DMS-100* FAMILY

All Products Computing-Module Loads

Provisioning Manual - Active Detail

Volume 2 of 3

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Volume Separator - Front Page

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Volume Separator - Front Page

Chapter 7

SERVICE CIRCUITS

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SERVICE CIRCUITS
Section Contents

1.0 ECM162 - TONE GENERATION CIRCUIT (TGC) NT3X68AB 7-1
1.1 Overview 7-1
1.2 Hardware Provisioning 7-1
1.2.1 Hardware Usage Restrictions 7-1
1.2.2 Hardware Dependencies 7-1
1.2.2.1 P and C Side Port Requirements 7-1
1.2.2.2 DMS BUS Port Requirements 7-1
1.2.2.3 Circuits Per Card 7-1
1.2.2.4 Discrimination Numbering 7-1
1.2.3 Provisioning Considerations 7-1
1.2.4 Office Layout Information 7-3
1.2.5 Traffic Tables 7-3
1.3 Product/System Specification 7-3
1.3.1 Physical Characteristics 7-3
1.3.2 EMI/Earthquake Information 7-3
1.3.3 Sparing Information 7-3
1.3.4 Power Feed and Fusing Requirements 7-3
1.3.5 Current Drain Information 7-3
1.4 Software Provisioning 7-4
1.4.1 Required Software Packages and Interdependencies 7-4
1.4.2 Software Usage Restrictions 7-4
1.4.3 Memory Provisioning 7-4
1.5 Real Time Impact 7-4

2.0 ECM320 - NT3X68AC Call Waiting Tone Circuit Pack 7-5
2.1 Overview 7-5
2.2 Hardware Provisioning 7-7
2.2.1 Hardware Usage Restrictions 7-7
2.2.2 Hardware Dependencies 7-7
2.2.2.1 P and C Side Port Requirements 7-7
2.2.2.2 DMS BUS Port Requirements 7-7
2.2.2.3 Circuits Per Card 7-7
2.2.2.4 Discrimination Numbering 7-7
2.2.3 Provisioning Considerations 7-8
2.2.4 Office Layout Information 7-13
2.2.5 Traffic Tables 7-13
2.3 Product/System Specification 7-13
2.3.1 Physical Characteristics 7-13
2.3.2 EMI/Earthquake Information 7-13
2.3.3 Sparing Information 7-13
2.3.4 Power Feed and Fusing Requirements 7-13
2.3.5 Current Drain Information 7-13
2.4 Software Provisioning 7-13
2.4.1 Required Software Packages and Interdependencies 7-14
2.4.2 Software Usage Restrictions 7-14
2.4.3 Memory Provisioning 7-14
2.5 Real Time Impact 7-14

3.0 ECM498 - Enhanced Coin Services (NTX089) 7-15

3.1 Overview 7-15
3.2 Hardware Provisioning 7-16
3.2.1 Hardware Usage Restrictions 7-16
3.2.2 Hardware Dependencies 7-17
3.2.2.1 P and C Side Port Requirements . . . 7-17
3.2.2.2 DMS BUS Port Requirements 7-17
3.2.2.3 Circuits Per Card 7-17
3.2.2.4 Discrimination Numbering 7-17
3.2.3 Provisioning Considerations 7-17
3.2.4 Office Layout Information 7-18
3.2.5 Traffic Tables 7-18
3.3 Product/System Specification 7-18
3.3.1 Physical Characteristics 7-18
3.3.2 EMI/Earthquake Information 7-18
3.3.3 Sparing Information 7-18
3.3.4 Power Feed and Fusing Requirements 7-18
3.3.5 Current Drain Information 7-18
3.4 Software Provisioning 7-18
3.4.1 Required Software Packages and Interdependencies 7-18
3.4.2 Software Usage Restrictions 7-18
3.4.3 Memory Provisioning 7-18
3.5 Real Time Impact 7-18

4.0 ECM531 - Enhanced DRAM (EDRAM) 7-19
4.1 Overview 7-19
4.1.1 Digital Recorded Announcement Module (DRAM) . 7-19
4.1.2 Enhanced Digital Recorded Announcement Machine 7-19
4.1.3 Enhanced Digital Recorded Announcement Module (EDRAM 4) 7-20
4.1.4 EDRAM 16 7-22
4.2 Hardware Provisioning 7-23
4.2.1 Hardware Usage Restrictions 7-23
4.2.2 Hardware Dependencies 7-23
4.2.2.1 P and C Side Port Requirements . . . 7-24
4.2.2.2 DMS BUS Port Requirements 7-24
4.2.2.3 Circuits Per Card 7-24
4.2.2.4 Discrimination Numbering 7-24
4.2.3 Provisioning Considerations 7-25
4.2.3.1 EDRAM Traffic Provisioning Example . 7-29
4.2.3.2 Standard Recorded Announcement . . . 7-31
4.2.3.3 Automatic Coin Toll Service (ACTS) . 7-33
4.2.3.4 Automated Calling Card Services (ACCS/MCCS/CCC) 7-34
4.2.3.5 Audiogram Delivery Service 7-35
4.2.3.6 Call Forward Remote Activation . . . 7-36
4.2.3.7 CLASS Phase I 7-37
4.2.3.8 CLASS Phase II List 1-12 7-38
4.2.3.9 CLASS Phase II List 13-31 7-39
4.2.3.10 CLASS Phase II CFN 7-40
4.2.3.11 Automatic Recall Date and Time . . . 7-41
4.2.3.12 Advanced Intelligent Network - SRC . 7-42
4.2.3.13 Automated Directory Assistance Service 7-43

4.2.3.14 TOPS Toll Branding 7-44
4.2.3.15 AOSS VR (CANADA ONLY) 7-45
4.2.3.16 Calling Number Announcement 7-46
4.2.3.17 Custom Announcement 7-47
4.2.3.18 Notification of Time and Charge (Japan Only) 7-48
4.2.3.19 100/102 Test Lines 7-49
4.2.3.20 Receiver-Off-Hook Tone Circuits . . 7-50
4.2.3.21 Deluxe Spontaneous Call Waiting Identification 7-51
4.2.3.22 Enhanced Busy Call Return 7-52
4.2.3.23 Enhanced Digital Recorded Announcements 7-53
4.2.4 Office Layout Information 7-55
4.2.5 Traffic Tables 7-55
4.2.5.1 DMS Traffic Tables 7-55
4.3 Product/System Specification 7-55
4.3.1 Physical Characteristics 7-55
4.3.1.1 Enhanced DRAM CP NT1X80AA or NT1X80BA 7-55
4.3.2 EMI/Earthquake Information 7-56
4.3.2.1 EMI/FCC 7-56
4.3.2.2 ESD 7-56
4.3.2.3 UL/CSA 7-56
4.3.3 Sparing Information 7-56
4.3.4 Power Feed and Fusing Requirements 7-56
4.3.5 Current Drain Information 7-56
4.4 Software Provisioning 7-56
4.4.1 Voice File Installation. 7-57
4.4.1.1 Disk Space Requirements. 7-57
4.4.2 Required Software Packages and Interdependencies 7-58
4.4.2.1 EDRAM Voice Files for BCS 34 7-58
4.4.2.2 EDRAM NON-CM Software Release 01 . . 7-59
4.4.2.3 SOFTWARE - JAPAN APPLICATIONS 7-59
4.4.2.4 SOFTWARE AND VOICE FILE DEPENDENCIES 7-59
4.4.2.5 DMSE SOFTWARE ORDERING 7-59
4.4.3 Software Usage Restrictions 7-61
4.4.4 Memory Provisioning 7-61
4.5 Real Time Impact 7-61

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1.0 ECM162 - TONE GENERATION CIRCUIT (TGC) NT3X68AB

1.1 Overview

This product provides ....

1.2 Hardware Provisioning

1.2.1 Hardware Usage Restrictions

Not applicable.

1.2.2 Hardware Dependencies

Not applicable.

1.2.2.1 P and C Side Port Requirements

Not applicable

1.2.2.2 DMS BUS Port Requirements

Not applicable

1.2.2.3 Circuits Per Card

Not applicable

1.2.2.4 Discrimination Numbering

Not applicable

1.2.3 Provisioning Considerations

When provisioning DTMF Senders for a DMS100 IBN/MDC office using the Outpulsing DTMF On A Line feature and/or the Attendant Console End-TO- End Signaling (ACEES) feature both of which are contained in S/W Pkg NTX101AA, then the following formula shall be used:

Definition on terms used in the formulas below:

Term	***DESCRIPTION***
ACEES-ABSBH-CCS	The sum of the traffic during the Average Busy Hour Busy Season in CCS from all Attendant Consoles equipped with the Attendant Console End-To-End Signaling (ACEES) feature

ACEES-AVG-HT The Average Holding Time of all calls orginating from all Attendant Consoles equipped with the ACEES feature in seconds.

TT Total Tie Trunks Traffic in CCS (TT) requiring Outpulsing DTMF on a Line

% OG ABSBH CCS The percentage of Total Tie Trunk traffic that is Outgoing (OG), during Average Busy Season Busy Hour (ABSBH), which require the outpulsing of DTMF.

TT-AVG-HT The Average Holding Time of the Total Tie Trunks

AVG-DTMFS-HT The Average Holding Time of the DTMF Senders (DTMFS)

DTMF Sender (DTMFS) Provisioning Formula:

$$DTMFS_{CCS} = \frac{TT(\%\ OG\ ABSBH\ CCS)100}{TT\text{-}AVG\text{-}HT} +$$

$$\frac{ACEES\ ABSBH\ CCS}{ACEES\text{-}AVG\text{-}HT} * AVG\text{-}DTMFS\text{-}HT$$

As indicated above, this formula produces the DTMF Sender (DTMFS) traffic requirements in CCS. The user must use the POISSON TRUNK TABLE in the 8620 Reference Manual or NTP-1001-450 TABLE 'V' to determine the number of DTMF Sender circuits required in accordance with the DTMFS CCS and the grade of service given by Telcos. The formula below diagrams the conversion from number of circuits to number of circuit packs.

$$\#DTMF\ CPs = \frac{\#CKTS(determined\ from\ the\ Table,\ using\ CCS\ from\ above}{4}$$

NOTE: One DTMF Sender (NT3X68AB) contains four (4) circuits.

If the number of senders for traffic figures exceed 25 circuits, then the number of circuits should be determined using the following formula:

#DTMF Senders =	DTMFS CCS
	AVG-DTMFS-HT

DTMF Outpulsing Via Other Means:

In the following situations DTMF or tones will be outpulsed straight from the respective peripheral modules.

For DMS-250 trunks on DCMs, DTCs or LTCs using DTMF outpulsing, do not supply the DTMF Sender CP, NT3X68AB.

For the other DMS applications, as of BCS-16 (or later) in case of digital trunks outpulsing DTMF on DTC or LTC, do not supply the DTMF Sender CP, NT3X68AB.

1.2.4 Office Layout Information

Not applicable.

1.2.5 Traffic Tables

Not applicable.

1.3 Product/System Specification

1.3.1 Physical Characteristics

Not applicable.

1.3.2 EMI/Earthquake Information

Not applicable.

1.3.3 Sparing Information

Not applicable.

1.3.4 Power Feed and Fusing Requirements

Not applicable.

1.3.5 Current Drain Information

Not applicable.

1.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

1.4.1 Required Software Packages and Interdependencies

Not applicable.

1.4.2 Software Usage Restrictions

Not applicable.

1.4.3 Memory Provisioning

Not applicable.

1.5 Real Time Impact

Not applicable.

2.0 ECM320 - NT3X68AC Call Waiting Tone Circuit Pack

2.1 Overview

The NT3X68AC Call Waiting Tone Generator circuit pack is used to provide 440Hz tone for the call waiting feature and several other features. The NT3X68AC circuit pack and feature software combine to provide distinctive tones for features which are grouped into ten functions as defined by fixed CLLI entries in the CLLI translation table. The ten functions and features associated with those functions are listed below. The abbreviations adjacent to each function listed below are the abbreviations used in the Special Tones (STN) table in translations. This table contains the NT3X68AC trunk circuit assignments for each function.

Call Waiting Tones CWT

Attendant Camp-on
Attendant Camp-on With Music
POTS Call Waiting
MDC Call Waiting Terminating
MDC Call Waiting Intragroup
Call Waiting Originating
Dial Call Waiting

Expensive Route Warning Tone ERWT

Expensive Route Warning Tone

Off Hook Queing OHQ

Off Hook Queing

Busy Verification Tone BVTONE

Busy Verification Station
Busy Verification Trunk
Trunk Busy Verification Tones

Executive Busy Override Tone EBOT

Business Set Busy Override
Executive Busy Override
Executive Busy Override On MADN
Directed Call Pick-up Barge-in

Distinctive Call Waiting Tones DISTCWT

Distinctive Call Waiting Tones

Distinctive Call Waiting Tones (CLASS) DRCWTONE

CLASS - Selective List Editing

Teen Service - Enhanced Call Waiting ENHCWT1

Teen Service - Enhanced Call Waiting ENHCWT2

Teen Service - Enhanced Call Waiting ENHCWT3

The functions defined by fixed CLLI and assigned in table STN have the following characteristics.

CWT

POTS = 300ms burst of 440hz tone, then another 300ms burst of tone 10 seconds later if the call waited party has not answered.

MDC = Same as POTS except for Customer Groups with Distinctive Call Waiting Tones. See DISTCWT.

ERWT

250ms of 440hz tone on, 250ms off, repeated three times.

OHQ

One second burst of 440hz tone.

BVTONE

Two second burst of 440hz tone followed by 15 seconds of silence followed by 500ms burst of 440hz tone. This cadence is repeated as long as the attendant is connected to the busy station.

EBOT

300ms burst of tone.

DISTCWT

For MDC customer groups assigned the option DISTCWTN, the stations in the group will be able to distinguish whether the waiting party is external to the customer group or internal to the customer group. For a call waiting that is external to the customer group, the station will be sent two bursts of tone. The length of the bursts and the silence between the two bursts is defined on a switch-wide basis by the office parameter DIST_CWT_TONE. For a call waiting that is internal to the group, the station will be sent a single burst of tone the length of which is defined by office parameter CWT_TONE_LENGTH.

DRCWTONE

For POTS lines with the CLASS feature, Selective List Editting, the same tones as defined in DISTCWT are used to distinguish calls waiting that a CLASS SLE subscriber has assigned to a list.

ENHCWT1

100ms of 440hz tone on, 100ms off, 100ms of 440hz tone on.

ENHCWT2

100ms of 440hz tone on, 100ms off, 100ms of 440hz tone on, 1 0ms off, 100ms of 440hz tone on.

ENHCWT3

100ms of 440hz tone on, 100ms off, 300ms of 440hz tone on, 1 0ms off, 100ms of 440hz tone on.

2.2 Hardware Provisioning

2.2.1 Hardware Usage Restrictions

The NT3X68AC Tone Circuit Generator circuit pack employs Time Switch Broadcasting to distribute tone simultaneously to multiple users. There is a maximum of one (1) NT3X68AC per MTM shelf. MTM shelves containing NT3X68AC should be on different Network Sub Groups.

2.2.2 Hardware Dependencies

Not applicable.

2.2.2.1 P and C Side Port Requirements

Not applicable.

2.2.2.2 DMS BUS Port Requirements

Not applicable

2.2.2.3 Circuits Per Card

Not applicable.

2.2.2.4 Discrimination Numbering

Not applicable.

2.2.3 Provisioning Considerations

Provisioning for NT3X68AC tone circuits

1. Time switch broadcasting is used to distribute tones to multiple users.

2. Each NT3X68AC Circuit Pack contains four circuits and requires two Maintenance Trunk Module(MTM) card slots.

3. It is recommended for redundancy purposes, a minimum of 8 circuits (2 CPs) should be provided for non-MDC offices, a minimum of 12 circuits (3 CPs) should be provided for MDC offices, and a mimimum of 4 circuits (1 CP) should be provided for each Teen Service Secondary Directory Number (SND).

4. Determine the Call Waiting Tone Generator Circuit requirements for POTS offices:

   a. Number of HDBH POTS calls terminating to a busy line equipped with the call waiting feature * ((.3 sec * 1.8)/100) = CCS. (This includes any calls to busy PDNs of lines equipped with the Teen Service feature.)

   b. Obtain the number of circuits required by using the CCS value in the Poisson Tables of NTP 297-1001-450

5. Determine the Call Waiting Tone Generator Circuit requirements for MDC offices:

   a. Number of HDBH Attendant Camp-On calls ?

   b. Number of HDBH Attendant Camp-On calls that will be recalled ?

   c. Number of lines with Dial Call Waiting (CWD) ?

   d. Number of lines with Call Waiting Originating (CWO) ?

   e. Number of MDC lines in the office ?

   f. Number of HDBH originating calls that reach a busy MDC line ?

   g. Number of HDBH terminating calls that reach a busy MDC line ?

   h. Number of MDC lines with Call Waiting Terminating ?

   i. Calculate the number of Call Waiting Tones circuits required for MDC Attendant Camp-On.

(5a + 5b) * ((.3 sec * 1.8)/100) = CCS

j. Obtain the number of circuits required by using the CCS value in the Poisson Tables of NTP 297-1001-450.

k. Determine the number of CWD and CWO HDBH calls.

((5d + (5c * .25)) * 5e) / 5f

(Round fractions up to the next integer)

l. Determine the Call Waiting Tone circuits required for CWD/CWO.

5k * ((.3 sec * 1.8)/100) = CCS

m. Obtain the number of circuits required by using the CCS value in Poisson Tables of NTP 297-1001-450

n. Determine the number of HDBH Call Waiting Terminating Calls.

(5g/5e) * 5h

(Round fractions up to the next integer)

o. Determine the number of Call Waiting Tone circuits required for Call Waiting Terminating.

5n * ((.3 sec * 1.8)/100) = CCS

p. Obtain the number of circuits required by using the CCS value in Poisson Tables of NTP 297-1001-450

q. Determine the total number of circuits required for MDC Call Waiting tones.

5j + 5m + 5p

6. Provisioning for ERWT

a. Number of calls requiring ERWT * (1.5 sec/100) = CCS.

| b. Obtain the number of circuits required by using the CCS value in the Poisson Tables of NTP 297-1001-450

7. Provisioning for OHQ

a. Number of calls requiring OHQT * (1 sec/100) = CCS.

b. Obtain the number of circuits required by using the CCS value in the Poisson Tables of NTP 297-1001-450

8. Provisioning for BVTONE

   a. Number of calls requiring BVTONE * (4 sec/100) = CCS.

   b. Obtain the number of circuits required by using the CCS value in the Poisson Tables of NTP 297-1001-450

9. Provisioning for EBOT

   a. Number of calls requiring EBOT * (.8 sec/100) = CCS.

   b. Obtain the number of circuits required by using the CCS value in the Poisson Tables of NTP 297-1001-450

10. Provisioning for DISTCWT

   a. Number of HDBH external calls to a busy station for an MDC customer group with the Distinctive Call Waiting feature * ((the total value of DIST_CWT_TONE in ms/1000)/100) * 1.8(round up) + Number of HDBH internal calls to a busy station for an MDC customer group with the Distinctive Call Waiting feature * ((the value of CWT_TONE_LENGTH in ms/1000)/100) * 1.8 (round up) = CCS

      DIST_CWT_TONE default = 350 ms

      CWT_TONE_LENGTH default = 300 ms

   b. Obtain the number of circuits required by using the CCS value in the Poisson Tables of NTP 297-1001-450

11. Provisioning for DRCWTONE

   a. Number of HDBH calls to busy lines on CLASS SLE screening lists * (.9 sec/100) * 1.8 = CCS

   b. Obtain the number of circuits required by using the CCS value in the Poisson Tables of NTP 297-1001-450

12. Provisioning for Teen Service; ENHCWT1, ENHCWT2, ENHCWT3

   a. The calculation for CWT on the Primary Directory Number (PDN) is included in the provisioning of item 4.

   b. Determine CWT circuit requirements for SDN1 lines. The tone for SDN1 is identified as ENHCWT1.

      1. Number of SDN1 Pots lines with Call Waiting feature?

      2. Total SDN1 lines ?

      3. Number of HDBH calls terminating to a SDN1 busy line?

4. Calculate the percentage of SDN1 lines (expressed as a decimal) with ENHCWT1 CWT in the office

   12b1/12b2

5. Determine the number of HDBH SDN1 calls waited.

   12b3 * 12b4

6. Determine the quantity of CWT circuits required for SDN1 lines.

   12b5 * ((.3sec * 1.8)/100) = CCS

7. Obtain the number of circuits required by using the CCS value in the Poisson Tables of NTP 297-1001-450

A minimum of one (1) CWT circuit is required for SDN1 ENHCWT1 lines.

c. Determine CWT circuit requirements for SDN2 lines. The tone for SDN2 is identified as ENHCWT2.

   1. Number of SDN2 Pots lines with Call Waiting feature?

   2. Total SDN2 lines ?

   3. Number of HDBH calls terminating to a SDN2 busy line?

   4. Calculate the percentage of SDN2 lines (expressed as a decimal) with ENHCWT2 CWT in the office

      12c1/12c2

   5. Determine the number of HDBH SDN2 calls waited.

      12c3 * 12c4

   6. Determine the quantity of CWT circuits required for SDN2 lines.

      12c5 * ((.3sec * 1.8)/100) = CCS

   7. Obtain the number of circuits required by using the CCS value in the Poisson Tables of NTP 297-1001-450

   A minimum of one (1) CWT circuit is required for SDN2 ENHCWT2 lines.

d. Determine CWT circuit requirements for SDN3 lines. The tone for SDN3 is identified as ENHCWT3.

1. Number of SDN3 Pots lines with Call Waiting feature?

2. Total SDN3 lines ?

3. Number of HDBH calls terminating to a SDN3 busy line?

4. Calculate the percentage of SDN3 lines (expressed as a decimal) with ENHCWT3 CWT in the office

   12d1/12d2

5. Determine the number of HDBH SDN3 calls waited.

   12d3 * 12d4

6. Determine the quantity of CWT circuits required for SDN3 lines.

   12d5 * ((.3sec * 1.8)/100) = CCS

7. Obtain the number of circuits required by using the CCS value in the Poisson Tables of NTP 297-1001-450

   A minimum of one (1) CWT circuit is required for SDN3 ENHCWT3 lines.

13. Determine the total Call Waiting Tone Generator circuit requirements.

    a. Total Call Waiting Tone Generator circuits required for POTS.

       4a

    b. Total Call Waiting Tone Generator circuits required for MDC.

       5r + 6b + 7b + 8b + 9b + 10b.

    c. Total Call Waiting Tone Generator circuits required for the CLASS feature.

       11b

    d. Total Call Waiting Tone Generator circuits required for the Teen Service feature.

       12b7 +12c7 + 12d7.

    e. Total Call Waiting Tone Generator circuits required.

       13a + 13b + 13c + 13d.

14. Determine the number of NT3X68AC circuit packs required.

    a. Total NT3X68AC circuits packs required.

| 13e/4 (Round up to the next multiple of 4) + 1. A minimum of 2 NT3X68AC circuit packs must be provided for a POTS office, a minimum of 4 NT3X68AC circuit packs must be provided for a MDC office and a minimum of 1 NT3X68AC circuit pack must be provided per SDN type for the Teen Service feature. This means a total of 3 NT3X68AC circuit packs is the minimum requirement for Teen Service.

2.2.4 Office Layout Information

Not applicable.

2.2.5 Traffic Tables

Not applicable.

2.3 Product/System Specification

2.3.1 Physical Characteristics

Not applicable.

2.3.2 EMI/Earthquake Information

Not applicable.

2.3.3 Sparing Information

| Provision spare NT3X68AC per standard sparing procedures.

2.3.4 Power Feed and Fusing Requirements

Not applicable.

2.3.5 Current Drain Information

Not applicable.

2.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

2.4.1 Required Software Packages and Interdependencies

Not applicable.

2.4.2 Software Usage Restrictions

Not applicable.

2.4.3 Memory Provisioning

Not applicable.

2.5 Real Time Impact

Not applicable.

3.0 ECM498 - Enhanced Coin Services (NTX089)

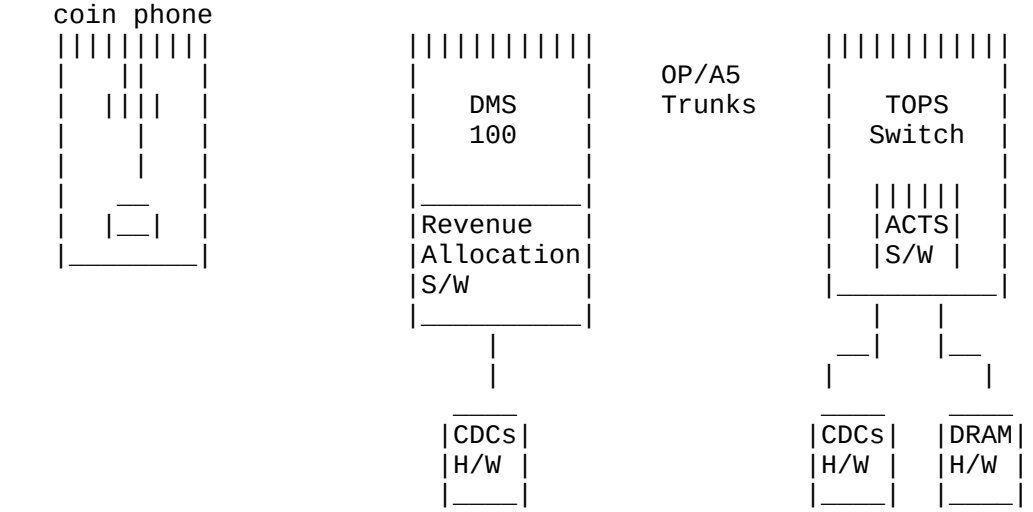
3.1 Overview

This feature provides per call records of the revenue collected on coin originated toll calls. The LAMA records required for this purpose, include information concerning the revenue col- lected on the call. This is reported as the number of five cent deposits collected on each call. Records also store the number of Operator Attached Intervals (OAI) during which the local switch- ing system was unable to monitor and record collected deposits because of circuit blockage or insufficient memory capacity. If tone detection errors are detected within a particular coin call, this information is also indicated within the LAMA record. Call code 136 has been assigned by Bellcore for these purposes.

Trunk groups that carry the ACTS compatable calls are identified through Table AMATKOPT. All coin calls going out over the trunks datafilled in this table with the REVALL option will have LAMA records generated if coins are collected during the call.

A separate pool of CDCs (Coin Detection Circuit) is required to determine the number of 5 cent deposits collected on each call. A CDC is connected in a one way speech path during each OAI. Upon com- pletion of the OAI, the CDCs report on the deposits detected. At termination of the call, a LAMA billing record is produced indi- cating the total amount collected.

A pictorial representation looks like this:



3.2 Hardware Provisioning

3.2.1 Hardware Usage Restrictions

Coin phones using this capability must be ACTS compatable. (ie. coin phones that generate dual frequency coin deposit tones)

The control signaling supported is 'Expanded Inband' and 'Multiwink'.

Trunk types supported, OP and A5.

The IC/INC Prefix in the LAMA record is derived from translations, Table STDPRT. The telco can have the LAMA records indicate a different carrier than the one dialed. (ie. If a 1 XXX1+ call is translated to AT&T even though the XXX is NOT AT&T, the LAMA record can indicate AT&T.) This is accom- plished by having a separate entry in Table STDPRT for coin lines and translating all 10XXX1+ calls to AT&T.

On any call in which the operator is envolved, such as 0- or 0+, some or all of the following information may NOT be available or may NOT be accurate in the LAMA record.

- Terminating NPA
- Terminating Number
- IC/INC Prefix

This information is not reported to the local office by the operator switch, so any changes to what was originally set up will never be known.

The OMs provided are three separate entities. What this means is that for one OAI, all the oms could be peged or just two of then. This is the case when a coin-collect or coin-return happens during an OAI. In all cases either an coin-collect or coin-return happens after an OAI.

CSP coin phones are not supported because trunks handeling these phones are datafilled with coin-control set to "NO".

3.2.2 Hardware Dependencies

This feature requires Coin Detection Circuits (CDC), NT3X08AA or AB.

3.2.2.1 P and C Side Port Requirements

Not applicable

3.2.2.2 DMS BUS Port Requirements

Not applicable

3.2.2.3 Circuits Per Card

Not applicable

3.2.2.4 Discrimination Numbering

Not applicable

3.2.3 Provisioning Considerations

Provision the NT3X08AA/AB circuits based on the following:

CCS = Total ABSBH toll coin attempts X average receiver holding time

Required trunk circuits = Look up CCS in the Trunk Capacity Table - CCS Per Hour (Poisson Table)

Number of NT3X08AA/AB circuits = Required trunk circuits/8 trunk circuit per card

NOTE: The standard default value for the receiver holding time is 38 seconds.

NOTE: Assignment rules for the NT3X08AA/AB are unaffected.

3.2.4 Office Layout Information

Not applicable.

3.2.5 Traffic Tables

3.3 Product/System Specification

3.3.1 Physical Characteristics

Not applicable.

3.3.2 EMI/Earthquake Information

Not applicable.

3.3.3 Sparing Information

Not applicable.

3.3.4 Power Feed and Fusing Requirements

Not applicable.

3.3.5 Current Drain Information

Not applicable.

3.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

3.4.1 Required Software Packages and Interdependencies

NTX089AA - Enhanced Coin Services

3.4.2 Software Usage Restrictions

None.

3.4.3 Memory Provisioning

None.

3.5 Real Time Impact

None.

4.0 ECM531 - Enhanced DRAM (EDRAM)

4.1 Overview

4.1.1 Digital Recorded Announcement Module (DRAM)

The Manufacturer Discontinued (MDd) DRA Module consists of the DRA shelf and circuit packs, and has been replaced by the single slot EDRAM CP. The DRA shelf is a modified version of the Maintenance Trunk Module (MTM). It must be equipped with the appropriate MTM controller circuit packs and power converter circuit packs to provide the basic MTM functions.

The announcement functions are provided by the provisionable DRA controller and announcement cards. Each DRA Module consists of a DRA controller card (NT1X75AA/BA/DA) and up to eight (8) single density or four double density provisionable announcement memory cards. Each single density memory card provides 30 seconds of announcement capacity; each double density memory card provides 6 seconds of announcement capacity.

- NT1X75BA - DRA controller card

- NT1X76XX - contains standard factory programmed announcements in non-alterable memories (EPROM). The announcements are identified by the "XX" PEC suffix and these announcements cannot be altered.

- NT1X77AA - provides storage for on-site customer recorded announcements in volatile memory (RAM).

- NT1X79AA - provides storage for on-site customer recorded announcements in non-volatile memory (EEPROM).

Each fully equipped DRA Module provides 30 announcement channels and 4 minutes of announcement time.

4.1.2 Enhanced Digital Recorded Announcement Machine

The Enhanced Digital Recorded Announcement Machine (EDRAM) or (EDRAM4) is a single slot circuit pack DMS peripheral module used for providing voice messages or instructions to the subscriber, thus reducing the need for an operator's assistance. Announcements are stored in digital format in memory using PCM coding so as to allow fast and random access of announcements, both in playback or recording stages.

The EDRAM card has replaced the existing Digital Recorded Announcement (DRA) Module for providing voice messages and recorded announcements in all DMS-100 Family switches.

The EDRAM provides the equivalent functions and capabilities of the replaced Digital Recorded Announcement (DRA) Module; i.e. exactly the same duration of announcement time as for the DRA (4.3 minutes) and 29 announcement channels for announcement playback/recording.

The EDRAM is a stand alone peripheral module (PM), having its own DS-30 link interface with the network (i.e. each EDRAM requires one (1) DS-30 network port appearance on the network). It can be plugged into one (1) of the thirteen (13) provisionable trunk card slots on the ISM shelf. The DS-30 cable for EDRAM is plugged directly into the backplane pins at the back of the shelf corresponding to the slot of the EDRAM. The ISM has a total of 18 service circuit slots.

Although the EDRAM can mount on existing DRA/MTM shelves, no new DRA/MTM shelves should be ordered. For new and existing offices, provision only ISM shelves to mount the EDRAM. ISM shelves, in turn, mount on Frames (FISM) or Cabinets (ISME) as required.

4.1.3 Enhanced Digital Recorded Announcement Module (EDRAM 4)

The single card slot EDRAM Module is equivalent to a fully equipped DRA Module, providing a large decrease in space requirements.

The EDRAM will provide a super-set of features that include or is equivalent to all existing features of the DRA shelf. The features can be categorized into the following areas:

- -Loader features
- -MTM features
- -DRA features

The loader will download the EDRAM application firmware load, and the specified announcement load from the DMS tape/disk to the EDRAM memory.

The loader will provide management of announcement files. Up to a maximum of any eight (8) single density announcement files or four (4) double density announcement files can be loaded to a specified EDRAM. Each announcement file corresponds to a version of NT1X76 card. Hence, announcements no longer need to be identified by the NT1X76 DRA EPROM PEC. The factory recorded announcements on the NT1X76 DRA EPROM cards are replaced with announcement files on DMS tape that can be downloaded to the EDRAM. This provides the flexibility of changing announcements at any time without retrofitting the DRA EPROM cards which contain factory programmed announcements.

The EDRAM will emulate the Maintenance Trunk Module (MTM) features required for DRA applications, which includes:

- -Loading and executing PM EXECs
- -Setting up speech connections needed for call processing
- -Performing PM sanity functions such as sending Who-Am-I, I-Am-Here messages to Central Control (CC)

-Network integrity and parity generation/checking
-Perform CC instructions through CC-PP primitives execution and handle command protocol violation checking
-PM load checksum tests.

The EDRAM will emulate all existing required DRA features, which includes:

-On site recording of announcements
-Playing announcements
-Configuration query
-Trunk level diagnostics.

NOTE: One EDRAM CP will provide the same functionality and capacity as one DRA shelf with NT1X76 PROM memory and NT1X77 RAM memory, but not the functionality of NT1X79 non volatile memory since the EDRAM memory is volatile. The functionality of NT1X79 non volatile memory will be provided by EDRAM in BCS-36 with the Feature No. AQ0984 - CC Support For EDRAM Uploading in software package NTXS72AA entitled CC Software Support For EDRAM Uploading. Until BCS-36, a manual action is required to restore Customer recorded annoucements lost due to MTM power converter failure.

In BCS-36, if the Customer orders optional software package NTXS72AA, then the Customer recorded announcements can be uploaded from the EDRAM card to the Disk Drive Unit (DDU); and, in the event that the Customer recorded announcements are lost from the EDRAM card due to MTM power converter failure, these Customer recorded announcements can be restored by downloading them from the DDU to the EDRAM card.

The EDRAM is a optimized DRA circuit pack. It introduces the concept of a single circuit pack Peripheral Module (PM) which has the dual appearance as a PM as well as a trunk. Although it is located on an ISM shelf, it is directly connected to the network through a DS-30 link. Hence, it will have two (2) Maintenance & Administration Position (MAP) appearances on the same hardware. It will appear as a PM, just like the ISM, since it is directly connected to the network, and it will also appear as a trunk, just like other provisionable trunk cards on the ISM, since it mounts on the ISM.

The EDRAM has its own pair of DS-30 links for connecting to both planes of the ENET, and communicates with the Message Switch (MS) directly via the message channel of this DS-30 link.

EDRAMs can be plugged into any one of thirteen (13) provisionable trunk slots (slots 5 - 17) of the ISM shelf and uses this shelf for the purposes of housing, logic power, and cable mounting. When all thirteen (13) slots are equipped with EDRAM cards, the maximum power dissipation limit of the ISM shelf is not exceeded.

The DS-30 cable for the EDRAM can be plugged directly into the pins at the back of the ISM backplane at the slot corresponding to the position of the EDRAM. The other end of the DS-30 cable is terminated at the Peripheral Speech Link (PSL) Panel mounted on the Speech Link Connecting (SLC) Frame or at the Enhanced Network (ENET) depending on office requirements.

EDRAMs can be slotted into existing DRAMs or MTMs, acting as a stand-alone card. The DRAM or MTM module must supply power and a DS-30 cable must be attached to link to the switch network.

4.1.4 EDRAM 16

The current EDRAM (EDRAM4) now has another version available. Coexisting with EDRAM4 will be the EDRAM16, which has all the same features and traffic capabilities but has a standardized 16 minute total playing time.

The EDRAM16 can contain a maximum of 32 single density voice files or 16 double density voice files. Referred to as a 16 minute EDRAM, it has the capability of 17.2 minutes compared to 4.3 minutes for the EDRAM4. As both EDRAM cards have 29 channels available for traffic, provisioning is the same for either card.

The EDRAM 16 will have a unique set of peripheral software. It is powered from both the shelf +5V and a separate -48V on-board power converter.

The first application for EDRAM16 will be in Japan for a Notification Time and Charge feature.

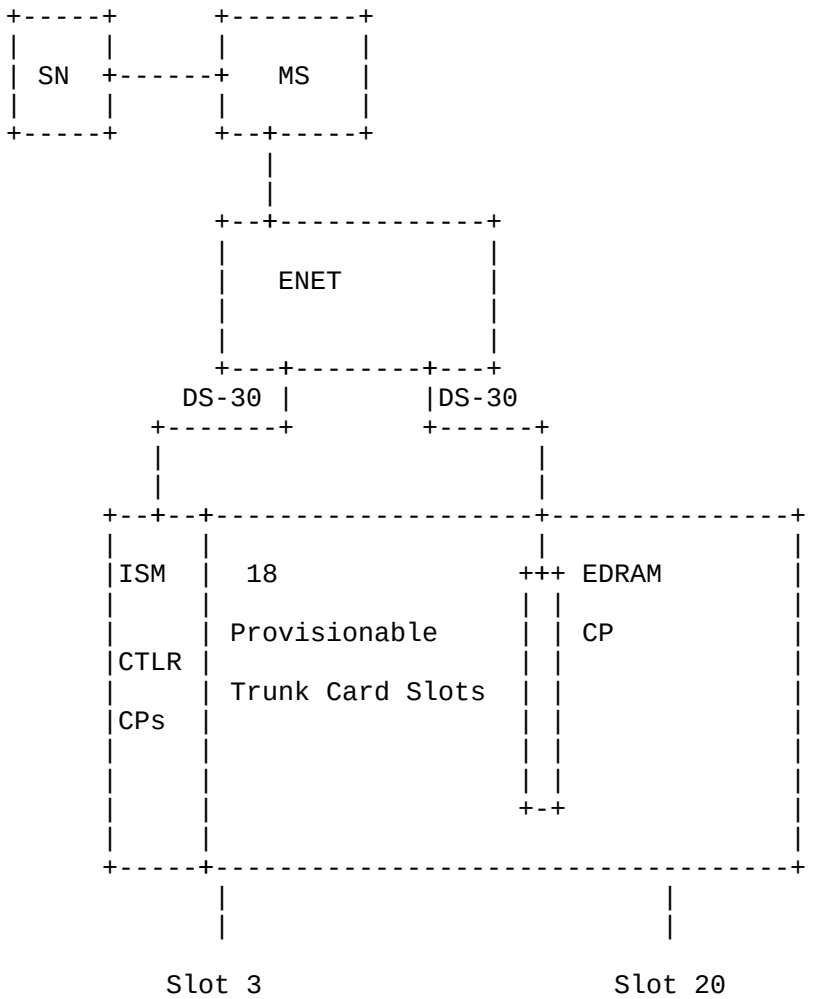


Figure 1. EDRAM System Configuration

4.2 Hardware Provisioning

4.2.1 Hardware Usage Restrictions

See “Product/System Specification” on page 7-55

4.2.2 Hardware Dependencies

For EDRAM applications, NT1X80AA cards must be provided, based on provisioning rules in section “Provisioning Considerations” on page 7-25

For Japan applications, NT1X80BA cards will be provided, based on provisioning rules in section “Provisioning Considerations” on page 7-25

4.2.2.1 P and C Side Port Requirements

The EDRAM4 and EDRAM16 have their own pair of DS-30 links for connecting to both planes of the Enhanced Network, and communicates with the Message Switch directly via the message channel of this DS-30 link.

Hence, the EDRAM has one (1) C-side port per plane terminating on the Enhanced Network (or Double Shelf Network Equipment).

4.2.2.2 DMS BUS Port Requirements

Not applicable

4.2.2.3 Circuits Per Card

The EDRAM4/EDRAM16 have 29 circuits per card.

4.2.2.4 Discrimination Numbering

Maximum Number of EDRAM Cards supported In A DMS Office, which can be either EDRAM4 and/or EDRAM16:

Software data table DRAMS has a maximum size of 512 tuples (to 511).

One (1) tuple in DRAMS is equivalent to one (1) virtual card credit (i.e. 512 tuples = 512 virtual card credits).

DRAMS is required to accommodate the virtual card credits of both the DRA Modules and the EDRAM Modules in a DMS office.

An existing Digital Recorded Announcement (DRA) Module/Shelf (NT2X58CB, NT2X58AM, NT2X58AK, (IMTM-DRA NT2X58AU)) can accommodate a maximum of 8 virtual card credits.

The EDRAM4 Modules are equivalent to a fully equipped DRA Module (i.e. one EDRAM Module = one DRA Module).

Hence, one EDRAM4 Card can accommodate a maximum of 8 virtual card credits.

One EDRAM16 card can accommodate a maximum of 32 virtual card credits.

Therefore, a DMS office can support a maximum of 64 (i.e. 512/8 = 64) DRA Modules OR 64 EDRAM4 Modules OR 16 EDRAM16 modules or a combination of the above which will not exceed the maximum of 512;

(DRAMs x 8) + (EDRAM4 x 8) + (EDRAM16 x 32) <= 512.

4.2.3 Provisioning Considerations

The EDRAM will be provisioned using the same provisioning rules as for the existing DRA Module as given in the Engineering Manual and PLN 8991-100 entitled DMS-100 Family Provisioning.

The EDRAM4 Module provides 29 announcement channels and 4.3 minutes of announcement time for announcement playback/recording.

The EDRAM16 Module provides 29 announcement channels and 17.2 minutes of announcement time for announcement playback/recording.

For each DMS office, provision the number of EDRAMs to accommodate the required announcements. For further information, refer to -- Heading id 'CROS531' unknown --

As a Customer requested option, each EDRAM may be duplicated or have a N + 1 spares for reliability. Redundancy is more important for toll offices where it is necessary to get the message sent to the subscriber.

The EDRAM card is to be inserted into one (1) of the thirteen (13) provisionable trunk card slots of the ISM shelf. When all thirteen slots are equipped with EDRAM cards, the maximum power dissipation limit of the ISM shelf is not exceeded. It derives +5V power from the shelf power converter, but otherwise, it is independent of the ISM shelf.

Although the EDRAM can mount on existing DRA/MTM shelves, no new DRA/MTM shelves should be ordered. For new and existing offices, provision only ISM shelves to mount the EDRAM.

As a general rule, EDRAM cards should be spread out on as many ISM/MTM/IMTM/DRA/IDRA shelves as possible, so that a power converter failure on a single ISM/MTM/IMTM/DRA/IDRA would result in as little disruption as possible.

Each EDRAM requires one (1) DS-30 network port appearance on each plane of the network. Each DS-30 network port (link) has 32 channels; 29 voice channels, channel 0 as the message channel, and channels 30 and 31 are not used.

The EDRAM has its own pair of DS-30 links for connecting to both planes of the Enhanced Network (ENET), and communicates with the SuperNode Core directly via the Message Switch (MS) on the message channel of this DS-30 link.

The DS-30 cable for the EDRAM can be plugged directly into the pins at the back of the ISM (or the older DRA/MTM) backplane at the slot corresponding to the position of the EDRAM. The other end of the

DS-30 cable is terminated at the Peripheral Speech Link (PSL) Panel mounted on the Speech Link Connecting (SLC) Frame for the older JNETS. DS-30 network connections to the ENET may be via a SLC or directly to the ENET based on the size and fiberization of the office.

Maximum Announcement Members per DRAM/EDRAM

Generally, a DRAM/EDRAM can access up to 29 speech channels. Because each channel is dedicated to a specific announcement member, this limits the number of announcement members in a DRAM/EDRAM to 29 maximum per DRAM/EDRAM.

Maximum Connections

The number of simultaneous connections that can be made to an announcement channel, is specified by table datafill. The maximum number of connections may be set to any number in the range 1 to 255. Each announcement has its own maximum number of connections specification parameter, however, only those announcement types labelled as Standard (STND) in translations may use time switch broadcasting.

The maximum connections setting for each broadcast announcement must be set to the minimum needed to provide the required grade of service, i.e. the minimum number of connections required to provide the required GOS (Grade Of Service) for the expected broadcast announcement traffic in the HDBH (High Day Busy Hour).

Office Parameter Limitations

The maximum number of simultaneous connections totalled for all announcements shall not exceed 80% of the number of CPWAKUPS defined in the Engineered Office Parameter (OFCENG) table. The recommended setting for the number of CPWAKUPS is 1000 and the default setting is 8 . Refer to NTP 297-1001-455,Office Parameters Reference Manual, Engineered Office Parameter Table OFCENG (Forms 237A, etc.) for details.

Broadcast Announcements

Unless an announcement is unique to a subscriber a single announcement member may be broadcast, by the Switch Network, to more than one subscriber for the purpose of economizing in DRAM/EDRAM provisioning.

For each member of an announcement, table parameters define the maximum number of broadcast connections, in the range 1 to 255, which can be made. Announcement broadcasts, are made by placing copies of the announcement in the Switch Network memory in locations assigned to inward timeslots used for connecting the announcement to subscribers. The timeslots are dynamically allocated across all 64 ports of a Switch Network Group. This means that any channel on any port has access to any timeslot. As many as 255 timeslots could be required for a single broadcast announcement. Therefore a single DRAM channel could consume the timeslot memory capacity equivalent of approximately 8 Switch Network ports. Refer to the section "Maximum Broadcast Connections" above.

To meet the required grade of service, for all features using broadcast DRAM announcements, provision must be made for sufficient switch network timeslot memory to be available for the estimated number of broadcast connections required, in addition to the timeslots required for non-broadcast connections. Non-broadcast connections include connections to Switch Network ports serving peripherals other than DRAM/EDRAMSs.

The technique of network port deloading for JNETS, is used avoid contention for timeslots and to ensure compliance with the required grade of service. Deloading is achieved by leaving one or more Switch Network Module ports unused.

To ensure effective provisioning of ports the specification of the maximum number of connections for a particular announcement is

based on estimates of the corresponding feature's switch usage penetration and expected feature activation.

The demand for a particular announcement to be played to more than one subscriber simultaneously may be met either by having multiple members of the announcement each for connection to one subscriber at a time or by broadcasting one member to multiple subscribers. The choice of either of these alternatives depends upon sizing and traffic considerations for each DRAM/EDRAM application.

Some features use announcements which are assembled at the time of the call according to individal call conditions, for example, announcements containing annunciations of the number dialled by the caller. Such announcements cannot be broadcast and are prohibited from being broadcast by software table data.

DRAM/EDRAM to Network Sub Group (NSG) Interface Limitation

For traffic considerations, the number of DRAM/EDRAMs which may be connected to a single Network Sub Group is limited to one (1). This applies to Junctored Networks (JNETs) only as the ENET is a non- blocking network.

Announcements Using Shared Speech Fragments

Additional economies in speech memory usage can be gained by specifying a speech fragment for use in more than one announcement.

Announcements Using Variable Speech Fragments

Some DRAM application features use variable speech fragments. For example, in announcements which enunciate (voiceback) the number dialled by the caller, as in "The number you have reached NNN NNN is.....". In this example, the variable fragments represent the enunciated directory number. The speech fragment used for the variable parts of an announcement is one of a set of enunciations covering the full range of possible variable selections. For example, the set may contain representations of number enunciations from 0 to 9 with intonation variations of each number.

The memory space required for such variable phrases is the sum of times taken to enunciate all possible phrase alternatives.

4.2.3.1 EDRAM Traffic Provisioning Example

Following is an example of traffic provisiong for an EDRAM with valid numbers for an office. Also included are notes which are designed to give further insight of how the numbers are generated.

1. Call attempts for this feature to the announcement. (HDBH) _ 10,000 _
   (Both call attempts and holding time should be Customer input quantities)

2. Holding Time /100 _ 40/100 = .4
   (Some features will have a default holding time, HT should be equal to the playing time of the announcement to the customer, plus any other reserved channel time)

3. Cycle Time Multiplier _ 1.8 __
   (In translations, the maxcyc defines the number of times the announcement can be cycled: ie: 1, 2, 3 etc., a decimal average factor could be used.).

4. Feature penetration in percentage. _ .6 ___
   (Use whole number)
   (60% was picked)

5. CCS of announcements (HDBH) _ 4320 _
   Q1 x Q2 x Q3 x Q4

6. Number of channels based on traffic _ 139 _
   (Reference ECM 590 Table 5 - Service Circuits. Read down the p.05 column until the number is equal to or higher than 4320. This number is 4327 therefore read left to the number of servers channels) is 139.

7. Number of EDRAs based on traffic _ 4.7 -> 5 _
   Q6 / 29
   (139/29 = 4.7) This can be 5 EDRAs with 8 channels available for another application IF there is sufficient storage capacity for another announcement that needs 8 channels or less.

| STANDARD ANNOUNCEMENTS

| The following file engineers the standard announcement set. The
| standard announcements are the only ones which can use Time Switch
| Broadcasting, and are defined in translations as type STND.

| ENGINEERING LIMITATIONS

| In engineering an office, NSG Interface Limitations, Maximum
| Connections, and Office Parameter Limitations should be strictly
| adhered to, as well as the following:

| For JNET offices, there should be a deloading of ports on a one-
| to-one basis for a EDRAM (or DRAM) connected to a NSG. Thus one
| speech link port (DS-30) consisting of 30 channels should remain
| spare (open) on the same NSG as the port for the EDRAM.

4.2.3.2 Standard Recorded Announcement

Standard announcements are the base set for a DMS 100F office. The voice data file contains the nine standard announcements.

1. Number of lines in office. _____

2. Calling rate per line to announcement. _____

3. Number of calls to EDRA. _____
   Q1 x Q2

4. Holding Time in sec./100 _____

5. Cycle Time Multiplier _____

6. CCS of announcements (HDBH) _____
   Q3 x Q4 x Q5

7. Number of channels based on traffic
   (Reference DMS Traffic Tables section) _____

8. Number of Time Switch Broadcasting _____
   connections to be used for these
   announcements.
   Reference the subsection on Maximum
   connections under Provisioning
   Considerations.
   Range is 1 to 255, often used
   default is 30.

9. Number of traffic required channels _____
   Q7 / Q8

10. Number of EDRAs based on traffic _____
    Q9 / 29

NAMED FEATURE ANNOUNCEMENTS

The following file details the named feature announcement set. Feature announcements are in translations by a feature name which can be an arbitrary name set for the feature.

ENGINEERING LIMITATIONS

In engineering an office, NSG Interface Limitations, Maximum Connections, and Office Parameter Limitations should be strictly adhered to, as well as the following;

For JNET offices, there should be a deloading of ports on a one-to-one basis for a EDRAM (or DRAM) connected to a NSG. Thus one speech link port (DS-30) consisting of 30 channels should remain spare (open) on the same NSG as the port for the EDRAM.

4.2.3.3 Automatic Coin Toll Service (ACTS)

ACTS is a feature that permits the automated processing of all portions of paid coin tolls.

ACTS DRA PROVISIONING

1. Number of coin lines in office. _____

2. Calling rate per line _____

3. Number of calls _____
   Q1 x Q2

4. Holding Time /100 _____
   (Default HT = 38 sec.)

5. Cycle Time Multiplier _____

6. CCS of announcements (HDBH) _____
   Q3 x Q4 x Q5

7. Number of channels based on traffic
   (Reference DMS Traffic Tables section) _____

7. Number of EDRAs based on traffic _____
   Q6 / 29

4.2.3.4 Automated Calling Card Services (ACCS/MCCS/CCC)

ACCS is a feature set introduced to reduce operator involvement in credit card type calls and to reduce the fradulent use of telephone calling cards.

ACCS replaces the operator's involvement by using digitally recorded announcements to instruct the customer to dial the card number, by using digitone receivers to receive this number and by exchanging Direct Signalling messages over the CCIS/CCS7 network with a Billing Validation Center to validate the card number.

Mechanized Calling Card Service was available for offices in the US utilizing CCIS (No. 6), CCC utilizes CCS7 signalling and is used in Canadian offices. ACCS is used in US offices and also utilizes CCS7 signalling.

. Total HDBH attempts for all 0+, 01+, ANI traffic determined by OST to be ACCS capable. _____

. Percentage of non-operator handled ACCS calls. _____

. Percentage of operator handled calls. _____

NOTE: Sum of Items 2 and 3 should be 1.0

4. Added Operator holding time. _____
Q3 x 6 seconds

5. ACCS EDRA holding time. _____
Q2 x 19 seconds

6. Cycle Time Multiplier _____

7. Weighted Average Holding Time of ACCS announcement machine _____
Q4 + (Q5 x Q6)

8. ACCS announcement machine traffic usage in CCS. Q1 x Q6 / 100 _____

9. Number of ACCS announcement channels required.
(Reference DMS Traffic Tables section) _____

0. Number of EDRAs based on traffic _____
Q9 / 29

4.2.3.5 Audiogram Delivery Service

Audiogram Delivery Service is a feature that provides the caller with the option to invoke message delivery when the called party is busy or does not answer within an office defined interval. The service is offered only to the subscribed end-users and is requested directly from the End Office where the call originated. ADS was originally called Special Delivery Service (SDS).

1. Call attempts for ADS feature to announcement. (HDBH) _____

2. Holding Time /100 (Default HT = 11 sec.) _____

3. Cycle Time Multiplier _____

4. Feature penetration in percentage. (Use whole number) _____

5. CCS of announcements (HDBH) Q1 x Q2 x Q3 x Q4 _____

6. Number of channels based on traffic (Reference DMS Traffic Tables section) _____

7. Number of EDRAs based on traffic Q5 / 29 _____

4.2.3.6 Call Forward Remote Activation

Call Forward Remote Activation is part of the master Residential Enhanced Services software. CFRA is therefore part of the CLASS features for an office.

The CALL FORWARD REMOTE ACTIVATION (CFRA) package allows an MDC or RES subscriber with Call Forward Intragroup (CFI), Call Forwarding Universal (CFU) or Call Forwarding Fixed (CFF) to activate or deactivate these features from a digitone line other than their own. This functionality is applied on a per line basis.

1. Call attempts for CRFA feature to announcement. (HDBH) _____

2. Holding Time /100 (Default HT = 15 sec.) _____

3. Cycle Time Multiplier _____

4. CCS of announcements (HDBH) Q1 x Q2 x Q3 _____

5. Number of channels based on traffic (Reference DMS Traffic Tables section) _____

6. Number of EDRAs based on traffic Q5 / 29 _____

4.2.3.7 CLASS Phase I

Custom Local Area Signalling Services or CLASS Features are a set of line-oriented features which the telephone company can deploy in their residential or Centrex customer environment.

Phase I features include Automatic Callback, Automatic Recall, Calling Number Display, Calling Number Delivery Blocking and Customer Originated Trace.

CLASS features are labelled Call Management Services (CMS) in Canada.

1. Call attempts to CLASS Phase 1 announcements. (HDBH) _____

2. Holding Time /100 _____

3. Cycle Time Multiplier _____

4. CCS of announcements (HDBH) _____
   Q1 x Q2 x Q3

5. Number of channels based on traffic (Reference DMS Traffic Tables section) _____

6. Number of EDRAs based on traffic _____
   Q5 / 29

4.2.3.8 CLASS Phase II List 1-12

Custom Local Area Signalling Services or CLASS Features are a set of line-oriented features which the telephone company can deploy in their residential or Centrex customer environment.

Phase II features include Distinctive Ringing and Call Waiting, Selective Call Forwarding and Selective Call Rejection.

1. Call attempts for CRFA feature to announcement. (HDBH) _____

2. Holding Time /100 _____

3. Cycle Time Multiplier _____

4. CCS of announcements (HDBH) _____
   Q1 x Q2 x Q3

5. Number of channels based on traffic (Reference DMS Traffic Tables section) _____

6. Number of EDRAs based on traffic _____
   Q5 / 29

4.2.3.9 CLASS Phase II List 13-31

Custom Local Area Signalling Services or CLASS Features are a set of line-oriented features which the telephone company can deploy in their residential or Centrex customer environment.

1. Call attempts for CRFA feature to announcement. (HDBH) _____

2. Holding Time /100 _____

3. Cycle Time Multiplier _____

4. CCS of announcements (HDBH) _____
   Q1 x Q2 x Q3

5. Number of channels based on traffic (Reference DMS Traffic Tables section) _____

6. Number of EDRAs based on traffic _____
   Q5 / 29

4.2.3.10 CLASS Phase II CFN

CLASS Phase II Customer Functional Names (CFN) are required if either of the Phase 2 CLASS announcements (List 1-12 or List 13-31) are required.

| 1. Check for provisioning of either of the Phase 2 Class announcements, List 1-12 or List 13-31. _____

| 2. Number of EDRAs for CFN announcements. If either of the other sets of announcements is provided, provide the CFN announcements. _____

4.2.3.11 Automatic Recall Date and Time

Automatic Recall Date and Time Feature (ARDT) provides the date and time voiceback capability for the Automatic Recall (AR) two-level activation sequence.

ARDT is considered part of the CLASS features for an office.

1. Call attempts for ARDT feature to announcement. (HDBH) _____

2. Holding Time /100 _____

3. Cycle Time Multiplier _____

4. CCS of announcements (HDBH) _____
   Q1 x Q2 x Q3

5. Number of channels based on traffic (Reference DMS Traffic Tables section) _____

6. Number of EDRAs based on traffic _____
   Q5 / 29

4.2.3.12 Advanced Intelligent Network - SRC

AIN Send to Resource Conversation responses require the use of designated announcements. These announcements, are provisioned per the following traffic rules.

1. Call attempts for SRC feature to announcement. (HDBH) _____

2. Holding Time /100 _____

3. Cycle Time Multiplier _____

4. CCS of announcements (HDBH) _____
   Q1 x Q2 x Q3

5. Number of channels based on traffic (Reference DMS Traffic Tables section) _____

6. Number of EDRAs based on traffic _____
   Q5 / 29

Note that the EDRA provisioned by this section is equal to the number of DTRs required for this feature. Reference AIN Rel. 0.1 in ECM 551.

4.2.3.13 Automated Directory Assistance Service

ADAS provides for automation of the first segment of a Directory Assistance call in which the location and listing name of the desired directory number is determined. Announcements for ADAS are provisioned per the following traffic rules.

1. Call attempts for ADAS feature to announcement. (HDBH) _____

2. Holding Time /100 _____

3. Cycle Time Multiplier _____

4. CCS of announcements (HDBH) _____
   Q1 x Q2 x Q3

5. Number of channels based on traffic (Reference DMS Traffic Tables section) _____

6. Number of EDRAs based on traffic _____
   Q5 / 29

4.2.3.14 TOPS Toll Branding

The optional TOPS DA/Toll Branding feature permits a multitude of different branding announcements to be played to a Customer. Each different announcement is recorded to match the end customer's choice for carrier.

1. Call attempts for Toll Branding feature to announcement. (HDBH) _____

2. Holding Time /100 _____

3. Cycle Time Multiplier _____

4. CCS of announcements (HDBH) _____
   Q1 x Q2 x Q3

5. Number of channels based on traffic (Reference DMS Traffic Tables section) _____

6. Number of EDRAs based on traffic _____
   Q5 / 29

4.2.3.15 AOSS VR (CANADA ONLY)

Auxiliary Operator Services System (AOSS) is a system that handles subscriber calls for Directory Assistance (DA) service and calls to directory numbers that require operator interception INT). AOSS also has the capability to handle operator calls for Rate and Route information.

1. Call attempts for AOSS VR feature to announcement. (HDBH) _____

2. Holding Time /100 _____

3. Cycle Time Multiplier _____

4. CCS of announcements (HDBH) _____
   Q1 x Q2 x Q3

5. Number of channels based on traffic (Reference DMS Traffic Tables section) _____

6. Number of EDRAs based on traffic _____
   Q5 / 29

4.2.3.16 Calling Number Announcement

The Calling Number Announcement (CNA) feature, NTX196AA, provides the ability to automatically verify service orders and line transfer cross-connections, or identify pairs in the event of a cable cut.

The maintenance person, using the subscriber pair in question, dials a special number, and the CNA feature, in conjunction with a DRAM, automatically announces the telephone number associated with the pair being used.

1. Call attempts by maintenance personnel to CNA announcement. (HDBH) _____

2. Holding Time /100 _____

3. Cycle Time Multiplier _____

4. CCS of announcements (HDBH) _____
   Q1 x Q2 x Q3

5. Number of channels based on traffic (Reference DMS Traffic Tables section) _____

6. Number of EDRAs based on traffic _____
   Q5 / 29

4.2.3.17 Custom Announcement

In a DMS100F office, the Customer may want to add custom announcements for uses within the Telco or for their end user Customers. These could be general announcements inside the office or those for a business such as a theatre or mail order distributor.

These custom announcements may be linked with a Business console to provide music on hold/delay. Reference the ECM on ACD Music On Hold/Delay for the hardware and software required.

1. Call attempts to custom announcement. (HDBH) _____

2. Holding Time /100 _____

3. Cycle Time Multiplier _____

4. CCS of announcements (HDBH) _____
   Q1 x Q2 x Q3

5. Number of channels based on traffic (Reference DMS Traffic Tables section) _____

6. Number of EDRAs based on traffic _____
   Q5 / 29

4.2.3.18 Notification of Time and Charge (Japan Only)

Notification of Time and Charge (NTC) service provides the subscriber an ability to receive an automatic notification of time and charge callback from the central office switch after the original call is disconnected successfully.

This feature is available to Japan only at this time.

1. Call attempts to NTC announcement. (HDBH) _____

2. Holding Time /100 _____

3. Cycle Time Multiplier _____

4. CCS of announcements (HDBH) _____
   Q1 x Q2 x Q3

5. Number of channels based on traffic (Reference DMS Traffic Tables section) _____

6. Number of EDRAs based on traffic _____
   Q5 / 29

4.2.3.19 100/102 Test Lines

This EDRAM card and tone file replaces the NT1X00AA/AB test cards. The combination of the voice file and card provides 1004 Hz. milliwatt or quiet termination for use in maintenance operations in a DMS100F office.

While four (4) channels is the recommended number for a DMS-100F small to low medium office, another number may be chosen to add more channels as required.

A Customer preference is to be able to order the 100/102 Test Line channels and the ROH channels together as a single EDRAM set. If provisioning for this, these two files may coexist on a single or multiple EDRAM(s).

Best engineering practice will also provide a full redundant quantity equal to the engineered set so that a failure in the office would not prevent test line tones and ROH tone from being switched to lines and trunks.

1. Provide 4 channels for 100/102 applications. _____

2. Number of EDRAs required. _____
   Q1 / 29

4.2.3.20 Receiver-Off-Hook Tone Circuits

| This EDRAM card and tone file replaces the NT1X00AC/AD test cards. The combination file and card provides ROH tone (permanent signal) to subscriber lines.

| A Customer preference is to be able to order the 100/102 Test Line channels and the ROH channels together as a single EDRAM set. If provisioning for this, these two files may coexist on a single or multiple EDRAM(s).

| Best engineering practice will also provide a full redundant quantity equal to the engineered set so that a failure in the office would not prevent test line tones and ROH tone from being switched to lines and trunks.

1. Call attempts to ROH tone. _____
   (If not available, use 1% of total originating calls)
   (HDBH)

2. Holding Time /100 _____
   (If not available, use 60 seconds as holding time)

3. Cycle Time Multiplier _____

4. CCS of announcements (HDBH) _____
   Q1 x Q2 x Q3

5. Number of channels based on traffic
   (Reference DMS Traffic Tables section) _____

6. Number of EDRAs based on traffic _____
   Q5 / 29

4.2.3.21 Deluxe Spontaneous Call Waiting Identification

When Deluxe Spontaneous Call Waiting Identification (DSCWID) is assigned to a line, incoming calls to that line, while idle, will receive normal terminating treatment. When the line is busy, the calling party is provided audible ringing, while the DSCWID subscriber is alerted that a call is waiting.

On being alerted of a second call, the subscriber then can choose one of several options for treating the incoming call.

For this feature, the Telco can add different phrases to a EDRAM so that the Customer (either calling or called) is prompted as to the sequence of possible treatments for the call.

1. Call attempts for DSCWID feature to DSCWID announcement. (HDBH) _____

2. Holding Time /100 _____

3. Cycle Time Multiplier _____

4. CCS of announcements (HDBH) _____
   Q1 x Q2 x Q3

5. Number of channels based on traffic (Reference DMS Traffic Tables section) _____

6. Number of EDRAs based on traffic _____
   Q5 / 29

4.2.3.22 Enhanced Busy Call Return

This software introduces Automatic Call Back (ACB) as an additional optional service offering on busy calls. When a busy condition is detected, the calling party receives the option of activating ACB, messaging, both, or neither. The service provider selects which services are offered after screening.

CAUTION: Read the DMSE Software Ordering section before installing EBCR in an office.

1. Call attempts for EBCR feature to EBCR announcement. (HDBH) _____

2. Holding Time /100 _____

3. Cycle Time Multiplier _____

4. CCS of announcements (HDBH) _____
   Q1 x Q2 x Q3

5. Number of channels based on traffic (Reference DMS Traffic Tables section) _____

6. Number of EDRAs based on traffic _____
   Q5 / 29

4.2.3.23 Enhanced Digital Recorded Announcements

The following is a summary of all the different EDRA provisioned in the individual sections. Also provided is the N+1 or Full redundancy method calculations for an office. Normally a selection based on software features required will determine which of these EDRA are added to an office. If the individual section is not required a zero quantity for that feature can be entered. The quantity of ISMs for an office is not calculated, based on spreading algorithms and the fact that multiple test, interface and trunk cards can all reside on the ISM.

Reference the ISM document and/or both tables on Trunk Module Provisionable cards to determine the actual number of ISMs required for an specific office.

1. Summation of EDRA required for this office. _____

" Standard Recorded Announcement" on page 7-31 Q10 +
" Automatic Coin Toll Service (ACTS)" on page 7-33 Q8 +
" Automated Calling Card Services (ACCS/MCCS/CCC)" on page 7-34 Q10 +
" Audiogram Delivery Service" on page 7-35 Q7 +
" Call Forward Remote Activation" on page 7-36 Q6 +
" CLASS Phase I" on page 7-37 Q6 +
" CLASS Phase II List 1-12" on page 7-38 Q6 +
" CLASS Phase II List 13-31" on page 7-39 Q6 +
" CLASS Phase II CFN" on page 7-40 Q2 +
"Automatic Recall Date and Time" on page 7-41 Q5 +
"Advanced Intelligent Network - SRC" on page 7-42 Q6 +
"Automated Directory Assistance Service" on page 7-43 Q6 +
"TOPS Toll Branding" on page 7-44 Q6 +
"AOSS VR (CANADA ONLY)" on page 7-45 Q6 +
"Calling Number Announcement" on page 7-46 Q6 +
"Custom Announcement" on page 7-47 Q6 +
"Notification of Time and Charge (Japan Only)" on page 7-48 Q6 +
"100/102 Test Lines" on page 7-49 Q2 +
"Receiver-Off-Hook Tone Circuits" on page 7-50 Q6 +
"Deluxe Spontaneous Call Waiting Identification" on page 7-51 Q6 +
"Enhanced Busy Call Return" on page 7-52 Q6 =

2. Standard or redundant configuration of EDRAs.
Answer 2.1 OR 2.2 OR 2.3

2.1 No redundancy required for EDRAs _____
Enter Q1

2.2 N + 1 redundancy required for EDRAs _____

(“ Standard Recorded Announcement” on page 7-31 Q6 +1) +
(“ Automatic Coin Toll Service (ACTS)” on page 7-33 Q6 +1) +
(“ Automated Calling Card Services (ACCS/MCCS/CCC)” on page 7-34 Q6 +1) +
(“ Audiogram Delivery Service” on page 7-35 Q6 +1) +
(“ Call Forward Remote Activation” on page 7-36 Q6 +1) +
(“ CLASS Phase I” on page 7-37 Q6 +1) +
(“ CLASS Phase II List 1-12” on page 7-38 Q6 +1) +
(“ CLASS Phase II List 13-31” on page 7-39 Q6 +1) +
(“ CLASS Phase II CFN” on page 7-40 Q6 +1) +
(“Automatic Recall Date and Time” on page 7-41 Q5 +1) +
(“Advanced Intelligent Network - SRC” on page 7-42 Q6 +1) +
(“Automated Directory Assistance Service” on page 7-43 Q6 +1) +
(“TOPS Toll Branding” on page 7-44 Q6 +1) +
(“AOSS VR (CANADA ONLY)” on page 7-45 Q6 +1) +
(“Calling Number Announcement” on page 7-46 Q6 +1) +
(“Custom Announcement” on page 7-47 Q6 +1) +
(“Notification of Time and Charge (Japan Only)” on page 7-48 Q6 +1) +
(“100/102 Test Lines” on page 7-49 Q6 +1) +
(“Receiver-Off-Hook Tone Circuits” on page 7-50 Q6 +1) +
(“Deluxe Spontaneous Call Waiting Identification” on page 7-51 Q6 +1) +
(“Enhanced Busy Call Return” on page 7-52 Q6 +1) =

2.3 Full redundancy required for EDRAs _____
(Q1 x 2)

4.2.4 Office Layout Information

Not applicable.

4.2.5 Traffic Tables

4.2.5.1 DMS Traffic Tables

Reference Table 5 (Service Circuits) using column p.05
in ECM 590, DMS 100 Traffic Tables, to find the
number of servers required based upon the traffic input in CCS.

4.3 Product/System Specification

4.3.1 Physical Characteristics

4.3.1.1 Enhanced DRAM CP NT1X80AA or NT1X80BA

MECHANICAL DIMENSIONS

Height	12.50 in. (317.5 mm)
Width	1.125 in. (29 mm)
Depth	10.00 in. (254 mm)

The circuit pack can mount on one (1) of the thirteen (13) provisionable trunk slots in the ISM shelf. It derives +5V power from the shelf power converter, but otherwise, it is independent of the ISM shelf.

NOTE: One EDRAM CP will provide the same functionality and capacity as one DRA shelf with NT1X76 PROM memory and NT1X77 RAM memory, but not the functionality of NT1X79 non volatile memory since the EDRAM memory is volatile. The functionality of NT1X79 non volatile memory will be provided by EDRAM in BCS-36 with the Feature No. AQ0984 - CC Support For EDRAM Uploading in software package NTXS72AA entitled CC Software Support For EDRAM Uploading. Until BCS-36, a manual action is required to restore Customer recorded annoucements lost due to ISM/MTM power converter failure.

In BCS-36, if the Customer orders optional software package NTXS72AA, then the Customer recorded announcements can be uploaded from the EDRAM card to the Disk Drive Unit (DDU); and, in the event that the Customer recorded announcements are lost from the EDRAM card due to ISM power converter failure, these Customer recorded announcements can be re-stored by downloading them from the DDU to the EDRAM card.

4.3.2 EMI/Earthquake Information

4.3.2.1 EMI/FCC

The EDRAM card will comply with EMI requirements as defined by FCC Rules and Regulations Class A Part 15 Subpart J, when equipped in a Streamline cabinet.

The introduction of EDRAM will not increase measured EMI emissions on a system level, compared with an equivalent system using DRAs.

4.3.2.2 ESD

The EDRAM card will withstand up to 15KV ESD discharge on the face panel without causing permanent damage to or corruption of the application/announcement load.

4.3.2.3 UL/CSA

The EDRAM card will conform to DMS-100 regulatory and safety requirements as specified by CSA or UL. Grounding will comply with the Isolated System Grounding Rules.

4.3.3 Sparing Information

The Mean Time Between Failure (MTBF) of NT1X80AA is 53 years at 40 degrees Celsius.

4.3.4 Power Feed and Fusing Requirements

Power 9.0 Watts (from +5V logic power) - NT1X80AA

Power 7.0 Watts (from +5V logic power) - NT1X80BA

4.3.5 Current Drain Information

Current Drain for the EDRAM card (NT1X80AA) is 188 mA typical.

(9 Watts/5 Volts = 0.1875 A = 188 mA)

Current Drain for the EDRAM16 card (NT1X80BA) is 1400 mA typical.

(7.0 Watts/5 Volts = 1.400 A = 1400 mA)

4.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

4.4.1 Voice File Installation.

Each EDRAM can be loaded with different voice files controlled by the voice file names datafilled in the EDRAMINV table. The voice files can be loaded directly into the EDRAM from the tapes in most situations. Loading EDRAM from tape will increase the loading time because additional time is needed to scan the tape to locate the specified file, and this scanning time may be as long as 20 minutes for each file. As the worst case loading and initialization time of the EDRAM (4 double density voice files)is only 16 minutes, the total tape scanning time may significantly exceed the actual file loading time.

The tape scanning time for an office may be reduced by creating a voice tape and by copying the voice files to the tape in the same sequence as the files to be loaded into the EDRAM.

For the purpose of reducing EDRAM loading time and to eliminate the manual activity needed for mounting the tapes, it is recommended to copy all the needed voice files to the disk and to load EDRAM from the disk.

SITUATIONS REQUIRING VOICE FILE LOADING FROM DISK

There are situations where the voice files must be loaded via the DMS IOC Disk or SLM disk, rather than from the voice tapes directly. The procedure to copy files from SLM tape to SLM disk is described in the section entitled Correcting EDRAM Voice File Trouble in NTP 297-8001-544 entitled Lines, Trunks, and Peripherals Trouble Locating and Clearing Procedures. This NTP replaces the existing NTP 297-1001-586 which has the same title.

4.4.1.1 Disk Space Requirements.

The voice files can be copied from SLM tape to the SLM disk.
The disk space required can be calculated by adding up the size
of all the required voice files.

For announcements that are recorded by the customer, the following formula may be used for calculating the approximate disk space requirements:

Disk space = Total announcement hold time (sec.) X 64,000/8 Bytes

4.4.2 Required Software Packages and Interdependencies

The EDRAM application firmware is downloaded from the DMS tape/disk to the program store segment of the EDRAM on board memory. The announcement data is sectionalized into eight (8) data files, each file corresponding to one (1) version of an NT1X76 board. These are also downloaded from DMS tape to the Data Store segment of the EDRAM on board memory.

Up to BCS-36, the EDRAM Peripheral Module (PM) load is delivered as part of the voice file tape. Hence, even if the Customer does not want the standard voice file announcements and wants to make their own custom announcements,r one (1) voice file package (i.e. NTG301__ to NTG305__) must be ordered to get the necessary EDRAM PM load delivered to the job site.

From CSP02, the EDRAM PM load and the EDRAM voice files will be ordered and delivered as part of the CSP Non-CM and PM load delivery process.

Starting in BCS-34, the EDRAM is available for domestic (mu-law) markets. Starting in BCS-35, the EDRAM is available for international (A-law) markets.

Full equivalency to the DRA module is available for jobs in BCS-36 and onwards via the BCS-36 software feature AQ0984 contained in NTXS72AA.

Integrated Service Module (ISM) is available for offices from BCS 36 onwards.

Background History

4.4.2.1 EDRAM Voice Files for BCS 34

In BCS-34, with the introduction of EDRAM, the EDRAM voice files were packaged under the following Computing Module (CM) software package codes to facilitate the ordering and delivering of these voice files to job sites:

NTG301AA EDRAM Voice Files: English Standard
NTG302AA EDRAM Voice Files: English CLASS/CMS
NTG303AA EDRAM Voice Files: French
NTG304AA EDRAM Voice Files: Spanish

NTG305AA EDRAM Voice Files: Superset for SLM II Tape

The preceding CM software package codes have been manufactured discontinued (MDed) in BCS-35 as of WK.34/93.

4.4.2.2 EDRAM NON-CM Software Release 01

As of WK.35/93, in BCS-35, the EDRAM voice files can be ordered and delivered under the non-BCS non-CM software order process. To use this non-BCS non-CM software order process, the EDRAM voice files have been upgraded to the following non-CM software package codes under EDRAM Release 01:

NTG301AB EDRAM Voice Files: English Standard
NTG302AB EDRAM Voice Files: English CLASS/CMS (upgraded by NTG302AC)
NTG303AB EDRAM Voice Files: French
NTG304AB EDRAM Voice Files: Spanish
NTG305AB EDRAM Voice Files: Superset for SLM II Tape

4.4.2.3 SOFTWARE - JAPAN APPLICATIONS

Software package code NTG306AA is for Japan applications only.
****

4.4.2.4 SOFTWARE AND VOICE FILE DEPENDENCIES

When EDRAM is required in a DMS office, the following CM software package is required:

NTXN16AA Enhanced DRAM

4.4.2.5 DMSE SOFTWARE ORDERING

The following is the ordering process for EDRAM Voice files and PM loads under the DMS Software Evolution:

| PCL Releases NA0002, 03, 04, 05, 06, and 07:

| Voice files are ordered via order code EDRM0001 through the NT-ACCESS/PAQS/SOLID interface, on a SLM cartridge. EDRM0001 should be ordered only when EDRAM does not exist in the office (Initial EDRAM). EDRAM PM load is ordered using NCL Order Code EDRM0008, and contains the EDRAM PM Load Name (EDRMAE02). It should be ordered via the NT-ACCESS/PAQS/SOLID interface, on a SLM cartridge.

| PCL Releases NA0008 and NA0009:

| Voice files are ordered via order code EDRM0001 through NT-ACCESS/PAQS/SOLID interface, on a SLM cartridge. EDRM0001 should be ordered only when EDRAM does not exist in the office (Initial EDRAM). The EDRAM PM load name (EDRMAE04) is part of the PM load tape from NA008 onwards, therefore it does not need to be ordered via the SOLID process.

| All voice files previously available under order codes NTG301-NTG306, and included in ordercodes EDRM0004/EDRM0006, are now available under a separate ordercode, EDRM0001, delivered in a SLM cartridge. EDRM0001 is compatible with any EDRAM PM load previously delivered up to and including EDRMAE02 and EDRMAE04.

| CAUTION: When installing Enhanced Busy Call Return (EBCR) in an office, the minimum PM load for the EDRAM should be EDRMAE02.

| EDRM0007 is replaced by EDRM0008, EDRM0007 is declared MD.

| EDRM0006 is replaced by EDRM0007, EDRM0006 is declared MD.

| Ordercode EDRM0004 and EDRM005 have been manufacturer discontinued.

| EDRM0008 requires NTXN16AA and NTX942AA/AB.

| Special Software Releases

Ordercode EDRM0084 contains EDRAM files for the GTE market on a SLM cartridge, and is in addition to the base order code.

Ordercode EDRM0074 contains the Message Service Application (MSA) EDRAM files for the NYNEX market (First Application). The Message Service Application software (MSA00001) is a prerequisite for EDRM0074.

Japanese Market Only

For the Japanese market, EDRM0008/EDRM00011 requires NTXV56AA.

Ordercode ED160001 is required for use with the EDRAM16 card. ED160001 contains the EDRAM PM load ED16AA01 and all voice files previously available under NTG301-NTG306. Initial application of ED160001 is for the Japan market only and ED160001 requires NTXN16AA

Voice files for use with ED160001 in the Notification of Time and Charge application for Japan (IDC) are included in the the order code JPN00020 and contain the following:

jpatc0da jpatc0db jpatc0dc jpatc0dd jpatc0ea jpatc0eb jpatc0ec jpatc0ed korean01 korean23 korean45 korean67 korean8 thai01 thai23 thai45 thai67 thai89 malay01 malay23 malay45 malay67 malay89 tagalog1 tagalog2 tagalog3 tagalog4 spansh01 spansh23 spansh45 spansh67 spansh8 prtugs01 prtugs23 prtugs45 prtugs67 prtugs89 prtugs10 mndm01 mndm23 mndm45 mndm67

Additional voice files are being developed for specific markets. Contact your regional Product primes for ordering information or contact:
Nortel Audio Technologies
97 Humboldt Street
Rochester, New York 14906
Attention: John Field
Phone 716-654-2123

4.4.3 Software Usage Restrictions

Refer to information above under REQUIRED SOFTWARE PACKAGES AND INTER-DEPENDENCIES.

4.4.4 Memory Provisioning

The addition of this peripheral module should have minimal impact on memory provisioning. Refer to the normal memory algorithms.

4.5 Real Time Impact

The loading of this peripheral module will not impact any of the CPU usage since this new PM will take the same time to load as the present XPMs.

All of the maintenance actions will take the same amount of time as the ones for the XPMs.

Refer to the normal real time algorithms.

Chapter 8

LINK PERIPHERAL PROCESSOR

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LINK PERIPHERAL PROCESSOR
Section Contents

1.0 ECM612 - Fiberized LIS(FLIS or Single Shelf LPP) 8-1
1.1 Overview 8-1
1.2 Hardware Provisioning 8-2
1.2.1 Hardware Usage Restrictions 8-2
1.2.2 Hardware Dependencies 8-2
1.2.2.1 P and C Side Port Requirements 8-3
1.2.2.2 DMS BUS Port Requirements 8-3
1.2.2.3 Circuits Per Card 8-4
1.2.2.4 Discrimination Numbering 8-4
1.2.3 Provisioning Considerations 8-4
1.2.3.1 (F)LIS Provisioning 8-4
1.2.3.2 Inter-MS Link Provisioning 8-12
1.2.3.3 C42(S/DMS) Cabinet Provisioning . . . 8-13
1.2.4 Office Layout Information 8-13
1.2.5 Traffic Tables 8-13
1.3 Product/System Specification 8-13
1.3.1 Physical Characteristics 8-13
1.3.2 EMI/Earthquake Information 8-13
1.3.3 Sparing Information 8-14
1.3.4 Power Feed and Fusing Requirements 8-14
1.3.5 Current Drain Information 8-15
1.4 Software Provisioning 8-15
1.4.1 Required Software Packages and Interdependencies 8-15
1.4.2 Software Usage Restrictions 8-15
1.4.3 Memory Provisioning 8-15
1.5 Real Time Impact 8-15

2.0 ECM620 - Functional Block/Detail Engineering - LIM 8-16
2.1 Overview 8-16
2.2 Hardware Provisioning 8-17
2.2.1 Hardware Usage Restrictions 8-17
2.2.1.1 Hardware Usage Restrictions for STP . 8-17
2.2.1.2 Restrictions for signaling links at 0.8 erlang 8-17
2.2.1.3 Hardware Usage Restrictions for SSP/SEP 8-18
2.2.1.4 Hardware Usage Restrictions for EIU . 8-18
2.2.1.5 Hardware Usage Restrictions for MDR7 8-18
2.2.1.6 Hardware Usage Restrictions for FRIU 8-18
2.2.1.7 Hardware Usage Restrictions for DMS-PH 8-19
2.2.1.8 Hardware Usage Restrictions for NIU . 8-19
2.2.1.9 Hardware Usage Restrictions for SEP . 8-20
2.2.2 Hardware Usage Restrictions for NT9X14DB . . . 8-20
2.2.3 Hardware Usage Restrictions for VPU 8-20
2.2.4 Hardware Dependencies 8-20
2.2.4.1 P and C Side Port Requirements . . . 8-20
2.2.4.2 DMS BUS Port Requirements 8-20
2.2.4.3 Circuits Per Card 8-20
2.2.4.4 Discrimination Numbering 8-20
2.2.4.5 Hardware Dependencies for STP 8-20

2.2.4.6 Hardware Dependencies for SSP/SEP . . 8-21
2.2.4.7 Hardware Dependencies for EIU 8-24
2.2.4.8 Hardware Dependencies for MDR7 . . . 8-24
2.2.4.9 Hardware Dependencies for FRIU . . . 8-24
2.2.4.10 Hardware Dependencies for DMS-PH . . 8-24
2.2.4.11 Hardware Dependencies for NIU . . . 8-24
2.2.4.12 Hardware Dependencies for SEP . . . 8-25
2.2.5 Provisioning Considerations 8-25
2.2.5.1 Signal Transfer Point (STP) 8-25
2.2.5.2 Service Switching Pt (SSP)/Signaling Pt (SP) 8-28
2.2.5.3 Ethernet Interface Unit (EIU) 8-31
2.2.5.4 Message Detail Recording (MDR7) . . . 8-37
2.2.5.5 Frame Relay Interface Unit (FRIU) . . 8-38
2.2.5.6 Network Interface Unit (NIU) 8-43
2.2.5.7 DMS Integrated Packet Handler (DMS-PH) 8-46
2.2.5.8 Channalized Access 8-48
2.2.5.9 Signaling End Point (SEP) 8-50
2.2.6 Office Layout Information 8-51
2.2.6.1 DS-30 Port Spread For LIM 8-52
2.2.7 Traffic Tables 8-52
2.3 Product/System Specification 8-53
2.3.1 Physical Characteristics 8-53
2.3.2 EMI/Earthquake Information 8-53
2.3.3 Sparing Information 8-53
2.3.3.1 Sparing Information for STP 8-53
2.3.3.2 Sparing Information for MDR7 8-55
2.3.4 Power Feed and Fusing Requirements 8-55
2.3.5 Current Drain Information 8-55
2.4 Software Provisioning 8-56
2.4.1 Required Software Packages and Interdependencies 8-56
2.4.1.1 Required Software for STP 8-56
2.4.1.2 Required and Optional DMS-STP S/W in DMSE. 8-57
2.4.1.3 Required Software for SSP/SP 8-58
2.4.1.4 Required Software for EIU 8-59
2.4.1.5 Required Software for MDR7 8-60
2.4.1.6 Required Software for FRIU 8-60
2.4.1.7 Required Software for DMS-PH 8-60
2.4.1.8 Required Software for NIU 8-61
2.4.1.9 Required Software for SEP 8-61
2.4.1.10 Required Software for Power Redundancy 8-62
2.4.1.11 Required Software for NT9X53AD Clock card 8-62
2.4.1.12 Required Software for NTEX22CA card 8-62
2.4.2 Software Usage Restrictions 8-62
2.4.2.1 Software Usage Restrictions for STP . 8-62
2.4.2.2 Software Usage Restrictions for SSP/SP 8-63
2.4.2.3 Software Usage Restrictions for EIU . 8-63
2.4.2.4 Software Usage Restrictions for MDR7 8-63
2.4.2.5 Software Usage Restrictions for FRIU 8-63
2.4.2.6 Software Usage Restrictions for DMS-PH 8-63

2.4.2.7 Software Usage Restrictions for NIU . 8-64
2.4.2.8 Software Usage Restrictions for SEP . 8-64
2.4.3 Memory Provisioning 8-64
2.4.3.1 Memory Provisioning for STP 8-64
2.4.3.2 Memory Provisioning for SSP/SP . . . 8-64
2.4.3.3 Memory Provisioning for EIU 8-65
2.4.3.4 Memory Provisioning for MDR7 8-65
2.4.4 Memory Provisioning for FRIU 8-65
2.4.5 Memory Provisioning for DMS-PH 8-65
2.4.6 Memory Provisioning for NIU 8-65
2.4.7 Memory Provisioning for SEP 8-65
2.5 Real Time Impact 8-65

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1.0 ECM612 - Fiberized LIS(FLIS or Single Shelf LPP)

1.1 Overview

Product/System Overview

The Fiberized LIS ((F)LIS) is designed to provide a small number of Link Interface Units (LIUs) in a SuperNode office in a cost-effective manner. Up to two Link Interface Shelves (LISs) with a maximum total of twenty-four LIUs may be provisioned.

The existing (non-fiberized) LIS shelves are housed in a Link Interface Module (LIM) cabinet and require Local Message Switch (LMS) shelves to interface to the Message Switch (MS).

The fiberized LIS uses a new FBUS controller circuit pack and a new fiber interface paddleboard to support a direct connection between the LIS and the MS.

The (F)LIS uses the Enhanced Multi-Purpose Cabinet (EMC) or C42 (S/DMS) Cabinet to house up to two LIS shelves. The first shelf resides in shelf position 26 and the second shelf, if provisioned, resides in shelf position 13. (Shelf positions 39 and 0 contain filler shelves and are reserved for future applications.)

FLIS in C42(S/DMS) cabinet is a cost and functionally enhanced version of the existing FLIS cabinet. The S/DMS cabinet is 42 inches wide compared with Streamline's width of 28 inches. This new cabinet supports features such as modified framework based on Streamline, "horizontal"(through line-up) cabling, and "hot slide" capability. "Horizontal" cabling meaning, cables running through a hole in the side of a cabinet and into the next cabinet(s) in the same lineup. "Hot slide" is the process of moving an operating cabinet into an existing lineup of equipment. The following diagram gives a pictorial representation of this cabinet:

Figure 1. FLIS or SSLPP in C42 Cabinet.

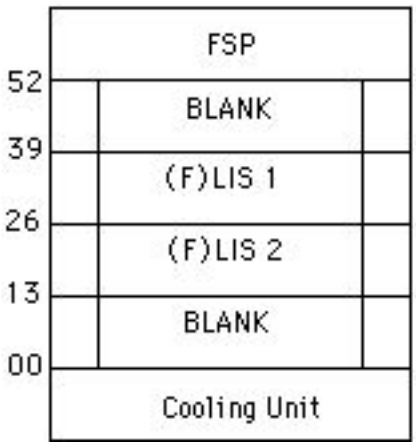

Figure 1. FLIS OR SSLPP IN C42 CABINET

1.2 Hardware Provisioning

1.2.1 Hardware Usage Restrictions

No more than twenty-four LIUs may be provisioned using (F)LIS. If additional LIUs are required, a LIM cabinet must be used.

The NT9X62BA CANNOT be used for the Inter-MS Link(IML) feature.

1.2.2 Hardware Dependencies

The (F)LIS requires the use of the following:

- NT9X13DC MS processor with 10 MBytes of memory.

- Two inter-MS links.

The power and ground cabling of the S/DMS cabinet depends on the site configuration. Installations that do not utilize horizontal cabling, require the power cables entering the cabinet to be fed through Electromagnetic Compatibility(EMC) filters. On the other hand,use of S/DMS cabinet in a Streamline lineup do not need the power filters.

Synchronization

SuperNode with SSLPP is capable of running syncronization with all clock configureations currently used on SuperNode.
(eg. office types: master external, master internal and slave; clock types: Stratum 2, 2.5 and 3)

Where DS0 interfaces are employed, a master timing reference is required. Typical equipment in a DMS office using DS0 interfaces includes:

- LIU7s on LIMs or SSLPP.
- Channel banks with data services,
- DS0A Interface CP on DTCs.

The preferred method is to use a Timing Supply Generator (TSG), also known as Signal Reference Distribution (SRD), which supplies all equipment with the required timing signal. For reliability, the components of the TSG are fully duplicated with hot standby capability. In an SSP/SP office, the TSG can be an inexpensive type, of low Stratum standard, without impacting reliability of the CCS7 links. The Stratum standard of the TSG does not have to agree with the Stratum standard of the SSP/SP office. The TSG is to be supplied by the telco.

The TSG should be located in or near the channel bank. Each Timing Output Card provides ten (10) ports. The following TSG equipment is required and should be supplied by the telco:

Description	Part Number
DCD-400 Shelf Assembly	990-40000-01
Fuse & Alarm Card	990-40014-01
Clock Input Card	990-40010-01
Stratum 3 Clock	990-40013-01
Timing Output Card	990-40011-01
Timing Output Card (Hot Spare)	990-40011-01
Matrix Control Card	990-40015-01

(Equipment manufactured by Telecom Solutions.)

1.2.2.1 P and C Side Port Requirements

Not applicable

1.2.2.2 DMS BUS Port Requirements

Each LIS shelf requires two ports on the MS. The MS should provide these ports via the NT9X17AD 4-Port MS Interface Circuit Pack and the NT9X62BA 4-Link SR512 Paddleboard.

Refer to section "Inter-MS Link Provisioning" for Inter-MS Link Provisioning.

1.2.2.3 Circuits Per Card

Not applicable

1.2.2.4 Discrimination Numbering

Not applicable

1.2.3 Provisioning Considerations

1.2.3.1 (F)LIS Provisioning

If one to twelve LIUs are required, provision one LIS shelf in shelf position 26. This shelf is referred to as LIS 1.

If thirteen to twenty-four LIUs are required, provision two LIS shelves in shelf positions 26 and 13. These shelves are referred to as LIS 1 and LIS 2, respectively.

Each Link Interface Unit (LIU) is composed of two circuit packs and one paddleboard. The first circuit pack is the NTEX22 IPF Processor and F-Bus Interface and is provisioned in an even-numbered slot from 8F to 30F. The second circuit pack is the NT9X76AA STP Signalling Terminal and is provisioned in the next highest (odd-numbered) slot (from 9F to 31F). The paddleboard is either an NT9X77AA/AB V.35 Interface or an NT9X78BA Enhanced DS0A Interface and is provisioned behind the NT9X76AA (in an odd-numbered slot from 9R to 31R).

These three cards make up a single Link Interface Unit.

Figure 2. LIU7 Configuration.

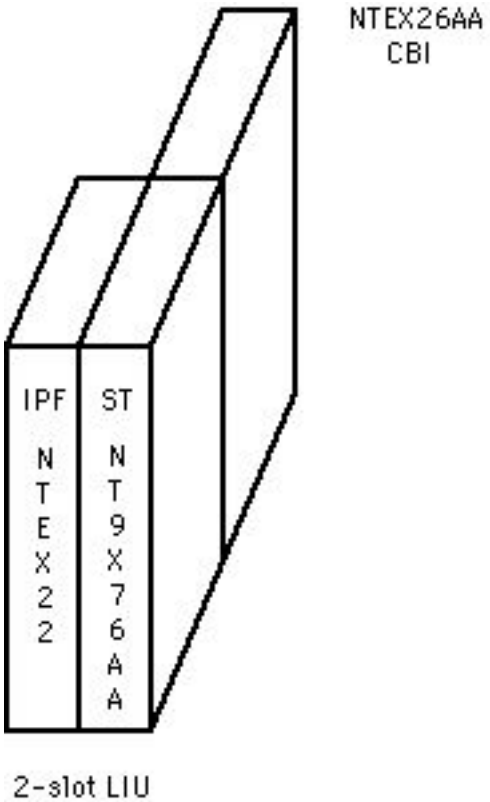

Figure 2. LIU7 CONFIGURATION

Up to twelve (12) LIUs may be provisioned per LIS shelf, with the left-most LIU occupying slots 8F, 9F and 9R, and the right-most LIU occupying slots 30F, 31F and 31R.

If more than twenty-four LIUs are required, the LIM cabinet must be used.

Provisioning of LIUs within LIS shelves should be done as follows:

In an office with one LIS shelf, LIUs forming a pair should be provisioned in different halves of the shelf with LIUs being assigned from the sides towards the middle.

Figure 3. LIU7 Assignment Sequence in Shelf 26.

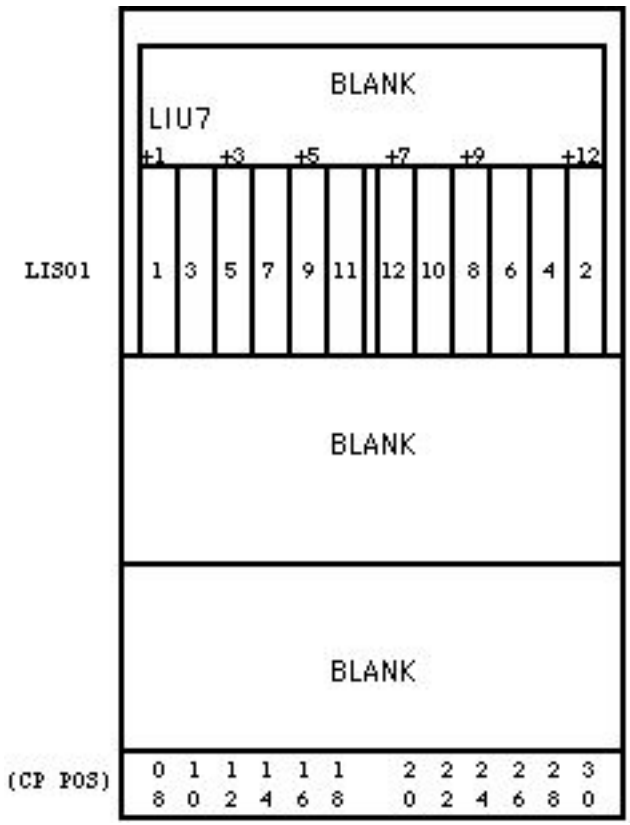

Figure 3. LIU7 ASSIGNMENT SEQUENCE IN SHELF 26.

In an office with two LIS shelves, LIUs forming a pair should be provisioned in opposite halves of different shelves with LIUs being assigned from the sides towards the middle of each shelf.

Figure 4. LIU7 Assignment Sequence in Shelves 26 and 13.

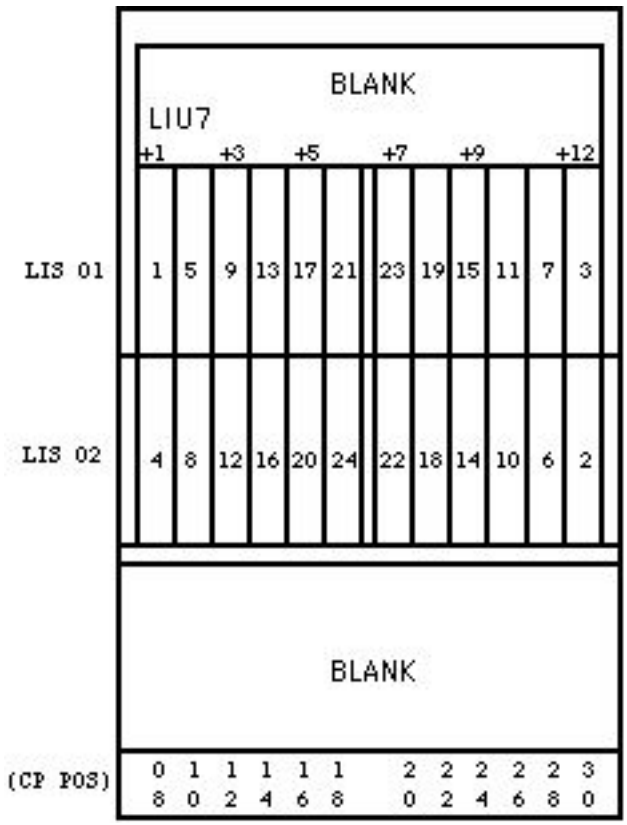

Figure 4. LIU7 ASSIGNMENT SEQUENCE IN SHELVES 13 A ND 26.

To support the signalling links, provisionable interface paddleboards are required. There are two types of paddleboards, one to interface V.35-protocol signalling links, the other to interface DS0A-protocol signalling links. The two types may be mixed within the LIS.

NTZZ30AM (CCS7 Link Interface Unit (E-DS0A 2 Slot))

The NTZZ30AM provides one Signaling Data Link for interface to other SS7 offices. Each LIU7 provides one E-DS0A link. Enhanced maintenance is available with the use of this type DS0A link.

The NT9X78BA Enhanced DS0A Interface Paddleboard supports one DS0A signalling link. It is enhanced from the NT9X78AA paddleboard by the addition of DS0A loopback and BERT capabilities for testing purposes. Note that the NT9X78AA has been MD'd and it is replaced by the NT9X78BA.

The NT9X77AA/AB V.35 Interface PB supports one V.35 signalling link. It can operate at the full V.35 rate (56 kbit/s) or at the following subrate speeds: 2.4, 4.8, 9.6 and 19.2 kbit/s. Optional software is

required for subrate operation (see Software Packages). V.35 Data Sets, if required, are to be furnished by the customer for this application.

NTZZ30CM (CCS7 Link Interface Unit (V.35 2 Slot))

The NTZZ30CM provides one Signaling Data Link for interface to other SS7 offices. Each LIU7 provides one V.35 link.

NTZZ30CN CCS7 8MEG LIU (V.35) - ISG

For offices requiring ISG compliance provide one (1) NTZZ30CN CCS7 8MEG LIU (V.35) - ISG BB.

For reliability the LIU7s must be assigned to shelf positions 26, and 13 in the order that is described in the rules section.

Network Interface Unit (NIU)

The NIU is made up of the following cards as shown in Figure 5 . The left unit, UNIT:0 uses the CBC NTEX25AA CP while the right unit, UNIT:1 uses the NTEX25BA CP.

Figure 5. Network Interface Units (NIUs).

Figure 5. NETWORK INTERFACE UNITS

Provide one (1) NTEX25AA for the left unit, UNIT:0 and one (1) NTEX25BA for the right unit, UNIT:1 for each LIS shelf that requires channelized access. The Channel Bus Controller (NTEX25AA/BA) does plane selection and controls the CBUS. The Channel Bus Controller (CBC) also receives and transmits data to and from the CBUS and the DMS network.

Provide two (2) NTEX28AA per LIS shelf (one for each unit). The Link Interface Paddleboard (NTEX28AA) interfaces four (4) DS-30 links and also interfaces to both CBCs (Channel Bus Controllers).

Provide two (2) NTEX22BB/CA per LIS shelf (one for each unit). The Integrated Processor and FBUS I/F is an integration of the NT9X13CA and NT9X75AA developed for LIU shrink.

Provide two (2) NT9X7021 Inter CBC Cable Assemblys per LIS shelf. These cables interconnect the two (2) Link Interface Paddleboards (NTEX28AA). The Inter CBC cabling enables each of the two (2) CBC cards (NTEX25AA/BA) to receive and transmit data to both planes of the network and also to pass status information between the CBCs in order to perform activity switching.

Provide four (4) NT9X7020 DS-30 Cable Assemblys per LIS shelf. Each cable connects an LPB (NTEX28AA) to its designated position on the bulkhead. The DS-30 cable connection allows the transmission of data from the network over four (4) DS-30 links.

The network data is transferred to the Channel Bus Controller (NTEX25AA/BA) through the LPB.

Figure 6. NIU cable connection.

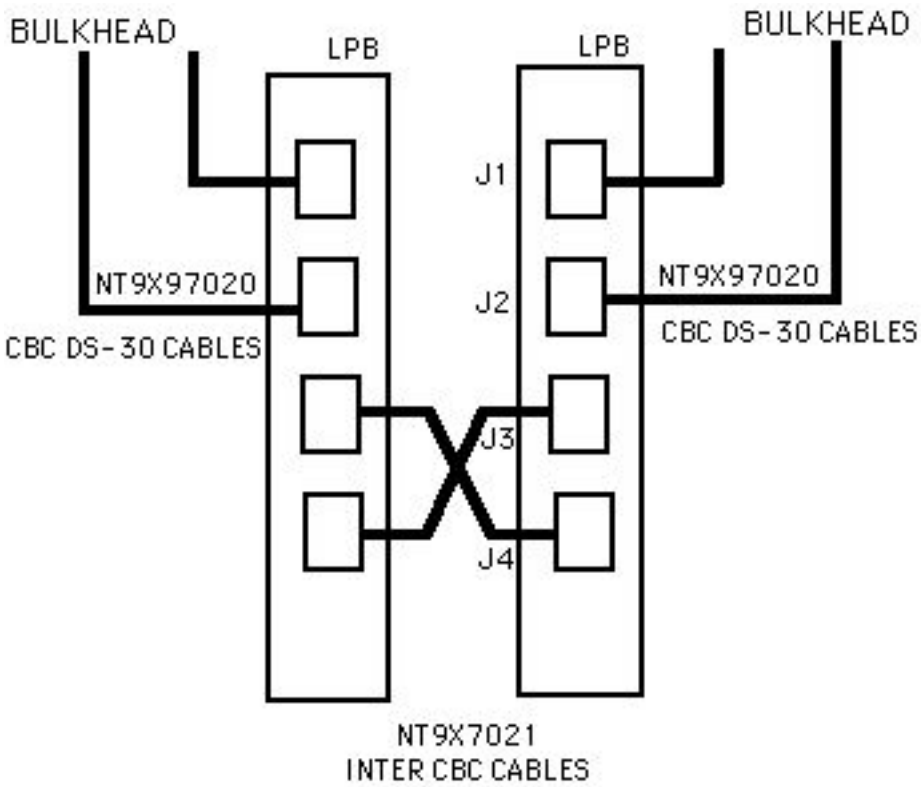

Figure 6. NIU CABLE CONNECTION

The NIU occupies the middle of the LIS shelf as shown in Figure 8 .

Channalized Access

Channelized access provides access to the SSLPP over the network without the need of an external OEM Channel Bank. An OEM chnnel bank was previously required to interface 56/64 Kbps LIU7 to the PCM30.

Channelized Access also provides the advantage of LIU sparing and also increases the number of applications avalaible through the SSLPP.

The SSLPP interface to the network is provided by the Network Interface Unit(NIU). The NIU is a warm spared peripheral with a DS-30 interface towards the network with the Channel Bus (CBUS) on the LIU7 side. LIUs that reside on a shelf with NIUs (plane 0,1) can have access to the CBUS through the Channel Bus Interface paddleboard and thus to the DMS net-

work. The NIU must be provided on all shelves where channel access is required, as the CBUSs are not extended between shelves.

Figure 7. LIU configuration requiring channelized access.

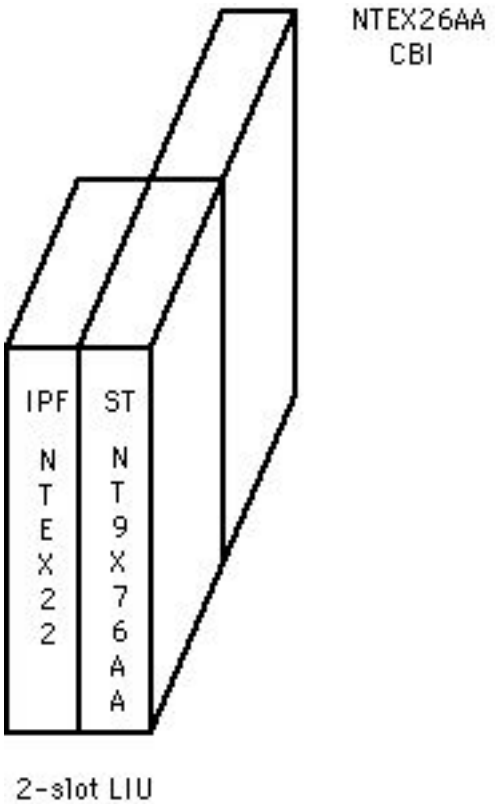

Figure 7. LIU CONFIGURATION REQUIRING CHANNELIZED ACCESS

Provide one (1) NTEX26AA for each LIU requiring channelized access. The Channel Bus Interface Paddleboard (NTEX26AA) provides an interface from the CBUS to the ST (Signalling Terminal) card (NT9X76AA), and hence, does not have any external cable connections to it. When in receive mode, the CBI selects data from the CBUS, selects the proper channel then transfers the data serially to the NT9X76AA. In transmit mode, the CBI drives the proper channels on both CBUSs. The CBI also provides CBUS functions related to fault detection and isolation.

Provide one (1) NT9X76AA (ST) card for each LIU.

AND
Provide one (1) NTEX22BB/CA Integrated FBUS I/F card for each 2-slot LIU as shown in Figure 7 . Note that the NTEX22AA and NTEX22BA are MD'd and are replaced by the NTEX22BB.

Figure 8. SSLPP with Channelized Access.

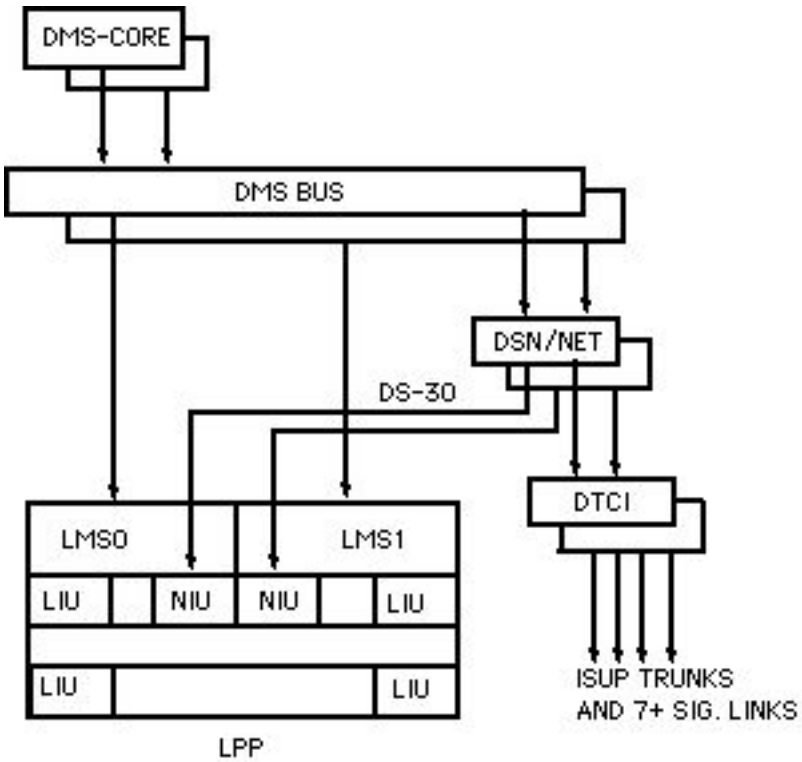

Figure 8. SSLPP WITH CHANNELIZED ACCESS

DMS Packet Handler

The DMS packet Handler (DMS PH) provides integrated X.25 packet service for the DMS-100 family of ISDN nodes. For the DMS packet handler application, the ASU is the X.25/X.75/X.75' Link Interface Unit (XLIU), which provides the X.25 and X.75 protocol processing for the DMS PH.

The XLIU is a three-card unit that includes the following cards:

1) NTEX22 IPF for layer 3 processing and F-Bus acccess.

2) NTFX10 HFP for layer 2 processing.

3) NTFX09 CIP for channel bus access to provide the HFP with the channelized data.

Refer to Figure 9 below.

Figure 9. DMS - Packet Handler Configuration.

Figure 9. DMS - PACKET HANDLER CONFIGURATION

The XLIU is configured for redundant access to the C-bus. Note that LIS MUST be provisioned with NIUs to use the DMS Packet Handler configuration, and NIUs cannot be split over two shelves.

Frame Relay Interface Unit (FRIU)

The Frame Relay Service (FRS) is a new high speed, connection oriented, switched packet data service. DATASPAN is the Northern Telecom trade name for this service. The slot provisioning for the FRIU are identical to its provisioning on the LPP LIS. Refer to ECM620 for more information.

Refer to Figure 10 below.

Figure 10. Frame Relay Interface Unit (FRIU).

Figure 10. FRAME RELAY INTERFACE UNIT

Ethernet Interface Unit (EIU)

The Ethernet Interface Unit (EIU) is an interface between DMS-BUS and an Ethernet Local Area Network (LAN). This allows for support of a variety of industry standard external communications interfaces (i.e. synchronous, asynchronous) and attachment of computers and work stations to the switch. It is based on the industry standard IEEE 802.3 10BASE5. The slot provisioning for the EIU are identical to to its provisioning on the LPP LIS. Refer to ECM620 for more information.

Refer to Figure 11 below.

Figure 11. Ethernet Interface Unit (EIU).

Figure 11. ETHERNET INTERFACE UNIT

1.2.3.2 Inter-MS Link Provisioning

The two inter-MS links (IMLs) required for (F)LIS to connect MS plane 0 to MS plane 1 and provide a path for messages in event of a failure.

For additional information about IMSL requirement, refer to ECM-626 DMS Buliding Block, Supernode Engineering. For fiber inter-MS links, provision two (2) A0352268 Inter-MS Provisioning rules for fiber IMLs are as follows: Each fiber IML can be provisioned on any un-used DS512 (or The ports selected for the two links must be on different another port must be freed up on another NT9X62BA The paddleboards and ports selected must be the same on The paddleboards and ports selected can be in any of the Fiber cable A0352138 can be used.

1.2.3.3 C42(S/DMS) Cabinet Provisioning

The S/DMS cabinet is very similar to the existing cabinet, items such as packs, shelf assemblies, interconnect cables, and bulkhead packs do not change. The differences from the existing Supernode cabinet are listed below.

1) The Cabinet changes from NT9X0113 to NT9X9575

2) The Kick plate is not required with the S/DMS cabinet.

3) Power wiring is optional. If the cabinet is in a Stream-line lineup, the cables will be equipped to take advantage of "horizontal" cabling. If the cabinet is in a Standalone lineup, power cables will be similar to existing power cables, so filters will have to be provisioned.

1.2.4 Office Layout Information

The S/DMS cabinet will be shipped with the doors, shelves,circuit packs, FSP, and cooling unit installed. The bus bar will be installed and appropriate connections will be made at the factory. The bulkheads form part of the Electromagnetic Compatibility(EMC) cage around the equip-ment and provide a place to mount filter PCBs and optional power fil-ters. The rear of the cabinet is equipped with two removeable bulkhead panels near the bottom of the cabinet. When these panels are removed, the cabinet can be installed in, or removed from, a lineup equipped with horizontal cabling.The cabinet may be slid "FORWARD" only.

Refer to ECM600 for office layout restrictions when this cabinet is applied in a DMS-100 Cabinetized lineup.

1.2.5 Traffic Tables

Not applicable.

1.3 Product/System Specification

1.3.1 Physical Characteristics

MECHANICAL DIMENSIONS

Height 72in. Width 42in. Depth 28in.

Weight Approximately 800 lbs.

1.3.2 EMI/Earthquake Information

End panels are required to complete the EMC enclosure for cabinets lo-cated at the end of a lineup. In earthquake installations, the S/DMS cabinet must be bolted to the floor in four(4) places through anchor holes provided in the base of the cabinet. The cooling unit must be

removed for access to the bolts. When the cabinet is bolted in place, the optional leveling feet must not be installed. Leveling will be accomplished through the use of non-conductive shims. The bolts must be tightened with a torque wrench to ensure adequate pretension.

For raised floor installations, a sub-structure support between the concrete sub-floor and the raised floor will be required. A qualified seismic engineer should be consulted regarding the required additional bracing.

1.3.3 Sparing Information

For U.S. applications use standard sparing algorithms.

For Canadian and other applications the following may be used.

LIS Shelf		
PEC	No. SPARES	FOR ENGINEERED INVENTORY
NTEX20AA	1	1
NTEX20BA	1	1
NT9X96AA	1	2
NT9X98AA	1	2

Version 2, C42 Cooling Unit:	
Blowers	660,000 hrs MTBF in its useful life of 10 years.
MTM cards	4,700,000 hrs MTBF
Relay	100,000,000 hrs MTBF

Note that the blower's useful life is about 10 years. Around that time, failures are to be expected. Good practice might dictate replacement of operating blowers around that time (analagous to replacing your car's engine belts before they break).

1.3.4 Power Feed and Fusing Requirements

The following fuses and feeds are required:

Fusing for the NTEX01AA is as follows:
Two (2) 20 Amp fuses per LIS shelf and
four (4) 5 Amp fuses for cooling blowers.

Fusing for the NTEX01AB is as follows:

Two (2) 20 Amp fuses per LIS shelf and
Two (2) 10 Amp fuses for cooling blowers.

1.3.5 Current Drain Information

The following describes the characteristics of the NTEX01AA FLIS cabinet:

Input Voltage -48VDC

Power Consumption 1720 watts(+/- 10%) for 2 shelves
Current Drain 72 Amps
Thermal Dissipation -NA- BTU/hr

1.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

1.4.1 Required Software Packages and Interdependencies

The (F)LIS requires the following software package(s):

NTXD87AA - Master Package. It consists of the following Packages.

NTXF71AB Super Node Enhanced Messaging

NTXN18AA FBUS - LIU Base

NTXN83AA LIS Support over SR512 Interface

NTXQ51AA Support For LIS-Resident LIS Controller

NTX945AA MS Base Link Maintenance

The (F)LIS requires the following software package for the CCS7 jobs.

NTXN19AA - LIU7 for LPP Based CCS7 Appplications (if supported)

1.4.2 Software Usage Restrictions

The (F)LIS requires software release BCS-33 or higher.

1.4.3 Memory Provisioning

Not applicable.

1.5 Real Time Impact

Not applicable.

2.0 ECM620 - Functional Block/Detail Engineering - LIM

2.1 Overview

Product/System Overview

The Link Interface Module (LIM) was initially introduced as a24-Link Cabinet. However, the 36-Link Cabinet was later introduced as the standard LIM offering. The two cabinets are shown below in Figure 1

Figure 1. LIM Cabinets.

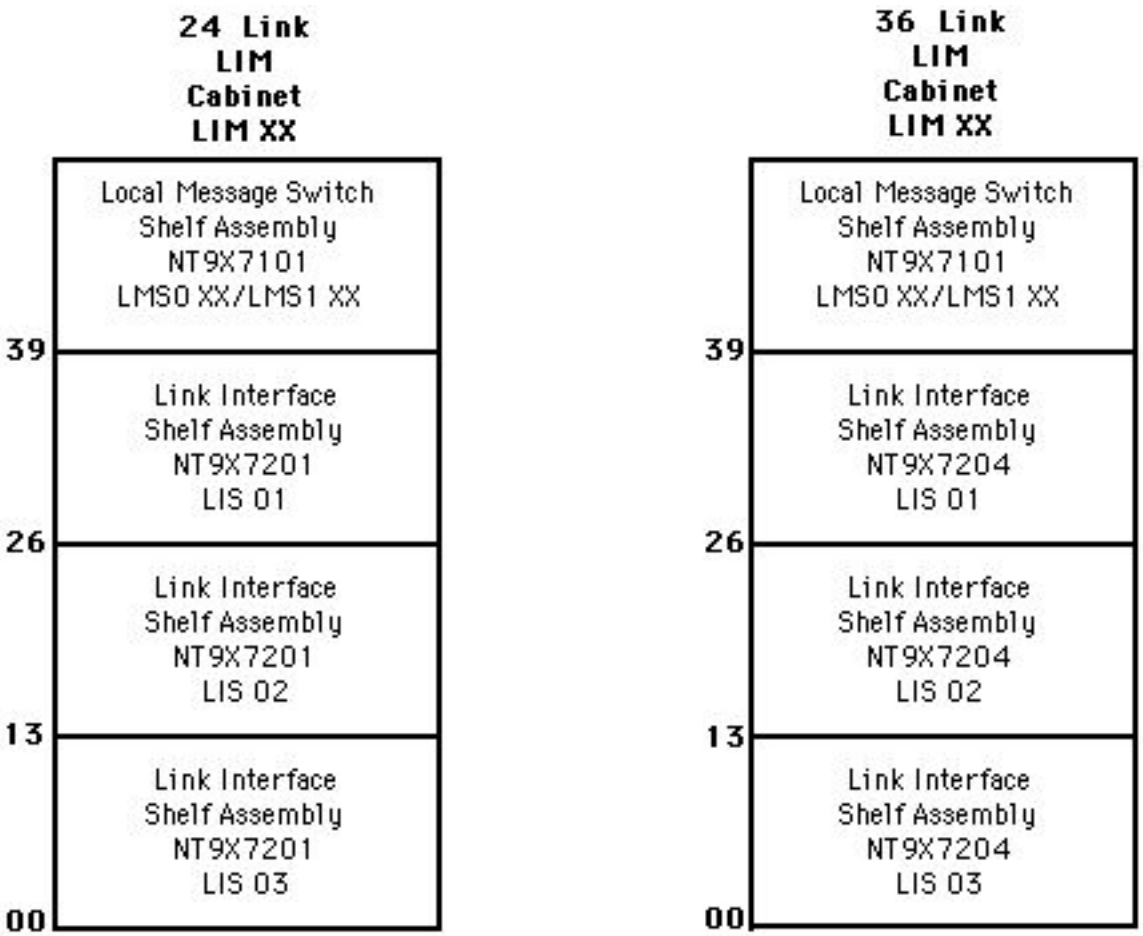

Figure 12. LIM CABINETS 24 AND 36 LINK

The upper shelf of the LIM (Sh 39) contains the duplicated load-sharing Local Message Switch (LMS). The LMS connects to the DMS-BUS

usingDS-30 for maintenance and administration, and for inter-LIM communication.

The lower three shelves of the LIM (Sh 26,13,00) contain the Application Specific Units (ASUs). An FBUS is cabled from the LMS shelf tothe three ASU shelves and provides the path for messages to/fromt he various ASUs.

Examples of ASUs are LIU7, EIU, FRIU, XLIU and Channalized access. The 24-Link Cabinet holds a maximum of 24 ASUs, and the 36-LinkCabinet holds a maximum of 36 ASUs.

2.2 Hardware Provisioning

2.2.1 Hardware Usage Restrictions

2.2.1.1 Hardware Usage Restrictions for STP

2.2.1.2 Restrictions for signaling links at 0.8 erlang

The following restrictions apply to signaling links on a DMS-STP that is running 25 byte messages on a 56Kb links at 0.8 Erlang:

- Full Inter-LIM traffic (36 LIU7s per LPP) is supported in duplex mode only. Duplex mode means all LPPs and DMS-Bus are fully functional.

Fully Loaded LPPs (36 LIU7s) with 26 LIU7s running inter-LIM traffic and 10 LIU7s running intra-LIM traffic are supported with thefollowing fault conditions:

- the STP is running in simplex mode (only one MS or LMS running),and
- there is a fault in a LPP that requires no more than threeLIU7s to be data synched simultaneously, or a fault requiring the loading of single LIU7, but not both faults simultaneously.

Traffic loss can be experienced during transitions into and out of single simplex mode. The following table summarizes expected message loss.

EXPECTED MESSAGE LOSS		
	Removal of a node (MS or LIM unit) from service	Return of a node (MS or LIM unit) from Service
Initiated by System	approximately 20 seconds of message loss number of MSUs varies with configurations.	less than 0.5 sec in duration 5 to 10 discarded MSUs
Initiated manually	no message loss	less than 0.5 sec in duration 5 to 10 discarded MSUs

2.2.1.3 Hardware Usage Restrictions for SSP/SEP

The LIM can be provisioned into an office which already containsMS7E frames, subject to the dependencies described in the next section. However, the concurrent use of MSB7s and LIMs will not be supported over BCS upgrades. All CCS7 links assigned to MSB7s must be moved over to LIMs during the same BCS, and the MS7E frames set to an inactive state and/or removed.

2.2.1.4 Hardware Usage Restrictions for EIU

Not Applicable

2.2.1.5 Hardware Usage Restrictions for MDR7

2.2.1.6 Hardware Usage Restrictions for FRIU

The DMS-100 switch must be a Supernode and be equipped with an LIM (LPP). If Frame Relay Service via DATAPATH lines is required, the switch must also be equipped with DATAPATH and any network upgrades required by that product. Please refer to the appropriate SEB for rules for mixing various ASUs on the LPP based upon specific BCS.

BCS 32 Frame Relay Services must use LIM (LPP) dedicated to FRIU.

FRIU shall not be mounted on an LPP in an STP only office.

Since each power supply serves six FRIUs. FRIUs should be added to the LPP so that they are spread as evenly as possible across the six power supplies (or half shelves). In addition, no more than one trunk in a trunk group should be served by any single power supply. With Enhanced Trunking this will ensure that a single power supply failure does not simultaneously disable both the primary and secondary route of an LLC.

56 Kbs DataSPAN access channels cannot be combined with 384 Kbs access channels on a T1 span. 384 Kbs channels on a T1 span cannot be concatenated to form larger bandwidth DataSPAN access channels.

The NTEX22BB/NTEX31BA FRIU must replace the NTEX22AA/ NTEX31AAat BCS 34 and beyond. The NTEX22BB/NTEX31BA is not backwards compatible with the NTEX22AA/NTEX31AA.

The LATA Switching Systems Generic Requirement (LSSGR: TR-TSY-000509;Section9.1.2.4), states that no single hardware fault should cause a loss of service to groups of more than 64 switching network terminations. If this criteria is applied to the DataSPAN application, this means that no power supply should control the availability of more than 64 access channels. (All other shared components of the system are duplicated.)

When provisioning and engineering a DMS-100Wireless switch, refer to ECM 726 DMS-100 Wireless for ASU Slot position layout for the FRUI's (CIU/CAU).

2.2.1.7 Hardware Usage Restrictions for DMS-PH

Refer to the appropriate SEB for Hardware restrictions.

2.2.1.8 Hardware Usage Restrictions for NIU

NIUs can be provisioned on the 3-slot LIU LIM cabinet (9X70AA)or the 2-slot LIU LIM cabinet (9X70BA).

One LIS will support one pair of Network Interface Unit (NIU)and up to a maximum of THREE per LPP Cabinet. The NIU can be located only in the center of the LIS shelf, and it is divided into two halves. Unit 0 for Plane 0 and Unit 1 for Plane 1 respectively. The NIU provides a connection form the LPP Cabinet to the network, and unit 0 and unit 1 cannot be split over two shelves.

The NIU pair is a six-card redundant unit consisting of two of each of the following cards:

1. NTEX25
   CBC interfaces the network planes with parallel C-bus to the XLIU and other ASUs. Two different models of CBC card are supplied with the NIU pair, one for NIU unit 0 and the other for NIU unit1.

2. NTEX22 IPF
   The NTEX22BB (8 Meg Enhanced) circuit pack must be used for NIUapplications. Note that the NTEX22AA (4 Meg) Integrated Processor and FBUS Interface Card cannot be used for NIU applications. The reason for this restriction is that the NIU software load exceeds4 Meg of memory, hence the 8 meg circuit pack must be used to provide sufficient memory for the NIU application.

3. NTEX28AA
   DS-30 link interface paddle board supports four (4) DS30 links for the DMS PH.

2.2.1.9 Hardware Usage Restrictions for SEP

SEP utilizes only the LIM/LPP, making conversion from MSB7 equipment not applicable. When used for SEP, the LIU7 card set includes theNT9X76CA in place of the NT9X76AA. The SEP always utilizes Channelized Access (NIU) as the interface to the LIU7.

All restrictions for NIU as documented in "Hardware Usage Restrictions for NIU" are applicable, with the following exceptions:

SEP utilizes only NT9X70BA and newer vintage LPP cabinets.

2.2.2 Hardware Usage Restrictions for NT9X14DB

The NT9X14DB memory circuit pack is required for the Application Processor Unit (APU) and the APU running UNIX (APUX) for ADAS application. For these ASUs the NT9X14DB memory pack uses the clock signal from the NTEX22 which is running at 20Mhz Bus speed and will NOT be compatible with the NTEX22CA, and will have to keep on using the previous vintages of NTEX22.

2.2.3 Hardware Usage Restrictions for VPU

The NTMX97AA and the NTMX99AA are part of the Voice Processing Unit (VPU) and the VPU is required for ADAS application. The VPU is NOT compatible with the NTEX22CA card and VPU application will have to keep on using the NTEX22BA/BB.

2.2.4 Hardware Dependencies

2.2.4.1 P and C Side Port Requirements

2.2.4.2 DMS BUS Port Requirements

2.2.4.3 Circuits Per Card

2.2.4.4 Discrimination Numbering

2.2.4.5 Hardware Dependencies for STP

Timing reference for the STP LIM can be referenced to an external, customer-provided Timing Source Generator (TSG) or Signal Reference Distribution (SRD) system. Cabling to the TSG/SRD is documented in CA0X06. Maximum distance from the LMS shelf to the TSG/SRD is 457 meters (1500 feet).

Interconnection to the TSG/SRD should be engineered to ensure minimum impact on the operation of the LIM if there are failures in the TSG/SRD unit. For example, when there is more than one output port card

available on the TSG/SRD, the link from each LMS plane (LMS 0 and LMS 1) should be assigned to a different port card.

The TSG should be located in or near the channel bank. Each Timing Output Card provides ten (10) ports. The following TSG equipment is required and should be supplied by the telco:

Equipment Supplied By Telco

Description	Part Number
DCD-400 Shelf Assembly	990-40000-01
Fuse & Alarm Card	990-40014-01
Clock Input Card	990-40010-01
Stratum 3 Clock	990-40013-01
Timing Output Card	990-40011-01
Timing Output Card (Hot Spare)	990-40011-01
Matrix Control Card	990-40015-01

(Equipment manufactured by Telecom Solutions.)

2.2.4.6 Hardware Dependencies for SSP/SEP

The LIM can only be provisioned into a Supernode-based SSP/SEP. Offices equipped with the NT40 core can only use MS7E peripherals for CCS7 applications.

It is necessary to synchronize all equipment to which signaling links are interfaced, in order that the position of the bits in the digital data stream can be recovered.

In the special case in which all LIU7s in a LIM are equipped withV.35 Interface Paddleboards; that is, all links employ V.35 protocol, then there is no need for external timing. The timing signal forV.35 is imbedded in the protocol.

However, where DS0 interfaces are employed, a master timing reference is required. Typical equipment in a DMS office using DS0 interfaces includes:

- LIU7s on LIMs,
- Channel banks with data services,
- DS0A Interface CP on DTCs.

The preferred method is to use a TSG, also known as Signal Reference Distribution (SRD), which supplies all equipment with the required timing signal. For reliability, the components of the TSG are fully

duplicated with hot standby capability. In an SSP/SP office, the TSG can be an inexpensive type, of low Stratum standard, without impacting reliability of the CCS7 links. The Stratum standard of the TSG does not have to agree with the Stratum standard of the SSP/SP office. The TSG is to be supplied by the telco.

For synchronization of the LIM, each NT9X78AA DS0A Paddleboard(PB) can be interfaced individually to the TSG, or timing can be supplied to the LMS for distribution to all LIU7s in the LIM.LIU7s equipped with NT9X78BA Enhanced DS0A Paddleboards do not have individual timing inputs; timing for this type of PB must be distributed via the LMS.

NT9X53AD Clock Card in LMS of the LPP.

The NT9X53 series of clock cards provide the system and subsystem clocks and frame pulses for Local Message Switch (LMS) of the LPP.

The NT9X53AD may be used as the clock card in the Local Message Switch (LMS) of the Link Peripheral Processor (LPP) platform. The NT9X53AD supports all clock applications associated with previous LMS clock card (NT9X53AA). That is, providing stable, synchronizable clocks, and maintenance integrated with the rest of the SuperNode. Note that the NT9X53AB and AC clock cards were never supported in the LMS.

The enhancements for LMS clocking with NT9X53AD is listed below:

- Primary and secondary frame pulse fault detectors have been added.
- LMS clock f/w will now be downloadable.
- The messaging link between CMU's is not applicable in the LPP platform, as each LMS is a separate entity for clocking.
- System/subsystem clock synchronization robustness improvements ensure that the LMS can consistently be reset by the MS using either in band or out-of-band messaging. This improvement eliminates a condition whereby the LMS could not be reset, without powering down, when the system and subsystem clocks were out of sync.
- Refer to Software usage restriction for NT9X53AD clock card.
- The NT9X78CA requires BCS33 and higher software.
- NT9X78DA supports the Link Fault Sectionalization Feature.

Where channel banks are used to interface signaling links to DS1facilities, the channel banks and the LIM can both be timed from the same TSG. The office may have existing channel banks with spare channels that could be used for signaling links. Primary and secondary timing references for the TSG should be derived from the same DS1s that carry the signaling links.

Figure 2.TIMING SUPPLY -LIM AND CHANNEL BANKS

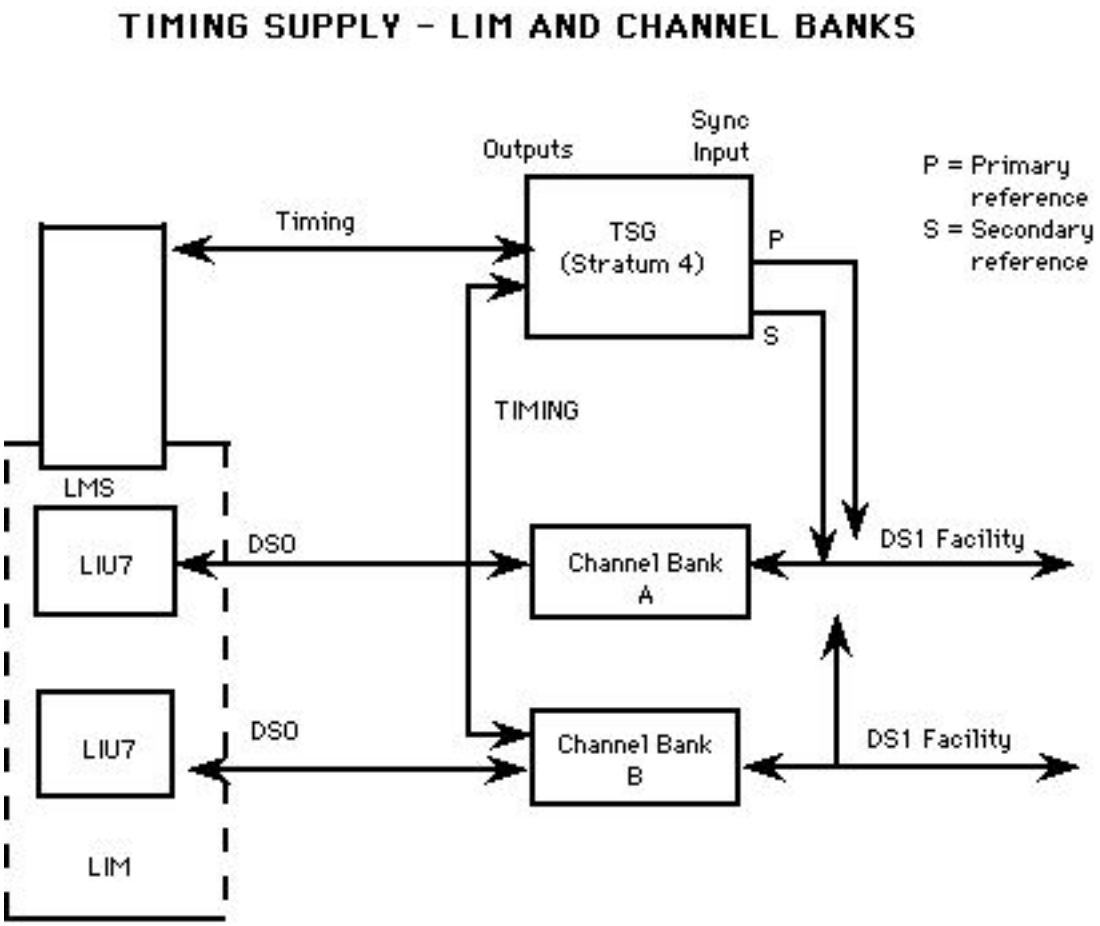

Figure 13. TIMING SUPPLY - LIM AND CHANNEL BANKS

Alternatively, the internal Timing Supply Unit (TSU) card on the channel banks could be used as the timing reference, thus eliminating the need for an external TSG. This configuration has limited application since a maximum of two LIU7s can be equipped. Timing must be interfaced directly from the two channel banks to the two DS0A Interface PBs. Only NT9X78AA type paddleboards can be used. It is not permissible to route the timing to the LMS and feed more than two LIU7s, because timing from the two channel banks will be out of phase, and two timing references are required for reliability.

It is not permitted to synchronize the LIU7s from the timing output of DTC DS0A Interface CPs. This output is present for lab test purposes only. Should a failure occur in this configuration, there would be no way to associate it at the MAP with a CCS7 link failure.

2.2.4.7 Hardware Dependencies for EIU

Not Applicable

2.2.4.8 Hardware Dependencies for MDR7

MDR7 requires the use of the Ethernet Interface Unit mounted on a Link Interface Shelf in a Link Interface Module (LIM) frame. The EIU requires a cable (NT9X0190) to the bulkhead and cabling from the bulkhead to the customer-provided Attachment Unit. This cabling is available for standard cable duct applications or for raised-floor/HVAC ductwork applications.

Either two or three slot EIUs may be used for MDR7.

2.2.4.9 Hardware Dependencies for FRIU

The FRIU on the LIM (LPP) for FRS channel access for BCS 33 or earlier includes the NTEX22AA IPF, NTEX31AA FRAP and NTEX30AAT1PB.

The FRIU on the LIM (LPP) for FRS channel access for BCS 34 or later includes the NTEX22BB IPF, NTEX31BA EFRAP and NTEX30AA T1PB.

LIS shelves on LPP frames equipped with FRIU(s) must be equipped with NT9X74DA FBUS/CBUS I/F CP.

2.2.4.10 Hardware Dependencies for DMS-PH

The DMS Packet Handler requires that the switch be a DMS Supernode equipped for ISDN and has an LPP/LIM Cabinet.

The LIS shelves on the LPP frames equipped with XLIU(s) must be equipped with NT9X74DA FBUS/CBUS I/F circuit packs.

The DMS Packet Handler also requires that the DMS-Bus be equipped with the following:

BCS LEVEL	MEMORY REQUIREMENTS
BCS-34	1 Mbytes of Memory
BCS-35	7 Mbytes of Memory

Refer to the following documents for the provisioning rules of the DMS-Bus (ECM-626 B Block Eng - Supernode In S/DMS Cabinet)

2.2.4.11 Hardware Dependencies for NIU

Inter Message Switch Links (IMSLs) are not required when NIU is provisioned on the LPP. An alternate message path already exists in the form of Inter-LMS links, and the LIM maintenance can effectively handle the associated fault conditions without provisioned IMSLs.

2.2.4.12 Hardware Dependencies for SEP

All dependencies for SSP/SP as documented in "DMS BUS Port Requirements" is applicable, with the following exceptions:

- SEP applies to Supernode offices only.
- SEP utilizes Channelized Access (NIU) interface only.

All dependencies for NIU as documented in "Hardware Dependencies for EIU" are applicable.

In addition, the following requirement must be met:

- SEP always utilizes PCM30 type CCS7 trunks (voice channels),which must have NT6X70AA Continuity Tone Detector CP's equippedin the trunk peripherals.

2.2.5 Provisioning Considerations

Refer to the appropriate Systems Engineering Bulletin (SEB) for allowable configurations based upon the BCS applied.

2.2.5.1 Signal Transfer Point (STP)

The Signal Transfer Point (STP) forms a node in a CCS7 network. The STP provides a message switching function between nodes in the network. It does not source or sink CCS7 messages. It performs message discrimination and routing along with signalling link and network management functions. The STP is configured as a mated pair interconnected by signalling links. A minimum of two links should be provisioned between mated pairs. In the event of partialor complete failure of one STP, the mate STP will provide uninterrupted message transfer for all connected signalling points.

Figure 3. A Conceptual View of The DMS-STP.

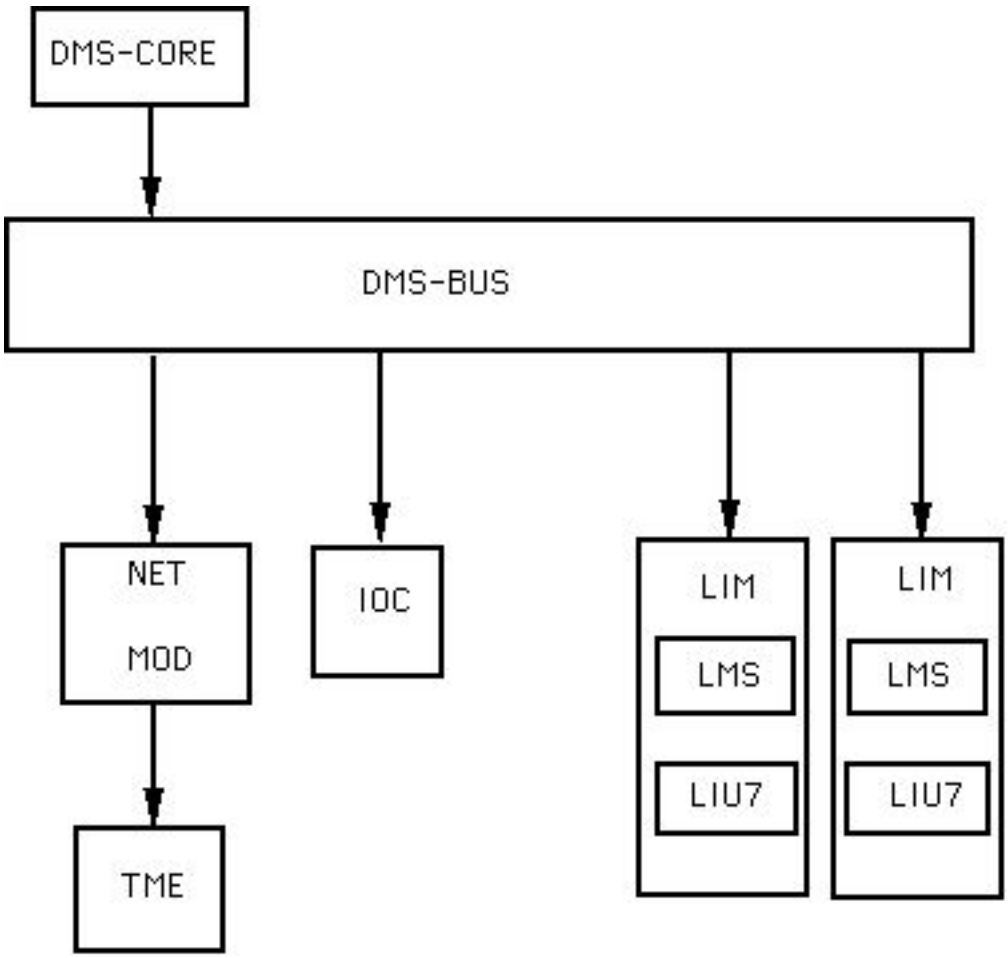

Figure 14. A CONCEPTUAL VIEW OF THE DMS STP

The individual SDLs terminate at the Link Interface Unit (LIU7). One (1) LIU7 will support one (1) SDL.

To support the signalling links, provisionable interface paddleboards are required. There are two types of paddleboards, one to interfaceV.35-protocol signalling links, the other to interface DS0A-protocol signalling links. The two types may be mixed within the LIS.

The NT9X77AA/AB V.35 Interface Paddleboard supports one V.35 signaling link. It can operate at the full V.35 rate (56 kbit/s) or at the following sub-rate speeds: 2.4, 4.8, 9.6 and 19.2 kbit/s. Optional software is required for sub-rate operation and refer to "Required Software Packages and Interdependencies" . V.35 Data Sets, if required, are to be furnished by the customer for this application. Note that

NT9X77AA is MD'd and replaced by the NT9X77AB. The NT9X77AB is ISG compliant.

The NT9X78AA DS0A Interface Paddleboard supports one DS0A signaling link. The NT9X78BA Enhanced DS0A Interface Paddleboard also supports one DS0A signaling link, but it is enhanced from the NT9X78AApaddleboard by the addition of DS0A loopback and BERT capabilities for testing purposes. The NT9X78BA and NT9X78AA only support a single transmission rate of 56 kb/s. The External Composite Clock Terminator included in the NT9X78AA CP was removed in the NT9X78BA.Provision this paddleboard only when interfacing a DS0A signalling link and when Enhanced Maintenance feature is required (BCS28or higher). Otherwise, provision NT9X78AA. Both the NT9X78AA and the 78BA are MD'd and replaced by the NT9X78DA.

The NT9X78CA Enhanced DS0A Interface Paddleboard supports one DS0A signaling link. It provides all the capabilities of the NT9X78BAplus the added feature of 56 kb/s and 64 kb/s transmission rates. The NT9X78CA paddleboard works for International Applications at 64Kbs. If the NT9X78CA is ordered for domestic applications, it can be datafilled as a NT9X78BA and does function, but it cannot provide 64Kbs rates for the domestic application. The NT9X78CArequires BCS33 and higher software along with these software packages:

- NTXN19AA - LIU7 for LPP Based CCS7 Applications.
- NTXR68AA - 64 KBIT CCS7 Link Interface he NTXR68AA allows to datafill the NT9X78CA to operate at 64KB/S.

Note that NT9X78CA is MD'd and replaced by the NT9X78DA.The NT9X78DA is provided to support the Link Fault Sectionalization Feature for DS0A.

C-Link Provisioning

C-Links are the provisioned signalling links between mated STP pairs. A minimum of two links must be provisioned and assigned as follows:

If there are two or more LIM cabinets in an office, the C-Links should be assigned to different cabinets for reliability.

If there is only one LIM cabinet in the office, the two C-Links should be assigned to a different LIS and assigned to different halves of the shelf because the two halves are powered from different feeds.

In some situations it may be necessary to provision more than two links. Enough links should be provisioned to carry all of the traffic between the two largest nodes attached to the STP. In the event of a multiple link failure, the C-Links would be required to support this traffic.

2.2.5.2 Service Switching Pt (SSP)/Signaling Pt (SP)

The LIM cabinet was introduced to support CCS7 signaling links only in Signal Transfer Point (STP) offices initially. At a Service Switching Point (SSP) or Signaling Point (SP) end office, trunk peripherals were provisioned to interface the signaling links, and MS7E frames were provisioned to perform message handling functions. This configuration is illustrated in Figure 4 . Note the requirement for nailed connections through the network between the MSB7 and trunk peripherals, thus consuming network capacity. As well, additional hardware (LTC, DTC or DCM ports) are required to interface the signaling links. The MSB7 is the limiting component in CCS7 messaging capacity.

Figure 4. CCS7 Architecture with MSB7 in SSP/SP.

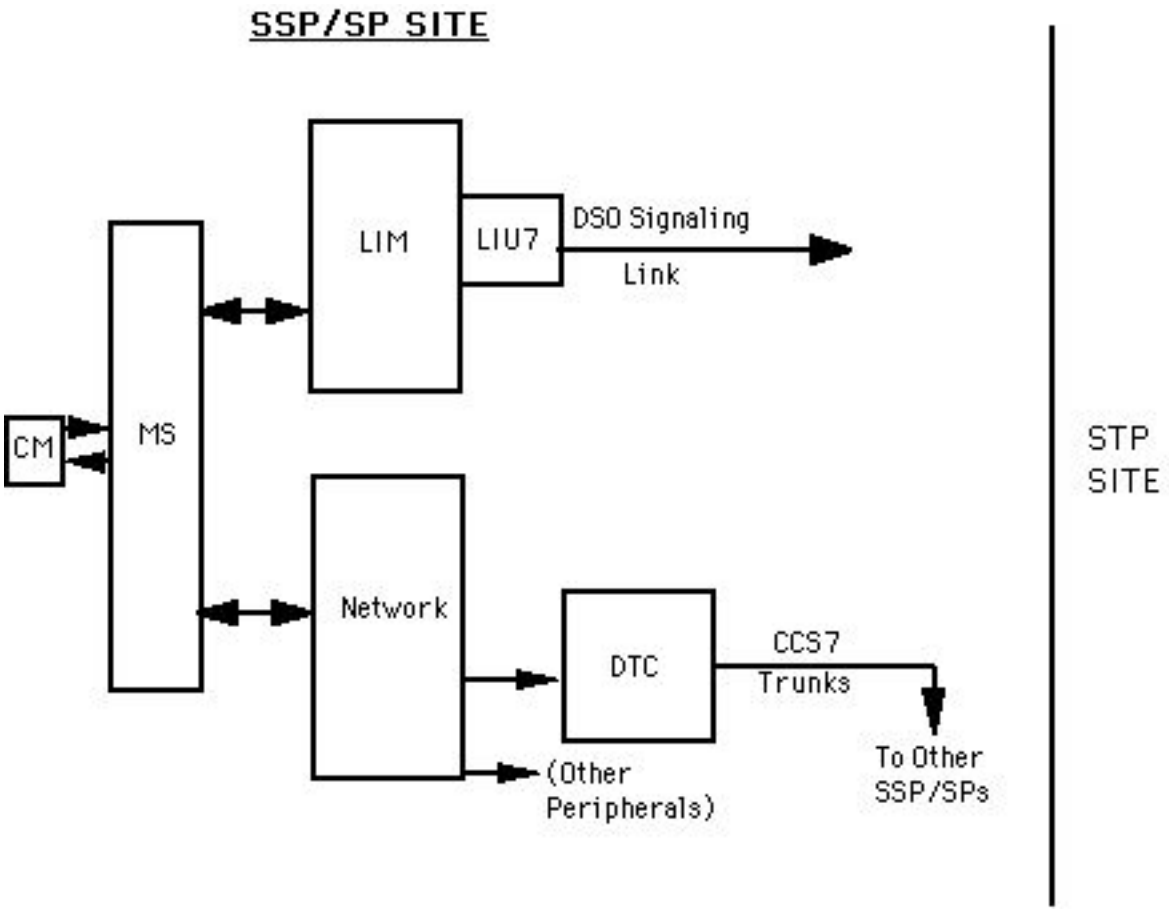

Figure 15. CCS7 ARCHITECTURE WITH MSB7 IN SSP/SP

In BCS30, software is introduced which allows the LIM to interfaceCCS7 signaling links in an SSP/SP office. This configuration is illustrated

in Figure 5 . With a junctored network, ISUP call processing messages from the LIM are routed via the MS and "bounced" off the Computing Module, then through the network to the DTC. In Enhanced Network (E-Net) applications, messages bypass the CM and are routed directly through the Message Switch.

Figure 5. CCS7 Architecture with LIM in SSP/SP.

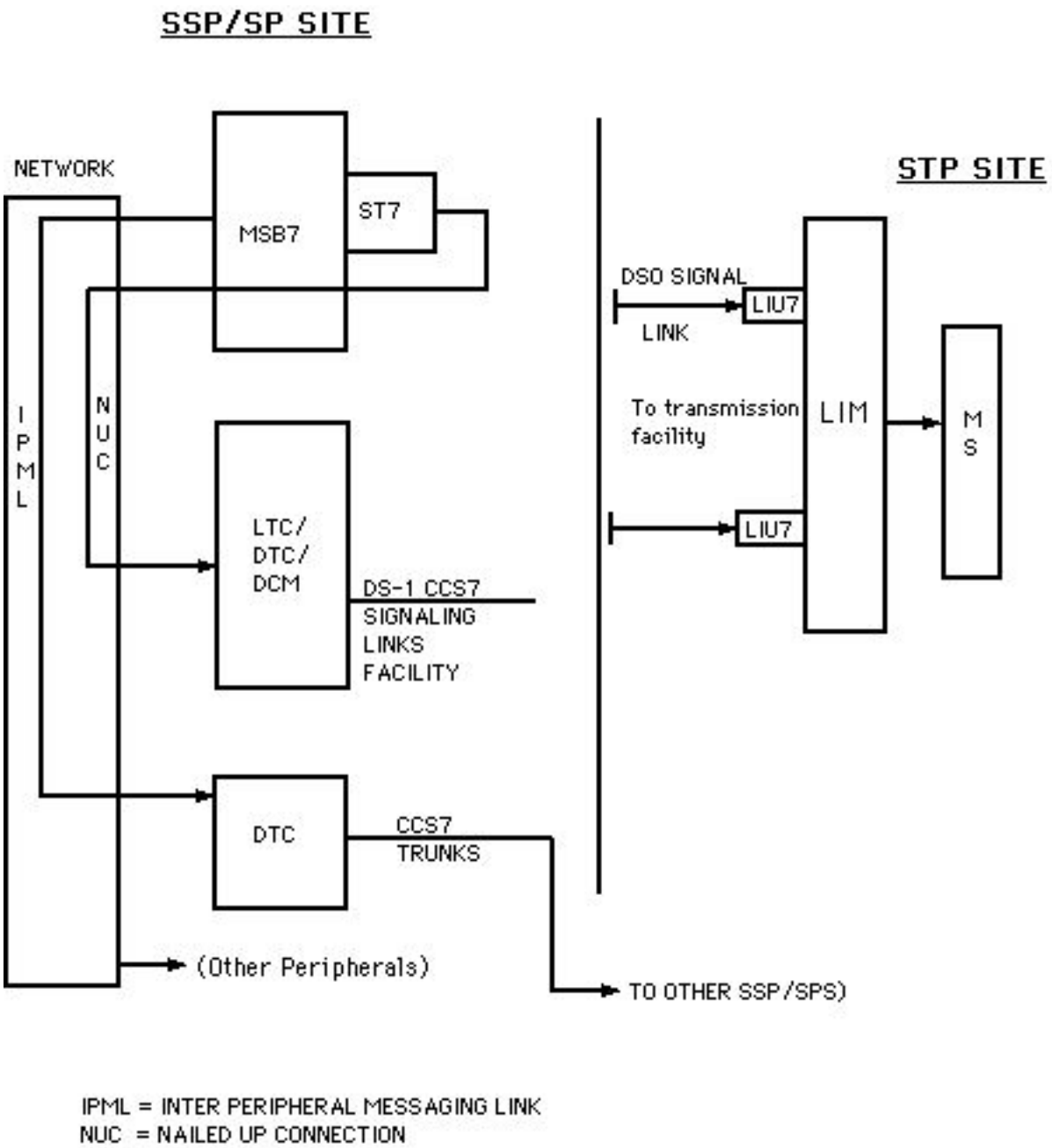

Figure 16. CCSS7 ARCHITECTURE WITH LIM IN SSP/SP

LIM hardware provisioning is the same as for STP applications. This section discusses the provisioning of signaling links and multiple LIM cabinets at the SSP/SP office.

The CCS7 Network is classified in two ways the FULLY ASSOCIATEDNETWORK and the QUASI ASSOCIATED NETWORK. The Fully Associated Network has every Service Switching Point (SSP - End Office) connected directly to the other SSPs. In this mode, the links are called F-links. The number of F-links is equal to n(n-1); where n = number of SSP nodes. The Quasi Associated Network has every SSP connected to other SSP through a Signaling Transfer Point (STP). In this case, the STPs serve as the hub for the signaling networks. The STP is configured in mated pairs. An SSP/SP is connected to the Home STP pair with A-links. The number of A-links is equal to2n; where n = number of SSP nodes. The SSP may also be connected to a Remote STP pair by E-links. Typically for SSP/SPs, it is the A or E links that are provisioned based on traffic figures.

Figure 6. QUASI-ASSOCIATED SIGNALING.

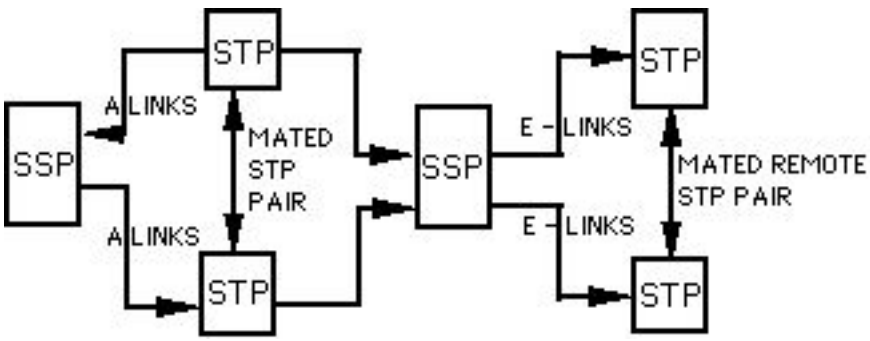

Figure 17. QUASI ASSOCIATED SIGNALING

Figure 7. FULLY-ASSOCIATEDSIGNALING.

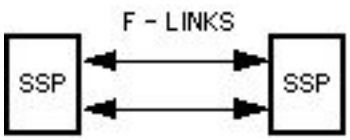

Figure 18. FULLY-ASSOCIATED SIGNALING

Provision LIM cabinets and LIU7s as required to support the calculatedquantity of links based on Traffic Provisioning.

In the case where the minimum of 2 signaling links is connected to another node, for reliability they will be assigned to different channel banks and different DS1 facilities.

2.2.5.3 Ethernet Interface Unit (EIU)

The Ethernet Interface Unit (EIU) is an interface between DMS-BUSand an Ethernet Local Area Network (LAN). This allows for supportof a variety of industry standard external communications interfaces(i.e.

synchronous, asynchronous) and attachment of computers andwork stations to the switch. It is based on the industry standardIEEE 802.3 10BASE5.

These external processors (computers and work stations) and communications interfaces make it possible to support a number of applications. Examples are: Message Detailed Recording for CCS7 Messages (MDR7)on a work station, work station based Service Control Point (SCP)database management, work station based Maintenance and Administration Position (MAP), etc.

The EIU is thus a facilitator of flexible communications between DMS and external systems. The figure below shows a DMS SuperNode interfacing with an Ethernet LAN.

Figure 8. A DMS SuperNode Interfacing with An Ethernet LAN.

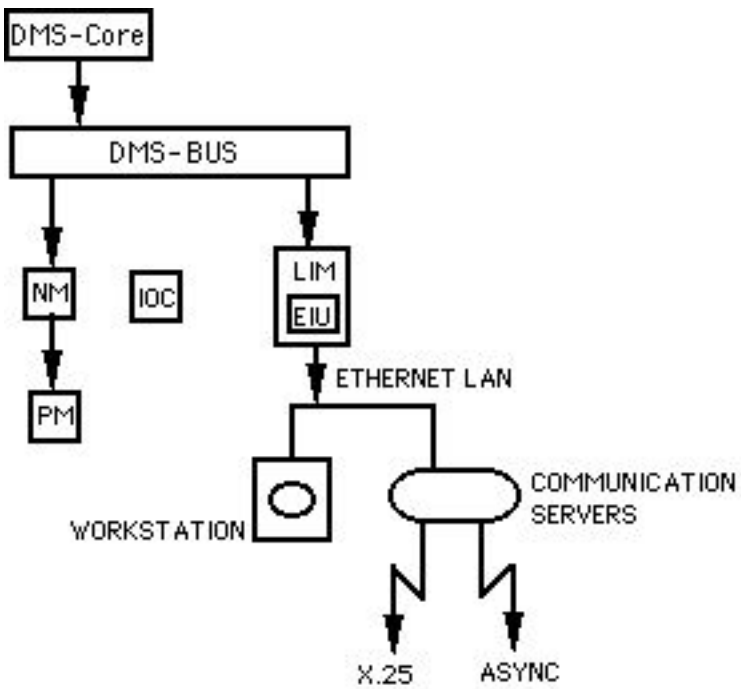

Figure 19. A DMS SUPERNODE INTERFACING WITH AN ETHERNET LAN

The Ethernet Interface Unit (EIU) acts as a "gateway" between the DMS-BUS and an Ethernet LAN supporting user data links. It acts as a concentration point between the peripherals (terminals and modems) and the DMS-BUS. The actual peripherals are not terminated on this unit, but on remote concentrators. These remote peripherals allow connection of HDLC (X.25, etc.) and asynchronous (MAP terminals, printers, etc.) terminal equipment to the system. The Ethernet also provides a linkage between DMS and workstations used for attached processing. Future

versions of the EIU will provide standard synchronous and asynchronous interfaces directly on the switch.

One of the main components of the STP is a Link Interface Module (LIM) Cabinet. An LIM cabinet containing an EIU is deployed in a DMS SuperNode to establish Ethernet connectivity. Provisioning of EIUs is application dependent. That is, the quantities required and their configuration is determined by a combination of product, software, and traffic engineering criteria.

Each EIU will support one (1) Ethernet communications link (port).The EIU consists of a three-card slot entity on the 24-Link Cabinet, and a two-card slot entity on the 36-Link Cabinet. The three-card slot EIU entity consists of the following:

- Integrated Processor and FBUS Interface CP
- Ethernet Interface CP
- Ethernet Access Unit Interface PB

The Ethernet Interface CP will support one (1) Ethernet communications link.

The EIU Paddleboard is the physical interface to the Ethernet system. It is a 25-pin D-type connector that provides the interface between the Ethernet controller and the Media Access Unit (MAU).The recommended MAU is a Hewlett Packard HP28685B (CPC A 383333).

There is an industry standard 15 pin AUI connector located at the LIS Bulkhead. This is a generic interface and is supported as an industry standard (IEEE 802.3 10BASE5 implementation). Note that this interface is compatible with ALL implementations of Ethernet through external equipment.

For each EIU, one (1) Ethernet Cable Assembly is required to cable from each EIU Paddleboard to the LIS Bulkhead. The Ethernet Cable Assembly is a cable with a 25-pin connector at one end and a 15pin connector at the other end. It cables from the EIU Paddleboard to the LIS Bulkhead.

If EIUs or NIUs are to be mounted on the 24-Link Cabinet, Provision two (2) NT9X6542 Bulkhead Plate assembly per LIS shelf which will be compatible with the 15-pin D-type connector. Note that theNT9X70AZ EIU/NIU retrofit change kit is MD'd and NT9X6542 Bulkhead Plate assembly can be used instead. For example with six (6) NT9X6542s,each half shelf in a three shelf LPP, in which all the half shelves contain NIUs or EIUs, should have exactly one NT9X6542 Bulkhead Plate Assembly.

Data Assignment Of Ethernet Addresses

One area of unique datafill pertains to the EIU. By industry convention, Ethernet addresses are to be unique everywhere. For this reason,

a 48 bit number is used. It is divided into several fields to identify manufacturers and individual units. In typical workstation applications, the Ethernet address is burned into a PROM device on the interface circuit pack.

Software allows up to four (4) EIUs per SuperNode.

EIU circuits require the assignment of a Mac address and an IP address. The Mac address is secured by the following process:

For Mac Address assignment (also known as Ethernet address), a COCOS user ID, "MAC Address" has been created for your request. The request should be made to "MAC Address "via COCOS and the following information must be provided:

CUSTOMER:
SITE NAME:
SITE ADDRESS:
SITE CLLI:
SITE/NT CONTACT:
NUMBER OF EIUs:

NOTE ON IP (INTERNET PROTOCOL ADDRESS)
IP (Internet Protocol) addresses are required for the DMS nodes including EIU if the EIU is running the TCP/IP protocol stack. The EIU running a OSI protocol stack doesn't require IP addresses.

Obtaining the block of IP addresses for the DMS based nodes (e.g., CM, EIU, APU, FP etc.) is the responsibility of the customer and is required in order to complete the configuration of the EIU and Internet Protocols on DMS. NORTEL CANNOT apply for the block of IP addresses on behalf of the customer. The reason being that the IP address belongs to whoever owns the network. Since the customer network doesn't belong to NORTEL it can't apply for the block of IP addresses on behalf of the customer. It is important, however, that the customer is notified of the IP address requirement. Should the customer not have the available IP addresses, then the customer may obtain them from the following organization:

DDN NETWORK INFORMATION CENTER
14200 Park Meadow Dr., Suite 200
Chantilly, VA 22021 USA
Phone: (800) 365-3642

Although it is not the responsibility of NORTEL to apply for the block of IP addresses (in other words Network address or id) on behalf of the customer, they do have the responsibility to tell the customer about the subnet information based on the information of the specific product on how EIU is configured for that product. The following information has to be gathered from the product specific configuration of the EIUs, in order to know or to be able to tell the customer how many subnets are required.

1. Read the product specific NTPs (for example, ADAS, DATAS,SDM, US Sprint, GSM etc.) to find out how many EIUs are required in that product.

2. Find out how they are connected to the LAN. This would provide the information on how many IP subnets are required for that product.

3. Note that DMS Supernode would have its own subnet (with a distinct subnet id) whereas EIUs in most of the cases act as a router between DMS subnet and the external LAN subnet(s) which may belong to an already existing network.

4. It should be clear at this point on how many LAN subnets are connected to the DMS via EIUs for the specific product the EIU sare being configured for. For example, The product may use 4 EIU swith each EIU on a separate LAN subnet or could be that all the EIUs are on the same LAN subnet.

5. There could be a situation where a customer already has a network. In this case there is no need to apply for a network number from NIC (Network Information Center).
   However, the following information will need to be obtained from the customer:

   - Size of the subnet bits to be used. Customer's existing Network ID.

   - IDs that are not in use but would be allocated to the DMS subnet, as well as to each one of the distinct LAN subnets, that should be connected via EIUs.

   - There could be a situation when the LAN subnets to which EIUs should be connected, already exist. In this situation the subnet IDs of those LAN subnets should be used to configure the LAN side IP address of the EIU

1. The supernode side IP address of the EIU always belongs to the DMS subnet id.

2. Similarly, the IP addresses of any node on the DMS (e.g., CM, APU, FP etc.) must belong to the DMS subnet id which is distinct from other subnet ids, including the EIU LAN subnets on the customer network. The following figure shows the number of distinct subnets required for one of the possible EIU configurations a product may choose to employ.

3. In case the customer doesn't have an existing network the number of subnet bits for a given network number allocated from NIC has to be chosen such that it caters to all the different LAN subnets the EIUs are supposed to be connected to including the DMS subnet. For example, a 2 bit subnet would only cater for two distinct subnet ids. One of them would be used for DMS subnet and the other one for the LAN side subnet of the EIU. This would restrict to connect another EIU on a different LAN subnet because of unavailability of

another distinct subnet id. But still it would be possible to connect other EIUS, if required, to the same LAN subnet.

Figure 9. Possible EIU Configuration.

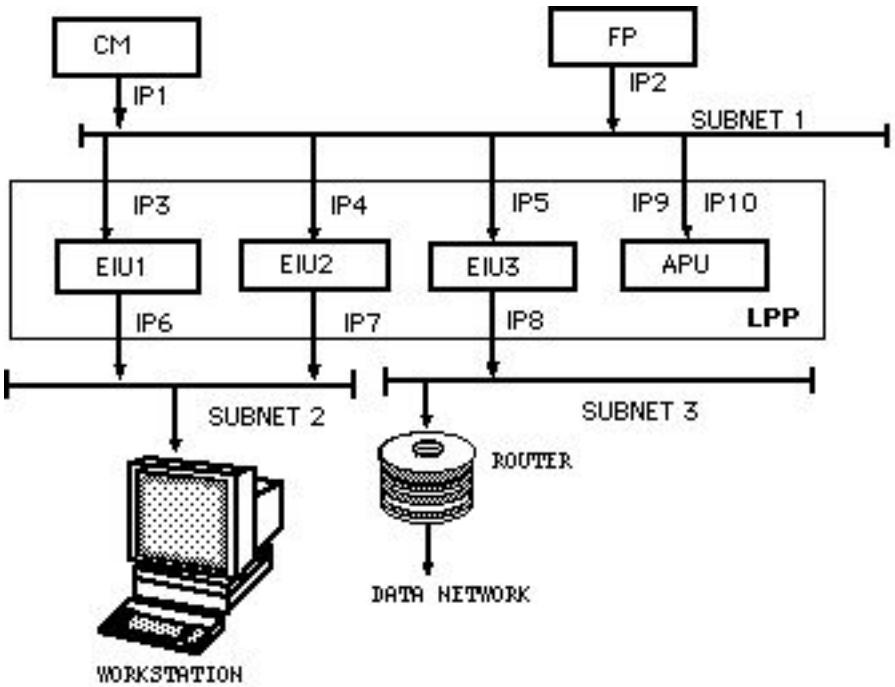

Figure 20. POSSIBLE EIU CONFIGURATION

In the above example the Ethernet side of the 2 EIUs (EIU 1 and EIU 2) are connected to the same subnet, i.e., subnet 2 and EIU3 is connected to the subnet 3. Therefore, Ethernet (LAN) side IP addresses of EIU 1 and EIU 2 must belong to subnet 2 and forEIU 3 it must belong to subnet 3. It means IP addresses IP6 andIP7 belong to subnet 2 and IP address IP8 belongs to subnet 3.The DMS side IP addresses of the EIUs and the IP addresses of all the other nodes (as shown in the diagram) belong to the DMS subnet, i.e., Subnet 1. Therefore, IP address of CM (IP1), FP(IP2) and APU (IP9 and IP10) must belong to DMS subnet, i.e., Subnet 1.

In summary, the following information shown is required before datafilling the tables mentioned later. The IP addresses for each one of the nodes would be derived from the information gathered so far.

Item 1: Network id or Network Address
Purpose: To know which customer network the DMS is going to be configured on. It would also reveal the IP address class of the network.

Item 2: Number of subnet bits or subnet mask

Purpose: The number must be the same as already being used in the customer network. Or for new LANs it would depend on how many different subnets are required. Please refer to the Product Specific NTP for the EIU connections to the LAN(s).

Item 3: Subnet numbers or ids
Purpose: One subnet id for DMS and other subnets depending on how many different LANs the EIUs are going to be connected to. Please refer to the Product Specific NTP for the EIU connections to the LAN(s).

Item 4: Host ids
Purpose: One distinct id belonging to a particular subnet for each node on a DMS. An EIU requires two host ids, one for the LAN side and the other for the DMS side subnets.

For IP address datafill requirements refer to tables

NTP-297-1001-451 Customer Data Schema

Internet Protocol Network Table (IPNETWRK)
Internet Protocol Subnet Router Table (IPROUTER)
Internet Protocol SuperNode End Host Table (IPHOST)

Job Aid: A NON-RES tool called IPTRACE (Module IPPTFCI) contains the commands to:

i) calculate IP address given Class, Network id, Subnet id, and Host id, and
ii) calculate Class, Network id, Subnet id, and Host id given IP address and subnet bits.

2.2.5.4 Message Detail Recording (MDR7)

The delivery of advanced network services often requires the interaction of multiple CCS7 networks and the use of resources owned by several telephone operating companies and/or their customers. As a conduit for internet work CCS7 traffic, the DMS-STP provides a centralized location for the collection of statistical information that can be used for usage sensitive CCS7 services.

The CCS7 Message Detail Recording feature allows the telco to capture the detailed CCS7 message signaling units (MSUs) being transported in the CCS7 network. Information provided by this feature in turn supplies data that allows recording of services or allocations of resources among networks that interwork to deliver advanced network services.

MDR7 uses the DMS-STP Gateway Screening feature (NTX840AA is a prerequisite) to identify which messages are to be tracked. The feature then takes a snapshot of the MTP, SCCP, and TCAP (or ISUP)of the CCS7 message and sends the snapshot across the DMS-Busto the appropriate EtherNet Interface Unit (EIU), a 68020-basedIEEE 802.3 interface card that resides in the LPP cabinet. The EIU routes the snapshot over an EtherNet

LAN to a customer-provided store-and-forward processor (SFP), where it is processed as required and then forwarded to the customer's mainframe computer. Refer to the EIU Section for EIU provisioning information.

The physical interface to the Ethernet system is the NT9X85AAEthernet Access Unit Interface which provides the interface between the Ethernet controller and the Media Access Unit. This interface is compatible with all implementations of Ethernet through external equipment.

2.2.5.5 Frame Relay Interface Unit (FRIU)

The Frame Relay Service (FRS) is a new high speed, connection oriented, switched packet data service. DATASPAN is the Nortel trade name for this service.

Customers may use Frame Relay Service to transfer data in packetized format from one location to another via a Datapath connection,a DDS (Digital Datapath Service) channel, or from a LAN via aT1 line.

Datapath is a Nortel feature on the DMS 100 or DMS 250 providing dial-up data circuits operating at 56 kbps. DDS is anAT&T developed private line digital data service operating at 56 kbps. Token Ring and Ethernet are types of LAN (local area networks) for connecting computer peripherals together. All these types of data services can now be connected using Frame Relay Service to transmit and receive data.

Figure 8 shows the connections of thesetype services to a DMS-100. A Datapath subscriber is connected through the DMS switching network to a FRS access channel as shown in Figure 10 . DDS subscribers must bemultiplexed on to a T1 line which can be connected directly to an FRS access channel. A LAN can be connected via a non-channelizedT1 line directly to a FRS access channel.

Figure 9 shows the connections of these type services to a DMS-250. Datapath subscribers access channels would terminate on a DTC for switching through the DMS network to a FRS access channel. DDS and LAN access is the same as the DMS-100.

FRS is available on the DMS-100 LEC (Local Exchange Carrier) and the DMS-250 IEC (Inter Exchange Carrier) from BCS 32 and beyond.

An FRS subscriber is connected to the frame relay switch via an access channel on which multiple logical link connections (LLC)to a number of other subscribers may exist. Each logical link connection operates independently of other logical links on the access channel.

The types of connections allowed are:

* Private - Customer FRS agent (logical link) to another FRS agent owned by the same customer.

* Non-private - Customer FRS agent to another FRS agent owned by a different customer.

Each logical link permits a full duplex exchange of frames and the order of frames is preserved in each direction. FRS limits the maximum frame size to 1600 bytes.

The initial release of FRS supports only permanent logical link connections (PLLC) which are set up at Telco subscription time. The throughput on a single logical link connection can be in excess of 1 megabit/second with an internal switch one way transit delay less than 3 ms. The three access channel speeds supported in the initial release are :

1. 56 kbps over DATAPATH and DDS circuits.

2. 1.344 Mbps SF over T1 line (non-channelized) circuits

3. 1.536 Mbps ESF over T1 line (non-channelized) circuits

DATAPATH Support: DATAPATH provides access via a local loop, a DMS remote peripheral, or a D4 channel bank. DATAPATH uses the DMS hotline feature to automatically connect the DTE to the frame relay service when the DTE comes on line. Only 56 kbps rates will be supported. T-link sub-rate encoding is not supported. The customer is required to use the High Speed Data Unit (HSDU) which supports the V.35 physical interfaces. Refer to ECM 270, Datapath ModemPooling.

DDS support: Digital Data Service (DDS) is an AT&T developed private line digital data service. Only the 56 Kbps non-error correcting form of this service will be supported. Individual DS0 must be multiplexed onto a T1 prior to connecting to Supernode. A maximum of 24 56 kbps access connections are supported on a single T1 access circuit.

Non-channelized T1: The non-channelized mode uses all 192 bits of information in a T1 frame to carry data associated with a singleframe relay frame.

All customer access protocols must use HDLC framing plus either LAPB/SDLC or LAPD logical link identification.

Dataspan T1 Trunking

Separate LPP cabinets in the Dataspan network can be connected via non-channelized T1 trunks. The trunks can connect LPP cabinets in the same office or in two different offices. These trunks are in trunk groups. The trunks can be of two types, standard or enhanced. The trunk groups can be of two types, shared or non-shared.

Standard trunks offer a basic node-to-node transport medium using the frame relay standard as it exists today (the ANSI T1S1 standard).They are connected to suppliers of end office equipment other than Northern

Telecom, and could be used to expand the network to areas not serviced by DMS Supernodes. Standard trunks may not be placed in trunk groups of more than one member.

Enhanced trunks offer the standard service plus a fault resistant capability. Enhanced trunk members may be grouped together into trunk groups of more than one member, and connections can be given a secondary route over a separate trunk member within the group. Connection duplication greatly improves reliability, and allows a trunk member in a multiple member group to be taken out of service for maintenance without seriously disrupting service for customers. Because of this enhancement, end-to-end sequencing of frames is done; that is; frames are guaranteed ordered from one access point to the eventual destination even in the case of trunk member failure(although with perhaps some frame loss).

A shared trunk group has members which may carry frames belonging to any customer who purchases connections across the trunk.

A non-shared trunk group is one in which all of the connections assigned to the group belong to a single customer. This customer, in effect, purchases the trunk group for his own private use.

Connections using trunks may be datafilled in such a way that they are tandem to an office. With this ability, a network need not be engineered to have maximum connectivity.

The enhancement of DataSPAN (Frame Relay Services) for FractionalT1 and ESF support is accomplished through the introduction of the EFRAP (ESF Frame Relay Applications Processor) circuit pack. The EFRAP replaces the FRAP introduced in BCS 33 as part of the FRIU (Frame Relay Interface Unit). The EFRAP, like the FRAP, is mounted on the LPP(LIM).

Fractional T1 supports four 384 Kbs hyper-channels for end-user access. With fractional T1 access, end-users who require greater than 56 Kbps for access, can also select a 384 Kbps channel to support their applications. Any unused T1 channels cannot be used for voice services. The DataSPAN product requires that the T1carry only data.

Figure 10. DMS-100 LATA Access.

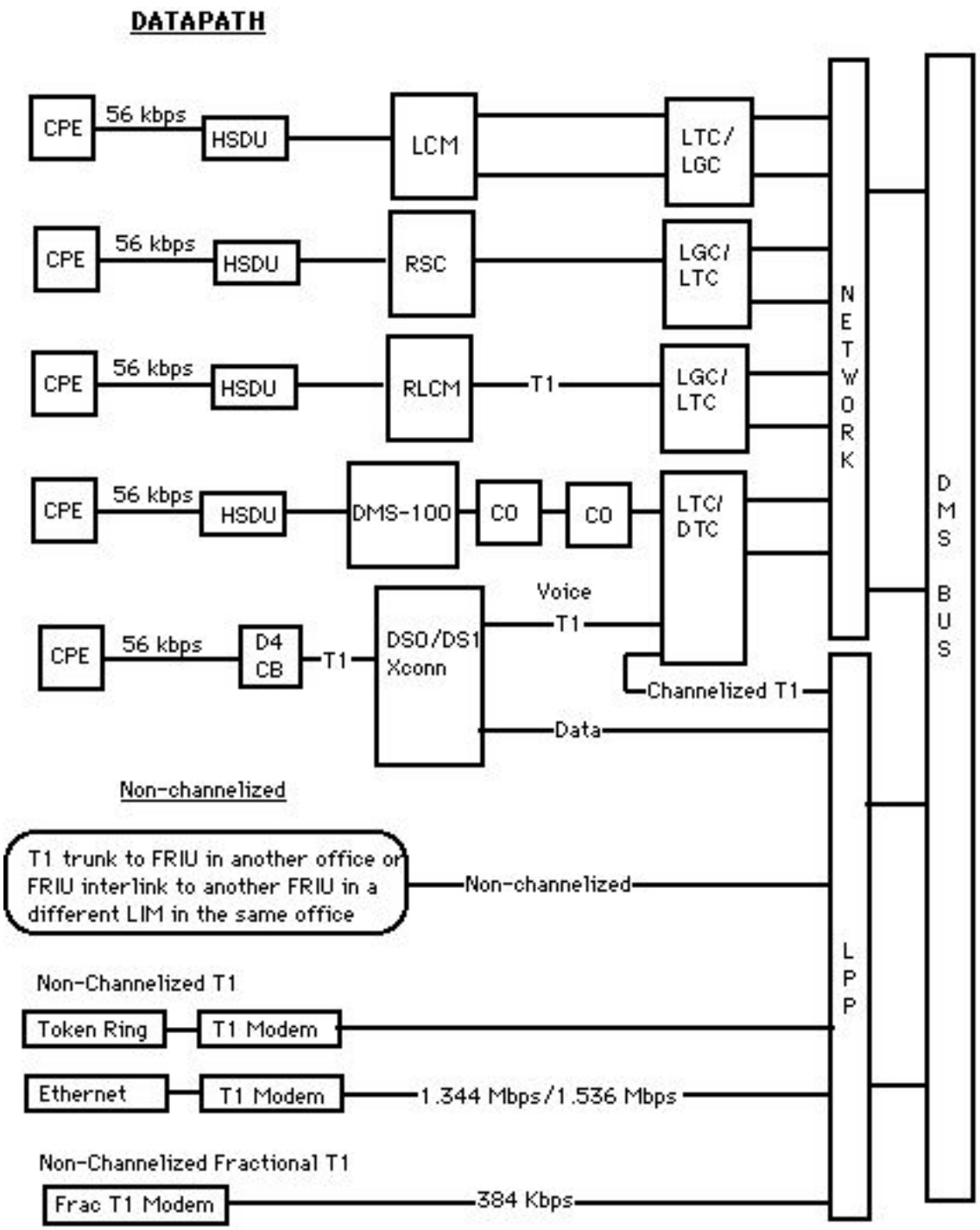

Figure 21. DMS-100 LATA ACCESS

Figure 11. DMS-250 Access.

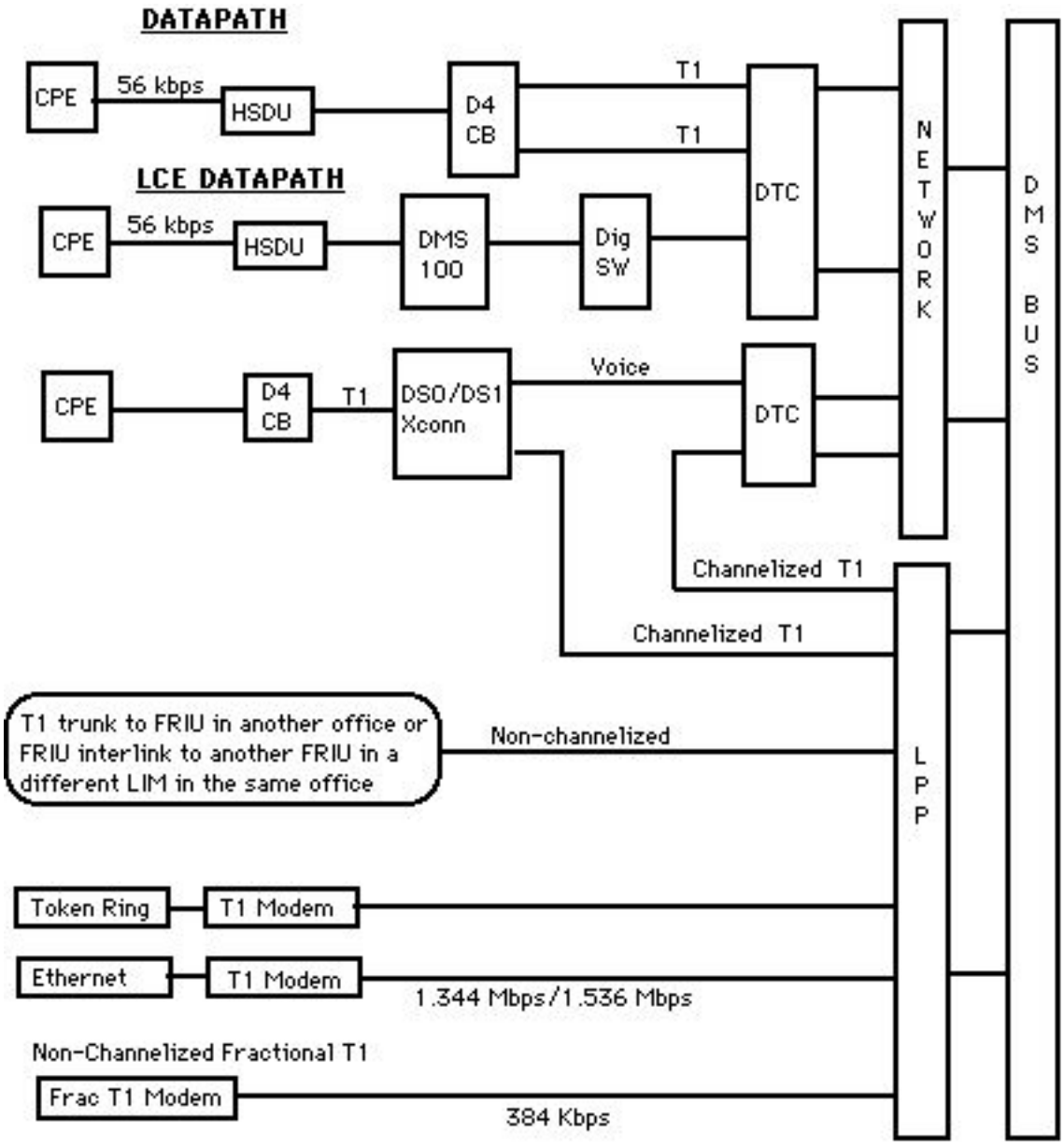

Figure 22. DMS-250 ACCESS

Figure 12. Datapath Connection to FRIU for Frame Relay Service.

Figure 23. DATAPATH CONNECTION TO FRIU FOR FRAME RELAY SERVICE

Connection of the DATAPATH line to the FRIU is accomplished via the hotline feature. The FRIU channel is assigned a DN in a single member trunk group for this purpose.

2.2.5.6 Network Interface Unit (NIU)

The NIU is made up of the following cards as shown in Figure 13 . The left unit, UNIT:0 uses the CBC NTEX25AA CP while the right unit, UNIT:1 uses the NTEX25BA CP.

Figure 13. Network Interface Units (NIUs).

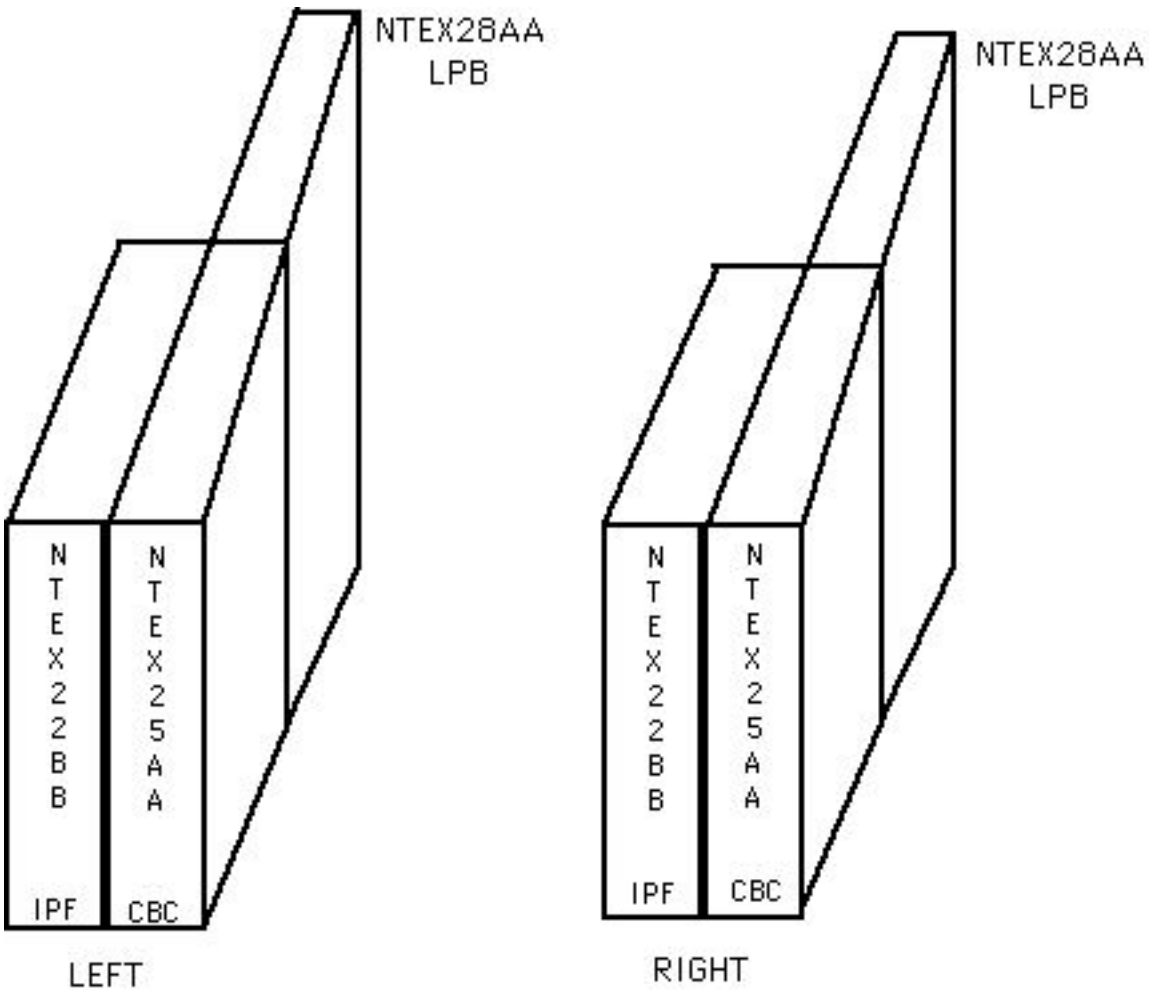

Figure 24. NETWORK INTERFACE UNITS

Provide one (1) NTEX25AA for the left unit, UNIT:0 and one (1)NTEX25BA for the right unit, UNIT:1 for each LIS shelf that requires channelized

access. The Channel Bus Controller (NTEX25AA/BA) does plane selection and controls the CBUS. The Channel Bus Controller(CBC) also receives and transmits data to and from the CBUS and the DMS network.

Provide two (2) NTEX28AA per LIS shelf (one for each unit). The Link Interface Paddleboard (NTEX28AA) interfaces four (4) DS-30links and also interfaces to both CBCs (Channel Bus Controllers).

Provide two (2) NTEX22BB per LIS shelf (one for each unit). The Integrated Processor and FBUS I/F is an integration of the NT9X13CAand NT9X75AA developed for LIU shrink.

Provide two (2) NT9X7021 Inter CBC Cable Assemblies per LIS shelf. These cables interconnect the two (2) Link Interface Paddleboards(NTEX28AA). The Inter CBC cabling enables each of the two (2)CBC cards (NTEX25AA/BA) to receive and transmit data to both planes of the network and also to pass status information between the CBCs in order to perform activity switching.

Provide four (4) NT9X7020 DS-30 Cable Assemblies per LIS shelf. Each cable connects an LPB (NTEX28AA) to its designated position on the bulkhead. The DS-30 cable connection allows the transmission of data from the network over four (4) DS-30 links.
The network data is transferred to the Channel Bus Controller (NTEX25AA/BA) through the LPB.

Figure 14. NIU Cable Connection

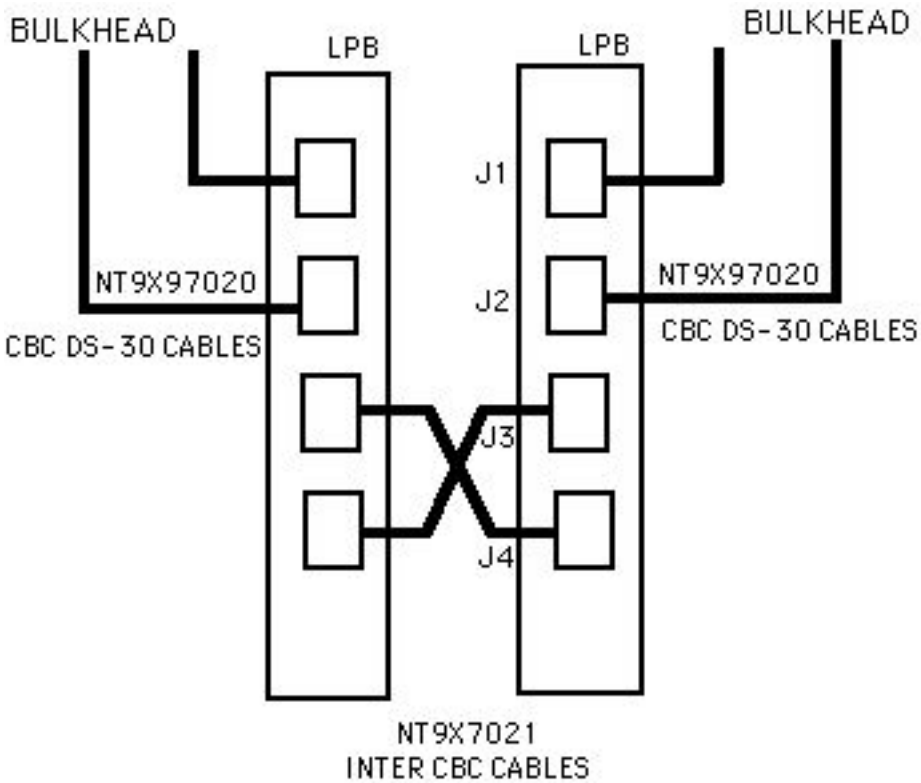

Figure 25. NIU CABLE CONNECTION

The NIU occupies the middle of the LIS shelf as shown in Figure 15 .The NUI consists of two units, UNIT:0 and UNIT:1.
Provision one NIU for each LIS shelf that requires channelized access up to a maximum of three (3) for each LPP cabinet.

Note that NT9X70BA has been MD'd and it is replaced by NT9X70BB.

Figure 15. 24 Link LPP (3-slotLIU) and 36 Link LPP (2-slot LIU)

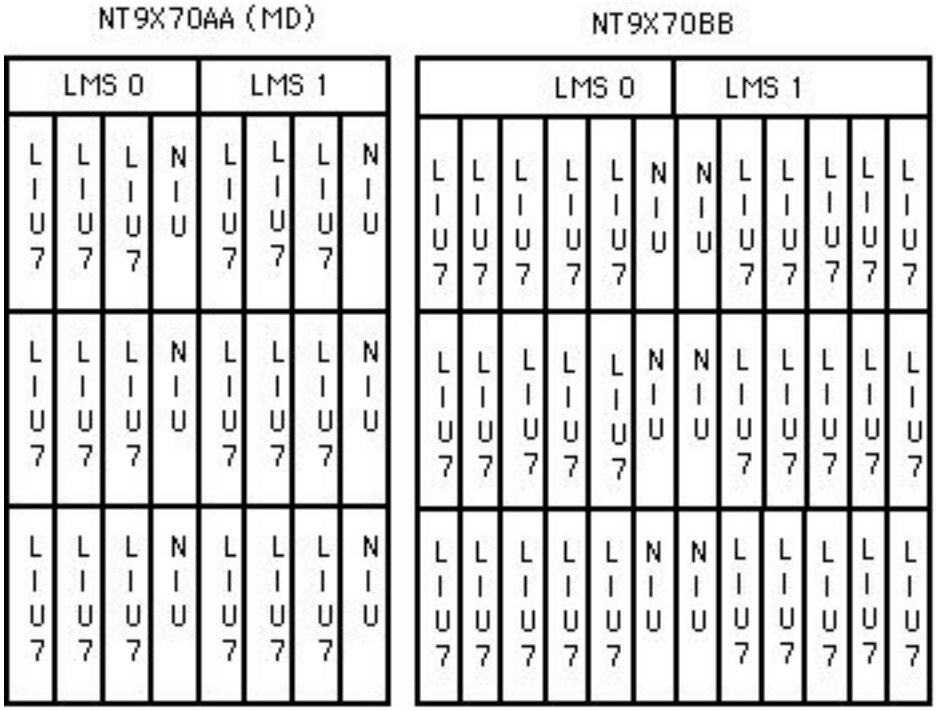

Figure 26. 24 LINK LPP (3-SLOT LIU) AND 36 LINK LPP (2-SLOT LIU)

2.2.5.7 DMS Integrated Packet Handler (DMS-PH)

Presently, packet services are provided by the DPN-based Packet Handler (DPN PH) which is connected to the DMS via DS1 links. The DMS Packet Handler (DMS PH) is being introduced to provideX.25 packet service for DMS-100 Integrated Services Digital Network(ISDN) as an integral component of the DMS Switch.

The DMS PH is based on the Link Interface Module (LIM) platform. The LIM provides the protocol processors required for packet switching. It relies on the common DMS operations, maintenance and provisioning systems to provide all OAM functions. To provide for simplified and consistent call services, the DMS PH will rely on the Call Processor of the DMS-Core to provide functions such as Digit translation and Hunt Group processing.

The DMS PH uses two types of Application Specific Units (ASU). These are the XLIU and the NIU, and are detailed as follows:

A) The X.25/X.75 Link Interface Unit (XLIU) provides interface to the X.25/X.75 Protocols. The XLIU handles physical, data link, and network level protocol services. One (1) Link Interface Shelf(LIS) will support up to ten (10) XLIUs; up to a maximum of thirty(30) XLIUs per LIM Cabinet. However, the configuration of only twenty four (24) XLIUs with

6 NIUs have been verified in the LPP cabinet (Refer to SEB 92-02-001). For example with 6 NIUs, eachshelf in a three shelf LPP, in which all the shelves contain XLIUs, should have exactly 8 XLIUs.

In order to keep Packet Handler traffic off the DMS-Bus, all the XLIUs must be located in the same LIM Cabinet.

Each XLIU should be provisioned using the following rules:

1. Traffic load of 130 DPPS when BCS < 35.

2. Traffic load of 150 DPPS when BCS = 35.

3. Traffic load of 160 DPPS when BCS > 35.

4. Maximum of 512 X.25 D-channel terminals.

5. Maximum of 31 DS-0 channels where each DS-0 can carry:

    - one (1) X.75/X.75' trunk, OR
      one (1) B-channel port, OR
      up to sixty-four (64) D-channel terminals

The XLIU must be provisioned for either X.25 lines or X.75/X.75'trunks. For X.25 service, a mixture of B-channel and D-channel terminals can be provisioned on the same XLIU. Each B-channel port consumes one of the 31 XLIU channels. D-channel terminals can be statistically multiplexed at a ratio of up to 64 on each XLIU channel to the maximum of 512 per XLIU. Similarly, both X.75and X.75' trunks can be terminated on the same XLIU, one trunk for each XLIU channel. Traffic should be estimated on a per channel basis and then channel allocation may be done on a per XLIU basis(Refer to SEB 90-05-002).

Each X.25/X.75 Link Interface Unit (XLIU) occupies two slots on the LIS and is composed of the following:

Integrated Proc and FBUS I/F (IPF)
HDLC Frame Processor (HFP)
CBUS Interface Paddleboard (CIP)

B) The Network Interface Unit (NIU) allows the LIM to be connected to the switching network such that the Application Specific Units(ASU) can have direct access to network channels.

The NIU must be provisioned for each LIS shelf containing any XLIUs. The NIU must be assigned to the CP position specified. Other applications (LIU7, EIU, FRIU, etc) shall be relocated if the need arises.

One (1) NIU will support ten (1O) XLIUs. One (1) Link Interface Shelf (LIS) will support one (1) NIU; up to a maximum of three(3) NIUs per LIM Cabinet. However, the NIU can only mount on a Link Interface Shelf (LIS) that has been equipped for Channel Bus (Cbus) Access. This is accomplished by equipping the LIS with the NT9X74DA, FBus Repeater CP.

The Network Interface Unit (NIU) consists of two units calledUNIT:0 and UNIT:1. UNIT:0 provides the interface to Network Plane:0and UNIT:1 provides the interface to Network Plane:1.

UNIT:0 of the Network Interface Unit (NIU) is composed of the following:

Integrated Proc and FBUS I/F (IPF)
Channel Bus Controller (CBC) Unit 0
DS30 Link Interface Paddleboard (LPB)

UNIT:1 of the Network Interface Unit (NIU) is composed of the following:

Integrated Proc and FBUS I/F (IPF)
Channel Bus Controller (CBC) Unit 1
DS30 Link Interface Paddleboard (LPB)

C) Provide four (4) DS-30 Links per Switching Network Plane for each NIU provisioned.

The DMS Packet Handler also requires that the DMS-Bus be equipped with the following:

BCS Level	Memory Requirements
BCS-34	10 Mbytes of Memory
BCS-35	7 Mbytes of Memory

Refer to the following documents for the provisioning rules ofthe DMS-Bus:

ECM-626 BBlock Eng - Supernode In S/DMS Cabinet

2.2.5.8 Channalized Access

LPP (Link Peripheral Processor) channelized access provides access to the LPP over the network without the need of an external OEM Channel Bank. An OEM channel bank was previously required to interface56/64 Kbps LIU7 to the PCM30.

Channelized access on LPP are supported on both the 2 slot and3 slot LIU shelves.
Channelized Access also provides the advantage of LIU sparing and also increases the number of applications available through the LPP.

The LPP interface to the network is provided by the Network Interface Unit (NIU). The NIU is a warm spared peripheral with a DS-30 interface towards the network with the Channel Bus (CBUS) on the LIU7 side. LIUs that reside on a shelf with NIUs (plane 0,1) can have accesst o the CBUS through the Channel Bus Interface paddleboard and thus to the DMS net-work. The NIU must be provided on all shelves where channel access is required, as the CBUSs are not extended between shelves.

Provision up to a maximum of six (6) LIUs per shelf for the MD'd3-slot LIU LPP cabinet (NT9X70AA) or 10 LIUs per shelf for the2-slot LIU LPP cabinet (NT9X70BA/BB) for an LPP requiring channelized access as shown below.

Figure 16. LIU configuration requiring channelized access

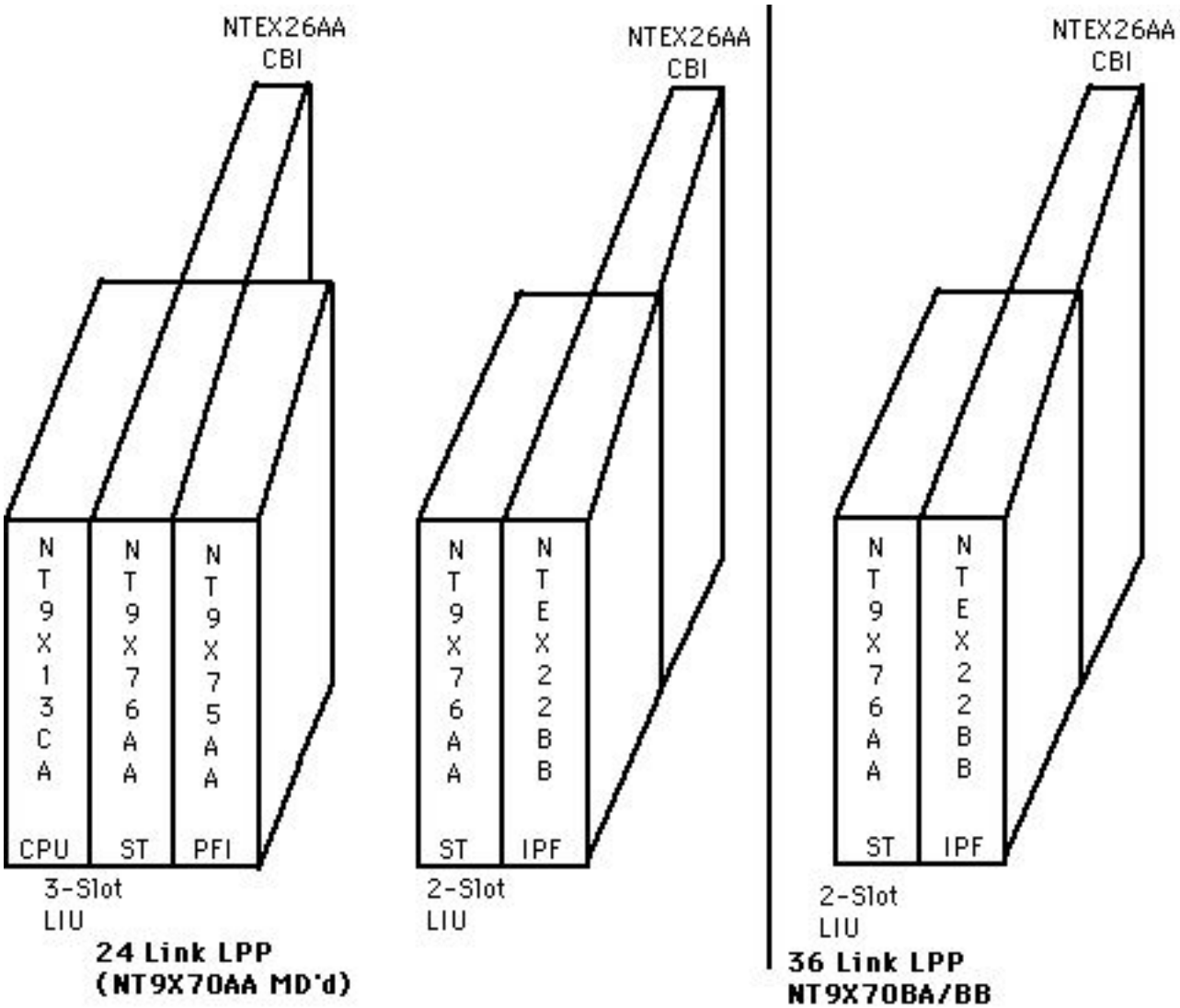

Figure 27. LIU CONFIGURATION REQUIRING CHANNELIZED ACCESS

Provide one (1) NTEX26AA for each LIU requiring channelized access. The Channel Bus Interface Paddleboard (NTEX26AA) provides an interface from the CBUS to the ST (Signaling Terminal) card (NT9X76AA),and hence, does not have any external cable connections to it. When in receive

mode, the CBI selects data from the CBUS, selects the proper channel then transfers the data serially to the NT9X76AA.In transmit mode, the CBI drives the proper channels on both CBUSs. The CBI also provides CBUS functions related to fault detection and isolation.

Provide one (1) NT9X76AA (ST) card for each LIU.

OR

Provide one (1) NT9X76CA (TTC7 ST) card for each LIU when 48Krate ISUP capability is required for SEP applications.

The only paddleboard that can be used with the NT9X76CA type LIU7is the NTEX26AA. This is because the only application that theNT9X76CA can be used for is a Channelized Access application. That is, the ISUP SEP LIU7 can only be used on a shelf that the NIU has been provisioned on.

AND

Provide one (1) NTEX22BB Integrated FBUS I/F card for each 2-slot LIU as shown in Figure 16 . In the MD'd NT9X70AA cabinet, a 2-slot LIU may replace a 3-slotLIU and function alongside existing 3-slot LIUs.

To replace a 3-slot LIU in NT9X70AA, provision a 2-slot LIU, and add one (1) NT9X19AA Filler pack in addition to all the items provided for a 2-slot LIU.

Provide two (2) NT9X74DA per LIS shelf, one (1) at each end of the shelf for channelized access. This CBUS Repeater/Terminator Card (NT9X74DA) provides terminations for the intra shelf CBUS.

Channelized access on the LPP is available for the following applications:

- SSP - Service Switching Point
- ISDN - Integrated Packet Handler
- SEP - Signaling End Point

2.2.5.9 Signaling End Point (SEP)

The Signaling End Point (SEP) in the Japan network is equivalent to an SSP/SP in the North American network operating in the Quasi-Associated Signaling mode, as shown in Figure 7 .The signaling data links and their end points share the North American terminology; for example, A-Links and STP.

The SEP always includes Channelized Access (NIU) as the interface to the LIU7. SEP functionality is known as Japan ISUP in NORTEL documentation.

All provisioning considerations for SSP/SP and NIU, as documented in "Service Switching Pt (SSP)/Signaling Pt (SP)" and "Network Interface Unit (NIU)" ,are applicable, with the following exceptions:

- SEP utilizes the 36 link LPP (NT9X70BA and newer vintage)only
- SEP utilizes NT9X76CA instead of NT9X76AA in the LIU7 cardset (refer to Figure 17 .)
- SEP LIU7/SDL signaling rates and protocols are different from North American rates and protocols, therefore use NTP 297-5121-101Jto verify planned link quantities.

Figure 17. LPP with Channelized Access

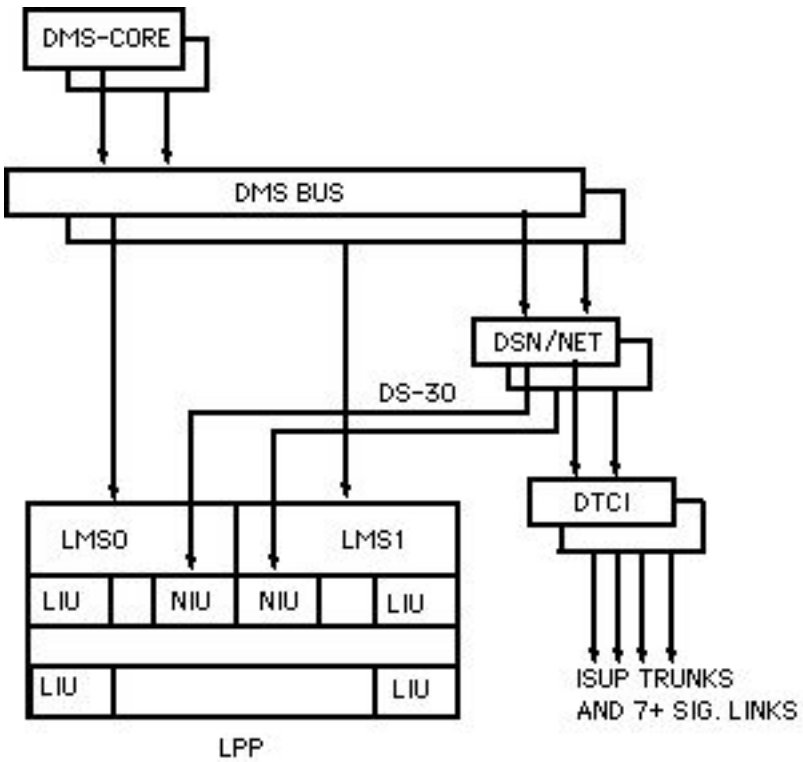

Figure 28. LPP WITH CHANNELIZED ACCESS

2.2.6 Office Layout Information

Refer to ECM626 for office layout restrictions when this cabinetis applied in a stand alone lineup.

Refer to ECM600 for office layout restrictions when this cabinetis applied in a DMS-100 Cabinetized lineup.

2.2.6.1 DS-30 Port Spread For LIM

Two DS-30 ports are connected from each LMS (LMS0 and LMS1) to each MS (MS0 and MS1) as shown below. Each MS port is shown with the specific port on the specific LIM cabinet to which it connects. For example:

LMS1 01 indicates LMS Side 1 LIM 01 29R-0 CP Pos 29R Port 0

Additional LIM cabinets will be connected to additional DS-30port cards using the same pattern as shown below:

The Local Message Switch Cross Connections via NT9X0171 cableare done by connecting:

- LMS0 00 9R-2 connects to LMS1 00 30R-2.
- LMS0 00 10R-2 connects to LMS1 00 29R-2.

Note that the Port 3 on all NT9X23BAs in the LMSs are not used.

Figure 18. MS DS-30 Port Connections For Two LIM Configuration

Figure 29. MS DS-30 PORT CONNECTIONS FOR 2 LIM CONFIGURATION

2.2.7 Traffic Tables

Refer to the following SEBs:

- 9 -02-001 LPP and FLIS Mixed Application Provisioning Rules.
- 9 -11-002 LIU7 Throughput and Capacity.
- 9 -07-002 DataSpan Traffic Engineering Rules.
- 9 -06-001 LPP on SSP Performance.
- 9 -05-002 DMS-100 Capacity Management Guidelines For ISDN
- 9 -04-001 Common Channel Signaling#7 (CCS7) Product Performance
- 9 -08-001 MSB7 Throughput and Capacity Update.
- 89-09-001 MSB7 Traffic Capacity Test.

For SEP, refer to the following NTP:

297-5121-101J DMS SuperNode Signaling End Point Planning and Engineering Guide

2.3 Product/System Specification

2.3.1 Physical Characteristics

MECHANICAL DIMENSIONS

Height 72in. Width 42in. Depth 28in.

Weight 1400lbs. (Full)

2.3.2 EMI/Earthquake Information

No additional bracing or stiffening hardware will be required for the enhanced cabinet in normal installations. The cabinet must be bolted to the floor in four (4) places through anchor holes provided in the base of the cabinet. When the cabinet is bolted in place, the optional leveling feet must not be installed. Leveling will be accomplished through the use of non-conductive shims.

For raised floor installations, a sub-structure support between the concrete sub-floor and the raised floor will be required. A qualified seismic engineer should be consulted regarding the required additional bracing.

2.3.3 Sparing Information

Use standard sparing algorithms for all applications on the LIM, unless otherwise specified in a 4.3 sub-section.

2.3.3.1 Sparing Information for STP

FOR U.S. OFFICES - use standard sparing algorithms to determine spare equipment quantities.

FOR CANADIAN OFFICES - provide spares for the STP unique circuit packs as follows. Note: these quantities are based on a 95% confidence level and a turnaround time (T) as shown. Sparing for the remaining LIM circuit packs and the DMS-Core circuit packs is calculated using standard sparing algorithms or PAQS100.

QUANTITY OF SPARES			
PEC	QUANTITY	T = 480 HRS	T = 720 HRS
NT9X73AA	2-6		1
NT9X73AA	8-34		2
NT9X73AA	2-10	1	
NT9X73AA	1 -34	2	
NT9X74AA	2-20		1
NT9X74AA	2 -102		2
NT9X74AA	2-32	1	
NT9X74AA	34-102	2	
NT9X75AA	1-6		1
NT9X75AA	7-45		2
NT9X75AA	46-100		3
NT9X75AA	1-9	1	
NT9X75AA	1 -67	2	
NT9X75AA	68-150	3	
NT9X76AA	1-7		1
NT9X76AA	8-50		2
NT9X76AA	5 -113		3
NT9X76AA	1-10	1	
NT9X76AA	1 -76	2	
NT9X76AA	77-169	3	
NT9X77AA/AB	1-15		1
NT9X78AA	16-106		2
NT9X78BA	1 7-238		3
NT9X78CA/DA	1-23	1	
NT9X78CA/DA	24-163	2	
NT9X78CA/DA	164-365	3	
NT9X79AA	1-68		1
NT9X79BA	1-68		1
NT9X23BA	4-16		1
NT9X23BA	2 -68		2
NT9X23BA	4-24	1	

NT9X23BA	28-68	2	

2.3.3.2 Sparing Information for MDR7

EIUs are provided in pairs with one active unit and one hot spare unit which carries test traffic. In the event of failure of the active unit, the spare takes over within ten seconds.

2.3.4 Power Feed and Fusing Requirements

For 48VDC applications on the LIS shelves the NT9X30AA power converter (-48V) is required. The NT9X30AA accepts only a -48V feed, and provides a +5 volt, 86 amp output. Eight (8) 20A Fuses - two per shelf are required (at PDC), and two (2) 10A Fuses for Cooling Unit.

For 60VDC applications on the LIS shelves the NT9X30AB power converter (-60V) is required.

For redundant power supply applications the NTDX16AA power converter (-48V/-60V) is required. This new power converter along with the new secondary backpanel allows redundant power to be provided at the Link Interface Shelf (LIS). Two NTDX16AAs are used per half shelf to provide the required redundancy. Each NTDX16AA canon its own provide the full power required by the half shelf, both for the +5V and the -5V. The NTDX16AA accepts either -48Vor -60V power feeds, and produces both +5 volt (91 amp) and -5volt (5 amp) outputs. It is deployed in pairs, each pair being housed in an NT9X2825 Parallel Interface Unit, which in turn plugs into the shelf.

For redundant power supply applications the NT9X2825 secondary backpanel is required. This new power backpanel is required such that two NTDX16AAs can be accommodated on the same side of the shelf. This backpanel slides into the power converter slots and mate with the existing power backpanel. It allows both power converter slots to have the same type of connectors, and access to both the +5V and -5V power tracks.

2.3.5 Current Drain Information

The following describes the characteristics of the NT9X70BB 36-LinkLIM Cabinet:

- Input Voltage -48VDC
- Power Consumption 3832 watts (+/- 10%) fully equipped
- Current Drain 80 Amps
- Thermal Dissipation -NA- BTU/hr

- Fusing Requirements Eight (8) 20A Fuses - two per Shelf
- at PDC for LMS and LIS.
- Two (2) 10Amp Fuses - Cooling Unit.
- Max current drain for a fully equipped LIS shelf = 173.3Aat 5V.
- Max power dissipation for a fully equipped LIS shelf = 990W.

It is estimated that the NTEX22CA current drain will be slightly (0.2A) higher than that of the NTEX22BB.

2.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyondrefer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

2.4.1 Required Software Packages and Interdependencies

2.4.1.1 Required Software for STP

The following software packages are applicable to STP. Check the appropriate PCA (Product Content Application) report for availability and to confirm required supporting packages.

A) Required Packages:

- NTX832AA STP Base (Master package)(through BCS-29)
- The Master package software for STP was removed from BCS-30pending a reorganization.
    - Modified packaging has been added back into BCS-31 as follows:
    - NTX832AB STP Base (Master package)(BCS-31 and up)
    - NTX960AC DMS SUPERNODE Series 20 Processor (Master Pkg.)
- The following software is also required:
    - NTX833AA STP Operations
    - NTX048AA Synchronization
    - NTX056AA Enhanced Administration
    - NTX074AA Disk Data Storage System
    - NTX445AB OM Selective Output

B) Optional Packages

- NTX834AA DS1S6 Translation (for Nynex customer only)

- NTX835AA DMS-STP SEAS Interface (release 1.1)
- NTX836AA STP - V.35 Subrate Links
    - This package is required only if the V.35 Interface Paddleboard is provided, and operation at subrate speeds is required. Operation at a full 56 kbits is included in mandatory package NTX833AA.
- NTX839AA STP - Enhanced Maintenance and BERT OR
- NTX839AB LPP - Enhanced Maintenance and BERT (requires BCS-31)
    - This package requires the NT9X78BA Enhanced DS0A Paddleboard.
- NTX840AA STP - Gateway Message Screening
- NTXE55AA SEAS Interface (release 2.0)
- NTXE24AA SEAS - Gateway Screening (release 3.0)
- NTXE32AA MTP - Preventive Cyclic Retransmission
- NTX292AB/BA - Enhanced Security Package
- NTXR37AA CCS7 Increased Route Sets
    - If this package is used for increased routing then the NTEX22BA/BBcard must be used. The NTXR37AA software package will be available and optional in BCS35.
- NTXS04AA MTP Routing
    - Enhancement If this package is used then the NTEX22BA/BB card is required. The NTXS04AA software package will be available and optional in BCS35.

2.4.1.2 Required and Optional DMS-STP S/W in DMSE.

The following two Product Computing Module Loads (PCLs) are available with the release of the DMS-STP:

1. STPBASE00x * - Providing basic STP functions
    - STP003: The PCL STPBASE003 order code is STBA0003.
    - STP004: The PCL STPBASE004 order code is STBA0004.

1. STPSEAS00x * - Providing STPBASE00x content plus SEAS functions
    - STP003: The PCL STPSEAS003 order code is STSE0003.
    - STP004: The PCL STPSEAS003 order code is STSE0004.

* 'x' represents the last digit of the DMS-STP release (for example'3' for STP003).

Figure 19. DMS-STP S/W required to build STPBASE00x				
Functional Group Number	Functional Group Name	Function Order Code	Function Name	Feature Name
STPB0001	STP Base			DMS-STP Basic Operation
STPE00001	Stand-Alone STP System Expansion	STPE0004 **	Routeset Expansion	255 Routesets (default)
		STPE0005 **	GTT Expansion	6 K GTT (default)
TEL00001	Telecom	TEL00008	CCS7 Base	Base CCS7 functionality
BASE0001	Base			Base Platform functionality
** represents "usage options"				

Basic STP capability supports 255 route sets. Increased route sets are available as SOC usage options in the following 256 orderable increments: 255 (default), 511,767,1023,1279,1535,1791,2047

On standalone STP, GTT tuple capacity in Table C7GTT is increased from 32K to 60K with the release of STP002. Amounts from 60K to200K are optional in STPE0005 with release of STP003. Developed as a SOC usage option in the following increments: 1 0K, 150Kand 200K.

2.4.1.3 Required Software for SSP/SP

Provision the following packages to support the LIM in an SSP/SP office. Refer to the appropriate Product Content Application (PCA)report for package status and interdependencies:

- Provide master package:
  - NTXD44AA LPP on DMS Supernode SSP
    This master package contains:
    - NTXF20AA LMS on LPP
    - NTXF71AA Supernode Enhanced Messaging
    - NTXN18AA FBUS-LIU Base
- Provide feature packages:
  - NTXN19AA LIU7 on SSP

- NTXR68AA 64 KBIT CCS7 Link Interface
- NTX041AB CCS7 MTP/SCCP
- (for all MSB7s, and existing LPPs at BCS33 or below)
- NTXR72AA CCS7 MTP/SCCP on LPP (for LPP initials and BCS34upgrades)

The NT9X78CA requires BCS33 and higher software along with the software packages:

- NTXN19AA LIU7 on SSP
- NTXN19AA allows to datafill the NT9X78CA to operate at 56KB/S.
- NTXR68AA 64 KBIT CCS7 Link Interface
- NTXR68AA allows to datafill the NT9X78CA to operate at 64KB/S.

The NT9X78DA paddleboard provides support for DS0A Link Fault Sectionalization feature, which requires AR0518 in STP02 software load.

2.4.1.4 Required Software for EIU

The software package for EIU is not to be ordered.

The software packages of the applications which require the EIU would be ordered. The individual packages which make up the software package of a particular application would not be ordered.

For example, the software package for the MDR7 (Message Detailed Recording for CCS7 Messages) application is NTXJ91AA. It consists of the following software packages:

- NTXF19AA TCP/IP Protocols
- NTXF05AA Ethernet Interface Unit (EIU)
- NTXN18AA LIU/FBUS Base
- NTXF20AA LMS on LPP
- NTXF71AA SuperNode Enhanced Messaging

Hence, when the MDR7 application is needed, the following software packages are required:

- NTXJ91AA MDR7

The other above software packages are not ordered because they are automatically pulled in via NTXJ91AA.

Check the appropriate PCA (Product Content Application) report for availability and to confirm required supporting packages.

2.4.1.5 Required Software for MDR7

The feature package for MDR7 is NTXJ91AA. The DMS-STP Gateway Screening feature (NTX840AA) is a prerequisite, since it is used to identify which messages are to be tracked. Refer to the PCA database for interdependencies and additional information.

2.4.1.6 Required Software for FRIU

For BCS 32 and 33, the following package is required for basic Frame Relay Services:

- NTXF25AA Frame Relay Basic.

For BCS 34 and later, the following package is required for basic Frame Relay Services:

- NTXF25AB Frame Relay Base (Upgrade of NTXF25AA)

Package NTXF25AB contains the Extended Superframe Format support feature.

The NTXF25AB is MD'd and is replaced with NTXF25AC and NTXR28AAfrom BCS 35 onwards.

For BCS 33 and later, the following packages are optional for Frame Relay Services:

- NTXQ34AA Frame Relay Billing Base Package
- NTXQ35AA Frame Relay LEC Billing

For BCS 34 and later, the following packages are optional for Frame Relay Services:

- NTXR28AA Fractional T1 Access

Refer to the PCA database for package content, interdependencies and availability.

2.4.1.7 Required Software for DMS-PH

The DMS Packet Handler is introduced in BCS-34 (VO and Limited Availability Offices), and is generally available in BCS-35. The DMS Packet Handler requires the following software packages:

- NTXD44 - LPP Master Package
- NTXF93 - ISDN Provisioning SERVORD
- NTX750 - ISDN Basic Access
- NTXH77 - NIU Software Base

- NTXP47 - DMS PH Software Base
- NTXP75 - ISDN DMS PH SERVORD

Refer to Product Content Application (PCA) for the software interdependencies of the above packages.

2.4.1.8 Required Software for NIU

Refer to the individual applications for software requirements when Channelized Access is needed.

NTXH77AA - Channelized Access on LPP/LIS

NTXH70AA - CCS7 Support for Channelized Access

2.4.1.9 Required Software for SEP

All required software for SSP/SEP as documented in "Required Software for SSP/SP" is applicable.

In addition to the above, SEP utilizes the following software according to NORTEL design documentation:

- NTXA79AA IBN TRUNKS WITH ISUP SIGNALING
- NTXB57AA OPEN NUMBER TRANSLATIONS
- NTXH86AB JAPAN LINE INTERFACE
- NTXV18AA JPN MESSAGE TRANSFER PART
- NTXV22AA JPN ISUP TRUNK SIGNALING
- NTXV23AA JPN ISUP TRUNK INTERWORKING
- NTXZ02AA ACD SUPPORT SOFTWARE 3
- NTX060AB NETWORK MANAGEMENT
- NTX060BB NETWORK MANAGEMENT - ENHANCED
- NTX167AB CCS7 TRUNK SIGNALING
- NTXH77AA CHANNELIZED ACCESS ON LPP/LIS
- NTXH70AA CCS7 SUPPORT FOR CHANNELIZED ACCESS

In addition, the following feature packages are provided for BCS-35SEP VO delivery:

- NTXH14AA NTT NCCI CCITT #7 MTP
- NTXJ41AA CCS7 TEST TOOLS
- NTXQ89AA INTEGRATED LINK PROTOCOL TESTS

- NTXV24AA JPN FLEX CHG SYS CALL TERM
- NTXV25AA JPN AUTO MASS TRK CONVERSION
- NTXZ11AA JAPAN TONES
- NTX875AA CCS7 MASS TRUNK CONVERSION

The Product Content Application (PCA) database must be consulted for any newly identified software requirements.

2.4.1.10 Required Software for Power Redundancy

Software support is offered for power redundancy initially inSTP02, and supports both 48V and 60V inputs. Reference the appropriateengineering manual section (initially NTZZ44LA) for additional details.

2.4.1.11 Required Software for NT9X53AD Clock card

vThe LPP platform supports several different customer applications. However, LPP software is delivered via only two vehicles. These vehicles are the CSP software releases and the STP software releases. All non-STP applications are delivered by the CSP software process. Initially LPP support of the NT9X53AD has been incorporated in the CSP05 software releases.

The following table gives a summary of the rollout of NT9X53ADclock application on a CSP or STP basis.

Platform	Clock Cfg./Clock	CSP01-CSP04	CSP05	STP03
non-STP	Remote Office/3	NO	YES	N/A
STP	Remote Office/3	N/A	N/A	YES*

YES means supported in this S/W release.
No means NOT supported in this S/W release.
* Supported but requires activation.

2.4.1.12 Required Software for NTEX22CA card

CSP06 will be the first platform software release supporting theNTEX22CA, 32MB ASU Processor.

2.4.2 Software Usage Restrictions

2.4.2.1 Software Usage Restrictions for STP

Minimum BCS-30 software is required to use the NTEX22AA IPF IntegratedProc and FBUS I/F CP (LIU Shrink).

2.4.2.2 Software Usage Restrictions for SSP/SP

Not Applicable

2.4.2.3 Software Usage Restrictions for EIU

Minimum BCS-30 software is required to use the NTEX22AA IPF Integrated Processor and FBUS Interface CP.

NTXF05AA and NTXF19AA require BCS-31. As mentioned in the above example, these software packages would not be ordered. Instead, the software package of the application which required the EIU would be ordered.

2.4.2.4 Software Usage Restrictions for MDR7

Traffic information for a specific LIU7 is assigned to an EIU by datafill. The customer must determine which LIU7s are carrying he information of interest and datafill accordingly.

2.4.2.5 Software Usage Restrictions for FRIU

The following software restrictions apply:

- 256,000 connections allowed to be programmed per office
- 1 00 customers per office
- 2 00 FRS agents allowed
- 992 connections allowed on each FRS agent (non-channelized)
- 254 connections allowed on each FRS agent (channelized)
- LAPD range of DLCI = 0 - 1023
- Customer may only own 10,000 connections

An FRS agent is defined as the logical termination of a frame relay service. Each FRIU can have up to 24 FRS agents in the channelized mode. As stated above the current limit for all FRS agents is2200.

The NTEX31BA or NTZZ30LA can operate at 24 x 64 Kbs channels but software will only allow 24 x 56 Kbs channels.

For FRIU at BCS 34 and later, the NTEX22BB/NTEX31BA

2.4.2.6 Software Usage Restrictions for DMS-PH

Not Applicable.

2.4.2.7 Software Usage Restrictions for NIU

The office must have at least BCS33 release software.

The maximum number of NIUs in an office for all LIM applications setting at BCS 35-36 is 6 (SIX). At CSP02 the maximum number of NIUs will change to 9 (NINE) for all LIM applications.

2.4.2.8 Software Usage Restrictions for SEP

The office must have at least BCS35 release software.

2.4.3 Memory Provisioning

2.4.3.1 Memory Provisioning for STP

For Computing Module memory calculations, use the FACET program.

For STP02 PCL loads, use the following CM memory predictions:

- STP02 Total Data Store 51825 Kbytes (50.61Mb)
- Total Program Store 27208 Kbytes (26.57Mb)

Offices provisioned with:

- all 24 MBytes cards, provide 96MB plus one card for "HOT" spare.
- mix of 6 and 24 MBytes cards, provide 84Mb plus one card for each for "HOT" spare.
- all 96 MBytes cards, provide 96Mb plus one card for

The individual DS & PS are broken down as follows:

	Overhead	Datafill	Frag	Subtotal	Admin Spare	Total
DS	40.74	3.46	4.00	48.20	2.41	50.61 MB
PS	21.57	0.00	0.00	21.57	5.00	26.57 MB

2.4.3.2 Memory Provisioning for SSP/SP

A new office parm is introduced into parm table OFCOPT. ParameterCCS7_NODE_ATTRIBUTES should be set to CCS7_SSP (the default). This new parm consumes 30 words of data store.

Other permissible parameter values, CCS7_STP and CCS7_SCP, do not apply to an SSP/SP office.

2.4.3.3 Memory Provisioning for EIU

Not Applicable.

2.4.3.4 Memory Provisioning for MDR7

The EIU has 4 Mbytes of memory which is dedicated to the MDR7application. MDR7 requires 4 Kbytes of memory in the LIU7 and410 Kbytes in the DMS Core.

2.4.4 Memory Provisioning for FRIU

Refer to the FACET program.

2.4.5 Memory Provisioning for DMS-PH

Refer to the FACET program.

The DMS Packet Handler requires that the DMS-Bus be equipped with the following:

BCS Level	Memory Requirements
BCS-34	10 Mbytes of Memory
BCS-35	7 Mbytes of Memory

Refer to the following documents for the provisioning rules of the DMS-Bus:

ECM-626 BBlock Eng - Supernode In S/DMS Cabinet

Memory provisioning is impacted by the number of Call Condensed Blocks (CCBs) required for LPP-based Packet Services. Traditional calculation of CCB requirement does not apply to packet service.I nitial view of CCB requirement for LPP-based Packet Service is stated as 200 CCBs per XLIU.

2.4.6 Memory Provisioning for NIU

Not Applicable.

2.4.7 Memory Provisioning for SEP

Refer to FACET for specific instructions on memory provisioning for SEP.

2.5 Real Time Impact

Refer to the System Engineering Bulletin for your application.

Chapter 9

APPLICATION PROCESSOR PERIPHERAL

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APPLICATION PROCESSOR PERIPHERAL
Section Contents

1.0 ECM675 - Application Processor Cabinet (C/42) 9-1
1.1 Overview 9-1
1.1.1 System Architecture 9-1
1.1.2 Application Processor Cabinet (APC) 9-4
1.1.3 SCSI Bus Configuration 9-4
1.2 Hardware Provisioning 9-5
1.2.1 Hardware Usage Restrictions 9-5
1.2.2 Hardware Dependencies 9-7
1.2.2.1 P and C Side Port Requirements 9-7
1.2.2.2 DMS BUS Port Requirements 9-7
1.2.2.3 Circuits Per Card 9-7
1.2.2.4 Discrimination Numbering 9-7
1.2.3 Provisioning Considerations 9-7
1.2.3.1 Application Processor (AP) Provisioning 9-8
1.2.3.2 File Processor (FP) Provisioning . . . 9-8
1.2.3.3 Storage Device (SD) Provisioning . . . 9-9
1.2.3.4 SCSI Cable Provisioning 9-12
1.2.3.5 Message Switch (MS) and Port Provisioning 9-27
1.2.3.6 Provisioning Memory on the Message Switch 9-27
1.2.3.7 Message Switch and File Processor Link Provisioning 9-28
1.2.3.8 Determining MS Slot Assignments on the DMS-CORE 9-29
1.2.3.9 Inter MS Links(on the DMS-CORE) . . . 9-30
1.2.3.10 DMS SuperNode Equipment 9-31
1.2.4 Office Layout Information 9-31
1.2.5 Traffic Tables 9-31
1.3 Product/System Specification 9-31
1.3.1 Physical Characteristics 9-31
1.3.2 EMI/Earthquake Information 9-31
1.3.3 Sparing Information 9-31
1.3.4 Power Feed and Fusing Requirements 9-32
1.3.5 Current Drain Information 9-32
1.4 Software Provisioning 9-32
1.4.1 Required Software Packages and Interdependencies 9-32
1.4.2 Software Usage Restrictions 9-32
1.4.3 Memory Provisioning 9-32
1.5 Real Time Impact 9-32

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1.0 ECM675 - Application Processor Cabinet (C/42)

1.1 Overview

1.1.1 System Architecture

The DMS SuperNode core is a duplicated single processor computing engine which handles call processing and runs switch based application software. Sophisticated software applications require augmented processing and data management power which is provided by the Application Processor Cabinet (APC).

The additional processing and storage capacity provided by the APC makes possible applications such as DMS Service Control Point (SCP) II and Billing Server. Provisioning of APC hardware for specific software applications is covered under separate provisioning documents. This document describes how to physically configure the Application Processor Cabinet hardware.

Components in the architecture communicate over fiber links via the DMS-Bus Message Switch. Flexible I/O functions are provided by an Ethernet interface housed in the Link Interface Shelf. Computing resources and mass storage devices are provisioned in the Application Processor Cabinet (APC), which is described in this ECM. Figure 1 illustrates the overall architecture.

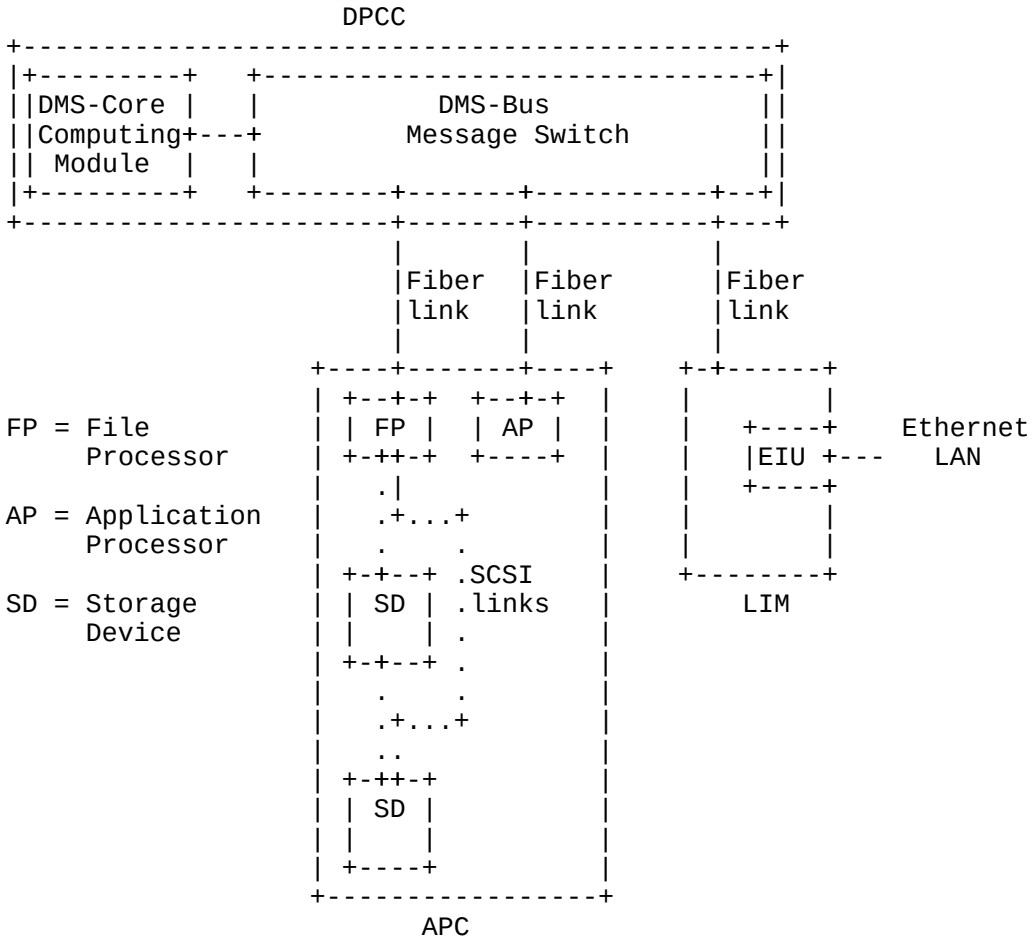


Figure 1. System Architecture

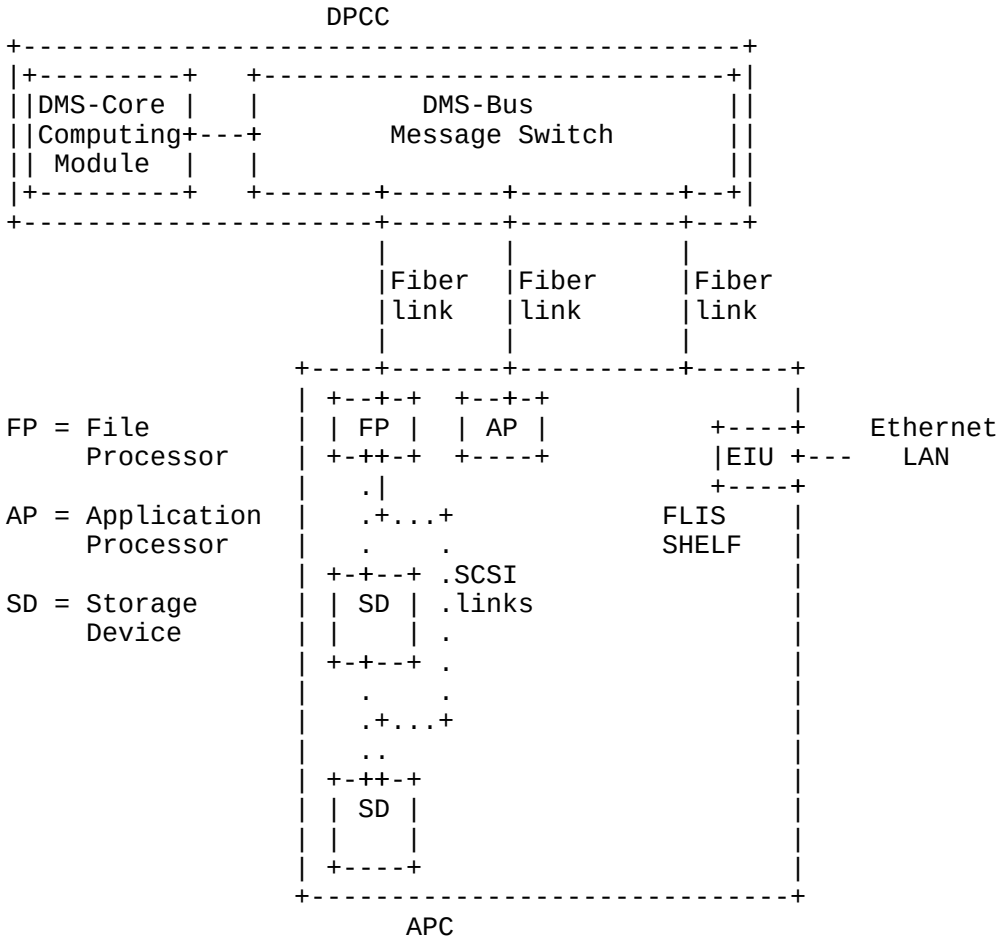


Figure 2. System Architecture w/Internal Billing

1.1.2 Application Processor Cabinet (APC)

There are three types of units provisionable on the Application Processor Cabinet shelves:

1. Application Processor (AP)

   The AP is a general purpose, dual plane computing engine with provisionable CPU and memory capacity.

2. File Processor (FP)

   The FP is simply an AP in which one of the memory slots is replaced by a Small Computer Standard Interface (SCSI) port to allow interface to storage devices.

3. Storage Device (SD)

   A variety of SCSI-compatible storage devices can be equipped. Currently, a 600 MByte hard disk drive, a 2 GByte hard disk drive, and 1.3 GByte Digital Audio Tape (DAT) drive are available (Note: 1 GByte = 1000 MByte).

4. Fiber Link Interface Shelf (FLIS)

   One FLIS shelf can be assigned at shelf position 26 for IEC bill purposes.

Three shelf positions in the Application Processor Cabinet are provisionable. The AP/FP shelf in shelf position 39 is always provided. On an Application Processor Shelf, each half-shelf can support one dual plane AP or FP, or it can be unequipped. On a Storage Device Shelf, each quarter-shelf ("quadrant") can support a single Storage Device, or it can be unequipped. Within a half-shelf, each AP/FP plane or storage Device is powered from a different feed ('A' or 'B') for reliability. Figure 3 on page 9-5 illustrates a typical APC configuration. Storage Devices may be "shadowed", meaning that two Storage Devices contain the same data for reliability. Due to the power arrangement, it is recommended to position the two members of a shadowed pair side by side within a half shelf.

1.1.3 SCSI Bus Configuration

Each FP is connected to one or more SDs via a daisy chain SCSI bus arrangement. In this arrangement, a cable is run from the SCSI port on a paddleboard at the rear of the FP to the paddleboard of the first SD in the chain. Paddleboards on subsequent SDs are chained together via provisionable cabling and/or backplane connections. Finally, the last SD in the chain is cabled back to the FP, terminating on the same paddleboard from which the chain began.

In this way, several FPs with independent SD chains of various sizes can be configured in a single cabinet.

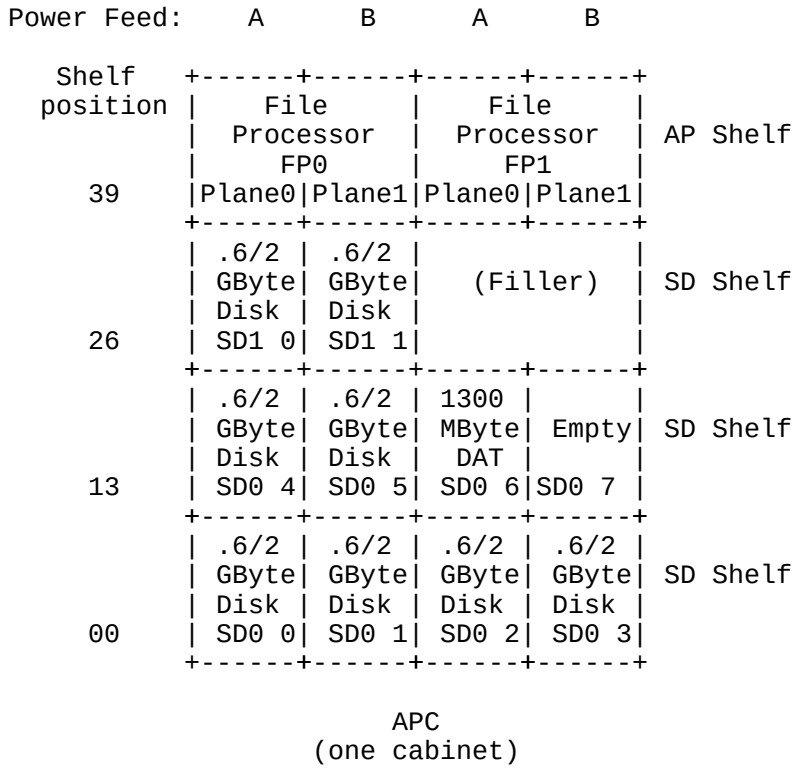


Figure 3. Application Processor Cabinet Configuration Example

1.2 Hardware Provisioning

1.2.1 Hardware Usage Restrictions

The Application Processor Cabinet is highly flexible by virtue of its provisionable shelves, devices and SCSI cabling. To facilitate system installation and field maintenance, and to avoid weight distribution and heat dissipation problems, several rules MUST be followed in configuring the cabinet:

1. Assign maximum four (4) FPs beginning from shelf 39 (top of cabinet) moving downwards, and left to right across each shelf. Allot space for SDs from shelf 00 (bottom of cabinet) moving upwards, and left to right across each shelf. Within the constraints of Rule 3, leave no gaps (eg. for "growth") in the assignment sequence.

2. Assign SCSI buses in order from the longest to the shortest, beginning at the bottom of the cabinet. In other words, the SCSI bus with the greatest number of devices must be assigned first, followed by the next largest bus, and so on.

   For EXTENSIONS the new configuration MUST MATCH one of the existing configurations outlined in section 2.4.4.

3. Provision the Storage Devices according to the permissible configurations outlined in the ECM. SCSI cabling cannot leave the cabinet.

4. Within each SD space allotment, Power Converters, SCSI Device Interface Paddleboards, and SCSI cables must be equipped initially. The Storage Devices themselves can be provisioned in a future extension. Any type of SD may be provisioned in an allotted quadrant, or a quadrant may be left unequipped. However, it is recommended to position the two members of a shadowed pair side by side within a half shelf.

5. Disk storage devices are more sensitive to vibration than DAT storage devices. Where possible, disk drives should be located lower in the cabinet than DAT drives.

6. After the FPs and SDs are assigned per the above rules, APs may be assigned to AP shelves in the remaining half-shelf spaces. It is possible to fill a cabinet with APs alone, should an application require it.

7. The FLIS shelf in position 26 is only permitted with Interexchange Carrier applications. These are the only applications tested with this configuration. Only 2 EIU's can be configured and they can only be used to transfer billing data.

Figure 4 shows some of the configurations permitted by the rules. The first digit in the device number indicates the SCSI bus to which it is connected; the second digit indicates the device number on that bus. For example, SD2 0 is the first storage device on the SCSI bus connected to FP2.

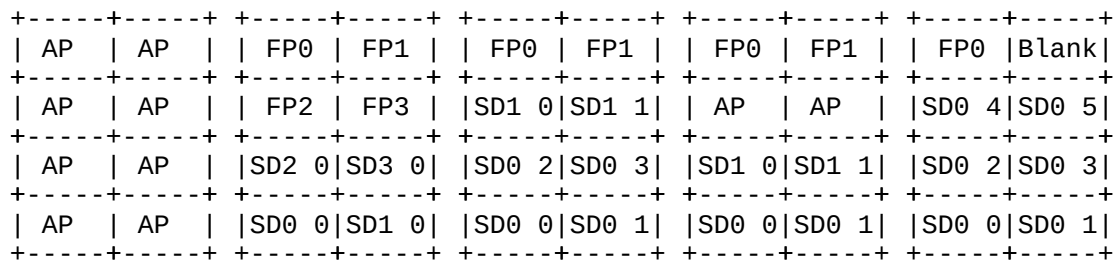


Figure 4. APC Configuration Examples

1.2.2 Hardware Dependencies

The Application Processor Cabinet can be provisioned only in a SuperNode office.

1.2.2.1 P and C Side Port Requirements

Not applicable

1.2.2.2 DMS BUS Port Requirements

Refer to the "Message Switch and File Processor Link Provisioning" section of the ECM for details of MS provisioning.

Refer to the "Inter MS Links(on the DMS-CORE)" section of this ECM for details of IML provisioning.

1.2.2.3 Circuits Per Card

Not applicable

1.2.2.4 Discrimination Numbering

Not applicable

1.2.3 Provisioning Considerations

The following general sequence is recommended to provision Application Processor Cabinets:

1. Determine the space allotment for SDs as required by the application, using the space allotment increments allowed by the Usage Restrictions. For example, if three SDs are required for an application, allot a 4-quadrant SD space. Also determine the number of APs required.

2. Assign into cabinets the Application Processor Shelves and Storage Device Shelves to house the APs, FPs, and SD space allotments in accordance with the Hardware Usage Restrictions.

3. Provision the AP and FP circuit packs, and the actual number of storage devices required by this particular job. Provision SD circuit packs to support all allotted SD quadrants. This allows devices to be added to the chain later without disrupting service. Provision Filler Face Plates or Filler Panels for all unallotted quadrants and unequipped shelf spaces.

4. Provision the required SCSI cable lengths to interconnect the FPs and all SD space allotments (whether equipped with devices or not) in each chain. Note that SCSI cabling cannot pass from one cabinet to another.

5. Provision the fiber links between the AP/FPs and the DMS-Core Message Switch (MS), and the circuit packs in the MS.

6. Provision one Cable Routing (RTG) Label per APC to match configuration of FPs and SDs.

1.2.3.1 Application Processor (AP) Provisioning

APs are assigned to the NT9X8101 Application Processor Shelf. A maximum of two (2) APs may be provisioned per shelf. APs and FPs may be mixed on a single shelf.

Currently, the only available CPU is the NT9X13LA 68030 4 MHz CPU CP. Provision two (2) per AP to equip both planes.

Provision minimum one (1) maximum four (4) NT9X14DB 24 MByte Memory CP per plane to fulfil the memory requirements of the application. Maximum memory available is 96 Mbytes per plane. The application may designate one of the memory cards as a hot spare; this is optional.

Provision two (2) NT9X26AB RTIF CP, of the same type that are currently equipped on the DMS-Core in the office (this avoids stocking more than one vintage of spare). New core applications should use NT9X26AB.

Provision common circuit packs and filler faceplates as detailed in the Engineering Manual sections.

1.2.3.2 File Processor (FP) Provisioning

FPs are assigned to the NT9X8101 Application Processor Shelf. A maximum of two (2) FPs may be provisioned per shelf. FPs and APs may be mixed on a single shelf.

FP provisioning is almost identical to that of the AP. One (1) of the Memory CPs in each plane is replaced by an NT9X87AA Dual Access Buffer Memory CP, thus reducing the maximum memory available to 72 MBytes per plane. Two of the rear filler faceplates in each plane are replaced by two (2) NT9X88AA Dual SCSI Interface Processor (SIP) paddleboards. These paddleboards provide two (2) SCSI ports each, one for the outgoing SCSI link to the first SD and one for the incoming SCSI link from the last SD in the chain. The two SIPs in a plane are designated as the primary SIP and the secondary SIP for that plane. Separate SCSI connections are made from the primary and secondary SIPs to the corresponding primary and secondary paddleboards of the storage device. This ensures maximum reliability.

1.2.3.3 Storage Device (SD) Provisioning

SDs are assigned to the NT9X8301 Storage Device Shelf. A maximum of four (4) SDs may be provisioned per shelf. APs and FPs are not permitted on Storage Device Shelves.

A quadrant on the SD shelf may be assigned any type of SD, or it can be unequipped. Provision NT9X90AA 600 MByte Disk Storage Units and/or NT9X90AB 2 GByte Disk Storage Units and/or NT9X90BA 1.3 GByte DAT Storage Units in the SD as required. Provision DG60M blank tape cartridges for the DAT SD as needed. Each removable cartridge can store up to 1.3 GBytes of data.

Provision four (4) SCSI Device Interface Paddleboards (SDIPs) and two (2) Storage Device Power Converters for each half-shelf that supports allotted SD space. The two SDIPs associated with an SD are designated as the primary SDIP and the secondary SDIP. Separate SCSI connections are made to the primary and secondary SDIPs, so there are always four SCSI links running to and from each SD for maximum reliability.

There are two types of SDIP: The NT9X89AA SCSI Device Interface (Shelf) PB, and the NT9X89BA SCSI Device Interface (Half-Shelf) PB. The differences between these are the key to understanding how the SCSI bus is physically configured.

The NT9X89BA is equipped when an SD space allotment of 2 quadrants is required. It has two SCSI connectors; one to accept the incoming SCSI link from the FP and one to send the returning SCSI link back to that FP. All connections to the NT9X89BA are made with provisionable SCSI cabling.

The NT9X89AA is equipped when an SD space allotment of 4, 8, or 12 quadrants is required. It has one SCSI connector and a backplane SCSI connection. The connector is used in one of four ways depending where the SD is in the SCSI bus and where it is physically located:

- Accepts the incoming SCSI link from the FP if it is the first SD in the chain; or,

- Accepts the SCSI link from the previous SD in the chain, located in the shelf below; or,

- Sends a link to the next SD in the chain, located in the shelf above; or,

- Sends the returning link to the FP if it is the last SD in the chain.

The backplane SCSI connection links the two halves of the Storage Device Shelf together to complete the chain. The various possible

links between paddleboards are illustrated in Figure 5 on page 9-11 . For clarity, only one connection in one plane is shown. In reality, there are identical connections between primary and secondary paddleboards in plane 0 and in plane 1.

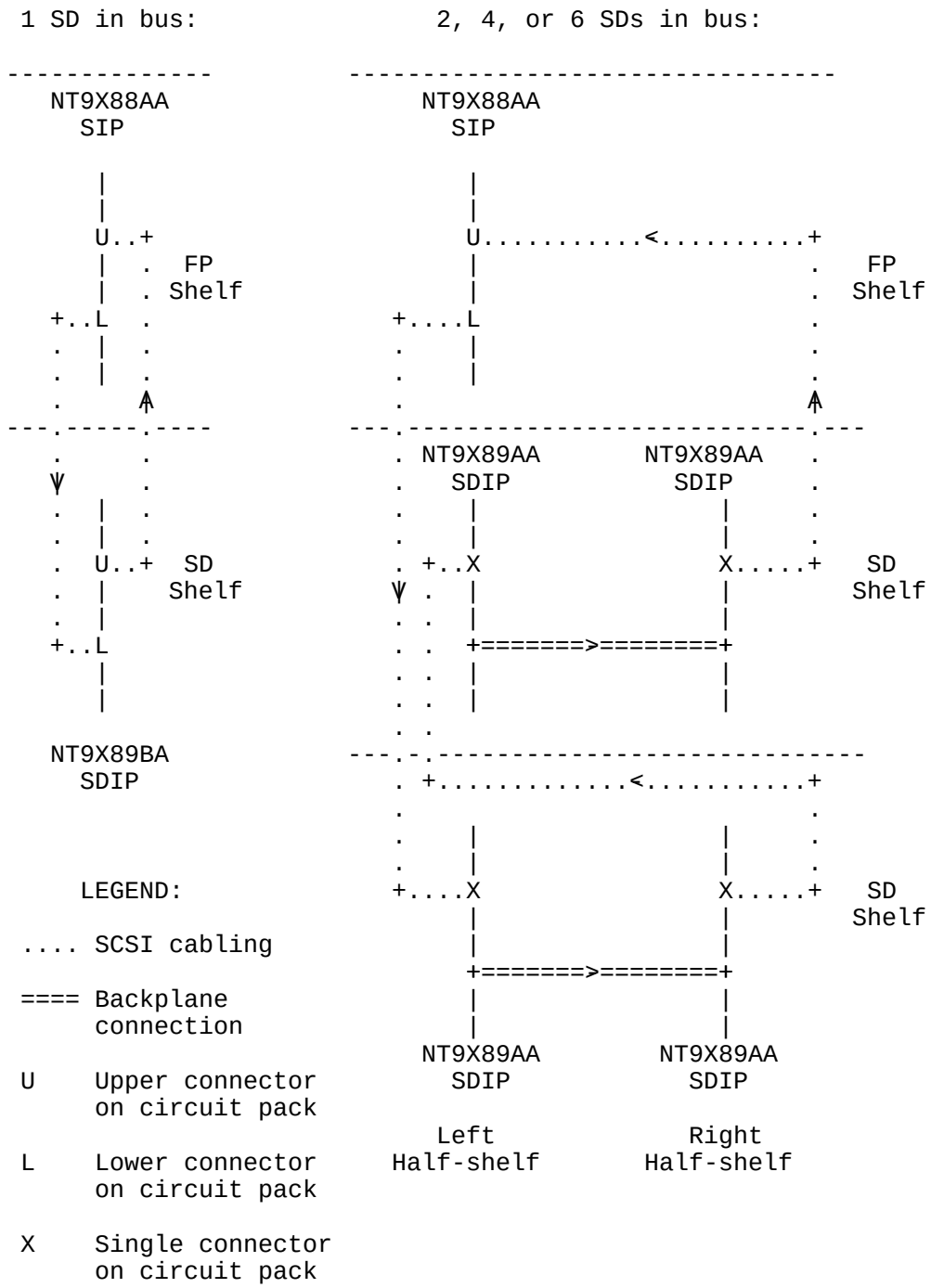


Figure 5. SCSI Connections to Paddleboards in FP and SD (High Reliability configuration)

1.2.3.4 SCSI Cable Provisioning

SCSI cables are selected based on the physical length from one SIP or SDIP paddleboard connector to the next. Figure 5 on page 9-11 illustrates how the cables are connected. Figure 6 on page 9-13 through Figure 19 on page 9-26 show all possible configurations of FPs and SDs based on the assignment rules. Each diagram in the table depicts a cabinet configuration with shelves 39, 26, 13 and 00 shown from top to bottom. "FP" represents a File Processor, "SD" a space allotted for a Storage Device, and "-" a blank space or Application Processor. The digit following FP or SD indicates which SCSI bus the device belongs to (eg. SD0 is a Storage Device on SCSI bus 0. It is connected to all other SD0 devices and FP0.)

Select the configuration with the desired quantity of FPs and SDs, and provision the quantity of cable PECs indicated, as well as one (1) SCSI Cable Routing (RTG) label per cabinet to match the configuration of the APC.

The following extension paths are considered valid and should be supported by cabling tools. The final configuration on the right of each line should be used for extension cables and connections.

File Processor = (FP), Storage Devices = (SD)
0 (FP), 0 (SD) convert to 1FP 6 SD

1 (FP), 2 (SD) convert to 1FP 4 SD
1 (FP), 2 (SD) convert to 1FP 6 SD
1 (FP), 2 (SD) convert to 1FP 8 SD
1 (FP), 2 (SD) convert to 1FP 10 SD
1 (FP), 2 (SD) convert to 1FP 12 SD

1 (FP), 4 (SD) convert to 1FP 6 SD
1 (FP), 4 (SD) convert to 1FP 8 SD
1 (FP), 4 (SD) convert to 1FP 10 SD
1 (FP), 4 (SD) convert to 1FP 12 SD

1 (FP), 6 (SD) convert to 1FP 8 SD
1 (FP), 6 (SD) convert to 1FP 10 SD
1 (FP), 6 (SD) convert to 1FP 12 SD

1 (FP), 8 (SD) convert to 1FP 10 SD
1 (FP), 8 (SD) convert to 1FP 12 SD

1 (FP), 10 (SD) convert to 1FP 12 SD

Specwriters Note : Please ensure that both the Frame I.D. and the SCSI cable routing table are always referenced in the Specwriters notes section.

Table 1 - SCSI Cable Provisioning

QTY FPs	CAB. CONFIGURATION	LENGTH(IN)	QTY	PEC
	+-------+	55	3	NT9X0443
	|FP0 - |	60	4	NT9X0444
	+-------+	65	3	NT9X0445
	|SD0 SD0|	70	5	NT9X0446
1	+-------+	75	1	NT9X0447
	|SD0 SD0|			
	+-------+			
	|SD0 SD0|			
	+-------+			

Figure 6. FRAME ID : 1 FP/12 SD

Provision one SCSI RTG Label P0724434 per Cabinet with above layout.

REF.	FROM PCB	FROM SHELF SLOT	FROM CONN	TO PCB	TO SHELF SLOT	TO CONN	CABLE PCB.	ROUTE	LENGTH
	NT9X88AA	39 - 11R	J2	NT9X89AA	00 - 08R	J1	NT9X0445	RIGHT	65|
	NT9X89AA	00 - 20R	J1	NT9X89AA	13 - 08R	J1	NT9X0446	LEFT	70|
	NT9X89AA	13 - 20R	J1	NT9X89AA	26 - 08R	J1	NT9X0446	LEFT	70|
	NT9X89AA	26 - 20R	J1	NT9X88AA	39 - 11R	J1	NT9X0445	LEFT	65|
	NT9X88AA	39 - 10R	J2	NT9X89AA	00 - 14R	J1	NT9X0446	RIGHT	70|
	NT9X89AA	00 - 26R	J1	NT9X89AA	13 - 14R	J1	NT9X0444	LEFT	60|
	NT9X89AA	13 - 26R	J1	NT9X89AA	26 - 14R	J1	NT9X0444	LEFT	60|
	NT9X89AA	26 - 26R	J1	NT9X88AA	39 - 10R	J1	NT9X0444	LEFT	60|
	NT9X88AA	39 - 17R	J2	NT9X89AA	00 - 15R	J1	NT9X0447	RIGHT	75|
	NT9X89AA	00 - 27R	J1	NT9X89AA	13 - 15R	J1	NT9X0443	LEFT	55|
	NT9X89AA	13 - 27R	J1	NT9X89AA	26 - 15R	J1	NT9X0443	LEFT	55|
	NT9X89AA	26 - 27R	J1	NT9X88AA	39 - 17R	J1	NT9X0443	LEFT	55|
	NT9X88AA	39 - 16R	J2	NT9X89AA	00 - 09R	J1	NT9X0446	RIGHT	70|
	NT9X89AA	00 - 21R	J1	NT9X89AA	13 - 09R	J1	NT9X0445	LEFT	65|
	NT9X89AA	13 - 21R	J1	NT9X89AA	26 - 09R	J1	NT9X0446	LEFT	70|
	NT9X89AA	26 - 21R	J1	NT9X88AA	39 - 16R	J1	NT9X0444	LEFT	60|

QTY FPs	CAB. CONFIGURATION	LENGTH(IN)	QTY	PEC
	+-------+	40	1	NT9X0419
	|FP0 - |	45	2	NT9X0420
	+-------+	55	4	NT9X0443
	|SD0 - |	60	1	NT9X0444
1	+-------+	65	3	NT9X0445
	|SD0 SD0|	70	4	NT9X0446
	+-------+	75	1	NT9X0447
	|SD0 SD0|			
	+-------+			

Figure 7. FRAME ID : 1 FP/10 SD

Provision one SCSI RTG Label P0724435 per Cabinet with above layout.

REF.	FROM PCB	FROM SHELF CONN SLOT	TO PCB	TO SHELF CONN SLOT	CABLE PCB.	CABLE ROUTE	CABLE LENGTH
	NT9X88AA	39 - 11R J2	NT9X89AA	00 - 08R J1	NT9X0445	RIGHT	65
	NT9X89AA	00 - 20R J1	NT9X89AA	13 - 08R J1	NT9X0446	LEFT	70
	NT9X89AA	13 - 20R J1	NT9X89BA	26 - 08R J2	NT9X0445	LEFT	65
	NT9X89BA	26 - 08R J1	NT9X88AA	39 - 11R J1	NT9X0419	RIGHT	40
	NT9X88AA	39 - 10R J2	NT9X89AA	00 - 14R J1	NT9X0446	RIGHT	70
	NT9X89AA	13 - 26R J1	NT9X89AA	13 - 14R J1	NT9X0444	LEFT	60
	NT9X89AA	13 - 26R J1	NT9X89BA	26 - 14R J2	NT9X0443	LEFT	55
	NT9X89BA	26 - 14R J1	NT9X88AA	39 - 10R J1	NT9X0440	RIGHT	45
	NT9X88AA	39 - 17R J2	NT9X89AA	00 - 15R J1	NT9X0447	RIGHT	75
	NT9X89AA	00 - 27R J1	NT9X89AA	13 - 15R J1	NT9X0443	LEFT	55
	NT9X89AA	13 - 27R J1	NT9X89BA	26 - 15R J2	NT9X0443	LEFT	55
	NT9X89BA	26 - 15R J1	NT9X88AA	39 - 17R J1	NT9X0443	RIGHT	55
	NT9X88AA	39 - 16R J2	NT9X89AA	00 - 09R J1	NT9X0446	RIGHT	70
	NT9X89AA	00 - 21R J1	NT9X89AA	13 - 09R J1	NT9X0445	LEFT	65
	NT9X89AA	13 - 21R J1	NT9X89BA	26 - 09R J2	NT9X0446	LEFT	70
	NT9X89BA	26 - 09R J1	NT9X88AA	39 - 16R J1	NT9X0420	RIGHT	45

QTY FPs	CAB. CONFIGURATION	LENGTH(IN)	QTY	PEC
	+-------+	55	1	NT9X0443
	|FP0 - |	60	1	NT9X0444
	+-------+	65	2	NT9X0445
	| - - |	70	3	NT9X0446
1	+-------+	75	4	NT9X0447
	|SD0 SD0|	80	1	NT9X0448
	+-------+			
	|SD0 SD0|			
	+-------+			

Figure 8. FRAME ID : 1 FP/8 SD

Provision one SCSI RTG Label P0724436 per Cabinet with above layout.

REF.	FROM PCB	FROM SHELF CONN SLOT	TO PCB	TO SHELF CONN SLOT	CABLE PCB.	CABLE ROUTE	CABLE LENGTH
	NT9X88AA	39 - 11R J2	NT9X89AA	00 - 08R J1	NT9X0445	RIGHT	65
	NT9X89AA	00 - 20R J1	NT9X89AA	13 - 08R J1	NT9X0446	LEFT	70
	NT9X89AA	13 - 20R J1	NT9X88AA	39 - 11R J1	NT9X0448	LEFT	80
	NT9X88AA	39 - 10R J2	NT9X89AA	00 - 14R J1	NT9X0446	RIGHT	70
	NT9X89AA	00 - 26R J1	NT9X89AA	13 - 14R J1	NT9X0444	LEFT	60
	NT9X89AA	13 - 26R J1	NT9X88AA	39 - 10R J1	NT9X0447	LEFT	75
	NT9X88AA	39 - 17R J2	NT9X89AA	00 - 15R J1	NT9X0447	RIGHT	75
	NT9X89AA	00 - 27R J1	NT9X89AA	13 - 15R J1	NT9X0443	LEFT	55
	NT9X89AA	13 - 27R J1	NT9X88AA	39 - 17R J1	NT9X0445	LEFT	65
	NT9X88AA	39 - 16R J2	NT9X89AA	00 - 09R J1	NT9X0447	RIGHT	75
	NT9X89AA	00 - 21R J1	NT9X89AA	13 - 09R J1	NT9X0446	LEFT	70
	NT9X89AA	13 - 21R J1	NT9X88AA	39 - 16R J1	NT9X0447	LEFT	75

QTY FPs	CAB. CONFIGURATION	LENGTH(IN)	QTY	PEC
	+-------+	55	3	NT9X0443
	|FP0 - |	60	2	NT9X0444
	+-------+	65	4	NT9X0445
	| - - |	70	2	NT9X0446
1	+-------+	75	1	NT9X0447
	|SD0 - |			
	+-------+			
	|SD0 SD0|			
	+-------+			

Figure 9. FRAME ID : 1 FP/6 SD

Provision one SCSI RTG Label P0724437 per Cabinet with above layout.

REF.	FROM PCB	FROM SHELF CONN SLOT	TO PCB	TO SHELF CONN SLOT	CABLE PCB.	CABLE ROUTE	CABLE LENGTH
	NT9X88AA	39 - 11R J2	NT9X89AA	00 - 08R J1	NT9X0445	RIGHT	65
	NT9X89AA	00 - 20R J1	NT9X89BA	13 - 08R J2	NT9X0445	LEFT	65
	NT9X89BA	13 - 08R J1	NT9X88AA	39 - 11R J1	NT9X0443	RIGHT	55
	NT9X88AA	39 - 10R J2	NT9X89AA	00 - 14R J1	NT9X0446	RIGHT	70
	NT9X89AA	00 - 26R J1	NT9X89BA	13 - 14R J2	NT9X0443	LEFT	55
	NT9X89BA	13 - 14R J1	NT9X88AA	39 - 10R J1	NT9X0444	RIGHT	60
	NT9X88AA	39 - 17R J2	NT9X89AA	00 - 15R J1	NT9X0447	RIGHT	75
	NT9X89AA	00 - 27R J1	NT9X89BA	13 - 15R J2	NT9X0443	LEFT	55
	NT9X89BA	13 - 15R J1	NT9X88AA	39 - 17R J1	NT9X0445	RIGHT	60
	NT9X88AA	39 - 16R J2	NT9X89AA	00 - 09R J1	NT9X0446	RIGHT	70
	NT9X89AA	00 - 21R J1	NT9X89BA	13 - 09R J2	NT9X0445	LEFT	65
	NT9X89BA	13 - 09R J1	NT9X88AA	39 - 16R J1	NT9X0444	RIGHT	60

QTY FPs	CAB. CONFIGURATION	LENGTH(IN)	QTY	PEC
	+-------+	65	1	NT9X0445
	|FP0 - |	70	2	NT9X0446
	+-------+	75	1	NT9X0447
	| - - |	80	1	NT9X0448
1	+-------+	85	3	NT9X0449
	| - - |			
	+-------+			
	|SD0 SD0|			
	+-------+			

Figure 10. FRAME ID : 1 FP/4 SD

Provision one SCSI RTG Label P0724438 per Cabinet with above layout.

REF.	<-----FROM-------> PCB	SHELF CONN SLOT	<----TO----------> PCB	SHELF CONN SLOT	<----CABLE-------> PCB.	ROUTE	LENGTH
	NT9X88AA	39 - 11R	J2 NT9X89AA	00 - 08R	J1 NT9X0445	RIGHT	65
	NT9X89AA	00 - 20R	J1 NT9X88AA	39 - 11R	J1 NT9X0449	LEFT	85
	NT9X88AA	39 - 10R	J2 NT9X89AA	00 - 14R	J1 NT9X0446	RIGHT	70
	NT9X89AA	00 - 26R	J1 NT9X88AA	39 - 10R	J1 NT9X0449	LEFT	85
	NT9X88AA	39 - 17R	J2 NT9X89AA	00 - 15R	J1 NT9X0447	RIGHT	75
	NT9X89AA	00 - 27R	J1 NT9X88AA	39 - 17R	J1 NT9X0448	LEFT	80
	NT9X88AA	39 - 16R	J2 NT9X89AA	00 - 09R	J1 NT9X0446	RIGHT	70
	NT9X89AA	00 - 21R	J1 NT9X88AA	39 - 16R	J1 NT9X0449	LEFT	85

QTY FPs	CAB. CONFIGURATION	LENGTH(IN)	QTY	PEC
	+-------+	60	1	NT9X0444
	|FP0 - |	65	3	NT9X0445
	+-------+	70	2	NT9X0446
	| - - |	75	1	NT9X0447
1	+-------+	80	1	NT9X0448
	| - - |			
	+-------+			
	|SD0 - |			
	+-------+			

Figure 11. FRAME ID : 1 FP/2 SD SYSTEM

Provision one SCSI RTG Label P0724439 per Cabinet with above layout.

REF.	FROM PCB	FROM SHELF SLOT	FROM CONN	TO PCB	TO SHELF SLOT	TO CONN	CABLE PCB.	CABLE ROUTE	LENGTH
	NT9X88AA	39 - 10R	J1	NT9X89BA	00 - 14R	J1	NT9X0446	RIGHT	70
	NT9X88AA	39 - 10R	J2	NT9X89BA	00 - 14R	J2	NT9X0445	RIGHT	65
	NT9X88AA	39 - 11R	J1	NT9X89BA	00 - 08R	J1	NT9X0445	RIGHT	65
	NT9X88AA	39 - 11R	J2	NT9X89BA	00 - 08R	J2	NT9X0444	RIGHT	60
	NT9X88AA	39 - 17R	J1	NT9X89BA	00 - 15R	J1	NT9X0448	RIGHT	80
	NT9X88AA	39 - 17R	J2	NT9X89BA	00 - 15R	J2	NT9X0447	RIGHT	75
	NT9X88AA	39 - 16R	J1	NT9X89BA	00 - 09R	J1	NT9X0446	RIGHT	70
	NT9X88AA	39 - 16R	J2	NT9X89BA	00 - 09R	J2	NT9X0445	RIGHT	65

QTY FPs	CAB. CONFIGURATION	LENGTH(IN)	QTY	PEC
	+-------+	45	1	NT9X0420
	|FP0 FP1|	50	4	NT9X0442
	+-------+	55	5	NT9X0443
	|SD1 SD1|	60	6	NT9X0444
2	+-------+	65	5	NT9X0445
	|SD0 SD1|	70	2	NT9X0446
	+-------+	75	1	NT9X0447
	|SD0 SD0|			
	+-------+			

Figure 12. FRAME ID : 2 FP/12 SD

Provision one SCSI RTG Label P0724429 per Cabinet with above layout.

REF.	FROM PCB	FROM SHELF CONN SLOT	TO PCB	TO SHELF CONN SLOT	CABLE PCB.	CABLE ROUTE	CABLE LENGTH
	NT9X88AA	39 - 11R J2	NT9X89AA	00 - 08R J1	NT9X0445	RIGHT	65
	NT9X89AA	00 - 20R J1	NT9X89BA	13 - 08R J2	NT9X0449	LEFT	65
	NT9X89BA	13 - 08R J1	NT9X88AA	39 - 11R J1	NT9X0446	RIGHT	55
	NT9X88AA	39 - 10R J2	NT9X89AA	00 - 14R J1	NT9X0446	RIGHT	70
	NT9X89AA	00 - 26R J1	NT9X89BA	13 - 14R J2	NT9X0443	LEFT	55
	NT9X89BA	13 - 14R J1	NT9X88AA	39 - 10R J1	NT9X0444	RIGHT	60
	NT9X88AA	39 - 17R J2	NT9X89AA	00 - 15R J1	NT9X0447	RIGHT	75
	NT9X89AA	00 - 27R J1	NT9X89BA	13 - 15R J2	NT9X0443	LEFT	55
	NT9X89BA	13 - 15R J1	NT9X88AA	39 - 17R J1	NT9X0445	RIGHT	65
	NT9X88AA	39 - 16R J2	NT9X89AA	00 - 09R J1	NT9X0446	RIGHT	70
	NT9X89AA	00 - 21R J1	NT9X89BA	13 - 09R J2	NT9X0445	LEFT	65
	NT9X89BA	13 - 09R J1	NT9X88AA	39 - 16R J1	NT9X0444	RIGHT	60
	NT9X88AA	39 - 22R J2	NT9X89BA	13 - 26R J2	NT9X0444	LEFT	60
	NT9X89BA	13 - 26R J1	NT9X89AA	26 - 14R J1	NT9X0444	RIGHT	60
	NT9X89AA	26 - 26R J1	NT9X88AA	39 - 22R J1	NT9X0442	LEFT	50
	NT9X88AA	39 - 23R J2	NT9X89BA	13 - 20R J2	NT9X0445	LEFT	65
	NT9X89BA	13 - 20R J1	NT9X89AA	26 - 08R J1	NT9X0442	RIGHT	50
	NT9X89AA	26 - 20R J1	NT9X88AA	39 - 23R J1	NT9X0443	LEFT	55
	NT9X88AA	39 - 28R J2	NT9X89BA	13 - 21R J2	NT9X0444	LEFT	60
	NT9X89BA	13 - 21R J1	NT9X89AA	26 - 09R J1	NT9X0442	RIGHT	50
	NT9X89AA	26 - 21R J1	NT9X88AA	39 - 28R J1	NT9X0442	LEFT	50
	NT9X88AA	39 - 29R J2	NT9X89BA	13 - 27R J2	NT9X0443	LEFT	55
	NT9X89BA	13 - 27R J1	NT9X89AA	26 - 15R J1	NT9X0444	RIGHT	60
	NT9X89AA	26 - 27R J1	NT9X88AA	39 - 29R J1	NT9X0440	LEFT	45

QTY FPs	CAB. CONFIGURATION	LENGTH(IN)	QTY	PEC
	+-------+	45	1	NT9X0420
	|FP0 FP1|	50	2	NT9X0442
	+-------+	55	3	NT9X0443
	|SD1 - |	60	3	NT9X0444
2	+-------+	65	3	NT9X0445
	|SD0 SD0|	70	3	NT9X0446
	+-------+	75	4	NT9X0447
	|SD0 SD0|	80	1	NT9X0448
	+-------+			

Figure 13. FRAME ID : 2 FP/10 SD

Provision one SCSI RTG Label P0724430 per Cabinet with above layout.

REF.	FROM PCB	FROM SHELF CONN SLOT	TO PCB	TO SHELF CONN SLOT	CABLE PCB.	CABLE ROUTE	CABLE LENGTH
	NT9X88AA	39 - 11R	J2 NT9X89AA	00 - 08R	J1 NT9X0445	RIGHT	65|
	NT9X89AA	00 - 20R	J1 NT9X89AA	13 - 08R	J1 NT9X0446	LEFT	70|
	NT9X89AA	13 - 20R	J1 NT9X88AA	39 - 11R	J1 NT9X0448	LEFT	80|
	NT9X88AA	39 - 10R	J2 NT9X89AA	00 - 14R	J1 NT9X0446	RIGHT	70|
	NT9X89AA	00 - 26R	J1 NT9X89AA	13 - 14R	J1 NT9X0444	LEFT	60|
	NT9X89AA	13 - 26R	J1 NT9X88AA	39 - 10R	J1 NT9X0447	LEFT	75|
	NT9X88AA	39 - 17R	J2 NT9X89AA	00 - 15R	J1 NT9X0447	RIGHT	75|
	NT9X89AA	00 - 27R	J1 NT9X89AA	13 - 15R	J1 NT9X0443	LEFT	55|
	NT9X89AA	13 - 27R	J1 NT9X88AA	39 - 17R	J1 NT9X0445	LEFT	65|
	NT9X88AA	39 - 16R	J2 NT9X89AA	00 - 09R	J1 NT9X0447	RIGHT	75|
	NT9X89AA	00 - 21R	J1 NT9X89AA	13 - 09R	J1 NT9X0446	LEFT	70|
	NT9X89AA	13 - 21R	J1 NT9X88AA	39 - 16R	J1 NT9X0447	LEFT	75|
	NT9X89AA	39 - 22R	J1 NT9X89BA	26 - 14R	J1 NT9X0443	RIGHT	55|
	NT9X88AA	39 - 22R	J2 NT9X89BA	26 - 14R	J2 NT9X0442	RIGHT	50|
	NT9X89AA	39 - 23R	J1 NT9X89BA	26 - 08R	J1 NT9X0442	RIGHT	50|
	NT9X88AA	39 - 23R	J2 NT9X89BA	26 - 08R	J2 NT9X0420	RIGHT	45|
	NT9X89AA	39 - 29R	J1 NT9X89BA	26 - 15R	J1 NT9X0445	RIGHT	65|
	NT9X88AA	39 - 29R	J2 NT9X89BA	26 - 15R	J2 NT9X0444	RIGHT	60|
	NT9X89AA	39 - 28R	J1 NT9X89BA	26 - 09R	J1 NT9X0444	RIGHT	60|
	NT9X88AA	39 - 28R	J2 NT9X89BA	26 - 09R	J2 NT9X0443	RIGHT	55|

QTY FPs	CAB. CONFIGURATION	LENGTH(IN)	QTY	PEC
	+-------+	55	1	NT9X0443
	|FP0 FP1|	60	1	NT9X0444
	+-------+	65	5	NT9X0445
	| - - |	70	3	NT9X0446
2	+-------+	75	2	NT9X0447
	|SD1 SD1|	80	1	NT9X0448
	+-------+	85	3	NT9X0449
	|SD0 SD0|			
	+-------+			

Figure 14. FRAME ID : 2 FP/8 SD

Provision one SCSI RTG Label P0724431 per Cabinet with above layout.

REF.	FROM PCB	FROM SHELF SLOT	FROM CONN	TO PCB	TO SHELF SLOT	TO CONN	CABLE PCB.	CABLE ROUTE	CABLE LENGTH
	NT9X88AA	39 - 11R	J2	NT9X89AA	00 - 08R	J1	NT9X0445	RIGHT	65
	NT9X89AA	00 - 20R	J1	NT9X88AA	39 - 11R	J1	NT9X0449	LEFT	85
	NT9X88AA	39 - 10R	J2	NT9X89AA	00 - 14R	J1	NT9X0446	RIGHT	70
	NT9X89AA	00 - 26R	J1	NT9X88AA	39 - 10R	J1	NT9X0449	LEFT	85
	NT9X88AA	39 - 17R	J2	NT9X89AA	00 - 15R	J1	NT9X0447	RIGHT	75
	NT9X89AA	00 - 27R	J1	NT9X88AA	39 - 17R	J1	NT9X0448	LEFT	80
	NT9X88AA	39 - 16R	J2	NT9X89AA	00 - 09R	J1	NT9X0446	RIGHT	70
	NT9X89AA	00 - 21R	J1	NT9X88AA	39 - 16R	J1	NT9X0449	LEFT	85
	NT9X88AA	39 - 23R	J2	NT9X89AA	13 - 08R	J1	NT9X0444	RIGHT	60
	NT9X89AA	13 - 20R	J1	NT9X88AA	39 - 23R	J1	NT9X0446	LEFT	70
	NT9X88AA	39 - 22R	J2	NT9X89AA	13 - 14R	J1	NT9X0445	RIGHT	65
	NT9X89AA	13 - 26R	J1	NT9X88AA	39 - 22R	J1	NT9X0445	LEFT	65
	NT9X88AA	39 - 29R	J2	NT9X89AA	13 - 15R	J1	NT9X0447	RIGHT	75
	NT9X89AA	13 - 27R	J1	NT9X88AA	39 - 29R	J1	NT9X0443	LEFT	55
	NT9X88AA	39 - 28R	J2	NT9X89AA	13 - 09R	J1	NT9X0445	RIGHT	65
	NT9X89AA	13 - 21R	J1	NT9X88AA	39 - 28R	J1	NT9X0445	LEFT	65

QTY FPs	CAB. CONFIGURATION	LENGTH(IN)	QTY	PEC
	+-------+	60	1	NT9X0444
	|FP0 FP1|	65	4	NT9X0445
	+-------+	70	5	NT9X0446
	| - - |	75	2	NT9X0447
2	+-------+	80	1	NT9X0448
	|SD1 - |	85	3	NT9X0449
	+-------+			
	|SD0 SD0|			
	+-------+			

Figure 15. FRAME ID : 2 FP/6 SD

Provision one SCSI RTG Label P0724432 per Cabinet with above layout.

REF.	FROM PCB	FROM SHELF SLOT CONN	TO PCB	TO SHELF SLOT CONN	CABLE PCB.	CABLE ROUTE	CABLE LENGTH INCH
	NT9X88AA	39 - 11R J2	NT9X89AA	00 - 08R J1	NT9X0445	RIGHT	65
	NT9X89AA	00 - 20R J1	NT9X88AA	39 - 11R J1	NT9X0449	LEFT	85
	NT9X88AA	39 - 10R J2	NT9X89AA	00 - 14R J1	NT9X0446	RIGHT	70
	NT9X89AA	00 - 26R J1	NT9X88AA	39 - 10R J1	NT9X0449	LEFT	85
	NT9X88AA	39 - 17R J2	NT9X89AA	00 - 15R J1	NT9X0447	RIGHT	75
	NT9X89AA	00 - 27R J1	NT9X88AA	39 - 17R J1	NT9X0448	LEFT	80
	NT9X88AA	39 - 16R J2	NT9X89AA	00 - 09R J1	NT9X0446	RIGHT	70
	NT9X89AA	00 - 21R J1	NT9X88AA	39 - 16R J1	NT9X0449	LEFT	85
	NT9X88AA	39 - 22R J1	NT9X89BA	13 - 14R J1	NT9X0446	RIGHT	70
	NT9X88AA	39 - 22R J2	NT9X89BA	13 - 14R J2	NT9X0445	RIGHT	65
	NT9X88AA	39 - 23R J1	NT9X89BA	13 - 08R J1	NT9X0445	RIGHT	65
	NT9X88AA	39 - 23R J2	NT9X89BA	13 - 08R J2	NT9X0444	RIGHT	60
	NT9X88AA	39 - 29R J1	NT9X89BA	13 - 15R J1	NT9X0447	RIGHT	75
	NT9X88AA	39 - 29R J2	NT9X89BA	13 - 15R J2	NT9X0446	RIGHT	70
	NT9X88AA	39 - 28R J1	NT9X89BA	13 - 09R J1	NT9X0446	RIGHT	70
	NT9X88AA	39 - 28R J2	NT9X89BA	13 - 09R J2	NT9X0445	RIGHT	65

QTY FPs	CAB. CONFIGURATION	LENGTH(IN)	QTY	PEC
	+-------+	60	1	NT9X0444
	|FP0 FP1|	65	4	NT9X0445
	+-------+	70	2	NT9X0446
	| - - |	75	5	NT9X0447
2	+-------+	80	3	NT9X0448
	| - - |	85	1	NT9X0449
	+-------+			
	|SD0 SD1|			
	+-------+			

Figure 16. FRAME ID : 2 FP/4 SD SYSTEM

Provision one SCSI RTG Label P0724433 per Cabinet with above layout.

REF. |<-----FROM-------> PCB	SHELF SLOT	CONN	|<----TO----------> PCB	SHELF SLOT	CONN	|<----CABLE-------> PCB.	ROUTE	LENGTH
NT9X88AA	39 - 10R	J1	NT9X89BA	00 - 14R	J1	NT9X0446	RIGHT	70
NT9X88AA	39 - 10R	J2	NT9X89BA	00 - 14R	J2	NT9X0445	RIGHT	65
NT9X88AA	39 - 11R	J1	NT9X89BA	00 - 08R	J1	NT9X0445	RIGHT	65
NT9X88AA	39 - 11R	J2	NT9X89BA	00 - 08R	J2	NT9X0444	RIGHT	60
NT9X88AA	39 - 17R	J1	NT9X89BA	00 - 15R	J1	NT9X0448	RIGHT	80
NT9X88AA	39 - 17R	J2	NT9X89BA	00 - 15R	J2	NT9X0447	RIGHT	75
NT9X88AA	39 - 16R	J1	NT9X89BA	00 - 09R	J1	NT9X0446	RIGHT	70
NT9X88AA	39 - 16R	J2	NT9X89BA	00 - 09R	J2	NT9X0445	RIGHT	65
NT9X88AA	39 - 22R	J1	NT9X89BA	00 - 26R	J1	NT9X0448	LEFT	80
NT9X88AA	39 - 22R	J2	NT9X89BA	00 - 26R	J2	NT9X0447	LEFT	75
NT9X88AA	39 - 23R	J1	NT9X89BA	00 - 20R	J1	NT9X0449	LEFT	85
NT9X88AA	39 - 23R	J2	NT9X89BA	00 - 20R	J2	NT9X0447	LEFT	75
NT9X88AA	39 - 29R	J1	NT9X89BA	00 - 27R	J1	NT9X0447	LEFT	75
NT9X88AA	39 - 29R	J2	NT9X89BA	00 - 27R	J2	NT9X0445	LEFT	65
NT9X88AA	39 - 28R	J1	NT9X89BA	00 - 21R	J1	NT9X0448	LEFT	80
NT9X88AA	39 - 28R	J2	NT9X89BA	00 - 21R	J2	NT9X0447	LEFT	75

QTY FPs	CAB. CONFIGURATION	LENGTH(IN)	QTY	PEC
	+-------+	50	1	NT9X0442
	|FP0 FP1|	55	3	NT9X0443
	+-------+	60	4	NT9X0444
	|FP2 - |	65	5	NT9X0445
3	+-------+	70	5	NT9X0446
	|SD1 SD2|	75	2	NT9X0447
	+-------+	80	1	NT9X0448
	|SD0 SD0|	85	3	NT9X0449
	+-------+			

Figure 17. FRAME ID : 3 FP/8 SD

Provision one SCSI RTG Label P0724417 per Cabinet with above layout.

REF.	FROM PCB	FROM SHELF SLOT CONN	TO PCB	TO SHELF SLOT CONN	CABLE PCB.	ROUTE	LENGTH INCH
	NT9X88AA	39 - 11R J2	NT9X89AA	00 - 08R J1	NT9X0445	RIGHT	65
	NT9X89AA	00 - 20R J1	NT9X88AA	39 - 11R J1	NT9X0449	LEFT	85
	NT9X88AA	39 - 10R J2	NT9X89AA	00 - 14R J1	NT9X0446	RIGHT	70
	NT9X89AA	00 - 26R J1	NT9X88AA	39 - 10R J1	NT9X0449	LEFT	85
	NT9X88AA	39 - 17R J2	NT9X89AA	00 - 15R J1	NT9X0447	RIGHT	75
	NT9X89AA	00 - 27R J1	NT9X88AA	39 - 17R J1	NT9X0448	LEFT	80
	NT9X88AA	39 - 16R J2	NT9X89AA	00 - 09R J1	NT9X0446	RIGHT	70
	NT9X89AA	00 - 21R J1	NT9X88AA	39 - 16R J1	NT9X0449	LEFT	85
	NT9X88AA	39 - 22R J1	NT9X89BA	13 - 14R J1	NT9X0446	RIGHT	70
	NT9X88AA	39 - 22R J2	NT9X89BA	13 - 14R J2	NT9X0445	RIGHT	65
	NT9X88AA	39 - 23R J1	NT9X89BA	13 - 08R J1	NT9X0445	RIGHT	65
	NT9X88AA	39 - 23R J2	NT9X89BA	13 - 08R J2	NT9X0444	RIGHT	60
	NT9X88AA	39 - 29R J1	NT9X89BA	13 - 15R J1	NT9X0447	RIGHT	75
	NT9X88AA	39 - 29R J2	NT9X89BA	13 - 15R J2	NT9X0446	RIGHT	70
	NT9X88AA	39 - 28R J1	NT9X89BA	13 - 09R J1	NT9X0446	RIGHT	70
	NT9X88AA	39 - 28R J2	NT9X89BA	13 - 09R J2	NT9X0445	RIGHT	65
	NT9X88AA	26 - 10R J1	NT9X89BA	13 - 26R J1	NT9X0444	LEFT	60
	NT9X88AA	26 - 10R J2	NT9X89BA	13 - 26R J2	NT9X0443	LEFT	55
	NT9X88AA	26 - 11R J1	NT9X89BA	13 - 20R J1	NT9X0445	LEFT	65
	NT9X88AA	26 - 11R J2	NT9X89BA	13 - 20R J2	NT9X0444	LEFT	60
	NT9X88AA	26 - 17R J1	NT9X89BA	13 - 27R J1	NT9X0443	LEFT	55
	NT9X88AA	26 - 17R J2	NT9X89BA	13 - 27R J2	NT9X0442	LEFT	50
	NT9X88AA	26 - 16R J1	NT9X89BA	13 - 21R J1	NT9X0444	LEFT	60
	NT9X88AA	26 - 16R J2	NT9X89BA	13 - 21R J2	NT9X0443	LEFT	55

QTY FPs	CAB. CONFIGURATION	LENGTH(IN)	QTY	PEC
	+-------+	35	1	NT9X0416
	|FP0 FP1|	40	3	NT9X0419
	+-------+	45	2	NT9X0420
	|FP2 - |	50	1	NT9X0442
3	+-------+	55	1	NT9X0443
	|SD2 - |	60	1	NT9X0444
	+-------+	65	4	NT9X0445
	|SD0 SD1|	70	2	NT9X0446
	+-------+	75	5	NT9X0447
		80	3	NT9X0448
		85	1	NT9X0449

Figure 18. FRAME ID : 3 FP/6 SD SYSTEM

Provision one SCSI RTG Label P0724428 per Cabinet with above layout.

REF.	FROM PCB	FROM SHELF SLOT CONN	TO PCB	TO SHELF SLOT CONN	CABLE PCB.	CABLE ROUTE	LENGTH
	NT9X88AA	39 - 10R J1	NT9X89BA	00 - 14R J1	NT9X0446	RIGHT	70
	NT9X88AA	39 - 10R J2	NT9X89BA	00 - 14R J2	NT9X0445	RIGHT	65
	NT9X88AA	39 - 11R J1	NT9X89BA	00 - 08R J1	NT9X0445	RIGHT	65
	NT9X88AA	39 - 11R J2	NT9X89BA	00 - 08R J2	NT9X0444	RIGHT	60
	NT9X88AA	39 - 17R J1	NT9X89BA	00 - 15R J1	NT9X0448	RIGHT	80
	NT9X88AA	39 - 17R J2	NT9X89BA	00 - 15R J2	NT9X0447	RIGHT	75
	NT9X88AA	39 - 16R J1	NT9X89BA	00 - 09R J1	NT9X0446	RIGHT	70
	NT9X88AA	39 - 16R J2	NT9X89BA	00 - 09R J2	NT9X0445	RIGHT	65
	NT9X88AA	39 - 22R J1	NT9X89BA	00 - 26R J1	NT9X0448	LEFT	80
	NT9X88AA	39 - 22R J2	NT9X89BA	00 - 26R J2	NT9X0447	LEFT	75
	NT9X88AA	39 - 23R J1	NT9X89BA	00 - 20R J1	NT9X0449	LEFT	85
	NT9X88AA	39 - 23R J2	NT9X89BA	00 - 20R J2	NT9X0447	LEFT	75
	NT9X88AA	39 - 29R J1	NT9X89BA	00 - 27R J1	NT9X0447	LEFT	75
	NT9X88AA	39 - 29R J2	NT9X89BA	00 - 27R J2	NT9X0445	LEFT	65
	NT9X88AA	39 - 28R J1	NT9X89BA	00 - 21R J1	NT9X0448	LEFT	80
	NT9X88AA	39 - 28R J2	NT9X89BA	00 - 21R J2	NT9X0447	LEFT	75
	NT9X88AA	26 - 10R J1	NT9X89BA	13 - 14R J1	NT9X0420	RIGHT	45
	NT9X88AA	26 - 10R J2	NT9X89BA	13 - 14R J2	NT9X0419	RIGHT	40
	NT9X88AA	26 - 11R J1	NT9X89BA	13 - 08R J1	NT9X0419	RIGHT	40
	NT9X88AA	26 - 11R J2	NT9X89BA	13 - 08R J2	NT9X0416	RIGHT	35
	NT9X88AA	26 - 17R J1	NT9X89BA	13 - 15R J1	NT9X0443	RIGHT	55
	NT9X88AA	26 - 17R J2	NT9X89BA	13 - 15R J2	NT9X0442	RIGHT	50
	NT9X88AA	26 - 16R J1	NT9X89BA	13 - 09R J1	NT9X0420	RIGHT	45
	NT9X88AA	26 - 16R J2	NT9X89BA	13 - 09R J2	NT9X0419	RIGHT	40

QTY FPs	CAB. CONFIGURATION	LENGTH(IN)	QTY	PEC
	+-------+	35	1	NT9X0416
	|FP0 FP1|	40	4	NT9X0419
	+-------+	45	5	NT9X0420
	|FP2 FP3|	50	4	NT9X0442
4	+-------+	55	1	NT9X0443
	|SD2 SD3|	60	2	NT9X0444
	+-------+	65	4	NT9X0445
	|SD0 SD1|	70	2	NT9X0446
	+-------+	75	5	NT9X0447
		80	3	NT9X0448
		85	1	NT9X0449

Figure 19. FRAME ID : 4 FP/8 SD

Provision one SCSI RTG Label P0724416 per Cabinet with above layout.

REF.	<-----FROM-------> PCB	SHELF CONN SLOT	<----TO----------> PCB	SHELF CONN SLOT	<----CABLE-------> PCB.	ROUTE	LENGTH
	NT9X88AA	39 - 10R J1	NT9X89BA	00 - 14R J1	NT9X0446	RIGHT	70
	NT9X88AA	39 - 10R J2	NT9X89BA	00 - 14R J2	NT9X0445	RIGHT	65
	NT9X88AA	39 - 11R J1	NT9X89BA	00 - 08R J1	NT9X0445	RIGHT	65
	NT9X88AA	39 - 11R J2	NT9X89BA	00 - 08R J2	NT9X0444	RIGHT	60
	NT9X88AA	39 - 17R J1	NT9X89BA	00 - 15R J1	NT9X0448	RIGHT	80
	NT9X88AA	39 - 17R J2	NT9X89BA	00 - 15R J2	NT9X0447	RIGHT	75
	NT9X88AA	39 - 16R J1	NT9X89BA	00 - 09R J1	NT9X0446	RIGHT	70
	NT9X88AA	39 - 16R J2	NT9X89BA	00 - 09R J2	NT9X0445	RIGHT	65
	NT9X88AA	39 - 22R J1	NT9X89BA	00 - 26R J1	NT9X0448	LEFT	80
	NT9X88AA	39 - 22R J2	NT9X89BA	00 - 26R J2	NT9X0447	LEFT	75
	NT9X88AA	39 - 23R J1	NT9X89BA	00 - 20R J1	NT9X0449	LEFT	85
	NT9X88AA	39 - 23R J2	NT9X89BA	00 - 20R J2	NT9X0447	LEFT	75
	NT9X88AA	39 - 29R J1	NT9X89BA	00 - 27R J1	NT9X0447	LEFT	75
	NT9X88AA	39 - 29R J2	NT9X89BA	00 - 27R J2	NT9X0445	LEFT	65
	NT9X88AA	39 - 28R J1	NT9X89BA	00 - 21R J1	NT9X0448	LEFT	80
	NT9X88AA	39 - 28R J2	NT9X89BA	00 - 21R J2	NT9X0447	LEFT	75
	NT9X88AA	26 - 10R J1	NT9X89BA	13 - 14R J1	NT9X0420	RIGHT	45
	NT9X88AA	26 - 10R J2	NT9X89BA	13 - 14R J2	NT9X0419	RIGHT	40
	NT9X88AA	26 - 11R J1	NT9X89BA	13 - 08R J1	NT9X0419	RIGHT	40
	NT9X88AA	26 - 11R J2	NT9X89BA	13 - 08R J2	NT9X0416	RIGHT	35
	NT9X88AA	26 - 17R J1	NT9X89BA	13 - 15R J1	NT9X0443	RIGHT	55
	NT9X88AA	26 - 17R J2	NT9X89BA	13 - 15R J2	NT9X0442	RIGHT	50
	NT9X88AA	26 - 16R J1	NT9X89BA	13 - 09R J1	NT9X0420	RIGHT	45
	NT9X88AA	26 - 16R J2	NT9X89BA	13 - 09R J2	NT9X0419	RIGHT	40
	NT9X88AA	26 - 22R J1	NT9X89BA	13 - 26R J1	NT9X0442	LEFT	50
	NT9X88AA	26 - 22R J2	NT9X89BA	13 - 26R J2	NT9X0420	LEFT	45
	NT9X88AA	26 - 23R J1	NT9X89BA	13 - 20R J1	NT9X0444	LEFT	60
	NT9X88AA	26 - 23R J2	NT9X89BA	13 - 20R J2	NT9X0442	LEFT	50
	NT9X88AA	26 - 29R J1	NT9X89BA	13 - 27R J1	NT9X0420	LEFT	45

```
NT9X88AA 26 - 29R J2 NT9X89BA 13 - 27R J2 NT9X0419    LEFT  40|
NT9X88AA 26 - 28R J1 NT9X89BA 13 - 21R J1 NT9X0442    LEFT  50|
NT9X88AA 26 - 28R J2 NT9X89BA 13 - 21R J2 NT9X0420    LEFT  45|
```

Connectorized power cabling is always provided with the cabinet for all shelf positions.

1.2.3.5 Message Switch (MS) and Port Provisioning

1.2.3.6 Provisioning Memory on the Message Switch

The memory on the Message Switch of the SuperNode can be provisioned ACCORDING TO THE TYPE OF APPLICATION being used. The follow are permissible.

a.) For 7MEG of Memory on the Message Switch:

Provision two (2) NT9X13DB CPU 16MHZ CP Shelf (26,39) slot 9F
Provision two (2) NT9X14BB 6 MB Memory Shelf (26,39) slot 10F

b.) For 10MEG of Memory on the Message Switch:

Provision two (2) NT9X13DC CPU 16MHZ CP Shelf (26,39) slot 9F
Provision two (2) NT9X14BB 6 MB Memory Shelf (26,39) slot 10F

c.) For 25MEG of Memory on the Message Switch:

Provision two (2) NT9X13DB CPU 16MHZ CP Shelf (26,39) slot 9F
Provision two (2) NT9X14DB 24MB Memory Shelf (26,39) slot 10F

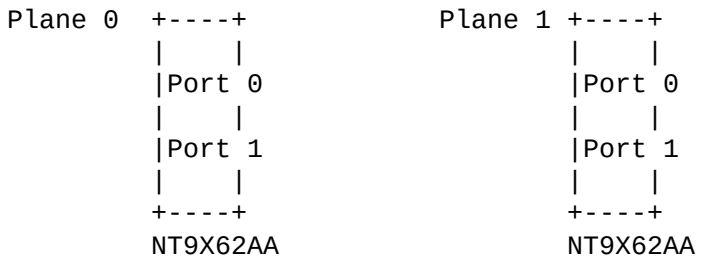
d.) For 28MEG of Memory on the Message Switch:

Provision two (2) NT9X13DC CPU 16MHZ CP Shelf (26,39) slot 9F
Provision two (2) NT9X14DB 24MB Memory Shelf (26,39) slot 10F

1.2.3.7 Message Switch and File Processor Link Provisioning

Each AP and FP is provisioned with two (2) NT9X62AA 2-Port Subrate DS-512 paddleboards(one per plane). There are two fiber link connections(port 0 and port 1) on each NT9X62AA.

Therefore one (1) File or Application Processor has:



On the DMS Core Message Switch, NT9X62BA 4-Port Subrate DS-512 paddleboards are provisioned. In BCS-33, only two connections (ports 0 and 1) are available. Also, the only subrates available in BCS-33 are 256 on the NT9X62AA and 256,512 on the NT9X62BA. In BCS-34 or higher there are 4 connections (ports 0,1,2,3) available on each NT9X62BA.

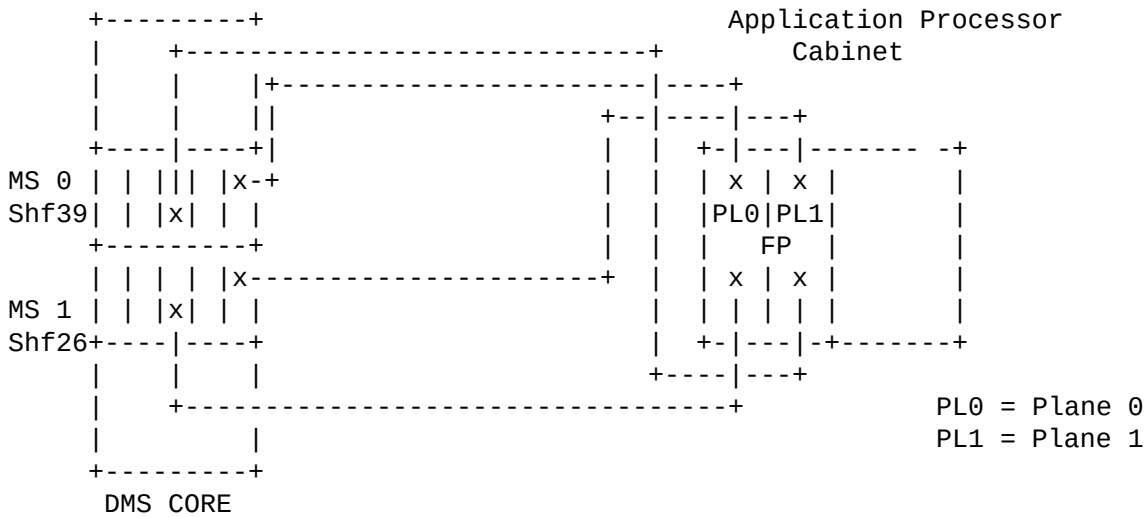
One (1) MS Port CP is provisioned at the front of the MS shelf in the same CP position as the rear NT9X62BA PB. Provision NT9X17DA MS 64-port CP. Each port card only supports one channels-per-link configuration; that is, you cannot mix 64-, 128- and 256-channel links on a single port card.

To Summarise the Use of NT9X17DA CARD

	BCS RELEASE			
	33	34	35	36
NT9X17DA	valid	valid	valid	valid

The maximum total number of APs and FPs that may be assigned to THE MS IS 11. This fanout is reduced by the number of networks, LIMs and other devices assigned to the MS, dependent upon the application.

General Overview of the MS and FP Link Layout



1.2.3.8 Determining MS Slot Assignments on the DMS-CORE

The following table is used to determine the slot assignments on the DMS-Core for the Memory Switch cards.

From NT9X62AA PB		To NT9X62BA PB		
AP/FP Plane	Port	MS plane	CP pos'n	Port
0	0	0	X	Y
0	1	1	W	Y
1	0	1	X	Y
1	1	0	W	Y

Where: X, W are any CP position in the MS. 'X' and 'W' can be the same but should be different for increased robustness.

Where: Y depends on the number of channels per link required by the application.

Channels per Link	Y =
256	0 , 1
128	0 , 1, 2, 3

Figure 20. DMS-Core Memory Switch Card Slot Assignments

1.2.3.9 Inter MS Links(on the DMS-CORE)

In APC applications IT IS NECESSARY to provision Inter-MS Links (IMLs) for reliability. These links connect MS plane 0 to MS plane 1 and provide a path for messages in event of a failure.

For DS-512 Inter-Ms Fiber links, provision two (2) NT9X17DA Port Card and two (2) NT9X20BB/BC Fiber Paddleboard for each Message Switch. (Note: This is a total of four port and paddleboard cards.) Card position is not restricted, but the cards residing in each message switch must be connected to its counterpart in the opposite message switch in the same slot. For example, Inter-MS link 0 could use slot 21 with NT9X17DAs in both Message Switches, slot 21F and NT9X20BB/BC in slot 21R and connecting fibers between them.

For Fiber inter-MS links, provision two (2) A0352268 Fiber Cables (62") per link.

1.2.3.10 DMS SuperNode Equipment

The DMS SuperNode MUST BE provisioned with the two (2) NT9X49CB MS P-BUS Terminator CP (Tracer Cards). This is to allow for tracing of messages and aid in fault dignostics and MS maintenance.

For synchronization, no new changes to the current DMS SuperNode functionality are introduced. The new components are not synchronized to the telephony network. APs and FPs, for the purposes of synchronization, are self contained end nodes.

See ECM 626 DMS-SuperNode for further information.

1.2.4 Office Layout Information

The Application Processor Cabinet is a standard SuperNode style cabinet. Refer to ECM626 DMS-Supernode for details of office layout considerations.

1.2.5 Traffic Tables

Not applicable. Individual provisioning documents for software applications of the APC will define traffic engineering parameters as appropriate.

1.3 Product/System Specification

1.3.1 Physical Characteristics

NOT APPLICABLE.

1.3.2 EMI/Earthquake Information

The APC cabinet is designed to be EMI compliant.

1.3.3 Sparing Information

Spares are calculated based on predicted Mean Time Between Failure (MTBF) values, given as follows:

PEC	MTBF (years)
NT9X13LA	11.4
NT9X21AB	163.1
NT9X62AA	38.1
NT9X62BA	39.4
NT9X86AA	19.0
NT9X87AA	12.7
NT9X88AA	63.4
NT9X89AA	81.5

NT9X89BA	81.5
NT9X90AA	3.2
NT9X90AB	3.2
NT9X90BA	4.5
NT9X91AB	57.1
NT9X91AC	57.1
NTDX15AB	57.1

1.3.4 Power Feed and Fusing Requirements

Eight (8) 20A Fuses - two per Shelf are required (at PDC for FP, SD and FLIS shelves), and two (2) 10A Fuses for Cooling Unit.

1.3.5 Current Drain Information

Current drain and power dissipation of each major half-shelf component in the APC are as follows:

COMPONENT	MAXIMUM CURRENT DRAIN (AMPS)	POWER DISS. (WATTS)
Application Processor	5	240
File Processor	6	288
600 MByte Disk SD	7	336
2 GByte Disk SD	7	336
1.3 GByte DAT SD	6	288

1.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

1.4.1 Required Software Packages and Interdependencies

Refer to the provisioning document for the specific software application of the APC for software provisioning information.

1.4.2 Software Usage Restrictions

Not applicable.

1.4.3 Memory Provisioning

Provisioning of memory cards in the AP and FP units is dependent upon the specific application. Refer to the appropriate provisioning document for information.

1.5 Real Time Impact

The addition of AP and FP components should have minimal impact on call processing. Additional background time, at a lower priority than call processing, is required to maintain the additional

components. APPLICATION PROCESSOR CABINET BUILDING BLOCK DEFINITION

The Application Processor Cabinet building block concept deals with a higher level of Product Engineering Code (PEC) ordering and simplifies the engineering ordering process.

NT9X80CA (APC Application Processor Cabinet)

Each NT9X80CA contains a Gray exterior APC cabinet and is provisionable with a Frame Supervisory Panel and Cooling Unit for either -48V capability or -60V capability.

NTZZ35MA/MB (APC C/42 Gray -48V)

Each NTZZ35MA/MB contains a Gray exterior APC cabinet along with Frame Supervisory Panel and Cooling Units for -48V capability.

NTZZ35NA/NB (APC C/42 Brown -48V)

Each NTZZ35NA/NB contains a Brown exterior APC cabinet along with Frame Supervisory Panel and Cooling Units for -48V capability.

NTZZ35PA/PB (APC C/42 Gray -60V)

Each NTZZ35NA/NB contains a Brown exterior APC cabinet along with Frame Supervisory Panel and Cooling Units for -60V capability.

NTZZ35QA (APC AP LEFT (C/42)

Each NTZZ35QA contains CPU Processors, Power Converter, Faceplates, Paddleboards, Bus Terminators to be inserted on the left half shelf of the cabinet to equip one (1) Application Processor.

NTZZ35RA (APC File Processor Left)

Each NTZZ35RA contains CPU Processors, Power Converter, Faceplates, Paddleboards, Bus Terminators to be inserted on the left half shelf of the cabinet to equip one (1) File Processor.

NTZZ35SA (APC Application Processor Right)

Each NTZZ35SA contains CPU Processors, Power Converter, Faceplates, Paddleboards, Bus Terminators to be inserted on the right half shelf of the cabinet to equip one (1) Application Processor

NTZZ35TA (APC File Processor Right)

Each NTZZ35TA contains CPU Processors, Power Converter, Faceplates, Paddleboards, Bus Terminators to be inserted on the right half shelf of the cabinet to equip one (1) File Processor

NTZZ35UA (APC Storage Device Left)

NTZZ35UA (A&M-See NTZZ35XA) contains the circuit packs such as Power Converters, Paddleboards, Faceplates necessary for the storage devices. This is placed on the left half shelf of the cabinet.

NTZZ35VA (APC Storage Device Right)

NTZZ35VA (A&M-See NTZZ35YA) contains the circuit packs such as Power Converters, Paddleboards, Faceplates necessary for the storage devices. This is placed on the right half shelf of the cabinet.

NTZZ35WA (APC Storage Device Full)

NTZZ35WA (A&M-See NTZZ35ZA) contains the circuit packs such as Power Converters, Paddleboards, Faceplates necessary for the storage devices on a full shelf in the cabinet.

NTZZ35XA (APC SD Left-GLOBAL PWR)

NTZZ35XA contains the circuit packs such as Global Power Converters, Paddleboards, Faceplates necessary for the storage devices. This is placed on the left half shelf of the cabinet.

NTZZ35YA (APC SD Right-GLOBAL PWR)

NTZZ35YA contains the circuit packs such as Global Power Converters, Paddleboards, Faceplates necessary for the storage devices. This is placed on the right half shelf of the cabinet.

NTZZ35ZA (APC SD Full-GLOBAL PWR)

NTZZ35ZA contains the circuit packs such as Global Power Converters, Paddleboards, Faceplates necessary for the storage devices on a full shelf in the cabinet.

Chapter 10

REMOTE PERIPHERALS

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REMOTE PERIPHERALS
Section Contents

1.0 ECM286 - Remote Line Concentrating Module (RLCM) 10-1
1.1 Overview 10-1
1.2 Hardware Provisioning 10-3
1.2.1 Hardware Usage Restrictions 10-3
1.2.2 Hardware Dependencies 10-3
1.2.2.1 P and C Side Port Requirements . . . 10-4
1.2.2.2 DMS BUS Port Requirements 10-4
1.2.2.3 Circuits Per Card 10-4
1.2.2.4 Discrimination Numbering 10-4
1.2.3 Provisioning Considerations 10-4
1.2.3.1 RLCM FSP Provisioning 10-4
1.2.3.2 RLCM RMM Provisioning 10-5
1.2.3.3 RLCM HIE Provisioning 10-5
1.2.3.4 LCM Provisioning 10-7
1.2.3.5 Miscellaneous Equipment Provisioning 10-8
1.2.4 Office Layout Information 10-8
1.2.5 Traffic Tables 10-8
1.3 Product/System Specification 10-8
1.3.1 Physical Characteristics 10-8
1.3.1.1 NT6X14AA - RLCM Frame 10-8
1.3.2 EMI/Earthquake Information 10-9
1.3.3 Sparing Information 10-9
1.3.4 Power Feed and Fusing Requirements 10-9
1.3.5 Current Drain Information 10-9
1.4 Software Provisioning 10-9
1.4.1 Required Software Packages and Interdependencies 10-9
1.4.2 Software Usage Restrictions 10-10
1.4.3 Memory Provisioning 10-10
1.5 Real Time Impact 10-10

2.0 ECM288 - Digital Carrier Module (DCM) and 10-11
2.1 Overview 10-11
2.1.1 Digital Carrier Module 10-11
2.1.2 Digital Echo Suppressor 10-11
2.2 Hardware Provisioning 10-11
2.2.1 Hardware Usage Restrictions 10-11
2.2.2 Hardware Dependencies 10-11
2.2.2.1 P and C Side Port Requirements . . . 10-12
2.2.2.2 DMS BUS Port Requirements 10-12
2.2.2.3 Circuits Per Card 10-12
2.2.2.4 Discrimination Numbering 10-12
2.2.3 Provisioning Considerations 10-12
2.2.3.1 Digital Carrier Module 10-12
2.2.3.2 Digital Echo Suppressor 10-13
2.2.3.3 Digital Carrier Equipment Frame . . . 10-14
2.2.4 Office Layout Information 10-15
2.2.5 Traffic Tables 10-15
2.3 Product/System Specification 10-15
2.3.1 Physical Characteristics 10-15

2.3.2 EMI/Earthquake Information 10-15
2.3.3 Sparing Information 10-15
2.3.4 Power Feed and Fusing Requirements 10-15
2.3.5 Current Drain Information 10-15
2.4 Software Provisioning 10-15
2.4.1 Required Software Packages and Interdependencies 10-15
2.4.2 Software Usage Restrictions 10-15
2.4.3 Memory Provisioning 10-15
2.5 Real Time Impact 10-16

3.0 ECM326 - Meridian Cabinet Remote Switching Center 10-17
3.1 Overview 10-17
3.2 Hardware Provisioning 10-17
3.2.1 Hardware Usage Restrictions 10-17
3.2.2 Hardware Dependencies 10-17
3.2.2.1 P and C Side Port Requirements . . . 10-18
3.2.2.2 DMS BUS Port Requirements 10-18
3.2.2.3 Circuits Per Card 10-18
3.2.2.4 Discrimination Numbering 10-18
3.2.3 Provisioning Considerations 10-18
3.2.3.1 MCRM CABINET 10-20
3.2.3.2 MCLM Cabinet 10-21
3.2.3.3 Intelligent Peripheral Module (Ref: ECM 509) 10-22
3.2.3.4 Miscellaneous 10-22
3.2.4 Office Layout Information 10-22
3.2.5 Traffic Tables 10-23
3.3 Product/System Specification 10-23
3.3.1 Physical Characteristics 10-23
3.3.2 EMI/Earthquake Information 10-23
3.3.3 Sparing Information 10-23
3.3.4 Power Feed and Fusing Requirements 10-23
3.3.5 Current Drain Information 10-23
3.4 Software Provisioning 10-24
3.4.1 Required Software Packages and Interdependencies 10-24
3.4.2 Software Usage Restrictions 10-24
3.4.3 Memory Provisioning 10-24
3.5 Real Time Impact 10-24

4.0 ECM415 - Remote Line Concentrating Cabinet (RLCC) / MCRU 10-25
4.1 Overview 10-25
4.2 Hardware Provisioning 10-26
4.2.1 Hardware Usage Restrictions 10-26
4.2.2 Hardware Dependencies 10-27
4.2.2.1 P and C Side Port Requirements . . . 10-27
4.2.2.2 DMS BUS Port Requirements 10-28
4.2.2.3 Circuits Per Card 10-28
4.2.2.4 Discrimination Numbering 10-28
4.2.3 Provisioning Considerations 10-28
4.2.4 Office Layout Information 10-31

4.2.5 Traffic Tables 10-31
4.3 Product/System Specification 10-31
4.3.1 Physical Characteristics 10-31
4.3.2 EMI/Earthquake Information 10-31
4.3.3 Sparing Information 10-31
4.3.4 Power Feed and Fusing Requirements 10-32
4.3.5 Current Drain Information 10-32
4.4 Software Provisioning 10-32
4.4.1 Required Software Packages and Interdependencies 10-32
4.4.2 Software Usage Restrictions 10-32
4.4.3 Memory Provisioning 10-32
4.5 Real Time Impact 10-32

5.0 ECM527 - Small Remote Unit 10-35
5.1 Overview 10-35
5.2 Hardware Provisioning 10-37
5.2.1 Hardware Usage Restrictions 10-37
5.2.2 Hardware Dependencies 10-37
5.2.2.1 P and C Side Port Requirements . . . 10-38
5.2.2.2 DMS BUS Port Requirements 10-38
5.2.2.3 Circuits Per Card 10-38
5.2.2.4 Discrimination Numbering 10-38
5.2.3 Provisioning Considerations 10-38
5.2.3.1 Host Interface Unit 10-41
5.2.3.2 SRU Control Unit (SCU) 10-41
5.2.3.3 Ringing Unit. 10-42
5.2.3.4 Line Drawer (NTBX32BA) 10-42
5.2.3.5 Remote Maintenance Unit (RMU) 10-43
5.2.3.6 Power Supply Unit. 10-44
5.2.3.7 Administration, Maintenance and Operations 10-45
5.2.3.8 Traffic Engineering 10-45
5.2.4 Office Layout Information 10-46
5.2.5 Traffic Tables 10-47
5.3 Product/System Specification 10-47
5.3.1 Physical Characteristics 10-47
5.3.2 EMI/Earthquake Information 10-47
5.3.3 Sparing Information 10-47
5.3.4 Power Feed and Fusing Requirements 10-47
5.3.5 Current Drain Information 10-47
5.4 Software Provisioning 10-47
5.4.1 Required Software Packages and Interdependencies 10-47
5.4.2 Software Usage Restrictions 10-48
5.4.3 Memory Provisioning 10-48
5.5 Real Time Impact 10-48

6.0 ECM544 - Meridian Cabinet Remote Module-SONET (MCRMS) . . 10-49
6.1 Overview 10-49
6.1.1 UPGRADING A CUSTOM EMI REMOTE WITH MCRMS CABINET 10-50
6.2 Hardware Provisioning 10-50

6.2.1 Hardware Usage Restrictions 10-50
6.2.1.1 D-CHANNEL RESTRICTIONS 10-50
6.2.2 Hardware Dependencies 10-51
6.2.2.1 P and C Side Port Requirements . . . 10-51
6.2.2.2 DMS BUS Port Requirements 10-51
6.2.2.3 Circuits Per Card 10-51
6.2.2.4 Discrimination Numbering 10-51
6.2.3 Provisioning Considerations 10-51
6.2.3.1 PROVISIONING OF P-SIDE PORTS 10-53
6.2.3.2 C-SIDE LINK PROVISIONING 10-55
6.2.3.3 METALLIC TEST ACCESS (MTA) 10-55
6.2.4 Office Layout Information 10-56
6.2.5 Traffic Tables 10-57
6.3 Product/System Specification 10-58
6.3.1 Physical Characteristics 10-58
6.3.2 EMI/Earthquake Information 10-58
6.3.3 Sparing Information 10-58
6.3.4 Power Feed and Fusing Requirements 10-58
6.3.5 Current Drain Information 10-58
6.4 Software Provisioning 10-59
6.4.1 Required Software Packages and Interdependencies 10-59
6.4.2 Software Usage Restrictions 10-59
6.4.3 Memory Provisioning 10-59
6.5 Real Time Impact 10-60

7.0 ECM562 - Outside Plant Access Cabinet (OPAC) 10-61
7.1 Overview 10-61
7.2 Hardware Provisioning 10-64
7.2.1 Hardware Usage Restrictions 10-64
7.2.2 Hardware Dependencies 10-64
7.2.2.1 P and C Side Port Requirements . . . 10-64
7.2.2.2 DMS BUS Port Requirements 10-64
7.2.2.3 Circuits Per Card 10-64
7.2.2.4 Discrimination Numbering 10-64
7.2.3 Provisioning Considerations 10-64
7.2.4 HOST INTERFACE EQUIPMENT (HIE) 10-65
7.2.5 LINE CONCENTRATING MODULE 10-67
7.2.6 REMOTE MAINTENANCE MODULE (RMM) 10-68
7.2.7 MODULAR SUPERVISORY PANEL (MSP) 10-71
7.2.8 BATTERY CHARGING UNIT (BCU) 10-71
7.2.9 END COMPARTMENT ACCESS 10-71
7.2.10 DOWN DRAFT COOLING UNIT 10-71
7.2.11 OC-1 KITS 10-71
7.2.12 SPC BLOCK 10-72
7.2.13 TELCO RESPONSIBILITIES. 10-73
7.2.14 Office Layout Information 10-73
7.2.15 Traffic Tables 10-73
7.3 Product/System Specification 10-73
7.3.1 Physical Characteristics 10-73
7.3.2 EMI/Earthquake Information 10-73
7.3.3 Sparing Information 10-74

7.3.4 Power Feed and Fusing Requirements 10-74
7.3.5 Current Drain Information 10-74
7.4 Software Provisioning 10-74
7.4.1 Required Software Packages and Interdependencies 10-74
7.4.2 Software Usage Restrictions 10-75
7.4.3 Memory Provisioning 10-75
7.5 Real Time Impact 10-75

8.0 ECM572 - S/DMS AccessNode 10-76
8.1 Overview 10-76
8.1.1 Fiber Central Office Terminal (FCOT) 10-76
8.1.2 Remote Fiber Terminal (RFT) 10-76
8.1.2.1 Outside Plant Cabinet (as an RFT) . . 10-76
8.1.2.2 Modular Business Package (as an RFT) 10-77
8.1.3 Network Elements 10-77
8.1.3.1 The Access Bandwidth Manager (ABM) 10-78
8.1.3.2 The Transport Bandwidth Manager (TBM) 10-78
8.1.4 System Architecture 10-78
8.1.4.1 Topologies 10-78
8.1.4.2 Future Topologies 10-78
8.1.4.3 Point to Point Applications: 10-79
8.1.4.4 Accessnode Packaging Options 10-80
8.2 Hardware Provisioning 10-81
8.2.1 Hardware Usage Restrictions 10-81
8.2.2 Hardware Dependencies 10-81
8.2.2.1 P and C Side Port Requirements . . . 10-82
8.2.2.2 DMS BUS Port Requirements 10-82
8.2.2.3 Circuits Per Card 10-82
8.2.2.4 Discrimination Numbering 10-82
8.2.3 Provisioning Considerations 10-82
8.2.4 Office Layout Information 10-82
8.2.5 Traffic Tables 10-83
8.3 Product/System Specification 10-83
8.3.1 Physical Characteristics 10-83
8.3.2 EMI/Earthquake Information 10-85
8.3.3 Sparing Information 10-86
8.3.4 Power Feed and Fusing Requirements 10-86
8.3.5 Current Drain Information 10-86
8.3.6 Power and Ground Distribution 10-88
8.3.7 Commercial 120 v AC Power: 10-88
8.4 Software Provisioning 10-89
8.4.1 Required Software Packages and Interdependencies 10-90
8.4.1.1 Core Software 10-90
8.4.1.2 Optional Software 10-90
8.4.2 Software Usage Restrictions 10-95
8.4.3 Memory Provisioning 10-95
8.5 Real Time Impact 10-95

9.0 ECM586 - RSC to RSC-S Conversions 10-96
9.1 Overview 10-96

9.2 Hardware Provisioning 10-97
9.2.1 Hardware Usage Restrictions 10-97
9.2.2 Hardware Dependencies 10-98
9.2.2.1 P and C Side Port Requirements . . . 10-98
9.2.2.2 DMS BUS Port Requirements 10-98
9.2.2.3 Circuits Per Card 10-98
9.2.2.4 Discrimination Numbering 10-98
9.2.3 Provisioning Considerations 10-98
9.2.3.1 RCE to RMME Conversions 10-99
9.2.4 Office Layout Information 10-99
9.2.5 Traffic Tables 10-99
9.3 Product/System Specification 10-100
9.3.1 Physical Characteristics 10-100
9.3.2 EMI/Earthquake Information 10-100
9.3.3 Sparing Information 10-100
9.3.4 Power Feed and Fusing Requirements 10-100
9.3.5 Current Drain Information 10-100
9.4 Software Provisioning 10-100
9.4.1 Required Software Packages and Interdependencies 10-101
9.4.2 Software Usage Restrictions 10-101
9.4.3 Memory Provisioning 10-101
9.5 Real Time Impact 10-101

10.0 ECM605 - Building Block Engineering - RLCM, IRLCM . . . 10-102
10.1 Overview 10-102
10.2 Hardware Provisioning 10-104
10.2.1 Hardware Usage Restrictions 10-104
10.2.2 Hardware Dependencies 10-104
10.2.2.1 P and C Side Port Requirements . . 10-105
10.2.2.2 DMS BUS Port Requirements 10-105
10.2.2.3 Circuits Per Card 10-105
10.2.2.4 Discrimination Numbering 10-105
10.2.3 Provisioning Considerations 10-105
10.2.3.1 RLCM/IRLCM Provisioning 10-105
10.2.3.2 RLCM/IRLCM FSP Provisioning . . . 10-106
10.2.3.3 RLCM/IRLCM RMM Provisioning . . . 10-106
10.2.3.4 RLCM/IRLCM HIE Provisioning . . . 10-106
10.2.3.5 RLCM/IRLCM LCM Provisioning . . . 10-107
10.2.3.6 RLCM/IRLCM Miscellaneous Equipment Provisioning 10-108
10.2.4 Office Layout Information 10-108
10.2.5 Traffic Tables 10-108
10.3 Product/System Specification 10-108
10.3.1 Physical Characteristics 10-108
10.3.1.1 NT6X14AA - RLCM Frame 10-108
10.3.2 EMI/Earthquake Information 10-108
10.3.3 Sparing Information 10-108
10.3.4 Power Feed and Fusing Requirements 10-108
10.3.5 Current Drain Information 10-109
10.4 Software Provisioning 10-109

10.4.1 Required Software Packages and Interdependencies 10-109
10.4.2 Software Usage Restrictions 10-109
10.4.3 Memory Provisioning 10-109
10.5 Real Time Impact 10-109

11.0 ECM610 - Building Block/Detailed RSCI Engineering . . . 10-110
11.1 Overview 10-110
11.2 Hardware Provisioning 10-113
11.2.1 Hardware Usage Restrictions 10-113
11.2.2 Hardware Dependencies 10-114
11.2.2.1 P and C Side Port Requirements . . 10-115
11.2.2.2 DMS BUS Port Requirements 10-115
11.2.2.3 Circuits Per Card 10-115
11.2.2.4 Discrimination Numbering 10-115
11.2.3 Provisioning Considerations 10-115
11.2.3.1 LCMI/LCME Provisioning 10-116
11.2.3.2 RCCI Provisioning 10-116
11.2.3.3 RCEI Labels 10-118
11.2.3.4 D-Channel Handler Provisioning . . 10-118
11.2.3.5 RCC2 Conversions 10-119
11.2.4 Office Layout Information 10-119
11.2.5 Traffic Tables 10-119
11.3 Product/System Specification 10-120
11.3.1 Physical Characteristics 10-120
11.3.2 Characteristics 10-120
11.3.2.1 - RCE Frame ISDN (RCEI) 10-120
11.3.3 EMI/Earthquake Information 10-120
11.3.4 Sparing Information 10-120
11.3.5 Power Feed and Fusing Requirements 10-121
11.3.6 Current Drain Information 10-121
11.4 Software Provisioning 10-121
11.4.1 Required Software Packages and Interdependencies 10-121
11.4.2 Software Usage Restrictions 10-121
11.4.3 Memory Provisioning 10-122
11.5 Real Time Impact 10-122

12.0 ECM618 - Detailed/Building Block Engineering - RSC . . 10-123
12.1 Overview 10-123
12.1.1 ISDN Line Drawer Remotes 10-123
12.2 Hardware Provisioning 10-125
12.2.1 Hardware Usage Restrictions 10-125
12.2.2 Hardware Dependencies 10-128
12.2.2.1 P and C Side Port Requirements . . 10-128
12.2.2.2 DMS BUS Port Requirements 10-128
12.2.2.3 Circuits Per Card 10-128
12.2.2.4 Discrimination Numbering 10-128
12.2.3 Provisioning Considerations 10-129
12.2.3.1 GENERAL RSC PROVISIONING 10-129
12.2.3.2 MONO RSC 10-130
12.2.3.3 DUAL RSC 10-130

12.2.3.4 HOST INTERFACE MODULE REQUIREMENTS 10-130
12.2.3.5 HOST/RSC C-SIDE PORTS/LINKS . . . 10-133
12.2.3.6 RSC P-SIDE PORTS 10-136
12.2.4 RSC PROVISIONING 10-137
12.2.4.1 REMOTE CONTROLLER FRAME 10-137
12.2.4.2 RCC UPGRADE KITS 10-138
12.2.4.3 SUBSCRIBER LINE CIRCUITS 10-140
12.2.4.4 RME/PDC FRAME PROVISIONING 10-141
12.2.4.5 OTHER MISCELLANEOUS H/W PROVISIONING 10-141
12.2.5 Office Layout Information 10-141
12.2.6 Traffic Tables 10-141
12.3 Product/System Specification 10-141
12.3.1 Physical Characteristics 10-141
12.3.1.1 Remote Controller Equipment Frame (RCE) 10-141
12.3.1.2 Remote Miscellaneous Equipment Frame (RME) 10-142
12.3.2 EMI/Earthquake Information 10-142
12.3.3 Sparing Information 10-142
12.3.4 Power Feed and Fusing Requirements 10-142
12.3.4.1 Remote Controller Equipment Frame (RCE) 10-142
12.3.4.2 Remote Miscellaneous Equipment Frame (RME) 10-142
12.3.5 Current Drain Information 10-142
12.3.5.1 Remote Controller Equipment Frame (RCE) 10-142
12.3.5.2 Remote Miscellaneous Equipment Frame (RME) 10-142
12.4 Software Provisioning 10-142
12.4.1 Required Software Packages and Interdependencies 10-143
12.4.1.1 Dual RCC Software 10-144
12.4.1.2 Dual RCC ESA (DESA) 10-144
12.4.1.3 Dual RCC ESA Force Down Option . . 10-145
12.4.1.4 ISDN Line Drawer Remotes 10-145
12.4.2 Software Usage Restrictions 10-146
12.4.2.1 Dual RCC Interlink Restrictions . 10-146
12.4.2.2 POTS Call Limitations 10-146
12.4.2.3 Dual RCC IBN Call Limitations . . 10-146
12.4.2.4 POTS/IBN Call Unsupported Services 10-147
12.4.2.5 POTS/IBN Call Supported Services . 10-147
12.4.2.6 Emergency Stand Alone (ESA) . . . 10-148
12.4.2.7 Dual RCC ESA 10-149
12.4.2.8 NTX381AA Feature Remote-off-Remote 10-149
12.4.3 Memory Provisioning 10-150
12.5 Real Time Impact 10-150

13.0 ECM691 - Model B Remote Switching Center - S ONET . . . 10-151
13.1 Overview 10-151
13.1.1 Subscriber Carrier Module 100S - Remote (SMS-R) 10-154

13.1.2 CRSC Layout 10-155
13.1.3 Layout 10-155
13.1.4 CEXT Layout 10-157
13.1.5 2 10-157
13.1.6 . CEXT Layout 10-157
13.1.7 RSCS Office Layout (Phase 1 View) 10-159
13.1.8 3 10-159
13.1.9 . Single (Mono) RSCS Office Configuration (Phase 1 View) 10-159
13.1.10 Dual RSCS Layout (Conceptual) 10-161
13.1.11 4 10-161
13.1.12 . Dual RSCS Office 10-161
13.1.13 .rc 1 ON;(text deleted) 10-161
13.1.14 .rc 1 OFF 10-161
13.1.15 Configuration (Phase 1 View) 10-161
13.1.16 Building Integrated Timing System (BITS) . 10-162
13.2 Hardware Provisioning 10-162
13.2.1 Hardware Usage Restrictions 10-162
13.2.2 Hardware Dependencies 10-170
13.2.2.1 P and C Side Port Requirements . . 10-170
13.2.2.2 DMS BUS Port Requirements 10-171
13.2.2.3 Circuits Per Card 10-171
13.2.2.4 Discrimination Numbering 10-171
13.2.3 Provisioning Considerations 10-171
13.2.3.1 Remote Cluster Controller 2 (RCC2) 10-173
13.2.3.2 Provisioning Host Interface . . . 10-177
13.2.3.3 The Extension (EXT) Shelf 10-178
13.2.3.4 P-Side Port Provisioning 10-186
13.2.3.5 TABLE H: RSC-SONET PROVISIONING AND CONFIGURATION TABLE 10-186
13.2.3.6 RSCS Service Circuits 10-186
13.2.3.7 RSCS Subscriber Lines 10-187
13.2.3.8 RSCS Miscellaneous Equipment . . . 10-187
13.2.4 Office Layout Information 10-187
13.2.5 Traffic Tables 10-188
13.3 Product/System Specification 10-191
13.3.1 Physical Characteristics 10-191
13.3.2 EMI/Earthquake Information 10-192
13.3.3 Sparing Information 10-192
13.3.4 Power Feed and Fusing Requirements 10-193
13.3.5 Current Drain Information 10-193
13.4 Software Provisioning 10-193
13.4.1 Required Software Packages and Interdependencies 10-193
13.4.2 Software Usage Restrictions 10-195
13.4.3 Memory Provisioning 10-203
13.4.4 Operational Measurements 10-203
13.4.5 Logs/Tools 10-203
13.5 Real Time Impact 10-203

14.0 ECM700 - Remote Switching Center-Multi Access 10-205
14.1 Overview 10-205

14.2 Hardware Provisioning 10-206
14.2.1 Hardware Usage Restrictions 10-206
14.2.2 Hardware Dependencies 10-207
14.2.2.1 P and C Side Port Requirements . . 10-207
14.2.2.2 DMS BUS Port Requirements 10-208
14.2.2.3 Circuits Per Card 10-208
14.2.2.4 Discrimination Numbering 10-208
14.2.3 Provisioning Considerations 10-208
14.2.4 Office Layout Information 10-208
14.2.5 Traffic Tables 10-209
14.3 Product/System Specification 10-212
14.3.1 Physical Characteristics 10-212
14.3.2 EMI/Earthquake Information 10-212
14.3.3 Sparing Information 10-212
14.3.4 Power Feed and Fusing Requirements 10-212
14.3.5 Current Drain Information 10-213
14.4 Software Provisioning 10-214
14.4.1 Required Software Packages and Interdependencies 10-214
14.4.2 Software Usage Restrictions 10-214
14.4.3 Memory Provisioning 10-215
14.5 Real Time Impact 10-215

1.0 ECM286 - Remote Line Concentrating Module (RLCM)

1.1 Overview

The Remote Line Concentrating Module (RLCM) is a DMS-100F remote. The RLCM is based on the Line Concentrating Module (LCM). The RLCM provides an interface for up to 640 remote subscribers and is packaged in a single DMS-100F frame. The following modules make up the RLCM (Figure 1 on page 10-3):

- Frame Supervisory Panel (FSP)
- Remote Maintenance Module (RMM)
- Host Interface Equipment (HIE)
- Line Concentrating Module (LCM)

Frame Supervisory Panel (FSP)

The FSP contains power control and alarm circuits which provide interfaces between the Power Distribution Center (PDC) and other DMS100F equipment frames. Office Repeaters, Filler Face Plates, and Fault Locator circuits are provisionable to the FSP.

Line Concentrating Module (LCM)

The LCM is a two-shelf module housing up to 640 subscriber line cards in 10 line drawers (5 per shelf).

The ISDN Line Drawer is a new LCM drawer type that will support ISDN line cards and contain the D-channel handler. The ISDN line drawer will co-exist with current POTS line drawers in a standard LCM. A maximum of two NT6X05DA Line Drawers can be provisioned per LCM. Only one ISDN line drawer per LCM shelf is allowable.

The ISDN line drawer is intended to be made available in all the DMS-100 frame and cabinet types provisionable with the RSC, RSC-S, OPM, OPAC, and RLCM remote products. It is intended to be designed and engineerable in the following vehicles: CLCE, CRSC, RLCM, OPM, OPAC and LCE.

Remote Maintenance Module (RMM) Shelf

The RMM provides the RLCM with test and service circuits. The RMM C-Side interfaces the LCM via a pair of DS30A links. The RMM shelf can accommodate up to 14 test or service circuit packs, selected from a variety of types to meet the office requirements.

Host Interface Equipment (HIE) Shelf

The HIE shelf houses equipment required to enable the RLCM to communicate with the host DMS. The HIE shelf may be configured to support communication via either DS-1 or PCM-30 links, as required to suit the transmission facilities available to the customer. When configured to support PCM-30 links, the RLCM is referred to as an International RLCM (IRLCM).

The RLCM supports all of the line features supported by the host DMS. Other available RLCM features include:

Intra-Switching An optional software feature which allows calls that both originate and terminate on lines subtending an RLCM to be connected without using the host network except for the initial call setup.

Emergency Stand Alone An optional feature providing the RLCM with the capability to continue service for intra-switched traffic in the event of a loss of communication with the host. During ESA of the RLCM, RSC or RSC-S, the ISDN Line drawer will not be supported. If an RSC or RSC-S enters ESA, the ILD call might survive the entry but no commitment is made to supporting any service within ESA.

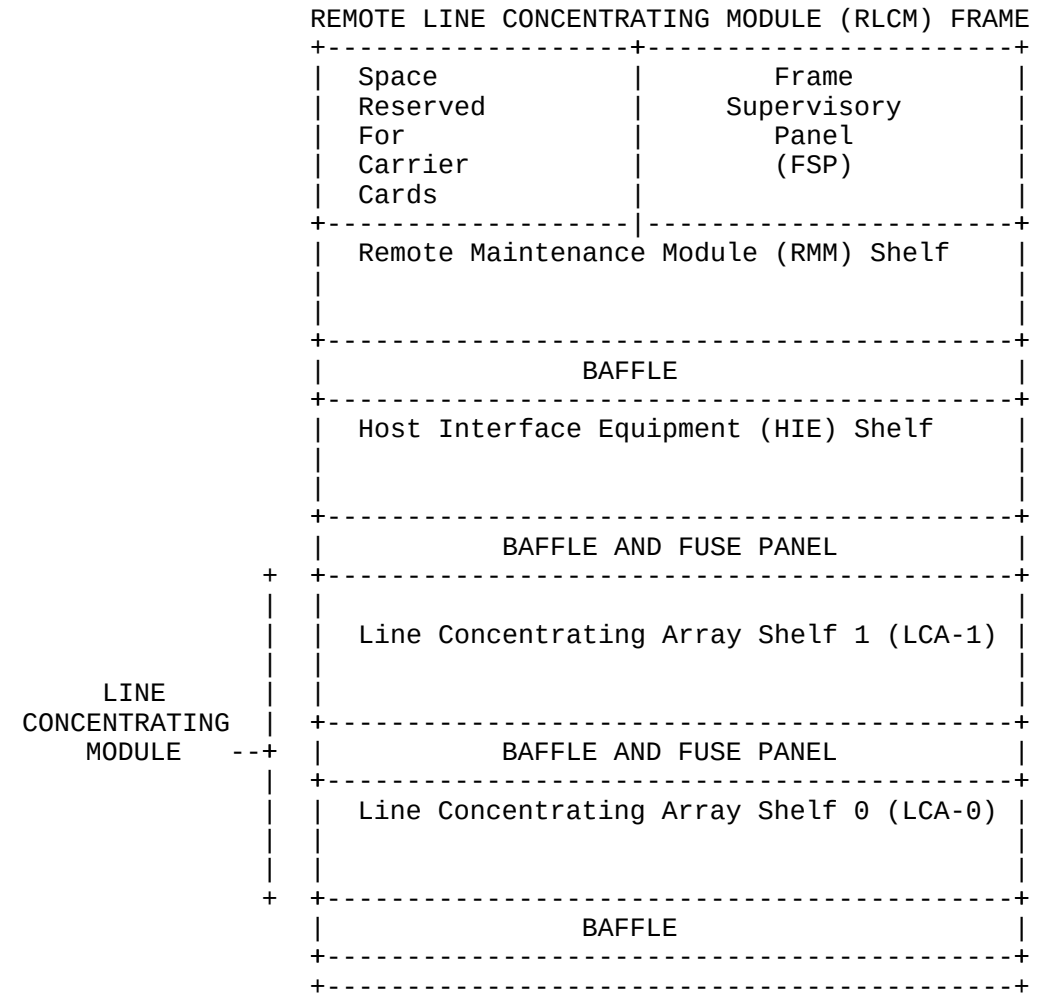


Figure 1. RLCM Shelf And Panel Configuration

1.2 Hardware Provisioning

1.2.1 Hardware Usage Restrictions

Not Applicable

1.2.2 Hardware Dependencies

The NT2X11AD provides the feature of supplying battery voltage to the Enhanced Business Set (EBS) sets while their line card is being tested, thus preventing the volume reset of the EBS. The NT2X11AD is backward compatible with all previous versions of the NT2X11

and should be ordered for all new applications. Existing offices using software package NTX106AA should be upgraded to NT2X11AD circuit packs.

1.2.2.1 P and C Side Port Requirements

The RLCM requires a minimum of two and a maximum of six DS-1 or PCM-30 links to the host. The two minimum links are the primary links. For reliability, the primary links should terminate on different interface cards at the host and on the RLCM.

1.2.2.2 DMS BUS Port Requirements

Not Applicable

1.2.2.3 Circuits Per Card

Not Applicable

1.2.2.4 Discrimination Numbering

Not Applicable

1.2.3 Provisioning Considerations

When provisioning the RLCM one must consider the five major options, where the frame PEC (NT6X14AA) is common to all application. These options are: FSP, RMM Packfill, HIE Packfill, LCM Packfill, and Miscellaneous Equipment.

1.2.3.1 RLCM FSP Provisioning

The Frame Supervisory Panel (FSP) NT6X25AA/BA is provisioned in the RLCM frame based on the number of DMS frames to occupy the RLCM Remote Office.

Provide the NT6X25AA FSP when the RLCM and other frames such as a RME are to be provided or Retrofit the RLCM frame with a NT6X25AA FSP when the office is extended with another frame. A PDC frame or RME frame equipped with PDC hardware and a NT6X1429 Interconnect Cable is required when provisioning the NT6X25AA FSP.

Provide the NT6X25BA for single frame installations and office growth expectations do not exceed the single frame limit. A NT6X1430 Interconnect cable is also required with this FSP.

The RLCM FSP (NT6X25AA/BA) must be equipped with RLCM to host office interface cards, a minimum of two (2) and a maximum of six (6) DS-1 links may be provisioned. The required number of links is based on traffic requirements (See ECM-497 for Traffic Provisioning).

1.2.3.2 RLCM RMM Provisioning

The Remote Maintenance Module (RMM) card cage is always provided with the frame PEC. However, the engineer must provision the appropriate circuit pack fill and test/service circuits specific to the market where the RLCM shall be installed. Refer to the chart below for Market to packfill association:

MARKET USAGE	RMM CP FILL NT6X13 AB	BA	DA	EA
U.S	X			
Canadian	X			
Turkey		X		
CEP			X	
SL-100 UK				X
China		X		

Figure 2. RLCM RMM Provisioning

There are fourteen (14) provisionable slots on the RMM. Refer to Table A section EMA14-01-000, in the Engineering Manual for RMM provisionable circuit packs.

Note: A NT2X48BB/CC pack is required if ESA is provisioned. One (1) NT0X10AA Scan Card should always be provided to support the reporting of Circuit Breaker 8 tripped or the loss of Talk Battery A.

1.2.3.3 RLCM HIE Provisioning

The Host Interface Equipment (HIE) shelf card cage is always provided with the NT6X14AA RLCM frame. However, the engineering must provision the HIE Circuit Packfill and certain other special application cards based on the Market where the office shall be installed as seen in Figure 3 on page 10-6:

PROVISIONABLE ITEMS	MARKET DEPENDENCE				
	US/Canadian	CEP	Turkey	CHINA	UK
„ NT6X11AB	X				
„„„ NT6X11BB		X	X		
NT6X11BC		X	X		
NT6X11EB					X
NT6X11KA				X	
NT6X60AA	X	X	X		
NT6X60AB					X
NT6X60CA	X	X	X		
NT6X60DA				X	
NT6X47AB	X	X	X	X	X
„„ NT6X47AC	X	X	X	X	X
NT6X45AF	X	X	X	X	X
NT6X50AA	X			X	
NT6X50AB	X			X	
NT6X27AB		X	X	X	X
NT6X27BB		X	X		X
NT6X75AA	X				
NT6X75DA		X	X		
NT6X75EA					X
NT6X75KA				X	

Figure 3. RLCM RMM Provisioning

* This packfill has been replaced by individual CPs.
** Required instead of NT6X47AB for BCS-33 and later.

*** This packfill has been replaced by NT6X11BC.

Two (2) DS-1 or PCM-30 Interface Circuit Packs, which provide ports for up to four links, are always provided for communication with the host office. An additional DS-1 or PCM-30 Interface CP is provisionable dependent on traffic requirements. The type of interface circuit provided depends upon market requirements, but all links to an RLCM must be the same type.

In US or Canadian RLCMs, (2) DS-1 I/F circuit packs are always required. Normally provided are (2) NT6X50AA DS-1 I/F packs. If the customer prefers, or if ISDN line drawers are provisioned provide instead NT6X50AB DS-1 I/F packs. The LCM Common CP in both shelves must be NT6X04AB or higher for RLCM, or NT6X04BB or higher for IRLCM, in order to provide the LCM processor capacity required when the NT6X50AB is used. All the DS-1 I/F packs in an RLCM must be the same part number, either NT6X50AA or NT6X50AB.

All RLCM DS-1/PCM-30 Links must access the same LGC/LTC/RCC module in the host office. In addition, the DS-1 I/F circuit packs in an RLCM must be the same part number, either NT6X50AA or NT6X50AB, as the DS-1 I/F circuit packs which terminate the links to that RLCM in the host LGC/LTC/RCC module.

For all ISDN applications, NT6X50AAs must be replaced with NT6X50ABs in both the remote and host equipment.

It is recommended to assign the HIE (C-side) message links, 0 and 1, to ports on different LGA/LTA at the host office (i.e. assign message link 0 to LGA/LTA shelf array 0 and assign message link 1 to LGA/LTA shelf array 1).

The NT2X70AY Power Converter Change Kit may be provisioned for field applications to replace an existing older Power Converter CP with the NT2X70AF.

1.2.3.4 LCM Provisioning

The Line Concentrating Module (LCM) in the RLCM is the same as provisioned in a DMS100 Central Office (CO). The LCM is a two-shelf configuration where the shelves are always provided with the RLCM frame. However, the engineer must provision the appropriate circuit packfill, Line Drawers, and Line Cards.

- Circuit Packfills, and Line Drawers
- US and Canadian Market

Refer to the appropriate BCS GATING HARDWARE ECM for the correct LCM Packfill to be provisioned. Line Cards

The Line cards are common to all markets. The maximum line capacity in an RLCM is 640 lines. All of the DMS100 LCM line card

types are also provisionable in the RLCM according to existing LCM provisioning rules.

Two (2) of the ten line drawers for each LCM may be NT6X05DA ISDN Line Drawers, one per shelf. Use of an NT6X05DA ISDN Line Drawer requires the use of NT6X04AE and NT6X50ABs for clear channel capability. The ISDN Line Drawer is for the North American Market only.

For ISDN applications (NT6X05DA), provide one (1) the NT6X04ZX LCM Processor CP Kit. This kit upgrades the LCM processor and labels to NT6X51DAs required for clear channel capability. Pack fill becomes NT6X04AE. Use of the NT6X04AE requires the use of NT6X50ABs in both host and remote equipment.

Only 1 ISDN LD can be defined in each LCA (Line Concentrating Array). ISDN Line Drawer can not be applied to positions 0 or 10. Preferred positions for locating the ISDN Line Drawer is 8 or 18. This means that if the ILD drawer number of the first ILD is within the range 2 - 8, the next ILD to be defined in this LCM will have its drawer number within the range 12 - 18. This limitation exists in order to permit an optimal heat dispersion in the LCM.

1.2.3.5 Miscellaneous Equipment Provisioning

Miscellaneous equipment in RLCM offices shall be mounted in a Remote Maintenance Equipment (RME) frame.

1.2.4 Office Layout Information

Not Applicable

1.2.5 Traffic Tables

Refer to ECM-497 for Traffic Tables and Traffic provisioning considerations.

1.3 Product/System Specification

1.3.1 Physical Characteristics

1.3.1.1 NT6X14AA - RLCM Frame

.....Input Voltage -48VDC at -42.75 To 55.8 Volts
.....Power Consumption N/A
.....Current Drain N/A
.....Thermal Dissipation N/A
.....Fusing Requirements 2, 7 or 9 20Amp Fuses as follows:

RLCM W/O PDC This option with Analog Ringing requires five A-Feeds and four B-Feeds, fused at 20amps each.

RLCM W/O PDC This option without Analog Ringing requires four A-Feeds and three B-Feeds, fused at 20amps each.

RLCM With PDC This option requires one A-Feed and one B-Feed, fused at 20amps each.

1.3.2 EMI/Earthquake Information

Refer to EMA15-03-000 Office EMI Compliance requirements.

Refer to EMA15-02-000 Office Earthquake Protection requirements.

1.3.3 Sparing Information

Standard sparing algorithms apply.

1.3.4 Power Feed and Fusing Requirements

1.3.5 Current Drain Information

1.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

1.4.1 Required Software Packages and Interdependencies

The following S/W packages are required in the host office:

NTX146AA - RLCM Basic
NTX156AA - RLCM Intra-Switching
NTX154AA - RLCM Emergency Stand Alone
NTX653AA - IRLCM - ESA

| The baseline software load for ISDN Line Drawer for Remotes is NA007 for the Host office, and XPM81 for the RLCM Remote and the ESA module, if so equipped. If the RLCM is subtended from an RSC or RSC-S, then that Remote will require an XPM08 software load.

1.4.2 Software Usage Restrictions

Not Applicable

1.4.3 Memory Provisioning

Not Applicable in the RLCM.

1.5 Real Time Impact

Not Applicable

2.0 ECM288 - Digital Carrier Module (DCM) and

2.1 Overview

2.1.1 Digital Carrier Module

The Digital Carrier Module (DCM) is a series I peripheral which provides the interface between the DS-1 digital system and the DMS Network.

A group of digital (DS-1) systems extending between common end terminating facilities constitute a Digital Group. Several trunk groups could share the same digital group and its individual systems.

An arbitrary discrimination number is assigned to each digital group. Trunk groups which are common to the same digital group should be listed together.

DS-1 systems originating from the same Remote Line Module (RLM) controller must terminate on the same DCM.

Generally, any new DMS jobs (initials or extensions) requiring an interface between the DS-1 digital system and the DMS Network would be provided with Digital Trunk Controller (DTC) modules, a series II peripheral.

2.1.2 Digital Echo Suppressor

The echo suppressor is a voice-operated circuit which reduces echo levels in long-haul trunks by inserting attenuation into the echo path. In DMS, echo suppressors are service circuits which are housed in Digital Echo Suppressor Modules (DES) and connected into the transmission path via the Network. Suppression is automatically disabled when data or specified tone signals are present in the transmission.

The DES is manufacture discontinued and no longer available.

2.2 Hardware Provisioning

2.2.1 Hardware Usage Restrictions

Not applicable

2.2.2 Hardware Dependencies

Not applicable

2.2.2.1 P and C Side Port Requirements

Not applicable

2.2.2.2 DMS BUS Port Requirements

Not applicable

2.2.2.3 Circuits Per Card

Not applicable

2.2.2.4 Discrimination Numbering

Not applicable

2.2.3 Provisioning Considerations

This section details the provisioning guidelines for this product.

2.2.3.1 Digital Carrier Module

Determine the number of DS-1 systems required for each digital group. This is determined by dividing the total number of digital circuits forecasted for each trunk group within the digital group by 24.

For digital groups serving a Remote Office, determine the number of DS-1 systems (RLM-host links) included in the group.

A quantity of spare DS-1 systems may be added at the discretion of the Customer.

DCM Line Cards terminate digital carrier systems operating in DS-1 format which interconnect with DMS. One card will terminate one DS-1 system.

Determine the number of DCM Line Cards required at the end of the engineered interval for each Distributing Frame (DF) on the basis of one card per DS-1 system.

The DCM provides the interface between the DS-1 digital system and the DMS Network.

Each module is contained in a single equipment shelf.

Each DCM shelf can terminate up to 5 digital carrier systems and interconnect with the Network via 4 speech links. One (1) DCM Line Card is required for each system terminated.

Since each DCM terminates up to 5 X 24 = 120 voice channels and the internal speech links can accommodate up to 4 X 30 = 120 VF

paths, there is no concentration and hence is not sensitive to traffic.

Digital Carrier Modules are provisioned for total terminations based on the forecast of digital trunk and RLM requirements for the busy season prior to exhaust.

One DCM is provided for every 5 DCM Line Cards to be accommodated at exhaust, subject to the condition that one DCM is required for each Remote Line Module (RLM) bay which terminates in the office.

When DCM shelves are required, a minimum of 2 is provided for service reliability.

All DS-1 systems originating from the same RLM bay must terminate on the same DCM shelf and be assigned to the lowest numbered circuit starting with circuit 0.

Each DCM can terminate DS-1 systems from a maximum of one RLM.

2.2.3.2 Digital Echo Suppressor

The DES is manufacture discontinued and no longer available.

Echo suppressors are required where the transmission round trip delay exceeds 45 msecs.

Digital Echo Suppressors always operate in a half mode.

Digital echo suppressor circuits are accessed from a service circuit pool; however, because of the high occupancy of long haul trunks and required service reliability, it is recommended that initial provisioning be on a per trunk basis. As traffic measurements become available, additional circuits may be provided on an actual demand basis.

Determine the number of forecasted trunk circuits for all digital trunk groups requiring echo suppression.

Provide 2 Echo Suppressor cards for every 15 digital echo suppressor circuits required.

Note: Each card contains nominally eight (8) circuits; however, odd card slots on the Digital Echo Suppressor Module (DES) shelf can access only seven (7) of these while even slots access all eight. The NTL assignment process will spread cards over even numbered slots first then over odd to maximize initial circuit availability. Customers employing Plug In Provisioning (PIP) should take this into account when preparing PIP orders since half of the slots will yield only 7 circuits each.

DES modules are required to house digital echo suppressor service circuits and interface them to the Network.

Each module is contained in a single equipment shelf.

Each shelf can contain up to 6 digital echo suppressor cards (nominally 8 circuits per card) and can address a total of 45 circuits.

Each circuit requires 2 speech channels to and from the network for a shelf total of 90.

Three speech links connect the DES to the network with a total of 90 voice channels. Consequently, there is no concentration and therefore the DES is not sensitive to traffic.

Digital Echo Suppressor shelves are provisioned for total card terminations based on the forecast for the busy season prior to exhaust.

One DES shelf is provided for every 6 Digital Echo Suppressor cards to be accommodated at exhaust.

When DES shelves are required, a minimum of 2 should be provided for service reliability.

Divide the total number of Digital Echo Suppressor cards required by 6 to determine the quantity of DES modules required.

2.2.3.3 Digital Carrier Equipment Frame

The primary function of the Digital Carrier Equipment (DCE) Frame is to house Digital Carrier Modules and Digital Echo Suppressor Modules.

It can also house Analogue Peripheral Modules (i.e., TMs, MTMs);however, this is not recommended.

NTL Customer Engineering is to be consulted regarding allowed configurations and mounting restrictions if Analogue Peripheral Modules are to be mounted on DCE frames.

The Customer may wish to mount DCM and DES shelves on separate frames. However, this is not a requirement of the system.

Determine the total number of DCE frames required for DCM and DES based on 4 shelves per frame.

There is a minimum of one DCE frame per office.

2.2.4 Office Layout Information

Not applicable

2.2.5 Traffic Tables

Not applicable

2.3 Product/System Specification

2.3.1 Physical Characteristics

Digital Carrier Module NT2X31AU

Length: 26 inches
Width: 14 inches

2.3.2 EMI/Earthquake Information

Not applicable

2.3.3 Sparing Information

Not applicable

2.3.4 Power Feed and Fusing Requirements

The following fuses and feeds are required:

2.3.5 Current Drain Information

Current Drain for the circuit packs are:

2.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

2.4.1 Required Software Packages and Interdependencies

Not applicable

2.4.2 Software Usage Restrictions

Not applicable

2.4.3 Memory Provisioning

Not applicable

2.5 Real Time Impact

Not applicable

3.0 ECM326 - Meridian Cabinet Remote Switching Center

3.1 Overview

The cabinetized MSL100 RSC-C utilizes the DMS-100 as the basis for system and module design. The design is such that the existing and future DMS-100 RSC software is used without modification.

An RSC-C can support an MCRU terminated on it. The MCRU is the Meridian Cabinet Remote Unit which is the cabinetized version of the RLCM (Remote Line Concentrating Module).

All standard features are available including Intra Switching and ESA.

3.2 Hardware Provisioning

3.2.1 Hardware Usage Restrictions

The RSC-C will support any combination of analog and digital terminals up to the real time capacity and/or traffic limit of the RCC. This is typically around 3,000 lines.

Direct trunking to the local public telephone network can be provided on a limited basis. Digital trunks can be provisioned at the expense of line peripheral ports.

If additional Universal Tone Receiver Packs (NT6X92BC) are required for traffic considerations above the two (2) provided with the NTNX17BD Common Packfill, then the RCC is restricted to a maximum of 12 NT6X50AA/AB P & C-side circuit packs. Also, if the CLASS Modem Resource Card (NT6X78AB) is provisioned in slot 18 of shelves 2 & 35 then the maximum number of NT6X50AA/AB is 10 circuit packs per RCC (P & C-side combined). This will allow sufficient current for the operation of the second UTR pair.

Note that End Panels must be provisioned with the first MCRM (of a lineup) in the Configuration Section of the specification. It must not appear in the "Loose Items" section of the specification and must never "ship Loose".

3.2.2 Hardware Dependencies

When provisioning NT6X50AB DS-1 Interface cards the host controller must also be equiped with the NT6X50AB CP. Also if a module is being ugraded to NT6X50AB the switch must be at aleast at BCS31 and an NT6X45BA or higher must be in place. For new offices use an NT6X45BD signal processor for Non-XPM+ functionality.

3.2.2.1 P and C Side Port Requirements

NT6X50AA and NT6X50AB are used for C-side and P-side DS-1 interfaces. Mixing of NT6X50AA's and NT6X50AB's is permitted in slots 1-5 and 21-23. If the NT6X50AB is used the host must be at BCS31 or higher and for Non-XPM+ applications the host peripheral must be equiped with a NT6X45BA or higher and the remote RCC must have a NT6X45BC or higher. The NTMX77AA and NTMX71AA must be used for all XPM+ applications and the host must be at BCS34 or higher.

An NT6X50AA/AB is always provided on shelves 21 & 35 slot 20 and both cards must be the same. C-side port assignments are as follows:

Shelf 21: ports- 0,1,4,5,8,9,12,13
Shelf 35: ports- 2,3,6,7,10,11,14,15

P-side ports can be used as either DS30A and DS-1. A maximum of 9 NT6X50AA/AB's can be provisioned. Slot 5 on shelf 21 (ports 0,1) is reserve for interface to the RMM and is always provisioned with a NT0X50AA filler card. P-side port assignments are as follows:

DS30A Ports (shared between shelves 21 & 35)
Slot 7: ports- 0,1,4,5,8,9,12,13,16,17
Slot 6: ports- 2,3,6,7,10,11,14,15,18,19

DS-1 Ports
Shelf 21: ports- 0,1,4,5,8,9,12,13,16,17
Shelf 35: ports- 2,3,6,7,10,11,14,15,18,19

3.2.2.2 DMS BUS Port Requirements

Not applicable

3.2.2.3 Circuits Per Card

Not applicable

3.2.2.4 Discrimination Numbering

MCRM, RMM, and RCC discrimination numbers must be continuous between remote sites in order to uniquely identify each frame and unit in the hardware inventory tables at the host.

3.2.3 Provisioning Considerations

The NT6X12ZF product change kit is ordered to provide the Universal Processor, the bus terminator and backplane wiring. Use the NT6X12ZF change kit as a guide for provisioning and assigning the circuit packs and wire and also for removing circuit packs not needed in XPM+ modules.

| ISDN LINE DRAWER FOR REMOTES - ILDR (NT6X05DA):

The ISDN Line Drawer for Remotes is a new LCM drawer type that will support ISDN line cards and contain the D-channel handler. The ISDN line drawer will co-exist with current POTS line drawers in a standard LCM. A maximum of two NT6X05DA Line Drawers can be provisioned per LCM. Only one ISDN line drawer per LCM shelf is allowable.

Implement the ISDN Line Drawer for Remotes (ILDR) in the MCLM & MCRU. Maximum of 2 line drawers per LCM is allowed. The number of ILDR drawers that can be provisioned on an XPM is dependent on equipment that subtends that XPM. The basic limitation is the number of available message channels on that equipment.

The following Table shows the equipment that can be subtended off a peripheral and the number of message channels that are allocated for that equipment. The bottom line shows the maximum resources available per XPM. Therefore, for example, if an RCC2 already has 4 RLCMs, 4 LCMs and an RMM subtending it, that would use up a total of 33 message channels (4x6 + 4x2 + 1), and leave a total of 12 message channels for ILDRs. Since each ILDR uses 2 message channels, a total of 6 ILDRs would be able to be provisioned on this RCC2.

It should be noted that the RCC2 already has software to check that these limits are not exceeded, and the ILDR will be included in this check. However, other peripherals (RCC+ and LTC+) do not have this capability and therefore this would have to be done manually. If this limitation is exceeded, functionality will be affected.

NODE	# MESSAGE CHANNELS	RELEVANT TO: RCC2	RCC+	LTC+
LCM	2	Y	Y	Y
RLCM WITH ESA & RMM	6	Y	Y	Y
LCME	2	Y	N	N
SMS-R	2	Y	N	N
RMM ON RCC2 OR RCC+	1	Y	Y	N
ILDR	2	Y	Y	Y
DUAL CONFIGURATION	2	Y	Y	N
RCC2/RCC+	2	N	N	Y
TOTAL # OF CHANNELS AVAILABLE:		45	39	47

The limitations in the Table define the number of ILDRs that can be provisioned per host shelf, and the limitation of 480 ISDN lines

| per host shelf defines the total quantity of ISDN lines that can be configured. As a general rule, the ILDR message channels will limit the configuration assuming that no LCME is provisioned on the same host. If an LCME is provisioned on the same host, then the number of ISDN lines would probably be the limiting factor.

| The ISDN line drawer for Remotes is intended to be made available in all Remote the DMS-100F frame and cabinet types provisionable with the RSC, RSC-S, MCRMS, MCRM, MCRU, MCLM and RLCM remote products.

| MCRM cannot be supported by LTCI or LGCI equipment at the host, when configured for ISDN Line Drawer. Also, remotes that subtends MCRM cannot be supported by LTCI or LGCI equipment at the host, when configured for for ISDN Line Drawer.

| ISDN Line Drawer for Remotes is for the North American Market Only.

| During ESA of the RSC or RSC-S, the ISDN Line drawer will not be supported. If an RSC or RSC-S enters ESA, the ILDR call might survive the entry but no commitment is made to supporting any service within ESA.

| ONLY 1 ILDR can be defined in each LCA (Line Concentrating Array). ISDN Line Drawer can not be applied to positions 0 or 10. Preferred positions for locating the ISDN Line Drawer is 8 or 18. This means that if the ILDR drawer number of the first ILDR is within the range 2 - 8, the next ILDR to be defined in this LCM will have its drawer number within the range 12 - 18. This limitation exists in order to permit an optimal heat dispersion in the LCM.

| A maximum of seven (7) ISDN Line Drawers (NT6X05DA) per remote site can be applied to a single RSC Sonet.

| A maximum of fourteen (14) ISDN Line Drawers (NT6X05DA) per remote site can be applied to a dual RSC Sonet.

| If the MCRM requires Extended Distance Capability, it may be equipped with the NTMX76AA or NTMX76AB circuit packs. The host XPM for a RSC-S with EDC must also be equipped for HDLC messaging (NTMX76AA or NTMX76AB instead of NT6X69) and must utilize the Unified Processor (XPM PLUS). Refer to ECM-445 for details of provisioning XPM PLUS. The host DS1 interfaces must be 64Kb clear channel (NT6X50AB) to support ISDN and and to ensure a protocol match with the NTMX81AA packs in the RCC2 RCC2 shelf (NTMX81AA is electrically the same as NT6X50AB.

3.2.3.1 MCRM CABINET

The MCRM provides power to the first lineup of the RSC-C. The system alarm, service and diagnostic circuits are located in the

RMM (Remote Maintenance Module) shelf. External connectors from these circuits to the MDF are provided via filtered connectors in the rear bulkhead.

The Power Distribution Panel (PDP) is located in the bottom shelf position of the MCRM cabinet.

Immediately above the PDP is the Cooling Unit. This cabinet is forced air cooled with a dual speed fan unit.

Above the cooling unit is the two shelf Remote Cluster Control (RCC) module which provides interface to the Host via DS1 Ports/T1 spans. The RCC can support the MCRU and digital trunks as well as its local ELMs and DLMs.

All twenty P-side ports for the RCC are always fully wired to filtered connectors in the rear bulkhead for use as digital trunks and/or to interface other remote line equipment.

The Remote Maintenance Module (RMM) is located above the RCC.

Located in the top of the MCRM is the frame supervisory panel (FSP) which distributes and controls power and alarms for the cabinet.

3.2.3.2 MCLM Cabinet

The MCLM contains up to two (2) fully duplicated Enhanced Line Modules (ELM). Each ELM has eight (8) Line Drawers providing a 5 2 card slot capacity. A MCLM has the capacity of 1024 single, physical line card slots.

An ELM is a repackaged standard DMS LCM. All four Line Drawers on each shelf are located on the left, leaving the control equipment on the right. Each ELM module contains a Ringing Generator on the lower array shelf and a fuse panel on the upper array shelf.

All six DS30A links for each ELM are hardwired to a single connector on the rear bulkhead. The MTA cable is also hardwired to the backpanel and has sufficient length to connect to the MCRM cabinet. Each ELM can have 2, 3, 4, 5 or 6 DS30A speech links to the RCC.

All Tip/Ring cables from the Line Drawers are hardwired to an EMI-filter, which is fifty-pin telephony connectors on the rear bulkhead.

An FSP is located in the top of the cabinet to distribute power control and alarms in the cabinet.

This cabinet is forced air cooled with dual speed fan units integrated in both the top and the bottom of the cabinet.

3.2.3.3 Intelligent Peripheral Module (Ref: ECM 509)

The Intelligent Peripheral Module (IPE) is a Meridian SL-1 product that has been adapted for use on the MSL-100. The IPE is a stackable module which contains the MSL-100 Controller Card (MCC) and sixteen avaliable slots for digital or analog lines. The modules can be stacked upto 4 modules high, depending on the amount of lines required, and each stack is refered to as an Intelligent Peripheral Equipment Column (IPEC).

The IPE interfaces the RCC through DS30A links. Each module can have 2 to 6 DS30A links which interface the IPE through the MCC circuit pack.

The IPE supports both digial and analog line cards. The NT8D02__ is the Digital Line Card which can interface to Meridian IVD digital sets (i.e. M 000 & M3000 series phones). The NT8D09__ is the Analog Message Waiting Line Card which can be used to interface 500 & 2500 Analog sets.

3.2.3.4 Miscellaneous

Always Required: (see Engineering Manual Insert for MCRM)

Provide a Remote Equipment Label Kit (NTNX1102).

Provide two sets of doors and labels per cabinet
(one set for front and one for rear).
Provide a set of cabinet type labels.
Provide a set of end panels per lineup.

Optional:

Provide one Patlon antistatic mat per RCC.
Provide a remote equipment tool set (NT0X58AD) per site.

3.2.4 Office Layout Information

The PDP is located in the bottom shelf of the MCRM. It can supply up to eight (8) additional cabinets in a lineup. An equipment lineup may consist of more that one MCRM. The maximum number of cabinets in a lineup would then be limited by the room size, traffic considerations (ie; #ELMs/DLMs served by the RCC), etc.

One set of End Panels must be provided per lineup and associated (in the configuration section of the specification) with the first MCRM in a lineup. They must be installed in the factory (never shipped loose).

3.2.5 Traffic Tables

Refer to NTP 297-1001-450 DMS100 Family Provisioning, Section 2, Traffic Criteria and Capacities and/or ECM 350, DMS100 Traffic Provisioning "The Credit System".

3.3 Product/System Specification

3.3.1 Physical Characteristics

Not applicable.

3.3.2 EMI/Earthquake Information

Refer to NTP 555-4001-103 Meridian SL100 Cabinetized Section 2-1 Earthquake Resistance

3.3.3 Sparing Information

As a rule of thumb, provision as spare, a minimum of one of each circuit pack up to a maximum of 10% of the total count of that item.

3.3.4 Power Feed and Fusing Requirements

The following fuses and feeds are required: All cabinets within a RSC-C lineup are powered from the PDP on the MCRM. The PDP is always provided with the following:

Qty 42 20.0A Fuses

Qty 1 10.0A Fuse

RSC-C is DC powered.

Cabinets in a lineup are powered from the Power Distribution Panel (PDP) located in the MCRM cabinet.

All power cables to the PDP from the cabinets in the lineup are factory equipped and shipped with the cabinets.

The MCRM will operate over the range of -44V to -56V.

3.3.5 Current Drain Information

The current drain per MCRM NTNX17AA cabinet is 14.0 AMPS.

The current drain per MCLM NTNX38__ cabinet is 20.0 AMPS.

The current drain per MCDM NTNX50AA cabinet is 18.0 AMPS.

3.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

3.4.1 Required Software Packages and Interdependencies

The MCRM is designed such that the existing and future DMS-100 RSC software is used without modification.

All standard features are available. Refer to NTP-1001-450 Section 32; Software Features, at the appropriate BCS level.

3.4.2 Software Usage Restrictions

Not applicable.

3.4.3 Memory Provisioning

CPU memory requirements are calculated with the host. Totals calculated include all remote lines and equipment.

3.5 Real Time Impact

CPU realtime impact is calculated with the host. Totals calculated include all remote equipment.

4.0 ECM415 - Remote Line Concentrating Cabinet (RLCC) / MCRU

4.1 Overview

The Remote Line Concentrating Cabinet (RLCC) is a repackaged version of the Remote Line Conentrating Module (RLCM) Frame. The cabinet is design to meet all earthquake zone requirements without external bracing. However when the RLCC is mounted on raised floors, under floor bracing is required. RLCC, RLCM 100C, RLCM C and MCRU are used interchangeably in reference to the Remote Line Concentrating Cabinet. In this document the acronym used to refer to the Remote Line Concentrating Cabinet is RLCC.

The RLCC uses the following modules:

- Remote Maintenance Module (RMM) - Same as used on the existing RLCM Frame
- Host Interface Equipment (HIE) - Same as used on the existing RLCM Frame
- Line Concentrating Equipment (LCE) - The DMS-100F LCE shelves do not meet space requirements, therefore, the Meridian SL-100F LCE shelves (NTNX2802) are used. The heat baffeles are removed from the Meridian LCE shelves, therefore cooling fans are used and fused from the FSP.
- Frame Supervisory Panel (FSP) - The RLCC uses the Meridian SL-100F FSP (NTNX26AA) which includes LCE fuses but does not include repeaters.
- Fan Cooling Unit (FCU) - The FCU will be essentially the same as used on the Merdian SL-100F but will us a nonmetallic fiber filter in place of the metal mesh filter.

EDC-RLCM (Extended Distance Capability) has been designed for the Japan Market only, the EDC option extends the one way transmission delay up to 20 milliseconds (msec). NTT requires the LTC+/RLCC combination to support 2 msec since rerouting of DS1s in the NTT transmission network due to transmission failure may result in delays of that magnitude. To support the EDC on the RLCC, a new processor pack NT6X51BA will replace the current processor pack NT6X51AB version. The HIE shelf must be provisioned with NT6X50AB DS-1 Interface Packs in slots 19-20. Provision Two (2) minimum, three (3) maximum dependent upon the number of links received from the LTC+. Optional NT6X50AB DS-1 Interface Pack will be inserted in slot 21.

In order to support the EDC option, the LTC+ that supports the RLCC must have the NTMX76AB Message Card and NT6X50AB DS-1 Interface Pack provisioned . Reference ECM-373 for more information.

Refer to Figure 4 on page 10-26 below which provides a pictorial comparison of the RLCM and RLCC.

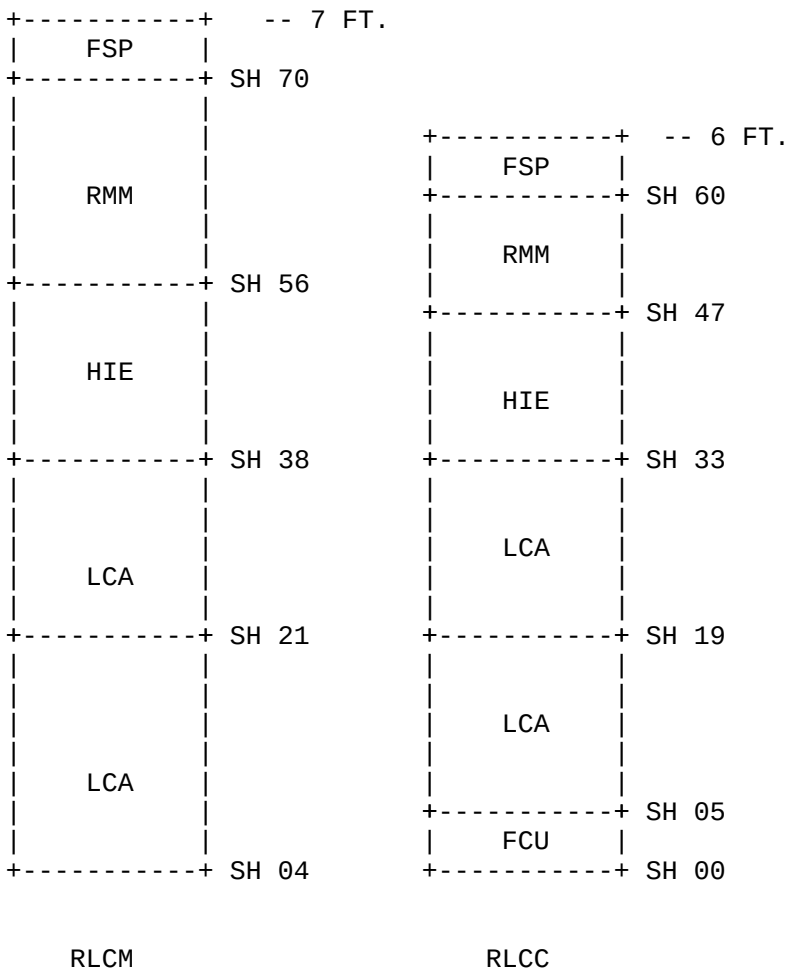


Figure 4. Comparision of RLCM and RLCC.

4.2 Hardware Provisioning

4.2.1 Hardware Usage Restrictions

RLCC restrictions are in the area of Trunk/Service circuit provisioning and assignments. These packs are restricted to card slots as illustrated in Figure 5 on page 10-27. Note, Figure 2 does not reflect all provisionable circuits, it reflects only Trunk/Service Circuits.

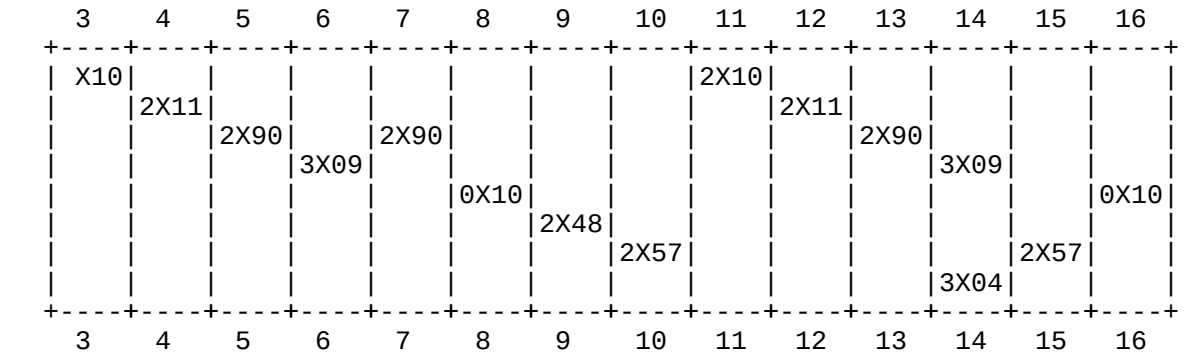


Figure 5. RMM Trunk Pack Assignment Chart.

4.2.2 Hardware Dependencies

The RLCC consists of one Frame Supervisory Panel (FSP), one Fan Cooling Unit (FCU), one Remote Maintenance Module (RMM), one Host Interface Equipment shelf (HIE) and two Line Concentrating Equipment (LCE) shelves. Refer to Figure 1 for shelf locations. All connections for external cabling is located on a bulkhead in the rear of the cabinet.

MODULE	DESCRIPTION
LCE	The RLCC uses the MSL-100 LCE shelves NTNX2802. These shelves are the same as DMS-100 LCE shelves except the heat baffle is omitted and fuse holders are moved to the FSP.
HIE	The RLCC uses the DMS-100 HIE Module NT6X1108.
RMM	RLCC uses the DMS-100 RMM Module NT6X1301 (See Figure 2).
FSP	RLCC uses the MSL-100 FSP NTNX26AA. This FSP includes fusing for line drawers but no provision for mounting repeater cards. Repeaters must be mounted external to the RLCC.
FCU	The RLCC uses a Fan Cooling Unit NTNX27AA because the baffels were removed from the LCE. The Fan Cooling Unit is not present in the frame mounted RLCM but is required for the RLCC. The FCU is the same as NTNX27AA except that a polyester filter is used
Bulkhead	The RLCC bulkhead is the same as MSL-RLCM except an additional connector is required for the bulkhead connections.

4.2.2.1 P and C Side Port Requirements

The RLCC requires a minimum of two and a maximum of six DS-1 links to the host. The two minimum links are the primary links. Each DS-1 interface card (NT6X50AB) connects two DS-1 links between the RLCC and the host XPM. All DS-1 links must

terminate on the same host peripheral. For reliability, the primary links should terminate on different NT6X50AB interface cards at the host and on the RLCC.

4.2.2.2 DMS BUS Port Requirements

Not Applicatable

4.2.2.3 Circuits Per Card

Not Applicatable

4.2.2.4 Discrimination Numbering

Not Applicatable

4.2.3 Provisioning Considerations

The RLCC is a cabinetized version of the frame mounted DMS-100 RLCM which enables installation in earthquake zones without additional bracing and simplifies EMI protection.

The RLCC consists of existing DMS and MSL modules and circuit packs mounted in an Earthquake and EMI protected cabinet. The RLCC is built in the same basic cabinet design as the MSL100 and DMS100 TOPS-MPC (NTNX25) and complies with earthquake zone requirements without additional frame bracing. However, in raised floor applications, additional bracing is required between the actual floor and the raised floor.

Additional framing or paneling is not required for EMI protection. The RLCC can be provided with all EMI protection included or with all EMI protection except for line filters (power filtering is always included). Filter adapters are readily field installable.

The RLCC is intended for use on customer premises where EMI protection is required to comply with FCC Regulation,Part 15,Subpart J for Class A computing devices. The functionality of the present DMS-100 RLCM is maintained except that the RLCC does not have the capability to install repeater cards in the Frame Supervisory Panel and the RLCC is equipped with a Fan Cooling Unit.

The RLCC RMM provisioning is standardized to a greater degree to simplify engineering and installation and all cabling is conectorized at the bulkhead.

| ISDN LINE DRAWER FOR REMOTES - ILDR (NT6X05DA):

| The ISDN Line Drawer for Remotes is a new LCM drawer type that
| will support ISDN line cards and contain the D-channel han-

dler. The ISDN ine drawer will co-exist with current POTS line drawers in a standard LCM. A maximum of two NT6X05DA Line Drawers can be provisioned per LCM. Only one ISDN line drawer per LCM shelf is allowable.

MCRU Hardware Requirements are as follows:
1) NT6X51DA (Process Controller Card)
2) NTBX27AA (ISDN 2B1Q Single Slot Line Card)
3) NT6X50AB (DS-1 E.F.F. Card) at Host and Remote
4. NT2X10BA/NT2X11BA (Multi-Line Test Unit Analog Card/Multi-Line Test Unit Control Card) for the Line Test function.

The ISDN line drawer is intended to be made available in all the Remote DMS-100F frame and cabinet types provisionable with the RSC, RSC-S, MCRMS, MCRM, MCRU, MCLM and RLCM remote products.

RSC Sonet cannot be supported by LTCI or LGCI equipment at the host, when configured for ISDN Line Drawer. Also, remotes that subtends RSC Sonet cannot be supported by LTCI or LGCI equipment at the host, when configured for ISDN Line Drawer.

ISDN Line Drawer for Remotes is for the North American Market ONLY.

During ESA (Emergency Stand Alone) of the RSC or RSC-S, the ISDN Line Drawer for Remotes will not be supported. If an RSC or RSC-S enters ESA, the ILDR call might survive the entry but no commitment is made to supporting any service within ESA.

ONLY 1 ILDR can be defined in each LCA (Line Concentrating Array). ISDN Line Drawer can not be applied to positions 0 or 10. Preferred positions for locating the ISDN Line Drawer is 8 or 18. This means that if the ILDR drawer number of the first ILDR is within the range 2 - 8, the next ILDR to be defined in this LCM will have its drawer number within the range 12 - 18. This limitation exists in order to permit an optimal heat dispersion in the LCM.

A maximum of seven (7) ISDN Line Drawers (NT6X05DA) per remote site can be applied to a single RSC Sonet.

A maximum of fourteen (14) ISDN Line Drawers (NT6X05DA) per re- mote site can be applied to a dual RSC Sonet.

If the RSC-S requires Extended Distance Capability, it may be equipped with the NTMX76AA or NTMX76AB circuit packs. The host XPM for a RSC-S with EDC must also be equipped for HDLC messaging (NTMX76AA or NTMX76AB instead of NT6X69) and

must utilize the Unified Processor (XPM PLUS). Refer to ECM-445 for details of provisioning XPM PLUS. The host DS1 interfaces must be 64Kb clear channel (NT6X50AB) to support ISDN and to ensure a protocol match with the NTMX81AA packs in the RCC2 shelf (NTMX81AA is electrically the same as NT6X50AB.

Implement the ISDN Line Drawer for Remotes (ILDR) in the MCLM & MCRU. Maximum of 2 line drawers per LCM is allowed. The number of ILDR drawers that can be provisioned on an XPM is dependent on equipment that subtends that XPM. The basic limitation is the number of available message channels on that equipment.

The following Table shows the equipment that can be subtended off a peripheral and the number of message channels that are allocated for that equipment. The bottom line shows the maximum resources available per XPM. Therefore, for example, if an RCC2 already has 4 RLCMs, 4 LCMs and an RMM subtending it, that would use up a total of 33 message channels (4x6 + 4x2 + 1), and leave a total of 12 message channels for ILDRs. Since each ILDR uses 2 message channels, a total of 6 ILDRs would be able to be provisioned on this RCC2.

It should be noted that the RCC2 already has software to check that these limits are not exceeded, and the ILDR will be included in this check. However, other peripherals (RCC+ and LTC+) do not have this capability and therefore this would have to be done manually. If this limitation is exceeded, functionality will be affected.

NODE	# MESSAGE CHANNELS	RELEVANT TO: RCC2	RCC+	LTC+
LCM	2	Y	Y	Y
RLCM WITH ESA & RMM	6	Y	Y	Y
LCME	2	Y	N	N
SMS-R	2	Y	N	N
RMM ON RCC2 OR RCC+	1	Y	Y	N
ILDR	2	Y	Y	Y
DUAL CONFIGURATION	2	Y	Y	N
RCC2/RCC+	2	N	N	Y
TOTAL # OF CHANNELS AVAILABLE:		45	39	47

The limitations in the Table define the number of ILDRs that can be provisioned per host shelf, and the limitation of 480 ISDN lines per host shelf defines the total quantity of ISDN lines that can be configured. As a general rule, the ILDR message channels will limit the configuration assuming that no LCME is provisioned on the same host. If an LCME is provisioned on the same host, then the number of ISDN lines would probably be the limiting factor.

4.2.4 Office Layout Information

Not Applicable

4.2.5 Traffic Tables

For traffic provisioning for the RLCC, refer to the RLCM traffic provisioning tables.

4.3 Product/System Specification

4.3.1 Physical Characteristics

The RLCC cabinet physical specifications are:

Height - 72 inches (excludes mounting feet)
Width - 28.5 inches
Depth - 28.25 inches
Weight - 925 pounds

The maximum current drain for a cabinet is 20 amps for the "A" side and 17 amps for the "B" side. The maximum heat dissipation for one cabinet is 1360 watts/hour.

The RLCC complies with the ISG grounding requirements. The Personal Hazard Ground (PHG) is cabled from the bulkhead to the ground reference point.

A cabinet requires four 20 amp fuses which mount in the FSP. The "A" and "B" sides of the RLCC cabinet are cabled to the power source.

4.3.2 EMI/Earthquake Information

The RLCC Cabinet by design meets the requirements of all earthquake zones. However, if the RLCC is installed in a raised floor environment earthquake bracing is required between the actual floor and the raised floor.

4.3.3 Sparing Information

Standard equipment sparing rules apply.

4.3.4 Power Feed and Fusing Requirements

Not Applicable

4.3.5 Current Drain Information

Maximum cabinet current drain is 23 AMPs.

4.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

4.4.1 Required Software Packages and Interdependencies

The RLCC utilizes the same software as the RLCM. The following is a list of software packages and the interdependencies for the RLCC:

NTX146AB - Remote Line Concentrating Module
requires - NTX901AA

NTX154AA - RLCM ESA Operation (Lines and Trunks)
requires - NTX146AA
requires - NTX901AA

NTX146AA - Remote Line Concentrating Module
requires - NTX901AA

NTX156AA - Intra RLCM Calling
requires - NTX146AA
requires - NTX901AA

4.4.2 Software Usage Restrictions

Not Applicable

4.4.3 Memory Provisioning

Not Applicable

4.5 Real Time Impact

The real time requirements for the RLCC are identical to the RLCM.

For RLCMs with Extended Distance Capabilities (EDC) for the Japan Market refer to SEB 96-07-001 (RLCM-EDC Performance Considerations).

Processing is distributed over the Central Processing Unit (CPU) and the Peripheral Processors (PP) in the peripheral modules. Real Time is one of the measurements that is utilized to determine the loading characteristics of these devices for specific applications. Real Time is the amount of time required for these processors to perform a function such as establish a call or activate a feature. For a detailed calculation of CPU real time, use the REAL TIME program issue 3E_1 or later. Refer to the Real Time Manual for more details on REAL TIME and operational instructions. For a detailed calculation of PP real time, use the PRTCALC program issue 4A or later. Refer to the PRTCALC Manual for details on PRTCALC and its' operational instructions. To measure the CPU real time for an inservice switch, use the ACTIVITY TOOL. Refer to SEB 86-11-005 for more details on the ACTIVITY TOOL and operational instructions. To measure the PP real time for an inservice switch, use the NEW PERIPHERAL ACTIVITY and PERFORMANCE TOOL for the new peripherals. Refer to the Real Time Manual for more details on the NEW PERIPHERAL ACTIVITY and PERFORMANCE TOOL.

Typically, the CPU has a maximum of 83% or 2,988,000 ms available for call processing and the remaining 17% or 612,000 ms is for overhead.

The new peripherals consist of the Line Concentrating Module (LCM), Remote Line Concentrating Module (RLCM), Outside Plant Module (OPM), Line Group Controller (LGC), Line Trunk Controller (LTC), Digital Trunk Controller (DTC), the Remote Cluster Controller (RCC) and the Subscriber Carrier Modules (SCM).

Processing in these devices is performed by the Signal Processor (SP) and the Master Processor (MP) except in the LCM, RLCM and the OPM. Separate studies must be performed for the SP and the MP to determine the limiting processor. The limiting processor is the processor with the higher percentage of occupancy. The real time is divided into overhead, maintenance, buffer and call processing areas.

There is NO additive for the LCM/RLCM call timings in a CLASS environment.

The following call timings are typical BCS24 timings. These timings are reflected in the call processing allocation area. (measurements in milliseconds)

	RLCC	
	ORIG Attempt	TERM Attempt
	=======	=======

POTS	535	535
MDC w/o MADN	535	535

5.0 ECM527 - Small Remote Unit

5.1 Overview

The Small Remote Unit (SRU) is a cabinetized DMS-100 remote whose hardware and software are based on the DMS Series-II peripherals. The SRU is a hybrid product, merging the LCME subscriber ISDN access capability with the remote maintenance and host interface deployment capabilities of the Remote Line Concentrating Module (RLCM) to provide ETSI MoU BRI Priority One Services without Terminal Portability.

The SRU provides remote access for up to 240 subscriber lines. It communicates with a DMS-100 Host using PCM30 links. The services provided by the SRU on the subscriber lines can be a mix of POTS, Centrex, and ISDN. The SRU does not support a Trunk interface.

The SRU supports the following types of subscriber interfaces.

- ISDN 2B1Q U interface.
- ISDN S/T interface.
- POTS.
- EBS sets.
- Attendant Consoles.

The devices that the SRU supports include POTS, IBN Centrex, EBS, and ISDN access such as ETSI compliant sets. The SRU can potentially support a maximum of 240 U type or 120 S/T type interfaces. However, drawer level B-channel Blocking can occur if more than 40 ISDN lines are datafilled per physical drawer which gives a maximum of 160 ISDN lines. The SRU supports any mix of line types in any physical slot on the same logical and physical line drawer. Through a combination of internal connections, the SRU associates a line with a PCM30 channel to enable an outgoing call to be made or an incoming call to be received.

The SRU's most significant feature is that it is intended to be located in a customer premises environment. The design objectives are to make full use of the existing DMS-100 hardware. The major elements housed in the SRU cabinet are:

- Duplicated SRU control units, LCME based.
- Up to 4 2B1Q Line Drawers.
- Host Interface using PCM30.
- Remote Maintenance Unit.
- Duplicated Ringing.
- Frame Supervisory Panel.
- Cooling Unit (fans).
- AC to DC rectifier (optional).
- Battery Charging Unit and batteries (optional).
- EMI terminations.

SRU Phase II provides ISDN ETSI Priority 1 MoU BRI Services for the UK. Phase II is a software change only.

The SRU provides ETSI MoU Priority One Services without Ter-Terminal Portability.

There are two types of customer premise equipment supported:

1 Northern Telecom devices
2 NET 3 compliant devices

ETSI MoU BRI includes the following capabilities:

1 ETSI MoU BRI to ETSI MoU BRI
2 ETSI MoU BRI to Centrex (IBN lines)
3 ETSI MoU BRI to ANSI7 (aka IBN7)
4 ETSI MoU BRI to C7 (BT) Version 2 using ANSI7 looparounds
5 ETSI MoU BRI to R1 (or other CAS) using ANSI7 looparounds

The SRU is currently engineerable for the U.K. market only.

Note:
B and D channel packet data service is not provided under this project. Software is currently unavailable for the SRU to function in the North American market.

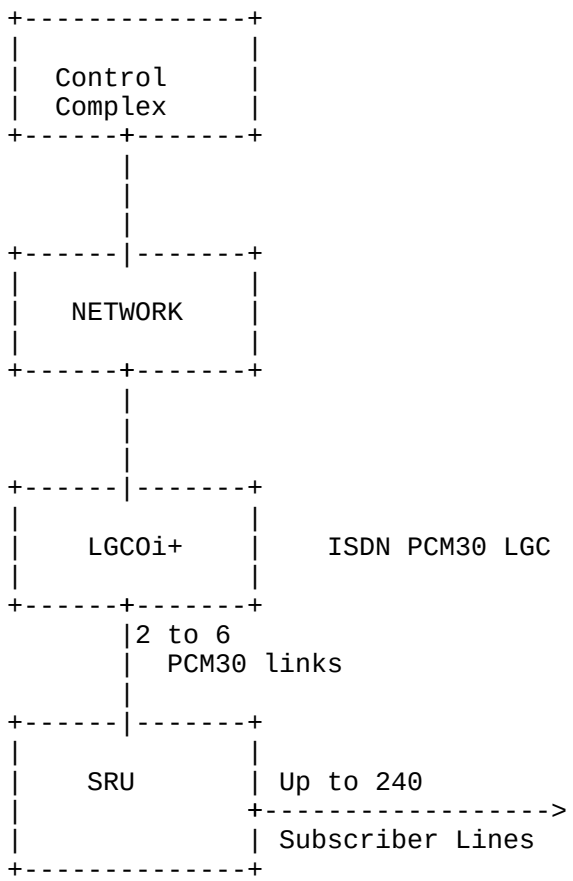


Figure 6. SRU

5.2 Hardware Provisioning

5.2.1 Hardware Usage Restrictions

The SRU meets the same host to remote distance requirements as the existing IRLCM remote, i.e., 230 miles.

PCM30 Line Drawer is not supported.

PCM30 repeaters and Lightening arrestor are not housed in the SRU cabinet. There is no backup rectifier.

5.2.2 Hardware Dependencies

None.

5.2.2.1 P and C Side Port Requirements

Not applicable.

5.2.2.2 DMS BUS Port Requirements

Not applicable.

5.2.2.3 Circuits Per Card

Not applicable.

5.2.2.4 Discrimination Numbering

Not applicable.

5.2.3 Provisioning Considerations

The SRU integrates into the overall DMS architecture in the same manner as a Remote (ie IRLCM) (see Figure 6 on page 10-37) The SRU can be provisioned to provide:

- Cabinetized SRU for end User premises (AC powered (rectifier) with or without battery back-up).
- Cabinetized SRU for Telco premises (DC powered without battery back-up).

The SRU consists of six (6) basic functional blocks; these are:

- Host Interface Unit (HIU)
- DUPLICATED SRU Control Units (SRU)
- Ringing Unit
- Line Drawers
- Remote Maintenance Unit (RMU)
- Power Supply Unit (PSU)

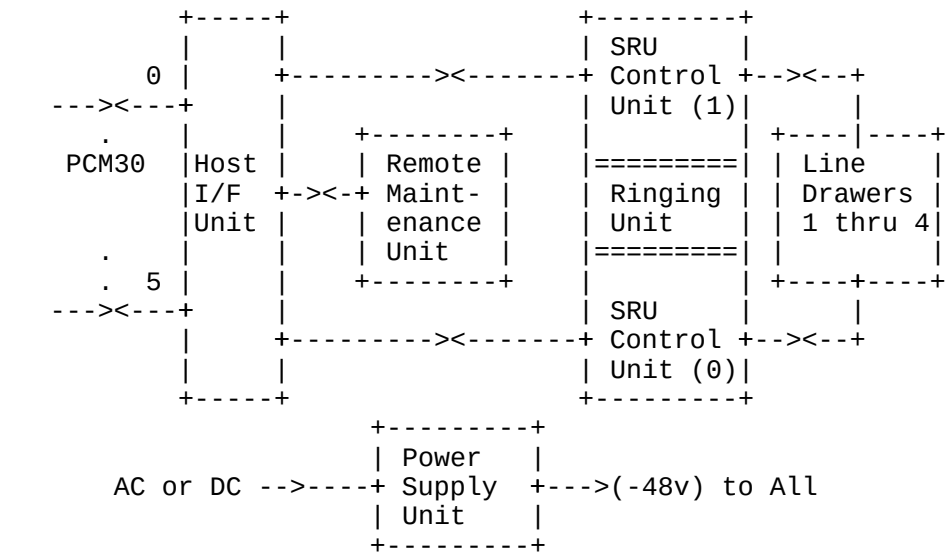


Figure 7. SRU Architecture.

The SRU cabinet has a front door to allow access to the equipment installed inside. Opening of the front door reveals a frame. This frame contains a Cooling unit, Service & Interface, LCME & FSP shelves. An optional Battery Charging Unit (BCU) and a Rectifier is mounted on the right hand side inside the SRU cabinet. Battery strings are mounted in two trays at the bottom of the SRU Cabinet. Each Battery string consists of four Batteries. Above the Battery trays, a connector field is provided. Basic functions of each equipment are described below.

- Cooling Unit: This contains an air filter and fans to force air cool the SRU equipment.

- Service & Interface Shelf: This contains the circuit packs for the Host Interface Unit (HIU), the Remote Maintenance Unit (RMU), one of SRU Control Unit (SCU) and two Ringing Generators.

- SCU Shelf. This shelf contains the other SCU and contains four (4) line Drawers.

- Frame Supervisory Panel: This contains the power distribution and a visual power frame fail indicator.

- Battery Charge Unit. This unit provides the capability to charge each battery string either under the control of the craftsperson, or automatically by the system.

- Rectifier: This provides AC to DC power conversion.

- Batteries: Two battery strings can be housed in the SRU cabinet, to provide power backup. Each battery string is good for two hours.

All external connections to the SRU are made at the connector field located in front and just below the Cooling Unit and behind the protective cover. The connector field contains 3 areas. The first, for PCM30 connection to the Host; the second, for Tip-Ring pairs, each connector having 25 pair; the third, for either an AC inlet or with -48 Vdc A and B feeds. In addition a Frame Ground connection is provided.

The Cabinetized SRU for Telco premises need not be equipped with battery back-up, a Rectifier (Telco to provide -48 Vdc power), or a RMU as the Remote Maintenance Unit packs can be provided by the MTM (if co-located with a DMS).

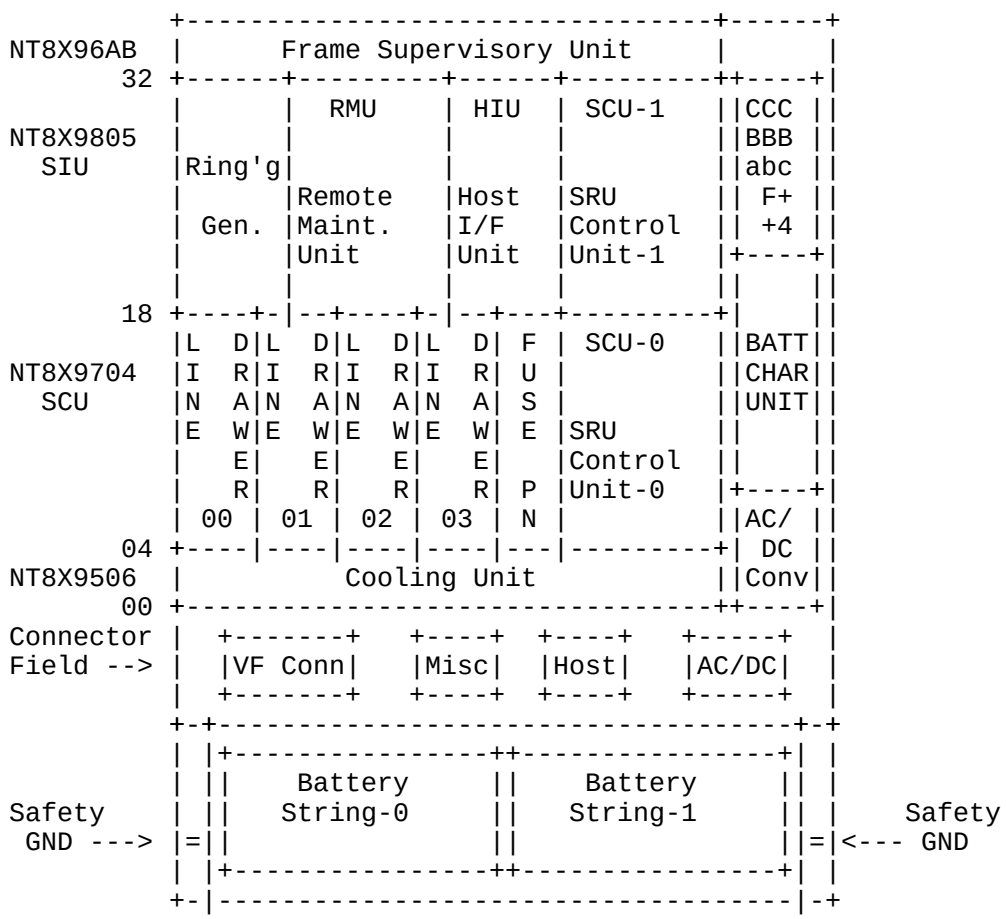


Figure 8. Small Remote Unit (NT8X95AB) Equipment Location

5.2.3.1 Host Interface Unit

The Host Interface Unit (HIU) provides the interface from the SRU to the DMS100 host. The HIU is power spared from both SRU Control Units (SCU) - it gets power from both SCUs. The HIU requires +5Vdc, +12Vdc, and -12Vdc for the power. The HIU consists of up to three (3) NT6X27 packs and two (2) NT6X73 packs.

PCM30 INTERFACE CARD (NT6X27BB)

This card provides two (2) 2.048 Mbits/s PCM30 interface between the host and the SRU. Total of six (6) PCM30 interface ports are provided by the SRU. The SRU requires a minimum of two (2) PCM30 links to the host. These links are designated as primary links and must terminate on a different PCM30 card on the SRU and the Host. Therefore, provide a minimum of two (2), maximum of three (3) NT6X27BB CPs for the SRU (depending on traffic requirements).

The LCME portion of the SRU requires two (2) message channels to the Host. These channels occupy ch#16 on each primary PCM30 link. When a Remote Maintenance Equipment (optional) is provided, it also requires a message channel on each of the primary PCM30 links, otherwise these channels are available for call processing. Failure of one of the primary PCM30 links results in the LCME portion of the SRU to go into TAKEOVER and force the LCME and RMU to use the remaining primary PCM30 link.

PCM30 LINK CONTROL CARD (NT6X73BA)

This card acts as the messaging interface and provides data rate conversion between the SCU, RMU, and the PCM30. It also acts as the clock source for the SRU.

Provide two (2) PCM30 Link Control Cards per SRU.

5.2.3.2 SRU Control Unit (SCU)

The SCU is based on the existing ISDN LCM Controller (LCME). There are two SRU Control Units, and each SCU consists of a processor (NTBX34), two digroup controller (NTBX35) and a new power converter (NT8X99). There is a total of four (4) circuit packs per SCU.

In normal operation each SCU handles service for the lines in its own two line drawers. In the event one SCU fails, the remaining working SRU will handle service to all the lines. Each SCU unit requires +15 Vdc and +5 Vdc for power, and is power spared from the other SCU unit.

Always provide one (1) SRU Common CP Fill NT8X95AX per SRU. The NT8X95AX provides two (2) NTBX34CB, four (4) NTBX35CA, two (1)

NT0X50AC and two (2) NT8X99AB circuit packs; half in SCU-0, half in SCU- 1. The function of each of these cards are outlined below.

LCME Processor (NTBX34CB)

This card is responsible for processing associated with scanning the line cards for calls, setting up call connections through the digroup controller card (NTBX35) and DMS-X messaging with the Host. This card also carries out background tasks for diagnostics.

LCME Digroup Controller (NTBX35CA)

This card provides time switching for external and internal channel assignments, and provides digital loop around paths. It also interface with the Link Control Card (LCC) and the Line Drawers.

LCME Power converter (NT8X99AB)

This circuit pack provides +5v dc to the NTBX34 and the two NTBX35s for its own SCU, and provides +15v dc to the Line Drawers and has the capability to power the mate SCU for power redundancy.

This pack also contains the Ring, ANI and Coin detector/multiplexer circuit, and in addition, has isolating diodes for serving the Line Drawer voltage needs.

5.2.3.3 Ringing Unit.

Two Ringing Generators (RG) NT6X60 are used in the SRU. The NT6X60 Ringing Generators do not provide ANI and COIN voltages for Subscriber lines.

Provide 0, 1, or 2 Ringing Generators per SRU to be used with POTS line cards.

Provide the NT6X60GA Ringing Generator for U.K. applications.

Provide the NT6X60EA Ringing Generator for Australian applications.
No Ringing Generators will be required when the SRU is installed with ISDN line cards only.

5.2.3.4 Line Drawer (NTBX32BA)

This is a 2B1Q Enhanced Line Drawer, which provides the means to house a 2B1Q Bus Interface Card (NTBX36), a Point of Use Power Supply (PUPS) (NTBX71) and up to 60 application specific line Cards. Provide up to four (4) Line Drawers (depending on the need). Refer to the Engineering Manual for more information on configuring line cards on the NTBX32BA line drawers.

2B1Q Bus Interface Card (NTBX36)

The 2B1Q Bus Interface Card (BIC) provides interface between the SCU and up to 60 line Cards. The principal functions of the BIC are to scan line cards for change in state, communicate with the LCME processor (NTBX34), D-channel multiplexing/demultiplexing & time switching, PUPS voltage supervision, ringing voltages control, and activity switching.

PUPS (NTBX71)

The Point of Use Power Supply (PUPS) occupies 4 line card slots in a two-by-two configuration. The PUPS converts the -48v Battery to +5v supply, which in turn is used to power the line Cards.

Line Cards

Line card that can be housed in the Line Drawer depends on the type of service required and the country in which the SRU will be used. POTS, CENTREX and ISDN lines should be equally divided between the Line Drawers.

Following is a list line cards that is used in the Australian and United Kingdom markets. Further details regarding each card may be obtained from the Engineering Manual, section EMA14-03-000, Table C.

Line Type	Australia	UK
A	NT6X17BA	NT6X17BA POTS
B	-	-
C	NT6X21BC	NT6X21BC (p-phone)
D	-	NT6X71AB (Data path)
	-	NT6X76AD (AIM LC)
ISDN	NTBX26AA	NTBX26AA (T I/F 2 slot)
	NTBX27AA	NTBX27AA (U I/F)

The NT6X17BA, World Line Card Type 'A', is currently available for all POTS applications on the SRU and replaces NT6X98AA UK DTMF/DP Signaling Line Card.

Note: NT6X76AD Hayes Supported Asynchronous Line Card replaces NT6X76AC AILC.

Note: NT6X71BA Single Slot Data Line Card replaces NT6X71AB for offices with BCS-32 or higher.

5.2.3.5 Remote Maintenance Unit (RMU)

The RMU is based on the existing Remote Maintenance Module (RMM) that is used in the IRLCM/RLCM/RSC. The RMU, like the RMM, is a modified cost-reduced Trunk Module (TM). The RMU supports line maintenance, Scan points and Battery Charge Unit (BCU). The BCU

is optional on the SRU. The Remote Maintenance Unit (RMU) consists of the following circuit packs:

RMM Control Card (NT6X74)

This card provides processor, memory and I/O functions.

Metallic Test Unit (NT4X97AA & NT4X98BC)

These cards are used to perform maintenance tests on the subscriber loops or the line cards. Provide one of each circuit pack (per SRU) if Metallic Testing is required.

Miscellaneous Scan Detector Card (NT0X10AA)

There are 14 scan detector circuits on this card, each of which may be configured as a loop, ground or battery detector. Provide one (1) (per SRU) if scan points are required.

Metallic Test access card (NT3X09BA) - Optional with BCU

This card provides 8 by 8 two wire metallic matrix for cross connection between the test equipment, test card, line and line card. Provide one (1) NT3X09BA (per SRU) if MTA is required.

Group Codec card (NT2X59) & Test Trunk card (NT2X90)

These packs can be provisioned on the RMU.

5.2.3.6 Power Supply Unit.

The SRU can be powered from external -48v DC supply. For reliability, both A & B feed are provided. DC power to each DC/DC converter in the SRU is controlled by the Frame Supervisory Panel, NT8X96AB, using circuit breakers.

Optionally the SRU may be powered from 240 Volt AC main. Provide one (1) NT5C06CA-1 Rectifier for the AC input. Batteries can also be housed in the SRU. This is done to provide power backup in the event either the AC power or rectifier fails. Provide A0376779 YUASA Batteries (quantity of 8) if this option is requested. Each string of batteries (quantity of 4) provide two hours of back-up power.

Where batteries are equipped then a Battery Charging Unit (BCU) shall also be provided. The BCU enables the batteries to be either automatically charged or under the control of a craftsperson. The batteries provide power back-up for up to 4 hours (two hours per string).

Frame Supervisory Panel (NT8X96AB)

This unit provides -48v dc distribution to the equipment used in the SRU, provides Talk Battery filter and detection of DC/DC power converter failures. The FSP has 6 circuit breakers. The FSP provides the Automatic Recovery from Low Battery (ARLB) feature (through the NT6X36AF ARLB FSP Alarm Card CP) which prevents the circuit breakers on the FSP from tripping in case of low battery supply. This eliminates the need for a craftsperson to manually re-set the breakers on site.

Battery Charging Unit

This unit enables the system and craftsperson with the ability to charge, determine the status of each battery string and also provides low voltage disconnect. Provide one unit when batteries are provided.

5.2.3.7 Administration, Maintenance and Operations

The SRU is an integral part of the host DMS-100 Office. It is centrally administered and maintained by the DMS-100 system from the MAP located at the host site. MAP access from a remote SRU site by using a dial up procedure currently established for DMS remotes, using modem on a working line.

For the SRU, the DMS supports integrated administration and maintenance consistent with that for the LCME, but with the following additional facilities:

Remote maintenance and diagnostics
Monitor SRU Alarms.
Carrier Alarms

5.2.3.8 Traffic Engineering

Traffic engineering rules for SRU are different from that of the LCME, as the number of lines and p-side channels is different. The SRU provides up to 180 p-side channels for call processing. Out of these channels, 2 are used by the SRU Control Unit and 2 by the RME. It must be noted that the SRU design is limited to maximum of 6 PCM-30 links to the host.

The following table presents approximate LCME line drawer load service for ISDN only, and mix service applications for the SRU.

No of lines			PCM-30 links req'd	ccs achieved
ISDN	POTS	CENTREX	(@8ccs for ISDN)	(with 6 links)
40 (100%)	0	0	6	6.44
16 (90%)	0	0	6	7.76
92 (80%)	0	0	6	9.41

No of lines ISDN	POTS	CENTREX	PCM-30 links req'd
16 (90%)	12 (5%)	12 (5%)	6
92 (80%)	24 (10%)	24 (10%)	6
68 (70%)	48 (20%)	24 (10%)	6
44 (60%)	72 (30%)	24 (10%)	5
20 (50%)	96 (40%)	24 (10%)	5
96 (40%)	120(50%)	24 (10%)	4
72 (30%)	144(60%)	24 (10%)	4
48 (20%)	168(70%)	24 (10%)	3
4 (10%)	192(80%)	24 (10%)	3
(0%)	216(90%)	24 (10%)	2

The above calculations are based upon the following assumptions,

- nailed connections on 10% ISDN lines
- 5% blocking (Grade of Service = 0.05)
- Traffic rate for ISDN = 8ccs
- Traffic rate for POTS = 6ccs
- Traffic rate for CENTREX = 6ccs

5.2.4 Office Layout Information

The SRU requires a minimum of 54" clearance at the front.

The maximum floor loading requirement is 4.5 kN applied with 50mm disc at a point.

For CPE installation, cables can be run down a wall and along either side of the SRU (behind the cover). For central office use, the pagoda top can be removed and the cables run to the top EMI bulkhead. Since the extra space at front in the case of wall installation is needed in order to pull the SRU cabinet forward to be able to access the rear, leave enough cable slack so this can be done without disconnecting any cables, thereby minimizing service impact.

Though Installation Engineering recommends that the SRU not be placed against a wall, it accepts that this is sometimes a customer requirement. In such a situation, it is necessary that guidelines be followed to minimize the risk of outage during maintenance or upgrade.

When space limitation dictate that an SRU be positioned against a wall, the cabinet requires a minimum of 54" (1.37 m) of clearance at the front. Otherwise (when not positioned against a wall), the SRU cabinet requires only 27" (0.69 m) of clearance.

5.2.5 Traffic Tables

None available.

5.3 Product/System Specification

5.3.1 Physical Characteristics

Height 56" Width 38" Depth 24"
Weight

(SRU w/o power option, with linecards)	423.9 kg (approx.)
(SRU w/o power option, w/o linecards)	300.0 kg (approx.)
(SRU with power option, with linecards)	555.9 kg (approx.)
(SRU with power option, w/o linecards)	403.0 kg (approx.)

5.3.2 EMI/Earthquake Information

The SRU has an EMI compliant air inlet below the front door of the cabinet. The air exhaust outlet is on the top of the cabinet and is protected against accidental spillage.

5.3.3 Sparing Information

Use standard sparing algorithms.

5.3.4 Power Feed and Fusing Requirements

Not applicable.

5.3.5 Current Drain Information

Not applicable.

5.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

5.4.1 Required Software Packages and Interdependencies

The SRU software is be based on the existing LCME software.

The OAM software for supporting ISDN access in CSP02 release will be packaged as shown below:

NTXR34AA	XPM PLUS Base
NTXR42AA	Firmware Download
NTXV10AB	ISDN Non Initializing Terminal Support
NTX750AD	ISDN Basic Access (XPM+)
NTXH96AA	SRU Basic
NTX274AA	PCM30 Carrier Maintenance

The ETSI services software is packaged as shown below:

NTXT03AA	ISDN ETSI BRI Compliance
NTX750AD	ISDN Basic Access (XPM+)
NTX753AB	ISDN Functional Mode Basic
NTX755AC	ISDN Supplementary Services
NTXK76AA	International Basic

The DMS-100 Data Schema NTP has been updated to include an inventory table that references the SRU. The Data Schema table OPMINV uniquely identifies the SRU in data fill.
For general information relating to tables and table control, refer to NTP 297-1001-451 and NTP 297-1001-310.

ESA capability is not provided.

Intraswitching is not supported.

5.4.2 Software Usage Restrictions

Software is currently unavailable for domestic applications. The current software only supports PCM-30 installations, A-LAW environment.

5.4.3 Memory Provisioning

Not applicable.

5.5 Real Time Impact

There is no degradation on CC real-time as compared to a LCME working through LGCI.

6.0 ECM544 - Meridian Cabinet Remote Module-SONET (MCRMS)

6.1 Overview

The MCRMS is the Meridian Cabinet version of the Cabinetized Remote Switching Center (CRSC). The MCRMS uses the existing Meridian Cabinet framework and is packaged in a single cabinet as opposed to CRSC which utilizes a second cabinet for the D-Channel Handler extension shelf. The MCRMS has been designed to carry the extension shelf, eliminating the LCME shelves and adding a Power Distribution (PDP) shelf.

The functions within the MCRMS are:

The RMM at position 49 is a standard Remote Maintenance Module, based on the central office DMS-100 family Maintenance Trunk Module, that performs line testing, diagnostics, and alarm monitoring at the remote site.

The RCC2 shelf contains central control functions. The single shelf, 68020-based module will support an option for direct SONET interface, and sigificantly increases capacity. The RCC2 has the capacity of 54 P-side ports, an increase of 34 from the RCC. The 54 P-side ports can be a mix of DS1, DS30A, and DCH (D-Channel handlers). A maximum of 46 DS1's, 30 DS30A's, and 10 DCH's can be provisioned in various combinations. See “Provisioning Considerations” on page 10-51 for port spread information and table.

The EXT shelf works in conjuction with the RCC2 to support 24 DS1 links or 10 D-Channel Handlers to accomodate ISDN line requirements.

The Cooling Unit(CU) is the fan unit providing air flow from the bottom of the cabinet to the top.

The Power Distribution Panel (PDP) provides power to the MCRMS and other cabinets in the lineup, plus up to 3 IPEC columns externally through bulkhead power filters. Special cable harnesses are provisionable for powering IPEC's from the PDP.

The MCRMS will introduce SONET interface in later BCS releases. The SONET interface will increase the network reliability, reduce hardware, Operation Administration, and Maintenance(OA&M), and provisioning costs. It will also expand the bandwidth to allow for future advanced services.

The MCRMS is based on the new Remote Cluster Controller 2 or RCC2. The RCC2 is a BCS34 introduction and will replace the RCC and RCCI. The RCC2 in combination with the EXT shelf expands the P-side ports from 20 for the RCC to 54 which can be a mix of DS1, DS30A and DCH

port interfaces. The RCC2 in combination with EXT (Extension) shelf make up the Common Peripheral Module or CPM. The CPM is a family of peripheral modules used in the DMS-100 family and uniquely combined in the MCRMS.

The RCC2 shelf houses five (5) Quad frame Carrier circuit packs (NTMX87). Four DS1 packlets can mount on the Quad frame Carrier CP. For further expansion the extension shelf can house up to three more Quad Frame carrier circuit packs. The RCC2 can also house three (3) NTBX02BA D-Channel handlers for a total of approximately 324 ports. The D-Channel handler card receives data from ISDN terminals and routes the data to either the ISDN signaling pre-processor (ISP) card or the packet handler.

The PDP equiped in the bottom of the MCRMS will provide power to other cabinets in the line-up and also powers the IPE coluumns via EMI bulkhead filters. This eliminates the need for a seperate power cabinet at the remote sites.

6.1.1 UPGRADING A CUSTOM EMI REMOTE WITH MCRMS CABINET

The MSL-100 Remote Migration Strategy is aimed at moving our customer installed base to a new applications platform made up of the MSL Cabinetized hardware and CSP based saftware.

Current feature requests have driven the current SL-100 Remote platforms beyond the point of supporting the myriad of product types and configurations existing on installed base customers. The MSL-100 Remote Migration Strategy enables extention growth paths utilizing the SONET technology portfolio. This strategy minimizes hardware requirements, thereby reducing support cost and hardware sustaining cost.

The MSL-100 installed base of remote Custom EMI hardware platforms can migrate to the SONET MSL-100 Cabinetized technology (MCRMS) when new features are required with this strategy.

6.2 Hardware Provisioning

6.2.1 Hardware Usage Restrictions

The maximum distance from the host to the farthest remote off the RCC2 is 100 miles and 150 miles for Private Line Applications.

The MCRMS is linked to the host by either DS1 or Fiber-Optic interface. Direct Fiber Interface (DFI) and PCM30 interface are not yet available (BCS37).

6.2.1.1 D-CHANNEL RESTRICTIONS

The theoretical maximum of D-channels on a DCH circuit pack (NTBX02) is 124. Due to restrictions the total amount of D-channels

on the RCC2 ,utilizing all three DCH slot positions, will net approximately 324 total channels, or 108 per card. The total slots (ports) available for DCH with the RCC2 and EXT shelf combined is 10.

6.2.2 Hardware Dependencies

The MCRMS is developed from the existing RSCS platform, reconfigured and packaged in a Meridian Cabinet.

6.2.2.1 P and C Side Port Requirements

See “Provisioning Considerations” .

6.2.2.2 DMS BUS Port Requirements

N/A

6.2.2.3 Circuits Per Card

See “Provisioning Considerations” below.

6.2.2.4 Discrimination Numbering

Use standard CADES "set" command for assigning numbering to RMM shelf.

6.2.3 Provisioning Considerations

ISDN LINE DRAWER FOR REMOTES - ILDR (NT6X05DA):

The ISDN Line Drawer for Remotes is a new LCM drawer type that will support ISDN line cards and contain the D-channel handler. The ISDN line drawer will co-exist with current POTS line drawers in a standard LCM. A maximum of two NT6X05DA Line Drawers can be provisioned per LCM. Only one ISDN line drawer per LCM shelf is allowable.

Implement the ISDN Line Drawer for Remotes (ILDR) in the MCLM, MCRU and PCLM. Maximum of 2 line drawers per LCM is allowed. The number of ILDR drawers that can be provisioned on an XPM is dependent on equipment that subtends that XPM. The basic limitation is the number of available message channels on that equipment.

The following Table shows the equipment that can be subtended off a peripheral and the number of message channels that are allocated for that equipment. The bottom line shows the maximum resources available per XPM. Therefore, for example, if an RCC2 already has 4 RLCMs, 4 LCMs and an RMM subtending it, that would use up a total of 33 message channels (4x6 + 4x2 + 1), and leave a total of 12 message channels for ILDRs. Since each ILDR uses 2 message chan-

nels, a total of 6 ILDRs would be able to be provisioned on this RCC2.

It should be noted that the RCC2 already has software to check that these limits are not exceeded, and the ILDR will be included in this check. However, other peripherals (RCC+ and LTC+) do not have this capability and therefore this would have to be done manually. If this limitation is exceeded, functionality will be affected.

NODE	# MESSAGE CHANNELS	RELEVANT TO: RCC2	RCC+	LTC+
LCM	2	Y	Y	Y
RLCM WITH ESA & RMM	6	Y	Y	Y
LCME	2	Y	N	N
SMS-R	2	Y	N	N
RMM ON RCC2 OR RCC+	1	Y	Y	N
ILDR	2	Y	Y	Y
DUAL CONFIGURATION	2	Y	Y	N
RCC2/RCC+	2	N	N	Y
TOTAL # OF CHANNELS AVAILABLE:		45	39	47

The limitations in the Table define the number of ILDRs that can be provisioned per host shelf, and the limitation of 480 ISDN lines per host shelf defines the total quantity of ISDN lines that can be configured. As a general rule, the ILDR message channels will limit the configuration assuming that no LCME is provisioned on the same host. If an LCME is provisioned on the same host, then the number of ISDN lines would probably be the limiting factor.

The ISDN line drawer for Remotes is intended to be made available in all Remote the DMS-100F frame and cabinet types provisionable with the RSC, RSC-S, MCRMS, MCRM, MCRU, MCLM, PCLM, and RLCM remote products.

RSC Sonet cannot be supported by LTCI or LGCI equipment at the host, when configured for ISDN Line Drawer. Also, remotes that subtend RSC Sonet cannot be supported by LTCI or LGCI equipment at the host, when configured for ISDN Line Drawer.

ISDN Line Drawer for Remotes is for the North American Market ONLY.

During ESA of the RSC or RSC-S, the ISDN Line drawer will not be supported. If an RSC or RSC-S enters ESA, the ILDR call might

survive the entry but no commitment is made to supporting any service within ESA.

ONLY 1 ILDR can be defined in each LCA (Line Concentrating Array). ISDN Line Drawer can not be applied to positions 0 or 10. Preferred positions for locating the ISDN Line Drawer is 8 or 18. This means that if the ILDR drawer number of the first ILDR is within the range 2 - 8, the next ILDR to be defined in this LCM will have its drawer number within the range 12 - 18. This limitation exists in order to permit an optimal heat dispersion in the LCM.

A maximum of seven (7) ISDN Line Drawers (NT6X05DA) per remote site can be applied to a single RSC Sonet.

A maximum of fourteen (14) ISDN Line Drawers (NT6X05DA) per remote site can be applied to a dual RSC Sonet.

If the RSC-S requires Extended Distance Capability, it may be equipped with the NTMX76AA or NTMX76AB circuit packs. The host XPM for a RSC-S with EDC must also be equipped for HDLC messaging (NTMX76AA or NTMX76AB instead of NT6X69) and must utilize the Unified Processor (XPM PLUS). Refer to ECM-445 for details of provisioning XPM PLUS. The host DS1 interfaces must be 64Kb clear channel (NT6X50AB) to support ISDN and and to ensure a protocol match with the NTMX81AA packs in the RCC2 RCC2 shelf (NTMX81AA is electrically the same as NT6X50AB.

6.2.3.1 PROVISIONING OF P-SIDE PORTS

The following table shows the logical port to physical port mapping on the RCC2 and Extension shelves.

Logical Ports	Physical DCH	Physical DS1	Physical DS30A
0	Not Used	RCC2 12:0	(First Dual RCC2 Interlink)
1	RCC2 12	RCC2 12:0	
2	Not Used	RCC2 12:1	
3	Not Used	RCC2 12:1	
4	Not Used	RCC2 12:2	
5	Not Used	RCC2 12:2	
6	Not Used	RCC2 12:3	
7	Not Used	RCC2 12:3	
8	Not Used	RCC2 16:0	(Second Dual RCC2 Interlink)
9	RCC2 16	RCC2 16:0	
10	EXT 3	RCC2 16:1	
11	EXT 5	RCC2 16:1	
12	EXT 7	RCC2 16:2	
13	EXT 8	RCC2 16:2	
14	EXT 4	RCC2 16:3	
15	EXT 6	RCC2 16:3	

16	Not Used	RCC2 14:0	
17	RCC2 14	RCC2 14:0	
18	EXT 9	RCC2 14:1	
19	EXT 10	RCC2 14:1	
20	RES	RCC2 14:2	
21	RES	RCC2 14:2	
22	RESERVE FOR RMM DS30A		RCC2 13 & 15]P0
23	RESERVE FOR RMM DS30A		RCC2 13 & 15]P1
24		EXT 4:0	RCC2 13 & 15]P2
25		EXT 4:0	RCC2 13 & 15]P3
26		EXT 4:1	RCC2 13 & 15]P4
27		EXT 4:1	RCC2 13 & 15]P5
28		EXT 4:2	RCC2 13 & 15]P6
29		EXT 4:2	RCC2 13 & 15]P7
30		EXT 4:3	RCC2 13 & 15]P8
31		EXT 4:3	RCC2 13 & 15]P9
32		EXT 6:0	RCC2 13 & 15]P10
33		EXT 6:0	RCC2 13 & 15]P11
34		EXT 6:1	RCC2 13 & 15]P12
35		EXT 6:1	RCC2 13 & 15]P13
36		EXT 6:2	RCC2 13 & 15]P14
37		EXT 6:2	RCC2 13 & 15]P15
38		EXT 6:3	RCC2 13 & 15]P16
39		EXT 6:3	RCC2 13 & 15]P17
40		EXT 8:0	RCC2 13 & 15]P18
41		EXT 8:0	RCC2 13 & 15]P19
42		EXT 8:1	RCC2 13 & 15]P20
43		EXT 8:1	RCC2 13 & 15]P21
44		EXT 8:2	RCC2 13 & 15]P22
45		EXT 8:2	RCC2 13 & 15]P23
46		EXT 8:3	RCC2 13 & 15]P24
47		EXT 8:3	RCC2 13 & 15]P25
48			RCC2 13 & 15]P26
49			RCC2 13 & 15]P27
50			RCC2 13 & 15]P28
51			RCC2 13 & 15]P29
52			RCC2 13 & 15]P30
53			RCC2 13 & 15]P31

Due to the extensive overlap between DCH, DS1 and DS30A ports, care must be taken in the assignment of circuit packs and ports. In order to optimize the configuration from the standpoint of allowing growth without the expense of reconfiguration refer to Table H of EMA14-08-000. This table was designed for the DMS-100 CRSC, but can also be applied to the MCRMS. When using this table for the MCRMS disregard column L which deals with Dynamic Trunks and numbers contained in parenthesis of colunm E which are equivalent slot positions on the right side of the Extension shelf if it were used in a CRSC.

After assigning DCH and DS1 circuit packs according to Table H use the table above to correlate circuit pack types and location with the associated logical ports.

For DS30A ports two NTMX74 circuit packs are provisioned in slots 13 & 15 of the RCC2 shelf. Only one (1) of these NTMX74 circuit packs are active at a time and handles all 32 DS30A ports on the MCRMS. Therefore, it is not necessary to distribute DS30As between both circuit packs. However, each NTMX74 card contains eight (8) DS30A Receiver Chips and each chip handles four (4) DS30A ports. If the message links (0 & 1) from a non-XPM peripheral are assigned to the same chip, an E1 outage can occur if that chip fails. Therefore, it is recomended to assign DS30A links in the following manner which insures both message links are assigned to different chips.

53,49,45,41,37,33,29,25,52,48,44,40,36,32,28,24,51,47,43,39,35, 31,27,50,46,42,38,34,30 and 26

6.2.3.2 C-SIDE LINK PROVISIONING

The C-Side by the packlets in slots 9 and 19 of the RCC2 shelf. The port assignments are as follows:

slot	packlet	ports	slot	packlet	ports
9	0	0,1	19	0	2,3
9	1	4,5	19	1	6,7
9	2	8,9	19	2	10,11
9	3	12,13	19	3	14,15

NOTE: Port 0 and port 2 are message ports and are always required.

Figure 9. C-Side Ports.

6.2.3.3 METALLIC TEST ACCESS (MTA)

The MCLM and MCLME are equipped with the shielded Metallic Test Access cables. A maximum of six (6) LM cabinets or 12 LCMs can be provisioned to one MCRMS cabinet RMM shelf. The cables from the Line cabinet are wire wrapped to the MTA in the MCRMS cabinet. The wiring of each line cabinet to the MCRMS is determined by it's position in the line-up with the closest cabinet to the MCRMS being the lowest numbered cabinet. The lowest numbered line cabinet

terminates on the RMM shelf at slot position 11 and the last on slot position 13:

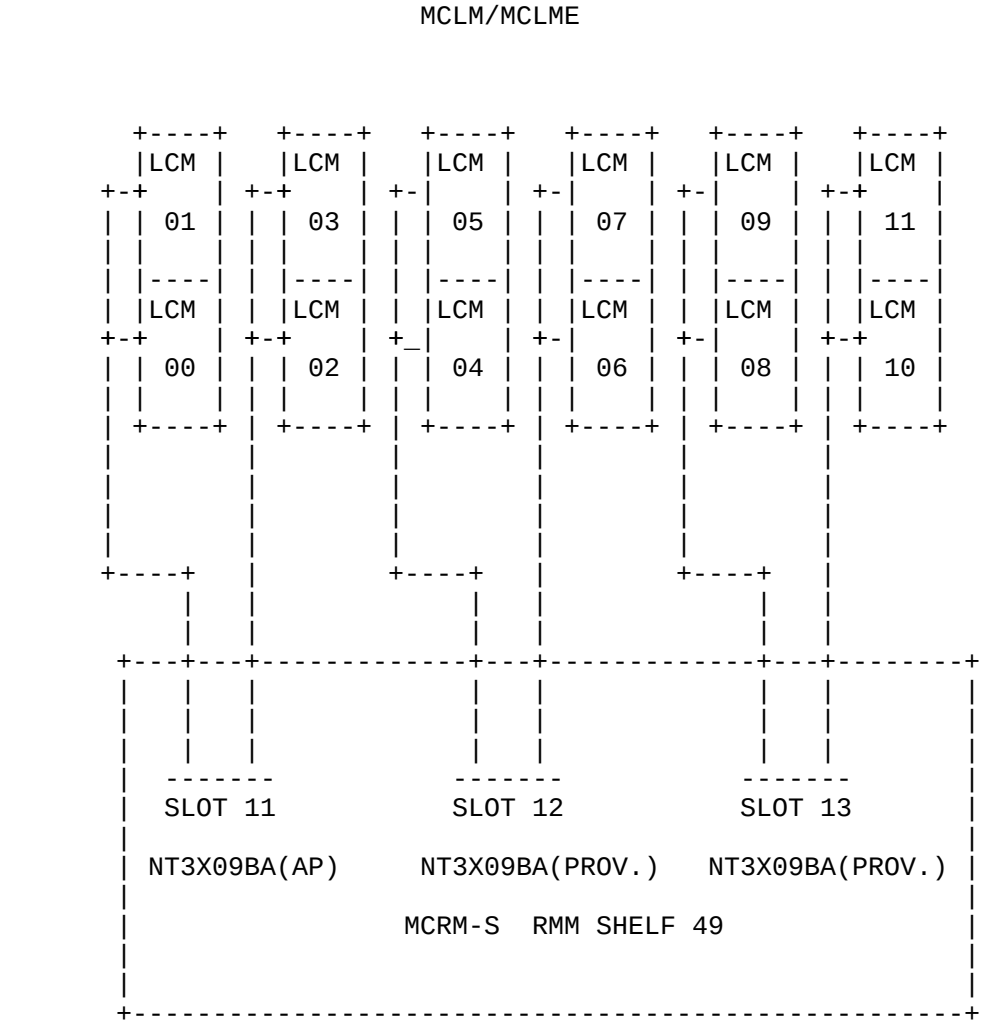


Figure 10. Metalic Test Access (MTA).

6.2.4 Office Layout Information

The physical lay-out of the MCRMS is comprised of a Remote Maintanence Module (RMM), the Remote Cluster Controler 2 with SONET interface capabilities an Extension shelf to handle addi-

tional Quad Frame Carrier packets and D-Channel handlers, and a Power Distribution Panel, PDP.

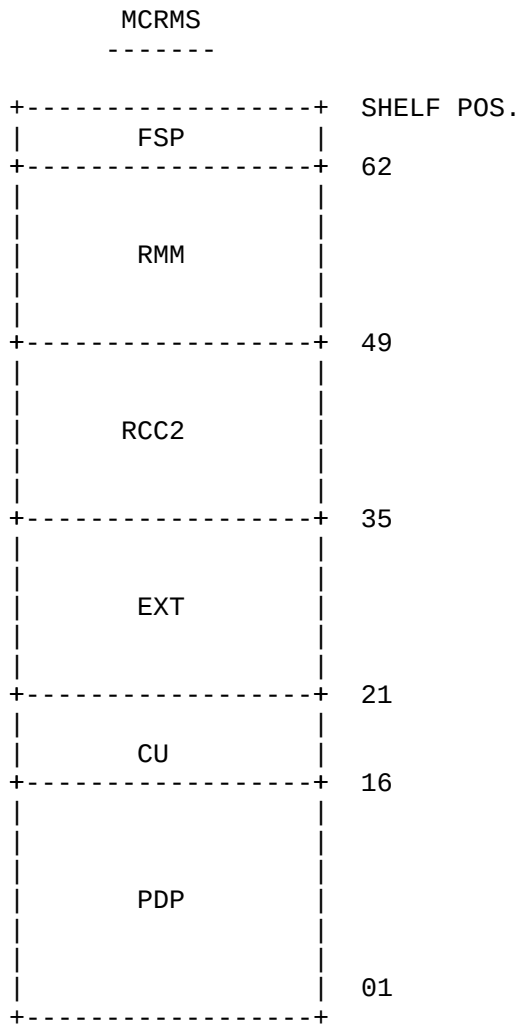


Figure 11. MCRM-S Layout.

6.2.5 Traffic Tables

The traffic capacity for the MCRMS can be as follows:

* All ISDN lines : 2400 at 11.4 CCS

* All MCLME POTS : 3360 at 7.9 CCS + 421 at 6.0 CCS

* All MCLM Lines : 3585 at 7.4 CCS + 421 at 6.0 CCS

* All IPE Lines : 1792 at 9.8 CCS + 1280 at 6.2 CCS

* All MCDM Lines : 1120 at 15.8 CCS + 800 at 10.0 CCS

6.3 Product/System Specification

6.3.1 Physical Characteristics

The MCRMS is packaged in a Meridian Cabinet and is fully integrated into a Meridian Cabinet Remote switch lineup. The MCRMS can be ordered in either grey or brown.

6.3.2 EMI/Earthquake Information

The MCRMS complies with FCC EMI regulations: Part 15, Class A, and Part 68.

The MCRMS, being packaged in a Meridian Cabinet uses the same earthquake anchoring proceedures and hardware as the Meridian Cabinet product line.

The MSL-100 Remote Migration Strategy provides a migration plan for existing Custom EMI hardware platforms to the MSL-100 Cabinetized technology. This strategy provides EMI components between the MSL cabinet(s) to Custom EMI frames.

6.3.3 Sparing Information

The standard algorithm applies when provisioning spares.

6.3.4 Power Feed and Fusing Requirements

The MCRMS receives secondary power from the Power Distribution Panel in the bottom of the Cabinet. The Cabinet requires -48VDC main feeds.

6.3.5 Current Drain Information

The shelves within the MCRMS have the following power requirements:

SHELF POWER REQUIREMENTS

RMM	5A	@ -48V :	240W TOTAL
RCC2	8.1A	@ -42V :	340W TOTAL
EXT	7.3A	@ -42V :	307W TOTAL

6.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

6.4.1 Required Software Packages and Interdependencies

Existing RSCS software will be used. Minor changes to diagnostics for shelf position datafills will be required.

The MCRMS software will consist of Central Control and Peripheral Module Features packages.

The base MCRMS base software packages are:

* NTX145AA SOFTWARE SWITHING FEATURE
* NTX150AA RSC-INTRA RSC CALLING
* NTXP92AA REMOTE SWITCHING CENTER SONET BASIC
* NTXP92AB REMOTE SWITCHING CENTER SONET BASIC (BCS35)

The follow is the list of optional software packages available to support additional capabilities for the MCRMS.

* NTX142AA DS-1 64 KBPS CLEAR
* NTX143AA DS-1 ESF
* NTX149AA RSC ESA-LINES
* NTX149AB RSC ESA-LINES AND TRUNKS
* NTX152AB RSC TRUNKING
* NTX380AA DUAL REMOTE CLUSTER CONTROLLER 2
* NTX381AA RSC REMOTE-OFF-REMOTE
* NTX750AB ISDN BASIC PACKAGE
* NTXJ00AA ISDN ON RSC
* NTXN82AB RSC ENHANCED ESA (LINES AND TRUNKS)
* NTXQ12AA RSC ENHANCED ESA(LINES
* NTXR34-- XPM BASIC

(In BCS-35, NTXR34AB replaces NTXR34AA, which is declared MD status.)

* NTXR42AA FIRMWARE DOWNLOADING

6.4.2 Software Usage Restrictions

This information is unavailable at this time.

6.4.3 Memory Provisioning

The Processor card in the RCC2 shelf has an initial 8Meg of memory and can be expanded to 16Meg.

6.5 Real Time Impact

The Real Time capacity of the MCRMS will be similar to the capacity as specified for the RSCS. Real Time capacity will not be specified until further testing is complete.

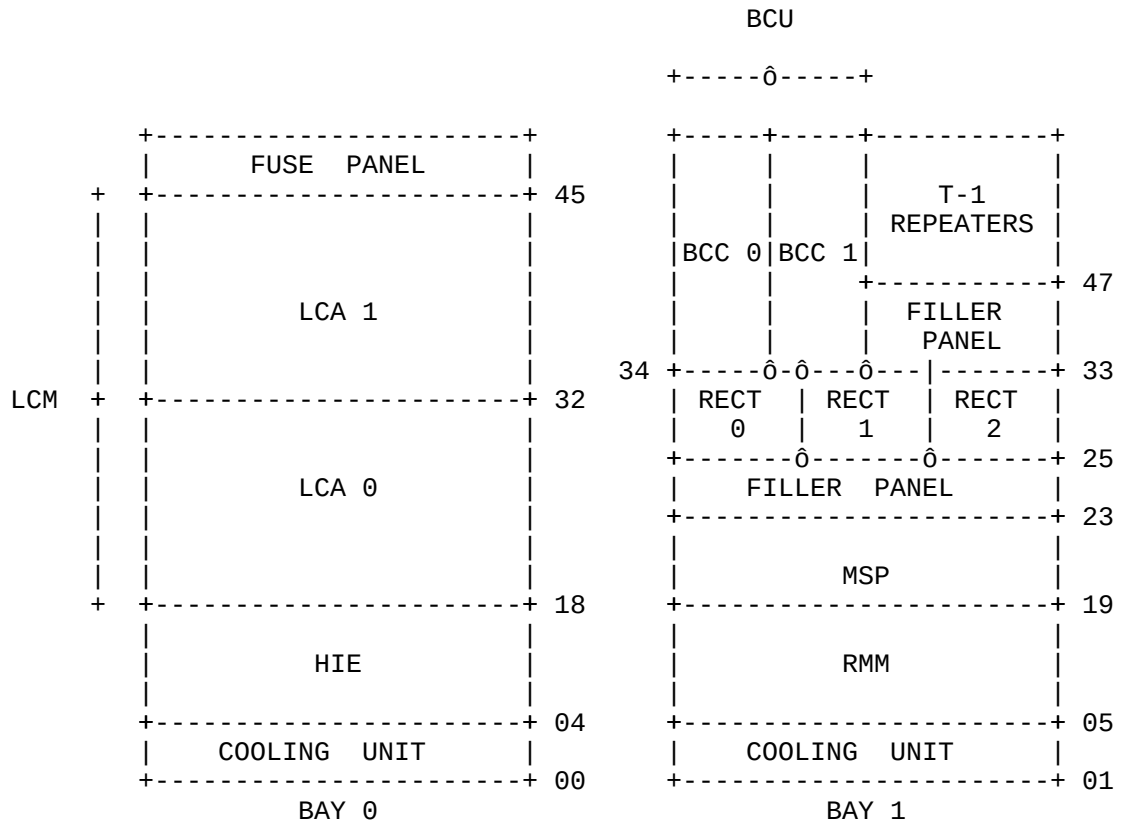
7.0 ECM562 - Outside Plant Access Cabinet (OPAC)

7.1 Overview

The Outside Plant Access Cabinet (OPAC) is the Outside Plant Module (OPM) functionality in a larger cabinet. This larger cabinet contains space in the rear for mounting optional equipment such as fiber shelves, channel banks, etc. The cabinet consists of a main compartment which houses the electronics, an Environmental control system, and batteries. The cabinet is also equipped with an end compartment containing the cable/wire termination, protection, and cross-connection facility.

The OPAC cabinet is configured such that it has four bays, two in the front (Bay 0 & 1) and two in the rear (Bays 2 & 3). The bays in the cabinet are hinged to allow access to the rear of the equipment mounted in the bays.

The OPAC configuration is shown below in Figure 12 on page 10-62 and Figure 13 on page 10-63.



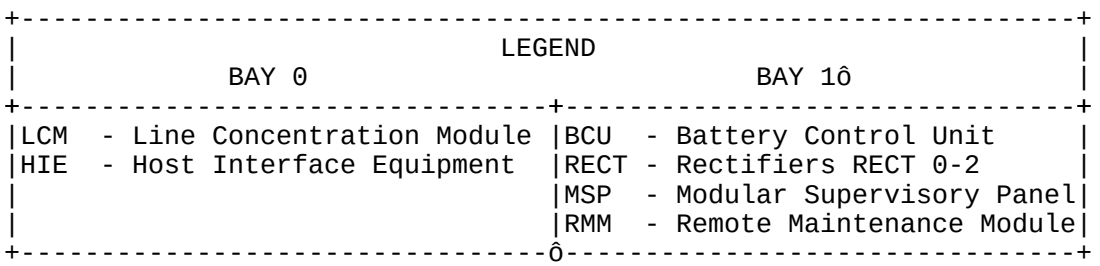
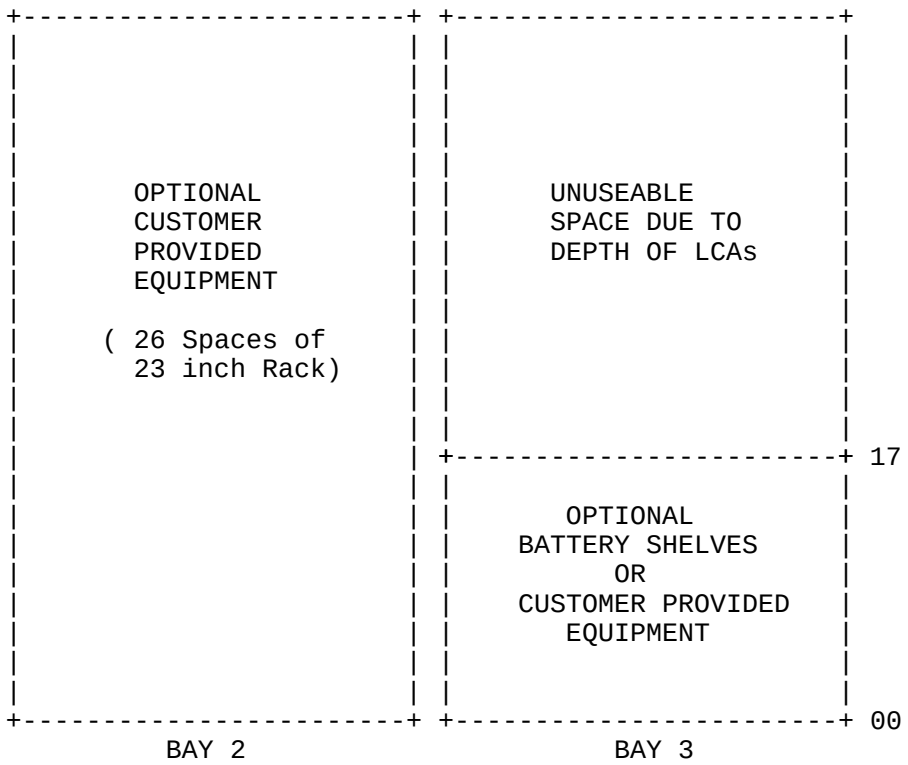


Figure 12. OPAC BAY 0 & 1 (Front of Cabinet)



NOTE: As viewed from the Rear Access Doors.

Figure 13. OPAC BAY 2 & 3 (Rear Of Cabinet)

The Line Concentration Module (LCM) is identical to the host LCM supporting up to ten (10) line drawers at 64 line cards per drawer. The OPAC LCM supports all of the line features available at the host. This includes POTS, Party Lines, Coin Lines, IBN stations, Business Sets, Data Units, Attendant Consoles and DataPath. Intra-Switching and Emergency Stand-Alone, are also available with the OPAC. The fuses for the LCM are mounted on the Fuse Panel above the LCM.

The Host Interface Equipment (HIE) module houses the circuitry required to communicate with the host during normal operation and to support the OPAC during the Emergency Stand Alone mode. Communication with the host is via a minimum of 2 to a maximum of 6 DS-1 links. Two DS-1 PCBs are always required. The number of links required is traffic dependent. Optionally, office repeaters may be provisioned and mounted in the T-1 Repeater Shelf.

Environmental Control equipment is provided to control the environment inside the OPAC cabinet. This equipment includes air in-

lets, air filters, fans, heaters and air outlets designed to protect the OPAC's internal circuitry from extreme outdoor conditions such as extreme heat, cold and heavy dust areas.

7.2 Hardware Provisioning

7.2.1 Hardware Usage Restrictions

Not Applicable

7.2.2 Hardware Dependencies

7.2.2.1 P and C Side Port Requirements

DS-1 Links: The OPAC requires a minimum of two (2) and a maximum of six (6) DS-1 links to the Host Office.

-PCM-30 links: The OPAC requires a minimum of four (4) and a maximum of six (6)PCM-30 links to the Host Office.

7.2.2.2 DMS BUS Port Requirements

Not Applicable

7.2.2.3 Circuits Per Card

Not Applicable

7.2.2.4 Discrimination Numbering

The RMM number must be unique per Host Office. This RMM number must not conflict with existing remotes.

7.2.3 Provisioning Considerations

The RMM number must be unique per Host Office. This RMM number must not conflict with existing remotes.

When provisioning the OPAC the engineer must select the desired cabinet color. The available colors are:

Brown
Ivory

Green

Cabinet models are divided into two (2) styles. The 220 Volt AC (3 Wire + ground) cabinet operates on a 220 volt system except for the heater units which operate on 110 volts. These cabinet models can be provisioned for the domestic and international markets. The 220 Volt AC (2 Wire + ground) cabinet operates on a 220 volt system and the heater units also operate on 220 volts. These cabinet models can be provisioned for the international markets only.

When the 220 Volt AC (2 Wire + ground) cabinet is provisioned, a 2 0 outlet kit must be provided for the specific international market.

The NTRX6126 is for the Philippines, NTRX6127 is for China, NTRX6128 is for India, and NTRX6129 is for Malaysia.

These are the only markets that can provision the 220 Volt AC (Wire + ground) cabinet and outlet kit.

When provisioning the OPAC the engineer must select the option with or without heaters in the available colors listed above.

If the ambient temperature for the international site is at or below 0 degrees Fahrenheit, then provide heaters for the respective cabinets.

The OPAC should be mounted on a concrete pad, located above local flood plains. Any mounting other than Concrete Pad is not supported. There are two (2) choices of Concrete Pad Mounting. One is a concrete pad with a 10-inch skirt around the OPAC, and the other is a concrete pad with a 30-inch skirt around the OPAC. The 3 -inch skirt provides enough room for a maintenance person to stand on the concrete pad instead of the ground. Refer to the Engineering Manual Section for ordering the approprate kit.
NOTE: For all OPAC installations engineered in the U.S., a Request For Schedule (RFS) for advance shipment of the mounting hardware kit and template should be initiated by the Systems Application Engineer (SAE) as soon as the OPAC mounting arrangement is identified. An advance ship note must be placed in the appropriate Equipment Specification and referenced against the material or an Advance Ship Spec should be issued by the EAE.

7.2.4 HOST INTERFACE EQUIPMENT (HIE)

The Host Interface Equipment (HIE) Shelf mounts in Bay 0, Shelf Pos 04 of the OPAC.

Provision two(2) Ringing Generator Modules per HIE to mount in Positions 01 & 05 for analog ringing.

Provision one(1) NT6X47AC (Master Processor Memory CP) in Pos 14, one(1) NT6X45AF (LGC/DTC Processor) in Pos 15, and one(1) NT6X75AA (ESA Clock and Tone Card) in Pos 16, when the Emergency Stand-Alone(ESA) option is required. For International applications provide one(1) NT6X75KA (ESA Clock and Tone Card / China and Philippines) or

one(1) NT6X75EA (ESA Clock and Tone Card / Malaysia)

in Pos 16 instead of the NT6X75AA. Also provide one(1) NT2X48BB or one(1) NT2X48CC (Intl) in the RMM Shelf when ESA is required.

During ESA of the OPAC, the ISDN Line Drawer will not be supported. The ISDN Line Drawer call might survive the entry but no commitment is made to supporting any service within ESA.

Provide two (2) NT6X50AA or two (2) NT6X50AB, DS-1 Interface, in position 19-20 of each HIE. The NT6X50 CP vintage must be the same as the cards of the host office.

Provide one (1) NT6X50AA/AB, DS-1 Interface, in position 21 of each HIE when the DS-1 links 5 and 6 are required to the Host. This NT6X50 CP MUST be the same vintage as already ordered for position 19-20.

For all ISDN applications, NT6X50AAs must be replaced with NT6X50ABs in both the remote and host equipment.

Provision one(1) NT0X50AA Filler Face Plate for pos 13-16,& 21 of the HIE shelf, when these positions are unequipped. Provision one(1) NT0X50AG in pos 09 of the HIE shelf.

For international applications provide two (2) NT6X27BBs PCM-30 Interface Packs, in position 19-20 of each HIE for a minimum of 4 PCM-30 Links.

Provide one (1) NT6X27BB, PCM-30 Interface, in position 21 of each HIE when the PCM-30 links 5 and 6 are required to the Host.

Provision one(1) NT0X50AA Filler Face Plate for pos 13-16,& 21 of the HIE shelf, when these positions are unequipped. Provision one(1) NT0X50AG in pos 09 of the HIE shelf.

7.2.5 LINE CONCENTRATING MODULE

OPAC is capable of terminating up to 640-Lines. Provide one (1) LCM Common CP in Bay 0, Sh Pos 18 for each OPAC ordered.

Line Drawers for the domestic market must be provisioned seperately from End Compartment Kits. For International markets the Line Drawers are provisioned as part of the End Compartment Kits. These kits contain the gate, blocks, line drawers/fillers and mounting hardware. Refer to the Engineering Manual Section and provide the appropriate kit.

The ISDN Line Drawer is a new LCM drawer type that will support ISDN line cards and contain the D-channel handler. The ISDN line drawer will co-exist with current POTS line drawers in a standard LCM. A maximum of two NT6X05DA Line Drawers can be provisioned per LCM. Only one ISDN line drawer per LCM shelf is allowable.

The ISDN line drawer is intended to be made available in all the DMS-100 frame and cabinet types provisionable with the RSC, RSC-S, OPM, OPAC, and RLCM remote products. It is intended to be designed and engineerable in the following vehicles: CLCE, CRSC, RLCM, OPM, OPAC and LCE.

Two (2) of the ten line drawers for each LCM may be NT6X05DA ISDN Line Drawers, one per shelf. Use of an NT6X05DA ISDN Line Drawer requires the use of NT6X04AE and NT6X50ABs for clear channel capability. The ISDN Line Drawer is for the North American Market only.

For ISDN applications (NT6X05DA), provide one (1) the NT6X04ZX LCM Processor CP Kit. This kit upgrades the LCM processor and labels to NT6X51DAs required for clear channel capability. Pack fill becomes NT6X04AE. Use of the NT6X04AE requires the use of NT6X50ABs in both host and remote equipment.

Only 1 ISDN LD can be defined in each LCA (Line Concentrating Array). ISDN Line Drawer can not be applied to positions 0 or 10. Preferred positions for locating the ISDN Line Drawer is 8 or 18. This means that if the ILD drawer number of the first ILD is within the range 2 - 8, the next ILD to be defined in this LCM will have its drawer number within the range 12 - 18. This limitation exists in order to permit an optimal heat dispersion in the LCM.

Refer to Host LCM Provisioning rules for line card provisioning in the Engineering Manual.

7.2.6 REMOTE MAINTENANCE MODULE (RMM)

The RMM number must be unique per Host Office. This RMM number must not conflict with existing remotes.

Provision one(1) NT6X13AB (RMM Common CP) in Bay 1 shelf position 05 for each OPAC ordered.

For All International markets except Malaysia provide one (1) NT6X13BA (RMM Common CP). For the Malaysian market provide one (1) NT6X13EA (RMM CP).

The RMM Common CP provides the circuitry necessary to enable basic RMM functions. However, thirteen (13) slots remain open which may be filled with eleven (11) different service/maintenance circuits.

The service/maintenance circuits detailed in the chart below are provisionable on the OPAC with specific card slot assignments.

PLEASE NOTE: The character ' X ' in each column of the chart indicates an invalid slot assignment for the pack. The numbers (1 thru 9) indicate the valid slot assignment for the pack and the corresponding note number which defines the provisioning rule(s). Slot Assignments as detailed below are specific to the OPAC. RMM Slot Assignments are different in other Remote Office applications. RMM CP Assignment Chart:

	2	2	3	3	0	2	2	2	3	4	4	2
	X	X	X	X	X	X	X	X	X	X	X	X
	1	1	0	0	1	5	9	4	0	9	9	4
	0	1	9	9	0	7	0	8	4	8	7	8
	B	B	B	A	A	A	A	A	A	B	A	C
SLOT	A	A	A	A	A	A	D	B	A	B	A	C
03	1	X	X	X	X	X	X	X	X	9	X	X
04	X	1	X	X	X	X	X	X	X	X	9	X
05	X	X	2	X	X	X	X	X	X	X	X	X
06	X	X	X	3	X	X	X	X	X	X	X	X
07	X	X	X	X	4	X	X	X	X	X	X	X
08	X	X	X	X	4	X	X	X	X	X	X	X
09	X	X	X	X	X	X	6	X	X	X	X	X
10	X	X	X	X	X	X	6	X	X	X	X	X
11	X	X	X	X	X	X	X	7	X	X	X	10

12	X	X	X	X	X	X	X	7	X	X	X	10
13	X	X	X	X	4	5	6	7	8	X	X	10
14	X	X	X	X	4	5	6	7	8	X	X	10
15	X	X	X	X	4	5	6	7	8	X	X	10
16	X	X	X	X	4	5	6	X	8	X	X	X

) For domestic applications, one MTU pair (NT2X10BA and NT2X11BA) is Always Required in slots 03 and 04. However, when the MTU is provisioned certain restrictions apply - see Item 2 below.

) One (1) NT3X09BA is Always Required in slot 05 on all OPAC systems for Battery Diagnostics and Line Testing. After standard assignments the NT3X09BA has one Horizontal Connection Left which may be used in one of three (3) ways:

a) For the third optional NT2X90AD assignable to slots 13 thru 16, or

b) For an optional NT3X04AA assignable to slots 13 thru 16, or

c) For the second test multiple on a MTU pair (NT2X10BA/NT2X11BA).

) One (1) NT3X09AA is Always Required in slot 06 on all OPAC systems for Battery Control.

4) The NT0X10AA is provisionable in Slots 07, 08, and is provisionable in slot 13-16 as follows:

a) One (1) NT0X10AA Scan Card is Always Required in slot 07 for Alarm Detection. This CP is pre-wired to internal OPAC circuitry.

b) One (1) NT0X10AA Scan Card is Always Required in slot 08 for Alarm Detection. This CP is pre-wired to internal OPAC circuitry.

c) Additional NT0X10AAs may be provisioned in Slots 13-16 per Telco specifications.

5) The NT2X57AA is optional, provisionable slots are 13-16 per Telco specifications for an external device.

6) Two (2) NT2X90ADs are Always Required in slots 9 and 10. The 3rd NT2X90AD is provisionable for slots 13-16 as follows (Note: Certain restrictions apply, refer to Item 2 above for restrictions):

   a) One in slot 9 for LTP/Talk Monitor function

   b) One in slot 10 for Operator Verification function

   c) One in slot 13, 14, 15, or 16 for a Telco Specified function.

   If the restrictions per Item 2 above and Item 7 below are not in conflict, three NT2X90ADs may be provisioned on the OPAC.

7) For domestic applications, a maximum of three (3) NT2X48BBs (Digitone Receiver (DTR)) is provisionable on the OPAC given the following restrictions:

   a) Three NT2X48BBs may be provided if NT2X90ADs are provided in slots 9 and 10.

   b) Calculate DTRs as follows:

   Holding Time Divided by 100 (HT/100)
   For Example: .079 divided by 100 = DTRs Required

   NOTE: .079 is the average holding time for a 7-digit call. The NT2X48BB is a two slot card which occupies the assigned slot and the next slot.

   A minimum of one NT2X48BB is Always Required when the ESA option is provided. The NT2X48BB (Digitone Receiver) is a one slot card.

8) One NT3X04AA is optionally provisionable in Slots 13 thru 16 for the Automate Electric (AE) #1 Local Test Desk (#1LTD) Interface. The specific slot used and/or the validity of its' use is dependent upon the restrictions defined in Items 2 & 7 above.

9) For International applications, one MTA pair (NT4X98BB and NT4X97AA) is Always Required in slots 03 and 04.

0) For International applications,a minimum of one NT2X48CC is Always Required when the ESA option is provided. The NT2X48CC (Digitone Receiver) is a two slot card which occupies the assigned slot and the slot below it. This card is provisionable in slots 11 thru 15.

7.2.7 MODULAR SUPERVISORY PANEL (MSP)

The OPAC MSP is located in Bay 1 immediately above the RMM shelf at shelf position 19.

7.2.8 BATTERY CHARGING UNIT (BCU)

Always Provision one(1) NT8X03AC Battery Charger Common CP Kit in Bay 1, Sh Pos 34.

Battery Strings shall be provisioned in the OPAC for Battery Backup. Refer to the Engineering Manual Section of this document for provisioning information on the available battery options and their required hardware.

7.2.9 END COMPARTMENT ACCESS

The End Compartment must be provisioned per Telco specifications. There are two (2) termination options available: Bix or Screw. Refer to the Engineering Manual Section and provide the appropriate kit. These kits contain the gate, blocks, line drawers/fillers (International only),and mounting hardware.

Domestic Kits no longer contain Line Drawers and must be provisioned seperately. International Kits contain the Line Drawers.

7.2.10 DOWN DRAFT COOLING UNIT

The Down Draft Cooling Unit (DDCU) is developed to cool Telco equipment located in Bay 2 of the OPAC. The DDCU houses two fans which blow in a downward direction. The cooling unit comes equipped with a cable assembly which connects to an existing MATE-N-LOK connector located abvove the AC outlet box.

7.2.11 OC-1 KITS

The OC-1 Access Module delivers high-performance, cost effective SONET service to the local loop enabling DS-1s to be deployed and managed for a wide range of applications including remote feeding

customer-premises access and thin-route transport. A kit to mount two OC-1 modules in Bay 3 of the OPAC behind the LCM is introduced in this phase.

Two (2) choices of OC-1 kits are offered.The ST Ready Kit (NTRX66AB) has cords with ST connectors on the patch panel end and on the OC-1 end. The NTRX66AB is comprised of an OC-1 shelf assembly, ST adapters, RCE Mounting assembly, cables, & misc. hardware. This kit provides ST connections at the patch panel which can accomodate ST or FC connections. The OC-1 can only accommodate ST connections.

The FC Ready Kit (NTRX66AC) has cords with FC connectors on the patch panel end and ST connectors on the OC-1 end. The NTRX66AC is comprised of an OC-1 shelf assembly, FC adapters, RCE Mounting assembly, cables, & misc. hardware. This kit provides FC connections at the patch panel which can accomodate ST or FC connections. The OC-1 can only accommodate ST connections.

Four OC-1 Fiber configurations can be provided: Total Fiber Configuration, Splice Box and Patch Panel, Splice Box only, and Patch Panel Only.

A Total Fiber only Configuration is equipped with a NTRX66AB or NTRX66AC, along with a Splice Box and Patch Panel.

A Splice Box Configuration is equipped with 4 trays. Each tray is equipped with 24 fiber connections each. The Splice Box provides splice management of outside fiber to fiber located inside of the OPAC.

A Patch Panel only Configuration is equipped to handle 24 fiber connections maximum. This configuration is used to cross-connect external fiber to internal fiber units.

A Patch Panel and Splice Box Configuration are also optionally provisionable for customer provided (other vendors) fiber shelves when OC-1 is not required.

7.2.12 SPC BLOCK

An additional NTRX65 Series Protector Block is being introduced to connect up to 36 T-1 links to the outside compartment. The T SPC block has six 25 pin D-sub filter adapters with filtering characteristics specific for T1 transmission. Cables used to connect to Telco equipment already exist and can be ordered as needed to connect Telco transmission equipment. Six (6) NTRX6033 Cables facilitate connections from the Protector Block to the Customer Equipment.

7.2.13 TELCO RESPONSIBILITIES.

The Customer Engineer must ensure that the TELCO is aware of the following items they are responsible for providing/completing:

- Site preparation.
- Mounting pad construction.
- Cabinet mounting.
- Interfacing of outside cables.
- Installation of Bix Covers.
- Minimum of two(2) DS-1 lines.
- FX Line for communication between OPAC and Host equipment.
- Temporary storage for Test equipment at OPAC site.
- Ground Tent with built-in ventilation/heater ports.
- 500 type telephone sets.
- 500 type ring party and tip party telephone sets.
- Hand telephone set with alligator clips.
- Engineer and Furnish the Telco provided optional equipment (e.g. FMT-150B, DDM-1000).

7.2.14 Office Layout Information

Not Applicable

7.2.15 Traffic Tables

See ECM-497 - Simplified Traffic Provisioning

7.3 Product/System Specification

7.3.1 Physical Characteristics

MECHANICAL DIMENSIONS
Height: 5'5"
Width : 6'11"
Depth : 2'6"
Weight: 2100lbs without batteries

7.3.2 EMI/Earthquake Information

EMI/Earthquake requirements are built into the OPAC cabinet.

However, for earthquake compliance in Zones 3 & 4, an additional earthquake kit is required to hold down the batteries. Refer to the OPAC engineering manual for detailed provisioning information.

7.3.3 Sparing Information

Spare circuit packs are provisioned per standard rules. The following equipment may be ordered as required per the Telco.

NT7A6930 - Air Induction Filter Kit
A0381740 - Replacement Fan
NT7A67AA - Protector Test Access Kit
A0352639 - Wrench Hex Key Lock
A0352702 - Wrench Insert Hex Key Lock

A0318483 - High Temperature Sensor
A0318484 - Low Temperature Sensor
A0326894 - Heater Thermostat
A0320836 - Fan Thermostat
A0361062 - Door Alarm Switch
A0320821 - GFI Outlet
A0385117 - Heater Outlet

7.3.4 Power Feed and Fusing Requirements

Input Voltage: Commercial AC 176-264V at 47-63Hz (Single Phase)
Fusing Requirements: 60Amps

7.3.5 Current Drain Information

Not Applicable

7.4 Software Provisioning

For NTX software packages to PCL/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

7.4.1 Required Software Packages and Interdependencies

Software Packages required at the host for the OPAC, are the following:

NTX146AA : Remote Line Concentrating Module
NTX147AB : Outside Plant Module Maintenance
NTX154AA : RLCM - ESA Operation
NTX156AA : Intra RLCM Calling

Refer to the SMS/SOLID database for Software Package Interdependicies.

The baseline software load for ISDN Line Drawer for Remotes is NA007 for the Host office, and XPM81 for the OPAC Remote and the ESA module, if so equipped. If the OPAC is subtended from an RSC or RSC-S, then that Remote will require an XPM08 software load.

7.4.2 Software Usage Restrictions

Not Applicable

7.4.3 Memory Provisioning

Refer to MEMCALC for memory provisioning.

7.5 Real Time Impact

Refer to REAL:QUICK or PRTCALC.

8.0 ECM572 - S/DMS AccessNode

8.1 Overview

S/DMS AccessNode is comprised of two (2) basic network elements they are;

- Fiber Central Office Terminal (FCOT)
- Remote Fiber Terminal (RFT)

8.1.1 Fiber Central Office Terminal (FCOT)

The FCOT interfaces with all the equipment in the central office. It will support both digital and analog host switches, by way of its industry standard TR303, TR008 and TR057 compliant interfaces. In addition, the FCOT conforms to the requirements of TR253 (SONET) and publication 43801 (Digital Channel Bank Requirements and Objectives). It can therefore be used in digital loop carrier (DLC) applications, channel bank applications or fiber mux applications, and in mixed applications that involve combinations of these functions. To make maximum use of interoffice interfaces and central office switch ports, the FCOT terminates all unused feeder bandwidth.

8.1.2 Remote Fiber Terminal (RFT)

The RFT supports locally switched services, non-locally switched services, and non-switched services. An RFT, or remote S/DMS AccessNode, supports both traditional narrowband services and services requiring high speed DS1, DS3, OC-3 or OC-12 rates. It grooms the services into VT payloads and STS payloads, which are transported to the central office by way of the SONET feeder. The RFT can be housed in a bay frame for Huts, Controlled Environmental Manhole (CEMHs) or Controlled Environmental Vaults (CEVs). The RFT can also be housed in an 0utside Plant Cabinet for CSA applications or in a Modular Business Package for customer premise applications.

8.1.2.1 Outside Plant Cabinet (as an RFT)

The Series 800A Outside Cabinet can perform as an RFT for a S/DMS AccessNode, and can be configured as a mux, UDLC, or IDLC system. The S800A provides a Carrier Service Area (CSA) configuration for the S/DMS AccessNode product. It is a 120 cubic feet, above ground outside plant enclosure, with optional heat exchanger or air induction cooling system, under ground in-pad battery vault and add-on AC compartment. It is divided into three separate compartments: Electronic, Termination (SAI) and Power, which have independent, locked access (security). The electronic compartment is accessible to the CO personnel, while non-CO personnel only have

access to the termination compartment (on the right), and to the power compartment (on the left).

The S800A cabinet houses a provisional 0-672 line S/DMS AccessNode system with 0-56 T1 Repeaters and DSX-1 Cross-Connect capabilities as well as fiber management capabilities. Its Service Protection Interface (SAI) options include: NT BIX OSP, 3M MS2 OSP, AT&T 710 OSP termination connectors, 100 pair modular VF Service Protection Center (SPC) and 2:1 cross-connect for up to 600 VF pairs. DC power options include 8 hour Yuasa 12V (25 AH), Eagle Picher 6V (53 AH) and Gates 12V (25 AH) battery based backup, and MPR25 n+1 rectifier redundancy.

The cabinet is to be used in Outside Plant Applications where HUTs or CEVs do not make economic or logistic sense. It is powered by commercial power, with backup battery reserves in the event of commercial power failure. The electronics is powered by a nominal -56 Volt DC rectifier. The S800A meets all requirements specified by the Canadian Standards Association and Underwriters Laboratories and the National Electrical Code for outdoor equipment. Environmental and equipment alarms are available.

8.1.2.2 Modular Business Package (as an RFT)

The Modular Business Package (MBP) can function as the RFT for a S/DMS AccessNode, and can be configured as a mux, UDLC, or IDLC system. The MBP is available for applications where an S/DMS AccessNode is installed in a customer's premises. This enclosure uses the Northern Telecom Meridian-1 modular cube concept. The cabinets can be equipped with lockable doors. The product is composed of two types of modules. The Dual Equipment Module (DEM) is the base for the product and houses the Access Common Equipment Shelf, Breaker Interface Panel, LCAP, one Copper Distribution Shelf, and a Pedestal (fan unit). The Single Equipment Module (SEM) is an expansion unit and can contain up to two Copper Distribution Shelves, or DSX-1 cross connect panels and T-1 repeaters. For the Modular Power Package (MPP) option details, refer to section “Modular Power Package” on page 10-81 herein.

8.1.3 Network Elements

Each S/DMS AccessNode network element (i.e.; FCOT or RFT) can be configured for a variety of access or applications. This network flexibility is achieved by a combination of common equipment and equipment shelves. Common Equipment and equipment shelves are as follows;

- Access Bandwidth Manager (ABM)
- Transport Bandwidth Manager (TBM)

8.1.3.1 The Access Bandwidth Manager (ABM)

The ABM shelf is a common equipment shelf that can be used at both the RFT and FCOT to support DS1 / DS3 services and one to seven Copper Distribution Shelves (CDS) for Voice Frequency (VF) line appearances.

- An ABM shelf must always be used at the RFT, as it is the only common equipment shelf type that can support copper distribution shelves and VF line appearances.
- An ABM shelf must be used at the FCOT if VF line appearances will be required.
- The CDS is an equipment shelf used to provide traditional copper line interfaces to serve subscribers. Up to seven (7) CDS shelves can be supported from an ABM shelf at an RFT or an FCOT, providing 96 2-wire VF lines per shelf, or a maximum of 672 lines per bay.

8.1.3.2 The Transport Bandwidth Manager (TBM)

The TBM shelf is a common equipment shelf used at the FCOT only when DS1 or DS3 capacity is required and VF line appearances are not required.

- A TBM shelf can be used at the FCOT if additional DS1/DS3 capacity is required, and only if no VF line appearances will be required at the Central Office.

8.1.4 System Architecture

8.1.4.1 Topologies

Before choosing a system topology, it must be decided how many S/DMS AccessNodes are to be included in the subnetwork and how they should be connected. Although the initial phase (AN06) of the S/DMS AccessNode rollout is limited to point to point topology, in-service expansion from point to point topology to more sophisticated topologies will be available in following phases. Therefore expansion alternatives should be considered at an early stage.

8.1.4.2 Future Topologies

Topologies available in releases of S/DMS AccessNode subsequent to AN06 are as follows:

- Central Office Hub
- Remote Hub
- Add-Drop

- Physical Ring
- Logical Ring

8.1.4.3 Point to Point Applications:

Multiplexer:

In a Multiplexer application, two S/DMS AccessNodes, 1 FCOT and 1 RFT, act as a multiplexer for DS1s and/or DS3s. You cannot differentiate the FCOT and RFT by location, because the RFT may be located in a central office. The FCOT is the S/DMS AccessNode that serves as the center of control for the subnetwork. The FCOT either contains the OPC module or is linked by a control network LAN to an operations controller (OPC) module that is nearby (within 400 ft). The subnetwork handles only two types of traffic, transport DS1s or DS3s.

Universal Application:

In a universal application, a subnetwork is served by one or more analog switches. The subnetwork is composed of 1 FCOT and 1 RFT (both containing ABMs). The RFT and FCOT contains up to 7 copper distribution shelves each. Each copper distribution shelf contains line cards that support DS0-based services offered over conventional copper lines. The subnetwork can handle locally switched DS0 based services and tandem DS1s. Transport DS1s and DS3s are available in release AN07 and later.

Integrated Application:

In an integrated application, a subnetwork is served by a digital switch. The subnetwork is composed of 1 FCOT, 1 RFT, and 1 Subscriber Carrier Module Access (SMA). The RFT can contain up to seven copper distribution shelves. Each copper distribution shelf contains line cards that support DS0-based services offered over conventional copper lines. The FCOT will contain a TBM shelf. The subnetwork can handle IDLC DS1s and tandem DS1s, and transport DS1s. The FCOT is linked to the DMS-100 SuperNode via the SMA. (Note that a S/DMS SuperNode is required for this application.)

Combined Application:

In a combined application, a subnetwork is served by two or more switches, one of these being digital, and the others being analog switches. The subnetwork is composed of 1 FCOT and 1 RFT. The RFT and FCOT contains up to seven copper distribution shelves each. Each copper distribution shelf contains line cards that support DS0-based services offered over conventional copper lines. The subnetwork can handle locally switched DS0 based services, tandem DS1s and IDLC DS1s. Transport DS1s and DS3s are available in release AN07 and later.

8.1.4.4 Accessnode Packaging Options

The S/DMS AccessNode equipment shelves and bay assembly modules are available in a variety of packaging options, as follows;

- 7',9', or 11'6" Bay Assembly (equipped with 1-3 Transport Bandwidth Manager shelves).
- 7' Bay Assembly (equipped with 1 Access Bandwidth Manager shelf and 0-7 Copper Distribution shelves).
- S800A Outside Plant Cabinet (equipped with 1 Access Bandwidth Manager shelf and 0-7 Copper Distribution shelves).
- Modular Business Package (MBP), otherwise known as a Customer Located Equipment Enclosure (CLE), (equipped with 1 Access Bandwidth Manager shelf and 0-7 Copper Distribution shelves).

Bay Assembly (TBM)

Three bay sizes are available in 7', 9', or 11'6" heights to accommodate from 1 to 3 Transport Bandwidth Manager shelves at the FCOT, if no VF line appearances will be required at the Central Office. An Access Bandwidth Manager shelf must be used at the FCOT if VF line appearances will be required.

Bay Assembly (ABM)

A bay size of 7' height is available to accommodate from 1 to 3 Access Bandwidth Manager shelves and 0-7 Copper Distribution shelves at the RFT to support VF line appearances.

S800A Outside Plant Cabinet

The S800A Cabinet can perform as the RFT for a S/DMS AccessNode system and can be configured as a mux, UDLC, or IDLC system. The Series 8 0A product provides a field upgradable 0 to 672 line S/DMS AccessNode System base housed in the existing Series 800E Outside Plant Cabinet. Accessories offered include a 56 or 84 position DSX-1 panel, an ADC fiber patch panel, and up to two (2) Rockwell repeaters.

Modular Business Package

The Modular Business Package (MBP) can function as the RFT for a S/DMS AccessNode, and can be configured as a mux, UDLC, or IDLC system. The package is built utilizing the various modular components. The base package consists of the Dual Equipment Module which houses the ABM shelf and BIP. The system can then be expanded by adding Single Equipment Modules, Secondary Stacks, and Field Expansion Modules. This will allow for a fully configured 672 2W line system which may or may not include a DSX-1 panel and/or a T-1 repeater shelf.

Modular Power Package

The Modular Power Package (MPP) will provide power to the Modular Business Package (MBP) in the S/DMS AccessNode. The MPP will be capable of providing up to 150 amps of current. The MPP will be delivered in one dual equipment module (DEM). The DEM will contain the DC distribution shelf and up to two rectifier shelves. Each rectifier shelf can accommodate up to three 25 amp rectifiers. Battery reserve power will initially be provided externally to the package via rack mounted batteries. Additional options may be available in the future.

8.2 Hardware Provisioning

8.2.1 Hardware Usage Restrictions

The ABM shelf supports narrowband services through the CDS. It has a capacity of 98 DS1s, up to 9 DS3s, or a mix. The ABM shelf is always used at the RFT. It is used at the FCOT to provide analog, or a mix of analog, narrowband digital, DS1 and DS3 interfaces.

The TBM shelf does not support narrowband services. It has a capacity of 126 DS1s, up to 9 DS3s, or a mix. The TBM shelf is never used at the RFT. It is used at the FCOT to provide additional DS1 and DS3 interfaces when no analog or narrowband digital interfaces are required.

The CDS shelf is used to provide traditional copper line interfaces to serve subscribers on loop lengths up to 1900 ohms (including telephone set) from the Remote Fiber Terminal (RFT). The CDS shelf is divided into two (2) line drawers, each of which contains 48 line card slots. Each line card slot has access to one tip and ring cable pair and a metallic test access bus. The maximum capacity of each Copper Distribution Shelf is therefore 96 2-wire circuits, 48 4-wire circuits, or 24 6/8-wire circuits. There are no restrictions on the placement of cards within the shelf, hence any combination of 2-wire, 4-wire or 6/8-wire line cards may be used to fill the 96 line card slots.

8.2.2 Hardware Dependencies

S/DMS AccessNode's modular hardware architecture enables multiple configurations to support a variety of applications. S/DMS AccessNode is a single product that combines the functionality currently provided by application specific products, and has the compatibility required for emerging access network requirements. S/DMS AccessNode eliminates the overlay network required to address current services, because it accommodates all services including narrowband, wideband and broadband.

8.2.2.1 P and C Side Port Requirements

Not applicable

8.2.2.2 DMS BUS Port Requirements

Not applicable

8.2.2.3 Circuits Per Card

Not applicable

8.2.2.4 Discrimination Numbering

Not applicable

8.2.3 Provisioning Considerations

This section details the provisioning guidelines for this product.

8.2.4 Office Layout Information

The building and equipment location for the installed equipment must meet the TR-EOP-000063, Network Equipment Building Systems (NEBS) standard. Use a floor loading of 730 kilograms per square meter(150 pounds per square foot) to determine the maximum allowable weight of a fully loaded frame, or MBP. Use a floor loading of 100 pounds per square foot for the MPP. The floor loading requirements for the MPP batteries must be calculated on a per site basis.

A clearance of 37 mm (1.5 in) must be maintained between the rear of a bay and a wall, or 77 mm (3 in) between bays installed back to back. A clearance of 762 mm (30 in) is recommended at the rear of the MPP cabinet, and between cabinets installed back to front in order to provide access for cabling and maintenance. A space of 2.65 inches is recommended between MPPs installed side by side.

A fully loaded bay, with seven copper distribution shelves including all circuit packs, weighs approximately 370 kilograms (814 pounds). For bays not fully equipped, the weight is 30 kilograms (66 pounds) less for each copper distribution shelf not equipped. For bays equipped with one common equipment shelf and associated cooling unit, the bay weight is 160 kilograms.

The Series 800A outside plant cabinet shall be mounted on a concrete pad. Pad anchoring plate kits for the cabinet and battery vault are offered. These kits consist of an 11 gauge steel anchoring plate and template assembly with anchoring bolts and two temporary support angles.

The S800A cabinet and battery vault shall be capable of supporting snow or ice loading to an extent of 295 Kg/m (60 lbs/sq ft) without damage to the cabinet or doors. The S800A cabinet shall be capable of resisting the overturning moment equivalent to a uniform wind load of 1 0 mph perpendicular to the largest area when tested according to Bellcore TR-TSY-000487, section 5.1.4.5.

Cable length limitations and restrictions that affect equipment locations are as follows:

DS3: Allowable maximum cable length is 137 m (450 ft) to interface the DSX-3 cross connect.

DS1: Allowable maximum cable length is 200 m (655 ft) to interface the DSX-1 cross connect.

Control Network: Allowable maximum length is 122 m (400 ft) for end to end cabling including shelf backplane tracking, when interconnecting S/DMS equipment shelves that coexist in the same location and are intended to operate on one OPC. For example, if three shelves are linked via C-Net, the max. distance between the first and last shelf cannot exceed 400 feet.

VT and D link: Allowable maximum cable length is 7.3 m (24 ft) to interconnect two access common equipment shelves that coexist in the same location, but are intended to operate as one system. (Future)

8.2.5 Traffic Tables

Not applicable.

8.3 Product/System Specification

8.3.1 Physical Characteristics

EQUIPMENT DIMENSIONS (FRAMES):

Width	659 mm (25.94 in)
Depth	305 mm (12.20 in)
Height	2.13 m (84.0 in) 2.74 m (108 in) with 2 foot frame extender 3.50 m (138 in) with 4.5 foot frame extender

EQUIPMENT DIMENSIONS (MBP):

Width	809 mm (31.85 in)
Depth	648 mm (25.5 in)
Height	The height of the cabinet depends on the number of single equipment modules and dual equipment modules it contains. The minimum height of a cabinet is 31.25 in., and the

maximum is 81.5 in. Heights of individual modules are as follows:

Top Cap	87.5 mm	(3.5 in)
SEM	418.7 mm	(16.75 in)
DEM	837.5 mm	(33.5 in)
Pedestal	279.4 mm	(11 in)

EQUIPMENT DIMENSIONS (MPP):

Width	809 mm (31.85 in)
Depth	648 mm (25.5 in)
Height	1130 mm (44.5 in)

Clearance between mounting rails	546 mm (21.5 in)
Horizontal mounting centers	566 mm (22.3 in)

EQUIPMENT DIMENSIONS (S800A):	H(IN)	W(IN)	D(IN)
Cabinet with Air Induction Roof	65	71	30
Cabinet with Heat Exchanger Roof	77	71	30

WEIGHT (S800A):	POUNDS (LBS)
Empty Cabinet	1,500
Equipped Cabinet w/o Packs or Batteries	2,100
Equipped Cabinet with Batteries	3,400
Battery Vault	20,000

ENVIRONMENTAL REQUIREMENTS:

S/DMS AccessNode bay, S800A cabinet, and MBP equipment operates within specifications providing the following environmental requirements are met:

AMBIENT TEMPERATURE:

Normal Operation	0 to +40 C
Short Term Operation	0 to +50 C
Shipping or Storage	-50 to +70 C
(S800A) Outside Operation	-40 to +46 C (-40 to +115 F)

RELATIVE HUMIDITY:

Operating (Including S800A)	5 to 95% relative humidity, or 3.6 kPa (.52 lbs/sq in) water vapor pressure, whichever is less, over the normal operating temperature range, no condensation.

ATMOSPHERIC DUST:

The equipment remains operational when subjected to the requirements described in TR-EOP-000063, Network Equipment Building Systems (NEBS),Section 4.6, "Airborne contaminants".

8.3.2 EMI/Earthquake Information

EMI INFORMATION:

EMI protection on S/DMS AccessNode equipment shelves and all intershelf cables are shielded, and cable interface signals on all other nonshielded cables are filtered. Electromagnetic interference (EMI) shielding and filtering is in compliance with FCC, Part 15, Subpart B, for Class A computing device. These same design features also ensure that the EMI susceptibility, specifically radio frequency interference (RFI) immunity, is in accordance with Bell Canada DS-8465. Note that compliance with EMI emissions and RF are guaranteed only when all line drawers are closed and the common-equipment shelf cover is properly latched in place. This applies to the various frames, the MBP, and the MPP. The S800A cabinet is a UL94 3R type enclosure. It is divided into three separate compartments: Electronic, Termination (SAI) and Power. Only the Electronic compartment is EMI and environmentally controlled.

EARTHQUAKE RESISTANCE:

S/DMS AccessNode equipment installation can include optional earthquake mounting hardware. The equipment operation, whether mounted in frames, the S800A cabinet or the MBP, is seismic resistant for zone 4 earthquake loading in accordance with TR-EOP-000063, Network Equipment Building Systems (NEBS), Section 4.5.

8.3.3 Sparing Information

Use standard sparing algorithms.

8.3.4 Power Feed and Fusing Requirements

S/DMS AccessNode bays, S800A cabinets, and Modular Business Packages equipped with an access common equipment shelf (CES), copper distribution shelves (CDS), and NT4K14AA BIP require four feeds fused at 30 amps from a source of -48 V dc for shelf logic power and talk battery, within the range of -42.75 to 56 V dc. Power feeds are as follows:

- Feed 1 provides logic battery for the CES and for CDS 1,3,5,7.
- Feed 2 provides redundant logic battery for the CES and logic battery for CDS 2,4,6.
- Feed 3 provides logic battery for the cooling unit and talk battery for CDS 1,3,5,7.
- Feed 4 provides redundant logic battery for the cooling unit and talk battery for CDS 2,4,6.

Pre-connectorized feeder cables are required, as described in "Cabling requirements" on page 5-1 of NTP FWP07, Volume 2, 3 3-3001-200.

S/DMS AccessNode bays equipped with a transport common equipment shelf and a NT7E56AB BIP require two fused feeds from a source of -48 V dc for shelf logic power within the range of -42.75 to 56 V dc. Connections are via one hole terminal lugs and can accommodate up to a 6AWG wire. A fully configured, 3 shelf TBM bay, draws approximately 21 amps and requires two individual feeds fused at 30 amps. Voltage drops between the BDFB and the BIP must not exceed 1.0 V.

8.3.5 Current Drain Information

The S/DMS AccessNode system draws between 23 and 30 amps in any typical central office or remote configuration. For example, a universal configuration S/DMS AccessNode in FWP07 configured with 672 Omega 2W cards supporting POTS at 6 CCS requires 23 amps at

the RFT and 19 amps at the FCOT. This translates to 971 watts at the CT end and 1288 watts at the RT end.

Worst case system consumption is 65 amps, when fully configured with 98 DS1s, 672 lines all channels busy, and a 42 V low battery condition. Four 30 amp fuses and all wiring must be engineered to support the worst case system drain. This level of engineering also allows the system to withstand transients in the power supply and ring all lines of the system simultaneously.

Maximum allowable power dissipation for the S/DMS AccessNode is defined by the Bellcore NEBS specification TR-EOP-000063 Issue 4. For a network equipment building (i.e. central office, hut, or CEV), the S/DMS AccessNode power dissipation is limited to 1270 watts based on rack size and standard aisle spacing. The watts per card for dissipation are different than the watts per card for consumption.

The following configurations all meet the NEBS requirements of 1 70 watts per bay power dissipation.

- 672 POTS, Coin, or FXS @ 6 CCS
- 532 POTS, Coin, or FXS @ 6 CCS + 140 2W FXS @ 18 CCS
- 560 POTS, Coin, or FXS @ 6 CCS + 112 ISDN @ 36 CCS
- 182 POTS, Coin, or FXS @ 6 CCS + 490 Loop Powered EBS @ 18 CCS
- 336 POTS, Coin, or FXS @ 6 CCS + 168 4 Wire FXS, FXO, or DDS

Many accounts only consider NEBS applicable to central office applications. In CLE applications the floor space surrounding the system would need to be considered in determining NEBS compliancy. The engineer for a specific equipment application should provide a power and ground layout, which describes location of the batteries and rectifier system and associated battery distribution fuse bay (BDFB), length and routes for dc and ac power cables, and the location of the building principle ground (BPG) and office single point ground (SPG).

The S/DMS AccessNode meets the NEBS requirements for all typical central office applications. At a remote site (i.e. hut or CEV), the S/DMS AccessNode meets NEBS for all typical applications.

8.3.6 Power and Ground Distribution

The power and ground distribution guidelines for dc and ac are described on page 4-1 of NTP FWP07, Volume 2, 323-3001-200. These guidelines are provided to ensure integration of the S/DMS AccessNode within the shared power and grounding environment of the central office switching equipment.

8.3.7 Commercial 120 v AC Power:

In central offices, 120 V ac (60 HZ) is required only as a customer option to wire utility outlets in the base of the bay (front access). See page 4-10 of NTP FWP06, Volume 2, 323-3001-200, for complete details of ac power distribution and wiring of ac receptacles.

8.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

(The above note does not apply to S/DMS AccessNode. Please disregard.)

Each network utilizes an Operational Controller which is the operations engine which runs the UNIX operating system. This operating system provides and controls the OAM&P for the network elements. The OPC acts as an OS gateway and performs software management. The actual software is stored on the OPC. Each OPC in a S/DMS AccessNode network requires a software load and the core software for each network element. The software load for each network element then resides in the active processor card in the respective shelf. This also applies to the S800A cabinet and the MBP.

Each software load is composed of the following:

- Core Software
- Optional Software

The core software and optional is discussed in detail in AccessNode NTP Volume 1, 323-3001-101 Features & Services.

8.4.1 Required Software Packages and Interdependencies

Every OPC requires the actual software load be transferred from the tape medium to the hard drive on the OPC at commissioning. The load is delivered via tape utilizing the equipment codes assigned for each software release. Two loads will be provided per network, one load is a back up. Current software codes are as follows: - ORDER ON 2801 SPEC

PEC	RELEASE	FEATURES
NT4K90AA	FWP04	AccessNode Multiplexer Application (MD)
NT4K90BA	AN06	AccessNode Universal / IDLC Application
NT4K90BB	AN06.1	AccessNode IDLC ISDN Application
NT4K90CA	AN07	AccessNode Universal / IDLC Application
NT4K90DA	AN08	AccessNode Universal / IDLC/ TR08 Application
NT7E24TA		DAT Tape

8.4.1.1 Core Software

Every software load contains core software for all network elements. Core software is documented via software certificates for each network element (one per network element).

NOTE: THE CORE SOFTWARE CERTIFICATE MUST BE ORDERED FOR EACH NETWORK ELEMENT. - ORDER ON THE 2801 SPEC

NTG370AA	AN06	CORE SOFTWARE
NTG370AB	AN07	CORE SOFTWARE
NTG370AC	AN08	CORE SOFTWARE

For a complete list of features included in the core software, reference Volume 1, 323-3001-101 section 1.1

8.4.1.2 Optional Software

The optional software offers enhanced capabilities not provided by the core software. Some of the optional software features have been grouped into feature packages, and some of the features are individually purchasable. If a feature is individually purchasable, it is not a member of any feature package.

There are no restrictions on the optional software that can go into a load. A software load can contain any number and combination of optional software feature packages, and any number and combination of individually purchasable software features. Optional software is documented via software certificates.

AN06 / AN06.1 Optional Software

ALL FEATURES ARE TURNED ON WITH THE RECEIPT OF THE SOFTWARE LOAD. CONTROL OF FEATURES IS PROVIDED BY THE USE OF RIGHT-TO-USE CERTIFICATES.

OPTIONAL SOFTWARE IN AN06 - ORDER ON 2801 SPEC

PEC	SOFTWARE ITEM NAME	REMARKS
NTG373AA	High-speed performance monitoring feature pkg.	Optical, OC-12 Protection Switch
NTG375AA	Integration feature package	Integrated app. only
NTG376AA	Meridian Business Set feature pkg.	Integrated app. only P-phone (MBS, EBS)
NTG350AA	X.25 Interface	X.25 port - OPC
NTG371AA	NMA / TL1 feature package	Select one from three
OR		
NTG351AA	ISNMS TL1 Surveillance OS Interface	Select one from three
OR		
NTG352AA	TL1 Generic Surveillance OS Interface	Select one from three
NTG374AA	OPS/INE feature package	Select one from two
OR		
NTG354AA	NEC TL1 Provisioning OS Interface	Select one from two
NTG353AA	DS1 1: N Protection Switching	Always provide at the FCOT, opt at the RFT
NTG378AA	Enhanced Administration	Multi user (NE and OPC)
NTG379AA	Enhanced Maintenance	Note 1
NT3G77AA	ISDN-U integration feature	Integ appl. only(AN06.1)
NT3G72AA	Standby OPC feature	1:1 protection

Note 1: Automatic Line Test (ALT) bypass pair. Automatic Line Insulation Test (ALIT) bypass pair. For complete descriptions of the individual features included in the software packages see pages 6-8 of NTP AN06, Volume 1, 323-3001-100.

AN07 Optional Software

ALL FEATURES CAN BE TURNED ON OR OFF WITH THE RECEIPT OF THE SOFTWARE LOAD (SEE API/ECM FOR AN07 FOR MORE DETAILS). FEATURES ARE TURNED ON WHEN THE SOFTWARE LOAD IS FIRST RECEIVED. CONTROL OF FEATURES IS STILL PROVIDED BY THE USE OF RIGHT-TO-USE CERTIFICATES. - ORDER ON 2801 SPEC

PEC	SOFTWARE ITEM NAME	REMARKS
NTG350AA	X.25 interface	Note 2
NTG351AA	ISNMS TL1 surveillance OS interface	Note 2,4
NTG352AA	TL1 Generic surveillance OS interface	Note 2,4
NTG353AA	DS1 protection switching (Provide at RFT only when DS1 protection is required)	Note 2
NTG354AB	NEC TL1 provisioning OS interface	Note 2,4
NTG355AA	TA-201 Special Service testing (SARTS testing)	Note 2,4
NTG357AA	Multihosting	Note 2,5
NTG358AA	DS-3 interfaces	Note 3
NTG359AA	DS-3 performance monitoring	Note 3
NTG371AA	NMA / TL1 surveillance OS interface	Note 2,4
NTG372AA	Standby OPC	Note 6
NTG373AB	High-speed performance monitoring (Optical Protection Switch)	Note 3
NTG374AB	OPS/INE TL1 provisioning OS interface	Note 2,4
NTG375AB	DMS SuperNode integration	Note 2
NTG376AA	Meridian Business Set (Integrated application only. P-phone, MBS, EBS)	Note 2
NTG377AA	ISDN-U integration (Integrated application only w/ ISDN)	Note 2
NTG378AB	Enhanced administration (Multi-user NE and OPC)	Note 2
NTG379AA	Enhanced maintenance (ALT and ALIT Feature)	Note 2
NTG620AA	DS-1 performance monitoring	Note 3
NTG622AA	OPC special-service testing (IRTU special services testing, NLS and NS)	Note 2
NTG623AA	CALRS testing	Note 2,4
NTG626AA	TL-1 generic provisioning OS I/F	Note 2,3

NOTE 1: Core software is required in every S/DMS AccessNode.(FCOT and RFT)

NOTE 2: If you order this item, order one instance for each RFT.
NOTE 3: If you order this item, order one instance for each network element.
NOTE 4: This software package works with x.25 software package
NOTE 5: This software package works with DMS SuperNode integration software package.
NOTE 6: If you order this item, order one instance for the FCOT containing the standby OPC.

NOTE: WHEN UPGRADING A SYSTEM FOR SOFTWARE, ENSURE THE PROPER DOCUMENTATION IS ALSO ORDERED.

AN08 Optional Software

ALL FEATURES CAN BE TURNED ON OR OFF WITH THE RECEIPT OF THE SOFTWARE LOAD (SEE API/ECM FOR AN08 FOR MORE DETAILS). FEATURES ARE TURNED ON WHEN THE SOFTWARE LOAD IS FIRST RECEIVED. CONTROL OF FEATURES IS STILL PROVIDED BY THE USE OF RIGHT-TO-USE CERTIFICATES. - ORDER ON 2801 SPEC

PEC	SOFTWARE ITEM NAME	REMARKS
NTG350AA	X.25 interface	Note 2
NTG351AB	ISNMS TL1 surveillance OS interface	Note 2,4
NTG352AB	TL1 generic surveillance OS interface	Note 2,4
NTG353AA	DS1 protection switching (Provide at RFT only when DS1 protection is required)	Note 2
NTG354AC	NEC TL1 Provisioning OS interface	Note 2,4
NTG355AB	TA-201 Special Service testing (SARTS testing)	Note 2,4
NTG356AA	DARTS testing	Note 2
NTG357AB	Multihosting	Note 2,6
NTG358AA	DS-3 interfaces	Note 3
NTG359AA	DS-3 performance monitoring	Note 3
NTG371AB	NMA TL1 surveillance OS interface	Note 2,4
NTG372AA	Standby OPC	Note 7
NTG373AB	High-speed performance monitoring (Optical Protection Switch)	Note 3
NTG374AC	OPS/INE TL1 Provisioning OS interface	Note 2,4
NTG375AC	DMS SuperNode integration	Note 2
NTG376AB	Meridian Business Set (Integrated application only, P-phone, MBS, EBS)	Note 2
NTG377AB	ISDN-U integration (Integrated application only w/ ISDN)	Note 2
NTG378AC	Enhanced administration (Multi-user NE and OPC)	Note 2
NTG379AB	Enhanced maintenance (ALT and ALIT Feature)	Note 2
NTG620AA	DS-1 performance monitoring	Note 3
NTG622AB	OPC special-service testing (IRTU special services testing, NLS and NS)	Note 2
NTG623AA	CALRS testing	Note 2,4
NTG624AA	Inventory, network-view	Note 5
NTG625AA	TR08	Note 6
NTG626AB	TL-1 generic provisioning OS I/F Network Manager (SEE NETWORK MANAGER API)	Note 2,4

NOTE 1: Core software is required in every S/DMS AccessNode.(FCOT and RFT).
NOTE 2: If you order this item, order one instance for each RFT.

NOTE 3: If you order this item, order one instance for each network element.
NOTE 4: This software package works with x.25 software package.
NOTE 5: If you order this item, order one instance for the FCOT containing the OPC.
NOTE 6: This software package works with DMS SuperNode integration software package.
NOTE 7: It you order this item, order one instance for the FCOT containing the standby OPC.
NOTE 8: An asterisk (*) in the far left column represents a new feature in this software load.

NOTE: WHEN UPGRADING A SYSTEM FOR SOFTWARE, ENSURE THE PROPER DOCUMENTATION IS ALSO ORDERED.

8.4.2 Software Usage Restrictions

A software load can contain any number and combination of optional software feature packages, and any number and combination of individually purchasable software features.

8.4.3 Memory Provisioning

Not applicable.

8.5 Real Time Impact

Not applicable.

9.0 ECM586 - RSC to RSC-S Conversions

9.1 Overview

The Remote Switching Center - SONET provides a number of added functions and improvements that make it desirable for telcos to upgrade existing remotes to the newer platform. This has been accomplished by replacing the RCE frame with a CRSC, and in some cases, a CEXT, as well. While this provides a successful upgrade method, the duplicated equipment between RCE and CRSC (i.e. RMM) and the equipment that may not be needed (i.e. LCM or LCME) make the upgrade too expensive for some applications. The EMI compliance of the CRSC is not required, in many cases, and also increases the price. To address these issues, new equipment is being introduced to provide a more cost-effective upgrade method for those applications requiring minimum added hardware.

The Remote Switching Center Equipment (RSCE) frame is being introduced to provide mounting space for up to two RCC2 shelves, as well as one EXT shelf, when needed. The existing RCE frame will be retained to mount RMM shelves but all controller functions will be moved to the RCC2 shelves on the RSCE frame. The minimum RSCE configuration will be a single RCC2 shelf, supported by a Modular Supervisory Panel and cooling unit. The second RCC2 and the EXT shelf will be provisioned when needed. Since a single EXT shelf can extend two RCC2 shelves, a fully-equipped RSCE will be able to provide the controller function for a completely extended Dual RSC-S.

The capacity and interface capabilities of the RSC-S are not changed by the new packaging option described in this document. RCC2 and EXT shelf provisioning is unchanged and all software information is the same as the existing RSC-S. Refer to ECM-691 for additional RSC-S provisioning and limitation information.

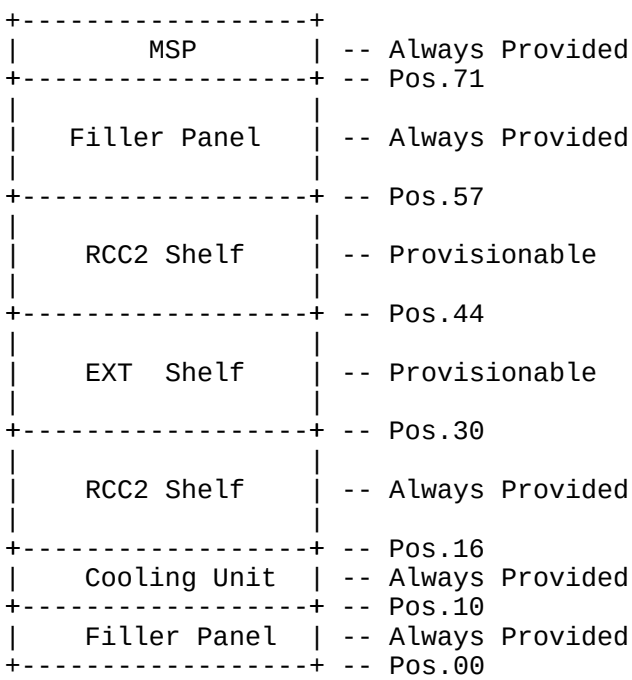


Figure 14. RSCE Frame.

9.2 Hardware Provisioning

9.2.1 Hardware Usage Restrictions

The RSCE frame is introduced for conversion of an existing RSC to RSC-S capability and is not available for use in a new installation.

There is no capability provided to mount either RMM shelves or line modules (LCM or LCME) in a RSCE frame. The RMM and line functions must be implemented externally to the RSCE. The existing RMMs (mounted in the RCE frame) will normally be re-used, by connecting them to the new RCC2 shelf in the RSCE. Likewise, existing line modules will be connected to the new RCC2 shelf.

Conversions using the RSCE are supported for DS1 (domestic type) applications only. Cables for PCM-30 interface (coaxial) are not available.

If ISDN line cards are to be supported after the conversion, LCEI frames must be ordered. The existing LCM bays will not support ISDN.

9.2.2 Hardware Dependencies

Not Applicable

9.2.2.1 P and C Side Port Requirements

P-side and C-side capabilities are the same as the existing RCC2. Refer to ECM-691 for details of RCC2 capabilities.

9.2.2.2 DMS BUS Port Requirements

Not Applicable

9.2.2.3 Circuits Per Card

Not Applicable

9.2.2.4 Discrimination Numbering

Not Applicable

9.2.3 Provisioning Considerations

The RSCE allows only the shelves needed for a specific application to be provided. The first RCC2 shelf is Always Provided with the frame. This shelf, in combination with the existing RCE (for mounting RMM(s)), RME/PDC (for power) and LCEs (for lines), supports a single RSC-S office.

The provisionable second RCC2 shelf allows the office to be expanded to a dual RSC-S configuration, when needed. The provisionable EXT shelf may be supplied to extend the capabilities of either or both RCC2 shelves. In this way, the RSCE allows the minimum equipment to be provided to support any practical RSC-S configuration.

If ISDN line cards are to be supported after the conversion, LCEI frames must be ordered. The existing LCM bays will not support ISDN.

| Two choices of processor packs are available in the RCC2 shelf.
| The NTZZ12XB provides the NTMX77AAs for software releases prior
| to XPM 08, while the NTZZ12XF provides the NTAX74AAs for software
| release XPM 08 and later. Provide the NTAX74AA for all initials
| and extensions that meet the XPM08 software requirements listed
| above. Existing sites with the NTMX77AA will work with XPM 08
| software release and later.

| The NT7X05AAs are not supportted by the NTAX74AAs prior to XPM 081
| software release.

9.2.3.1 RCE to RMME Conversions

This section desrcibes the introduction of the NT6X10DA RMME frame (field product only) and the NT6X10ZA Product Change Kit to allow field conversions of existing RSC/RSCI frames (NT6X10AC/AD) to the new NT6X10DA RMME frame. This change is created as a solution to provide additional space for two RMM shelves during single-to-dual RSC-S conversions.

During the RSC to RSC-S conversion process, the NT6X12 RCC controller shelves of field based NT6X10AC/AD RSC/RSCI frames are taken out of commission leaving only RMM shelves functioning in the top two mounting positions. The RCC2 shelf, always provided in the (new production) adjacent NTMX89GA RSCE frame, is then used to interface with the RMM shelves in the old NT6X10AC/AD frame. This practice works fine for single-to-single RSC-S conversions.

However, an issue arises during single-to-dual RSC-S conversions. In this situation a customer has one existing NT6X10AC/AD frame in the field and purchases a new NTMX89GA RSCE frame (for a total of two potential RCC2 shelves - one "always provided" and one "provisionable"). The "always provided" RCC2 controller shelf of the RSCE frame interfaces with the two RMM shelves remaining in the existing NT6X10AC/AD frame. The second "provisionable" RCC2 controller shelf of the RSCE frame now has no RMM shelves to interface with. So, the customer requests that he be able to place two additional RMM shelves in the two lower positions (where the decommissioned NT6X12 RCC controller shelves reside) of the existing NT6X10AC/AD frame.

As a result of customer requests, the new NT6X10ZA Product Change (PC) Kit is introduced which allows NT6X13 RMM shelves (or full shelf filler panels) to replace NT6X12 RCC shelves in field based NT6X10AC/AD RSC/RSCI frames. Because the functionality of the NT6X10AC/AD frame is changing, application of the NT6X10ZA PC Kit changes the frame PEC/designation of the RSC/RSCI frame from NT6X10AC/RCE, or NT6X10AD/RCEI, to NT6X10DA/RMME.

For additional information about these conversions, refer to ECM618, ECM610 and Engineering Manual Sections NT6X10AC (RCE), NT6X10AD (RCEI), NT6X10DA (RMME) and NT6X10ZA (PC Kit).

9.2.4 Office Layout Information

Not Applicable

9.2.5 Traffic Tables

Refer to ECM-497 for traffic provisioning and capacity tables for the RSC-SONET.

9.3 Product/System Specification

9.3.1 Physical Characteristics

The RSCE has the following physical characteristics;

Height: 84"
Width : 27"
Depth : 18"
Weight: TBD

9.3.2 EMI/Earthquake Information

The RSCE frame supplies a non-EMI compliant version of the RSC-S.

The RSCE frame is housed in the NT0X25AH frame and earthquake bracing is the same as other NT0X25AH-housed equipment.

9.3.3 Sparing Information

Standard sparing algorithms apply.

9.3.4 Power Feed and Fusing Requirements

The RSCE Frame is powered by an external -48V power supply which comforms to the following:

Voltage level within -42V to -56V (-48V nominal)
Max current of 5A for each unit (0 & 1) in the CPM2 shelf

The following fuses and feeds are required for each RSCE:

(2) 30 Amp "A" Feeds
(2) 30 Amp "B" Feeds
(4) Returns

9.3.5 Current Drain Information

The maximum current drain for a fully configured RSCE at the PDC is 25 Amps of -48V.

The Thermal Dissipation for a fully configured RSCE at the nominal voltage -48v is 1200 Watts, or 4095 BTU/hr.

9.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

9.4.1 Required Software Packages and Interdependencies

Software requirements are the same as the CRSC. Refer to ECM-691 for provisioning information.

9.4.2 Software Usage Restrictions

Software restrictions are the same as the CRSC. Refer to ECM-691 for software usage information.

9.4.3 Memory Provisioning

Not Applicable

9.5 Real Time Impact

Not Applicable

10.0 ECM605 - Building Block Engineering - RLCM, IRLCM

10.1 Overview

The Remote Line Concentrating Module (RLCM) and the International Remote Line Concentrating Module (IRLCM) are DMS-100F remotes. The RLCM/IRLCM is based on the Line Concentrating Module (LCM). The RLCM/IRLCM provides an interface for up to 640 remote subscribers and is packaged in a single DMS-100F frame. The following modules make up the RLCM/IRLCM (Figure 15 on page 10-104)

- Frame Supervisory Panel (FSP)
- Remote Maintenance Module (RMM)
- Host Interface Equipment (HIE)
- Line Concentrating Module (LCM)

Frame Supervisory Panel (FSP)

The FSP contains power control and alarm circuits which provide interfaces between the Power Distribution Center (PDC) and other DMS100F equipment frames. Office Repeaters, Filler Face Plates, and Fault Locator circuits are provisionable to the FSP.

Line Concentrating Module (LCM)

The LCM is a two-shelf module housing up to 640 subscriber line cards in 10 line drawers (5 per shelf).

The ISDN Line Drawer is a new LCM drawer type that will support ISDN line cards and contain the D-channel handler. The ISDN line drawer will co-exist with current POTS line drawers in a standard LCM. A maximum of two NT6X05DA Line Drawers can be provisioned per LCM. Only one ISDN line drawer per LCM shelf is allowable.

The ISDN line drawer is intended to be made available in all the DMS-100 frame and cabinet types provisionable with the RSC, RSC-S, OPM, OPAC, and RLCM remote products. It is intended to be designed and engineerable in the following vehicles: CLCE, CRSC, RLCM, OPM, OPAC and LCE.

Remote Maintenance Module (RMM)

The RMM provides the RLCM with test and service circuits. The RMM C-Side interfaces the LCM via a pair of DS30A links. The RMM shelf can accommodate up to 14 test or service circuit packs, selected from a variety of types to meet the office requirements.

Host Interface Shelf (HIE)

The HIE shelf houses equipment required to enable the RLCM to communicate with the host DMS. The HIE shelf may be configured to support communication via either DS-1 or PCM-30 links, as required to suit the transmission facilities available to the customer. When configured to support PCM-30 links, the RLCM is referred to as an International RLCM (IRLCM).

The RLCM/IRLCM supports all of the existing line features now supported at the host. Other available RLCM/IRLCM features include:

Intra-Switching An optional software feature which allows calls that both originate and terminate on lines subtending an RLCM to be connected without using the host network except for the initial call setup.

Emergency Stand Alone An optional feature providing the RLCM/IRLCM with the intelligence to continue service for intra-switched traffic in the event of a loss of communication with the host. During ESA of the RLCM, RSC or RSC-S, the ISDN Line drawer will not b e supported. If an RSC or RSC-S enters ESA, the ILD call might survive the entry but no commitment is made to supporting any service within ESA.

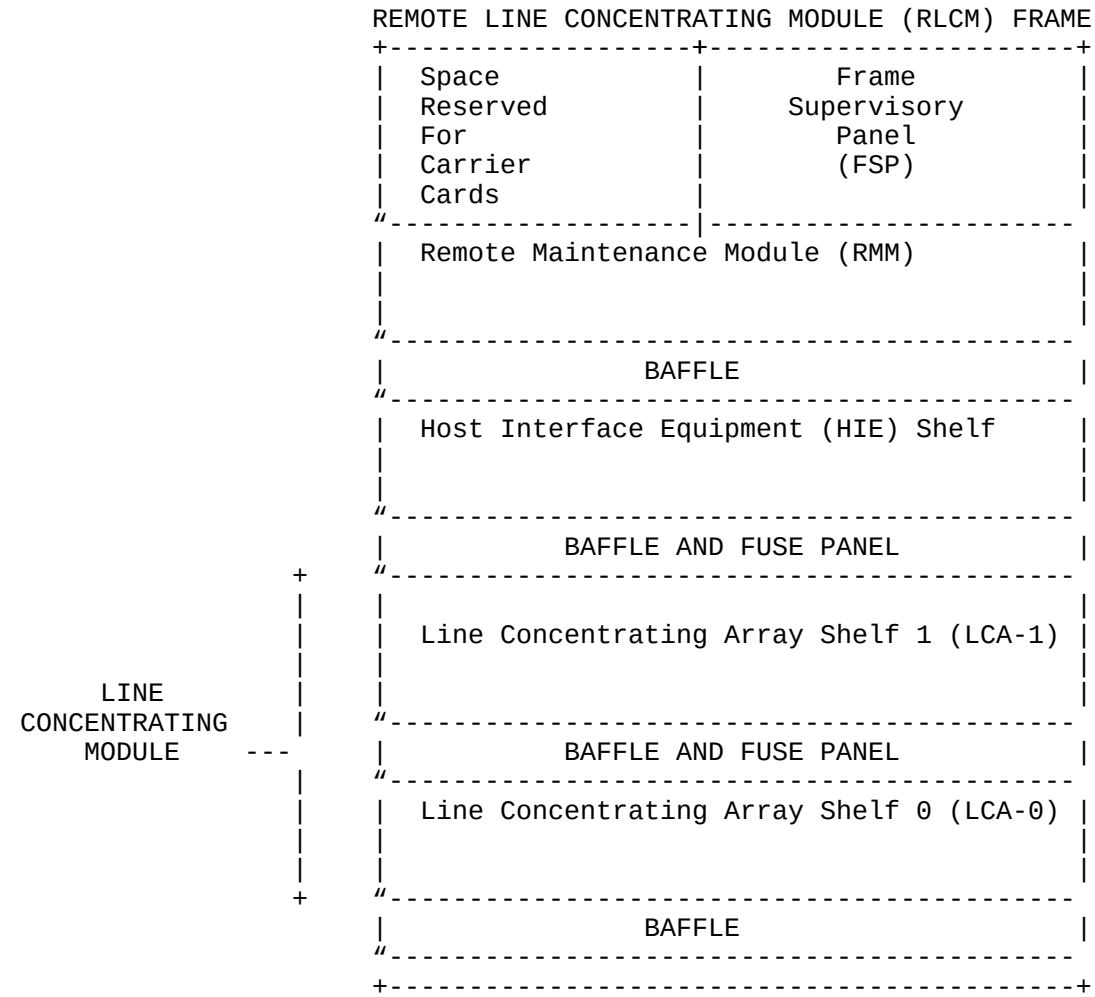


Figure 15. RLCM/IRLCM Shelf and Panel Configuration

10.2 Hardware Provisioning

10.2.1 Hardware Usage Restrictions

Not Applicable

10.2.2 Hardware Dependencies

Not Applicable

10.2.2.1 P and C Side Port Requirements

Two (2) DS-1 or PCM-30 Interface Circuit Packs, which provide ports for up to four links, are always provided for communication with the host office. An additional DS-1 or PCM-30 Interface CP is provisionable dependent on traffic requirements. The type of interface circuit provided depends upon market requirements, but all links to an RLCM must be the same type.

In US or Canadian RLCMs, (2) DS-1 I/F circuit packs are always required. Normally provided are (2) NT6X50AA DS-1 I/F packs. If the customer prefers or ISDN line drawer is provided, provide instead NT6X50AB DS-1 I/F packs. The LCM Common CP in both shelves must be NT6X04AB or higher for RLCM, or NT6X04BB or higher for IRLCM, in order to provide the LCM processor capacity required when the NT6X50AB is used. All the DS-1 I/F packs in an RLCM must be the same part number, either NT6X50AA or NT6X50AB.

All RLCM DS-1/PCM-30 Links must access the same LGC/LTC/RCC module in the host office. In addition, the DS-1 I/F circuit packs in an RLCM must be the same part number, either NT6X50AA or NT6X50AB, as the DS-1 I/F circuit packs which terminate the links to that RLCM in the host LGC/LTC/RCC module.

It is recommended to assign the HIE (C-side) message links, 0 and 1, to ports on different LGA/LTA at the host office (i.e. assign message link 0 to LGA/LTA shelf array 0 and assign message link 1 to LGA/LTA shelf array 1).

10.2.2.2 DMS BUS Port Requirements

Not Applicable

10.2.2.3 Circuits Per Card

Not Applicable

10.2.2.4 Discrimination Numbering

Not Applicable

10.2.3 Provisioning Considerations

When provisioning the Building Block RLCM/IRLCM one must consider six major options. Options included are: RLCM Frame, FSP, RMM Packfill, HIE Packfill, LCM Packfill, and Miscellaneous Equipment.

10.2.3.1 RLCM/IRLCM Provisioning

For US and Canadian applications provide NTZZ16NB, which uses the DS-1 type RLCM to Host link.

For International applications provide NTZZ41RB, which uses the PCM-30 type RLCM to Host link.

For US, Canadian, and CALA applications that require a specific number of line drawers, provide NTZZ16NB, which uses the DS-1 type RLCM to Host link and has the line drawers as provisionable items.

10.2.3.2 RLCM/IRLCM FSP Provisioning

The Frame Supervisory Panel (FSP) is provisioned in the RLCM/IRLCM based on the number of DMS frames to occupy the RLCM/IRLCM Remote Office and whether or not power distribution is required to a single RLCM/IRLCM frame only (NTZZ16CA FSP) or multiple frames (NTZZ16BA FSP). If power distribution is required to multiple frames a PDC frame or equivalent is required.

10.2.3.3 RLCM/IRLCM RMM Provisioning

The Remote Maintenance Module (RMM) card cage is Always Provided with the RLCM/IRLCM frame. However, the engineer must provision the appropriate circuit packfill and test/service circuits specific to the Market where the RLCM/IRLCM will be installed.

Refer to the RLCM/IRLCM Engineering Manual Section for the specific Market, as defined in " RLCM/IRLCM RMM Provisioning" section of this document for the provisioning details.

There are (14) provisionable slots on the RMM. Refer to TABLE A, Engineering Manual Section EMA14-01-000, for RMM provisioning.

10.2.3.4 RLCM/IRLCM HIE Provisioning

The Host Interface Equipment (HIE) shelf card cage is Always Provided with the RLCM/IRLCM frame. However, the engineer must provision the HIE Circuit Packfill and certain other special application cards based on the Market where the RLCM/IRLCM will be installed.

Refer to the RLCM/IRLCM Engineering Manual Section for the specific Market, as defined in the " RLCM/IRLCM Provisioning" on page 10-105 section of this document for the provisioning details.

Two (2) DS-1 or PCM-30 Interface Circuit Packs, which provide ports for up to four links, are always provided for communication with the host office. An additional DS-1 or PCM-30 Interface CP is provisionable dependent on traffic requirements. The type of interface circuit provided depends upon market requirements, but all links to an RLCM must be the same type.

In US or Canadian RLCMs, (2) DS-1 I/F circuit packs are always required. Normally provided are (2) NT6X50AA DS-1 I/F packs. If

the customer prefers, provide instead NT6X50AB DS-1 I/F packs. The LCM Common CP in both shelves must be NT6X04AB or higher for RLCM, or NT6X04BB or higher for IRLCM, in order to provide the LCM processor capacity required when the NT6X50AB is used. All the DS-1 I/F packs in an RLCM must be the same part number, either NT6X50AA or NT6X50AB.

All RLCM DS-1/PCM-30 Links must access the same LGC/LTC/RCC module in the host office. In addition, the DS-1 I/F circuit packs in an RLCM must be the same part number, either NT6X50AA or NT6X50AB, as the DS-1 I/F circuit packs which terminate the links to that RLCM in the host LGC/LTC/RCC module. However, the DS-1 I/F circuit packs can be either NT6X50AA or NT6X50AB when linked to a RSC Sonet equipped with NTMX81AA Dual DS-1 Packlet circuit packs. (All the DS-1 I/F packs in an RLCM must be the same part number, either NT6X50AA or NT6X50AB).

It is recommended to assign the HIE (C-side) message links, 0 and 1, to ports on different LGA/LTA at the host office (i.e. assign message link 0 to LGA/LTA shelf array 0 and assign message link 1 to LGA/LTA shelf array 1).

For all ISDN applications, NT6X50AAs must be replaced with NT6X50ABs in both the remote and host equipment.

10.2.3.5 RLCM/IRLCM LCM Provisioning

The Line Concentrating Module (LCM) in the RLCM is the same as provisioned in a DMS100 Central Office (CO). The LCM is a two-shelf configuration where the shelves are always provided with the RLCM frame PEC (NT6X14AA). However, the engineer must provision the appropriate circuit packfill, Line Drawers, and Line Cards.

The maximum line capacity in an RLCM/IRLCM is 640 lines. All of the DMS100 LCM line card types are also provisionable in the RLCM/IRLCM according to existing LCM provisioning rules.

Refer to the RLCM/IRLCM Engineering Manual Section for the specific Market, as defined in “ RLCM/IRLCM Provisioning” on page 10-105 section of this document for the provisioning details.

Two (2) of the ten line drawers for each LCM may be NT6X05DA ISDN Line Drawers, one per shelf. Use of an NT6X05DA ISDN Line Drawer requires the use of NT6X04AE and NT6X50ABs for clear channel capability. ISDN Line Drawer is for the North American market only.

For ISDN applications (NT6X05DA), provide one (1) NT6X04ZX LCM Processor kit. This kit upgrades the LCM processor labels to NT6X51DAs required for clear channel capability. Pack fill becomes NT6X04AE. Use of the NT6X04AE requires the use of the NT6X50BAs in both host and remote equipment.

Only 1 ILD can be defined in each LCA (Line Concentrating Array). ISDN Line Drawer can not be applied to positions 0 or 10. Preferred positions for locating the ISDN Line Drawer is 8 or 18. This means that if the ILD drawer number of the first ILD is within the range 2 - 8, the next ILD to be defined in this LCM will have its drawer number within the range 12 - 18. This limitation exists in order to permit an optimal heat dispersion in the LCM.

10.2.3.6 RLCM/IRLCM Miscellaneous Equipment Provisioning

Miscellaneous equipment in RLCM offices shall be mounted in a Remote Maintenance Equipment (RME) frame.

10.2.4 Office Layout Information

Not Applicable

10.2.5 Traffic Tables

Refer to ECM-497 for Traffic Tables and Traffic provisioning considerations.

10.3 Product/System Specification

10.3.1 Physical Characteristics

10.3.1.1 NT6X14AA - RLCM Frame

MECHANICAL DIMENSIONS

Height 84" Width 27"

10.3.2 EMI/Earthquake Information

Refer to EMA15-03-000 EMI requirements.

10.3.3 Sparing Information

Standard sparing algorithms apply.

10.3.4 Power Feed and Fusing Requirements

.....Input Voltage -48VDC at -42.75 To 55.8 Volts
.....Power Consumption N/A
.....Current Drain N/A
.....Thermal Dissipation N/A
.....Fusing Requirements 2, 7 or 9 20Amp Fuses as follows:

RLCM W/O PDC This option with Analog Ringing require five A-Feeds and four B- Feeds fused at 20amps each.

RLCM W/O PDC This option without Analog Ringing require four A-Feeds and three B-Feeds, fused at 20amps each.

RLCM With PDC This option requires one A-Feed and one B-Feed, fused at 20amps each.

10.3.5 Current Drain Information

Not Applicable

10.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

10.4.1 Required Software Packages and Interdependencies

The following S/W packages are required in the Host office:

NTX146AA - RLCM Basic
NTX156AA - RLCM Intra-Switching
NTX154AA - RLCM Emergency Stand Alone
NTX653AA - IRLCM - ESA

| The baseline software load for ISDN Line Drawer for Remotes is NA007
| for the Host office, and XPM81 for the RLCM Remote and the ESA module,
| if so equipped. If the RLCM is subtended from an RSC or RSC-S, then that
| Remote will require an XPM08 software load.

10.4.2 Software Usage Restrictions

Not Applicable

10.4.3 Memory Provisioning

Not Applicable in the RLCM.

10.5 Real Time Impact

Not Applicable

11.0 ECM610 - Building Block/Detailed RSCI Engineering

11.1 Overview

The ISDN RSC (RCCI) is part of the ongoing evolution of ISDN. The objective is to support ISDN both on new shipments and on retrofit of existing "in-service" RSCs. The NT6X1022 Change kit allows an existing NT6X12CA RCC to be converted to an RCCI. The additional equipment which must be added to the current RSC includes an ISDN version of the LCM and RCC (LCMI and RCCI) and a Packet Handler. The RCCI will support ISDN Basic Rate Access (BRA), basic Emergency Stand Alone (ESA) service, single or dual Universal Tone Receiver (UTR)(single UTR only when CLASS Modem Resource card is required), delivery of calling number to 500/2500 sets (CND under CLASS) and all terminals and features supported by the existing RSC base as of BCS-28.

All call processing features available for ISDN loops on host peripherals will be supported for the RCCI, in addition to the non-ISDN services currently available on the RCC. Host loop maintenance features will be provided for ISDN loops on an RCCI and all standard maintenance features will be supported.

ISDN Basic Rate Access (BRA) Services supported on RCCI are as follows:

- stimulus signaling
- functional signaling
- All supplementary services as offered to host lines
- Intraswitching of BRA calls
- Dynamic trunks - intra to BRA lines
- ESA - basic call set-up with either stimulus or functional signalling is provided.
- Packet handler service during ESA can optionally be provided.

Primary Rate Access (PRA) is not part of the RCCI program. Nothing in the RCCI architecture would preclude the addition of PRA at a later date. The PRA links can be homed to the host.

Several software enhancements to the RCCI were implemented in BCS-31. No reconfiguration nor additional hardware is required for these capabilities. The following list summarizes these BCS-31 enhancements:

- software added to have RCCI recognize and handle ISDN terminals and nodes while in ESA.

- software added to have CC download ISDN terminal information to RCCI so that it is prepared to handle ISDN calls while in ESA mode.

- capability to intraswitch ISDN BRA calls on RCCI.

- support for Dual RCC with ISDN (DRCCI) during ESA or non-ESA conditions and trunks from RCCI during ESA. (Either one or both RSCs in DRCCI may support ISDN loops.)
- provides RCCI support of LCME and support for AMI U-loop linecard and 2B1Q ISDN U-loop linecard.
- provides RCCI support of Digital Test Access (DTA).

Refer to Figure 16 on page 10-112 for general ISDN architecture of the RCCI.

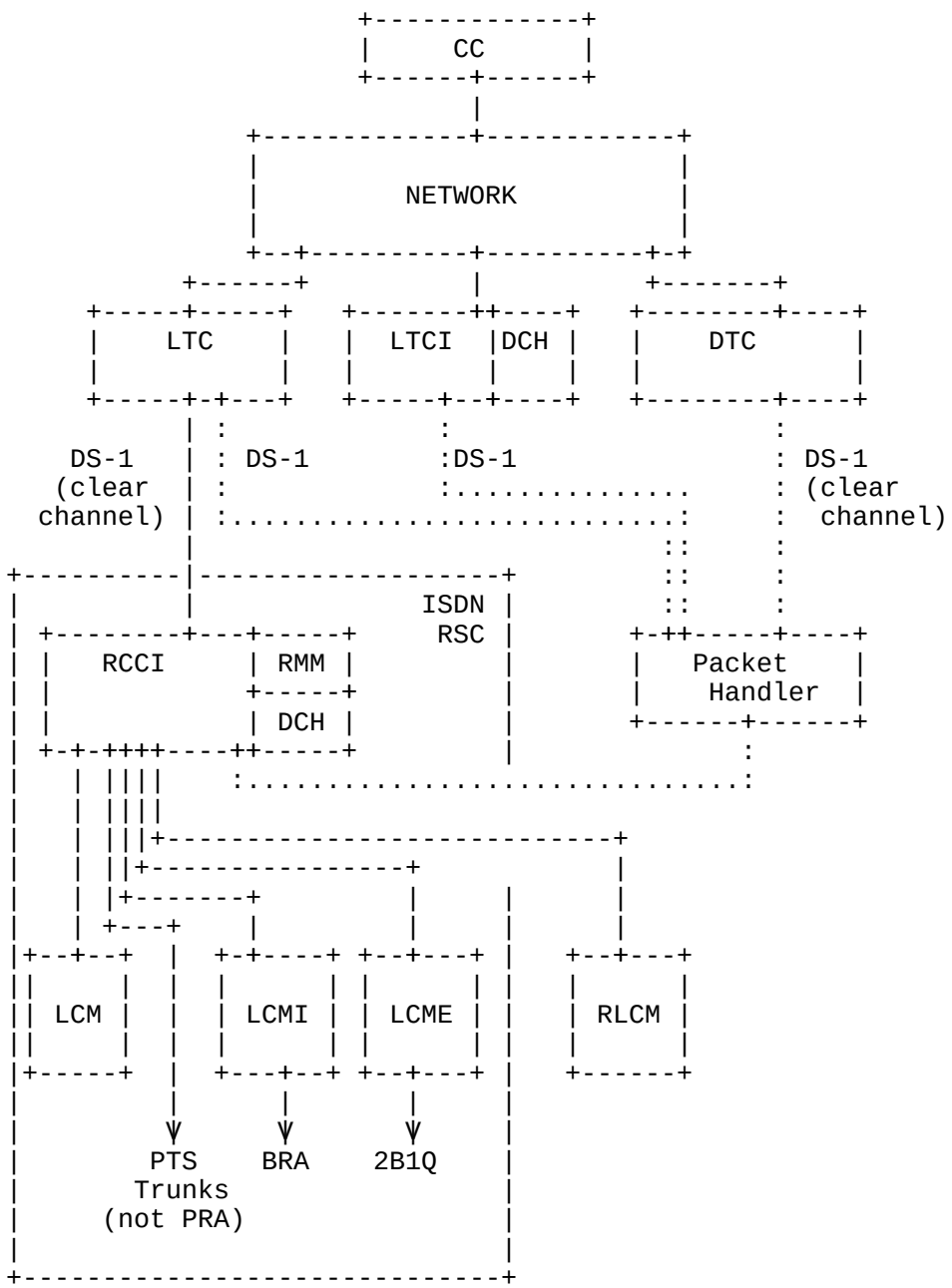


Figure 16. DMS ISDN Architecture

11.2 Hardware Provisioning

11.2.1 Hardware Usage Restrictions

In addition to RCC base functionality, the RCCI will support the following to provide ISDN functionality:

- The collection of both D and concentrated B channels from LCMI/LCME via DS-30A ports.
- Provisioning of the front end Q.931 processing of D-Channels in ISP.
- Routing the D-Channels to the D-Channel Handler.
- Routing the Bd and Bb packet data to the P-side located packet handler via intraswitched C-side channels or to host located packet handler via C-side host umbilicals.
- Routing switched B channels, if host destined via host umbilicals or if not via intraswitching.
- handling all digit collection for CC.
- physically terminating DCH via DS-1 slots on P-side.

Functions provided by the D-Channel Handler include:

- terminates signaling frames and routes them to ISP.
- statistically multiplexes packet frames and sends them to the packet handler (stat. mux ratio up to 64:1).
- reflects user to user loop around frames back towards user.

The DMS-100 Packet Handler can be co-located with the RCCI or co-located at the host DMS-100. The physical location of the Packet Handler is largely a tradeoff of ESA functionality and system cost. Links to the Packet Handler can be via one of the following:

- P-side links off host XPM (not routed via network)
- nailed up network connections terminating via DTC/DTCIs.
- P-side links off RCCI.

The host XPM can be a LTC,LTCI,LGC or LGCI. The host XPM has the following capabilities:

- terminates DS-1 umbilicals from RCCI and switches them through to the network (non-concentrating).
- optionally can terminate LCMs directly. The host LGC/LTC need NOT be upgraded to a LGCI/LTCI unless it supports a separate LCME/LCMI in addition to the RCCI.

- must be LTC or LTCI if there are trunks off of the RCCI.

The DS-1 umbilical for the RCCI must support 64Kbps clear channels. The RCCI host umbilical restrictions are essentially the same as those for the RSC. The maximum distance is 100 miles. The intervening transmission network may be whatever the operating company chooses (e.g. copper,fiber,digital radio,etc.). Extended Super Frame format and Bipolar Coding with 8 Zeros Suppression (B8ZS) are required to support 64K clear channels.

The NT6X45 circuit pack requires new firmware to support 64Kbps clear channels to the host. This is provided by the NT6X45BC pack.

The RCCI is limited to the use of one Universal Tone Receiver (UTR) only when the CLASS Modem Resource card is required. Dual UTRs can be supported if that pack is not required.

If circuit pack NT6X78-- (CLASS Modem Resouce) is present, a maximum of ten NT6X50AB DS-1 cards can be supported, thereby limiting C-side and P-side to a maximum of 20 DS-1 ports in a RCCI.

The Remote Maintenance Module (RMM) datafill will be identical to the current RCC. Ports 0 and 1 will be reserved for RMM use.

The LCME does not support the AMI U-loop linecard nor coin lines at this time.

The 2B1Q requires the Multiline Test Unit (MTU) for the line test function. If 2B1Q lines home on the RCCI, the RMM must be equipped with an MTU pair (NT2X10BA/NT2X11BA). Refer to ECM-389 for details.

Extended Super Frame (ESF) must be used when the Packet Handler is host located or when a high percentage of the circuit switched data traffic is host bound.

If this section is inapplicable or the information is unavailable, use one of the following:

Not applicable.

This information is unavailable at this time.

11.2.2 Hardware Dependencies

The RCCI makes use of two new circuit packs developed for the CPCI;the NTBX02AA D-Channel Handler and the NTBX01AA ISDN Signaling Pre-Processor. The DCH will be mounted in DS-1 card slots and the ISP will utilize a spare slot on the RCC shelf (slot 16). Free DS-1 slots must be available to accept the provisionable DCH packs, with a minimum of two and an anticipated maximum of ten (nine active and one spare).

The Frame Supervisory Panel must supply a combined A/B power feed (C power) for use by the DCH packs. There are also other wiring changes to the frame required to distribute the C power and to provide ISP/DCH signal interconnection.

Specific varieties of common control circuit packs must be used to minimize the current demand placed on the central power converter. Refer to the Engineering Manual sections for specific packs.

RCCI XPM Plus modules must be equipped with the NTBX01AB Enhanced ISDN Signal Pre-Processor. The NTBX01AB is part of the NT6X12DE and NT6X12ZE kits.

11.2.2.1 P and C Side Port Requirements

See “LCMI/LCME Provisioning” on page 10-116

11.2.2.2 DMS BUS Port Requirements

Not applicable.

11.2.2.3 Circuits Per Card

See “D-Channel Handler Provisioning” on page 10-118

11.2.2.4 Discrimination Numbering

Not available.

11.2.3 Provisioning Considerations

The hardware design approach taken for the RCCI is to retrofit the existing RSC equipment with D-Channel Handler capability. The basic design changes which must be made to provide ISDN BRA on the RCCI are:

- Application of frame level wiring and FSP modifications.
- Installation of ISDN Signalling Pre-Processor (ISP) CP (NTBX01AA).
- Installation of a provisionable number of D-Channel Handler (DCH) CPs (NTBX02AA)
- Change C-side DS-1 cards to clear channel (NT6X50AB)
- Change P-side DS-1 cards to clear channel (NT6X50AB) for P-Side Packet Handler connection (if used)
- Add LCMI/LCME

11.2.3.1 LCMI/LCME Provisioning

Provisioning information for the LCMI and LCME has been provided in ECM616. The LCMI or LCME used for the RCCI will be provisioned per the rules published in that ECM.

The C-side and P-side ports for the RCCI must be provisioned based on traffic considerations. Refer to ECM497 for port provisioning guidelines, and then configure the required equipment per the Engineering Manual. The information in the RCCI Provisioning section provides generic rules for provisioning an RCCI. Specific configuration will be based on the office configuration and requirements.

11.2.3.2 RCCI Provisioning

The NT6X1022 Product Change kit provides the capability to upgrade an existing RCC with NT6X12CA packfill to RCCI (with NT6X12AD). In order to apply this kit, the existing RCC must first be brought to NT6X12CA packfill level. This is accomplished using existing kits as described in ECM-618. The NT6X12CA RCC is converted to an RCCI by applying Product Change kit NT6X1022. This kit provides materials and circuit packs required for the RCCI and also provides instructions for using some of the circuit packs from the existing RCC in the new RCCI.

When this conversion is made, installers will move traffic from the existing RCC to a temporary RCC (supplied by Installation) and will then convert the RCC using the NT6X1022 kit. The FSP and ISDN Remote Controller Array shelves for the RCCI are included in the kit. After they have been mounted, existing circuit packs from the RCC will be relocated as follows:

CP PEC	RCC Slot	Action	RCCI Slot
NT6X47AB	11	Move to	11
NT6X46BA	12	Move to	12
NT6X44AA	15	Move to	15
NT6X92BB	16	Move to	14
NT6X69AB	17	Move to	17
NT6X72AA	19	Return to customer	
NT0X50AA	23	Move to	24

Additional required circuit packs and mounting locations are provided as part of the kit. All provisionable NT6X50AAs on the RCC must be replaced with NT6X50ABs for RCCI applications. Refer to the Engineering Manual insert for details of NT6X1022 contents and mounting locations.

RCCI packfill NT6X12DC is introduced as the replacement for NT6X12DA for all new RCCI orders. When this packfill is applied, the slots where the NT6X69-- (slot 17), NT6X46-- (slot 12) and

NT6X47-- (slots 10 and 11) packs mount become provisionable. This allows the latest versions of these packs to be provided. Refer to the Engineering Manual section for NT6X10AD for details.

If there is an LCME subtending the RCCI, NT6X46BB circuit packs must be provided with the NT6X12DC packfill. Existing NT6X46BA packs may be used if there is no LCME subtending but are not to be provided for new orders.

Product Change kit NT6X12ZB allows an existing NT6X12DA packfill to be upgraded to NT6X12DC in the field. This kit makes slots 10,11,12 and 17 on the RCCI shelves provisionable. Refer to the Engineering Manual section for NT6X10AD for provisioning details.

Refer to the Engineering Manual for RCCI (NT6X10AD) provisioning rules.

Refer to ECM 282 for details of RSC engineering. The ISDN RSC will use the same equipment as the standard RSC except as described above.

Engineering for the RCCI must take several factors into account:

- number of C-side ports
- number of P-side ports and slots (DS-30A and DS-1)
- number of DS-1 slots (incl. DCH)
- Speech Bus bandwidth
- MP,SP and ISP real time

Refer to the Engineering Manual section for provisioning information.

For the RCCI application, a new Frame Supervisory Panel (FSP) is required to supply a "C Power Feed" for use by D-Channel Handlers. This FSP is the NT0X28EC, which is Always Provided on the RCEI frame.

The RCCI has 20 accessible P-side ports shared between DS-30A, DS-1 and optional PH interface. DCH use 1 P-side port and 1 DS-1 slot per DCH. The basic rules are:

DS-30A ports + # DS-1 ports + # DCH <= 19 (excl. RMM)

DS-1 slots <= 9 (with each DCH using one slot)

Due to power limitations,use of NT6X78-- CLASS CMR will add the following rule:

DS-1 cards (C-side) + DS-1 cards (P-side) <= 10 maximum

D-channels are multiplexed 4:1 and together with Bd and Bb links destined for the PH (if PH interface is from the P-side) are con-

nected to the P-side using the intra switching capability of the RCCI.

Each DCH occupies a single P-side port and consumes one P-side DS-1 slot on the RCCI. The number of DCHs required depends on the number of D terminals per loop, user packet throughput on each D-channel and the stat mux ratio used in the DCH.

Refer to ECM465 and ECM497 for DCH and link provisioning information.

Each provisioned DCH reduces the number of available P-side DS-1 slots by one.

The number of LCMIs that can be supported by the available P-side DS-30A ports will depend on the number of ISDN loops per LCMI, the number of provisioned B packet channels and circuit switched B channel traffic levels.

11.2.3.3 RCEI Labels

The following labels should be provisioned for all RCEI applications:

RCEI FSP Shelf labels: Order one of each P0715228 and P0715229

RCEI PDC Frame labels: Order one of each P0715232, P0715233 and P 715234

RCEI FSP Frame labels: Order one of each P0715235 and P0715236

11.2.3.4 D-Channel Handler Provisioning

The 16Kbps D-channels from each ISDN line are time division multiplexed (TDM) 4:1 by the LCMI and are presented to the RCCI as a single 64Kbps channel. These channels consume capacity on the DS-30A links from the LCMI.

At the DCH, D-channels having a "Service Access Point Identifier" (SAPI) indicating packet data are statistically multiplexed and routed on DS-1 links to the PH. Messages with SAPI 0 frames are routed to the ISP. Each DCH has 32 channels which are used as follows:

1 for messaging to ISP a i.X for incoming 4:1 TDM D-channels
Y for outgoing stat mux'd packet data (Bd)

If there is no Bd, then 31 channels can be used for multiplexed (mux'd) D-channels, meaning a D-Channel Handler can support a maximum of 124 lines. Typically, a DCH will support about 108 D-channels.

Refer to ECM 616 for information regarding Packet Handler provisioning.

11.2.3.5 RCC2 Conversions

The NT6X10ZA Product Change (PC) Kit allows NT6X13 RMM shelves (or full shelf filler panels) to replace NT6X12 RCC shelves in field based NT6X10AC/AD RSC frames. Because the functionality of the NT6X10AC/AD frame is changing, application of the NT6X10ZA PC Kit changes the frame PEC/designation of the RSC frame from NT6X10AC/RCE or NT6X10AD/RCEI to NT6X10DA/RMME. Refer to ECMs 586 & 618 for additional information on these conversions.

11.2.4 Office Layout Information

ISDN Packet Services on a RCCI are the same as those on a host LTCI, making use of the same Packet Handler (PH) at the host. If ESA is needed, either a complete remote PH or a remote access module may be deployed. If the availability benefits afforded in ESA are not required, the RCCI can use the PH deployed at the host. There are three ways the RCCI can be linked to the host PH for provisioned packet data services:

- direct P-side DS-1 port off RCCI
- nailed up via host umbilical but looped back in host XPM and routed out on DS-1 links to PH
- nailed up via host umbilical and host network

Remote deployment of a DMS-100 Packet Handler at the remote location maximizes the remote's ESA functionality but a more cost effective option is to deploy only a remote Access Module (AM). The remote AM is recommended only under the following circumstances:

- majority of packet traffic is local to the remote.
- ESA is required for packet services.
- reduced connectivity in ESA is acceptable.

During ESA, the Access Module will maintain all calls local to that AM and will allow the set-up of new calls local to that AM, provided that the link to the AM remains intact.

11.2.5 Traffic Tables

- RCCI Characteristics

  RCCI traffic information is provided in ECM465 and ECM497 and should be referenced for all applications of the RCCI.

- LCMI Characteristics

The LCMI supports up to a maximum of 160 AMI U-linecards or 192 S/T-linecards from a single LCMI. The LCMI also supports up to eighteen DS-30As for connection to the RCCI and these links can carry both B- and D-channel traffic. The LCMI will support eight line drawers containing a maximum of 48 Type A,B or C linecards OR 24 Type D or S/T linecards OR 20 0-linecards per drawer. Different line types can be mixed within the same physical drawer as long as ISDN line types are not mixed with other line types within the same logical drawer.

- D-channel Characteristics

  The D-Channel Handler function is an integrated part of the RCCI, handling the termination of D-channel messages from BRA terminals. The RCCI supports a maximum of nine (8 active + 1 hot spare) provisionable DCHs. Each DCH typically supports 108 D-channels. The D-channels are multiplexed 4:1 onto DS-0 channels on these links. A minimum of two DS-30A links are required per LCMI.

11.3 Product/System Specification

11.3.1 Physical Characteristics

11.3.2 Characteristics

The Remote Controller Equipment ISDN Frame physical specifications are as follows:

11.3.2.1 - RCE Frame ISDN (RCEI)

Input Voltage..... 48Vdc
Power Consumption....._____ watts
Current Drain.....23 Amps D.C. Fully Equipped
Thermal Dissipation....._____ BTU/hr
Fusing Requirements.....3 each 20 amp Fuses

MECHANICAL DIMENSIONS

Height	_____	Width	_____	Length	_____
Weight	_____	Depth	_____		

11.3.3 EMI/Earthquake Information

Refer to ECM-125 For RSCI EMI requirements.

11.3.4 Sparing Information

Standard sparing algorithms shall apply.

11.3.5 Power Feed and Fusing Requirements

RCEI Frame requires three (3) 20 Amp fuses.

11.3.6 Current Drain Information

RCEI Frame current drain is 23 Amps D.C. fully equipped.

11.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

11.4.1 Required Software Packages and Interdependencies

The supporting software for the RSCI, NTXJ00AB - ERI+, will be changed to MD status effective with XPM03, BCS-37.

11.4.2 Software Usage Restrictions

The base software for the RCCI will include support for eighteen (18) LCMI C-side links,messaging,DCH maintenance and processing via the ISP and intraswitching for ISDN lines.

The following software packages will be required in addition to the base RSC software:

NTX750AB - ISDN Base Package

NTXJ00AA - ISDN on RSC (includes BCS-31 enhancements)

NTXJ00AA has been replaced by NTXJ00AB effective BCS-34 and later.

NTXJ00AB - ISDN on RSC (Replaces NTXJ00AB Effective in BCS-34)

Optional Package:

NTX143AA includes Extended Super Frame capability

NTXR34AA - XPM Plus (Product Life Upgrade) Basic(RATE CHANGE PENDING)

Note:

- NTRX34AA is MD'ed effect BCS-35 and replaced by NTXR34AB.
- The above package is optional for Non-XPM Plus jobs and always required for XPM Plus Jobs.

11.4.3 Memory Provisioning

Not applicable.

11.5 Real Time Impact

Refer to ECM 497 for real time calculations

12.0 ECM618 - Detailed/Building Block Engineering - RSC

12.1 Overview

Product/System Overview

The major elements of an RSC are RCE and LCE frames.

There is (1) RCE frame per Mono, (2) per Dual RSC. The RCE contains a (2) shelf Remote Control Cluster (RCC) module and (1) to (2) Remote Maintenance Modules (RMM).

The (2) shelf Remote Control Cluster (RCC) module is an LTC type peripheral. The controller side (C-Side) interfaces to the host over DS-1 links to an LGC/LTC. The peripheral side (P-Side) of an RCC consists of 20 ports that currently support LCMs (each 2 to 6 DS-30A links), DS-1 trunks (8 Max) and (2) Remote Maintenance Modules (each 1 DS-30A link). NOTE: Software Translations require from 3 to 16 ports to interface to an RSC. Hardware facilitates a host interface requirement of from 2 to 16 DS-1 links, with a third link reserved.)

Each RMM occupies one (1) shelf in the RCE frame. At least one RMM shelf is required at each site to provide service circuits and diagnostic tests. The RMM shelf can be shared between co-located RSCs, provided they share the same host. The RMM can be shared with a co-located RLCM, provided they share the same host as the RSC and only if the RLCM does not have the Emergency Stand Alone (ESA) feature option specified.

The are a maximum of (5) LCE frames (9 LCMs) per Mono, (10) per Dual (18 LCMs) RSC. The LCMs, which perform the line interface function, are identical to those used in a DMS host and housed in standard DMS bays.

12.1.1 ISDN Line Drawer Remotes

The ISDN Line Drawer Remotes (NT6X05DA) is a new LCM drawer type that will support ISDN line cards and contain the D-channel handler. The ISDN Line Drawer Remotes (ILD-R) will co-exist with current POTS line drawers in a standard LCM. A maximum of two NT6X05DA Line Drawers can be provisioned per LCM. Only one line drawer per LCM shelf is allowable.

The ISDN Line Drawer for Remotes is a product which has been developed for the DMS-100 system enabling existing Remote sites to upgrade to ISDN without the expense of having to add an LCME, and upgrade host peripherals. It is also being developed to provide new job initials with the ability to provide low line size BRI features. The introduction strategy is thus targeted at providing

the new capability to new job shipments as well as for upgrading the installed base of Nortel Remotes.

It is recommended that the ILD-R Drawer be provisioned in the right hand drawer position of each shelf in physical position 4 and 9 (logical drawers 8 and 18) in order to permit an optimal heat dispersion in the LCM. However, ISDN Line Drawers can be provisioned in any drawer position on the LCM shelf except physical position 0 and 5 (logical position 0 and 10). This is because BIC Relay Test diagnostics require those positions for systems use.

The new ILD-R type will support up to 28 BRI ISDN line cards (NTBX27AA). Non-NTBX27AA cards are not supported.

The ILD-R will require an XLCM based load (256K memory).

LGCI and LTCI are not supported with ILD-R.

Upgrading an existing RSC (LCE) line drawer to an ILD-R drawer will involve deleting all lines from that drawer, removing that drawer from service, physically replacing the drawer and then declaring and RTSing the new ILD-R line drawer. This procedure will not cause other drawers to be removed from service.

The RMM requires an MTU pack instead of the LTU that is used for POTS line cards in order to allow ISDN line maintenance.

During ESA of the RSC, the ILD-R drawer will not be supported. If an RSC enters ESA, the ILD-R might survive the entry, but no commitment is made to supporting any service within ESA.

ISDN Line Drawer for Remotes requires 64kbs clear channel capability on the C-side link back to the Host.

Since the ILD-R requires ISDN line maintenance, the RMM that is connected to the LCM (LCE) containing the ISDN Line drawer should be provisioned with an MTU pack (NT2X10BA/BB and NT2X11BA circuit packs). For RMMs without ISDN capability, this might require an upgrade from the standard LTU pack (NT2X11AD/NT2X10AB).

The ISDN Line Drawer Remotes is only available for North America (U.S. and Canada) Remote applications.

See ECM619, EMS NT6X05DA, and EMS NT6X03AA for further information and rules concerning the provisioning and use of the ISDN Line Drawer Remotes with the RSC (LCE) product.

12.2 Hardware Provisioning

12.2.1 Hardware Usage Restrictions

There are RSC usage restrictions on the Host LGC/LTC and the RSC P-Side Port Configuration as follows:

1. LGC/LTC P-SIDE CONFIGURATION
2. RSC P-SIDE CONFIGURATION
3. SOFTWARE NODAL REQUIREMENTS
4. ENHANCED OFFICE RECOVERY

- LGC/LTC P-SIDE CONFIGURATION
  When provisioning the P-Side of an LGC/LTC, the P-Side ports can be configured for a maximum of two (2) RCCs if the following conditions are met:
  - 2 RCCs from separate Mono RSC configurations.
  - 1 RCC from a dual configuration and 1 RCC from a single configuration. Both RCCs from a dual configuration can not mount on the same LGC/LTC, and two RCCs from separate dual configurations can not mount on the same LGC/LTC.
  - Traffic, Real Time and software Nodal requirements do not exceed the recommended engineering limits.
  - All DS-1 links from a RCC must terminate on the same LGC/LTC.
  - LTC required when CDO/PBX Trunking is required.
  - In addition, the remaining P-Side ports can be configured for two RLCMs or OPMs if the Traffic, Real Time and software Nodal requirements do not exceed the recommended engineering limits.
- RSC P-SIDE CONFIGURATION
  The P-Side of an RSC can be configured for the following maximums if the Traffic, Real Time and software Nodal requirements do not exceed the recommended engineering limits:
  - Maximum of 9 LCMs (using 2 ports per LCM)
  - Maximum of 8 DS1s assigned to CDO/PBX Trunking Functions; DS1s may be assigned to the CDO and or PBX function in any combination not to exceed eight (8).
  - Maximum of 18 DS1s for any combination of RLCMs and OPMs
  - Any combination of the above not to exceed the stated individual maximums

- WARNING - If for some reason the DS1 spans between the Host and RSC are reversed or otherwise misconnected (during an initial installation, upgrade or other move) no error log warnings will be given. A symptom of reversed spans crosstalk on subscriber lines.
  Each job is given a R820 drawing which lists the available DS-1 cards and ports, along with other information. There is an area in which the TELCO writes down where these links are to terminate. Nortel does not specify this information.

- SOFTWARE NODAL REQUIREMENTS
  A host LGC/LTC can support a maximum software datafilling of 18 Peripheral Side (P-Side) software nodes with BCS 22. In BCS 23 and later, the capacity increases to 62 P-Side nodes. A node is defined as follows:

  - Host LCMs, RSC LCMs, RMMs, RCCs, RLCMs, SMS-Rs,OPMs, ESA processors (for the RLCM or OPM), and dummy software nodes.

  - An example of counting software nodes follows:

    - A host LGC configured with two (2) host LCMs, one (1) RLCM, one (1) OPM and one (1) RSC (remotes configured below) would constitute a total of 15 software nodes.

    - The host LCM would constitute two (2) software nodes.

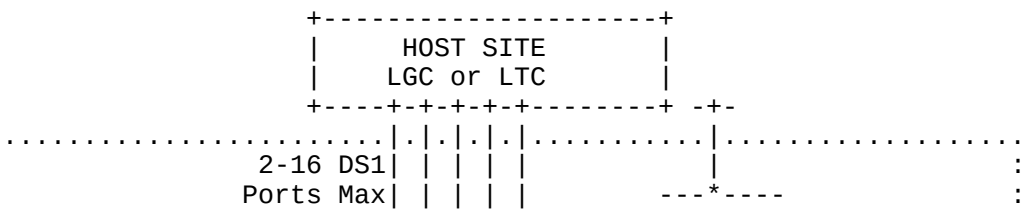
    - An RLCM configured with one (1) RMM and ESA processor would constitute three (3) software nodes.

    - An OPM configured with one (1) RMM would constitute two (2) software nodes.

    - An RSC configured with one (1) RCC, two (2) RMMs and five (5) LCMs would constitute eight (8) software nodes.

- ENHANCED OFFICE RECOVERY
  The feature NTXA66AA - Enhanced Office Recovery has been incorporated into the DMS-100 Basic S/W Package - NTX001. Therefore, the NT6X45BA and later LGC Processors are required to support Enhanced Office Recovery Feature.

Figure 1. Typical Mono RCC Remote Off Remote C & P-Sided Configuration



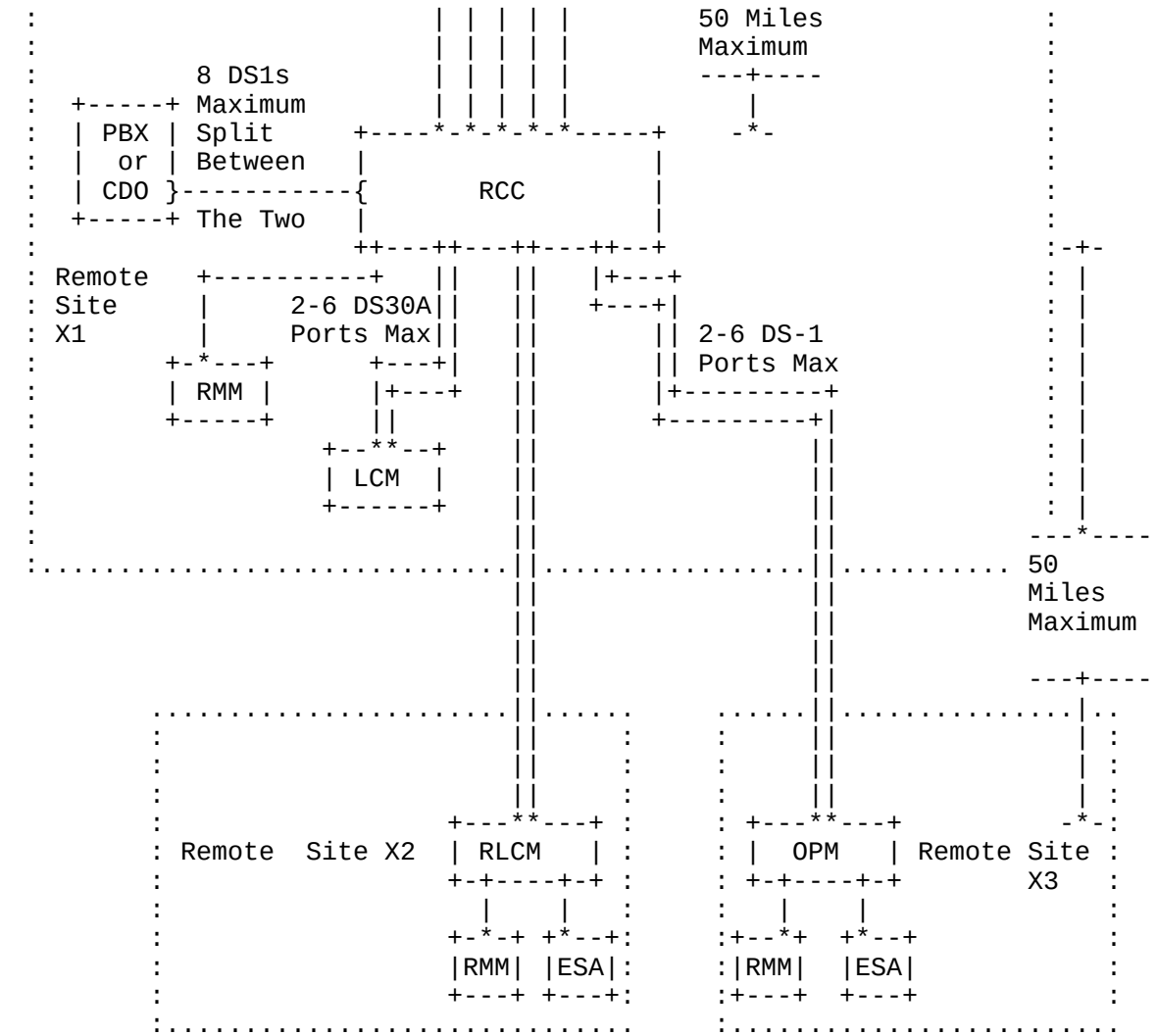
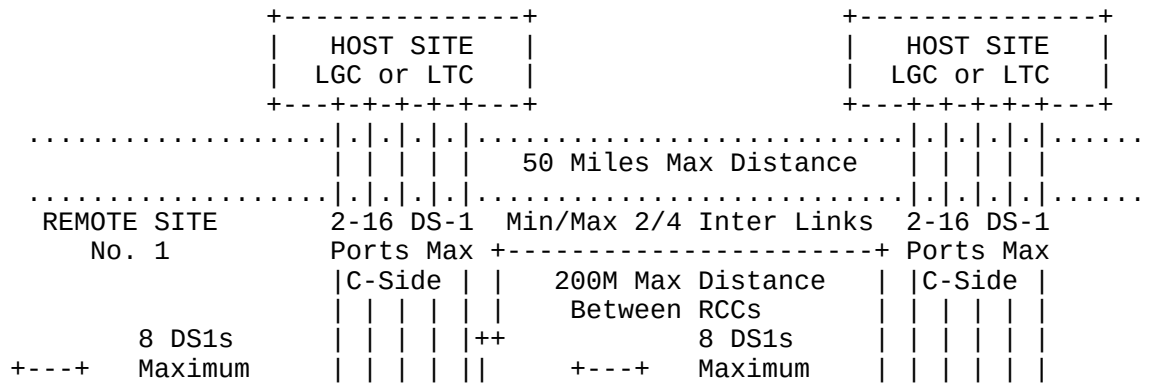
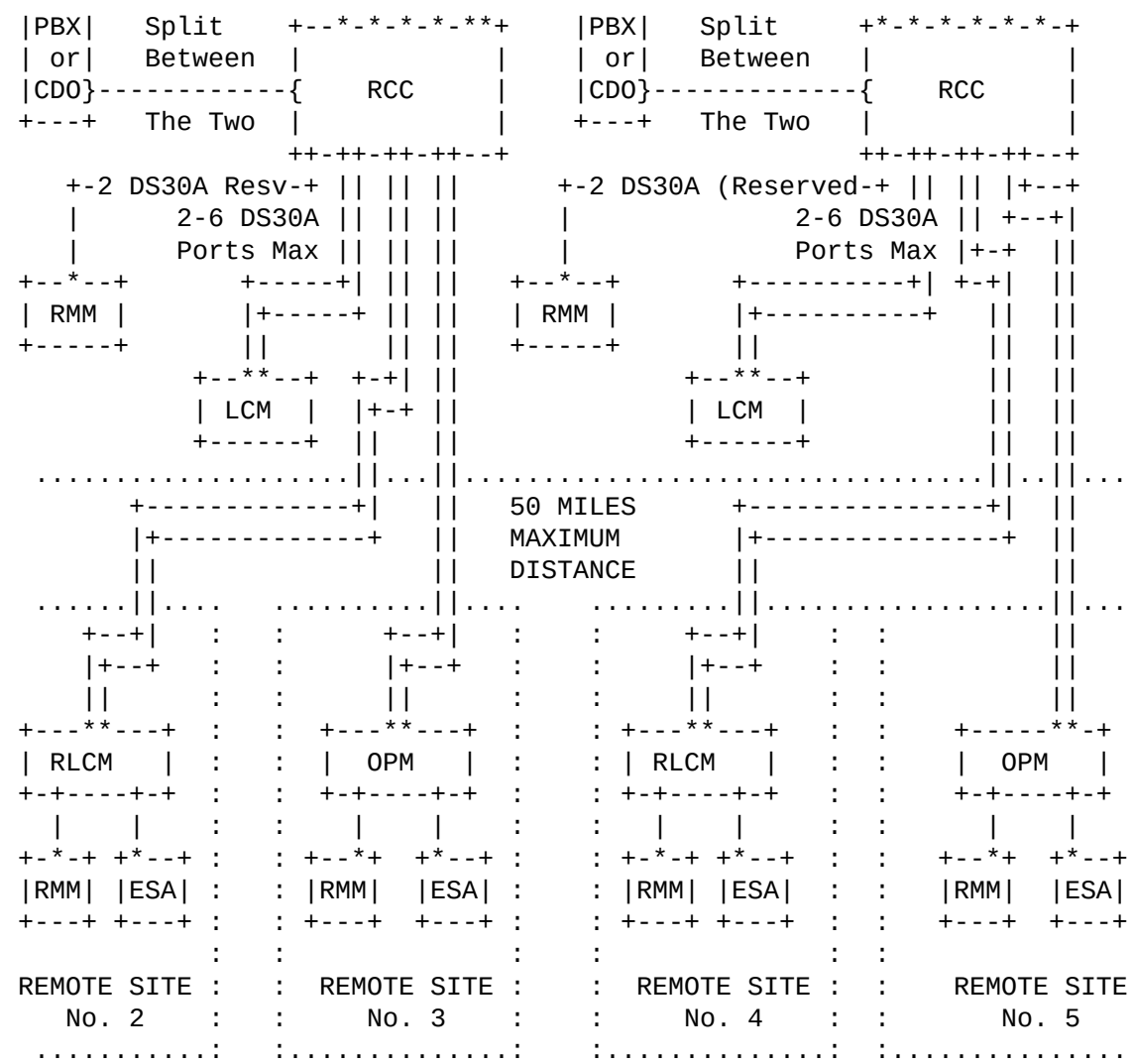


Figure 2. Typical DUAL RCC Remote Off Remote C & P-Side Configuration





12.2.2 Hardware Dependencies

Refer to "Product/System Specification" .

12.2.2.1 P and C Side Port Requirements

12.2.2.2 DMS BUS Port Requirements

12.2.2.3 Circuits Per Card

12.2.2.4 Discrimination Numbering

12.2.3 Provisioning Considerations

12.2.3.1 GENERAL RSC PROVISIONING

The RSC may be provisioned with the following Hardware (H/W), where specific quantities are restrained by Traffic, REAL-TIME, and Capacity issues unique to the service mix required:

RCE FRAME One per Mono RSC, two per Dual RSC, two Mono RSCs may be located on/in the same floor/building. The RCE consists of one Remote Maintenance Module (RMM) Card Cage, one double shelf Remote Cluster Controller (RCC),

LCE FRAME Line Concentration Equipment (LCE) is provisioned in the RSC as follows:

- Max 5 LCEs (9 LCMs) per Mono RSC, Max 10 LCEs (18 LCMs) per Dual RSC. A maximum of 5,760 Lines per Mono RSC or 11,520 per Dual RSC. The exact quantities provisionable according to a specific service mix are limited by Traffic, REAL TIME, and Capacity issues (Refer to ECM-497).
- The LCE may consist of two LCM, each LCM may have up to 10 Line Drawers, each line drawer may house up to 64 Line Card.
- For ISDN Line Drawer Remotes, see Section 1.1.1.

PDC Frame The Power Distribution Center (PDC) frame is required in the RSC when the total number of fuses needed exceeds 56. Otherwise provide the RME frame below.

RME Frame The Remote Miscellaneous Equipment (RME) Frame is provisioned in sufficient quantities to house equipment as follows:

- Power Distribution Equipment consisting of:
  - Max 2 each Fuse Panel A and B
  - PDC Frame, Frame Supervisory Panel (FSP)
  - Frame fuses not to exceed 56.
  - Miscellaneous Frame Grounding hardware
- Miscellaneous Frame Mounted Equipment such as:
  - MIS Frame, Frame Supervision Panel (FSP)
  - Inverter
  - Common Equipment Shelf
  - Modem Shelves
  - etc, Refer to MIS/RME Frame Engr Manual Section

REMOTES RLCM, SMS-R, and OPM 256/640 REMOTES may home on the RSC via 2-6 DS-1 ports, except for the SMSR which can have 2-4. Up to nine (9) RLCM / OPM REMOTES may be connected to a Mono RSC, 10 for a Dual RSC. The SMSR provides a direct digital interface between the SLC-96 remote concentrator or other TR-008 compliant digital loop carriers and the Remote Switching Center (RSC). The SMSR module is mounted in a subscriber maintenance equipment (SME) frame which is collocated in the same RSC office. If the SMSR supports CLASS Services off of it, the CMR cards are mounted in the RCE RCC shelf, not in the SME. The SMSR connects directly to the SLC-96 through DS-1 links. The number of DS-1 links used depends on the SLC-96 mode of operation. There are three operating modes for the SLC-96: Mode I, II, and III.

MISC EQPT Other miscellaneous equipment provisionable is as follows: Maintenance Tools and Alarm Panels.

12.2.3.2 MONO RSC

The Mono RSC is comprised of a single Remote Controller Equipment (RCE) Frame. Also required but custom provisioned are the Line Concentrating Equipment (LCE) Frames, Remote Miscellaneous Equipment (RME) Frames, Remote VDU, Remote Printer, Modems, Alarm Panel, Inverter, and Maintenance Tools.

12.2.3.3 DUAL RSC

The minimum requirements for a Dual RSC configuration are:

- Maximum 200 Meters between RCCs.
- Minimum two Interlinks assigned.

Refer to Figure 1 and Figure 2 for a block diagram of a typical Mono-RSC and Dual-RSC deployment, respectively.

12.2.3.4 HOST INTERFACE MODULE REQUIREMENTS

The RSC must be connected to a LTC peripheral module when Community Dial Office (CDO) and/or Private Branch Exchange (PBX) traffic is routed to the RSC.

Trunking Features for RSCs are available in BCS-22 and later.

If software feature package NTX152AA/AB RSC Digital Trunking is specified then the RSC must interface to a host LTC and RCC packfills NT6X12AA/AB/AC/AD/AE/AF/AG/CA/DA/DC/DE/DG, containing NT6X45BC or earlier, must be upgraded to NT6X45BD or higher or XPM+ (MX77). This will bring the packfill to NT6X12AL.

The RSC supports limited trunking. Specifically, local (non toll) interoffice trunking (EAS), Private Branch Exchange (PBX), Direct Inward/Outward Dial (DID/DOD) Trunking.

TRUNKING CHARACTERISTICS

- DS-1 Trunking Only
- Multi-Frequency (MF), Dial Pulse (DP), Dual Tone Multi-Frequency (DTMF), Wink Start, Delay Dial and Immediate Dial Supervision
- Trunks may have Local Call Detail Recording (LCDR) and/or Multi-Unit Message Rate (MUMR) recorded at the host (non-functional during ESA)
- up to 48 members/trunk group
- 8 trunk groups Maximum to a total of 4 NT6X50AA DS-1 I/F CPs for trunks (192 trunks) per RCC
- RSCs supporting trunks will require a LTC at the Host Office

Trunking Characteristics NOT SUPPORTED and their associated definitions:

UNSUPPORTED FUNCTION	FUNCTION DESCRIPTION
Coin or ANI Signaling	Definition Pending
Common Channel Signaling	System which makes use of an independent signaling network for the transmission of telephony messages related to groups of speech circuits.
Cut Through Dialing	The Cut Through Dialing feature allows the DMS-100 to process calls in cut through mode which allows the digits dialed by the originator to directly control the selection of routes used to complete the call.
Echo Suppressers	Hardware used to attenuate echoes on trunks over substantial distances.
Revertive Pulsing	Pulsing over a trunk in reverse direction. That is, from the terminating office instead of from the originating office. When the incoming office trunk is seized, it sends open or group pulses to the office that originated the call. The originating office counts the pulses and opens the trunk when the correct number of pulses has been received.
Toll	Long Distance calls made outside of the local serving area that terminate to a long distance carrier. Also, the associated billing of Toll, Toll Completing, and Intertoll transactions is not supported.
Toll Completing (TC)	A trunk function identifying a trunk circuit capable of interfacing with a toll connecting trunk facility in a TC application.
InterToll (IT)	A trunk function abbreviation referring to a type of trunk circuit used to interface with an intertoll office trunk.

Offices that received Software Package NTX152AA RSC Digital Trunking (currently rated A&M) must provide, on a one-to-one dedicated span basis, one span back to the host for every span terminating on the P-Side for trunking (from the RSC to other CDOs). In addition, the dedicated spans back to the host must terminate on the same controller (LTC) as the host-RSC DS-1 links. Refer to ECM-497 for a complete definition of the RCC Link Rules.

Refer to ECM 373 or ECM-616 for host office controller requirements.

In order for the Dual RSC to translate E911 calls while in ESA, each RCC must have a 911 LEN or an EMERGENCY SERVICES TRUNK.

12.2.3.5 HOST/RSC C-SIDE PORTS/LINKS

The following is a table of valid host LGC/LTC P-Side links that can be used for LGC/LTC to RCC links versus the number of LGC/LTC C-Side links (network ports).

No. of Network ports (C-Side)	Valid LGC/LTC P-Side links (links to peripherals)
3	0,1,2
4	0,1,2,3,4
5	0,1,2,3,4,5
6	0,1,2,3,4,5,6
7	0,1,2,3,4,5,6,7
8	0,1,2,3,4,5,6,7,8,9
9	0,1,2,3,4,5,6,7,8,9,10
10	0,1,2,3,4,5,6,7,8,9,10,11
11	0,1,2,3,4,5,6,7,8,9,10,11,12
12	0,1,2,3,4,5,6,7,8,9,10,11,12,13,14
13	0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15
14	0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16
15	0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17
16	0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19

For example: If you had a host LTC/LGC with 10 Network links you could have an RCC with 4 C-Side links connected to LGC/LTC P-Side links 9,11,3,6 (or 0,1,2,3) etc. In other words, you can select any or all of the valid links in the list to go to an RCC.

The P-Side links available for assignment to the RCC increases

The NT6X50AA or NT6X50AB may be provisioned on the C-Side of the RCC | or RCC+ based on the following: The NT6X50AA CP has been rated MD.

- The Host and the RCC DS-1 CP must match (eg. If 6X50ABs on C-Side of RCC, then they must terminate on 6X50ABs on the P-Side of the host XPM.

- NT6X50AB CPs may be provisioned on the C-Side of the RCC effective in BCS-31. RCC Packfills where slot 20 is Always Provided (AP) with a NT6X50AA must be upgraded

- The span must be datafilled in table LTCPSINV with a tuple from table CARRMTC which contains the correct card type. This is because the NT6X50s for the C-SIDE interface in an RCC which has received a load and static data, take on the parameters from the datafill of the NT6X50s that they interface with in the host LGC/LTC.

- When an RCC is at ROM level (i.e. the RCC does not contain a load), the NT6X50s for interfacing the C-SIDE T1 spans get their parameters from an address hardwired on the RCC backplane. The strapping on all RCC shelves release AG and below is configured from the factory for NT6X50AA cards for interfacing the C-SIDE T1 spans. The strapping can be modified to support the NT6X50AB cards with various formatting modes and zero code mode configurations. If an RCC shelf release NT6X12AG or lower, is currently provisioned with NT6X50AB cards for interfacing the C-SIDE T1 spans or is to be upgraded with NT6X50AB cards then CAP 1411 must be applied to the frame or NT6X50AA cards must be installed.

- The following are the four possible configurations which may be found in the field and the recommended corrective actions. The recommended actions are only for RCCs with NT6X45 type processor cards.

Host	Remote	Actions
6X50AA	6X50AA	Verify that the spans are datafilled in table LTCPSINV with the DEFAULT tuple for RCCs from table CARRMTC
6X50AA	6X50AB	Preferred Configuration: (NT6X50ABs on both ends) - If NT6X45BCs or higher are NOT equipped in the RCC, then they MUST be installed by applying CAP 1203 to the RCC - Replace the NT6X50AAs in the host w/NT6X50ABs by applying CAP 1199 - Apply CAP 1411 to the RCC to modify the backplane strapping for NT6X50ABs Optional Configuration: (NT6X50AAs on both ends) - Replace the NT6X50ABs in the remote w/NT6X50AAs by applying CAP 1532
6X50AB	6X50AA	Preferred Configuration: (NT6X50ABs on both ends) - If NT6X45BCs or higher are NOT equipped in the RCC, then they MUST be installed by applying CAP 1203 to the RCC - Replace the NT6X50AAs in the remote with NT6X50ABs by applying CAP 1411 Optional Configuration: (NT6X50AAs on both ends) - Replace the NT6X50ABs in the host w/NT6X50AAs by applying CAP 1532
6X50AB	6X50AB	- If NT6X45BCs or higher are NOT equipped in the RCC, then they MUST be installed by applying CAP 1203 to the RCC - Apply CAP 1411 to the RCC to modify the backplane strapping for NT6X50ABs

DS-1 links on the RCC (C-Side) interfacing to the host LGC/LTC must be assigned in circuit order as follows:

The RCC (C-Side) message links, 0 and 2 may be assigned to the same LGA/LTA, however, this method shall be used by special request only. Standard Engineering Practice is to assign RCC C-Side Ports to port on

different LGA/LTA at the host office (i.e. assign message link 0 to LGA/LTA shelf array 0 and assign message link 2 to LGA/LTA shelf array 1).

WARNING - If for some reason the DS1 spans between the Host and RSC are reversed or otherwise misconnected (during an initial installation, upgrade or other move) no error log warnings will be given. A symptom of reversed spans crosstalk on subscriber lines.

Each job is given a R820 drawing which lists the available DS-1 cards and ports, along with other information. There is an area in which the TELCO writes down where these links are to terminate. Nortel does not specify this information.

Dual RCC InterLinks

For the Dual RCC configuration, links 1 and 3 must be configured as inter-RCC links (1 and 3 on the C-Side of one RCC must be connected to links 1 and 3 on the interconnected RCC). Additional interlinks may be provisioned as well, to a maximum of 14 interlinks.

Currently, the RSC requires that links 0,1 and 2 be configured as links to the host. This must be changed to allow either single or dual RCC configurations. As part of the dual RCC development, the capability for any RCC to be configured with only links 0 and 2 serving as links to the host was included in BCS-24.

12.2.3.6 RSC P-SIDE PORTS

The RSC has 20 peripheral side (P-Side) ports in Mono-RSC configuration via the one RCE Frame RCC Module or 40 P-Side Ports in the Dual-RSC
| configuration. NT6X50AA and NT6X50AB can be mixed on the P- Side. The
| NT6X50AA CP has been rated MD. The following equipment may be connected to these ports:

LCMs Up to five (5) LCE Frames (09 LCMs) in a Mono-RSC or ten (10) LCE Frames (18 LCMs) in a Dual Configuration. Each LCM may have from 2 to 6 DS-30A Links/P-SIDE Ports.

DS-1 Trunks DS-1 Trunks refer to CDO/PBX Connections. A total of eight (8) DS-1 Links/P-SIDE Ports may be assigned. These ports may be used in any combination not to exceed eight (eg 8-CDO 0-PBX, 4-CDO 4-PBX, etc.).

RMMs The RSC may contain a maximum of two (2) Remote Maintenance Modules (RMM) in a Mono-RSC or four (4) in a Dual-RSC. Each RMM requires one (1) DS-30A link. P-SIDE Port zero (0 & 1) are dedicated to RMMs on each RCC. Each RMM occupies one (1) shelf in the RCE frame. At least one RMM shelf is always required at each site to provide service circuits and diagnostic tests.

The RMM shelf can be shared in the RSC when it is configured as a Dual or co-located RSC configuration, provided they share the same host. The RMM can be shared with a co-located RLCM, provided they share the same host as the RSC and only if the RLCM does not have the Emergency Stand Alone (ESA) feature option specified.

REMOTES Via the Remote-Off-Remote feature the following Remotes may be connected to the RSC with 2 to 6 DS-1 Links: RLCM, RLCC, and OPM256/640.

12.2.4 RSC PROVISIONING

Refer to ECM-497 to provision the RSC based on Traffic. The following components should be derived from ECM-497 (Refer to Engr. Manual Section EMA2-15-000 (NT6X10AC) for RCC P-Side and C-Side Ports PEC assignments):

- RSC Configuration Required (e.g. Mono, Co-Located, Dual, etc.).
- Quantity of RCCs Required.
- Quantity of LCMs Required. Refer to ECM-425 to equip LCE frames and to Provision PECs.
- Quantity of Links per LCM Required.
- Quantity of C-Side Links To Host Required.
- Quantity of RCC InterLinks Required for Dual RSC applications.

12.2.4.1 REMOTE CONTROLLER FRAME

The RCE frame hardware is provisioned via the Engineering Manual Section EMA2-15-000 for Detailed Engineering. The following modules reside on the RCE frame:

MODULE	DESCRIPTION
RMM	Remote Maintenance Module (RMM) which houses the service and diagnostic circuits. One RMM Card Cage is always provided at shelf position 51. A second optional RMM may be provisioned at shelf position 65. The RMM has 14 provisionable card slots. Slot 10 must always be equipped with an NT0X10 Scan Card. The always provided slots are populated via common PEC. One fully configured RMM is always required in the RSC.
RCC	Remote Cluster Controller (RCC) is the brains of the RSC. It is a two shelf module. Each shelf is called a Remote Controller Array (RCA). Circuits provisionable on the RCC are DS-1s, DS-30A, Shelf Power Card, CLASS Modem Resource CP, Universal Tone Receivers (UTR), and Labels.
CU	Cooling Unit (CU) is always required when provisioning the RCE Frame.

12.2.4.2 RCC UPGRADE KITS

The following RCC upgrade scenarios exist:

- NT6X12AB TO NT6X12AD w/NT6X02ZJ (US Only)
  In order to upgrade existing RCC modules NT6X12AB to NT6X12AD, use the PC Kit NT6X02ZJ. This kit contains two (2) NT6X46AC circuit packs for expanding the processor memory and two (2) new designation strips.
  This upgrade kit changes slots 8 and 13 to provisionable slots for NT6X45AF cards. Also, slot 10 is changed to allow for the provisioning of the second NT6X47AB (The first NT6X47AB (slot 11) remains AP). The NT6X47AB CP has been rated MD.
  For U.S. offices, provide one (1) NT6X02ZJ, Product Change Kit, for each existing RCC module NT6X12AB to be upgraded to NT6X12AD.
  In Canada, Change Application Dept. 1955 BRW will field upgrade existing peripheral modules as required (i.e. Systems Application Engineering will not order this kit). However, after Change Application field upgrades an office, Systems Application Engineering will update the office records accordingly.

- NT6X12AB TO NT6X12AE (Canadian Only)
  Canadian Change Application Dept. 1955 BRW will field upgrade existing NT6X12AB modules to the NT6X12AE vintage as required. However, after Change Application field upgrades an office, Systems Application Engineering will update the office records accordingly.

- NT6X12AC TO NT6X12CA w/NT6X02ZF PC-Kit
  In order to upgrade existing RCC modules NT6X12AC to NT6X12CA, use the Product Change Kit NT6X02ZF. It contains four (4) NT6X45BA circuit packs to replace the existing four (4) NT6X45AF cards. It also contains four (4) new designation labels.

- NT6X12AD TO NT6X12AF w/NT6X12ZY PC Kit
  MD per Issue: 12 of the ECM per ECD 11-17790. Replaced by NT6X69AC. For more information concerning upgrading the host processors, refer to ECM 373.

- NT6X12AE TO NT6X12CA w/NT6X12ZY (Canadian Only)
  MD per Issue: 12 of the ECM per ECD 11-17790.
  For more information concerning upgrading the host processors, refer to ECM 373.

- NT6X12AD TO NT6X12AG w/NT6X12ZC
  This PC Kit provides information required for upgrading the NT6X12AD Packfill to a NT6X12AG Packfill.

- NT6X12CA TO NT6X12AG w/NT6X12ZD
  MD per Issue: 22 of the ECM per ECD 11-17790.

- NT6X12AF TO NT6X12CA w/NT6X12ZZ
  This PC kit provides information required for upgrading the NT6X12AF packfill to a NT6X12CA packfill.
  The NT6X12AF packfill may be upgraded directly to XMP+ as follows:
  1) Use NT6X12ZG Kit - Remove any vintage NT6X45 (shelf 18/32 - pos 8,13). Remove any vintage NT6X46 (shelf 18/32 - pos 12). Remove any vintage NT6X47 (shelf 18/32 - pos 10,11).
  2) Order (2) NT6X72AB and (2) Des Labels, P0733837. Use them to replace the (2) NT6X72AA cards (shelf 18/32 - pos 19).
  3) Order NT6X12AL Designation Strip, P0739325.
  Note: If upgrading to the NT6X12AN CP Fill, the NT6X72AA CP does not have to be replaced with NT6X72AB.

- NT6X12AH (NT6X50AB Upgrade Kit)
  This kit is designed for NT6X12CA and earlier RCC Common Circuit Pack Fills. It upgrades the existing NT6X45 to the NT6X45BC vintage and replaces the NT6X50AA in the RCC Slot 20 with a NT6X50AB. The remaining NT6X50ABs must be provisioned as required.
  The NT6X45BC has been replaced with NT6X45BD for Dual RCCs and Mono RCCs . When the NT6X12AH is provisioned the host office XPM must be equipped with BCS-31 or later and at least the NT6X45BC. Note: NT6X50s between host and remote must match (eg. AAs in host AA must be on C-Side of remote).

- NT6X12AG TO NT6X12AK RCC+ w/ NT6X12ZF Upgrade Kit
  MD per Issue: 15 of the ECM per ECD 11-20918. Replaced by NT6X02XG which uses paddleboards instead of wire.

- NT6X12ZG Dual RCC Upgrade Kit
  This kit upgrades the RCC Common CP Fill from the NT6X45BC to NT6X45BD for RCC applications.

- NT6X12AA-AG & CA TO NT6X12AK RCC+ w/NT6X02XG Upgrade Kit
  This kit is designed to replace the MP/SP Processor CPs with the UP (MX77/71AA) processor. It includes paddleboards, instead of wire, to inplement the required backplane jumpers.

- NT6X12AL TO NT6X12AN w/NT6X12ZJ Upgrade Kit
  This kit makes the the NT6X72 and NT6X92 circuit packs provisionable in the RCC. Previously, they were always provided in the stocklist of RCC CP Fills. The NT6X12AN allows any vintage of the NT6X72 to be used as well as the NT6X92BB and above vintages of the UTR.

- RCC TO RCC2 w/NT6X10ZY Product Change Kit
  This kit replaces the NT6X1201 RCC controller shelves with NT0X84AA filler shelves during conversions from RCC to RCC2. The NT6X10ZY PC Kit has been rated "Manufacture Discontinued".

- RCE TO RMME w/NT6X10ZA Product Change Kit
  The NT6X10ZA Product Change (PC) Kit allows NT6X13 RMM shelves (or full shelf filler panels) to replace NT6X12 RCC shelves in field based NT6X10AC/AD RSC frames. Because the functionality of the NT6X10AC/AD frame is changing, application of the NT6X10ZA PC Kit changes the frame PEC/designation of the RSC frame from NT6X10AC/RCE or NT6X10AD/RCEI to NT6X10DA/RMME.

12.2.4.3 SUBSCRIBER LINE CIRCUITS

The LCE frame at the remote site contains the same Line Concentrating Modules (LCM), ringing generators and line drawer cutoff straps as provisioned in the host. Each LCM will serve up to 640 subscribers. The LCM will interface to the RCC module via DS-30A links (each 2 to 6).

For provisioning LCEs and LCEIs, refer to ECM 619 and ECM 685 respectively.

An RCC Module may be provisioned with four (4) DS-30A LCM Interface CP (NT6X48AA) (i.e. a CP in card slot 6 & 7). The ports from each LCM must be spread evenly across both circuit packs.

DS-30A ports 0 & 1 (found on the NT6X48AA CP equipped in card slot 07 of the RCC) are reserved for control of the RMM shelf. Thus all RSCs equipped with RMM shelf(s) and interfacing to LCM must be configured with four (4) DS-30A LCM Interface CP (NT6X48AA).

The RSC supports all current line features that are supported by host LCM's. This includes POTS, IBN stations, IBN consoles, DATAPATH and IBN Business Sets.

The dual RCC configuration supports the same subscriber line feature set provided by the current RSC except when in ESA mode.

12.2.4.4 RME/PDC FRAME PROVISIONING

The RME Frame is provisioned in the RSC to house Power Distribution equipment and/or other miscellaneous assemblies. The RME may serve as RSC's power distribution center, if the total number of fuses does not exceed 56.

When extending an office equipped with an RME frame configured as a PDC, provision one NT0X58DA (ABS Alarm Kit) to convert from a 10 Amp fuse to a 20 Amp fuse. This change is always required on a one time basis when extending an office.

The RME may not serve as the RSC power distribution center, if the office is engineered for Electromagnetic Interference (EMI). This is due to an inability to equip the RME with EMI-Shielding.

Remote Miscellaneous Equipment (RME) Frame

The RME Frame (NT0X02AB) will serve as frame space for the power distribution fuse panels, spare circuit pack cages or other Telco defined miscellaneous frame space.

12.2.4.5 OTHER MISCELLANEOUS H/W PROVISIONING

A tool kit (NT0X58AD - RLCM/RSC maintenance tool kit) is now available for RSC and RLCM offices. Provisioning information is similar to the tool kits currently ordered for host offices.

The Remote Alarm Panel (NT0X63AC) may now be provided for a RSC Site.

12.2.5 Office Layout Information

Not Applicable.

12.2.6 Traffic Tables

See ECM 497 For Traffic Data.

12.3 Product/System Specification

12.3.1 Physical Characteristics

12.3.1.1 Remote Controller Equipment Frame (RCE)

MECHANICAL DIMENSIONS
Height 84" Width 27"

12.3.1.2 Remote Miscellaneous Equipment Frame (RME)

MECHANICAL DIMENSIONS
Height 84" Width 26"

12.3.2 EMI/Earthquake Information

ELECTROMAGNETIC INTERFERENCE (EMI)
When the EMI option is specified for a RSC, all power equipment must reside in a Power Distribution Center (PDC) Frame. The RME may not be equipped with power fuse panels when the EMI option is specified. Reference all EMI hardware provisioning information in ECM-125.

EARTHQUAKE INFORMATION
The RSC is now being provisioned with the NT0X25AH Universal frame for all applications.

12.3.3 Sparing Information

Standard Sparing algorithms apply.

12.3.4 Power Feed and Fusing Requirements

12.3.4.1 Remote Controller Equipment Frame (RCE)

Input Voltage -48 VDC
Power Consumption 1000 Watts
Current Drain 22 Amps
Thermal Dissipation Content Variable

12.3.4.2 Remote Miscellaneous Equipment Frame (RME)

Input Voltage -48 VDC
Power Consumption Content Variable
Current Drain Content Variable
Thermal Dissipation Content Variable

12.3.5 Current Drain Information

12.3.5.1 Remote Controller Equipment Frame (RCE)

The RCE Frame requires 3 each 20 amps fuses.

12.3.5.2 Remote Miscellaneous Equipment Frame (RME)

The RME Frame requires 2 each 20 amps fuses.

12.4 Software Provisioning

For NTX software packages to PCL/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

12.4.1 Required Software Packages and Interdependencies

The RSC software packages and their interdependencies are outlined as follows:

RSC Basic	
NTX145AA	R SC Basic
Needs NTX269AA	Universal Tone Rece
NTX270AA	New Peripheral Main
NTX901AA	Local Basic
NTX001AA	Common Basic

Optional RSC S/W	
NTX149AA	E mergency Stand Alone (ESA) (lines only)
NTX150AA	Intra RSC Calling
# NTX152AB	RSC Digital Trunking
# NTX152AA	RSC Digital Trunking (A&M only)
NTX149AB	ESA Lines & Trunks
NTX381AA	RSC-Remote off Remote
* NTXR34AA	XPM Plus Basic (Replace by NTXR34AB in BCS-35
* NTXJ05AA	XPM Plus In RSC
* NTX750AB/AC	XPM Plus In RSC (BCS-34)
* NTX750AC	XPM Plus In RSC (BCS-35)

If software feature package NTX152AA/AB RSC Digital Trunking is specified then the RSC must interface to a host LTC and RCC packfills NT6X12AA/AB/AC/AD/AE/AF/AG/CA/DA/DC/DE/DG, containing NT6X45BC or earlier, must be upgraded to NT6X45BD or higher or XPM+ (MX77). This will bring the packfill to NT6X12AL.
* Required to support NTMX77/71AA Processor in RSC.

Dual RCC S/W	
NTX380AA	D ual RCC
Needs NTX145AA	RSC Basic
NTX150AA	Intra RSC Calling

NOTE: In BCS 34 - The Following ESA S/W Pkgs Are Required, If The ESA Option Is Selected
FOR ESA Lines Only:
NTX149AA - ESA RSC Lines Only ESA (Pre-Requisite)
NTXQ12AA - Enhanced RSC (Line Only) ESA

FOR ESA Lines And Trunks:
NTX149AB - ESA Lines & Trunks (Pre-Requisite)
NTXN82AB - Enhanced RSC ESA (Lines & Trunks)

12.4.1.1 Dual RCC Software

The following software information is provided for the Dual RCC feature only; for further software information on RSCs, refer to the appropriate NTPs and General Feature Descriptions.

12.4.1.2 Dual RCC ESA (DESA)

Dual RCC ESA increases the line capacity from a maximum of 5,760 lines to 11,520 lines while in ESA. The two RCCs coordinate their individual resources with one another by utilizing interprocessor messages over the digital links that connect the RCCs. The number of digital links between RCCs is engineered according to traffic characteristics, but a minimum of two is required.

This feature provides the capability for a line subscriber originating off of an RCC to call a subscriber terminating off of the mate RCC while in DESA. When it is not possible to process a request, because the call is destined for lines reached through the host or because features require host resources not available at either RCC, the subscriber will be connected to reorder tone.

Interswitching of calls while in ESA is possible since all calls between subscribers subtending one Remote Cluster Controller or its spouse (e.g., the other RCC) are completely processed within the dual configuration.

In order for the Dual RSC to translate E911 calls while in ESA, each RCC must have a 911 LEN or an EMERGENCY SERVICES TRUNK.

An emergency call (such as 0 or 911) that normally terminates at the host can be routed to a special termination specified in Table ESAPXLA. The TELCO can specify alternate routing, on a per RCC basis, for up to sixteen entries for POTS and a maximum of eight entries for each IBN customer group.

Automatic activation of dual ESA call control will occur whenever both RCCs have entered ESA and at least one messaging interlink is serviceable. Should only one RCC enter ESA, then interlink call processing will not be activated. Only intracalling will be possible.

An RCC will enter ESA when it has the correct datafill and can no longer message to the CC over its C-Side host links. This may be due to faults on its host links, or because the LTC/LGC is out of service for some reason.

The two RCCs in a Dual configuration communicate via the Interlinks. When an RCC in a Dual configuration enters ESA, it queries the other

RCC as to whether or not the conditions for Dual ESA (DESA) are present. If DESA conditions are not present then the mate can be forced into ESA (BCS 27). If DESA conditions are present, then DESA is entered and interswitching can proceed. The conditions for DESA are:

1. Each RCC is in ESA.

2. DS1 Frame Synchronization is verified on the Interlinks.

3. Each RCC can message to the other via the Interlinks.

During ESA the host DMS switch will continually try to re-establish communications with both RCCs. Upon restoration of communications, the host will exit the RCCs from ESA. If both RCCs are in a system or C-Side busy state and Office Parameter ESAEXIT is not zero, the system will automatically initiate ESA exit. Otherwise, manual exit will be necessary.

Exit from ESA will result in all intra- and intercalls being dropped. Typically, it will take approximately eight minutes to fully restore call processing per each RCC after exiting ESA.

12.4.1.3 Dual RCC ESA Force Down Option

The Force Down Option is chosen via a flag in the IRLNKINV TABLE, where the interlinks are datafilled. If the flag is "y", then whenever one RCC in the Dual configuration enters ESA, the other also enters ESA. When an RCC enters Force Down, it sends a PM189 info log to the CC with the text "FORCE DOWN", and simulates link faults on its host messaging links (C-Side link numbers 0 and 2). If these links are posted at the Carrier level of the Maintenance and Administration Position (MAP), they will show Remote Carrier Group Alarms (RCGAs).

If for some reason the RCCs can no longer message over the Interlinks during DESA with one RCC in Force Down, then the RCC which is in Force Down will start a timer. If Interlink messaging is not restored before the timer expires, then that RCC will stop simulating link faults, and exit ESA. If Interlink messaging is restored before the timer expires, then the timer is canceled, and DESA is re-established. If after the timer expires and the RCC exits ESA, Interlink communication is restored, then the RCC will be forced into ESA again.

The reason for the timer is to avoid exiting Force Down due to bouncing interlinks. The amount of time that the RCC waits is determined by the office parameter RSC_ESAENTRY_BADLINK in table OFCENG, which is used to filter bouncing host links for ESA entry and defaults to 30 seconds.

12.4.1.4 ISDN Line Drawer Remotes

The baseline software load for ISDN Line Drawer for Remotes is NA007 for the Host office, and XPM08 for the RSC Remote.

12.4.2 Software Usage Restrictions

12.4.2.1 Dual RCC Interlink Restrictions

Interlinks can only be assigned in Table IRLNKINV if the port is not already equipped as a C-Side link, or allocated for dynamic trunks.

Each member of a trunk group in an RSC must belong to the same RCC. Also, Table IRLNKINV (interlink table) must be datafilled to establish a dual relationship between two RCCs before their route entries can be datafilled in Table ESARTE to use each other's trunk groups.

There will not be any Automatic Number Identification (ANI) out pulsed for a line terminating on an Emergency Service Bureau (ESB) trunk on the spouse RCC.

Additionally, the office must be configured with package NTX152AB for trunk interswitching calls to work.

12.4.2.2 POTS Call Limitations

Dual RCC S/W adheres to the following limitations for POTS calls:

1. Only one Home Numbering Plan Area code will be supported per dual RCC configuration while in ESA mode.
2. Billing information is not recorded while in ESA.
3. No custom calling features are supported while in ESA.
4. No dial tone speed measurements are taken while in ESA.
5. Equal access features are not supported while in ESA.
6. Foreign exchange calls are not supported while in ESA.
7. All calls will be dropped during ESA entry and exit.

12.4.2.3 Dual RCC IBN Call Limitations

Dual RCC S/W adheres to the following limitations for POTS calls:

1. Network Class Of Service is not supported for IBN lines.
2. Custom calling features are not supported. EBS and Data Unit feature keys will not operate, flash is not recognized, no action will be taken when feature keys are pressed, and conferencing is not supported.
3. All calls will be dropped during ESA entry and exit.

12.4.2.4 POTS/IBN Call Unsupported Services

The following POTS/IBN line services are not supported in a Dual ESA mode:

1. Automatic lines (AUL) originating on one RCC and terminating on the spouse.

2. Calls originating on one RCC and terminating to a hunt group on the spouse. For BCS25 the originating subscriber will only be capable of terminating on the spouse if the group member that was associated to the DN by CC static data is idle (i.e. the group is not searched).

12.4.2.5 POTS/IBN Call Supported Services

The following POTS/IBN line services are supported in a Dual ESA mode:

1. Basic line-to-line dialing: A subscriber can make calls to any other subscriber serviced within the dual RCC configuration.

2. Invalid termination is routed to reorder.

3. POTS Line Services Supported in a Dual ESA Mode of operation are the same as those supported for a single RCC configuration while in ESA.

4. Supported Customer Services While in a Dual ESA Mode

   - In addition to the IBN customer group services supported on a per RCC basis, five more are also supported on a dual RCC configuration basis which are:

   - Only the treatments strip and translate (SRPXLA); and strip, second dial tone and translate (SRPDXLA) are supported using table ESAPXLA.

   - Direct outward dialing with or without second dial tone for terminating on a POTS line.

   - Denied incoming call for a station.

   - Termination to the primary directory number of a Multiple Appearance Directory Number (MADN) group.

   - Origination by all lines within a MADN group.

5. Supported POTS Line Types While in a Dual ESA Mode

   - Single party flat rate.

   - Two party flat rate.

   - Four party flat rate without ANI.

   - Eight party flat rate without ANI.

- Multi-party flat rate without ANI.
- Individual message rate lines are treated as single party flat rate.
- Coin dialtone first service with coin returned.
- Coin coin first service with coin returned.
- Semi-postpay coin service with no coin refund while in ESA.
- Cutoff on disconnect option - cutoff relay is operated for 300 milliseconds.
- PBX message rate lines treated as PBX flat rate.

6. Supported IBN Line Types while in a Dual ESA Mode

- Standard 500 and 2500 sets.
- An IBN supported electronic business set is treated like a 2500 set with the primary directory number (PDN) as the directory number. Only the PDN and RELEASE keys are supported.
- Only the primary directory number is supported for a data unit (i.e., no modem pool).
- Attendant consoles are not supported.

12.4.2.6 Emergency Stand Alone (ESA)

The ESA software feature (NTX149AA) (lines only) in the RSC provides sufficient intelligence in the RSC to allow continued limited POTS service for intraswitched calls when the message DS-1 links to the host LGC/LTC are out of service, such as:

SUPPORTED SYSTEMS	NON-SUPPORTED SYSTEMS
POTS calls (Intra-RSC)	IBN Attendant Consoles
IBN Station calls (Intra-RSC)	Datapath
IBN Business Set's	Station features
Primary numbers	Feature Activation

Up to 16 directory numbers or prefixes may be datafilled for special routing during ESA. Up to eight (8) prefixes or special numbers may be datafilled per IBN customer group for special routing during ESA. Calls in progress are taken down during entry to and exit from ESA. Billing info is lost for calls during ESA takeover. Local coin calls are free during ESA. No additional hardware is required for operation of the ESA feature.

12.4.2.7 Dual RCC ESA

When both RSCs in a dual RCC configuration are in ESA mode, line and trunk intracalling within each RSC and line and trunk interswitching between the RCCs via the DS1 interlinks are supported. If either RSC in a dual RCC configuration loses communication with the host, the customer will be given the option of having both RSCs enter ESA or of having one in ESA and the other in normal operation with interswitching not supported. Support for a dual RCC configuration with one RSC in ESA mode and the other RSC in normal operation with full interswitch capabilities cannot be provided currently.

12.4.2.8 NTX381AA Feature Remote-off-Remote

1. General
   This feature is currently available at BCS-23 in feature package NTX381AA and is compatible with the dual RCC. However, each RLCM or OPM must still home on only one RCC. The number of remotes supported by two RCCs in a dual RCC configuration is twice that supported by a single RCC. As is true now, loss can be inserted at the line card when either or both RSCs are in a remote-off-remote configuration.

2. RLCM/OPM Off RSC
   The Remote Off Remote feature provides for connecting an RLCM/OPM to the P-Side of an RCC which will provide the same features that are available to an LCM off the RCC.
   The Remote-off-Remote configuration allows several smaller sites to be remoted off the site served by the RCC. This facilitates the conversion of small offices to DMS-100, and with intraswitching the usage of DS-1 facilities is kept to a minimum. The same features that are provided for an RLCM off a Line Trunk Controller (LTC) (such as intraswitching, ESA, RMM, and carrier maintenance) are supported on a RLCM off an RCC.

3. Intraswitching
   Intraswitching provides the capability of switching calls at a remote location without requiring transmission back to the host. Both the RCC and the RLCM have line to line intraswitching capabilities which operate as follows:

   - For intraswitched line to line calls a loss of 0dB is inserted. This loss value is valid for up to 100 miles on a line to line call. This feature supports a maximum distance on intraswitched calls of 100 miles. Therefore, for intraswitching purposes the RCC and the RLCM must be within a distance of 100 miles from the host LTC.

   - Furthermore, the RLCM must be within 50 miles of the host RCC because an intraswitched call at the RLCM level could be blocked and then an attempt is made to intraswitch at the RCC level. This would result in a path of 100 miles (2 X 50) and is within the 100 mile limit. The same situation occurs if a call is made

between two RLCMs on the same RCC (See Typical Remote-Off-Remote Configuration diagram).

4. Emergency Stand Alone (ESA) Issues
Both the RCC and the RLCM have ESA capabilities. Entry into ESA occurs when communication to the host node is lost. Several points are of special importance when considering RCC and RLCM ESA entrance and exit:

- It is the breaking of the PM's message links or the inability of a host processor to return the ESA loop around message that triggers ESA entrance. Both the CC and the RCC (when in ESA mode) can return the loop around message. So as long as the RLCM can talk to either of these it does not enter ESA.
- The RLCM cannot exit ESA if the RCC is still in ESA. This is because the RLCM ESA exit involves a system Return to Service (RTS) of the RLCM and this cannot be handled by the RCC resident software.
- The RLCM_ESAENTRY_BADCSIDE time-out control in table OFCENG, has to be long enough to prevent the RLCM from entering ESA while its C-Side modules (CC-LTC-RCC) are performing a restart.

12.4.3 Memory Provisioning

Refer to MEMCALC for Host Office Memory Requirements as they relate to the Host Based Remote Switching Center (RSC) software.

12.5 Real Time Impact

Refer to MEMCALC for Real Time provisioning requirements.

13.0 ECM691 - Model B Remote Switching Center - S ONET

13.1 Overview

Product/System Overview

The RSCS (text deleted) is a cabinetized Remote Switching Center based on the Remote Cluster Controller 2 (RCC2), a new controller with more P-side ports than the standard RCC. The RCC2 shelf mounts in the CRSC cabinet.

The RCC2 replaces the RCC and the CCI for new systems (BCS-33).

RCC2 Key Characteristics

- 54 P-Side ports (instead of 20) which can be a mix of DS1s, PCM30, DS30As and DCHs. A maximum of 46 DS1/PCM30s, 32 DS30As or 10 DCHs may be provided in various combinations. Restrictions on mixing these interfaces will be detailed in this ECM.
- Handles ISDN 2B1Q and POTS traffic

The RCC2 shelf utilizes a Quad Carrier circuit pack which mounts four DS1/PCM30 "packlets". Each packlet provides two DS1/PCM30 interfaces so each slot with a Quad Carrier provisioned may have up to eight DS1/PCM30s.

The International RSCS hardware differs from the North American RSCS as follows:

- PCM30 Packlet
- New coaxial Bulkhead
- Coaxial cabling
- Inclusion of International RMM

The RSCS may be deployed in single or multi- cabinet configurations. The single cabinet configuration consists of the CRSC cabinet powered by the office power board. The multi-cabinet configuration may consist of:

- one or two CRSC Cabinets (Mono RCC2 or Dual RCC2)
- CPDC, CMIS and CMSS Cabinets as needed
- one CEXT cabinet per two CRSC cabinets
- up to 5 Line Cabinets (CLCEs) (in Mono RCC2)

| The Remote Switching Center - S (text deleted) (RSCS) shall be introduced in two (2) phases. The plan announced earlier has been changed to combine Phases 2 and 3. The current plan is as follows:

- Phase I (BCS-33):
  - Single cabinet configuration with a maximum of 480 lines mounted in the integral LCME (2B1Q, POTS, MDC). Standard RMM provides maintenance and service circuits. Supports all current RSC and RSCI features. Maximum of 16 C-side and 54 P-side ports.
  - Multi-cabinet configuration with CPDC and provisionable CEXT, which extends the capabilities of the CRSC by providing increased mounting flexibility. A CMIS may be provisioned for miscellaneous equipment. Additional lines can be housed in CLCEs.
  - P-side Interlinks for Dual RSCS.
  - OPM/RLCM off RCC2 - maximum of seven OPM+RLCM equipped with ESA
  - Notes: If Coin Lines are required an LCM must be provisioned to support them. This LCM can be in a separate CLCE/LCE or in the CRSC with a provisionable LCM. This ECM covers provisioning of the CRSC and CEXT only. Refer to ECM-600 for provisioning of CLCE, ECM-655 for Model A CMIS, ECM-683 for Model B CMIS, and ECM-631 for CPDC provisioning. Provide NTRX49AA (Model A) or NTRX49BA (Model B) Cabinetized Miscellaneous Spare Storage for spares storage in RSC-S applications.
- Phase I Enhancements (BCS-34)
  - SMSR support
  - Downloadable firmware support for NTMX77AA
- Phase II (Schedule To Be Determined)
  - Cabinetized LCME (CLMI)
  - RLCM to RSCS upgrades (in Conversions program)
  - RSC to RSCS upgrades (in Conversions program) (ECM-586)
  - full fiberization (OC-3 interface card)
  - Fiber multiplex interface (STS-1) (BCS-38)
  - Cabinetized Direct SONET Interface (CDSI) (BCS-38)
  - Development of Fiber Interface Module (FIM) and RMM2
- Other Developments

- Products and services for International Markets

| It should be noted that the Int ernationa l roll-out is one BCS later than the domestic RSC-S roll-out and the hardware introduction is synchronized with the BCS release. This plan addresses hardware roll-outs for Phase 1 only (i.e. BCS-34). Phase 2 and 3 which are funded by separate DAs (Development Agreements) are covered in separate standalone plans later.

Phase II developments are Gated separately and the provisioning and configuration rules for SMS-R are included herein.

| The (text deleted) RSC S default color is FiberWorld Grey. Codes for providing DMS brown equipment are included herein.

Extended Distance Capability

| A RSCS (text deleted) can be upgraded to operate beyond the present 100 mile (150 mile in Canada) distance limit by changing the messaging protocol used by the remote and the host. These modifications increase the allowable signal delay to 6.5 milliseconds (one way), which provides the capability of about 500 miles from the host. This is useful both for remotes situated more than 100 miles from the host and for fiber ring applications where the transmission delay is increased without increasing the actual distance. The increase is provided by changing the DMSX messaging protocol to HDLC. The Extended Distance Capability (EDC) is intended for use over any physical transmission medium, provided that no existing RSC-S specification (for example, jitter or Bit Error Rate) is violated. The RSC-S with EDC must be hosted by an XPM PLUS-equipped peripheral that is equipped with the HDLC messaging packs (NTMX76AA-EDC only) or (NTMX76AB-EDC and ADSI/SCWID feature).

| (text deleted)

| RSCS (text deleted) EDC is introduced for domestic applications in BCS-35 and international applications in BCS-36.

| Model B RSC-S (text deleted) Changes

The Model B Remote Switching Center project introduced the en-
| hanced cabinet and Modular Supervisory Panel to the RSCS (text
| deleted) for both domestic and International applications. Improvements in the cooling unit and system cabling are also included. These improvements eliminate many of the assignment restrictions previously required on Remote Maintenance Module (RMM) shelves in RSC-S applications and ease integration of remote cabinets with existing frame-based equipment.

Since the Model B RSC-S project primarily addressed cabinet, cooling, MSP and cabling issues, circuit pack level provisioning

rules are basically unchanged. The RCC2 and EXT shelves are equipped exactly as in the original RSC-S and the numbers and types of interfaces supported are unchanged. The Model B remote is vertically powered (i.e. powered through a top mounted remote power filter unit) for all applications except when extending an existing Model A lineup which uses horizontal (internal) power. There is a horizontal power kit which may be supplied for this application.

| The Model B RSC-S is packaged (text deleted) so that the same base cabinet package is used for all CRSC and CEXT applications. This base cabinet package is then equipped with various kits to produce the required configuration. The following combinations are available:

- Twisted Pair cable CRSC with internal LCM shelves
- Twisted Pair cable CRSC with internal LCME shelves
- Coaxial cable (PCM) CRSC with internal LCM shelves
- Coaxial cable (PCM) CRSC with internal LCME shelves
- Twisted Pair cable CEXT with internal LCME shelves
- Coaxial cable (PCM) CEXT with internal LCME shelves

Refer to the Engineering Manual sections for provisioning details.

13.1.1 Subscriber Carrier Module 100S - Remote (SMS-R)

The Subscriber Carrier Module 100S - Remote (SMS-R) may be homed
| off an RSCS (text deleted) . The SMS-R module is mounted in a Cabinetized Common Peripheral Equipment (CCPE) unit which resides at the RSC-S site. RCSs homing on the SMS-R may be located up to twenty miles away. The SMS-R interfaces to the RCC2 shelf via two to four DS30A links. The absolute maximum number of SMS-Rs that may be hosted by a single RCC2 shelf is nine but such a configuration would be unable to support any additional traffic. The maximum number of RCSs per SMS-R is six.

The SMS-R supports Special Connections (hairpins) from its P-side. If these connections are routed to more than two P-side DS-1s, an external digital cross-connect should be utilized to expedite this routing. This avoids wasting an excessive number of SMS-R P-side ports. Refer to ECM-497 for SMS-R traffic provisioning rules.

Refer to Building Block NTZZ22CA for CCPE provisioning and NTZZ03EA for the SMS-R module. Refer to the Software Restrictions section for information on counting SMS-R Terminal IDs, etc.

Provisionable EISP

| Prior to BCS-35, the RSCS (text deleted) software required the presence of the Enhanced ISDN Signaling Preprocessor (EISP) for all applications. A BCS-35 enhancement changes this requirement so that the EISP is required only when ISDN is supported. Since the original RCC2 packfill (NTZZ12XA) included the EISP pack as Always Provided equipment, a new packfill is introduced which allows for provisioning the EISP packs only when required. In order to allow this packfill to support both normal and extended distance applications, the messaging packs are also removed to allow either the NT6X69-- or NTMX76-- to be provisioned. This packfill (NTZZ12XB) can therefore be equipped for either non-ISDN or ISDN applications as well as for standard or extended distance.

The provisionable EISP feature is not available in the international RSC-S software load and the EISP packs must be supplied for all non-North American applications.

13.1.2 CRSC Layout

13.1.3 Layout

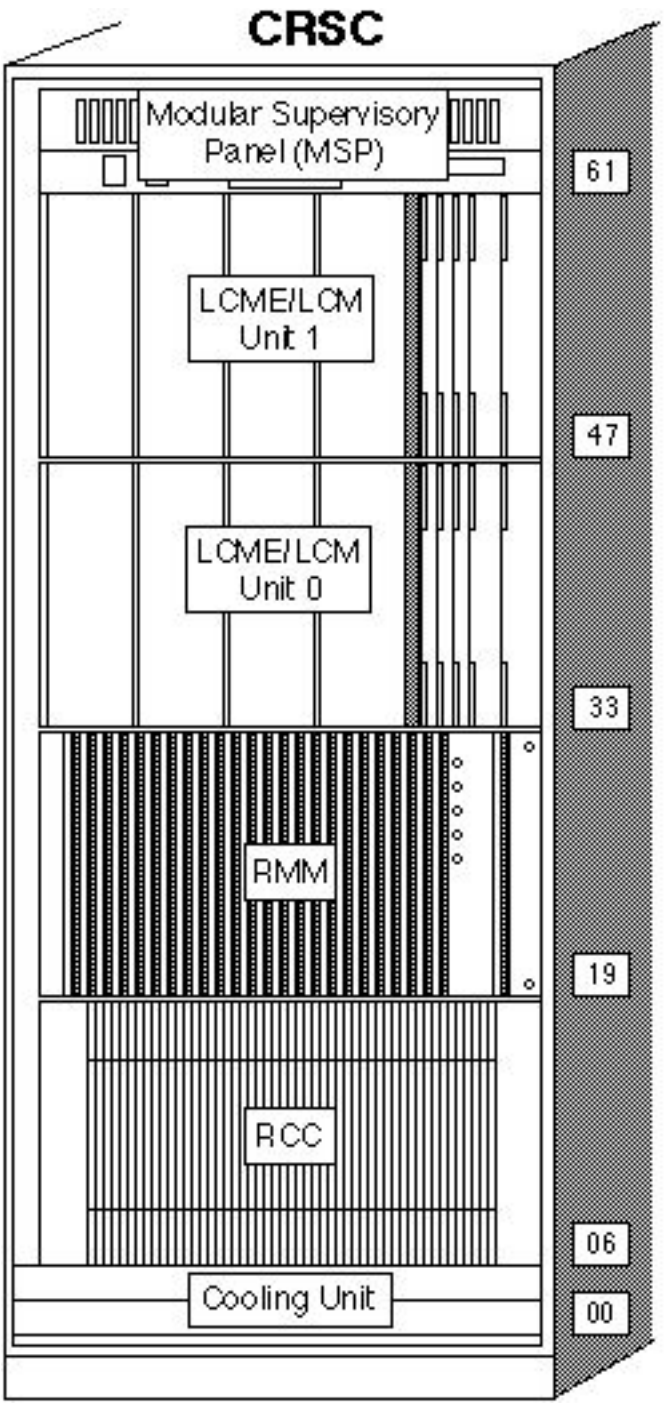


Figure 17. GCRSCCAB.GIF

13.1.4 CEXT Layout

13.1.5 2

13.1.6 . CEXT Layout

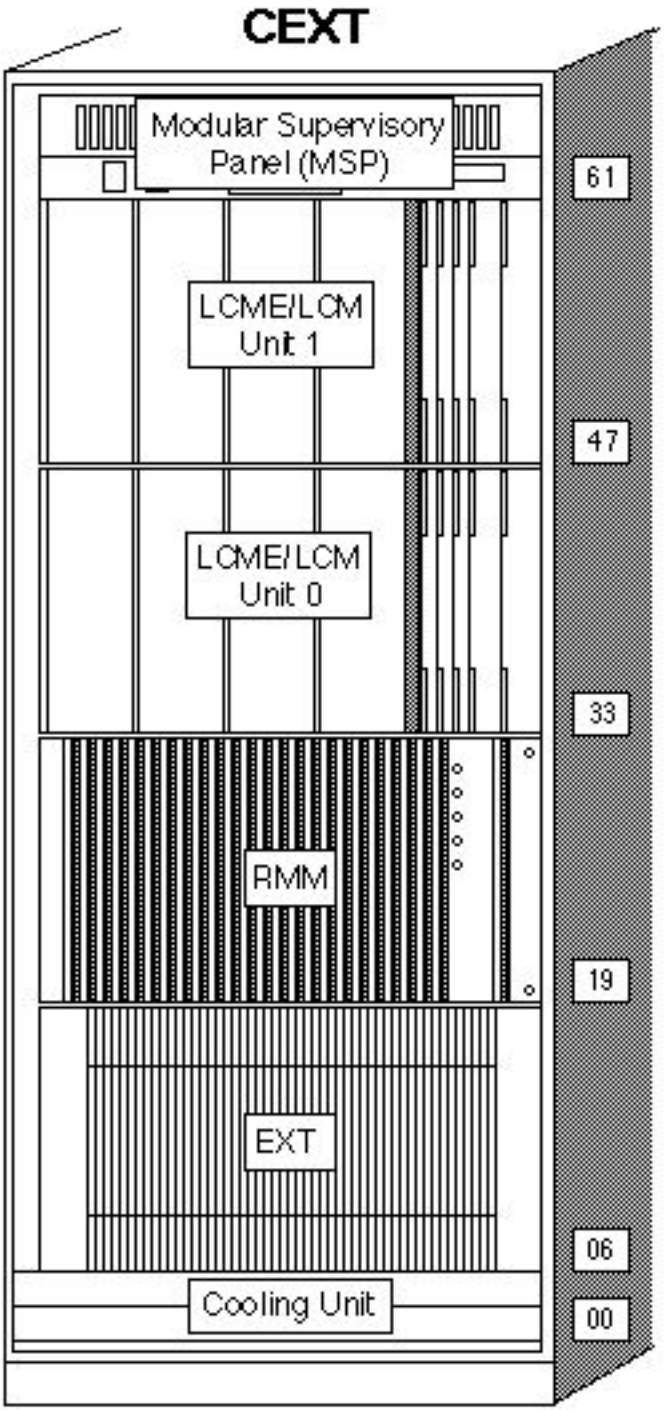


Figure 18. GEXTCAB.GIF

13.1.7 RSCS Office Layout (Phase 1 View)

13.1.8 3

13.1.9 . Single (Mono) RSCS Office Configuration (Phase 1 View)

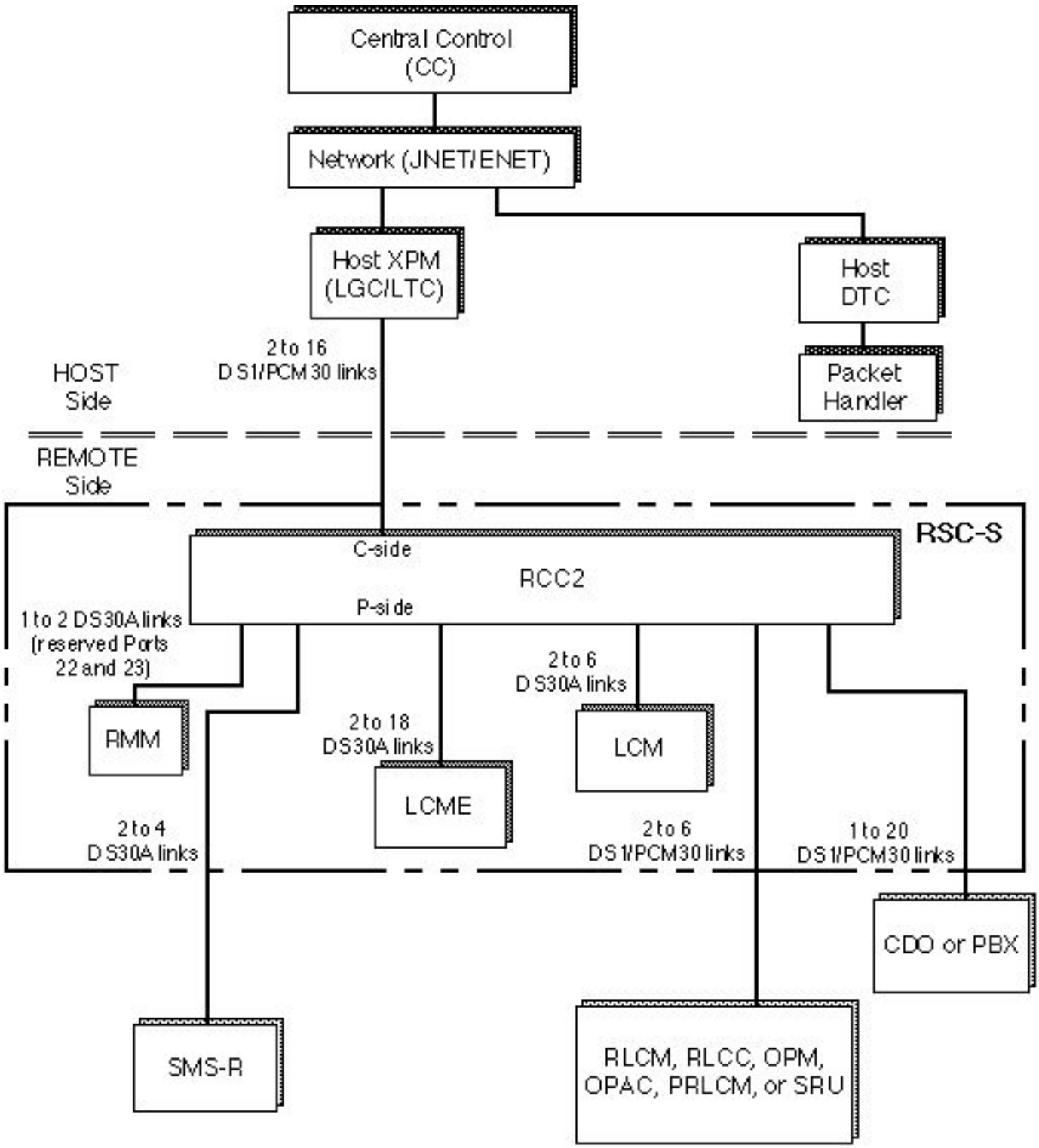

Central Control
(CC)
Network (JNET/ENET)
Host XPM
(LGC/LTC)
Host
DTC
2 to 16
DS1/PCM30 links
HOST
Side
Packet
Handler
REMOTE
Side
RSC-S
C-side
RCC2
P-side
1 to 2 DS30A links
(reserved Ports
22 and 23)
2 to 6
DS30A links
RMM
2 to 18
DS30A links
LCM
LCME
2 to 4
DS30A links
2 to 6
DS1/PCM30 links
1 to 20
DS1/PCM30 links
CDO or PBX
SMS-R
RLCM, RLCC, OPM,
OPAC, PRLCM, or SRU

Figure 19. GRSCSOFC.GIF

13.1.10 Dual RSCS Layout (Conceptual)

13.1.11 4

13.1.12 . Dual RSCS Office

13.1.13 .rc 1 ON;(text deleted)

13.1.14 .rc 1 OFF

13.1.15 Configuration (Phase 1 View)

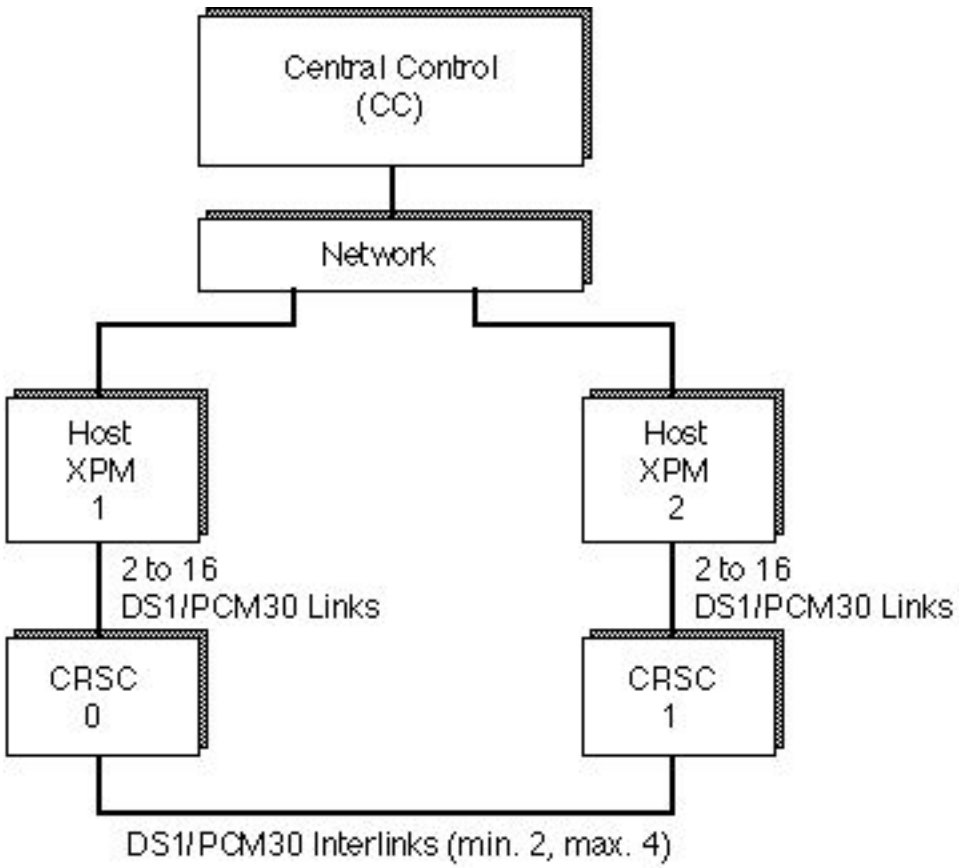


Figure 20. GDUORSCS.GIF

NOTE: The first two interlinks must be Port 0 (Slot 12: packlet 0) and Port 8 (Slot 16: packlet 0).

13.1.16 Building Integrated Timing System (BITS)

The BITS project has been cancelled.

13.2 Hardware Provisioning

13.2.1 Hardware Usage Restrictions

The NTAX74AA CPM Processor is a new enhanced processor used in RSCS
| (text deleted) applications in place of the NTMX77AA Processor.

For the RSC-S, the NTAX74AA Processor CPs may be provisioned in
| Domestic/North American, (text deleted) Global/International and European markets. Listed are software release requirements:
* Domestic/North American Markets - The NTAX74AA is optional in NA007/XPM08. Any new RSC-S engineered with NA007/XPM08 may have either NTAX74 or NTMX77 as its main processor. The NTAX74AA is required in all new Initials and new Extension shipments ordered
| with NA008/XPM081. (Initial is defined as new switch that passes
| through the manufacturing floor and Extension is defined as adding equipment to existing offices.) Orders supporting NA006/XPM07 extensions and earlier software releases should continue to be provided with the NTMX77s. The NTMX77AA is currently projected to
| exhaust in XPM 1 (live through XPM 1); therefore, NTAX74AA will
| be required on all applications in NA0 1 /XPM 1 .
* Europe Market - NTAX74AA Introduced and required in EUR06/XPM08E.
| (text deleted)
* China Market - NTAX74AA introduced and required GL03.1/XPM08G.

| (text deleted)

| (text deleted)

| The NTAX74AA does not support the NT7X05AA Peripheral Loader prior
| to NA008/XPM081 software release for the North American market.
| If the NT7X05AA is present prior to NA008/XPM081, replace with
| NT0X50AA filler panel and label. As of NA008/ XPM081, the NT7X05AA will provide loadfile support for the NTAX74AA in the DMS100 RSCS
| Applications. Imaging cap a bility is NOT Supported for the
| NTAX74AA. The NT7X05AA Peripheral Loader (NTZZ02UB) can be pro-
| visioned with the NTMX77AA at XPM05 or later.

The Minimum baseline enhanced ISP Pack, required for proper NTAX74AA functionality, is the NTBX01BA.

| General RSC-S (text deleted) Hardware Usage Restrictions are as follows:

1. The Maximum Cable Distance Between the RCC2 Shelf located on the CRSC Cabinet and the EXT shelf located on the CEXT Cabinet is 20 feet.

2. The maximum distance from the host to the farthest remote off the RCC2 when using DMSX messaging (NTZZ12XB packfill with NT6X69 messaging CP) is 100 miles for U.S. applications and 150 miles for Canadian applications. The RCC2 shelf may be equipped for HDLC messaging with NTMX76AA messaging CP or NTMX76AB messaging CP to achieve greater distances. The NTMX76AA supports EDC (Extended Distance Capability) while the NTMX76AB supports EDC and the ADSI/SCWID feature. This configuration has the following additional restrictions:

   - The EDC RSC-S is limited to 5 milliseconds transmission delay to its host XPM PLUS. Together with switching delays, this limitation gives up to 6.5 ms delay from the
   | subscriber line to the host network. (text deleted)

   - Bit Error Rate (BER) on the host link should be better than (10 exp -9) for data service and (10 exp -6) for voice only service.

   - Only B8ZC messaging protocol is supported. ZCS is not supported.

   - Firmware patching for the NTMX76 is not supported.

   - To improve voice quality, a 6 db loss is inserted in the remote line card on each connection going through the host to offset echo.

3. A maximum of 10 LCDs (Line Concentrating Devices) can be en-
   | gineered per RCC2 in the RSC S (text deleted) . LCD capacity for each equipment type are listed in Figures 5 and 6.
   Max 10 LCMs and 2 LCMEs are provisionable on the P-Side links of the RCC2. In combination, no more than ten (10) LCMs and LCMEs may be provided (For ex.:2 LCMEs + 8 LCMs). If ten (10) LCMs are provided, no RMMs can be used due to the limits defined in the Software Restrictions section. LCMs in RLCM/OPMs remoted from the RCC2 must be included in the ten maximum. Refer to Software Restrictions section for details.

4. CDO or PBX trunks may be assigned only on the first 20 P-Side T1/PCM30 links on RCC2. These links are physically located in slots 12:0-3, 16:0-3 and 14:0-1.

5. Connection to the Packet Handler is from the RCC2 C-side as part of the host links and then a host XPM. Rules in this ECM support this configuration only. Support for P-side connection will be added at a later date.

6. The RCC2 P-Side Ports may be allocated as follows:

   - The first two interlinks in a Dual configuration must be Port 0 (Slot 12:0) and Port 8 (Slot 16:0). Subsequent interlinks may use any DS1/PCM30 ports and do not require dynamic trunking capability.

- Since the first two DS1 ports for the RCC2 inter-links must be assigned at locations 12:0 and 16:0 and these are two of the 20 ports available for DS1 trunks, ONLY 18 DS1 ports per RCC2 are actually available for CDO/PBX trunks. The limit of 36 DS1 trunks for Dual RSC-S Office.

- DS-1/PCM30s are allowed on links 0-21 and 24-47.

- DS-30A Links may be defined on Links 22 thru 53, where links 22 and 23 are reserved for the Remote Maintenance Module (RMM).

- DS-30A Links are to be assigned beginning with port 53 and descending.

- A maximum of nine SMS-R modules may be hosted by a single RCC2 shelf. Each SMS-R may home a maximum of six Remote Concentrator Units (RCSs/SLC-96s). An RCC2 with this configuration would not be able to support anything else due to XPM nodal limits.

- When the RCC2 shelf is NOT equipped with an EISP pack (requires BCS-35 or higher), the NTMX8947 strapping kit must be applied. If the EISP is subsequently added, the straps must be removed.

- International RSC-S does not support SLC-96 or RDTs.

RCC2 and EXT Slot to P-Side DS1/PCM30 Port Assignments

Table 1: Slot to P-Side Port Assignments			
Port #	Shelf	Slot	Usable for Dynamic Trunk?
0-1	RCC2	1 :0	Yes
2-3	RCC2	1 :1	Yes
4-5	RCC2	1 :2	Yes
6-7	RCC2	1 :3	Yes
8-9	RCC2	16:0	Yes
10-11	RCC2	16:1	Yes
12-13	RCC2	16:2	Yes
14-15	RCC2	16:3	Yes
16-17	RCC2	14:0	Yes
18-19	RCC2	14:1	Yes
20-21	RCC2	14:2	No
22-23	Reserved for RMM	No DS1/PCM30 assignment	No
24-25	EXT	4(23):0	No
26-27	EXT	4(23):1	No
28-29	EXT	4(23):2	No
30-31	EXT	4(23):3	No
32-33	EXT	6(21):0	No
34-35	EXT	6(21):1	No
36-37	EXT	6(21):2	No
38-39	EXT	6(21):3	No
40-41	EXT	8(19):0	No
42-43	EXT	8(19):1	No
44-45	EXT	8(19):2	No
46-47	EXT	8(19):3	No

Notes:

Numbers in parenthesis are for the right half of the Extension shelf.

Check Table H for port interactions. Use of some DS1/PCM30 ports disables DS30A ports.

C-Side Port Assignments

C-side interfaces are provided by the packlets in slots 9 and 19 on the | RCC2 shelf. Specific port assignments are shown in Table 2 . (text | deleted)

Table 2: Slots 9 and 19 C-side Port Assignments

Slot	Packlet	Ports		Slot	Packlet	Ports
9	0	0,1		19	0	2,3
9	1	4,5		19	1	6,7
9	2	8,9		19	2	1 ,11
9	3	1 ,13		19	3	14,15

DCH Port Assignments

Assignment of a D Channel Handler to a slot uses a specific port for | the DCH traffic as shown in Table 3 . (text deleted)

Table 3: DCH Slot to Port Relationship

DCH Shelf/Slot	Port Used	DCH Shelf/Slot	Port Used
RCC2/12	1	EXT/7(20)	12
RCC2/14	17	EXT/8(19)	13
RCC2/16	9	EXT/4(23)	14
EXT/3(24)	10	EXT/6(21)	15
EXT/5(22)	11	EXT/9(18)	18
Notes :			
Numbers in parenthesis are for the right side of the EXT shelf.			

DS-30A Port Assignments

Each DS30A circuit pack provides 32 individual links per RCC2 shelf. | Two circuit packs are provisioned per RCC2 shelf. Since only one (text | deleted) circuit pack is active at a time, alternating assignment of message links between circuit packs is not required or necessary and does not enhance system reliability. There are other reliability concerns, however.

On CPM peripherals (XPM peripherals are not affected), if both message links are terminated on the same interface IC on a DS30A circuit pack

and that chip fails (due to lighting, etc.) the message links can go SYSB leading to an LCM outage.

To prevent this failure the LCM message links off the CPM shelf should | not be on the same chip. The (text deleted) link/chip relationship is shown in Table 4 .

Table 4: MX74 Chip to Link Relationship

MX74 Chip	Controls	Links
1		22, 23, 24, 25
2		26, 27, 28, 29
3		30, 31, 32, 33
4		34, 35, 36, 37
5		38, 39, 40, 41
6		42, 43, 44, 45
7		46, 47, 48, 49
8		50, 51, 52, 53

Notes:

Links 22 and 23 are reserved for RMM applications.

The recommended link assignment order on each DS30A circuit pack is:

5 , 49, 45, 41, 37, 33, 29, 25, 52, 48, 44, 40, 36, 32, 28, 24, 51, 47, 43, 39, 35, 31, 27, 50, 46, 42, 38, 34, 30, and 26.

When adding links to an LCM off a CPM any incorrect link assignment will be alerted. The following warning could result: "Both message links are on the same IC receiver". This message was implemented by the fix LINA.1 in CDNB004 and was patched back with RZS12C36.

| Model A RSC-S (text deleted) RMM Provisioning and Configuration

Due to limitations imposed by cabling through a bulkhead, the RMMs in | Model A RSC-S (text deleted) applications must conform to specific restrictions. RMM layouts must configure slots 3-10 with the allowed

packs, as listed below. Slots 11-16 can mount any provisionable RMM pack but all existing RMM circuit pack mounting rules in Section 14 of the Engineering Manual also apply to an RMM in an RSC-S application. Slots 3-6 can mount ONLY the packs shown below. Slots 7-10 can mount ONLY the packs shown, used for the indicated function ONLY. Any card requiring connection to the Distributing Frame must mount in slots 11-16. There is no mandatory requirement for any of these packs to be present but, if used, they must use the indicated positions.

The capability of provisioning RMM shelves in the CMIS provides options for RSC-S configurations. The first RMM at a RSC-S site will mount in the CRSC. Subsequent RMMs can mount either on the CEXT (if it is present) or on a CMIS. If office requirements dictate the need for a CEXT to mount DCHs or DS1/PCM30 ports, the RMM shelf position provides the logical location for the second RMM. If the CEXT is not needed for capacity or if additional RMMs are needed, they can be mounted on a CMIS. Refer to ECM-655 for details of provisioning RMM shelves on the Model A CMIS.

The RMM in the CRSC is currently powered from an "A" feed. The RMM in the CEXT is powered from a "B" feed. An RMM in a CMIS may be configured as either "A" or "B" powered. If the telco requires two or more RMMs and wants them powered from different feeds but the office does not require a CEXT, the CMIS must be used and the powering requirement specified in a note so that Equipment Engineering can properly configure the power.

| When provisioning a custom RMM layout in a Model A RSC-S (text deleted)
| , slots must be used as shown in Table 5 . (text deleted)

Table 5: RMM Slot Assignments	
RMM Slot	Circuit Pack Allowed
3	NT2X10BA
4	NT2X11BA
5	NT0X10AA
6	NT3X09BA
7	NT2X90AD for MONTALK
8	NT2X90AD for MONTALK
9	NT2X90AD for VERIFICATION 90
1	NT2X90AD for VERIFICATION 90
1	FULLY PROVISIONABLE WITHIN RULES
1	FULLY PROVISIONABLE WITHIN RULES
1	FULLY PROVISIONABLE WITHIN RULES
14	FULLY PROVISIONABLE WITHIN RULES
15	FULLY PROVISIONABLE WITHIN RULES
16	FULLY PROVISIONABLE WITHIN RULES

Internal cabling from the RMM to the bulkhead connects slots 5 and 6 to connector C00 on the shelf 19 bulkhead, slots 11 and 12 to C01, slots 13 and 14 to C02 and slots 15 and 16 to C03 (all on the shelf 19 bulkhead).

The resistor networks associated with DCHs have been made an Always Provided part of the RCC2 and CEXT shelves and no longer need to be provisioned. Rules for providing these resistor networks have been removed from this document.

Only grey cabinetized equipment is currently supported for International applications.

Support for PCM Line Drawers (PLD) on LCMs off the RSC-S is NOT available. This capability is not currently planned (International applications).

RMM Repowering Kit

The RMM in the CRSC is normally powered from the "A" feed but it may be desirable to change it to the "B" feed in some applications (for example, a dual configuration with an RMM in both CRSCs and no CEXT). The NTMX89LA kit is available for this purpose and allows the RMM in the CRSC to be changed to the "B" power feed.

Hardware Usage Restrictions of BITS

| The BITS project has been cancelled. (text deleted)

| DMS-10 Hosted RSC-S (text deleted)

| Additional restrictions for RSC-S (text deleted) off DMS-10 are as follows:

The CEXT is not supported off DMS-10, since it was designed to support larger ISDN applications and extensive remote-off-remote requirements. The additional DS-1s and DCHs supported by the EXT shelf and the additional LCME module were designed for large ISDN installations. The DMS-10 is not designed for such applications. (Without the EXT shelf, the RSC-S can support 30 DS30A ports for LCMs and SMSRs and 22 DS1 ports for remotes and trunks.)

RSC-S off DMS-10 does not currently support ISDN, since the DMS-10 does not support ISDN yet.

DMS-10 is limited to 32 nodes so the number of RSC-Ss hosted by a DMS-10 is lower than off a DMS-100.

P-side 911 trunks on an RSC-S hosted by a DMS-10 do not support Automatic Number Identification (ANI) spill.

Dual RSC-S is not supported off DMS-10 because the normal small rural DMS-10 environment does not require a large remote.

RSC-S capacity differs between DMS-100 and DMS-10 due to differences in applications. For example, all LCMs off DMS-10s use four DS30A links. Since there are 30 available DS30A ports, a maximum of seven LCMs per RSC-S is supported off DMS-10 (a RSC-S off a DMS-100 could have ten 3 port LCMs). Both DMS-100 and DMS-10 RSC-Ss are limited to ten Line Concentrating Devices (LCDs) of all types. Again, the DMS-10 environment does not need the maximum capacity capabilities of the RSC-S.

13.2.2 Hardware Dependencies

In order to utilize the Extended Distance Capability of the RSC-S, the XPM hosting the RSC-S must also be equipped for HDLC messaging (i.e. NTMX76AA messaging pack or NTMX76AB Messaging pack, instead of NT6X69--). The NTMX76AB is required for EDC and ADSI/SCWID.

The NTMX82AA requires a communication path using the NT6X27BA circuit pack to communicate with a host peripheral (LGCO).

13.2.2.1 P and C Side Port Requirements

The RSC-S has a minimum of two and a maximum of sixteen DS-1/PCM30 ports to the host on its C-side. A maximum of fifty-four P-side ports may be provisioned, consisting of DS30A, DCH and DS-1/PCM30 interfaces in

various combinations. Refer to ECM-497 for traffic provisioning information and to Table H in the Engineering Manual for physical assignment locations and valid interface mix data. (text deleted)

13.2.2.2 DMS BUS Port Requirements

Not applicable.

13.2.2.3 Circuits Per Card

NTMX81AA: two DS1 interfaces per packlet

NTMX82AA: two PCM-30 interfaces per packlet

NTMX74AA/AB: thirty-two DS30A interfaces per pack

13.2.2.4 Discrimination Numbering

(text deleted) For the software to properly identify line modules, it is necessary to assign a unique discrimination number to each frame/cabinet that contains either an LCM or an LCME. Existing frames that contain a line module should retain their current discrimination number and new frames/cabinets being added should be numbered consecutively.

For example, an existing RSC office containing RCE 00 and LCE 00-02 that was converted to RSC-S (text deleted) would replace the RCE frame with a CRSC and would name it CRSC 03 to ensure a unique discrimination number for the line module in the CRSC.

13.2.3 Provisioning Considerations

The RSCS may be deployed in a Single Cabinet Configuration by providing the CRSC only and powering it from the Power Board. A kit containing power cable, filter adapters, straps, etc. must be provisioned for this application to equip the CRSC. This kit is NTMX8943 for Model A RSC-S (text deleted) applications and NTMX8904 for Model B applications.

A kit is introduced to resolve problems from lightning storms when using the NTMX8943 kit. This kit is the NTRX3663 Power Filter Kit and it is supplied for all applications using the NTMX8943 kit.

The RSCS also may be provisioned in a Multi-Cabinet Configuration consisting of the CRSC, CPDC, CLCE, CMIS, MCSS, and CEXT Cabinets.

While the preferred configuration for RSC-S offices is cabinetized, it is permissible to mix LCEs, PDC/RMEs, MIS and CPCE frames with the CRSC and CEXT. Certain stipulations exist for the mixed configuration of RSC-S (text deleted) and 7 ft. frames. It is allowable for mixed configurations to be engineered for initial remote sites. Also, when a mixed configuration is engineered it can only be powered from the 7 ft. PDC or RME frame. The mixed RSC-S (text deleted) with 7 ft. frame con-

figuration applies to both Model A and B cabinets. Cables for connecting lines in frames to the CRSC are available in the Cable Assembly drawings. Refer to the appropriate CA drawing for details.

The ISDN Line Drawer is a new LCM drawer type that will support ISDN line cards and contain the D-channel handler. The ISDN line drawer will co-exist with current POTS line drawers in a standard LCM. A maximum of two NT6X05DA Line Drawers can be provisioned per LCM.

It is Recommended that the ISDN Line Drawer, NT6X05DA, be provisioned N in the right hand drawer position of each shelf, in physical position 4 and 9 (logical drawers 8 and 18) in order to permit an optimal heat dispersion. However ISDN line Drawers may be provisioned in any drawer position on the shelf except physical position 0 and 5 (logical position 0 and 10). This is because BIC Relay Test diagnostics require those positions for system use. Only one ISDN line drawer per LCM shelf is allowable.

The ISDN line drawer is intended to be made available in all the DMS-100 frame and cabinet types provisionable with the RSC, RSC-S, OPM, OPAC, and RLCM remote products. It is intended to be designed and engineerable in the following vehicles: CLCE, CRSC, RLCM, OPM, OPAC and LCE.

| RSC-S (text deleted) cannot be supported by LTCI or LGCI equipment at the host , when configured for ISDN Line Drawer. Also, remotes that hang
| off RSC-S (text deleted) cannot be supported by LTCI or LGCI equipment at the host, when configured for ISDN Line Drawer.

ISDN Line Drawer is for the North American Market Only.

During ESA of the RSC or RSC-S, the ISDN Line drawer will not be supported. If an RSC or RSC-S enters ESA, the ILD call might survive the entry but no commitment is made to supporting any service within ESA.

Only 1 ILD can be defined in each LCA (Line Concentrating Array). ISDN Line Drawer can not be applied to positions 0 or 10. Preferred positions for locating the ISDN Line Drawer is 8 or 18. This means that if the ILD drawer number of the first ILD is within the range 2 - 8, the next ILD to be defined in this LCM will have its drawer number within the range 12 - 18. This limitation exists in order to permit an optimal heat dispersion in the LCM.

A maximum of seven (7) ISDN Line Drawers (NT6X05DA) per remote site can
| be applied to a single RSC-S (text deleted) .

A maximum of fourteen (14) ISDN Line Drawers (NT6X05DA) per remote site
| can be applied to a dual RSC-S (text deleted) .

The Baseline software load required for the ISDN Line Drawer (ILD) is NA007 for the Host and XPM08 for the RSC-S Remote.

If the RSC-S requires Extended Distance Capability, it may be equipped with the NTZZ12XB packfill and the NTMX76AA or NTMX76AB circuit pack. The host XPM for a RSC-S with EDC must also be equipped for HDLC messaging (NTMX76AA or NTMX76AB instead of NT6X69) and must utilize the Unified Processor (XPM PLUS). Refer to ECM-678 for details of provisioning XPM PLUS. The host DS1 interfaces must be 64Kb clear channel (NT6X50AB) to support ISDN and to ensure a protocol match with the NTMX81AA packs in the RCC2 shelf (NTMX81AA is electrically the same as NT6X50AB). NTZZ12XB does not include the EISP packs. The EISP packs must be present for all pre-BCS35 domestic applications and all international applications. The EISP packs become optional for domestic applications (based on ISDN support) in BCS-35. If EISP packs are NOT equipped, the NTMX8947 kit must be applied to properly strap the back-
| plane. (text deleted)

| (text deleted)

| (text deleted)

| (text deleted)

| (text deleted)

13.2.3.1 Remote Cluster Controller 2 (RCC2)

Provisioning the RCC2 is described below in terms of Always Provided (AP) CPs and Provisionable (PROV) CPs.

Slots 12, 14 and 16 may be equipped with a D-Channel Handler (BX02) or PCM Quad Carrier CP (MX87AA). The MX87AA may be equipped with up to four "packlets" which may be dual DS-1 (MX81AA) or a filler plate (MX83AA). A dual PCM30 (NTMX82AA) packlet is available for International applications.

Unequipped provisionable slots (5,7,12,14,16,22,23) must be equipped with filler plates.

Table 6: RCC2 Unit 0 Physical Layout				
Slot		Circuit Pack Description	PEC	Status
1-2		POWER CON-VERTER	MX72AB	PROV
3		UNIFIED PROCESSOR or	MX77AA	PROV
		UNIFIED PROCESSOR	AX74AA	
4		ISDN SIG. PREPROCESSOR	BX01BA	PROV
5		CLASS MODEM RESOURCE or	6X78AB	PROV
		PERIP. RE-COVERY LOADER	7X05AA	
6		UNIVERSAL TONE REC	6X92--	PROV
7		UNIVERSAL TONE REC or	6X92--	PROV
		PERIP. RE-COVERY LOADER	7X05AA	
8		ENHANCE MSG CP or	6X69--	PROV
		HDLC MSG CP (for EDC) or	MX76AA	PROV
		HDLC MSG CP (for EDC and ADSI/SCWID)	MX76AB	PROV
9	Packlet #	QUAD CARRIER C-SIDE	MX87AA	PROV
	0-3	DUAL DS1 PACKLET	MX81AA	PROV
	0-3	DUAL PCM30 PACKLET	MX82AA	PROV

	0-3	PACKLET FILLER FACE PL	MX83AA	PROV
1		MATRIX CP	MX75AA	PROV
1		SIGNALING CP	MX73--	PROV
1		D-CHANNEL HANDLER (DCH)	BX02AA	PROV
		ENHANCED D-CHANNEL HDL	BX02BA	PROV
	Packlet #	QUAD CARRIER	MX87AA	PROV
	0-3	DUAL DS1 PACKLET	MX81AA	PROV
	0-3	DUAL PCM30 PACKLET	MX82AA	PROV
	0-3	PACKLET FILLER FACE PL	MX83AA	PROV
1		DS-30A I/F CP	MX74AB	PROV

Table 7: RCC2 Unit 1 Physical Layout				
Slot		Circuit Pack Description	PEC	Status
14		D-CHANNEL HANDLER(DCH)	BX02AA	PROV
		ENHANCED D-CHANNEL HDL	BX02BA	PROV
	Packlet #	QUAD CARRIER	MX87AA	PROV
	0-2	DUAL DS1 PACKLET	MX81AA	PROV
	0-2	DUAL PCM30 PACKLET	MX82AA	PROV
	0-3	PACKLET FILLER FACE PL	MX83AA	PROV
15		DS 30A I/F CP	MX74AB	PROV
16		D-CHANNEL HANDLER(DCH)	BX02AA	PROV
		ENHANCED D-CHANNEL HDL	BX02BA	PROV
	Packlet #	QUAD CARRIER	MX87AA	PROV
	0-3	DUAL DS1 PACKLET	MX81AA	PROV
	0-3	DUAL PCM30 PACKLET	MX82AA	PROV
	0-3	PACKLET FILLER FACE PL	MX83AA	PROV
17		SIGNALING CP	MX73--	PROV
18		MATRIX CP	MX75AA	PROV
19	Packlet #	QUAD CARRIER C-SIDE	MX87AA	PROV
	0-3	DUAL DS1 PACKLET	MX81AA	PROV

	0-3	DUAL PCM30 PACKLET	MX82AA	PROV
	0-3	PACKLET FILLER FACE PL	MX83AA	PROV
2		ENHANCED MSG CP or	6X69--	PROV
		HDLC MSG CP (for EDC) or	MX76AA	PROV
		HDLC MSG CP (for EDC and ADSI/SCWID)	MX76AB	PROV
2		UNIVERSAL TONE REC'VR or	6X92--	PROV
		PERIP. RE-COVERY LOADER	7X05AA	
2		UNIVERSAL TONE REC'VR	6X92--	PROV
2		CLASS MODEM RESOURCE or	6X78AB	PROV
		PERIP. RE-COVERY LOADER	7X05AA	
24		ISDN SIG. PREPROCESSOR	BX01BA	PROV
25		UNIFIED PROCESSOR CP or	MX77AA	PROV
		UNIFIED PROCESSOR CP	AX74AA	
26-27		POWER CON-VERTER CP	MX72AB	PROV

13.2.3.2 Provisioning Host Interface

The C-Side interface is provided via up to sixteen DS1 or PCM30 links. These links provide up to 384 channels on DS1 or 480 channels on PCM30 for host traffic. The two Quad Carrier packs and packlets are

Provisionable based on traffic requirements. Refer to the Engineering Manual section for details.

The host peripheral module must be equipped with Common Circuit Pack Fills per BCS-33 standards. The host controller must be a LTC/LTCI if the RCC2 terminates CDO or PBX trunks and may be a LGC/LGCI if the RCC2 terminates lines only. The ISDN capability of LTCI and LGCI controllers is not required by the RCC2.

The host peripheral must utilize clear channel DS-1s (NT6X50AB) in order to support ISDN connections to the Packet Handler via the host umbilical and to ensure protocol compatibility between the NTMX81AAs at the remote and the host DS-1 interfaces (NTMX81AA and NT6X50AB are the same electrically).

13.2.3.3 The Extension (EXT) Shelf

| The Extension Shelf Layout is shown in Table 8. (text deleted)

Table 8: Extension (EXT) Shelf Layout

SLOT:	1	2	...	7	-	8	...	1	--	14	...	19	-	2	...	25	26
					-				--				-				
	0 X 5 0 A A	M X 7 9 A A			- - - -			M X 7 9 A A	-- -- -- --	M X 7 9 A A			- - - -			M X 7 9 A A	0 X 5 0 A A
	Unit 0				- -	Unit 1			-- --	Unit 1			- -	Unit 0			
	Module 0 Connect to first RCC2								--	Module 1 Connect to second RCC2							

| (text deleted) The Extension Shelf is (text deleted) two functional
| modules in (text deleted) a single card cage. (text deleted) Slots 1-13 constitute Module Zero and Slots 14-26 make up Module One. Each module is further broken down into two logical units (0 & 1) which provide redundancy. Each module on the EXT shelf is provisioned independently. The left module is provisioned in support of the first RCC2 shelf and the right module is provisioned to support the second RCC2 shelf. Like slots 12, 14, and 16 on the RCC2 Shelf, the EXT shelf slots 4, 6, 8, 19, 21, and 23 may be equipped with a D-Channel Handler (BX02AA) or PCM

Quad Carrier CP (MX87AA). Provisionable slots not equipped with a circuit pack must be equipped with the NT0X50AA Filler Face Plate.

EXT Shelf Left Side Physical Layout

Table 9: EXT Module 0 - Connect to First RCC2				
U N I T 0				
SLOT		DESCRIPTION	PEC	STATUS
1		FILLER FACE PLATE	0X50AA	PROV
2		DS60 EXTENDER CP	MX79AA	PROV
3		D-CHANNEL HANDLER (DCH)	BX02AA	PROV
		ENHANCED D-CHANNEL HDL	BX02BA	PROV
4		D-CHANNEL HANDLER (DCH)	BX02AA	PROV
		ENHANCED D-CHANNEL HDL	BX02BA	PROV
	Packlet #	QUAD CARRIER	MX87AA	PROV
	0-3	DUAL DS1 PACKLET	MX81AA	PROV
	0-3	DUAL PCM30 PACKLET	MX82AA	PROV
	0-3	PACKLET FILLER FACE PL	MX83AA	PROV
5		D-CHANNEL HANDLER (DCH)	BX02AA	PROV
		ENHANCED D-CHANNEL HDL	BX02BA	PROV
6		D-CHANNEL HANDLER (DCH) BX02AA	PROV	
		ENHANCED D-CHANNEL HDL	BX02BA	PROV

	Packlet #	QUAD FRAME CARRIER	MX87AA	PROV
	0-3	DUAL DS1 PACKLET	MX81AA	PROV
	0-3	DUAL PCM30 PACKLET	MX82AA	PROV
	0-3	PACKLET FACE PLATE	MX83AA	PROV
7		D-CHANNEL HANDLER (DCH)	BX02AA	PROV
		ENHANCED D-CHANNEL HDL	BX02BA	PROV
U N I T 1				
SLOT		DESCRIPTION	PEC	STATUS
8		D-CHANNEL HANDLER (DCH)	BX02AA	PROV
		ENHANCED D-CHANNEL HDL	BX02BA	PROV
	Packlet #	QUAD FRAME CARRIER	MX87AA	PROV
	0-3	DUAL DS1 PACKLET	MX81AA	PROV
	0-3	DUAL PCM30 PACKLET	MX82AA	PROV
	0-3	PACKLET FACE PLATE	MX83AA	PROV
9		D-CHANNEL HANDLER (DCH) BX02AA	PROV	
		ENHANCED D-CHANNEL HDL BX02BA	PROV	
1		D-CHANNEL HANDLER (DCH)	BX02AA	PROV

		ENHANCED D-CHANNEL HDL	BX02BA	PROV
1		D-CHANNEL HANDLER (DCH)	BX02AA	PROV
		ENHANCED D-CHANNEL HDL	BX02BA	PROV
1		D-CHANNEL HANDLER (DCH)	BX02AA	PROV
		ENHANCED D-CHANNEL HDL	BX02BA	PROV
1		DS60 EXTENDER CP	MX79AA	PROV

EXT Shelf Right Side Physical Layout

Table 10: EXT Module 1 - Connect to Second RCC2				
U N I T 1				
SLOT		DESCRIPTION	PEC	STATUS
14		DS60 EXTENDER CP	MX79AA	PROV
15		D-CHANNEL HANDLER (DCH)	BX02AA	PROV
		ENHANCED D-CHANNEL HDL	BX02BA	PROV
16		D-CHANNEL HANDLER (DCH)	BX02AA	PROV
		ENHANCED D-CHANNEL HDL	BX02BA	PROV
17		D-CHANNEL HANDLER (DCH)	BX02AA	PROV
		ENHANCED D-CHANNEL HDL	BX02BA	PROV
18		D-CHANNEL HANDLER (DCH)	BX02AA	PROV
		ENHANCED D-CHANNEL HDL	BX02BA	PROV
19		D-CHANNEL HANDLER (DCH)	BX02AA	PROV
		ENHANCED D-CHANNEL HDL	BX02BA	PROV
	Packlet #	QUAD FRAME CARRIER	MX87AA	PROV
	0-3	DUAL DS1 PACKLET	MX81AA	PROV

	0-3	DUAL PCM30 PACKLET	MX82AA	PROV
	0-3	PACKLET FACE PLATE	MX83AA	PROV
U N I T 0				
SLOT		DESCRIPTION	PEC	STATUS
2		D-CHANNEL HANDLER (DCH)	BX02AA	PROV
		ENHANCED D-CHANNEL HDL	BX02BA	PROV
2		D-CHANNEL HANDLER (DCH)	BX02AA	PROV
		ENHANCED D-CHANNEL HDL	BX02BA	PROV
	Packlet #	QUAD FRAME CARRIER	MX87AA	PROV
	0-3	DUAL DS1 PACKLET	MX81AA	PROV
	0-3	DUAL PCM30 PACKLET	MX82AA	PROV
	0-3	PACKLET FACE PLATE	MX83AA	PROV
2		D-CHANNEL HANDLER (DCH)	BX02AA	PROV
		ENHANCED D-CHANNEL HDL	BX02BA	PROV
2		D-CHANNEL HANDLER (DCH)	BX02AA	PROV
		ENHANCED D-CHANNEL HDL	BX02BA	PROV
	Packlet #	QUAD FRAME CARRIER	MX87AA	PROV

	0-3	DUAL DS1 PACKLET	MX81AA	PROV
	0-3	DUAL PCM30 PACKLET	MX82AA	PROV
	0-3	PACKLET FACE PLATE	MX83AA	PROV
24		D-CHANNEL HANDLER (DCH)	BX02AA	PROV
		ENHANCED D-CHANNEL HDL	BX02BA	PROV
25		DS60 EXTENDER CP	MX79AA	PROV
26		FILLER FACE PLATE	0X50AA	PROV

EXTENSION SHELF LAYOUT

Provision the EXT shelf to increase the number of DS1/PCM30s assignable on the RCC2 by a maximum of 24 or the number of D-Channel Handlers which may be assigned on the RSC-S to 10.

The PECs and quantities shown in Table 11 are provisionable on the EXT.

Table 11: Provisionable PECs in EXT

Qty	Description	PEC
0 to 3	Quad Frame Carrier	NTMX87AA
0 to 12	Dual DS-1 Packlet	NTMX81AA
0 to 12	Dual PCM30 Packlet	NTMX82AA
0 to 12	Packlet Face Plate	NTMX83AA
0 to 10	D-Channel Handler for ISDN	NTBX02AA
OR	Enhanced D-Channel Handler	NTBX02BA
0 to 10	Filler Face Plate	NT0X50AA Per Side

13.2.3.4 P-Side Port Provisioning

The RCC2 offers a maximum of 54 P-Side Ports for use with local and remote lines, trunking, DCHs and RMMs. The hardware requirement to support the 54 ports is greater than the physical capacity of the RCC2 so the Extension (EXT) shelf was developed.

The RCC2 and EXT shelves are housed in different cabinets and linked via a cable limited to 20 feet in length. Provisioning the EXT Shelf enables the assignment of up to 46 DS-1 P-Side ports at a cost of DS-30A ports or up to 10 DCH Ports at a cost of DS-1 Ports.

Since RCC2 physical maximum (i.e. 54 p-side ports) is exceeded by the combined individual maximums, balancing the allocation of these ports must be performed to fit the combined individual maximums into the shelf.

13.2.3.5 TABLE H: RSC-SONET PROVISIONING AND CONFIGURATION TABLE

| Table Z1 has been renamed Table H (text deleted) to avoid confusion with
| (text deleted) TABLE Z (text deleted) and incorporated into the Engi-
| neering Manual. Refer to Section EMA14-08-000 for RSC-S (text deleted) Provisioning and Configuration. Table H simplifies the provisioning/configuration of the RCC2 and EXT shelves by showing hardware combinations of DCHs, PCM30s/DS-1s, and DS-30As. All quantities presented in the Table H charts are maximums and do not need to be supplied unless required for the specific configuration.

13.2.3.6 RSCS Service Circuits

The RSCS can support up to two (2) Remote Maintenance Modules (RMM) within the CRSC and CEXT. Additional RMMs may be mounted in a CMIS. Refer to ECM-655 for details of provisioning RMM shelves on the Model A CMIS. Detailed below are the RMM Circuit Packs.

The following packs are required for all RMMs used with the RCC2.

| NT6X13AB RMM Always Provided Circuit Packs :

- NT6X74AB - Control Card
- NT2X59AA - Group Codec
- NT2X06AB - 5V @ 40A Power Converter
- NT2X09AA - +-5V, +-12V @ 8A Power Converter

| RMM Provision As Required C ircuit P ack s :

- NT2X90AD - INC/OG Test Trunk (Required For Metallic Testing)
  In order for this CP to function it must be equipped with a Balance Network. Provision either NT2X77AA/AB/AC/AD or NT2X80AA.

- NT3X09BA - Remote Metallic Test Access
  - Required for MTU
  - Interfaces up to four LCMs or LCME
  - Contains eight test ports
- NT0X10AA - Scan (SC) Point Card
  - 14 SC Points Per Card
- NT2X10BA/NT2X11BA - MTU
- NT2X57AA - Signal Distribution (SD) Card
  - 14 SD Points Per Card

| RMM Optional - Provision As Required C ircuit P ack s :

- NT3X04AA - AECO Local Test Board Interface

13.2.3.7 RSCS Subscriber Lines

The RSCS supports POTS, MDC and ISDN subscriber lines via the Always Provided LCME modules in the CRSC and CEXT, CLCE cabinets and LCE frames. LCMs must be provisioned if coin lines are required. LCMEs can support NT6X18 line card types only if they are not configured as high voltage lines (Coin,ANI,etc.).

Phase 1 limits ISDN modules to the CRSC and CEXT only. Ten (10) LCMs max are provisionable in five (5) CLCE cabinets or LCE frames for a Mono RSCS configuration (see Software Restrictions for a Dual RCC2) for Phase 1. All line card types with the exception of coin lines are provisionable in the ISDN line drawer. The ISDN line card cannot be mounted in a POTS line drawer/LCM.

13.2.3.8 RSCS Miscellaneous Equipment

All new orders should specify the Model B CMIS, NTRX56AA, or the CRME, NTRX31EA. Refer to these Engineering Manual Sections for details. Refer to ECM-655 for Model A CMIS provisioning.

Provision the NTRX49BA per Telco requirements for Spare Card storage. The NTRX49AA is MD and replaced by the NTRX49BA. Note: An NTMX87 must be provisioned as required to store spare DS1/PCM30 packlets.

13.2.4 Office Layout Information

Either the CPDC, PDC, RME, or CRME may be used to power RSC-S lineups. The standalone CRSC configuration is available for single cabinet applications. The CPDC must be the first cabinet in any lineup it powers. Therefore, when providing a standalone CRSC in an office that will ul-

timately grow to require additional cabinets (CLCE,CEXT,etc.), space should be left for the CPDC to be the first cabinet in the lineup.

Fully cabinetized RSC-S lineups will not exceed eleven cabinets. As office configurations are determined, this restriction will be reviewed.

When using a PDC or RME frame to power a Model A CRSC or CEXT, an external power kit (NTMX8943) must be provided for each CRSC/CEXT cabinet.

CRSC and CEXT cabinets must be located so that the DS60 cables between them do not exceed twenty feet in length. Since one CEXT can support two CRSCs, in Dual configurations, each CRSC would need to be within 20 feet of the CEXT (assuming both CRSCs require CEXT facilities).

The availability of power filter kits makes it possible to power two or more lineups from one CPDC, rather than using one CPDC per lineup. When using power filter kits (vertical power option), the number of CPDCs required is based on the number of circuit breakers required to power equipment, not the number of lineups. Vertical powering is to be used for all new RSC-S offices. Horizontal powering should only be provided to extend an existing horizontally-powered lineup.

The Model B RSC-S may be used with either cabinetized or frame-based equipment. When extending an existing Model A cabinetized lineup (new Model B equipment in the same lineup), the internal powering option will be required. Both brown and grey equipment is available for domestic use. Only grey equipment is currently supported for International (PCM-30) applications.

In order to use a Model A CPDC to power equipment in another lineup, the NTRX31LC and NTRX31LD personality plates must be utilized. Refer to the appropriate Engineering Manual section for details.

13.2.5 Traffic Tables

Traffic tables for domestic RSC-S applications are included in ECM-497.

| The following table illustrates the Host to RSC-S (text deleted) theoretical traffic capacity for international RSC-S applications.

Using the International Traffic Tables

For: 2 PCM30s providing 60 Channels with 2.00% Grade of Service, provides 48.65 erlangs of traffic carrying capacity.

Assumption: Delay/Loss System: 55.0/ 45.0

Table 12: Traffic Table 1						
PCM 30s	Chan-nels	Grade of Service				
		0.001%	0.100%	0.500%	1.00%	2.00%
2	6	36.62	40.76	44.53	46.48	48.65
3	9	0.92	66.42	71.40	73.94	76.74
4	1 0	86.19	92.87	98.88	101.93	105.27
5	150	112.09	119.82	126.76	130.26	134.07
6	180	138.42	147.11	154.90	158.81	163.04
7	2 0	165.08	174.67	183.24	187.53	192.15
8	240	191.99	202.42	211.73	216.38	221.36
9	270	219.12	230.34	240.34	245.32	250.64
1	3 0	246.42	258.39	269.06	274.36	280.00
1	3 0	273.86	286.56	297.86	303.44	309.39
1	360	301.42	314.83	326.72	332.61	338.83
1	390	329.11	343.17	355.67	361.83	368.33
14	4 0	356.89	371.61	384.67	391.08	397.86
15	450	384.75	400.08	413.69	420.39	427.42
16	480	412.69	428.64	442.78	449.72	456.97

Table 13: Traffic Table 2						
PCM 30s	Chan-nels	Grade of Service				
		3.00%	4.00%	5.00%	6.00%	7.00%
2	6	50.02	51.04	51.84	52.50	53.06
3	9	78.49	79.76	80.76	81.58	82.27
4	1 0	107.33	108.82	109.98	110.93	111.71
5	150	136.40	138.08	139.37	140.42	141.29
6	180	165.62	167.46	168.87	170.01	170.94
7	2 0	194.94	196.93	198.45	199.66	200.66
8	240	224.35	226.47	228.09	229.37	230.42
9	270	253.83	256.07	257.77	259.11	260.22
1	3 0	283.36	285.69	287.47	288.89	290.03
1	3 0	312.92	315.39	317.22	318.69	319.89
1	360	342.53	345.08	347.00	348.50	349.72
1	390	372.17	374.81	376.81	378.36	379.61
14	4 0	401.83	404.56	406.61	408.19	409.50
15	450	431.50	434.33	436.42	438.06	439.39
16	480	461.22	464.11	466.28	467.94	469.28

Table 14: Traffic Table 3					
PCM 30s	Channels	Grade of Service			
		8.00%	9.00%	10.00%	20.00%
2	6	53.55	53.98	54.36	56.72
3	9	82.86	83.38	83.83	86.55
4	1 0	112.38	112.96	113.48	116.45
5	150	142.02	142.66	143.21	146.38
6	180	171.74	172.41	173.01	176.33
7	2 0	201.50	202.22	202.84	206.29
8	240	231.30	232.05	232.70	236.26
9	270	261.13	261.91	262.58	266.24
1	3 0	291.00	291.81	292.47	296.22
1	3 0	320.86	321.69	322.39	326.19
1	360	350.75	351.58	352.33	356.19
1	390	380.64	381.50	382.25	386.17
14	4 0	410.56	411.44	412.19	416.17
15	450	440.47	441.36	442.14	446.17
16	480	470.39	471.31	472.08	476.14

13.3 Product/System Specification

13.3.1 Physical Characteristics

The Model B RSC-S product uses the NTRX25AA Enhanced Cabinet on all CRSC and CEXT configurations. The dimensions of the NTRX25AA are 8.5W X 28.7D X 72.0H inches. The approximate weight of the cabinet is 810 pounds.

The issue of Circuit Protection and Grounding must be addressed as follows:

CIRCUIT PROTECTION

Any wire or wire pair other than battery supply or ground which is connected to the RSCS and leaves the building must be protected against lightning by suitable arrestors.

DS1/PCM30 input and output ports will be protected against the following conditions:

- Shorts to ground, input to output, and across the pair

- DC voltages: +/- 100 VDC with respect to ground, and +/- 60 VDC between the leads
- AC voltage to 110 VAC 50/60 Hz with respect to ground

GROUNDING

All RSCS configurations will incorporate the grounding systems as specified in the DMS-100F Technical Specification. Grounding methods will comply with Isolated System Grounding rules.

MECHANICAL DIMENSIONS

Height 72" Width 28.5"
Weight 810 lb. Depth 28.5"

13.3.2 EMI/Earthquake Information

The Model B RSC-S complies with FCC and EN Class A EMI requirements. The NTRX2564 Earthquake Anchor kit shall be provided for each CRSC/CEXT in earthquake applications (Refer to NTRX25AA for details).

13.3.3 Sparing Information

The CMSS Cabinet shall be supplied to house spare circuit packs. Standard sparing algorithms apply.

| The (text deleted) circuit packs in Table 15 are considered critical spares for the RCC2 and EXT shelves.

Table 15: Spare Circuit Packs

RCC2	NTMX72--, NTMX73--, NTMX74AB, NTMX75AA, NTMX77AA, NTAX74AA, NTMX81AA, MTMX82AA, NTMX87AA, NT6X92--, NT6X69--, or NTMX76AA or NTMX76AB, NTBX01BA (BX01AB MD'ed)
(if provisioned)	NT6X78AB, NTBX02AA, NTBX02BA, NT7X05AA
EXT	NTMX79AA
(if provisioned)	NTMX81AA, NTMX82AA, NTMX87AA, NTBX02AA, NTBX02BA
FSP	NT6X36AA, NT6X36AB (Model A Only)

Standard sparing algorithms apply to the Model B RSC-S.

The NTRX92AA 10" Cooling Unit kit includes the NTRX91AA Cooling Unit which uses the A0346832 air filter medium. This air filter may be required for sparing.

13.3.4 Power Feed and Fusing Requirements

Power and fusing requirements are the same for the Model A and Model B RSC-S. In the RCC2 shelf there are fuses on individual packs. Max current from -48V feed is 8.1A. RCC2 power requirement is 340 Watts. Refer to NTZX16CA for System Power and Grounding information.

Table 16: Power and Fusing Requirements - CRSC and CEXT	
Input Voltage	-48 VDC
Power Consumption	1142 Watts (worst case)
Current Drain	5 Amps (at -42VDC)
Thermal Dissipation	3897 BTU/hour (worst case)
CPDC Requirements	(3) 30 Amp Breakers on "A" Feed ( ) 30 Amp Breakers on "B" Feed

13.3.5 Current Drain Information

The maximum current drain for the CRSC or CEXT is 25 Amps at -42VDC.

13.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

NOTE: The RSC-S (text deleted) software accomodates the versions of the CRSC with provisionable LCM or with provisionable LCME.

13.4.1 Required Software Packages and Interdependencies

Domestic Applications The Baseline software load required for the ISDN Line Drawer (ILD) is NA007 for the Host and XPM08 for the RSC-S Remote.

Software packages specifically required for the domestic RSC-S are as follows:

- NTXP92AA RSC-S Basic
- NTX750AB is required at the host for all RSC-S (text deleted) applications (both ISDN and non-ISDN) for BCS-33 only.
- NTXJ00AB is required for all applications for BCS-33 only.

- Neither NTX750 nor NTXJ00 is a prerequisite for NTXP92 for BCS-34 or later. With BCS-34 or later, these packages will be ordered only when ISDN is needed.

- NTX145AA Basic RSC Features must also be included in the load for
| all RSC-S (text deleted) applications (both ISDN and non-ISDN).

- NTXR42AA Firmware Downloading is required in BCS-34 as a prerequisite for NTXP92AA.

Optional Packages:

- NTXR71AA RSC-S Extended Distance Capability

- NTXA85AB Basic SMS-R Features (Mono & Dual RCC/RCC2)

- NTXA86AA SMS-R Special Services (Including SPOTS)

- NTXE38AB CLASS - Calling Number Delivery on SMS-R (NTXE38 requires CMR card in host RCC2)

- NTXR34-- XPM Plus Basic (Limited Availability in BCS-34) (NTXR34AA is replaced by NTXR34AB in BCS-35.)

| (text deleted)

International Applications

The following packages are required for all International applications:

- NTX145AA RSC Basic

- NTXH52AA PCM-30 RSCO

- NTXK79AA PCM-30 Unified Processor

- NTX149AA ESA - RSC

- NTX149AB ESA - RSC L/T

- NTX150AA RSC Intra Calling

- NTX152AA RSC Trunking

The following packages are optional:

- NTXK77AA PCM-30 RSCO-S

- NTXK78AA RSCO Intra and ESA

- NTXT00AA RSCS R1 Trunking (requires XK77)

Software previously required for RSC is also applicable to RSC-S. Refer to Software Management System (SMS) for interdependencies.

13.4.2 Software Usage Restrictions

Prior to BCS-35, the RSC-S software requires the presence of the EISP packs for all applications. With BCS-35 or higher, the EISP is required only when the RSC-S is to support ISDN. If the EISP is not equipped, the NTMX8947 EISP Strapping kit must be applied. The EISP is required for all international applications.

| Because of restrictions imposed by software structuring, RSC-S (text
| deleted) hardware configurations will need to be checked against the following software limits. Any configuration exceeding these limits is invalid.

For the office configuration, determine total software ports and terminals as follows:

PORTS

1. Add one port for each RMM required. Include RMMs in RLCM/OPMs homing on RCC2.

2. Add sixteen ports for each RCC2 required.

3. Add eight ports for each LCM required. Include LCMs in RLCM/OPMs homing on RCC2.

4. Add nineteen ports for each LCME required.

5. Add fifty-four ports for each RCC2 shelf if part of a Dual configuration.

6. Add four ports for each SMS-R subtending the RCC2.
   IF BCS-33, 1+2+3+4+5+6 < or = 159 (per RCC2)
   IF BCS-34, 1+2+3+4+5+6 < or = 259 (per RCC2)

TERMINALS:

1. Add 641 terminals for each LCM. Include LCMs in RLCM/OPMs homing on RCC2.

2. Add 513 terminals for each LCME.

3. Add 31 terminals for each RMM. Include RMMs in RLCM/OPMs homing on RCC2.

4. Add 641 terminals for the RCC2 itself.

5. Add one terminal for each B channel used for voice in an LCME.

6. Add 31 terminals for PRA if RSC-S is handling ISDN. (i.e. if at least one ISDN line card is equipped)

7. Add 589 terminals for each SMS-R homing on the RCC2.
   6+7+8+9+10+11+12 < or = 7055 (per RCC2 in BCS-33)
   6+7+8+9+10+11+12 < or = 7884 (per RCC2 in BCS-34)

6+7+8+9+10+11+12 < or = 8676 (per RCC2 in BCS-35)

In addition to this limit, there are a limited number of Logical Terminal Identifiers (LTIDs) available for the ISDN B channels. (LTIDs for D channels draw on a different resource.) The following maximums must not be exceeded:

- BCS-33: maximum of 972 ISDN loops per RCC2, maximum of 960 ISDN B channel LTIDs
- BCS-34: maximum of 972 ISDN loops per RCC2, maximum of 1024 ISDN B channel LTIDs
- BCS-35/36: maximum of 1296 ISDN loops per RCC2, maximum of 1944 ISDN B channel LTIDs

Table 17: Examples of Ports and Terminals

For RCC2 with 2 LCMEs, 2 RMMs and 8 LCMs in BCS-33:	
Ports	Terminals
16 for the RCC2	641 for RCC2
2 for the RMMs	62 for RMMs
64 for the LCMs	5128 for LCMs
38 for the LCMEs	1026 for LCMEs
	31 for PRA
	167 B channels
120 Total Ports (within limit)	7055 Total Terminals (within limit)
Note: Only 167 B channels could be used since more would exceed the software limit.	

For RCC2 with 0 LCMEs, 0 RMMs and 10 LCMs in BCS-33:	
Ports	Terminals
16 for the RCC2	641 for RCC2
0 for RMM	0 for RMMs
80 for the LCMs	6410 for LCMs
00 for LCME	0 for LCME
96 Total Ports (within limit)	7051 Total Terminals (within limit)

Due to the limit in CC and XPM software on the maximum number of nodes during ESA warm exit, if the maximum of nine SMS-Rs with six RCSs each are defined on an RCC2, no other P-side nodes (LCMs, LCMEs, etc.) may be defined.

As indicated by the previous checks, the maximum number of P-side modules that may be supported off an RCC2 is limited in some cases by the software structures, rather than the physical ports or channel capacity. This is particularly true for those configurations supporting ISDN lines. The following tables provide the information needed to determine if a particular P-side configuration can be supported.

Table 18 lists the static resources used by each P-side module and Table 19 shows the maximum for each catagory, based on BCS level. Table 20 lists the maximums for the host XPM supporting an RCC2. Table 21 , Table 22 , Table 23 , and Table 24 show the number of Logical Terminal IDentifiers (LTIDs) available for support of ISDN lines when using various mixes of P-side equipment. Table 21 is for BCS-35, Table 22 and Table 23 are for BCS-34 and Table 24 is for BCS-33.

For a configuration to be valid, it must be within the limits given in the appropriate table.

Table 18: RCC2 Static Resource Usage						
Entity	Ports	TID	Nodes	Msg_Lk	LCD	W.Exit
Self	16	641	1	0	0	2
Dual Spouse	54	1	1	2	0	0
LCM	8	641	1	2	1	1
RLCM/OPM	8	641	1	2	1	1
ESA of RLCM/OPM	2	1	1	2	0	1
RMM (own)	1	3	1	1	0	1
RMM (at RLCM/OPM)	2	3	1	2	0	1
Extra if ISDN	0	3	0	0	0	0
LCME	19	5 3	1	2	1	1
Ckt-Sw LTID	0	1	0	0	0	0
DCH	0	0	0	0	0	0
SMS-R	4	1	1	2	0	1
RCS at SMS-R	0	98	1	0	0	1

Table 19: RCC2 Static Resource Capacities by BCS									
BCS	Ports	TIDs	Nodes	Msg_Lk	LCDs	W.Exit	LTID	DNs	SMSRs
BCS-33	159	7 55	1 7	39	1	66	960		9
BCS-34	255	7884	1 7	39	1	66	1 24	3 76	9
BCS-35	255	8676	1 7	39	1	66	1944	6552	9
BCS-36	255	8676	1 7	39	1	66	1944	6552	9

Table 20: Host LTC Static Resource Usage					
Entity	Ports	TID	Nodes	Msg_Lk	LCD
Self	16	641	1	0	0
RCC2	16	641	1	2	0
LCM (own)	8	641	1	2	1
LCM at RCC2	0	0	1	0	0
RLCM/OPM (own)	8	641	1	2	1
RLCM/OPM at RCC2	0	0	1	0	0
ESA of own RLCM	2	1	1	2	0
ESA of RCC2 RLCM	0	0	1	0	0
RMM at own RLCM	2	3	1	2	0
RMM at RCC2	0	0	1	0	0
RMM at RCC2's RLCM/OPM	0	0	1	0	0
LCME off RCC2	0	0	1	0	0
SMS-R off RCC2	0	0	1	0	0
RCS at SMS-R	0	0	1	0	0

Table 21: TID Motivated Limitations BCS-35						
ISDN	Dual	#LCME	#RLCM	#LCD	#LCD+SMSR	# LTID
Yes	No	= 1			=< 960	
Yes	No	= 2	= 0	=< 9	=< 9	=< 1920
Yes	No	= 2	= 0	=< 7	= 10	=< 1920
Yes	No	= 2	= 0	= 8	= 10	=< 1890
Yes	No	= 2	= 0	= 9	= 10	=< 1838
Yes	No	= 2	= 0	= 10	= 10	=< 1786
Yes	No	= 2	=<3	=< 9	=<10	=< 1728
Yes	No	= 2	=<3	= 10	= 10	=< 1690
Yes	No	= 2	= 4	=< 9	=< 9	=< 1728
Yes	No	= 2	= 4	=< 8	= 10	=< 1728
Yes	No	= 2	= 4	= 9	= 10	=< 1710
Yes	No	= 2	= 4	= 10	= 10	=< 1658
Yes	No	= 2				=< 1512
Yes	No	>= 3	= 0	=< 8		=< 1944
Yes	No	>= 3	=<4			=< 1728
Yes	No	>= 3				=< 1512
Yes	Yes	= 1				=< 960
Yes	Yes	>= 2	=<4			=< 1512
Yes	Yes	>= 2				=< 1296

Table 22: TID Motivated Limitations BCS-34						
			Number of LTIDs when Configured with:			
LCD+SMSR	LCD	RLCM	1LCME	2LCME	3LCME	4LCME
9	9	7	960	1 24	-	-
1	5	4	960	-	-	-
1	6	3	960	1 24	1 24	-
1	6	4	946	1 24	-	-
1	6	5	9 4	-	-	-
1	7	1	960	1 24	1 24	1 24
1	7	2	958	1 24	1 24	1 24
1	7	3	9 6	1 24	1 24	1 24
1	7	4	894	1 22	1 24	-
1	7	5	862	990	-	-
1	7	6	8 0		-	-
1	8	0	960	1 24	1 24	1 24
1	8	1	9 8	1 24	1 24	1 24
1	8	2	9 6	1 24	1 24	1 24
1	8	3	874	1 02	1 24	1 24
1	8	4	842	970	1 24	1 24
1	8	5	8 0	9 8	1 24	-
1	8	6	778	9 6	-	-
1	8	7	746	-	-	-
1	9	0	9 8	1 24	1 24	1 24

Table 23: TID Motivated Limitations BCS-34 (continued)						
			Number of LTIDs when Configured with:			
LCD+SMSR	LCD	RLCM	1LCME	2LCME	3LCME	4LCME
1	9	1	886	1 14	1 24	1 24
1	9	2	854	982	1 24	1 24
1	9	3	8 2	950	1 24	1 24
1	9	4	790	9 8	1 24	1 24
1	9	5	758	886	1 14	1 24
1	9	6	7 6	854	982	-
1	9	7	694	8 2	-	-
1	1	0	866	994	1 24	1 24
1	1	1	8 4	962	1 24	1 24
1	1	2	8 2	9 0	1 24	1 24
1	1	3	770	898	1 24	1 24
1	1	4	7 8	866	994	1 24
1	1	5	7 6	8 4	962	1 24
1	1	6	674	8 2	9 0	1 24
1	1	7	642	770	898	-

Table 24: TID Motivated Limitations BCS-33										
LCD	RLCM	Number LTID When Number of LCME is:								
		1	2	3	4	5	6	7	8	9
8	7	960								
9	0	678	8 6	9 4	960	960	960	960	960	960
9	1	646	774	9 2	960	960	960	960	960	-
9	2	6 4	742	870	960	960	960	960	-	-
9	3	582	7 0	8 8	960	960	960	-	-	-
9	4	550	678	8 6	9 4	960	-	-	-	-
9	5	5 8	646	774	9 2	-	-	-	-	-
9	6	486	6 4	742	-	-	-	-	-	-
9	7	454	582	-	-	-	-	-	-	-
1	0	36	164	292	4 0	548	676	8 4	9 2	960
1	1	4	1 2	260	388	5 6	644	772	9 0	960
1	2	0	1 0	2 8	356	484	6 2	740	868	-
1	3	0	68	196	3 4	452	580	7 8	-	-
1	4	0	36	164	292	4 0	548	-	-	-
1	5	0	4	1 2	260	388	-	-	-	-
1	6	0	0	1 0	2 8	-	-	-	-	-
1	7	0	0	68	-	-	-	-	-	-

13.4.3 Memory Provisioning

The Unified Processor Pack in the RCC2 shelf is equipped with 8M of memory. Expansion of the memory to 16 megabytes will also be possible.

13.4.4 Operational Measurements

Basic OMs for the XPM have been applied to the RCC2.

13.4.5 Logs/Tools

Existing PM Logs are updated to reflect the RSC-S. Resident tools are updated for the CC/XPM as well.

13.5 Real Time Impact

The RCC2 combines the Master Processor and Signal Processor functions of the RCC/RCCI into the Unified Processor hardware. The Unified Processor is capable of handling 1.6 times the call attempts of the

existing MP and SP hardware at the recommended engineering level of 80%, assuming the RCC is not equipped with per trunk signaling trunks. The real time cost at the host XPM is the same as for the RCC/RCCI hardware configuration. Refer to SEB 91-05-001 (Issue 02 or later) for additional information.

Real time impact of SMS-R off RCC2 is included in PRTCALC Version 2G.

14.0 ECM700 - Remote Switching Center-Multi Access

14.1 Overview

The RSC-M, Remote Switching Center-Multi Access, provides CAS capability on the RCO-2, remote concentrator offshore, platform.

The RCO-2 is a member of the CPMO family of peripheral modules used in the DMS 100 family for international applications. The CPM family is based on the CPM main shelf and the CPM extension shelf. The CPM replaces the XPM (series 2) family of peripheral modules. RCO2 is a CPMO remote unit for Australia and UK markets and is connected to the host via metallic connections or fiber.

As a remote unit, RCO2 will support several types of lines. The lines include LCM's or LCME's with POTS, P-phones, Data path, and ISDN capability. RCO2 also supports 2Mb trunks to other CDO's and other NT small remotes such as PRLCMs and SRUs. The scope here is RCO2 in the RSCM which does not require EISP and EDCH packs as there is no way of connecting to the LCME for support of ISDN lines. RCO2 in the CRSC provides this support. The figure depicts the RCO2 and extension shelf in the RSC-M cabinet.

Refer to Figure 21 on page 10-206 for an example layout of the RSCM cabinet NTRX25AA. See individual cabinet Engineering Manual Section for specifics of CP slot assignments.

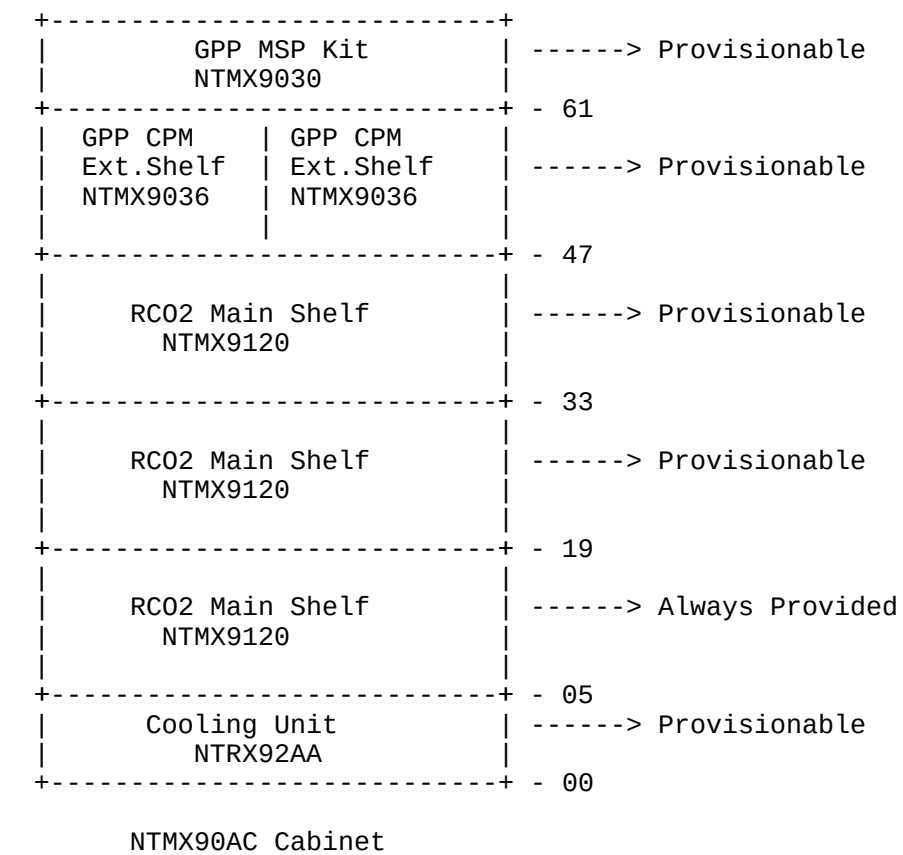


Figure 21. Remote Switching Center-Multi Access (RSCM) Cabinet

14.2 Hardware Provisioning

14.2.1 Hardware Usage Restrictions

The main RCO2 shelf configuration will be identical to the GPP main shelf with the following exceptions:

- C-side slots (9 and 19) will be MX87 with MX82 packlets.
- Slots 7 and 21 can support UTR packs if required.
- Message card (slots 8 and 20) will be 6X69LB or MX76AA.
- Slots 13 and 15 will require DS30A packs (MX74AB).

The extension shelf is identical to the GPP extension shelf.

Note that the MX73AB and MX74AB packs are required for added robustness.

14.2.2 Hardware Dependencies

The RSC-M requires the following equipment:

RCO2 Shelf

(2) NTMX77AA - Unified Processor
(2) NTMX76AA/NT6X69LB - Message , Tone and CSM pack
(2) NTMX73AB - Signaling Processor
(2) NT6X92CA - Universal Tone Receiver
(2) NTMX75AA - Matrix pack
(2) NTMX72AA - Power Supply
(A/R) NT0X50AA - Filler Face Plate

C-side Interface

(2) NTMX87AA - Quad PCM Carrier

P-side Interface

(max 3) NTMX87AA Quad Carrier pack
up to (4) NTMX82AA PCM30 packlets per NTMX87AA

14.2.2.1 P and C Side Port Requirements

A maximum of 16 C-side PCM-30 links can be declared giving a maximum of 480 C-side channels. Depending on traffic requirements and the proportion of intraswitched calls, the number of C-side links can be decreased. The provisioning rules will be included in a later version when it is provide in the product specification.

Of the 480 C-side channels, up to 4 are used for messaging and are not available for speech. 2 channels are required in all cases, and if EDC is configured, another 2 channels are used for messaging.

| P-side provisioning should be performed according to standard RCO2 rules. The RCO2 total limits are as follows:

| Ports - 16

| TIDS - 641

| S/W nodes - 1

| Msg Links - 0

| LCDs - 0

| Warm Exit nodes - 2

| The MEL CAS AMC total limits are as follows:

| Ports - 8

| TIDS - 257

| S/W nodes - 1

| Msg Links - 0

| LCDs - 0

| Warm Exit nodes - 0

| Additionally, the total number of circuit swithed LTIDs must not
| exceed 1944.

14.2.2.2 DMS BUS Port Requirements

Not applicable

14.2.2.3 Circuits Per Card

Not applicable

14.2.2.4 Discrimination Numbering

Not applicable

14.2.3 Provisioning Considerations

MEL CAS PROTOCOL Information

The RCO2 Shelf can be provisioned and is considered a fully-equipped shelf with sixteen (16) PCM-30 C-side links (16 TX and 16 RX). For standard configurations, the bottom and 2nd main shelves will be internally connected to the extension in the top position, and the 3rd main shelf will never have an extension. The RCO2 remote shelf is to provide the same MEL CAS functionality that exists in the GPP shelf. Additionally, the RCO2 shelf is to support intraswitching for MEL CAS lines and cold ESA entry/exit. The RSCM cabinet is to support a maximum of 3420 MEL CAS lines.
| The host LGCOi+ can support up to 2 RCO2 shelves.

14.2.4 Office Layout Information

Not applicable

14.2.5 Traffic Tables

The following table reflects the current view of traffic capacity for the RCO2 Shelf in the RSCM application:

From the traffic standpoint, the RSC-M shelf and the EXT half-shelf connected to it (if configured) form one entity and should be provisioned as such. Therefore, in the rest of this section, the term RSC-M is used to mean either one of these configurations, unless indicated otherwise.

The required number of channels on the RSC-M C-side is the sum of the required special connection channels to LGCOi+ and the required switched channels.

The special-connection channel requirement is computed by counting the lines requiring such connection and adding the number of message channels used. The total HDBH carried traffic of all the switched lines needs to be computed (in Erlangs), and looked up in the following table in figure 2 (if the value is not in the table, use the next higher value). 3 configurations are shown in the Table - no intraswitching, 2 % intraswitching and 40% intraswitching.

The required number of C-side links is obtained by dividing the total number of C-side channels by 30 (round up).

Switched Erlangs			
Chan. Req.	Intraswitching (in percentages) 0	20	40
5	1.7	2.1	2.8
1	5.0	6.2	8.1
15	8.9	11.0	14.4
2	12.9	16.0	20.9
25	17.1	21.2	27.6
3	21.4	26.5	34.6
35	25.7	31.8	41.5
4	30.1	37.2	48.6
45	34.6	42.8	55.9
5	39.1	48.3	63.1
55	43.6	53.9	70.4
6	48.2	59.6	77.8
65	52.8	65.2	85.2
7	57.4	70.9	92.6
75	62.0	76.6	100.0
8	66.7	82.4	107.6
85	71.3	88.1	115.0
9	76.0	93.9	122.6
95	80.7	99.7	130.2
1 0	85.4	105.5	137.8
1 5	90.1	111.3	145.4
1 0	94.8	117.1	153.0
1 5	99.5	122.9	160.5
1 0	104.3	128.8	168.3
1 5	109.0	134.6	175.9
1 0	113.7	140.4	183.4
1 5	118.5	146.3	191.2
140	123.3	152.3	198.9
145	128.0	158.1	206.5
150	132.8	164.0	214.2
155	137.6	169.9	222.0
160	142.4	175.9	229.7
165	147.2	181.8	237.5
170	152.0	187.7	245.2
175	156.8	193.6	253.0
180	161.6	199.6	260.7
185	166.4	205.5	268.4
190	171.2	211.4	276.2
195	176.0	217.3	283.9
2 0	180.8	223.3	291.7
2 5	185.6	229.2	299.4
2 0	190.5	235.2	307.3
2 5	195.3	241.2	315.0
2 0	200.1	247.1	322.8
2 5	205.0	253.1	330.7
2 0	209.8	259.1	338.4

Switched Erlangs

Chan. Req.	Intraswitching (in percentages) 0	20	40
2 5	214.6	265.0	346.2
240	219.5	271.0	354.1
245	224.3	277.0	361.8
250	229.2	283.0	369.7
255	234.0	288.9	377.5
260	238.9	295.0	385.4
265	243.7	300.9	393.1
270	248.6	307.0	401.0
275	253.5	313.0	408.9
280	258.3	318.9	416.7
285	263.2	325.0	424.6
290	268.0	330.9	432.3
295	272.9	337.0	440.2
3 0	277.8	343.0	448.1
3 5	282.6	348.9	455.9
3 0	287.5	355.0	463.8
3 5	292.4	361.0	471.7
3 0	297.3	367.1	479.6
3 5	302.1	373.0	487.3
3 0	307.0	379.1	495.2
3 5	311.9	385.1	503.1
340	316.8	391.2	511.0
345	321.7	397.2	518.9
350	326.5	403.1	526.7
355	331.4	409.2	534.6
360	336.3	415.2	542.5
365	341.2	421.3	550.4
370	346.1	427.3	558.3
375	351.0	433.4	566.2
380	355.9	439.4	574.1
385	360.8	445.5	582.0
390	365.7	451.5	589.9
395	370.6	457.6	597.8
4 0	375.4	463.5	605.5
4 5	380.3	469.6	613.4
4 0	385.2	475.6	621.3
4 5	390.1	481.7	629.2
4 0	395.0	487.7	637.1
4 5	399.9	493.8	645.0
4 0	404.8	499.8	653.0
4 5	409.7	505.9	660.9
440	414.6	511.9	668.8
445	419.5	518.0	676.7
450	424.5	524.1	684.7
455	429.4	530.2	692.6
460	434.3	536.2	700.5

	Switched Erlangs		
Chan. Req.	Intraswitching (in percentages) 0	20	40
465	439.2	542.3	708.4
470	444.1	548.3	716.3
475	449.0	554.4	724.2

Figure 22. Traffic Capacity Table for RSCM

Note: Table based on High Day Busy Hour (HDBH) carried traffic, at 0.03 HDBH blocking, using a mixed loss delay model with 55% originations.

14.3 Product/System Specification

14.3.1 Physical Characteristics

The RSC-M is packaged in a Model B C28 cabinet and has the following physical characteristics:

Height: 72"
Width : 28.5"
Depth : 28.7"
Weight: Approximately 810 pounds

14.3.2 EMI/Earthquake Information

The RSC-M complies with FCC and EN Class A EMI requirements. The NTRX2564 Earthquake Anchor kit shall be provided for each RSC-M in earthquake applications (refer to NTRX25AA for details).

14.3.3 Sparing Information

Standard sparing algorithms apply.

The NTRX92AA 10" Cooling Unit kit includes the NTRX91AA Cooling Unit which uses the A0346832 air filter medium. This air filter may be required for sparing.

14.3.4 Power Feed and Fusing Requirements

The following fuses and feeds are required:

The RSC-M is powered by an external -48V power supply which conforms to the following:

Voltage level within -42V to -56V (-48V nominal)
Ripple voltage shall be less than 0.02V.
Max current of 5A for each unit (0 & 1) in the RCO2 Shelf

The following circuit breakers are required for each RSC-M:

(2) 30 Amp "A" Feeds
(2) 30 Amp "B" Feeds
(4) Returns

14.3.5 Current Drain Information

Current Drain for the circuit packs is:

The following is the -5V current drain, in Amps, of each cp that can mount on the RCO2 Shelf; (Note: Worst Case Current drain is incomplete as all CP data is not available at this time but will be incorporated in future issue.)

PEC	DRAIN	QTY CPS	TOTAL DRAIN	COMMENTS
NTMX72AA	0	2	0	Power supply (40 Amp)
NTMX77AA	4.00	2	8.00	Unified Processor
NT6X92CA	3.91	4	15.64	UTR
NT6X78AB	2.78	2	5.56	CLASS Modem
NTMX76AA/ /NT6X69LB	2.00	2	4.00	Message Cards
NTMX75AA	2.00	2	4.00	Matrix Card
NTMX73AB	2.70	2	5.40	Signalling processor
NTMX87AA	0	5	0	PCM30 Quad Frame
NTMX82AA	0.36	20	7.20	Dual PCM30 Packlet
NTMX74AB	1.50	2	3.00	DS30A Interface

TOTAL Worst Case CURRENT DRAIN			= 52.80 Amps	

The following is the -5V current drain, in Amps, of each cp that can mount on the GPP EXT Shelf;

PEC	DRAIN	QTY CPS	TOTAL DRAIN	COMMENTS
NTMX79AA	1.50	4	6.00	Power supply (7 Amp)
NTMX87AA	0	6	0	PCM30 Qual Frame
NTMX82AA	0.36	24	8.64	Dual PCM30 Packlet

TOTAL Worst Case CURRENT DRAIN			= 14.64 Amps	

The worst case dissipation for a fully configured RSC-M cabinet is 865.2 Watts (173.04 Amps output = 865.2 Watts output). This figure considers three full main RCO2 shelves and one full extension shelf.

Assuming that the NTMX72 and NTMX79 power supplies takes about 25 percent converting the -48V to 5V, and that the -12V requirements are minimal, the total power requirements of a fully populated RSCM from the PDC is 1154 Watts (input) or approximately 24 Amps assuming a -48V power supply.

Thermal analysis and testing will be performed to verify that the RSCM will operate at a maximum operating temperature of 40 degrees C as per ETSI ETS 300 019-3 Class 3.1. with the 200 CFM air delivery from the cabinet cooling unit.

14.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

14.4.1 Required Software Packages and Interdependencies

Development on the RSC-M project will be done on the XPM07, CCM06, TL06 and WT06 DRUs, or the EUR05 PCL.

The software areas that will need development are:

- Allow MEL CAS lines to be added to the RCO2 (Datafill).
- Support MEL CAS links as P-side of RCO2 (HMI)
- Static Data
- MEL CAS protocol support on RCO2.
- CLASS code consolidation.
- Cold ESA Entry/Exit for MEL CAS.
- AMC node Maintenance (AMC is the logical PM type representing the MUX).
- PCM30 Maintenance for links going to the MEL CAS MUX.

14.4.2 Software Usage Restrictions

The OA&M (operation, administration and maintenance) limitations and restrictions are:

- DC5A and DC5ADD will not support intra switching or ESA.
- Only 46 P-side links are available for MEL CAS.
- The MX74AB DS30A packs are required in the RCO2.
- Calls that require the CMR card (Calling Number Display) will not be intraswitched.

- No Custom Calling Features will be supported in ESA mode.

14.4.3 Memory Provisioning

Not applicable

14.5 Real Time Impact

Not applicable

Chapter 11

COMMON CHANNEL SIGNALLING PERIPHERALS

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COMMON CHANNEL SIGNALLING PERIPHERALS
Section Contents

1.0 ECM569 - DMS SSP/STP Integrated Node (INode) 11-1
1.1 Overview 11-1
1.2 Hardware Provisioning 11-3
1.2.1 Hardware Usage Restrictions 11-3
1.2.2 Hardware Dependencies 11-3
1.2.2.1 P and C Side Port Requirements . . . 11-3
1.2.2.2 DMS BUS Port Requirements 11-3
1.2.2.3 Circuits Per Card 11-3
1.2.2.4 Discrimination Numbering 11-3
1.2.3 Provisioning Considerations 11-3
1.2.3.1 Software Load Gating Hardware 11-3
| 1.2.3.2 Hardware for Initials and Extensions 11-6
| 1.2.3.3 Product Introduction Strategy 11-7
1.2.4 Office Layout Information 11-7
1.2.5 Traffic Tables 11-8
1.3 Product/System Specification 11-8
1.3.1 Physical Characteristics 11-8
1.3.2 EMI/Earthquake Information 11-8
1.3.3 Sparing Information 11-8
1.3.4 Power Feed and Fusing Requirements 11-9
1.3.5 Current Drain Information 11-9
1.4 Software Provisioning 11-9
| 1.4.1 Required Software Packages and Interdependencies 11-11
| 1.4.1.1 Required S/W Packages for North American application 11-11
1.4.1.2 Required S/W Packages for other Market application 11-12
1.4.1.3 Software Usage Restrictions 11-12
1.4.2 Memory Provisioning 11-12
1.5 Real Time Impact 11-12

2.0 ECM603 - Building Block Engineering - MS7E 11-13
2.1 Overview 11-13
2.2 Hardware Provisioning 11-13
2.2.1 Hardware Usage Restrictions 11-13
2.2.2 Hardware Dependencies 11-13
2.2.2.1 P and C Side Port Requirements . . . 11-13
2.2.2.2 DMS BUS Port Requirements 11-13
2.2.2.3 Circuits Per Card 11-13
2.2.2.4 Discrimination Numbering 11-13
2.2.3 Provisioning Considerations 11-14
2.2.3.1 NTZZ05AA (Message Signalling 7 Frame) 11-14
2.2.3.2 NTZZ05BA (CCS7 Signalling Terminal) 11-14
2.2.3.3 NTZZ05CA (Signalling Terminal 7 Group Shelf) 11-14
2.2.3.4 NTZZ05DA (Signalling Terminal I/F with Terminator) 11-14

2.2.3.5 NTZZ05EA (Signalling Terminals for STG7 Shelf) 11-14
2.2.3.6 NTZZ05FA (Signalling Terminal I/F) 11-14
2.2.3.7 NTZZ05GA (ST Filler Faceplates) . . . 11-15
2.2.3.8 NTZZ05HA (Message Signalling 7 Frame (US)) 11-15
2.2.3.9 NTZZ05JA (Earthquake MS7E Frame (US)) 11-15
2.2.3.10 MS7E CALCULATIONS 11-15
2.2.3.11 CUSTOMER CONFIGURATION 11-16
2.2.3.12 MS7E CUSOMER QUESTIONS 11-18
2.2.3.13 Office MSB7 Messaging Requirement 11-18
2.2.3.14 Section I 11-18
2.2.3.15 Section II 11-18
2.2.4 Office Layout Information 11-19
2.2.5 Traffic Tables 11-19
2.3 Product/System Specification 11-19
2.3.1 Physical Characteristics 11-19
2.3.2 EMI/Earthquake Information 11-19
2.3.3 Sparing Information 11-19
2.3.4 Power Feed and Fusing Requirements 11-19
2.3.5 Current Drain Information 11-19
2.4 Software Provisioning 11-19
2.4.1 Required Software Packages and Interdependencies 11-19
2.4.2 Software Usage Restrictions 11-20
2.4.3 Memory Provisioning 11-20
2.5 Real Time Impact 11-20

3.0 ECM692 - International Cabinetized Message Switch 7, Model B 11-21
3.1 Overview 11-21
3.2 Hardware Provisioning 11-22
3.2.1 Hardware Usage Restrictions 11-22
3.2.2 Hardware Dependencies 11-22
3.2.2.1 P and C Side Port Requirements . . . 11-22
3.2.2.2 DMS BUS Port Requirements 11-22
3.2.2.3 Circuits Per Card 11-23
3.2.2.4 Discrimination Numbering 11-23
3.2.3 Provisioning Considerations 11-23
3.2.4 Office Layout Information 11-27
3.2.5 Traffic Tables 11-27
3.3 Product/System Specification 11-27
3.3.1 Physical Characteristics 11-27
3.3.2 EMI/Earthquake Information 11-27
3.3.3 Sparing Information 11-27
3.3.4 Power Feed and Fusing Requirements 11-27
3.3.5 Current Drain Information 11-27
3.4 Software Provisioning 11-27
3.4.1 Required Software Packages and Interdependencies 11-27
3.4.2 Software Usage Restrictions 11-27
3.4.3 Memory Provisioning 11-27

3.5 Real Time Impact 11-27

4.0 ECM713 - Location Routing Number, Local Number Portability on a Service Switching Point (SSP) 11-28
4.1 Overview 11-28
4.1.1 Introduction to Local Number Portability . . . 11-28
4.1.2 Location Routing Number-Local Number Portability 11-29
4.1.2.1 Non-ported number in a portable NPA-NXX 11-31
4.1.2.2 Per trunk signaling interworking . . 11-31
4.1.2.3 Interworking with a nonLNP-capable switch 11-32
4.1.2.4 Intermediate switches, nonLNP capable 11-32
4.1.2.5 Intermediate switches, LNP capable 11-32
4.1.2.6 InterLATA, nonLEC intraLATA calls . . 11-32
4.1.3 Query on Release 11-32
4.2 Hardware Provisioning 11-35
4.2.1 Hardware Usage Restrictions 11-35
4.2.2 Hardware Dependencies 11-35
4.2.2.1 P and C Side Port Requirements . . . 11-35
4.2.2.2 DMS BUS Port Requirements 11-36
4.2.2.3 Circuits Per Card 11-36
4.2.2.4 Discrimination Numbering 11-36
4.2.3 Provisioning Considerations 11-36
4.2.4 Office Layout Information 11-36
4.2.5 Traffic Tables 11-36
4.3 Product/System Specification 11-36
4.3.1 Physical Characteristics 11-36
4.3.2 EMI/Earthquake Information 11-36
4.3.3 Sparing Information 11-36
4.3.4 Power Feed and Fusing Requirements 11-36
4.3.5 Current Drain Information 11-37
4.4 Software Provisioning 11-37
4.4.1 Required Software Packages and Interdependencies 11-37
4.4.2 Software Usage Restrictions 11-38
4.4.2.1 Feature interactions 11-39
4.4.3 Memory Provisioning 11-39
4.5 Real Time Impact 11-39

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1.0 ECM569 - DMS SSP/STP Integrated Node (INode)

1.1 Overview

Not every LATA has the growth or growth potential to justify deploying stand-alone STP capabilities. In otherwors, in low-density rural and suburban areas, STP functionality can be integrated with an existing DMS-100 SSP to minimize the expense of deploying stand-alone STPs in LATAs where there is a lower demand for CCS7 based services. The INode will function as a STP within the CCS7 network but will also perform call processing. The call processing portion of the switch will perform as though it were an SSP. All messages to and from the SSP function will be sent and received on the STP signaling links. Note that there is no virtual links connecting the SSP and STP functions. The Figure 1 shows the typical CCS7 Network.

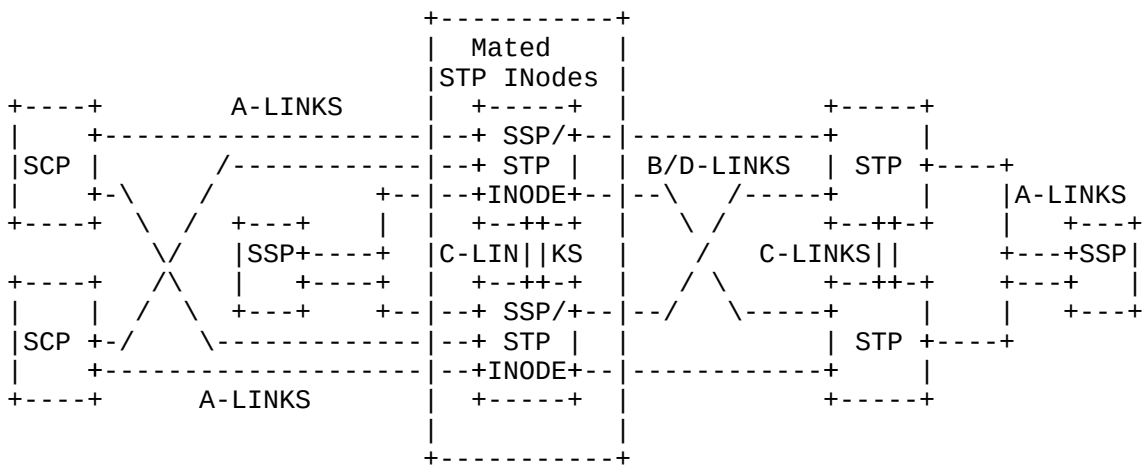


Figure 1. Typical CCS7 Network

Physical links will connect the various nodes in the CCS7 network, usually either 56kbs or 64kbs in bandwidth. Note that SPs are not shown in the figure. The links are described as follows:

1. 'A' (Access)-Links, Connect SSPs, SCPs, and SPs to STPs.

2. 'B' (BRIDGE) Links, Link quads which fully interconnect STP mated pairs to other STP pairs.

3. 'C' (Cross)Links, which join two STPs to form mated pairs

4. 'D' (Diagonal) Links, Link quads interconnecting a primary (regional) STP pair with a secondary (LATA) STP pair

5. 'E' (Extended)Links, Access links to a remote STP pair other than the home STP. They provide additional redundancy.

6. 'F' (Fully Associated) Links, Associated signaling links inter- connecting two SPs (excluding STPs).

The SP node portion of the INode will not have direct links to the outside network. F-links and the SP terminating end of A-links and E-links will not be supported by the integrated node. B-links, C-links, D-links, and only the remote STP end of A-links and E-links will be supported by the integrated SP/STP CCS7 node.

The INode is exclusively software based. Integration can occur in any one or both sides of an STP pair.

Mapping Common Channel Signaling No.7 (CCS7) function

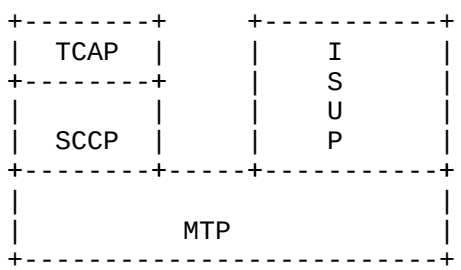
CCS7 signaling is a generic term for a telecommunications system using two separate paths for information transfer: one for voice/data and one for signaling information. The CCS7 protocol represented by four parts as shown below:

1. Message Transfer Part (MTP)

2. Signaling Connection Control Part (SCCP)

3. Integrated Services Digital Network User Part (ISUP)

4. Transaction Capabilities Application Part (TCAP)



The MTP ensures reliable transfer of signaling units in correct sequence without loss or duplication, and the ISUP provides signaling for setting up, monitoring, and taking down CCS7 calls on ISUP trunks using MTP. The ISUP is called a user part because it transports signaling messages associated with the connection between two users in a network.

There are three levels to the MTP.

1. Physical level is the level one, and it is performed by the NT9X77 or the NT9X78 Paddle Boards.

2. Link Level is the level two, and it is performed by the NT9X76 pack.
3. Network level is the level three, and it performs logical address routing. This level is done by the Integrated Processor and F-Bus interface (IPF), card.

After the MTP function, if the message is addressed to one of the DMS-STP's capability codes, it is passed to the SCCP processor of the Integrated Processor and F-Bus interface (IPF), where Global Title Translation (GTT) is performed.

1.2 Hardware Provisioning

1.2.1 Hardware Usage Restrictions

MSB7s are not supported on the Integrated Node.

The 4 Meg LIU7 are not supported in LSTB004 and UP.

1.2.2 Hardware Dependencies

Not applicable.

1.2.2.1 P and C Side Port Requirements

Not applicable

1.2.2.2 DMS BUS Port Requirements

Not applicable

1.2.2.3 Circuits Per Card

Not applicable

1.2.2.4 Discrimination Numbering

Not applicable

1.2.3 Provisioning Considerations

1.2.3.1 Software Load Gating Hardware

If loading of the PCL is attempted before the Load Gating Hardware has been installed, a load abort will occur.

LOAD GATING HARDWARE
Load Gating Hardware is, for a specific Software Release Stream (such as LSTB006), the hardware that is deemed to be necessary to load and run the specific Software Release.

Figure 2. DEFINITIONS.

The minimum hardware required for the INode for LSTB006 is identified in the table below for existing field hardware:

Product	PEC	Description	Reason
SLM-II	NT9X44AB	System Load Module	Load Size > 70MB
SN-20 Optional BRISC-50 BRISC-60	NT9X13BC NT9X10AA/24M NT9X10AA/96M	SuperNode 20 SuperNode 50 SuperNode 60	Capacity For SEAS see Note 1
MS and in LMS	NT9X13DD OR NT9X13DC + NT9X14DB	16 MEG Proc/Mem OR 4 MEG Proc/Mem + 24Meg Memory	Minimum of 16 Meg Memory
LIU7	NTEX22BA/BB	8 Meg memory	Note 2

Note 1:

Due to the amount of CM CPU usage required by SEAS functionality when processing the Bellcore-specified maximum frequency of SEAS requests and event reports, SEAS on an INode is only supported on BRISC Series 50 or 60. In addition, call processing should be engineered as if the INode office utilized a Series 40-based CM processor.

Note 2:

With 8 Meg Link Interface Units, the following maximum system configuration can be supported.

System Capability	LSTB004	LSTB006

	Maximum	Maximum
Global Title Translation table entries (up to 18 Digit)	10,000	10,000
Gateway Screening rules (including validation)	2,000	2,000
CCS7 Links with BRISC Processing	72 108	72 108
Routesets	255	511
CCS7 trunk members	20,000	20,000

1.2.3.2 Hardware for Initials and Extensions

The minimum hardware required for the INode is identified in the table below for initials and extensions:

Product	PEC	Description	Reason
SLM-III	NT9X44AD	1.0GB Hard Drive 500 MB Tape	Capacity
ENET	NT9X13KA	16MB processor	Capacity
LMS	NT9X13DD NT9X53AD	16 MEG Proc/Mem Clock	Minimum of 16Meg Robustness
LIU7	NT9X77AB	V.35 PB	Surface Mount and ISG Compliant
LIU7	NTEX22BB	8 Meg memory	Capacity
IOC	NT1X55AA NT1X89BB	SCSI-DDU Enhanced MPC	Dedicated for SEAS Datacom + 9.6KB/s
IOM *	NTFX30AA	I/O, DDU, MTD	Cost reduction
Optional in LPP in CM	 NTDX16AA + NT9X2825 NT9X10BA + NT9X26EA	 Dual Power Converter Power I/F Panel BRISC SERIES 70 RTIF	 Power Redundancy

* Check Availability prior to ordering.

Mixed applications are supported on the single LPP of the INode as of LSTB006. Refer to ECM 620 for Mixed application provisioning rules. Note that the Mixed application is supported with the following conditions:

- MNA7 is turned on

  The MNA7 provides a DMS switch with multiple network address capability. With this capability, one physical DMS switch can be datafilled with more than one point code as its own addresses, or point codes in a CCS7 signaling network. In other words, With MNA7 capability, a switch can be datafilled as two logical nodes, one as STP and the other as SSP.

- multi-application ASUs are located on the same LPP as the SSP links.

- STP links are on the separate LPP.

1.2.3.3 Product Introduction Strategy

The following conversions are supported:

1. SSP stand-alone to an SSP/STP Inode via an ONP

2. SSP/STP INode to an SSP stand-alone via an ONP

3. Single Point Code Inode to Multiple CCS7 Network Address(MNA7) INode via SOC.

Note that call processing needs to be engineered to the lower INode capacity when converting SSP stand-alone to an INode.

The following conversions are not supported:

1. STP stand-alone to an SSP/STP INode via an ONP

2. SSP/STP INode to an STP stand-alone via an ONP

1.2.4 Office Layout Information

Not applicable.

1.2.5 Traffic Tables

CCS7 TRAFFIC: Traffic supported for different message lengths, speeds and data rates are outlined in the Tables below. For additional details on CCS7 traffic provisioning, refer to System Engineering bulletin (SEB) 92-12-001 LPP/LIU7 Performance, Throughput, and Capacity.

Traffic supported for 15 byte messages:

	<-------LINK SPEED------->	
MESSAGE RATE	56 Kbps	64 Kbps
224 msg/s	0.64 Erlang	0.56 Erlang

The above assumes no Gateway Screening or Global Title Translation, and 50% incoming and 50% outgoing messages. This is applicable to China market.

Traffic supported for 25 byte messages:

	<-------LINK SPEED------->	
MESSAGE RATE	56 Kbps	64 Kbps
112 msg/s	0.40 Erlang	0.35 Erlang
224 msg/s	0.80 Erlang	0.70 Erlang

Traffic supported for 29 byte messages:

	<-------LINK SPEED------->	
MESSAGE RATE	56 Kbps	64 Kbps
112 msg/s	0.46 Erlang	0.40 Erlang
224 msg/s	0.92 Erlang	0.80 Erlang

That is, for a particular link speed and message throughput, a greater Erlang value is obtained for longer messages.

1.3 Product/System Specification

1.3.1 Physical Characteristics

Not applicable.

1.3.2 EMI/Earthquake Information

Not applicable.

1.3.3 Sparing Information

Not applicable.

1.3.4 Power Feed and Fusing Requirements

Not applicable.

1.3.5 Current Drain Information

Not applicable.

1.4 Software Provisioning

The LSTB004 PCL is built upon the CSP04 platform and it is made up of the following software layers:

- BASE05
- TL04
- SHR04
- CCM04
- CNA04
- XPM05
- STPO23

The LSTB006 PCL is composed of all LECB006 PCL software with STPBASE002 PCL to provide the INode product functionality. The LSTB006 is built upon the CSP06 platform and is made up of the following software layers:

- BASE07
- TL06
- SHR06
- CCM06
- CNA06
- XPM07
- STPI06

All functionalities available in the LECB006 PCL are available in the LSTB006 PCL plus the following:

- The STP portion of the CSP06 INode includes Signaling Engineering and Administration System(SEAS),Enhanced Cluster Routing(ECR) and capability codes.

- The CCS7 portion of the CSP06 INode includes Multiple Network Adressing for CCS7 (MNA7) phase1 and 511 Routeset Expansion(RSX).

Note that the LSTB006 is based on STP02 with some increments from STP03. The table below indicates the maximum number of links, linksets, routes, routesets that can be provisioned through the software datafill on the Inode using LSTB006. Note that Channelized Access links are not supported on the STP component of an MNA7 INode which has SEAS built into the load.

Item	Maximum Configurable	SOC Information	Comments
Links **	72 w/out BRISC 108 with BRISC 90 Cha.Acc Links	n/a	1 per LIU7 Refer Table C7LINK
Linksets	72 w/out BRISC 108 with BRISC	n/a	Max. of 16 links per linksets Refer Table C7LKSET
Routesets	0-255 without MNA7 0-511 with MNA7	n/a TEL00010	Refer Table C7RTESET
Routes	Maximum of 6 routes/routeset	n/a	
GTT	10,000	n/a	Refer Table C7GTT
ISUP trunks	20,000	n/a	Refer Table C7TRKMEM

** maximum number of 72 links for INODE when NIUs are not provisioned.

There are 3 ways to datafill an LIU7:

It is datafilled as a channelized access LIU7 in table LIUINV. This channel allocation scheme interfaces the LIU7 directly to the ports on the Network via it's associated NIU. A T1 carrier, on the DTC connected to the Network is then used to interface the LIU7 to the outside world. Similarly, A PCM30 carrier, on the PDTC

connected to the Network is then used to interface the LIU7 to the outside world.

(OR)

it is datafilled as a non-channelized access LIU7, where a direct interface to the outside world is provided, in this case using a V.35 paddleboard.

(OR)

it is datafilled as aa external Router. External Routers must be at least eight Meg LIU7s. They are physically the same as the LIU7s used for signaling links. Physical links are not permitted for an LIU7 configured as an External Routers. Even if a link is attached, it will not be used.

1.4.1 Required Software Packages and Interdependencies

1.4.1.1 Required S/W Packages for North American application

The following software is required to add STP functions to a SSP:

Pacakage Name	Order Code
STP Base	STPB0001
STP/SSP Integration	STPE0300
CCS7 Base	TEL00008
Optional:	
CCS7 Channelized Access	TEL00002
Gateway Screening and Gateway Screening Validation	TEL00003
CCS7 Link Protocol Tester	TEL00006
CCS7 Network Reliability Council Items	TEL00009
Multiple CCS7 Network Addresses	TEL00010
STP Signaling Engineering and Administration	STPS0001
Network Reliability Council Items	STPE0200
DCIS6	STPE0002
STP X-List Management	STPE0003

1.4.1.2 Required S/W Packages for other Market application

In addition to the DMS100i software load, The software packaging for Integrated SP/STP is:

NTXN00AA : Integrated SP/STP (single point code)
NTX833AB : STP Operations

The DMS100i Inode is part of the DMS100i evolution program which retains NTX package data for software definition. Refer to relevant documentation for SP and STP standalone software packaging.

The integrated SP/STP will use a software load based on the BCS stream of software. Any vintage of application software for STP and SP will be compatible providing they are within three BCS releases of each other.

1.4.1.3 Software Usage Restrictions

Not Applicable

1.4.2 Memory Provisioning

| Refer to SEB 92-01-001 Link Interface Unit (LIU7) Memory Calcu-
| lations For LIU7 Memory requiremnts.

| Refer to ECM 626 for CM Memory details.

1.5 Real Time Impact

Performance of the Inode must be considered with the requirements of both the SSP & STP. The STP functionality uses very little CM CPU time unless service-affecting faults (e.g. network outages, link failure, CCS7 hardware failure) occur, upon which the STP's maintenance activities in the CM are invoked. These activities result in intensive usage of CPU time. As a result, a derate of 20% is applied to the SSP call processing capacity of the INode to assure STP recovery under all scenarios. The following provisioning rule is required:

Call Processing capacity for INode = stand-alone SSP capacity * 0.8

A 20% reduction in SP capacity means decreasing the SP's call-processing usage of the CM CPU by 20%. This reduction is reserved for use by the Distributed Data Management dynamic updating and CCS7 network maintenance, both critical for network and switch sanity.

2.0 ECM603 - Building Block Engineering - MS7E

2.1 Overview

The purpose of this ECM is to document Building Block Engineering for the MS7E frame.

There are three main components to this ECM:

1. MS7E Customer Questions
2. MS7E Calculations
3. MS7E Configuration

MS7E Customer Question: Worksheet of Telco inputs required at the time of order capture.

MS7E Calculations: Worksheet of provisioning algorithms driven from the results of the Customer Question section to determine the number of MSB7s required, based on messaging.

MS7E Configuration: Signaling Terminals required for customer application are spread across the MSB7s determined above and configured on each MSB7 per algorithms provided.

2.2 Hardware Provisioning

2.2.1 Hardware Usage Restrictions

Not applicable.

2.2.2 Hardware Dependencies

Not applicable.

2.2.2.1 P and C Side Port Requirements

2.2.2.2 DMS BUS Port Requirements

Not applicable

2.2.2.3 Circuits Per Card

Not applicable

2.2.2.4 Discrimination Numbering

Not applicable

2.2.3 Provisioning Considerations

The Message Switch and Buffer (MSB) building block concept deals with a higher level of Product Engineering Code (PEC) engineering order process. Optional to the basic MSB equipped with two (2) Signalling Terminals (ST), additional ST's can be provided.

The ST7E Frame has not been re-issued in the Building Block format due to the lack of a practical need for this frame due to the real time limitations of the MSB7.

2.2.3.1 NTZZ05AA (Message Signalling 7 Frame)

The NTZZ05AA contains the basic MS7E frame components and one (1) pair of Signalling Terminal CP's. Each NTZZ05AA includes all Power Converters, Processors, Filler Panels, etc. to make a fully functional MSB. The MSB frame will be ISG compliant and contain a universal framework. The MSB will always be provided with three (3) ports to the Network. An office can contain a maximum of four (4) MSB's. Additional ST's can be provided on an optional basis.

2.2.3.2 NTZZ05BA (CCS7 Signalling Terminal)

The NTZZ05BA contains the circuit packs to provide two (2) additional Signalling Terminals and designation strips. These will be provided on an as needed basis when the requirements exceed the two (2) always provided STs in the NTZZ05AA building block.

2.2.3.3 NTZZ05CA (Signalling Terminal 7 Group Shelf)

The NTZZ05CA contains the shelf required when the number of signalling terminals exceed 8 or 4 pairs. The shelf comes equipped with one pair of ST's and all functionally required equipment. It can contain up to 16 or 8 pairs of STs.

2.2.3.4 NTZZ05DA (Signalling Terminal I/F with Terminator)

The NTZZ05DA contains the pair of ST Interface packs required on the last shelf that contains Signalling Terminals.

2.2.3.5 NTZZ05EA (Signalling Terminals for STG7 Shelf)

The NTZZ05EA contains a pair of ST packs for use on the STG7 shelf (position 51).

2.2.3.6 NTZZ05FA (Signalling Terminal I/F)

The NTZZ05FA contains a pair of ST Interface packs for use on the next to last shelf containing Signalling Terminals.

2.2.3.7 NTZZ05GA (ST Filler Faceplates)

The NTZZ05GA contains filler faceplates for use on unequipped ST positions.

2.2.3.8 NTZZ05HA (Message Signalling 7 Frame (US))

The NTZZ05HA contains the basic MS7E frame components and one (1) pair of Signalling Terminal CP's. Each NTZZ05HA includes all Power Converters, Processors, Filler Panels, etc. to make a fully functional MSB. The MSB frame will be ISG compliant and contain a common framework. The MSB will always be provided with three (3) ports to the Network. An office can contain a maximum of four (4) MSB's. Additional ST's can be provided on an optional basis.

2.2.3.9 NTZZ05JA (Earthquake MS7E Frame (US))

The NTZZ05JA contains the same components as the NTZZ05HA except for the common framework. NTZZ05JA contains the NT0X2AH earthquake framework.

2.2.3.10 MS7E CALCULATIONS

There can be a maximum of four (4) MSB7s per office. The following calculations establish the number required.

A = (Q1 / 3600) * 6 _____

B = (Q2 / 3600) * 12 _____

C = (Q3 / 3600) * 6 _____

D = (Q4 / 3600) * 2 _____

E = (Q5 / 3600) * 2 _____

F = (Q6 / 3600) * 2 _____

G = (Q7 / 3600) * 4 _____

H = (Q8 / 3600) * 4 _____

I = (Q9 / 3600) * 13 _____

J = (Q10 / 3600) * 2 _____

ISUP = A + B + C OR Q11 _____

TCAP = D + E + F + G + H + I + J OR Q12 _____

Total ISUP msg/sec. + (2*TCAP msg/sec.) < = 135 AND
Total TCAP Messages per second < = 30 requires one MSB7.

Total ISUP msg/sec. + (2*TCAP msg/sec.) < = 205 AND
Total TCAP Messages per second < = 46 requires two MSB7s.

Total ISUP msg/sec. + (2*TCAP msg/sec.) < = 340 AND
Total TCAP Messages per second < = 76 requires three MSB7s.

Total ISUP msg/sec. + (2*TCAP msg/sec.) < = 460 AND
Total TCAP Messages per second < = 107 requires four MSB7s.

P = Number of MSB7s Required (determined above) _____

2.2.3.11 CUSTOMER CONFIGURATION

5A: Number of STs required per MS7E = Q13 / P (Round up) _____
(Maximum 12 pairs per MS7E)

(If Q13/P was rounded up, the result shall determine the configuration of all the frames required except the last which shall be configured as 5A - 1).

Example: Q13 = 23 (23 CCS7 links required) and P = 3 (3 MS7E frames required).

Q13/P = 23/3 = 7.66 (Round up) = 8

With 5A = 8, the first two MS7E frames would be configured as 5A = 8, as shown below, but the last MS7E frame would be configured as 5A = 7, as shown below (5A - 1).

If 5A = 1, provide one NTZZ05AA, NTZZ05HA, or NTZZ05JA, six NTZZ05GA, one NTZZ05DA, and one NT0X84AA.

If 5A = 2, provide one NTZZ05AA, NTZZ05HA, or NTZZ05JA, one NTZZ05BA, four NTZZ05GA, one NTZZ05DA, and one NT0X84AA. (For U.S. applications provide 2 NT6X66AA or NT6X66AC rather than the NTZZ05BA).

If 5A = 3, provide one NTZZ05AA, NTZZ05HA, or NTZZ05JA, two NTZZ05BA, two NTZZ05GA, one NTZZ05DA, and one NT0X84AA. (For U.S. applications provide 4 NT6X66AA or NT6X66AC rather than the NTZZ05BA).

If 5A = 4, provide one NTZZ05AA, NTZZ05HA, or NTZZ05JA, three NTZZ05BA, one NTZZ05DA, and one NT0X84AA. (For U.S. applications provide 6 NT6X66AA or NT6X66AC rather than the NTZZ05BA).

IF 5A = 5, provide one NTZZ05AA, NTZZ05HA, or NTZZ05JA, three NTZZ05BA, one NTZZ05CA, one NTZZ05FA, and fourteen NTZZ05GA.
(For U.S. applications provide 6 NT6X66AA or NT6X66AC rather than the NTZZ05BA).

If 5A = 6, provide one NTZZ05AA, NTZZ05HA, or NTZZ05JA, three NTZZ05BA, one NTZZ05CA, one NTZZ05EA, one NTZZ05FA, and twelve NTZZ05GA.
(For U.S. applications provide 8 NT6X66AA or NT6X66AC rather than the NTZZ05BA and NTZZ05EA).

If 5A = 7, provide one NTZZ05AA, NTZZ05HA, or NTZZ05JA, three NTZZ05BA, one NTZZ05CA, two NTZZ05EA, one NTZZ05FA, and ten NTZZ05GA.
(For U.S. applications provide 10 NT6X66AA or NT6X66AC rather than the NTZZ05BA and NTZZ05EA).

If 5A = 8, provide one NTZZ05AA, NTZZ05HA, or NTZZ05JA, three NTZZ05BA, one NTZZ05CA, three NTZZ05EA, one NTZZ05FA, and eight NTZZ05GA.
(For U.S. applications provide 12 NT6X66AA or NT6X66AC rather than the NTZZ05BA and NTZZ05EA).

If 5A = 9, provide one NTZZ05AA, NTZZ05HA, or NTZZ05JA, three NTZZ05BA, one NTZZ05CA, four NTZZ05EA, one NTZZ05FA, and six NTZZ05GA.
(For U.S. applications provide 14 NT6X66AA or NT6X66AC rather than the NTZZ05BA and NTZZ05EA).

If 5A = 10, provide one NTZZ05AA, NTZZ05HA, or NTZZ05JA, three NTZZ05BA, one NTZZ05CA, five NTZZ05EA, one NTZZ05FA, and four NTZZ05GA.
(For U.S. applications provide 16 NT6X66AA or NT6X66AC rather than the NTZZ05BA and NTZZ05EA).

If 5A = 11, provide one NTZZ05AA, NTZZ05HA, or NTZZ05JA, three NTZZ05BA, one NTZZ05CA, six NTZZ05EA, one NTZZ05FA, and two NTZZ05GA.
(For U.S. applications provide 18 NT6X66AA or NT6X66AC rather than the NTZZ05BA and NTZZ05EA).

If 5A = 12, provide one NTZZ05AA, NTZZ05HA, or NTZZ05JA, three NTZZ05BA, one NTZZ05CA, seven NTZZ05EA, and one NTZZ05FA.
(For U.S. applications provide 20 NT6X66AA or NT6X66AC rather than the NTZZ05BA and NTZZ05EA).

2.2.3.12 MS7E CUSOMER QUESTIONS

2.2.3.13 Office MSB7 Messaging Requirement

Office provisioning must be based on either estimated call attempts or actual office measurements but not both. Answer questions under either “Section I” , or “Section II”, depending on the basis for provisioning which applies.

2.2.3.14 Section I

If an estimate of the High Day Busy Hour call attempts will be the basis for office provisioning, the following questions must be answered:

Q : Line to CCS7 Trunk HDBH Call Attempts _____

Q : CCS7 Trunk to CCS7 Trunk HDBH Call Attempts _____

Q : MF/DP Trunk to CCS7 Trunk HDBH Call Attempts _____

Q4 : E800 HDBH Call Attempts _____

Q5 : Exchange Alternate Billing Service HDBH Call Attempts _____

Q6 : PVN w/o PIN HDBH Call Attempts _____
(PIN is Personal Identification Number)

Q7 : PVN w/ PIN HDBH Call Attempts _____

Q8 : RAG (Network Ring Again) HDBH Call Attempts _____

Q9 : Automatic Call Back HDBH Call Attempts _____

Q 0: Automatic Recall HDBH Call Attempts _____

2.2.3.15 Section II

Actual message counts can be obtained on an inservice system by reading registers from OM groups ISUPUSAG and TCAPUSAG.

If office Operational Measurements are to be the basis for provisioning, the following questions must be answered:

Q 1: Total ISUP messages per second

$$\frac{(\text{ISMGOUT} + \text{ISMSGOT2} + \text{ISMSGIN} + \text{ISMSGIN2})}{3600} = _____$$

Q 2: Total TCAP messages per second

$$\frac{(TCMSGOUT + TCMGOU2 + TCMSGIN + TCMSGIN2)}{3600} = _____$$

Q 3: Signaling Terminal pairs required per office _____

2.2.4 Office Layout Information

Not applicable.

2.2.5 Traffic Tables

Not applicable.

2.3 Product/System Specification

2.3.1 Physical Characteristics

Not applicable.

2.3.2 EMI/Earthquake Information

Not applicable.

2.3.3 Sparing Information

Not applicable.

2.3.4 Power Feed and Fusing Requirements

Refer to ECM 271.

2.3.5 Current Drain Information

Refer to ECM 271.

2.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

2.4.1 Required Software Packages and Interdependencies

Not applicable.

2.4.2 Software Usage Restrictions

Not applicable.

2.4.3 Memory Provisioning

Not applicable.

2.5 Real Time Impact

Not applicable.

3.0 ECM692 - International Cabinetized Message Switch 7, Model B

3.1 Overview

This document describes engineering and provisioning considerations for the NTRX48BA Model B International Cabinetized Message Switch 7 (CMS7).

The NTRX48BA cabinet houses a dual-shelf Message Switch Buffer 7 (MSB7) module and two Signaling Terminal Group 7 (STG7) shelves. The MSB7 shelves are connected to each plane of the CDSN Network through the CSLC via bulkhead DS30 cabling.

In the top of the cabinet is the FSP which distributes power, control and alarms to the cabinet.

The cabinet is forced air cooled with a fan unit integrated into the base of the cabinet.

The Building Block for this product is NTZZ37HC. Refer to the Engineering Manual Section for NTZZ37HC for additional information. Refer to ECM-683 for details of the Model B cabinet features.

The dimensions of the Model B CMS7 Cabinet are shown in Figure 1.

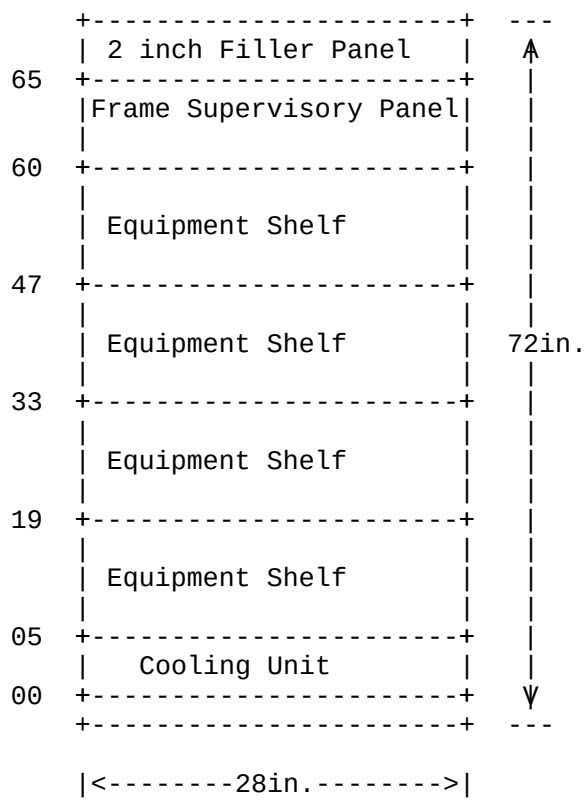


Figure 3. DMS-100 MODEL B CABINET LAYOUT

3.2 Hardware Provisioning

3.2.1 Hardware Usage Restrictions

Please refer to ECM-683

3.2.2 Hardware Dependencies

Please refer to ECM-683

3.2.2.1 P and C Side Port Requirements

Not applicable

3.2.2.2 DMS BUS Port Requirements

Not applicable

3.2.2.3 Circuits Per Card

Not applicable

3.2.2.4 Discrimination Numbering

Not applicable

3.2.3 Provisioning Considerations

Each of the MSB7 and STG7 shelves supports 4 and 16 NT6X66 Signaling Terminal (ST) circuit packs, respectively, for a total of 40 STs per cabinet.

NT6X66AA and NT6X66CA STs are provionable for CCS7 and DPNSS respectively.

The NTRX48BA is always provided in building block NTZZ37HC International CMS7 Model B Cabinet.

The NTZZ37HC can be provisioned as a gray or a brown cabinet.

Signaling links are provisioned in pairs. Provide a pair of Signaling Terminal (ST) circuit packs per signaling link pair as follows:

- For UK CCS7 provide:
  - two (2) NT6X66AA ST CCS7 CPs, or

- For UK DPNSS provide:
  - two (2) NT6X66CA ST DPNSS CPs.

For reliability, the two ST circuit packs associated with a signaling link pair must be provided in slots powered by different power feeds (A & B).

Please refer to Figure 4 on page 11-24 on the following page for the power feed and ST group definitions and the order in which ST CP pairs should be assigned.

For each slot not equipped with an ST circuit pack provide:

- one (1) NT0X50AA Filler Face Plate.

PAIR NUMBER	ST POSITION Shelf-Slot	ST GROUP	POWER FEED
0	05-07	0	A
	19-07	1	B
1	05-06	0	A
	19-06	1	B
2	05-05	0	A
	19-05	1	B
3	05-04	0	A
	19-04	1	B
4	33-17	2	B
	33-11	3	A
5	33-18	2	B
	33-10	3	A
6	33-19	2	B
	33-09	3	A
7	33-20	2	B
	33-08	3	A
8	33-21	2	B
	33-07	3	A
9	33-22	2	B
	33-06	3	A
10	33-23	2	B
	33-05	3	A
11	33-24	2	B
	33-04	3	A
12	47-17	4	B
	47-11	5	A
13	47-18	4	B
	47-10	5	A
14	47-19	4	B
	47-09	5	A
15	47-20	4	B
	47-08	5	A
16	47-21	4	B
	47-07	5	A
17	47-22	4	B
	47-06	5	A
18	47-23	4	B
	47-05	5	A
19	47-24	4	B
	47-04	5	A

Figure 4. Power Feed and ST Group Definitions

For the UK (CCS7 and DPNSS) provide NT6X68AC and NT6X68AD CPs as follows:

- ST Group pair 0 and 1 (STA7 shelves 05 and 19):
  - When ST group pair 0 and 1 (see table of RUL1) is not the last ST group pair in the office (ie if ST pair(s) provisioned in ST group pair 2 and 3), provide in CP slots 08 of shelves 05 and 19:
    - two (2) NT6X68AC STI CPs, or
  - When ST group pair 0 and 1 is the last ST group pair in the office (ie if no ST is provisioned in ST group pair 2 and 3), provide in CP slots 08 of shelves 05 and 19:
    - two (2) NT6X68AD STI with Terminator CPs.
- ST Group Pair 2 and 3 (STG7 shelf 33):
  - When at least one ST pair is provisioned in ST group pair 2 and 3 (see table of RUL1), provide:
    - in CP slots 15 and 16 of shelf 33
      - two (2) NT6X68AC STI CPs.
    - in CP slots 12 and 13 of shelf 33
      - When ST group pair 2 and 3 is not the last ST group pair in the office (ie if ST pair(s) provisioned in ST group pair 4 and 5),
        - two (2) NT6X68AC STI CPs, or
      - When ST group pair 2 and 3 is the last ST group pair in the office (ie if ST pair(s) not provisioned in ST group pair 4 and 5),
        - two (2) NT6X68AD STI with Terminator CPs.
- ST Group Pair 4 and 5 (STG7 shelf 47):
  - When at least one ST pair is provisioned in ST group pair 4 and 5 (see table of RUL1), provide:
    - in CP slots 15 and 16 of shelf 47

- two (2) NT6X68AC STI CPs.

- in CP slots 12 and 13 of shelf 47

  - When ST group pair 4 and 5 is not the last ST group pair in the office

    - two (2) NT6X68AC STI CPs, or

  - When ST group pair 4 and 5 is the last ST group pair in the office

    - two (2) NT6X68AD STI with Terminator CPs.

For each slot not equipped with an STI circuit pack provide:

- one (1) NT0X50AA Filler Face Plate.

Provide NT2X70AF CPs as follows:

- STG7 shelf 33 (ST Group pair 2 and 3), when at least one ST pair is provisioned in ST group pair 2 and 3 (see table of RUL1), provide in CP slots 01 and 25:

  - two (2) NT2X70AF +-5/12V Power Converter 50A CPs.

- STG7 shelf 47 (ST Group pair 4 and 5), when at least one ST pair is provisioned in ST group pair 4 and 5 (see table of RUL1), provide in CP slots 01 and 25:

  - two (2) NT2X70AF +-5/12V Power Converter 50A CPs.

The formerly provided NT2X70AE Power Converter has been changed to MD status and replaced by the NT2X70AF.

For each slot 01 or 25 of shelves 33 and 47 not equipped with NT2X70AF Power Converter, provide:

- one (1) NT0X50AE Filler Face Plate.

Provide the appropriate designation label for each CP provided.

For each cabinet, provide:

- one (1) NTRX3541 English Label Kit, or
- one (1) NTRX3542 German Label Kit.

3.2.4 Office Layout Information

Not applicable.

3.2.5 Traffic Tables

Not applicable.

3.3 Product/System Specification

3.3.1 Physical Characteristics

Not applicable.

3.3.2 EMI/Earthquake Information

Not applicable.

3.3.3 Sparing Information

Standard sparing algorithms apply.

3.3.4 Power Feed and Fusing Requirements

The following fuses and feeds are required:

3.3.5 Current Drain Information

Current Drain for the circuit packs are:

3.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

3.4.1 Required Software Packages and Interdependencies

Not applicable.

3.4.2 Software Usage Restrictions

Not applicable.

3.4.3 Memory Provisioning

Not applicable.

3.5 Real Time Impact

Not applicable.

4.0 ECM713 - Location Routing Number, Local Number Portability on a Service Switching Point (SSP)

4.1 Overview

Product/System Overview

4.1.1 Introduction to Local Number Portability

NOTE: The "Planning and engineering" Section of the LRN-LNP Service Implementation Guide, NTP 297-8981-021, contains all Engineering information regarding LNP, and is an alternative source of information to this ECM.

LNP provides the capability for customers to retain their geographic or nongeographic directory numbers (DNs) when they change their location, service provider, or service.

Three types of LNP services exist:

- Service Provider Portability enables customers to keep their current directory number when changing from one service provider to another.
- Location Portability allows customers of a service provider to keep their directory numbers when changing locations.
- Service Portability allows customers to retain their directory number after changing service types, for example, from wireline to wireless service.

This document applies only to Service Provider Portability within a rate center. This document does not apply to Location Portability, Service Portability, or portability outside of a rate center. These services are currently under study.

LRN-LNP on the SSP forms an integral part of the overall network LNP solution. It promotes fair competition between the incumbent local exchange carriers (ILEC) that currently provide local service, and the competitive local exchange carriers (CLEC) that are new entrants to the local service market.

The Nortel LRN-LNP product for Service Provider Portability allows customers to change their service provider without having to change their DN. Callers can connect to ported directory numbers without having to change their dialing procedures. This capability removes the major deterrent for most customers when deciding whether or not to switch local service providers.

Individual lines or entire customer families are portable, but not individual members, (that is, customer groups belonging to these families, their extensions and attendant consoles). Stand-alone customer groups are portable as a whole group, with all the members included. In order to port a customer group that has a family dependency, the whole group must first be converted into a stand-alone customer group and then ported.

4.1.2 Location Routing Number-Local Number Portability

The Nortel LRN-LNP solution is built upon the Advanced Intelligent Network (AIN) 0.1 as defined by Bellcore's TR-NWT-001284 and TR-NWT-001285.

LRN-LNP uses a new public office dialing plan (PODP)-like trigger located at the Information Analyzed trigger detection point in the AIN 0.1 basic call model to query the LNP Service Control Point (SCP) for routing information. This new trigger, known as the LNP trigger, is encountered on calls to DNs in designated NPA-NXX codes.

Figure 1 depicts the basic steps involved in a call to a DN that has changed service providers.

Figure1 Call to a ported DN

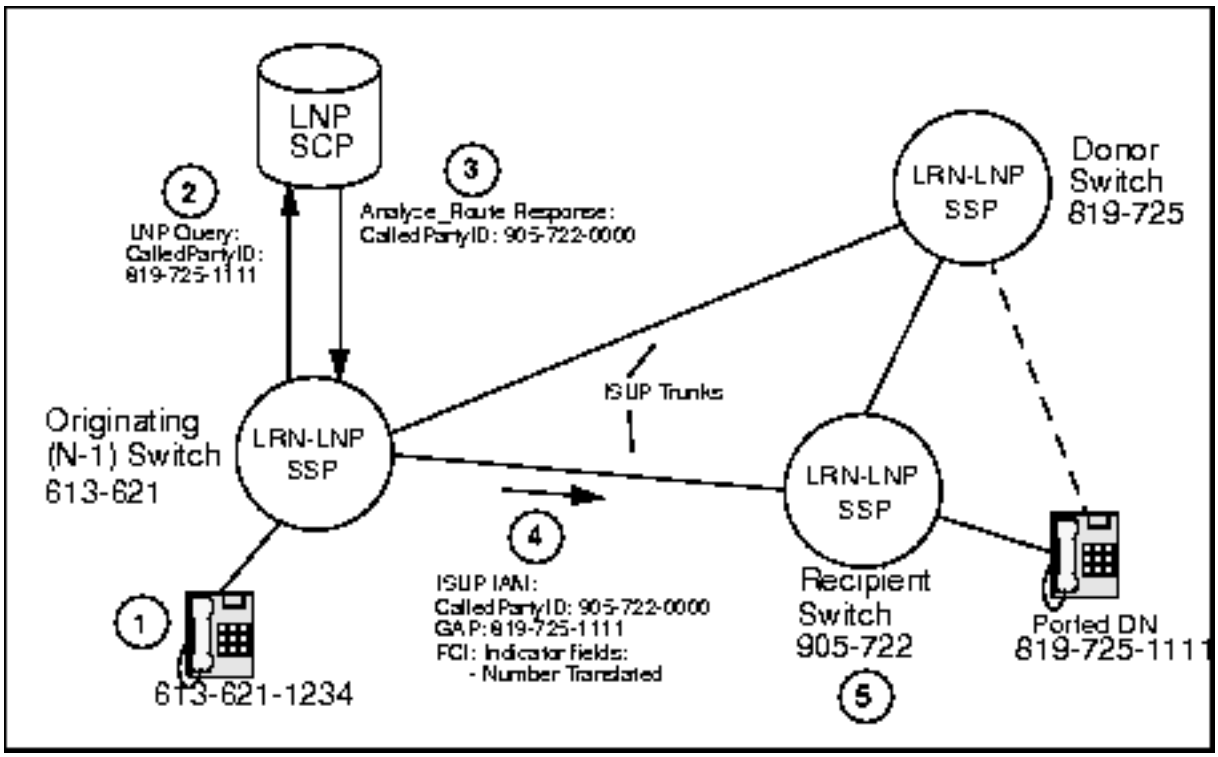


Figure 5. CALL TO A PORTED DN

In step 1, the originator (613-621-1234) dials 819-725-1111, which is an intraLATA LEC call. Translation of this number determines that the DN is not resident on the originator's SSP and that 819-725 is a portable NPA-NXX (and therefore may contain DNs that have been ported). In this scenario, the originator's service provider is the next-to-last, or N-1 carrier, and therefore performs the LNP query (step 2), with the dialed DN that is populated as the CalledPartyID in the LNP query.

In step 3, the LNP-SCP determines if the dialed DN has been ported: in this case, 819-725-1111 has moved from the original or donor switch to the recipient switch. The LNP-SCP therefore responds with an Analyze_Route message that contains a CalledPartyID with a ten-digit Location Routing Number that identifies the recipient switch (905-722-0000).

After receiving the Analyze_Route message with this parameter, the originating SSP continues translating the call using the LRN that is contained in the CalledPartyID to choose a route to the recipient switch. The dialed numbers are now placed in the GAP. (If translations were made with the dialed DN it would lead to the donor switch where the directory number is no longer located.)

In step 4, if a route over an ISUP trunk is chosen then the following steps occur:

- the LRN is populated in the initial address message (IAM) called party number parameter,
- the ported (dialed) DN is populated in the IAM generic address parameter (GAP), and
- the IAM ForwardCall Indicator (FCI) is populated with Number Translated in the translated called number indicator field.

Note:

The translated called number indicator field indicates the next switch in the call on which an LNP query has already been performed.

In step, 5 the recipient switch receives this IAM and examines the contents to determine if the LRN is the switch's home LRN (HLRN), that is, if the recipient switch owns the LRN. In this case, the recipient SSP owns 905-722-0000, and therefore swaps the incoming Called Party Number, which contains the LRN with the generic address parameter, which contains the customer's DN. The call terminates to the ported DN.

A number of variations are possible in the call scenario presented in Figure 1 and are explained below.

4.1.2.1 Non-ported number in a portable NPA-NXX

In step 3, the LNP-SCP does the following:

- returns the dialed DN (instead of the LRN) in the CalledPartyID,
- sets the FCI Translated Called Number Indicator (TCNI) field to Number Translated, and
- routes the call to the terminating DN's switch based on the CalledPartyID.

Note:

The FCI TCNI field indicates to any intermediate switches that an LNP query has already been performed.

4.1.2.2 Per trunk signaling interworking

In step 4, if the N-1 switch (that is, the SSP that launched the LNP query) chooses a route over a per trunk signaling (PTS) trunk, then only one of the LRN and the dialed DN can be signaled to the next switch. In this case, only the dialed DN can be sent (in the

Called Party Number parameter), and any knowledge of an LNP query is lost, which may result in subsequent LNP queries later in the call progression.

4.1.2.3 Interworking with a nonLNP-capable switch

In step 4, if the SSP that launched the LNP query chooses a route to a nonLNP-capable switch then the nonLNP switch cannot process the dialed DN that is contained in the GAP.

Only the dialed DN in the Called Party Number parameter can be processed, and the LNP information is lost. The signal ported number (SPN) option controls whether or not the LRN and GAP parameters are signalled. If the SPN option is not provisioned, then these parameters are sent even if the next switch is not LNP-capable.

4.1.2.4 Intermediate switches, nonLNP capable

If the N-1 switch is an intermediate nonLNP switch, it signals all the information in the IAM message to the recipient switch.

4.1.2.5 Intermediate switches, LNP capable

In Figure 1 the N-1 switch chooses a route and builds an ISUP IAM, that is based on the Analyze_Route response, and sends the IAM over the route to the next switch, which may or may not own the LRN contained in the IAM. If the LRN is not the HLRN of the next switch, that is, it is an intermediate switch, then the intermediate switch simply translates the call based on the LRN that is contained in the IAM Called Party Number. It routes the call out of the office by appending the received IAM GAP and FCI onto the outgoing GAP and FCI.

4.1.2.6 InterLATA, nonLEC intraLATA calls

If a caller makes either an interLATA call or an intraLATA call that is not carried by the caller's LEC, then the originating switch shown in Figure 1 is not the N-1 carrier. Therefore, the originating switch does not perform the LNP query. In this case, standard feature group D (FGD) signaling applies between the originating switch and the inter-exchange carrier of the call, which now performs the LNP query.

4.1.3 Query on Release

ATTENTION

The FCC has concluded that permitting carriers to deploy Query On Release (QOR) as a number portability method in the U.S. does not serve the public interest.

The Nortel LRN-LNP product also contains a look-ahead feature, known as Query on Release (QOR) which is a seperate product built on top of LNP and purchased seperately. QOR reduces the number of database queries in an AIN-based LNP system by eliminating the need to query the LNP-SCP on calls to nonported DNs within a portable NPA-NXX. Query on Release is a seperate product built upon LNP. It is not part of LNP.

TheSSP engages the QOR feature when it receives a call request to a DN in a portable NPA-NXX, and no previous LNP query or QOR routing attempt has been performed. QOR routes the call over ISUP facilities to the donor switch instead of launching an LNP query. If the called DN has not ported, the call terminates at the donor switch; otherwise, the call is released back to the SSP that initiated the QOR attempt. The initiating switch then performs the LNP query, and continues to process the call with standard LNP processes.

Figure 2 depicts the basic call scenario when the QOR feature is active for a given NPA-NXX.

Figure2 Call to a ported DN, with Query on Release

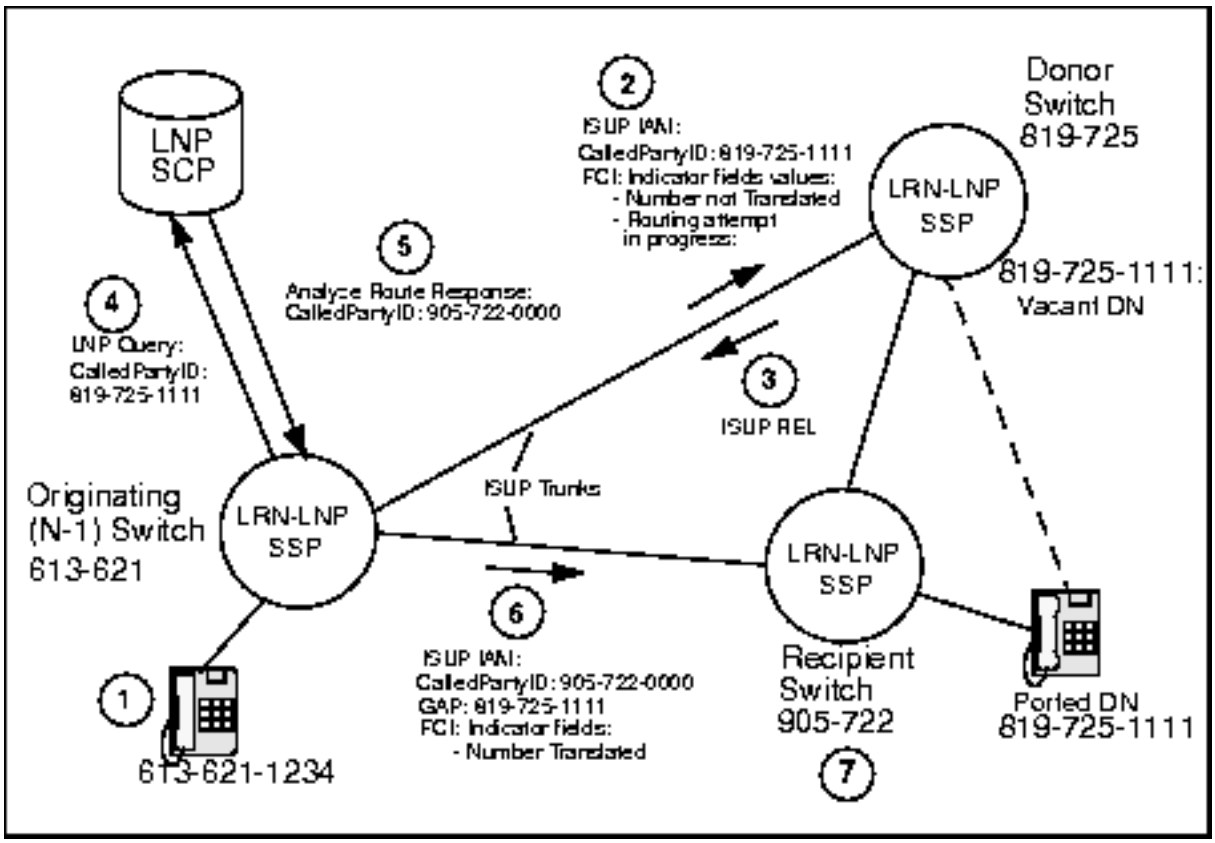


Figure 6. CALL TO A PORTED DN, WITH QUERY ON RELEASE

In step 1, the originator dials 819-725-1111, which is an intraLATA call. Translation of this number determines that the DN is not resident on the originator's SSP, and that 819-725 is a portable NPA-NXX. As was the case in Figure 1 the caller's service provider is the N-1 carrier, which is responsible for launching the query. However, in this case QOR has been activated on 819-725, so the N-1 switch in step 2 attempts to complete the call to the dialed DN at the donor switch, instead of launching an LNP query to the LNP SCP.

The originating switch sends an ISUP IAM to the donor switch with the FCI parameter fields set to

- "Number Translated", if the interim (INT) option is selected, to prevent subsequent LNP queries from occurring, and "Number not translated" if the standard (STD) option is set.
- "Routing Attempt in Progress", which prompts the donor switch to release the call back to the originating switch (instead of applying treatment locally) if the call fails.

When the donor switch receives this IAM, it attempts to terminate to 8 9-725-1111, which is marked as "Vacant". So, in step 3, because the incoming IAM contained an FCI with indicator field set to "Routing Attempt in Progress", the donor switch releases the call to the originating switch by sending an ISUP Release (REL) message. The originating switch, upon receiving this REL message, terminates the QOR routing attempt, and proceeds with standard LNP processing in steps 4 through 7, which are identical to steps 2 through 5, as shown in Figure 1 .

Note:

In step 2, if the DN had not been ported and was still present on the donor switch, then the call proceeds using existing procedures. The donor switch sends an ISUP answer message (ANM) back to the originating switch, where the Query on Release attempt terminates, and standard call-processing procedures prevail.

Note:

Throughout the description of Figure 2 an ISUP connection is assumed between the switch initiating QOR and the donor switch. If this is not an ISUP connection, the donor switch does not know that the incoming call is a QOR routing attempt, and may either initiate its own QOR routing attempt or launch an LNP query.

QOR is a feature that can be enabled or disabled at each QOR-capable switch for each portable NPA-NXX, as an option against the LNP trigger.

4.2 Hardware Provisioning

4.2.1 Hardware Usage Restrictions

BRISC is the minimum hardware required in NA007. All NA007 initial switch installations need series 60 processors or higher, with 96 Mbytes memory. All upgrades to NA007 need series 50 processors or higher with mixed memory. Series 70 processors are positioned as the premium product.

Limitations and restrictions which are applicable to the AIN 0.1 SSP product are also applicable to the LRN-LNP SSP prod uct

4.2.2 Hardware Dependencies

4.2.2.1 P and C Side Port Requirements

Not Applicable

4.2.2.2 DMS BUS Port Requirements

Not Applicable

4.2.2.3 Circuits Per Card

Not Applicable

4.2.2.4 Discrimination Numbering

Not Applicable

4.2.3 Provisioning Considerations

Not Applicable

4.2.4 Office Layout Information

Not Applicable

4.2.5 Traffic Tables

TCAP traffic will change as numbers are ported. Therefore, some planning is required for new routing in a network changing to LNP. For more information, see SEB 92-12-001, Issue 02.01 which includes capacity and provisioning guidelines for LPP, LIU7s and HLIU.

For DPP/BMC Impacts, refer to the "System engineering" chapter of NTP 297-8981-021 - LRN-LNP Service Implementation Guide.

4.3 Product/System Specification

4.3.1 Physical Characteristics

Not Applicable

4.3.2 EMI/Earthquake Information

Not Applicable

4.3.3 Sparing Information

Not Applicable

4.3.4 Power Feed and Fusing Requirements

Not Applicable

4.3.5 Current Drain Information

Not Applicable

4.4 Software Provisioning

4.4.1 Required Software Packages and Interdependencies

Software Optionality Control (SOC) gives Customers the flexibility to activate additional features of the software through the entry of software codes on a switch. For LRN LNP, Nortel provides the ability to enable and disable separately the following:

- LRN-LNP SOC option (LNP00100): This option provides core functionality of LRN-LNP which controls LRN LNP functionality on the originating switch, in addition to providing support for Query on Release at the Terminating office.

- LNP QoR SOC option (LNP00101): This option provides Query on Release, which controls Query on Release functionality on the originating switch.(LNP00100 is a prerequisite)

- LNP GR-2936 Phase 1 option (LNP00200): This options tracks phase one of Bellcore GR-2936 compliance. This option controls functionality developed for compliance to Bellcore GR-2936.

In order for Query on Release to be enabled, LRN LNP core functionality must be enabled. When QoR is disabled through SOC, a QoR origination attempt is disallowed and processing continues, allowing an LRN LNP query to be attempted (unless LRN LNP has also been disabled by SOC). Disabling QoR through SOC does not disable the handling of QoR on an intermediate or terminating switch.

SOC for LRN-LNP resides on top of (that is, is dependent on) the following existing AIN SOC options:

- AIN Essentials Option (AIN00002): This option activates/deactivates the basic AIN call processing capability. Its state determines whether AIN is considered active in the office.

- AIN Call Management Option (AIN00006): This option controls the activation and deactivation of all AIN 0.1 SSP related capability. It is dependent on the AIN00002 ASOC option. Thus, these two ASOC options (AIN00002 and AIN00006) must be in the ON state in order for AIN 0.1 SSP software to function.

- AIN Call Model Control Option (AIN00007): This is a track option associated with features that enhance AIN 0.1 call control.

- AIN Services Supporting Option (AIN00009): This track option is associated with features that provide support for services on AIN.

For LRN LNP to be enabled, AIN Essentials must be enabled. If LRN LNP is disabled, QoR is automatically disabled.When LRN LNP is disabled through SOC, whenever an LRN LNP trigger is encountered, it is skipped as if the trigger does not exist. This is the case regardless of whether the switch is the originating, intermediate, or terminating switch.

If AIN essentials is disabled, both LRN LNP and QoR cannot be enabled.

PODP/LRN LNP interworking can be enabled or disabled independently of the other SOC options.

4.4.2 Software Usage Restrictions

The following limitations and restrictions apply to the initial release of the LRN-LNP SSP:

- LRN-LNP supports only Service Provider Portability within a rate center. Location Portability, Service Portability, and portability outside a rate center are not supported.
- Unallocated numbers (DNs that are not provisioned in table DNINV) cannot be ported.
- Limitations and restrictions in the AIN 0.1 SSP product are also present in the LRN-LNP SSP product.
- The Test Call feature LNPTST is only compatible with the Digitone (DGT) option.
- No other feature except DGT can be assigned to a 1FR RES line while the LNPTST option is present on that line.
- In addition, all office wide and customer-based features and options are blocked at run time for a 1FR RES line with LNPTST option while input collection is in progress for an LNP Test Call originating from that line.
- DN routing cannot be used with PORT option.
- For incoming local and FGC trunks the originating trunk's translations are based on the 10-digit translation format. If 7-digit translation is used, 10-digit translation datafill must exist in the local trunk's exception pretranslator. This must be true is existing trunk translation datafill is to be reused.
- The TRNSLVF subcommand of the TTP (Trunk Test Position) MAP level is not supported at this time to handle LNP Response

Translations. In NA007, the TRAVER interface should only be used to verify translation within LNP environment.

4.4.2.1 Feature interactions

For more detailed feature interactions, please see the chapter "Feature Interactions" of NTP 297-8981-021 - LRN-LNP Service Implementation Guide.

In addition, note that under the current functionality, all calls routing to a non-native and resident DN terminate directly onto the DN regardless of the actual datafill in table HNPACONT/FNPACONT. Therefore, routing features like Conditional Routing (CND) will not be encountered since routing features should only be encountered when the call is routed out of the office.

Loop-around trunks datafilled in table HNPACONT will not be encountered when the routing number corresponds to a resident, non-native DN since the terminating switch has no knowledge of whether the route is a looparound or not. The way to work around this issue is to set up the looparound either in table STDPRTCT or in table CLSVSCRC (Class Of Service Screening).When a subscriber casually dials a carrier access code (CAC) on a local call, LNP trigger is not encountered. If causal access to local call is allowed, the call will be routed to the dialed carrier to complete the call. Otherwise, the call will be blocked and sent to the No dial Access Code (NACD) treatment.

Duplicate NXX

NA009 support for Duplicate NXX includes all DMS CM functionality with the exception of:

- SERVORD commands NEWACD, SWAP, and PLP
- logs and OMs

Remote peripherals do not support Duplicate NXX. However, for example, 5 9-333-1111 may exist on a remote and 416-333-1212 may be on a different remote or directly on the switch.

4.4.3 Memory Provisioning

Refer to the MEMCALC tool for calculating memory impact.

4.5 Real Time Impact

Deployment of Local Number Portability affects many variables in a DMS-100 family office. The Flexible Advanced Capacity Engineering Tool (FACET) is available to determine its impact upon processor real-time capacity.

FACET is a platform of automated programs that are designed to evaluate and plan for DMS-100 family office memory utilization, real-time call-attempt capacity of the DMS-100 family computing module (CM) central processing unit (CPU), and the capacity of DMS-100 family peripheral processors.

Refer to the "System capacity engineering" chapter of NTP 297-8981-021 - LRN-LNP Service Implementation Guide, for additional information on LNP real-time impact and the use of FACET with LNP.

Chapter 12

TELEPHONE OPERATOR POSITION SYSTEMS

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TELEPHONE OPERATOR POSITION SYSTEMS
Section Contents

1.0 ECM209 - Headset Overvoltage Protection for TOPS-3 12-1
1.1 Overview 12-1
1.2 Hardware Provisioning 12-1
1.2.1 Hardware Usage Restrictions 12-1
1.2.2 Hardware Dependencies 12-1
1.2.2.1 P and C Side Port Requirements . . . 12-1
1.2.2.2 DMS BUS Port Requirements 12-1
1.2.2.3 Circuits Per Card 12-1
1.2.2.4 Discrimination Numbering 12-1
1.2.3 Provisioning Considerations 12-1
1.2.4 Office Layout Information 12-1
1.2.5 Traffic Tables 12-1
1.3 Product/System Specification 12-2
1.3.1 Physical Characteristics 12-2
1.3.2 EMI/Earthquake Information 12-2
1.3.3 Sparing Information 12-2
1.3.4 Power Feed and Fusing Requirements 12-2
1.3.5 Current Drain Information 12-2
1.4 Software Provisioning 12-2
1.4.1 Required Software Packages and Interdependencies 12-2
1.4.2 Software Usage Restrictions 12-2
1.4.3 Memory Provisioning 12-2
1.5 Real Time Impact 12-2

2.0 ECM273 - Loop-Around Trunks 12-3
2.1 Overview 12-3
2.2 Hardware Provisioning 12-3
2.2.1 Hardware Usage Restrictions 12-3
2.2.2 Hardware Dependencies 12-3
2.2.2.1 P and C Side Port Requirements . . . 12-3
2.2.2.2 DMS BUS Port Requirements 12-3
2.2.2.3 Circuits Per Card 12-3
2.2.2.4 Discrimination Numbering 12-3
2.2.3 Provisioning Considerations 12-3
2.2.3.1 TOPS Loop-Around Requirements 12-3
2.2.3.2 E911 Loop-Around Requirements 12-7
2.2.4 Office Layout Information 12-7
2.2.5 Traffic Tables 12-7
2.3 Product/System Specification 12-7
2.3.1 Physical Characteristics 12-7
2.3.2 EMI/Earthquake Information 12-7
2.3.3 Sparing Information 12-7
2.3.4 Power Feed and Fusing Requirements 12-7
2.3.5 Current Drain Information 12-7
2.4 Software Provisioning 12-7
2.4.1 Required Software Packages and Interdependencies 12-8
2.4.2 Software Usage Restrictions 12-8
2.4.3 Memory Provisioning 12-8
2.5 Real Time Impact 12-8

3.0 ECM287 - TOPS Tone and Scrambler 12-9
3.1 Overview 12-9
3.2 Hardware Provisioning 12-9
3.2.1 Hardware Usage Restrictions 12-9
3.2.2 Hardware Dependencies 12-9
3.2.2.1 P and C Side Port Requirements . . . 12-9
3.2.2.2 DMS BUS Port Requirements 12-9
3.2.2.3 Circuits Per Card 12-9
3.2.2.4 Discrimination Numbering 12-9
3.2.3 Provisioning Considerations 12-9
3.2.3.1 PROVISIONING 12-9
3.2.3.2 MOUNTING 12-10
3.2.3.3 CABLING 12-10
3.2.4 Office Layout Information 12-10
3.2.5 Traffic Tables 12-10
3.3 Product/System Specification 12-11
3.3.1 Physical Characteristics 12-11
3.3.2 EMI/Earthquake Information 12-11
3.3.3 Sparing Information 12-11
3.3.4 Power Feed and Fusing Requirements 12-11
3.3.5 Current Drain Information 12-11
3.4 Software Provisioning 12-11
3.4.1 Required Software Packages and Interdependencies 12-11
3.4.2 Software Usage Restrictions 12-11
3.4.3 Memory Provisioning 12-11
3.5 Real Time Impact 12-11

4.0 ECM361 - International TOPS (ITOPS) 12-12
4.1 Overview 12-12
4.1.1 ITOPS Position Provisioning 12-14
| 4.1.1.1 ITOPS ENGLISH OPERATOR POSITION . . . 12-14
| 4.1.1.2 ITOPS ENGLISH IN-CHARGE/ASSISTANCE POSITIONS 12-14
| 4.1.1.3 ITOPS FRENCH OPERATOR POSITION . . . 12-14
| 4.1.1.4 ITOPS FRENCH IN-CHARGE/ASSISTANCE POSITIONS 12-14
4.2 Hardware Provisioning 12-15
4.2.1 Hardware Usage Restrictions 12-15
4.2.2 Hardware Dependencies 12-15
4.2.2.1 P and C Side Port Requirements . . . 12-15
4.2.2.2 DMS BUS Port Requirements 12-15
4.2.2.3 Circuits Per Card 12-15
4.2.2.4 Discrimination Numbering 12-15
4.2.3 Provisioning Considerations 12-15
4.2.3.1 TTY Devices 12-15
4.2.3.2 TTY Modem Ordering Information . . . 12-16
4.2.3.3 Service Circuit Provisioning 12-16
4.2.3.4 Trunk Provisioning 12-16
4.2.3.5 Loop around Trunks 12-16
4.2.3.6 Attenuator Pads 12-17
4.2.3.7 Cabling 12-17

4.2.3.8 Miscellaneous 12-17
4.2.4 Office Layout Information 12-19
4.2.5 Traffic Tables 12-19
4.3 Product/System Specification 12-19
4.3.1 Physical Characteristics 12-19
4.3.2 EMI/Earthquake Information 12-19
4.3.3 Sparing Information 12-19
4.3.4 Power Feed and Fusing Requirements 12-19
4.3.5 Current Drain Information 12-19
4.4 Software Provisioning 12-19
4.4.1 Required Software Packages and Interdependencies 12-20
4.4.2 Software Usage Restrictions 12-20
4.4.3 Memory Provisioning 12-20
4.5 Real Time Impact 12-20

5.0 ECM391 - TOPS Operator Centralization (OC) 12-21
5.1 Overview 12-21
5.2 Hardware Provisioning 12-23
5.2.1 Hardware Usage Restrictions 12-23
5.2.2 Hardware Dependencies 12-23
5.2.2.1 P and C Side Port Requirements . . . 12-23
5.2.2.2 DMS BUS Port Requirements 12-23
5.2.2.3 Circuits Per Card 12-23
5.2.2.4 Discrimination Numbering 12-23
5.2.3 Provisioning Considerations 12-23
5.2.4 Office Layout Information 12-23
5.2.5 Traffic Tables 12-23
5.3 Product/System Specification 12-23
5.3.1 Physical Characteristics 12-23
5.3.2 EMI/Earthquake Information 12-23
5.3.3 Sparing Information 12-23
5.3.4 Power Feed and Fusing Requirements 12-23
5.3.5 Current Drain Information 12-23
5.4 Software Provisioning 12-23
5.4.1 Required Software Packages and Interdependencies 12-23
| 5.4.2 Software Packaging 12-23
| 5.4.3 Closedown Operation 12-26
| 5.4.4 Affected Software Tables 12-28
| 5.4.5 Affected Office Parameters 12-29
| 5.4.6 PS and DS Overheads and Incremental DS Requirements 12-29
5.4.7 Software Usage Restrictions 12-30
5.4.8 Memory Provisioning 12-30
5.5 Real Time Impact 12-30

6.0 ECM468 - TOPS Message Switch (TMS) 12-31
6.1 Overview 12-31
6.1.1 TOPS MP 12-31
6.1.2 TOPS IWS 12-31
6.1.3 System configurations 12-32

6.1.3.1 TOPS MP 12-32
6.1.3.2 TOPS IWS 12-34
6.1.4 EWSS TMS Networking 12-36
6.2 Hardware Provisioning 12-38
6.2.1 Hardware Usage Restrictions 12-38
6.2.2 Hardware Dependencies 12-39
6.2.3 TMS CP line up 12-39
6.2.3.1 T1 channel bank 12-40
6.2.3.2 E1 channel bank 12-40
6.2.4 P and C Side Port Requirements 12-42
6.2.4.1 TOPS04 and up 12-42
6.2.4.2 DS-1 CP Provisioning 12-42
6.2.4.3 PCM-30 CP Provisioning 12-44
6.2.4.4 Link provisioning 12-46
6.2.4.5 DMS BUS Port Requirements 12-48
6.2.4.6 Circuits Per Card 12-49
6.2.4.7 Discrimination Numbering 12-49
6.2.5 Provisioning Considerations 12-49
6.2.5.1 TMS Label Provisioning 12-49
6.2.5.2 Frame Configuration 12-50
6.2.5.3 Operator Configuration (3 DS-1 CPs for oper interface) 12-50
6.2.5.4 96 Operator Configuration (3 PCM-30 CPs for OPR I/F) 12-51
6.2.5.5 64/80 Operator Configuration (DS-1 Applications) 12-51
6.2.5.6 64/80 Operator Configuration (PCM-30 Applications) 12-52
6.2.5.7 Operator Centralization Enhanced TOPS Message Switch 12-52
6.2.5.8 Retrofit Guidelines 12-54
6.2.6 Office Layout Information 12-54
6.2.7 Traffic Tables 12-54
6.3 Product/System Specification 12-55
6.3.1 Physical Characteristics 12-55
6.3.2 EMI/Earthquake Information 12-55
6.3.3 Sparing Information 12-55
6.3.4 Power Feed and Fusing Requirements 12-55
6.3.5 Current Drain Information 12-55
6.3.6 POWER/HEAT DISSIPATION 12-55
6.4 Software Provisioning 12-55
6.4.1 Required Software Packages and Interdependencies 12-55
6.4.2 Software Usage Restrictions 12-56
6.4.2.1 Load-to-release cross-reference . . . 12-56
6.4.3 Memory Provisioning 12-59
6.5 Real Time Impact 12-59

7.0 ECM495 - Meridian Applications Cabinet Packaging of TOPS VSN 12-60
7.1 Overview 12-60
7.2 Hardware Provisioning 12-61
7.2.1 Hardware Usage Restrictions 12-61

7.2.2 Hardware Dependencies 12-61
7.2.2.1 P and C Side Port Requirements . . . 12-61
7.2.2.2 DMS BUS Port Requirements 12-61
7.2.2.3 Circuits Per Card 12-61
7.2.2.4 Discrimination Numbering 12-61
7.2.3 Provisioning Considerations 12-61
7.2.3.1 TOPS Voice Service Node (VSN) 12-61
7.2.3.2 Voice Links 12-82
7.2.3.3 Data Links 12-82
7.2.3.4 Alarms 12-83
7.2.3.5 Multiple VSNs 12-83
7.2.4 Office Layout Information 12-84
7.2.5 Traffic Tables 12-86
7.2.5.1 TOPS Voice Service Node (VSN) 12-86
7.2.5.2 Three Party Conference circuits (CF3P) 12-88
7.2.5.3 Traffic Provisioning Example: English Only 12-90
7.3 Product/System Specification 12-91
7.3.1 Physical Characteristics 12-91
7.3.1.1 DIMENSIONS 12-91
7.3.1.2 WEIGHT 12-91
7.3.2 EMI/Earthquake Information 12-91
7.3.3 Sparing Information 12-92
7.3.4 Power Feed and Fusing Requirements 12-93
7.3.5 Current Drain Information 12-93
7.3.6 POWER/HEAT DISSIPATION 12-94
7.3.7 Software Provisioning 12-94
7.3.8 Required Software Packages and Interdependencies 12-94
7.3.8.1 DMS SOFTWARE 12-94
7.3.8.2 TOPS VSN Software 12-95
7.3.9 Software Usage Restrictions 12-95
7.3.9.1 Compatible BCS releases 12-95
7.3.9.2 Compatible PCL releases 12-95
7.3.9.3 General Software Usage Restrictions 12-96
7.3.10 Memory Provisioning 12-96
7.4 Real Time Impact 12-96

8.0 ECM582 - TOPS04 REQUIREMENTS 12-97
8.1 Overview 12-97
8.2 Hardware Provisioning 12-97
8.2.1 Hardware Usage Restrictions 12-97
8.2.2 Hardware Dependencies 12-97
8.2.2.1 P and C Side Port Requirements . . . 12-98
8.2.2.2 DMS BUS Port Requirements 12-98
8.2.2.3 Circuits Per Card 12-98
8.2.2.4 Discrimination Numbering 12-98
8.2.3 Provisioning Considerations 12-98
| 8.2.3.1 Toll Break In and R2-to-TOPS (Global Applications only) 12-98
8.2.3.2 VSN Custom Branding 12-98
8.2.3.3 VSN Call Screening Enhancements . . . 12-98

8.2.3.4 External Rater Interface 12-99
8.2.3.5 Operator Centralization Enhanced TOPS Message Switch 12-99
8.2.4 Office Layout Information 12-100
8.2.5 Traffic Tables 12-100
8.3 Product/System Specification 12-100
8.3.1 Physical Characteristics 12-100
8.3.2 EMI/Earthquake Information 12-101
8.3.3 Sparing Information 12-101
8.3.4 Power Feed and Fusing Requirements 12-101
8.3.5 Current Drain Information 12-101
8.4 Software Provisioning 12-101
8.4.1 Required Software Packages and Interdependencies 12-101
8.4.2 Software Usage Restrictions 12-102
8.4.3 Memory Provisioning 12-102
8.5 Real Time Impact 12-102

9.0 ECM583 - New Features in TOPS03 12-103
9.1 Overview 12-103
9.2 Hardware Provisioning 12-103
9.2.1 Hardware Usage Restrictions 12-103
9.2.2 Hardware Dependencies 12-103
9.2.2.1 P and C Side Port Requirements . . 12-103
9.2.2.2 DMS BUS Port Requirements 12-103
9.2.2.3 Circuits Per Card 12-103
9.2.2.4 Discrimination Numbering 12-103
9.2.3 Provisioning Considerations 12-104
9.2.3.1 Cellular/IEC/LEC ADACC Screening Enhancements 12-104
9.2.3.2 Automated Room and Authorization Number (ARAN) 12-104
9.2.3.3 Commercial Credit Card Support . . 12-104
9.2.3.4 Audiogram for MDS 12-105
9.2.3.5 VSN Dialog Enhancements 12-105
9.2.3.6 Calling Card Denial Reasons 12-105
9.2.3.7 Line-to-TOPS (MD in TOPS03) 12-105
9.2.4 Office Layout Information 12-105
9.2.5 Traffic Tables 12-105
9.3 Product/System Specification 12-105
9.3.1 Physical Characteristics 12-105
9.3.2 EMI/Earthquake Information 12-105
9.3.3 Sparing Information 12-106
9.3.4 Power Feed and Fusing Requirements 12-106
9.3.5 Current Drain Information 12-106
9.4 Software Provisioning 12-106
9.4.1 Required Software Packages and Interdependencies 12-106
9.4.2 Software Usage Restrictions 12-106
9.4.3 Memory Provisioning 12-106
9.5 Real Time Impact 12-106

10.0 ECM606 - TOPS Engineering 12-107
10.1 Overview 12-107
10.2 TOPS MP 12-107
10.3 TOPS IWS 12-107
10.3.1 Token ring 12-107
10.3.2 . IWS Token Ring System Configuration . . . 12-108
10.3.3 . IWS Token Ring System Overview 12-108
10.3.4 IWS maintenance 12-108
10.3.5 Ethernet 12-109
10.3.6 TOPS Message Switch (TMS) 12-110
10.3.7 TOPS QMS 12-110
10.4 Hardware Provisioning 12-112
10.4.1 Hardware Usage Restrictions 12-112
10.4.1.1 TOPS MP 12-112
10.4.1.2 TOPS IWS 12-112
10.4.2 Hardware Dependencies 12-112
10.4.2.1 TOPS MP Position Controller Equipment (PCE) 12-112
10.4.2.2 TOPS MP Auxiliary Access Equipment (AAE) 12-112
10.4.2.3 TOPS MP Positions 12-112
10.4.2.4 TOPS MP Directory Assistance Application 12-112
10.4.2.5 TOPS MP Operator Reference Database 12-112
10.4.2.6 TOPS MP Stand-alone Configuration 12-112
10.4.2.7 TOPS MP Integrated TMS Configuration 12-112
10.4.2.8 TOPS MP Dual HSDA Configuration . 12-112
10.4.2.9 TOPS IWS token ring 12-112
10.4.2.10 TOPS IWS ethernet 12-114
10.4.2.11 TOPS QMS 12-114
10.4.2.12 P and C Side Port Requirements . 12-114
10.4.2.13 DMS BUS Port Requirements 12-115
10.4.2.14 Circuits Per Card 12-115
10.4.2.15 Discrimination Numbering 12-115
10.4.3 Provisioning Considerations 12-115
10.4.3.1 TOPS MP Provisioning 12-115
10.4.3.2 TOPS MPX Provisioning 12-115
10.4.3.3 Call Control Link Provisioning (MPC/EMPC) 12-115
10.4.3.4 Operator Centralization Datalinks 12-117
10.4.3.5 Operator Centralization Voice Links 12-117
10.4.3.6 Three Port Conference Circuits . . 12-118
10.4.3.7 ARU Trunk Provisioning 12-118
10.4.3.8 TOPS MP Datalinks (without TMS) . 12-119
10.4.3.9 TOPS QMS 12-119
10.4.3.10 Loop-Around Trunk Requirements . 12-119
10.4.4 Digital Trunks 12-120
10.4.5 Channel bank 12-120
10.4.6 Office Layout Information 12-120
10.4.6.1 TOPS MP Layout Information 12-120
10.4.6.2 TOPS IWS Layout Information . . . 12-120
10.4.6.3 Miscellaneous Frame 12-120

10.4.7 Traffic Tables 12-122
10.4.7.1 TOPS MP AND TOPS MPX POSITIONS . . 12-122
10.5 Product/System Specification 12-122
10.5.1 Physical Characteristics 12-122
10.5.1.1 Frame and Logic Grounding 12-122
10.5.1.2 TOPS MP 12-123
10.5.1.3 TOPS MPX 12-123
10.5.2 EMI/Earthquake Information 12-123
10.5.3 Sparing Information 12-123
10.5.3.1 TOPS MP 12-123
10.5.3.2 TOPS IWS 12-123
10.5.4 Power Feed and Fusing Requirements 12-123
10.5.5 Current Drain Information 12-123
10.6 Software Provisioning 12-124
10.6.1 IWS software 12-124
10.6.2 Required Software Packages and Interdependencies 12-124
10.6.2.1 LET003 to LET006 limitation . . . 12-124
10.6.2.2 TOPS MP Software (Toll & Assist only) 12-124
10.6.2.3 TOPS MP NT-NAS (CCI) Directory Assistance 12-124
10.6.2.4 TOPS MP IBM Directory Assistance . 12-125
10.6.2.5 TOPS MP ORDB Feature Packages . . 12-125
10.6.2.6 TOPS MPX (IBM DA AOSS) Software Packages 12-125
10.6.2.7 TOPS QMS Feature Packages 12-125
10.6.2.8 Additional (Optional) Feature Packages for MP and/or MPX 12-125
10.6.2.9 TMS, AABS, ACTS, and ADAS 12-126
10.6.3 Software Usage Restrictions 12-126
10.6.3.1 TPC Software 12-126
10.6.3.2 QMS Software 12-126
10.6.3.3 Other DMS Software 12-126
10.6.3.4 DRAM Assignment Restrictions . . . 12-127
10.6.4 Memory Provisioning 12-127
10.7 Real Time Impact 12-127

11.0 ECM684 - TOPS MPX NT DA AOSS 12-128
11.1 Overview 12-128
11.2 Hardware Configurations. 12-128
11.3 Hardware Provisioning 12-128
11.3.1 Hardware Usage Restrictions 12-128
11.3.2 Hardware Dependencies 12-129
11.3.2.1 P and C Side Port Requirements . . 12-129
11.3.2.2 DMS BUS Port Requirements 12-129
11.3.2.3 Circuits Per Card 12-129
11.3.2.4 Discrimination Numbering 12-129
11.3.3 Provisioning Considerations 12-129
11.3.3.1 20+2 Token Ring Config (with Routers) 12-129
11.3.3.2 Standard 20 Position Token Ring Config (no Routers) 12-130
11.3.4 Office Layout Information 12-132

11.3.5 Traffic Tables 12-132
11.4 Product/System Specification 12-132
11.4.1 Physical Characteristics 12-132
11.4.2 EMI/Earthquake Information 12-132
11.4.3 Sparing Information 12-132
11.4.4 Power Feed and Fusing Requirements 12-132
11.4.5 Current Drain Information 12-132
11.5 Software Provisioning 12-132
11.5.1 Required Software Packages and Interdependencies 12-133
11.5.1.1 DMS 100/200 12-133
11.5.1.2 Operator Positions 12-133
11.5.1.3 Combined Operator/Maintenance Positions 12-133
11.5.1.4 Gateway Positions (DMS Gwy, Database Gwy, and Router) 12-134
11.5.2 Software Usage Restrictions 12-134
11.5.3 Memory Provisioning 12-134
11.6 Real Time Impact 12-134

12.0 ECM695 - TOPS IWS overview and provisioning rules Release 2.93 and up 12-135
12.1 Overview 12-135
12.1.1 IWS configuration types 12-136
12.1.2 IBM and Nortel's partnership 12-136
12.2 HARDWARE CONFIGURATIONS 12-136
12.2.1 Minimum workstation configurations for IWS Release 2.93 and up 12-136
12.2.2 Integrated vs. Modular Offering 12-137
12.2.2.1 Position requirements for modular configurations 12-138
12.3 Hardware Provisioning 12-138
12.3.1 Hardware Usage Restrictions 12-138
12.3.1.1 Hardware usage restrictions for token ring and ethernet configurations . . . 12-138
12.3.1.2 Hardware usage restrictions for token ring configurations 12-140
12.3.1.3 Ethernet hardware usage restrictions 12-140
12.3.2 Hardware Dependencies 12-140
12.3.2.1 P and C Side Port Requirements . . 12-141
12.3.2.2 DMS BUS Port Requirements 12-141
12.3.2.3 Circuits Per Card 12-141
12.3.2.4 Discrimination Numbering 12-141
12.3.3 Provisioning Considerations 12-141
12.4 Token ring, MAU and cluster provisioning 12-141
12.4.1 ASN routers 12-142
12.4.2 Token-ring position types without ASN routers 12-142
12.4.2.1 DMS gateway 12-142
12.4.2.2 Database gateway 12-143
12.4.2.3 Operator and Maintenance positions 12-143
12.4.3 Token ring assignments without ASN routers 12-143
12.4.3.1 Assignments for Cluster Size 4 . . 12-143

12.4.3.2 Assignments for Cluster Size 16 . 12-145
12.4.3.3 Assignments for Cluster Size 20 . 12-146
12.4.4 Token-ring position types with ASN Routers 12-148
12.4.4.1 DMS gateway positions 12-148
12.4.4.2 Operator and maintenance positions 12-148
12.4.5 Token-ring assignments with ASN routers . . 12-148
12.4.5.1 Assignments for cluster size 4 . . 12-149
12.4.5.2 Assignments for Cluster Size 16 . 12-151
12.4.5.3 Assignments for Cluster Size 20 . 12-152
12.5 Ethernet position and cluster provisioning 12-153
12.5.1 Ethernet position types 12-153
12.5.1.1 DMS Gateway 12-153
12.5.1.2 Operator and maintenance positions 12-153
12.5.2 Ethernet position clusters 12-153
12.5.2.1 Assignments for Cluster Size 20 . 12-154
12.6 RAMP Functionality 12-154
12.6.1 RAMP Architecture 12-155
12.6.1.1 RAMP Local LAN Configuration . . . 12-156
12.6.1.2 RAMP Controlling Remote Token-ring 12-156
12.6.1.3 Booting RAMP 12-157
12.6.1.4 Access To RAMP Application 12-157
12.6.1.5 RAMP Optional Hardware 12-158
12.7 Token ring configuration overview 12-159
12.7.1 Token ring data and voice connections . . . 12-160
12.7.1.1 T1 Channel Bank 12-160
12.7.1.2 E1 Channel bank 12-162
12.8 Ethernet configuration 12-164
12.8.1 Ethernet data and voice connections 12-165
12.8.1.1 T1 channel bank 12-165
12.8.1.2 E1 Channel bank 12-167
12.9 IWS Adapter Cards 12-169
12.9.1 Token ring card 12-169
12.9.2 RTIC Card 12-169
12.9.2.1 RS-422 12-170
12.9.2.2 RS-422 limitations and restrictions 12-170
12.9.3 Audio Card 12-170
12.9.3.1 ISA Audio Card 12-170
12.9.3.2 PCI Audio Card 12-171
12.9.3.3 IWS Audio Card software compatibility 12-171
12.10 Headset jack assemblies 12-172
12.10.1 ISA Audio Card Headset Jack Assembly . . . 12-172
12.10.2 PCI Audio Card Headset Interfaces 12-172
12.10.2.1 NTNX5312 12-173
12.10.2.2 NTNX5313 12-173
12.10.2.3 NTNX5310 12-173
12.10.3 T Channel bank 12-173
12.10.3.1 DE-4 Enhanced 12-173
12.10.3.2 DE-4E Smart 12-174
12.10.4 E channel bank 12-174
12.10.5 Digital Trunks 12-174
12.10.5.1 North American Digital Trunks . . 12-174

12.10.5.2 International Digital Trunks . . 12-175
12.10.6 Office Layout Information 12-175
12.10.7 Traffic Tables 12-175
12.11 Product/System Specification 12-175
12.11.1 Physical Characteristics 12-175
12.11.2 EMI/Earthquake Information 12-176
12.11.3 Sparing Information 12-176
12.11.4 Power Feed and Fusing Requirements 12-176
12.11.5 Current Drain Information 12-176
12.12 Software Provisioning 12-177
12.12.1 IWS CM Dependencies 12-177
12.12.1.1 IWS Release 2.93 Features with BCS-35 or Higher 12-177
12.12.1.2 IWS Release 2.93 Features Requiring TOPS03 12-178
12.12.1.3 IWS Release 4.0 Features with BCS-35 or Higher 12-179
12.12.1.4 IWS Release 4.0 Features Requiring TOPS04 12-179
12.12.1.5 IWS Release 4.1 Features Requiring TOPS04 12-179
12.12.1.6 IWS Release 5.0 Features Requiring TOPS05 12-179
12.12.1.7 IWS Release 6.0 Features Requiring TOPS06 12-180
12.12.1.8 IWS Release 7.0 Features Requiring TOPS07 12-180
12.12.1.9 IWS Release 8.0 Features Requiring TOPS08 12-181
12.12.1.10 IWS Release 9.0 Features requiring TOPS09 12-181
12.12.2 LET003 to LET006 limitation 12-181
12.12.3 IWS ordering and engineering process . . . 12-182
12.12.4 Position software 12-184
12.12.4.1 IWS Release 6.0 12-184
12.12.4.2 IWS Release 7.0 Position Software 12-186
12.12.5 Software Usage Restrictions 12-192
12.12.6 Software Compatibility 12-192
12.12.6.1 IWS and TOPS 12-192
12.12.7 Memory Provisioning 12-193
12.13 Real Time Impact 12-193

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1.0 ECM209 - Headset Overvoltage Protection for TOPS-3

1.1 Overview

During severe thunder storm activity, high voltage transients may appear between the TOPS operator's headset wiring and the position controller chassis ground.

1.2 Hardware Provisioning

1.2.1 Hardware Usage Restrictions

1.2.2 Hardware Dependencies

1.2.2.1 P and C Side Port Requirements

1.2.2.2 DMS BUS Port Requirements

Not applicable

1.2.2.3 Circuits Per Card

1.2.2.4 Discrimination Numbering

1.2.3 Provisioning Considerations

For each TOPS-3 position arranged for 110V AC operation, provide the following:

List	Equipment	J Drawing	Title
010	Equipment and wiring required in addition to list 1 after issue 7 on all positions arranged for 110V AC operation (i.e. positions without list 6 or list 7). Provides headset over-voltage protection (HOP).	J3Y52AA-3	SP-1 4 Wire Specifications for One TOPS Operator Position Control Unit Assembly, Wiring, and Common Equipment.

1.2.4 Office Layout Information

Not applicable.

1.2.5 Traffic Tables

Not applicable.

1.3 Product/System Specification

1.3.1 Physical Characteristics

Not applicable.

1.3.2 EMI/Earthquake Information

Not applicable.

1.3.3 Sparing Information

Not applicable.

1.3.4 Power Feed and Fusing Requirements

Not applicable.

1.3.5 Current Drain Information

Not applicable.

1.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

1.4.1 Required Software Packages and Interdependencies

Not applicable.

1.4.2 Software Usage Restrictions

Not applicable.

1.4.3 Memory Provisioning

Not applicable.

1.5 Real Time Impact

Not applicable.

2.0 ECM273 - Loop-Around Trunks

2.1 Overview

Not Applicable.

2.2 Hardware Provisioning

2.2.1 Hardware Usage Restrictions

Not Applicable.

2.2.2 Hardware Dependencies

Not Applicable.

2.2.2.1 P and C Side Port Requirements

Not applicable.

2.2.2.2 DMS BUS Port Requirements

Not applicable.

2.2.2.3 Circuits Per Card

Not applicable.

2.2.2.4 Discrimination Numbering

Not applicable.

2.2.3 Provisioning Considerations

2.2.3.1 TOPS Loop-Around Requirements

TOPS loop-around requirements apply to host, remote, or standalone DMS-100/200 TOPS offices.

ALL TOPS-to-line traffic requires loop-around trunks, regardless of BCS/PCL release.

ALL line-to-TOPS traffic in an equal access office requires loop-around trunks, regardless of BCS/PCL release.

For BCS-36 and prior (in non-equal access offices), a portion of the line-to-TOPS traffic requires loop-around trunks. Some customers may be using loop-around trunks for the traffic which does not require loop-around trunks.

Beginning with TOPS03 (NA003), ALL line-to-TOPS traffic requires loop-around trunks.

FOR CUSTOMERS WHO HAVE NOT BEEN USING LOOP-AROUND TRUNKS FOR ALL LINE-TO-TOPS TRAFFIC (IN A NON-EQUAL-ACCESS OFFICE) AND ARE UP-GRADING TO TOPS03 OR HIGHER, ADDITIONAL LOOP-AROUND TRUNKS WILL BE REQUIRED. THESE ADDITIONAL LOOP-AROUND TRUNKS WILL BE REQUIRED FOR COIN, HOTEL, AND NON-FEATURED POTS TRAFFIC.

The attached charts detail TOPS loop-around requirements. Calculate the total traffic in CCS for each station type requiring loop-around trunks. Refer to traffic provisioning tables for trunk capacities to determine the required trunk quantities for loop-around trunks.

Loop-Around Requirements
Through BCS-36 for LINE-TO-TOPS
(In a Non-Equal Access Office)

STATION TYPE	CALL TYPE	LOOP-AROUND REQUIRED
COIN	0+,0-,1+,01+,011+	NO
COIN (ACTS, MCCS)	ALL	NO
HOTEL	0+,0-,1+,01+,011+	NO
IBN LINES	0+,0-,01+	YES
ONI/ANIF	0+,0-,1+,01+,011+	YES
POTS (FEATURED)	0+,0-,01+	YES
POTS (WITHOUT FEATURES)	ALL	NO

Loop-Around Requirements for
TOPS-TO-LINE for all BCS/PCL Releases

TRUNK GROUP	CALL STATION TYPE		LOOP-AROUND REQUIRED
INTERTOLL	INWARD		YES
TOPS (TERMINATING ON POTS LINES)	COIN	0+-,1+	YES
	HOTEL	0+-,1+	YES
	NON-COIN	0+-,1+	YES
	ONI/ANIF	0+-,1+	YES
	PBX	0+-,1+	YES
TOPS (TERMINATING ON IBN LINES)	ALL CALLS		YES
VERIFICATION	VFY		YES

2.2.3.2 E911 Loop-Around Requirements

Two types of calls within an E911 office will require loop-around trunks in order to process properly.

The provisioning calculation for loop-around trunks is as follows:

$$\frac{(A + B + \ldots \text{ calls/hour}) \times \text{Average Hold Time (sec)}}{100} = \text{CCS}$$

For E911 offices:

A = HDBH E911 calls that originate within the E911 DMS-100 office.

B = HDBH E911 calls that originate from remotes within the E911 DMS-100 office.

2.2.4 Office Layout Information

Not applicable.

2.2.5 Traffic Tables

Refer to ECM 497.

2.3 Product/System Specification

2.3.1 Physical Characteristics

Not applicable.

2.3.2 EMI/Earthquake Information

Not applicable.

2.3.3 Sparing Information

Not applicable.

2.3.4 Power Feed and Fusing Requirements

Not applicable.

2.3.5 Current Drain Information

Not applicable.

2.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

Not applicable.

2.4.1 Required Software Packages and Interdependencies

Not applicable.

2.4.2 Software Usage Restrictions

Not applicable.

2.4.3 Memory Provisioning

Refer to MEMCALC.

2.5 Real Time Impact

Not applicable.

3.0 ECM287 - TOPS Tone and Scrambler

3.1 Overview

Product/System Overview

The purpose of the Tops Tone & Scrambler is to scramble the speech of a subscriber as heard by the operator during verification, and to introduce an alerting tone to the subscriber when an operator must "barge-in" on an established connection.

3.2 Hardware Provisioning

3.2.1 Hardware Usage Restrictions

Not applicable

3.2.2 Hardware Dependencies

Not applicable

3.2.2.1 P and C Side Port Requirements

Not applicable

3.2.2.2 DMS BUS Port Requirements

Not applicable

3.2.2.3 Circuits Per Card

Not applicable

3.2.2.4 Discrimination Numbering

3.2.3 Provisioning Considerations

3.2.3.1 PROVISIONING

Provisioning of the tone & scrambler circuit is based on the actual verification traffic as given by the customer. The holding time of the circuit is approximately equal to the average holding time of the line under verification by the operator. Provide the required quantity of NT3J00AB circuits per calculations using given parameters at P.001.

The NT3J00AA card cage is used to house the tone & scrambler circuit packs. Provide one (1) shelf for every ten (10) NT3J00AB.

As an interface to the circuit, provide one (1) NT2X88 4-W E&M trunk (2 ckt's) for each NT3J00AB.

One (1) scan point per NT3J00AA is required to detect an alarm condition on the unit.

In order to ensure limited Operator Verification capabilities in the event of an "A" or "B" power failure, the following recommendations may be offered to the customer.

1) Provide a minimum of two (2) NT3J00AA card cages per office and power all card cages from alternating power feeds.

2) Provide a minimum of two (2) NT3J00AB scrambler CPs per office.

3) Spread all scrambler CPs evenly over all card cages.

Full tone & scrambler redundancy is not required. Instead ensure that the calculated scrambler requirements are distributed evenly between the "A" and "B" feeds. Recommendations 1 and 2 are not requirements and therefore should only be offered as an option.

3.2.3.2 MOUNTING

The NT3J00AA card cage will be mount in a standard MIS frame and is seven (7) inches high and twenty six (26) inches wide. The NT3J00AB is packaged on a double wide circuit pack and should be
| located in odd slots 03 through 21. An NT3J00 AC power supply is always provided in slot 01 of the card cage.

3.2.3.3 CABLING

The NT3J00AA card cage is cabled to the distributing frame via three (3) NT0X26UE 50 pin connectorized cables. These cables terminate on the following shelf connectors:
Connector J1 - cabling slots 3 - 9 (Slot 9 is split between
Connector J2 - cabling slots 9 - 15 connector J1 and J2)
Connector J3 - cabling slots 17 - 21

Leads for each individual NT3J00AB are (subs) T,R,EA,EB,MA,MB and (TOPS) T,R,T1,R1,EA,EB,MA,MB. Also provide an 812A cable from NT3J00AA TB1-9 and TB1-10 to the DF, cabling out the alarm leads NO,C. The alarm relay is normally open with contact closure in the event of an alarm condition.

3.2.4 Office Layout Information

Not applicable

3.2.5 Traffic Tables

Not applicable

3.3 Product/System Specification

3.3.1 Physical Characteristics

Not applicable

3.3.2 EMI/Earthquake Information

Not applicable

3.3.3 Sparing Information

Provide one (1) NT3J00AB Tone & Scrambler ckt and one (1) NT3J00 AC Power Supply CP.

3.3.4 Power Feed and Fusing Requirements

Not applicable

3.3.5 Current Drain Information

Not applicable

3.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

3.4.1 Required Software Packages and Interdependencies

TOPS Tone & Scrambler feature is contained in package NTX030CC.

3.4.2 Software Usage Restrictions

3.4.3 Memory Provisioning

Not applicable

3.5 Real Time Impact

4.0 ECM361 - International TOPS (ITOPS)

4.1 Overview

ITOPS is configured using a combination of positions and devices. The available positions and devices are as follows:

Positions

Operator Position
In-Charge Position
Assistance Position

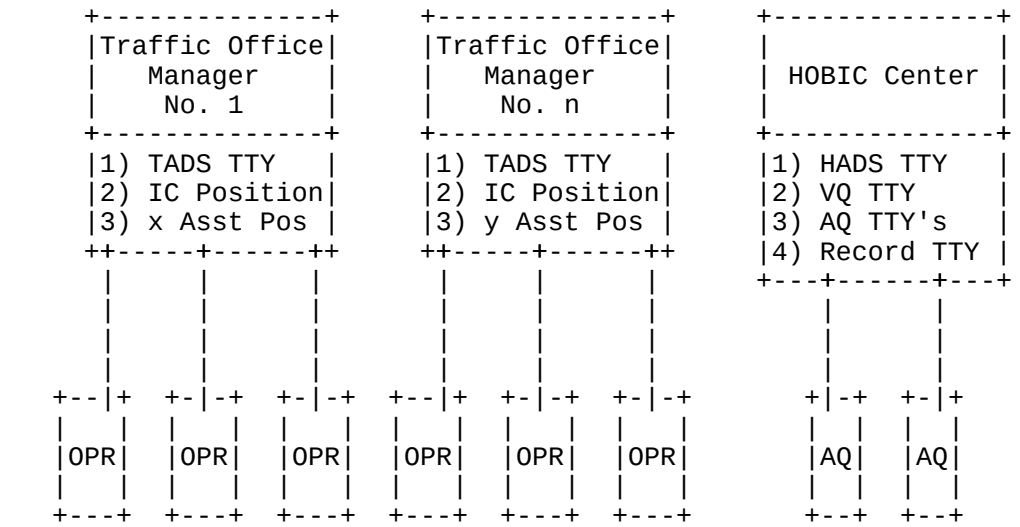
Devices:

Traffic Administration Data System (TADS) TTY
System Administration Data System (SADS) TTY
Database Administration Data System (DADS) TTY
Time and Charges (T&C) TTY's
- Voice Quote (VQ)
- Autoquote (AQ)
- Record
- HADS - Hotel Administration Data System

These positions and devices are configured to form groups of operators known as a Traffic Office (TO). The ITOPS system will support up to thirty (30) TO's.

Each TO will consist of several Operator Positions, one In-Charge (supervisory) position, at least one Assistance Position and a TADS TTY device. In small offices a separate assistance position is not required as the capability is provided by the In-charge positions.

In addition, there may be a Hotel Billing Information Center (HOBIC). This will consist of autoquote TTY's, a voice quote TTY, a record TTY and a HADS TTY.



n <= 30
x+y <= 126

Figure 1. TOPS Configurations

In an office configured with only one (1) Traffic Office, a System Administration Data System TTY (SADS) is used in place of the Traffic Administration TTY (TADS) and the Hotel Administration Data System TTY (HADS).

4.1.1 ITOPS Position Provisioning

The ITOPS-PC upgrade kits that allow a regular PC to operate as an ITOPS position are the NTZ000AP ITOPS-PC English Operator Position Kit, NTZ000AU ITOPS-PC English In-Charge Position Kit, NTZ000AV French Operator Position Kit, and the NTZ000AW French In-Charge Position Kit. The ITOPS-PC Kit and ITOPS-PC Software should be purchased via the Rochester Directory and Operator Services Division at (716) 482-5000. ITOPS Position NT4X71DD and ITOPS Position NT4X71DC have been MD'd

The individual office positions are ordered as follows:

4.1.1.1 ITOPS ENGLISH OPERATOR POSITION

Provide one (1) NTZ000AP ITOPS-PC English Operator Position Kit, one (1) NTAR13AF ITOPS-PC Software package, and one (1) PC purchased in country for each operator position.

4.1.1.2 ITOPS ENGLISH IN-CHARGE/ASSISTANCE POSITIONS

Provide one (1) NTZ000AU ITOPS-PC English In-Charge Position Kit, one (1) NTAR13AF ITOPS-PC Software package, and one (1) PC purchased in country for each in-charge/assistance position.

4.1.1.3 ITOPS FRENCH OPERATOR POSITION

Provide one (1) NTZ000AV ITOPS-PC French Operator Position Kit, one (1) NTAR13AF ITOPS-PC Software package, and one (1) PC purchased in country for each operator position.

4.1.1.4 ITOPS FRENCH IN-CHARGE/ASSISTANCE POSITIONS

Provide one (1) NTZ000AW ITOPS-PC French In-Charge Position Kit, one (1) NTAR13AF ITOPS-PC Software package, and one (1) PC purchased in country for each in-charge/assistance position.

4.2 Hardware Provisioning

4.2.1 Hardware Usage Restrictions

An operator bureau may consist of current ITOPS terminals, ITOPS-PCs, or a mix of both.

4.2.2 Hardware Dependencies

The ITOPS-PC must meet the following minimum requirements:

Processor	Intel 486
Processor speed	25 MHZ
Hard drive capacity	80 MB
RAM capacity	8 MB
Floppy drive/Density	3.5 inch, DS, HD
Slots available	2
Bus type	ISA/AT Bus
Number of serial ports	1
Serial port connector	9 pin D type male
Number of parallel ports	1
Video controller	VGA
Keyboard connector	PS/2 style 6 pin round
Monitor pixels	640 X 480
Monitor pitch	.28 M (recommended)
Monitor screen size	14 inch (recommended)
DOS	5.0
Windows	3.1, English

4.2.2.1 P and C Side Port Requirements

Not Applicable.

4.2.2.2 DMS BUS Port Requirements

Not Applicable.

4.2.2.3 Circuits Per Card

Not Applicable.

4.2.2.4 Discrimination Numbering

Not Applicable.

4.2.3 Provisioning Considerations

4.2.3.1 TTY Devices

Provision the TTY devices as per Table A.

USER CLASS	TTY	BAUD RATE	MODEM

TADS	LA120DA (KSR)	300	GDC 108-3M
SADS	LA120DA (KSR)	300	GDC 108-3M
DADS	LA120DA (KSR)	300	GDC 108-3M
T&C Voice Quote	LA120DA (KSR)	300	GDC 108-3M
T&C Record	LA120DA (KSR)	300	GDC 108-3M
Autoquote	LA120DA (KSR)	300	GDC 108-3M
HADS	LA120DA (KSR)	300	GDC 108-3M

4.2.3.2 TTY Modem Ordering Information

Provide one (1) modem for each ITOPS TTY device.

MODEM TYPE	OPERATING VOLTAGE	ORDERING CODE
GDC 108-3M	120V +/- 10%	055A001-001

There is no NT-approved 220V modem available.

4.2.3.3 Service Circuit Provisioning

Provide one (1) NT3X02AA/NT3X03AA TOPS Digital Modem Circuit for each ITOPS position and for each ITOPS TTY device. Note, the NT3X02AA/NT3X03AA pair provides four (4) Digital Modem Circuits.

Provide one (1) Three Port Conference Circuit NT3X67BA for each ITOPS Operator Position, Assistance Position, and In-Charge Position. The NT3X67BA circuit pack provides two (2) Three Port Conference Circuits.

4.2.3.4 Trunk Provisioning

The network is fully digital; therefore, all of the provisioned trunks are on PCM-30 digital links. The link between ITOPS positions and the DMS host switch is via Telco supplied channel banks. Provision one (1) NT6X27BB for every two PCM-30 links required. Trunk appearances are required as follows:

One (1) trunk appearance is required for each TTY device.

Two (2) trunk appearances are required for each ITOPS Operator, In-Charge, and Assistance Position.

4.2.3.5 Loop around Trunks

When ITOPS is equipped on a DMS-100/200 configuration, loop around trunks (NT6X27BB) must be provisioned to route traffic between the DMS-100 and the DMS-200 portion of the switch. Provisioning of the number of loop around trunks is based upon the traffic requirements. All line-to-TOPS and TOPS-to-line calls must be routed via loop around trunks.

Loop Around Provisioning:

1. Outgoing operator traffic can be obtained in the following ways:

   a) Directly from Telco/Customer

   b) Calculation based on data from 86xx Questionnaire (0-, 0+ 5 to 10D, 01 + 12D. 1+CAMA)

   c) Approximate method:

   Total lines X originating traffic (50%) X .05% (traffic to operator)

2. Incoming operator traffic can be obtained in the following ways:

   a) Approximate method:

   10% of toll completing traffic

   b) Calculation based on data from 86xx Questionnaire (0-, 0+5, 7D) around.

3. Calculation of loop around trunks:

   a) Add line to TOPS (outgoing operator) and TOPS to line (incoming operator) traffic.

   b) Use ERLANG B Table with grade of service 0.005 (P0.005).

4.2.3.6 Attenuator Pads

Attenuator pads are NOT required for ITOPS-PC positions.

4.2.3.7 Cabling

The ITOPS-PC will interface to the switch via a single cable that contains two 4-wire E&M trunks. One trunk is for data, and one is for voice. This interface is the same as the original ITOPS position.

Voice and data connections to the ITOPS controller of the original positions are via a single 34 pin connector. Provide one (1) NT0X26CK for connections from the ITOPS position to a distribution frame (DF) or cross-connect.

4.2.3.8 Miscellaneous

Headset Specifications

The PRS 500 supports two headset interfaces, including the Operators (OP) and Supervisors (SUP). Nominal impedances for the circuits are as follows:

Circuit	Impedance
EAR (operator and supervisor)	300 ohms
MIC (operator and supervisor)	50 ohms

Figure 2. Nominal Impedances

Simultaneous operation of two different types of headsets at a position can result in the loss of transmit capability from one of the headsets.

Chair Availability

| All chairs have been Manufacture Discontinued with no replacements.

Adjustable Furniture

| All TOPS 04 adjustable furniture have been Manufacture Discontin-
| ued with no replacements.

4.2.4 Office Layout Information

Not Applicable.

4.2.5 Traffic Tables

Not Applicable.

4.3 Product/System Specification

4.3.1 Physical Characteristics

Not Applicable.

4.3.2 EMI/Earthquake Information

Not Applicable.

4.3.3 Sparing Information

Normal sparing algorithms should apply.

4.3.4 Power Feed and Fusing Requirements

The ITOPS-PC Operator Position is AC powered. A source of reliable power, such as a UPS, is recommended to provide power in the event of AC power failure.

The always provided 110V modem with the ITOPS-PC will require power conversion in markets using 220V.

4.3.5 Current Drain Information

Not Applicable.

4.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

4.4.1 Required Software Packages and Interdependencies

The ITOPS-PC requires (1) NTAR13AF ITOPS-PC Software package per ITOPS-PC position.

4.4.2 Software Usage Restrictions

No switch software changes are required for the implementation of the ITOPS-PC.

4.4.3 Memory Provisioning

Not Applicable.

4.5 Real Time Impact

Not Applicable.

5.0 ECM391 - TOPS Operator Centralization (OC)

5.1 Overview

The TOPS OC Night Closedown feature will allow the Telco to close-down and reopen various combinations of TOPS Stand-alone offices, TOPS Host OC offices, TOPS Remote OC offices, and TOPS MP offices at specified times of the day. The offices being closed down must be connected to a designated 24 Hour Host (Super Host). In Figure 3 TOPS Standalones and OC offices are closing down to a 24 Hour Host containing TOPS III or IV positions.

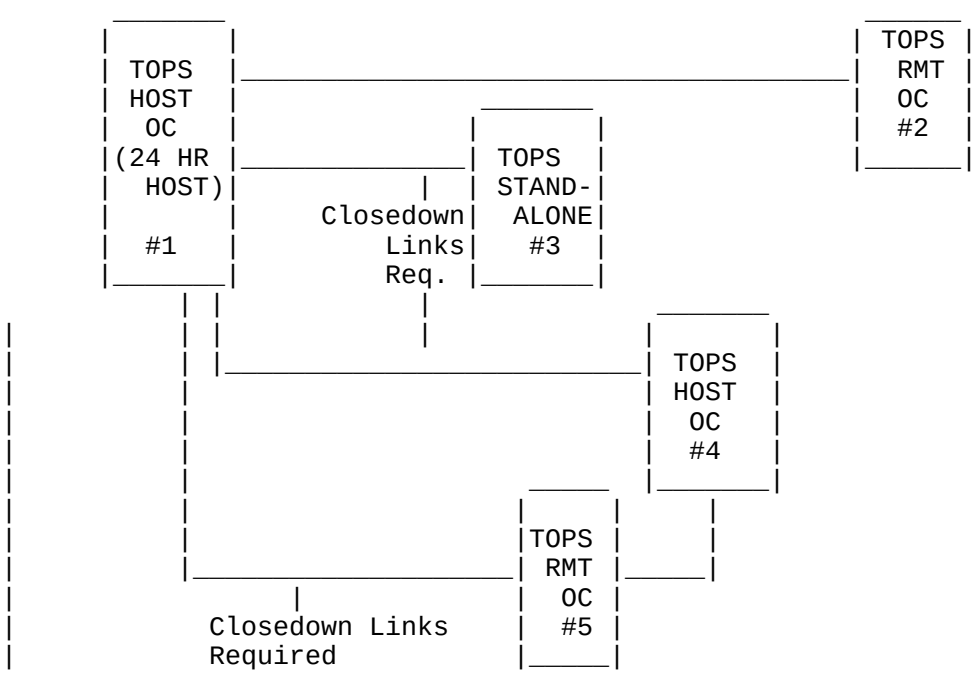


Figure 3. TOPS Night Closedown to TOPS III or IV Host Configuration

When in the closedown mode the TOPS Stand-alone Office (#3) and/or TOPS Host OC Office (#4) will function as a Remote OC Office to the TOPS OC 24 Hour Host (#1). The TOPS Remote OC office (#5) connected to a closed Host (#4) will be switched to the 24 Hour Host (#1).

In Figure 4 the offices in Figure 3 on page 12-21 are closing down to a 24 Hour Host containing TOPS MP postions or a mix of TOPS III or IV and TOPS MP positions.

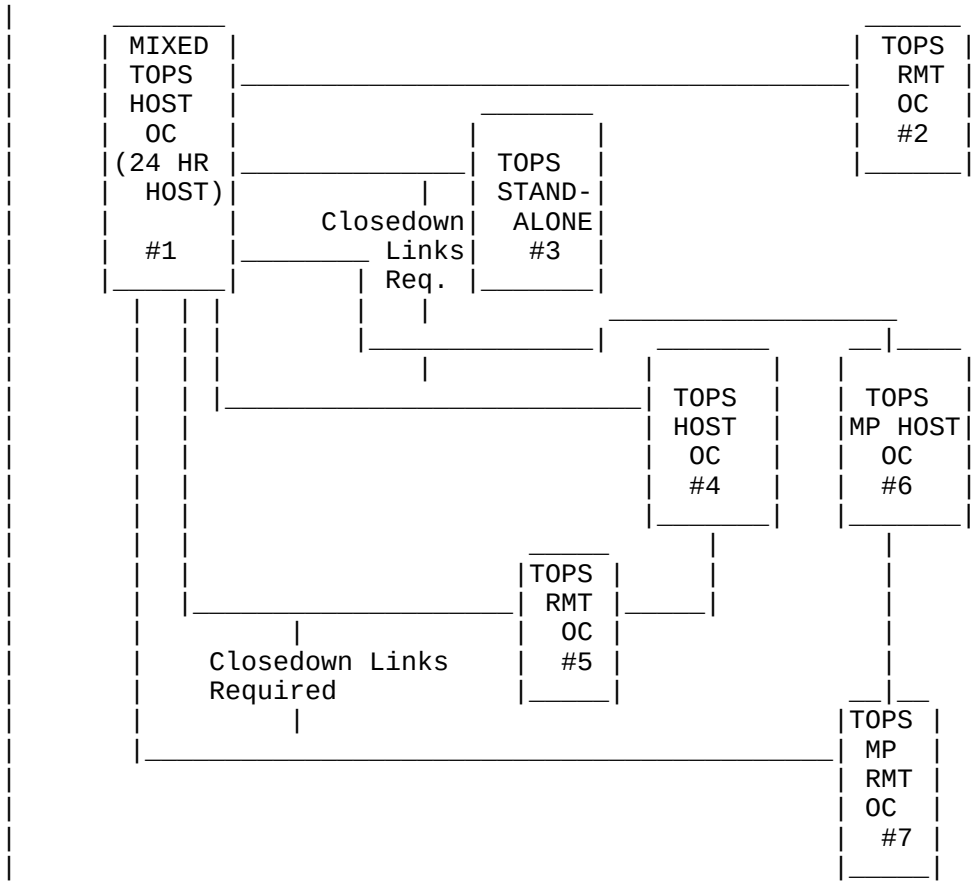


Figure 4. TOPS Night Closedown to TOPS MP or Mixed Host Configuration

5.2 Hardware Provisioning

5.2.1 Hardware Usage Restrictions

5.2.2 Hardware Dependencies

5.2.2.1 P and C Side Port Requirements

5.2.2.2 DMS BUS Port Requirements

Not applicable

5.2.2.3 Circuits Per Card

5.2.2.4 Discrimination Numbering

5.2.3 Provisioning Considerations

5.2.4 Office Layout Information

Not applicable.

5.2.5 Traffic Tables

Not applicable.

5.3 Product/System Specification

5.3.1 Physical Characteristics

5.3.2 EMI/Earthquake Information

5.3.3 Sparing Information

Not applicable.

5.3.4 Power Feed and Fusing Requirements

5.3.5 Current Drain Information

5.4 Software Provisioning

For NTX software packages to PCL/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

5.4.1 Required Software Packages and Interdependencies

| 5.4.2 Software Packaging

| Packaging required for Night Closedown is described below. The
| basic package is NTXA60AA TOPS DIRECT NIGHT CLOSEDOWN which con-
| tains the following features:

| F1317 - Operator Centralization - Remote
| F2602 - Remote ONI via O.C.
| F2605 - TOPS Closedown

| NTXA60AA requires NTX030CC and NTX801AA as interdependencies.
| These packages are provided in all TOPS Major Group packages.

If the offices shown in Figure 1 require BCS23 or lower the following S/W packages must be ordered to support the TOPS OC Night Closedown feature:

#1 - TOPS Host OC (24 Hour Host)

NTX288AC TOPS Host Operator Centralization

#2 - TOPS Remote OC

NTX289AC Remote Operator Centralization

#3 - TOPS Standalone (with closedown feature)

NTX288AD TOPS Host Operator Centralization with TOPS Closedown

#4 - TOPS Host OC (with closedown feature)

NTX288AD TOPS Host Operator Centralization with TOPS Closedown

| #5 - TOPS Remote OC (with closedown feature)

NTX289AD Remote Operator Centralization with TOPS Closedown

If the offices shown in Figure 3 on page 12-21 require BCS24 or higher the following S/W packages must be ordered to support the TOPS OC Night Closedown feature:

#1 - TOPS Host OC (24 Hour Host)

NTX287AC TOPS Standard
NTX039AA Host OC Data-Link Handling

#2 - TOPS Remote OC

NTX289AC Remote Operator Centralization

#3 - TOPS Standalone (with closedown feature)

NTX287AC TOPS Standard
NTXA60AA TOPS Direct Night Closedown

#4 - TOPS Host OC (with closedown feature)

NTX287AC TOPS Standard
NTX039AA Host OC Data-Link Handling
NTXA60AA TOPS Direct Night Closedown

| #5 - TOPS Remote OC (with closedown feature)

NTX289AC Remote Operator Centralization
NTXA60AA TOPS Direct Night Closedown

| If the offices shown in Figure 4 on page 12-22 require BCS24 or higher the following S/W packages must be ordered to support the TOPS OC Night Closedown feature. Note that the TOPS Remote MP Major Grouping is required for each office which will close down to a TOPS MP or mixed 24 Hour Host:

| #1 - TOPS Host OC (Mixed 24 Hour Host)

| NTX704AA TOPS MP Standard
| NTX039AA Host OC Data-Link Handling
| NTX873AA Host TOPS MP OC Data Link Handling

| #2 - TOPS Remote OC

| NTX706AA TOPS MP Remote (Remote OC)

| #3 - TOPS Standalone (with closedown feature)

| NTX287AC TOPS Standard
| NTXA60AA TOPS Direct Night Closedown
| NTX706AA TOPS MP Remote

| #4 - TOPS Host OC (with closedown feature)

| NTX287AC TOPS Standard
| NTX039AA Host OC Data-Link Handling
| NTXA60AA TOPS Direct Night Closedown
| NTX706AA TOPS MP Remote

| #5 - TOPS Remote OC (with closedown feature)

NTX706AA TOPS MP Remote
NTXA60AA TOPS Direct Night Closedown

#6 - TOPS MP Host (with closedown feature)

NTX704AA TOPS MP Standard
NTX039AA Host OC Data-Link Handling
NTX873AA Host TOPS MP OC Data Link Handling
NTX706AA TOPS MP Remote
NTXA60AA TOPS Direct Night Closedown

#7 - TOPS MP Remote (with closedown feature)

NTX706AA TOPS MP Remote
NTXA60AA TOPS Direct Night Closedown

5.4.3 Closedown Operation

OC Night Closedown operates in two distinct modes: Auto and Manual.

Auto mode provides the ability for the TOPS network to automatically change to its nightime configuration (closed) and then back to the day- time configuration (open) at user specified times. Each switch which is to alter its traffic must be instructed when to close, when to reopen and which host will service its traffic when closed. Once activated these changes will occur automatically every day.

Manual mode provides the ability to command a switch to immediately change to its nightime configuration or to return to its daytime config- uration. This mode also allows the parameters necessary for activation of auto mode to be specified. The times at which a switch is to automat- ically close, when it is to reopen and the host which will service its traffic when closed may only be designated or altered in Manual mode. Manual mode is accessed by a set of subcommands via MAPCI command "OCNC".

The telco should abide by the following rules to ensure the coordination of TOPS OC networks that are automatically closing or opening:

If a closing host has subtending remotes, the remotes should be redi- rected before the host is closed (i.e. the closing times of the subtend- ing remotes should always be before the closing time of their host. If a remote is not redirected, its operator traffic will continue to the closing host (even if the closing host has already closed and is functioning as a remote).

When redirecting remote offices or closing host and stand-alone offices, the telco must ensure sufficient manned positions at the new host to handle the additional traffic. If there are not adequate positions, the call waiting queue at the new host will overflow and calls will be lost.

When reopening a closed host, the host should be reopened and staffed be- fore the remotes are brought back (i.e. the opening time for a host should always be prior to the opening times of its subtending remotes. If a remote opens before a host, the remote's traffic will appear at the host (even though the host is closed and functioning as a remote). If the host positions are not yet staffed, its call waiting queue will overflow and calls will be lost.

5.4.4 Affected Software Tables

The telephone company must install new operator voice links and datalinks from the closing host to the 24 Hour Host and from remotes subtending the closing host to the 24 Hour Host. These data and voice links must be identified to the switches they connect by data filling them within the Operator Centralization data tables OCGRP, TOPSHDLC and VLMEM.

To complete the OC Night Closedown feature a new field OFCTYPE has been added to table OCGRP. This new field designates whether a data filled office is a HOST office or a REMOTE office. It is needed because an OC host office with OC Night Closedown may function as a host or a remote office. When it is a host, it needs to know which of the data filled offices are remotes so it can service their operator traffic. When functioning as a remote, it needs to know which of the data filled offices may be used as its host. Field OFCTYPE is required in all OC offices, regardless of whether they contain OC Night Closedown.

Table OCOFC: (additional entries)	For closing offices, the 24 Hour Host office must be added. For the 24 Hour Host office, the closing offices must be added.
Table OCGRP: (changed, additional entries)	For closing offices, the 24 Hour host office and the associated voice link groups and data link groups must be added. The OFCTYPE field must be entered as host for the 24 Hour Host. If the closing office is a remote, the OC host office must also have an OFCTYPE of host. If the closing office is a host the remote office tuples must have an OFCTYPE of remote. For the 24 Hour Host office, the closing offices and their associated voice link groups and data link groups must be added. The OFCTYPE field for the closing offices and any other remote offices must be entered as remote.
Table TOPSHDLC: (additional entries)	For closing offices, the new data links to the 24 Hour Host office must be added. For the 24 Hour Host office, the new data links to the closing offices must be added.

| Table VLMEM (additional entries): For closing offices, the new voice links to the 24 Hour Host office must be added.

It should be noted that translations for delay calls are performed at the host switch while all other remote call translations are performed at the remotes. Translations datafill for the 24 Hour Host should be compatible with the translations datafill of its remotes.

5.4.5 Affected Office Parameters

The Office Engineered Parameter TOPS_OC_ENVIRONMENT determines how an office is closed. When the environment is HOST the switch is closed by changing it functionally to a remote and then opened by changing it back to a host. When functionally a remote the user specified 24 Hour Host will service its operator traffic.

When TOPS_OC_ENVIRONMENT is REMOTE, the switch functionally remains a re- mote. It will be closed by changing its host to the user specified24 Hour Host. It will open by changing back to the host designated by table OCHOST.

In a remote environment, or in a host which is closed and functioning as a remote, the Engineered Office (OFCENG) parameter TOPS_OC_REMOTE_BVC designates how MCCS queries are accomplished. When "Y", the queries are sent over an OC data link to the host. The host queries the Billing Validation Center (BVC) by injecting query messages into the CCIS network. The results are returned over the data link to the remote. Otherwise, the switch is presumed to have a CCIS connection and the Billing Validation Center is queried directly.

In a remote environment with TOPS_OC_REMOTE_BVC = "Y", closing of the switch results in queries being sent to the OC Night Closedown host, which would require MCCS software. When the remote reopens, the queries will again be sent to the original host for validation.

The MCCS queries from an open host are injected directly into the CCIS network without regard to the value of TOPS_OC_REMOTE_BVC.

Additional office parameter resources (RUs, CCBs etc.) within the 24 Hour Host must be engineered for the added traffic during the closedown period.

5.4.6 PS and DS Overheads and Incremental DS Requirements

TOPS Direct Night Closedown will require 94.4K Bytes (BCS24) of program store overhead and approximately 8.6K words of data store overhead. Note that these values are based upon the sum total of all modlists within the software package NTXA60AA. Any redundant

| modlist within the software load will not be counted in memory requirements and may result in a lesser memory impact for the closedown feature. Refer to MEMCALC for a more precise value.

| Host and standalone switches, which will function as remotes when closed, will need to allocate seventy-five words for each voice link to the 24 Hour Host.

5.4.7 Software Usage Restrictions

5.4.8 Memory Provisioning

5.5 Real Time Impact

| CPU Call Timings will be impacted for operator-handled calls in those offices that normally act as host or standalone TOPS offices, and act as remote OC offices in the closedown mode. For example, for call type NC_0_MINUS in BCS24, a standalone TOPS office requires 72.0 ms per call attempt. For the same office in the closedown mode, the same call attempt would require 82.1 ms, or an increase of approximately 14 per- cent for that particular call type. For further information on TOPS call timings, refer to System Engineering Bulletin 86-11-001 for the appropriate BCS release. CPU Capacity calculations are contained in the REAL::TIME tool release 3E_1 or later.

6.0 ECM468 - TOPS Message Switch (TMS)

6.1 Overview

Product/System Overview

6.1.1 TOPS MP

The TOPS MP product has been MD'd and replaced by IWS.

For TOPS MP, the TMS interfaces to the DMS Central Control (CC), to the TOPS Position Controller (TPC), and to service nodes. Nortel and Computer Generation, Inc. (CGI) provide OIA-compliant databases which interface to TMS. Nortel Network Application Systems (formerly CCI) and IBM provide Directory Assistance databases which interface to TMS. Direct links from TPCs to these databases are not required, providing facilities savings for the telco. The TMS also eliminates the need for MTM-mounted digital modems, which were used for CC-TPC communication.

6.1.2 TOPS IWS

For TOPS IWS and AOSS (MD'd) , the TMS provides a data interface between DMS gateway ("type 2") positions and the DMS. When OIA is offered with TOPS IWS, the TMS will also provide a data interface between DMS gateway positions and the OIA database. DA gateway ("type 1") positions have links directly to the DA database (IBM or NT-NAS); these DA gateway positions do not interface to the TMS. The TMS carries the voice links between the DMS and all IWS positions on the token ring (except for dedicated router positions, which do not have voice capability).

TMS provides the following capabilities to IWS:

- Link switching/concentration which provides facilities savings.
- CC messaging/X.25 protocol conversion.
- High speed CC-TPC communications. Two 56Kbps data links between the TMS and TPC increase messaging throughput.
- X.25 implementation between TMS and all subtending nodes.
- X.25 protocol parameters.
- Network coordination.
- Elimination of digital modems for CC-TPC messaging.
- TPC and MP maintenance from the MAP.

- TMS networking (interconnecting TMSs so messages can be switched via intermediate TMSs until the ultimate destination is reached).

The TOPS Message Switch must be used for all applications of TOPS IWS. The links from the TMS to the DA database will not be used when Directory Assistance is being implemented using TOPS IWS positions.

6.1.3 System configurations

Refer to the following diagrams system configuration of the TOPS Message Switch. Refer to "Acronyms/Abbreviations" for abbreviations.

6.1.3.1 TOPS MP

The TOPS MP product has been MD'd and replaced by IWS.

The following figure shows the TMS with the TOPS MP configuration.

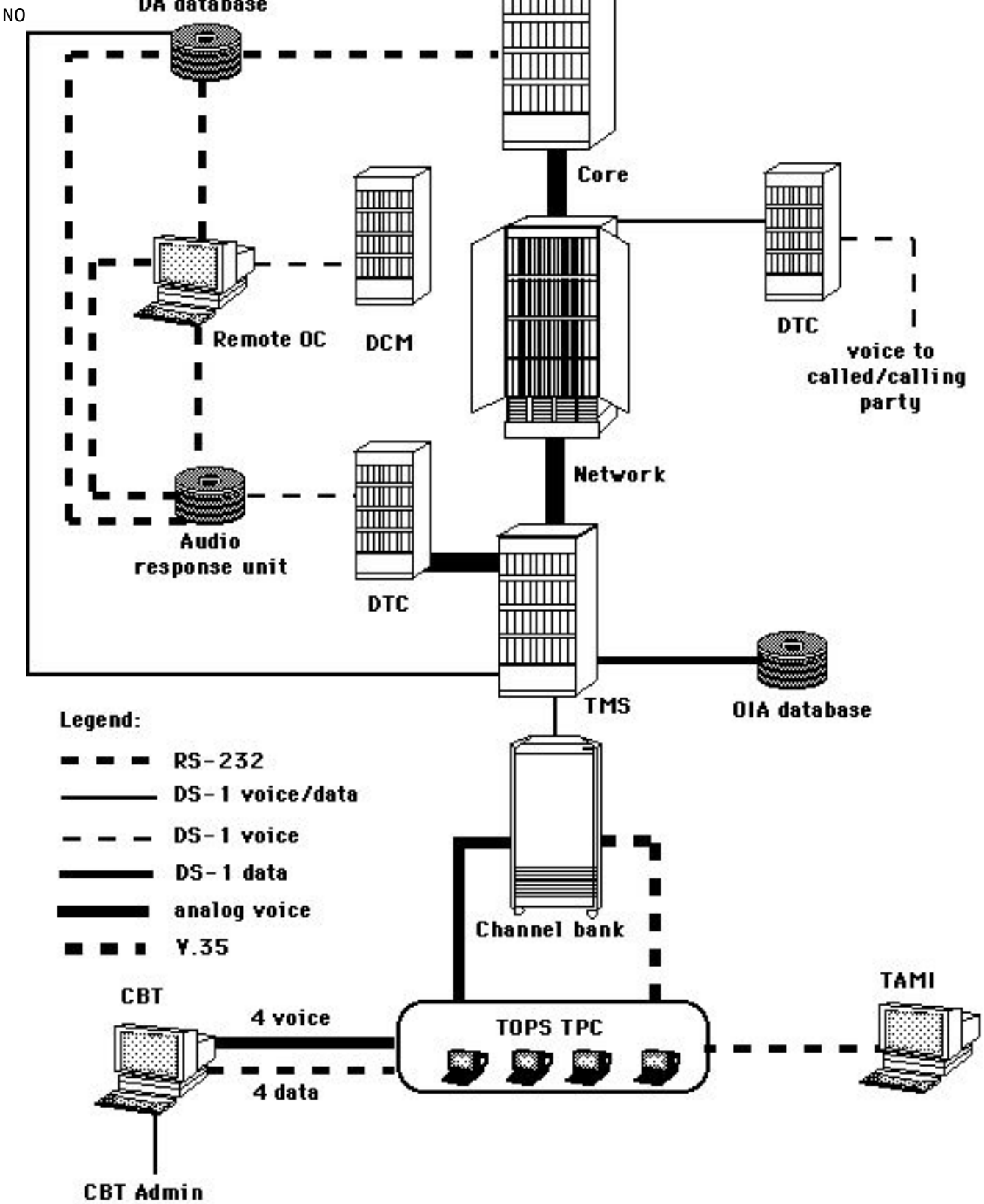

NO
DA database
Core
Remote OC
DCM
DTC
voice to
called/calling
party
Network
Audio
response unit
DTC
TMS
OIA database
Legend:
RS-232
DS-1 voice/data
DS-1 voice
DS-1 data
analog voice
Y.35
Channel bank
TAMI
CBT
4 voice
TOPS TPC
4 data
CBT Admin

Figure 5. TMS WITH TOPS MP

6.1.3.2 TOPS IWS

The following figure shows the TMS with the TOPS IWS configuration.

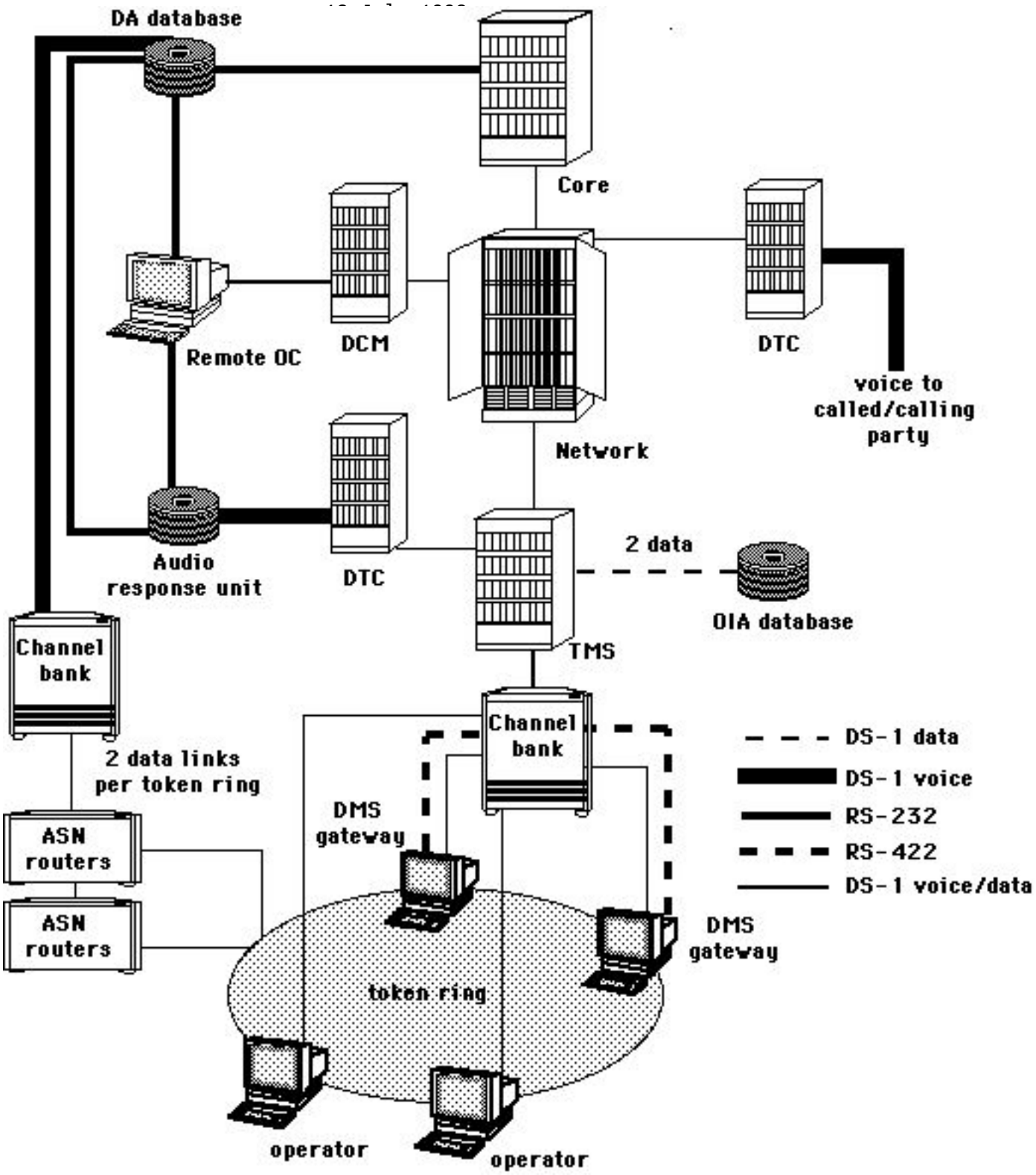

DA database
Core
DCM
Remote OC
DTC
voice to called/calling party
Network
Audio response unit
DTC
2 data
OIA database
TMS
Channel bank
2 data links per token ring
Channel bank
DS-1 data
DS-1 voice
RS-232
RS-422
DS-1 voice/data
DMS gateway
ASN routers
ASN routers
DMS gateway
token ring
operator
operator

Figure 6. TMS WITH TOPS IWS

Note: References to DS1 may be PCM30 for non-North American markets.

6.1.4 EWSS TMS Networking

EWSS TMS Networking is a feature which allows TMSs in an office to share DS-1 links to a low-usage OIA database (e.g. ORDB). Directory Assistance can NOT be accessed in this manner. This feature is part of functional group EWSS0006.

With EWSS TMS Networking, "middle" TMSs have no direct links to the database. Instead, they access the database through the network and an "end" TMS. Refer to DDOC AF2592 for more information.

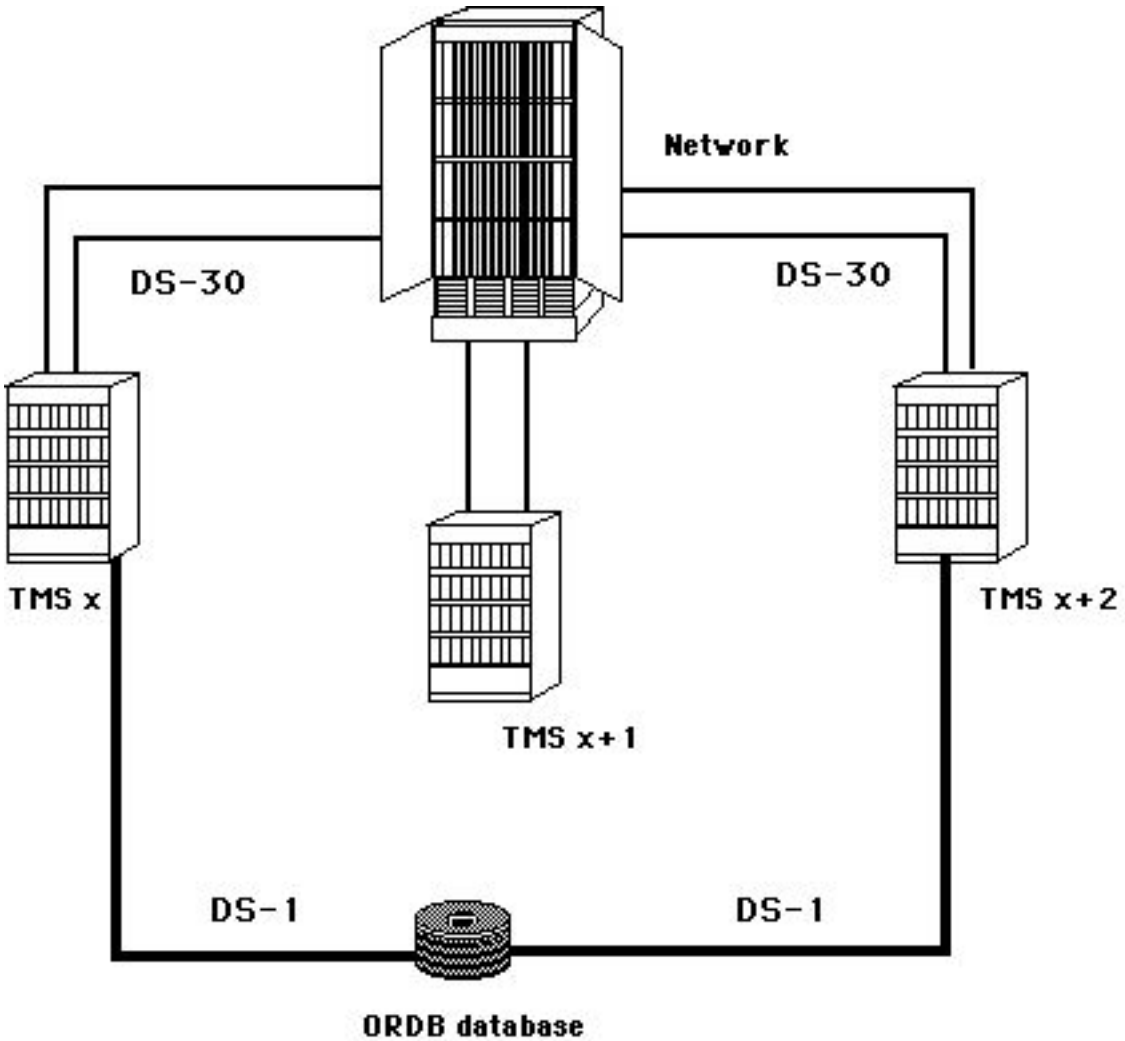


Figure 7. EWSS TMS NETWORKING

The number of DS-0 channels used on each DS-1 is equal to x (the number of networked TMSs).

Note: References to DS1 may be PCM30 for non-North American market.

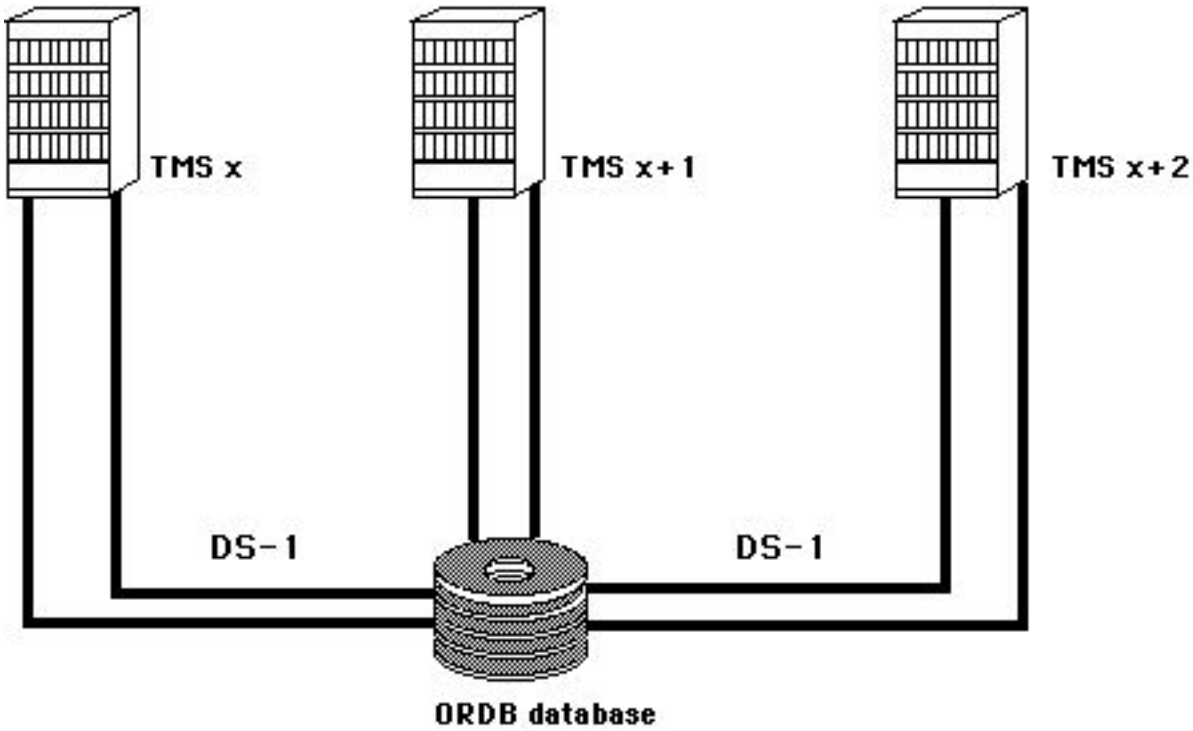


Figure 8. TMS CONNECTION TO ORDB W/O EWSS

Links shown above are DS-1 one DS-0 channel is utilized on each DS-1. DS-30 links to the network are not shown, since they are not in the path for TMS to ORDB communications.

6.2 Hardware Provisioning

6.2.1 Hardware Usage Restrictions

The following lists all hardware usage restrictions for TMS.

- The following circuit packs are NOT supported on the TMS until TOPS03:
  - NTMX77AA Unified Processor
  - NTBX01AB Enhanced ISDN Processor
  - NTAX78AA Enhanced Time Switch
- Beginning with the TOPS05 release, the MP/SP version of the TMS is no longer supported. XPM+ is required in TOPS05.
- The AX74 processor is not supported in the TMS.
- Use of EDCH in TMS requires BCS-36 or higher.

- A TMS can support a mixture of MP (MD'd), AOSS (MD'd), and IWS positions. However, mixing cluster sizes is limited to the datafill options described in AF3003.

- All TMSes must be upgraded to ETMS before applying TOPS07.

- TMSes equipped with 6X45 MP/SP processors will NOT support the EISP (NTBX01AB, AC, BA) circuit pack. Only the ISP (NTBX01AA) is supported.

6.2.2 Hardware Dependencies

The following list hardware dependencies for TMS.

- The TOPS Message Switch is based on XPM hardware with a different software load. Equipment previously supplied for standalone (non-TMS) TOPS MP applications may be reconfigured and used with the TOPS Message Switch.

- The following components are required for TMS configuration:

    - TPC provisioned with updated software load and HSDA card in slot 13 (TOPS MP only) or IWS token-ring or ethernet LAN configuration.

    - The TMS requires a standard Channel Bank to multiplex/demultiplex TMS T1 and E1 (DS-1/PCM-30) interfaces.

    - non-TMS subtending in-charge and assistance positions cannot monitor TMS subtending positions. TMS subtending in-charge and assistance positions cannot monitor non-TMS subtending positions. The FM position can serve TMS TOPS MP positions, non-TMS TOPS MP positions, and TOPS IWS positions.

    - TMS can only be used for controlling trunks associated with TOPS MP and TOPS IWS (i.e. NOT TOPSIV)

    - Inter-DCH communication is required for TMS configurations providing OIA access. This is provided by a NT6X50AB in slot 3 of the upper TMS shelf for T1 (DS-1), by a NT6X27BB in slot 4 of the upper TMS shelf for E1 (PCM-30), OR by providing feature EWSS0006 (EWSS TMS Interworking). This feature allows inter-DCH communications to occur on the time switch.

6.2.3 TMS CP line up

The TMS CP line up is dependent on whether T1 (DS-1) or E1 (PCM-30) interface is used.

6.2.3.1 T1 channel bank

The following show a possible lineup for the domestic (T1) TMS.

NOTE: The TMS has the same circuit pack (CP) line up as the LTCI with the exception of the Universal Tone Receiver (NT6X92) in slot 15. The LTCI requires this pack; whereas, the TMS does NOT require it.

Table 1. Domestic TMS CP line up

slot number	circuit pack PEC	circuit pack description
1, 2	NTBX02	Enhanced D Channel Handler
3, 4, 5	NT6X50	DS1 interface card
6-11	NT0X50	Filler plate
12	NTMX77	Unified processor
13	NT0X50	Filler plate
14	NT6X44	Timeswitch
15	NT0X50	Filler plate
16	NT6X01	ISDN Signaling Preprocessor Card (ISP)
17	NT0X50	Filler plate
18	NT6X69	Message/Tone Card
19	NT0X50	Filler plate
20	NT6X42	Channel Supervision Message
21	NT6X41	Formatter
22	NT6X40	DS-30 Card
23, 24	NT0X50	Filler plate
25, 26, 27	NT2X70	Power Converter

6.2.3.2 E1 channel bank

The following show a possible lineup for the international (E1) TMS.

NOTE: The TMS has the same circuit pack (CP) line up as the LTCI with the exception of the Universal Tone Receiver (NT6X92) in slot 15. The LTCI requires this pack; whereas, the TMS does NOT require it.

Table 2. International TMS CP line up		
slot number	circuit pack PEC	circuit pack de-scription
1, 2	NTBX02	Enhanced D Channel Handler
3, 4, 5	NT6X27	PCM30 Trunk Interface
6, 7	NT6X48	DS30A
8-11	NT0X50	Filler plate
12	NTMX77	Unified processor
13	NT0X50	Filler plate
14	NT6X44	Timeswitch
15	NT0X50	Filler plate
16	NTBX01	ISDN Signaling Pre-processor Card (ISP)
17	NT0X50	Filler plate
18	NT6X69	Message/Tone Card
19 (See Note 1 and 2)	NT6X28	PCM-30 Signalling CP
19R	NTCX50	Echo Canceller Control Paddleboard
20	NT6X42	Channel Supervision Message
20R	NTMX71	XPM + Term
21	NT6X41	Formatter
22	NT6X40AD/NT6X40FB	DS-30 Card (non-fiber)/DS-512 Card (fiber)
22R (See Note 3)	NT6X40	XPM DS512 Link Paddle Card
23, 24	NT0X50	Filler plate
25, 26, 27	NT2X70	Power Converter

Note 1: NT6X28AC (PCM-30 Singalling) requires NTCX50AB (Echo Canceller Control Paddleboard). They are both required for XPM +.

Note 2. NT6X28AA and NTCX50AA are not supported in XPM+.

Note 3: Slot 22R is only valid if fiber (DS-512) is used. Spec NT6X40GA in slot 22R for fiber applications.

6.2.4 P and C Side Port Requirements

The following section provides provisioning information for:

- P and C side port requirements for TOPS04 and up
- DS-1 CP
- PCM-30 CP
- Link provisioning
  - DS-1 links
  - PCM-30 links
  - DS-30 links
  - DS-512 links

6.2.4.1 TOPS04 and up

With TOPS04, P and C Side Port requirements changed. Refer to SEB 90-08-001 for detailed DS-1 to DS-30 channel mapping. The channel mapping in the SEB applies to all XPMs, including the OC-ETMS. The table below gives DS-30 port requirements based on the DS-1 ports used.

Table 3. P and C side port requirements for TOPS04 and up

If any of these DS-1 ports are used	All of these DS-30 ports are required
0,1,2,3,4	0,1,2,3
5,6,7,8,9	4,5,6,7
10,11	8,9,10,11
Note: Some XPMs can have up to 20 DS-1 ports. The TMS has only 12 DS-1 ports since slots 1 and 2 have the DCH card installed.	

6.2.4.2 DS-1 CP Provisioning

The following shows how many DS-1 (6X50) circuit packs (CP) to provision for the following:

- operator position (TOPS MP MD'd“, AOSS MD'd“ and IWS)
- database (i.e. CCDB, D1)
- ORDB (OIA)

TOPS MP (MD'd) and AOSS (MD'd) operator positions

TOPS MP and AOSS operator positions require the following:

Table 4. DS-1 CP provisioning for TOPS MP and AOSS

number of positions	number of DS-1 CPs
1-64	2
65-96	3

TOPS IWS operator positions

TOPS IWS operator positions require the following:

Table 5. DS-1 CP provisioning for IWS

cluster size	number of DS-1 CPs	number of positions
4	2	64
4	3	96
16	2 (See note 1)	64
16	3	96
20	2 (See note 1)	80
20	3	96

Note 1: Using a DNX (digital cross-connect) will allow additional positions to be supported, using the available DS-0 channels on the DS-1s.

TOPS MP database access

For TOPS MP DA database access without Dual HSDA and/or ORDB, provision two (2) additional DS-1 CPs.

Note: A "middle" TMSs with Inter-TMS Networking for ORDB does not require these additional DS-1 CPs unless it is providing access to a DA database.

TOPS AOSS (MD'd) database access

DA access is directly from the token ring to the DAS, and ORDB is not available with AOSS (MD'd) applications, so no DS-1 CPs are required for database access.

TOPS IWS database access

For IWS database access to OIA/ORDB, provision two (2) additional DS-1 CPs.

These additional DS-1 CPs are required on the "middle" TMSs with Inter-TMS Networking.

TOPS MP positions with inter-DCH for ORDB

Provision one (1) additional DS-1 CP for inter-DCH for ORDB.

Note: If software functionality EWSS0006 is provisioned on the switch, the additional DS-1 CP is NOT needed.

TOPS IWS AOSS (MD'd) positions with inter-DCH

Inter-DCH for ORDB is not applicable for IWS AOSS.

TOPS IWS positions with inter-DCH for OIA/ORDB

Provision one (1) additional DS-1 CP for inter-DCH for ORDB.

Note: If software functionality EWSS0006 is provisioned on the switch, the additional DS-1 CP is NOT needed.

6.2.4.3 PCM-30 CP Provisioning

Refer to "Provisioning Considerations" for slot locations of the PCM-30 CPs.

Note: If database access is required through the TMS, a digital cross-connect may be required to "share" a PCM-30 between operator interface and database access.

The following shows how many PCM-30 (6X27) CP to provision for the following:

- operator position (TOPS MP MD'd“, AOSS MD'd“ and IWS)
- database (i.e. CCDB, D1)
- ORDB (OIA)

TOPS MP (MD'd) and AOSS (MD'd) operator positions

TOPS MP and AOSS operator positions require the following:

Table 6. PCM-30 provisioning for TOPS MP and AOSS	
number of positions	number of PCM-30 CPs
1-72	2
73-96	3

TOPS IWS operator positions

TOPS IWS operator positions require the following:

Table 7. PCM-30 provisioning for TOPS IWS		
cluster size	number of PCM-30 CPs	number of positions
4	2	64
	3	96
16	2 (See note 1)	64
	3	96
20	2 (See note 1)	80
	3	96
Note 1: Using a DNX (digital cross-connect) will allow additional positions to be supported, using the available DS-0 channels on the DS-1s.		

TOPS MP database access

For TOPS MP database access without Dual HSDA and/or ORDB, provision at least three (3) additional PCM-30 CP for operator interface/database access, regardless of the number of positions. The CPs for the operator interface are shared with database access.

TOPS AOSS (MD'd) database access

DA access is directly from the token ring to the DAS, and ORDB is not available with AOSS (MD'd) applications, so no PCM-30 CPs are required for database access.

TOPS IWS database access

For IWS database access to OIA/ORDB, provision three (3) additional PCM-30 CPs for operator interface/database access regardless of the number of positions.

the CPs for operator interface are shared with database access.

TOPS MP positions with inter-DCH for ORDB

Provision one (1) additional DS-1 CP for inter-DCH for ORDB.

Note: If software functionality EWSS0006 is provisioned on the switch, the additional DS-1 CP is NOT needed.

TOPS AOSS (MD'd) positions with inter-DCH

Inter-DCH for ORDB is not applicable for AOSS (MD'd).

TOPS IWS positions with inter-DCH for OIA/ORDB

Provision one (1) additional DS-1 CP for inter-DCH for ORDB.

Note: If software functionality EWSS0006 is provisioned on the switch, the additional DS-1 CP is NOT needed.

6.2.4.4 Link provisioning

Links must be provisioned for DS-1s, PCM-30s and DS-30s.

DS-1 Link Provisioning

DS-1 link provisioning is dependent on the cluster size.

Cluster size 4

For MP (MD'd) positions, IWS, and AOSS (MD'd) positions with cluster size of four, one DS-1 link is required for every sixteen positions.

Note: AOSS (MD'd) and MP (MD'd) positions are only in clusters of four.

Cluster size 16

For IWS positions with cluster size of sixteen, each of the first five clusters (on a given TMS) require one DS-1 link. The sixth cluster can be spread over the other five DS-1 links; thus, saving one DS-1 link.

Cluster size 20

For IWS positions with cluster size of twenty, each cluster requires one DS-1 link.

Note: Cluster sizes of sixteen or twenty leave some unused channels on the DS-1 links. Use of a digital cross-connect may allow additional savings in DS-1 links.

Refer to DDOC AF3003 for additional information.

PCM-30 Link Provisioning

PCM-30 link provisioning is dependent on cluster size.

Cluster size 4

For MP (MD'd), AOSS (MD'd) or IWS positions with cluster size of four, one PCM-30 link is required for every sixteen positions.

Cluster size 16

For IWS positions with cluster size of sixteen, each of the first five cluster (on a given TMS) requires one PCM-30 link. The sixth cluster can be spread over the other five PCM-30 links, thus, saving one PCM-30 link.

Cluster size 20

For IWS positions with cluster size twenty, each cluster (on a given TMS) requires one PCM-30 link.

Note: Cluster sizes of sixteen or twenty leave some unused channels on the PCM-30 links. Use of a digital cross-connect may allow additional savings in DS-1 links.

Refer to AF3003 for additional information.

DS-30 Link Provisioning

TMS can use either DS-512 (fiber) or DS-30 interface to the network.

If using DS-30 interface to the network, two DS-30 cards in the TMS provide the capacity for sixteen duplicated DS-30 C-side links. Ports 0 and 2 must be used since they are required for messaging and maintenance information. Use of Inter-DCH Networking does NOT affect the requirements for DS-30 ports. Provision DS-30 network ports as follows:

DS-30 Port Requirements WITHOUT Inter-TMS Networking

The following provides DS-30 port requirements without Inter-TMS networking.

Table 8. DS-30 Port Requirements WITHOUT Inter-TMS Networking		
cluster size	number of DS-30 ports	number of positions
4	5 (See note 1)	1-80
	5	81-96
16	5 (See note 1)	1-80
	5 (See note 1)	81-96
20	5 (See note 1)	1-80
	5 (See note 1)	81-96
Note 1: If only DS-1/PCM-30 ports 0-4 are used (i.e. port 5 is NOT used) for operator interface, subtract 1 from the number of DS-30 ports required.		

DS-30 Port Requirements WITH Inter-TMS Networking

The following provides DS-30 port requirements with Inter-TMS networking.

cluster size	number of DS-30 ports	number of positions
4	6 (See note 1)	1-80
	6	81-96
16	6 (See note 1)	1-80
	6 (See note 1)	81-96
20	6 (See note 1)	1-80
	6 (See note 1)	81-96
Note 1: If only DS-1/PCM-30 ports 0-4 are used (i.e. port 5 is NOT used) for operator interface, subtract 1 from the number of DS-30 ports required.		

DS-512 Port Requirements

For information on DS-512 port requirements, see ECM704 (International XPMs) and ECM711 (Domestic XPMs).

6.2.4.5 DMS BUS Port Requirements

Not applicable

6.2.4.6 Circuits Per Card

Not applicable

6.2.4.7 Discrimination Numbering

Not applicable

6.2.5 Provisioning Considerations

The following are provisioning guidelines for the TMS:

- One TMS can support up to 96 positions (MP or MPX). Refer to "Traffic Tables" and "Cross-Reference Publications" for details and limitations.
- Redundant links to databases must be provided. The provisioning guidelines assume that paired links (DS0 channels) are routed via separate DS-1/PCM-30 cards and facilities so that a single point failure of a DS-1 or transmission facility used for database connectivity does not disrupt database access. Therefore, a minimum of two DS-1 cards is required to provide database access.
- Channel banks are required to connect positions to the TMS.
- A TMS can support positions from more than one office.

6.2.5.1 TMS Label Provisioning

There are four types of TMS labels:

- TMS
- ETMS
- OC_ETMS
- TMS labels for PDC

TMS labels

Order one P0869130 for TMS labeling. The label numbering is TMS 00-0 to TMS 15-1. These labels fit on the FSP. One sheet is enough for a maximum sized office.

ETMS labels

Order one P0869131 for ETMS labeling. The label numbering is ETMS 00-0 to ETMS 15-1. These labels fit on the FSP. One sheet is enough for a maximum sized office.

OC-ETMS labels

Order one P0869132 for OC-ETMS labeling. The label numbering is OC-ETMS 00-0 to OC-ETMS 15-1. These labels fit on the FSP. One sheet is enough for a maximum sized office.

TMS labels for PDC

Provide one P0738591 label sheet and one P0738592 label sheet for TMS labels on the PDC. P0738591 is for TMA 0; P0738592 is for TMA 1. These label sheets provide enough labels for a maximum sized office.

6.2.5.2 Frame Configuration

The TMS uses the LTEI frame hardware, with two modules provisionable. Module 0 mounts on the lower frame half and Module 1 mounts on the upper half. Shelf 0 of each module is the lower one (shelf 18 or 51) and shelf 1 of each module is the upper one (shelf 32 or 65). The TMS is also available in cabinets. Refer to "Engineering Manual Sections Referenced" . Both shelves of each module are equipped identically to provide redundancy, except for slots 1-5, which are equipped with DS-1s (or PCM-30) and DCHs based on specific application.

6.2.5.3 Operator Configuration (3 DS-1 CPs for oper interface)

The DCHs and DS-1s needed for a TMS with 96 operators is summarized as follows:

- Four DCH/EDCH CPs (BX02)
    - TMS Module;Shelf 0;Slot 1
    - TMS Module;Shelf 0;Slot 2
    - TMS Module;Shelf 1;Slot 1
    - TMS Module;Shelf 1;Slot 2
- DS-1 CPs (6X50)
    - Required for all 96 operator configurations:
        - TMS Module;Shelf 0;Slot 4 (TPC interface)
        - TMS Module;Shelf 0;Slot 5 (TPC interface)
        - TMS Module;Shelf 1;Slot 5 (TPC interface)

Optional:

A TMS with database access (ORDB with MP/IWS, or DA with MP) may require additional DS-1s for this capability. These additional DS-1 CPs, if required, are mounted as follows:

- TMS Module;Shelf 1;Slot 4 (database access)
- TMS Module;Shelf 0;Slot 3 (database access)

Additionally, if ORDB is required, a DS-1 for DCH intercommunication is needed (unless EWS0006 is used for inter-DCH communication).

- TMS Module;Shelf 1;Slot 3 (DCH intercommunication)

6.2.5.4 96 Operator Configuration (3 PCM-30 CPs for OPR I/F)

The DCHs and PCM-30s needed for a TMS with 96 operators is summarized as follows:

- Four DCH/EDCH CPs (BX02)
    - TMS Module;Shelf 0;Slot 2
    - TMS Module;Shelf 0;Slot 3
    - TMS Module;Shelf 1;Slot 2
    - TMS Module;Shelf 1;Slot 3
- PCM-30 Circuit Packs (6X27)
    - Required for all 96 operator configurations:
        - TMS Module;Shelf 0;Slot 4 (TPC interface)
        - TMS Module;Shelf 0;Slot 5 (TPC interface)
        - TMS Module;Shelf 1;Slot 5 (TPC interface)

Additionally, if ORDB is required, a PCM-30 for DCH intercommunication is needed (unless EWS0006 is used for inter-DCH communication).

- TMS Module;Shelf 1;Slot 4 (DCH intercommunication)

6.2.5.5 64/80 Operator Configuration (DS-1 Applications)

The DCHs and DS-1s needed for a TMS with 64 operators (80 operators if cluster size is 20) are summarized as follows:

- Four DCH/EDCH Circuit Packs
    - TMS Module;Shelf 0;Slot 1
    - TMS Module;Shelf 0;Slot 2
    - TMS Module;Shelf 1;Slot 1
    - TMS Module;Shelf 1;Slot 2
- DS-1 Circuit Packs
    - Required for all 64 operator configurations:
        - TMS Module;Shelf 0;Slot 5
        - TMS Module;Shelf 1;Slot 5

Optional:

A TMS with database access (ORDB with MP/IWS, or DA with MP) may require additional DS-1s for this capability. These additional DS-1 CPs, if required, are mounted as follows:

- TMS Module;Shelf 1;Slot 4
- TMS Module;Shelf 0;Slot 3

Additionally, if ORDB is required, a DS-1 for DCH intercommunication is needed (unless EWS0006 is used for inter-DCH communication).

- TMS Module;Shelf 1;Slot 3 (DCH intercommunication)

6.2.5.6 64/80 Operator Configuration (PCM-30 Applications)

The DCHs and PCM-30s needed for a TMS with 64 operators (80 operators if cluster size is 20) are summarized as follows:

- Four DCH/EDCH Circuit Packs
    - TMS Module;Shelf 0;Slot 2
    - TMS Module;Shelf 0;Slot 3
    - TMS Module;Shelf 1;Slot 2
    - TMS Module;Shelf 1;Slot 3
- PCM-30 Circuit Packs
- Required for all 64 operator configurations:
    - TMS Module;Shelf 0;Slot 5
    - TMS Module;Shelf 1;Slot 5

Additionally, if ORDB is required, a PCM-30 for DCH intercommunication is needed (unless EWS0006 is used for inter-DCH communication).

- TMS Module;Shelf 1;Slot 4 (DCH intercommunication)

6.2.5.7 Operator Centralization Enhanced TOPS Message Switch

The OC ETMS will replace the DCM for OC data link channels. The OC ETMS also supports OC voice link channels. If desired by the customer, OC voice link channels can be supported on other trunking peripherals (e.g.DTC, LTC).

The OC ETMS is ONLY for OC voice/data link channels. It can NOT be used to interface operator positions to the DMS. Refer to "Hardware Provisioning" for provisioning of the TMS for operator position interface.

DCMs and OC ETMSs can coexist on a DMS, but both ends of a given OC data/voice link channels must be on the same type of peripheral.

Determine the number of OC data link channels as follows. (These calculations are based upon TOPS IWS positions, which is a worst case assumption, with the possible exception of an OPP 3rd party application/terminal, which may require more messaging than IWS. TOPS4, MP, and AOSS positions require less messaging than IWS.)

The capacity of each OC data link channel on the OC ETMS is 25 messages/sec. Therefore,

- no. of OC data link channels = Round Up ((messages per second)/25)
- msg/sec = (DA Busy Half Hour Call Volume (BHHCV) x msg/DA call + TA BHHCV x msg/TA call)/1800
- msg/DA call = 10 (Based off MPX IWS values)
- msg/TA call = 15 (Based off MPX IWS values)

Resulting in the following combined formula

- no. of OC data link channels = Round Up ((DA BHHCV x 10 + TA BHHCV x 15)/ (1800 x 25))

For each OC Node

- no. of DS-1s = Round Up (+ OC Data link channels + no. of Voice link channels) /24
  OR
- no. of PCM-30s = Round Up (no. of OC Data link channels + no. of Voice link channels)/30

Note: For TOPS IWS offices, TA is called OA.

For redundancy, provide at least two OC data link channels, even if the traffic is less than the capacity of a single OC data link channel. For maximum reliability, provide a minimum of two OC ETMSs, regardless of traffic.

The capacity of an OC ETMS is 50 messages per second. Therefore, an OC ETMS can support two OC data link channels if each channel is operating at 25 messages per second. If the channels have less traffic, the OC ETMS can support more than two data link channels.

The absolute maximum number of OC data link channels an OC ETMS can support is 32. Any of the 24 or 30 DS-0 channels on any of the 20 DS-1 or 16 PCM-30 ports may be used for OC data link channels. Remaining channels/ports may be used for OC voice link channels. The OC ETMS can NOT support any other type of voice channels. OC voice link channels and OC data link channels can be mixed on a DS-1/PCM-30.

Under a failure condition, a OC data link channel can support 50 msg/sec, and an OC ETMS can support 100 msg/sec. Since OC data link channel and OC ETMS provisioning are based on 25/50 msg/sec, most configurations will not exceed the failure limit of 50/100 msg/sec. However, each configuration must be checked to insure that no single point failure (of a link, DS-1 card, shelf, or (optionally) OC ETMS) will exceed 50/100 msg/sec on a OC data link channel/OC ETMS. Messages will experience some additional delay when operating above 25 msg/sec/OC data link channel or 50 msg/sec/OC ETMS.

The maximum distance for OC voice/data link channels on an OC ETMS is an engineerable limit. Satellite links are permitted. Satellite use gives a delay of 500 ms per key function. Normal concerns for speed delay and echo should be taken into consideration.

The hardware for the OC ETMS is identical to the ETMS (XPM+ version of the TMS) for slots 6 through 25. Refer to the Engineering Manual Sections. Slots 1-5 are provisioned with DS-1 or PCM-30 interface CPs as required to support the voice/data links. For PCM-30, slot 1 is always provided with a filler. As with other XPMs, slot 5 of shelf 1 is used first, then slot 5 of shelf 0, followed by slot 4 of shelf 1, etc. EDCH (NTBX02) are not required on the OC version of the ETMS.

With the Enhanced Remote Support feature, the OC ETMS allows up to 31 Remote Operator Centers off a Host Operator Center. If using Host/Remote Networking by Queue Type, the maximum number of remotes is reduced from 31 to 30. OC ETMS DOES NOT INCREASE THE MAXIMUM NUMBER OF OPERATORS (1022).

6.2.5.8 Retrofit Guidelines

To retrofit a TOPS MP TA-only installation requires that two DSUs be added per TPC subtending the TMS. A NTNX66AA HSDA CP is required in slot 13 of each TPC.

To retrofit a TOPS MP TA+DA installation does not require additional DSUs. However, the facilities connecting the TPCs to the Gateway must be rerouted through the TMS.

To retrofit a TOPS MP TA+ORDB installation, one additional DSU is required per TPC subtending the TMS and the NTNX66AA HSDA CP must be moved from slot 8 to slot 13 of each TPC.

6.2.6 Office Layout Information

The TOPS Message Switch (TMS) must be located in the Central Office within 750 feet of the DMS Network.

6.2.7 Traffic Tables

Provisioning for the TOPS Message Switch is based on the number of operators, the applications supported (Toll & Assist, IBM DA, CCI (NT)

DA, ORDB), the type of position (MP or IWS), and the CC-position protocol (AOSS or OPP). Refer to the Systems Engineering Bulletin.

Engineering rules in the SEB MUST be followed to avoid overloading the TMS.

6.3 Product/System Specification

6.3.1 Physical Characteristics

Not applicable

6.3.2 EMI/Earthquake Information

The LTEI (which houses the TMS) used to be available either with or without earthquake framework. New frames always use earthquake framework. Refer to the Engineering Manual Sections for details.

6.3.3 Sparing Information

The TMS does not use "hot sparing" for the DCH/EDCH.

Standard sparing algorithms shall apply.

6.3.4 Power Feed and Fusing Requirements

Fusing for the frame mounting of a TOPS Message Switch module is identical to fusing for an LTEI frame.

6.3.5 Current Drain Information

The total -48Vdc supply current requirement for a fully-equipped TMS is a maximum of 36 Amps.

6.3.6 POWER/HEAT DISSIPATION

The total -48Vdc supply power requirement for a fully-equipped TMS shall not exceed 1700 Watts.

TMS heat dissipation shall be such that the DMS specification for maximum heat dissipation per DTE frame (1120W/hr) is not exceeded.

6.4 Software Provisioning

6.4.1 Required Software Packages and Interdependencies

TMS software is provided by the following packages:

- EWS0003 - EWSS TOPS DA Subtending TMS
- GOS0001 - Global TMS (available only with TOPSGOS07)

- EWSS0005 - EWSS TOPS Increased Multiplexing (only needed for cluster size greater than four)
- EWSS0006 - EWSS TMS Interworking

For OC ETMS (available in TOPS04) order the following:

- ENSV0001 - Enhanced Services Functional Group
- ENSV0008 - ENSV OC ETMS
- ENSV0011 - ENSV Enhanced Remote Support (optional - see note 1)
- EWSS0001 - Enhanced Workstation Software Functional Group
- EWSS0003 - TOPS Message Switch
- EWSS0007 - TMS Processor Upgrade
- GOS00001 - GOS Functional Group (optional - only needed for PCM-30 version of OC ETMS)

Note 1: ENSV0011 is required to support more than 15 remote operator centers (ROC). This SOC is required at the HOC and at remote number 16 or higher.

Software packaging information is accurate at the time of publication. However, check SMS, SOLID and/or PCA for updates and interdependencies.

6.4.2 Software Usage Restrictions

The following list TMS software usage restrictions.

- EWSS TOPS Increased Multiplexing (EWSS0005) is only applicable to TOPS MPX IWS.
- The NTAX74 firmware load is NOT supported by the TMS.
- Basic DTC/LGC/LTC XPM Plus PM loads are not contained in the TOPS PCLs. To support DTC/LGC/LTC, order LEC or LET PCLs. For more information on XPM PMs, see NTP 297-8981-599, North American Peripheral Module Software Release Document or 297-8441-599, GTOPS Peripheral Module Software Release Document.

6.4.2.1 Load-to-release cross-reference

The following tables define the TMS PM loads required for TMS and and the PCLs in which they reside.

TOPS004 release

The following table lists the PM loads required by TMS and which NA004 PCL it resides.

Table 9. ETMS load-to-NA004 release cross-reference				
Load name	Load desc	LET004	TOPS04 US/CDN	TOPS04 NON US/CDN
ETM05xx	TMS w/ XPM +		X	X
EXC05xx	Enhanced DCH for TMS	X	X	X
MX77NBxx	MX77 firmware	X	X	X
MX77NGxx	MX77 firmware	X	X	
EUT05xx	TMS w/ XPM + and PCM30			X
UTM03C	TMS w/PCM30			X

TOPS005 release

The following table lists the PCL loads required by TMS and which NA005 PCL the load resides.

Table 10. ETMS load-to-NA005 release cross-reference				
Load Name	Load desc	LETB005	TOPS05	TOPS05 NON US/CDN
ETM06xx	TMS w/ XPM +		X	X
EXC06xx	Enhanced DCH for TMS	X	X	X
MX77NBxx	MX77 firmware	X	X	X
MX77NHxx	MX77 firmware	X	X	
EUT06xx	TMS w/ XPM + and PCM30			X
UTM03C	TMS w/PCM30			X

TOPS006 release

The following table lists the TMS PM loads required for TMS and which the NA006 PCL the load resides.

Table 11. ETMS load-to-NA006 release cross-reference				
Load name	Load desc	LETB006	TOPS06 US/CDN	TOPS06NON US/CDN
ETM07xx	ETMS w/ MX77		X	X
EXC07xx	Enhanced DCH for TMS	X	X	X
MX77NBxx	MX77 firmware	X	X	X
MX77NHxx	MX77 firmware	X	X	
EUT08xx	TMS w/ XPM + and PCM30			X

TOPS007 release

The following table lists the TMS PM loads required for TMS and which NA007 PCL the load resides.

Table 12. ETMS load-to-NA007 release cross-reference				
Load name	Load Desc	LETB007	TOPS07 US/CDN	TOPS07 NON US/CDN
ETM08xx	ETMS w/ MX77		X	X
EXC08xx	Enhanced DCH for TMS	X	X	X
MX77NBxx	MX77 firmware	X	X	X
MX77NHxx	MX77 firmware	X	X	

TOPS008 release

The following table lists the TMS PM loads required for TMS and which NA008 and GTOPS PCL the load resides.

Table 13. ETMS load-to-NA008/GTOPS08 release cross-reference			
LoadName	Load Desc.	LETB008	GTOPS08
ETM81AZ	ETMS w/ MX77	X	
EXC08BC	Enhanced DCH for TMS		X
EXC81AZ	Enhanced DCH for TMS	X	
MX77NB03	MX77 firmware	X	X
EUT08BC	TMS w/ XPM + and PCM30		X

| TOPS009 release

| The following table lists the TMS PM loads required for TMS and which
| NA009 and GTOPS PCL the load resides.

Table 13. ETMS load-to-NA008/GTOPS08 release cross-reference			
LoadName	Load Desc.	LETB009	GTOPS09
ETM09xx	ETMS w/ MX77	X	
EXC09xx	Enhanced DCH for TMS	X	X
MX77NB03	MX77 firmware	X	X
EUT09xx	TMS w/ XPM + and PCM30		X

6.4.3 Memory Provisioning

Memory in the TMS is not provisionable.

6.5 Real Time Impact

Refer to the Systems Engineering Bulletin ("Cross-Reference Publications").

ENGINEERING RULES IN THE SEB MUST BE FOLLOWED TO AVOID OVERLOADING THE TMS.

7.0 ECM495 - Meridian Applications Cabinet Packaging of TOPS VSN

7.1 Overview

Automated Alternate Billing Service (AABS) is a feature of the Traffic Operator Position System (TOPS). This feature provides the ability to fully automate operator-handled Collect and Billed-to-Third Number calls. In addition, the AABS feature will support all current automated calling-card service features, such as Mechanized Calling Card Service and Exchange Alternate Billing Service.

The AABS offering will comprise of a DMS switch connected to a TOPS Voice Service Node (VSN). The AABS feature will integrate the call processing of automated TOPS Toll and Assistance calls with the TOPS Voice Service Node (VSN). The TOPS VSN is a new applications program based on the Data Voice System (DVS) hardware technology, which is designed to meet industry standards for computers. The TOPS VSN is a hardware and software system which is used to provide the interactive voice technology and speech recognition that are required for the AABS feature. The TOPS VSN provides dual-tone multi-frequency (DTMF) acceptance, speech-recognition, speech-storage, and speech-playback capabilities.

The TOPS Voice Service Node (VSN) requests the billing method from the calling party through prompting announcements. Initially, the desired billing method is accepted through DTMF input; determination by using speech recognition is planned as a future enhancement. If acceptance of the charges is required, the TOPS VSN places an automated call to the requested billed party by using speech recognition, stored announcements, speech storage, and playback announcements. Operator assistance can be obtained by DTMF input, switch-hook flash, or time-out during the acceptance phase.

When a call arrives at the DMS, it is screened to determine whether or not it may be routed to the TOPS VSN for AABS handling. The following conditions must be true for AABS handling to be selected:

- The call must be a 0+ call that can be processed by the telephone operating company.
- The Automatic Number Identification (ANI) digits must have been successfully received by the DMS.
- The call is from a touch-tone telephone.
- Billing must not be restricted for at least one of the three billing types handled by the TOPS VSN (calling card, collect, and third number billing).

- The call must not be from a hotel that requires no-charge records. Such calls require an operator to obtain the room number.

- The call must have arrived over a trunk group for which TOPS VSN processing is provided.

Some of these calls (person-to-person, for example) cannot be handled automatically and are sent to an operator for processing. This occurs after a time-out period or when the calling party dials 0 or switchhook flashes at the indicated time.

7.2 Hardware Provisioning

7.2.1 Hardware Usage Restrictions

Automated Alternate Billing Service (AABS) is a feature of the DMS Traffic Operator Position System (TOPS). The AABS feature can be offered on DMS-200 TOPS, DMS-200 Remote OC TOPS, a DMS-100/200 TOPS, and a DMS-100/200 Remote OC TOPS.

The TOPS VSN supports connection to only one DMS at a time, (i.e. the TOPS VSN cannot be functionally split across multiple DMS's). Therefore, the AABS feature will require a TOPS VSN at each host and remote TOPS switch.

7.2.2 Hardware Dependencies

Not Applicable

7.2.2.1 P and C Side Port Requirements

Not Applicable

7.2.2.2 DMS BUS Port Requirements

Not Applicable

7.2.2.3 Circuits Per Card

Not Applicable

7.2.2.4 Discrimination Numbering

Not Applicable

7.2.3 Provisioning Considerations

7.2.3.1 TOPS Voice Service Node (VSN)

Provide the TOPS VSN system at each host and remote TOPS switch which requires the AABS software feature. The TOPS VSN is a

hardware and software system which is used to provide the interactive voice technology and speech recognition that are required for the AABS feature.

The TOPS VSN is packaged in EMI-compliant 28.5"x28.5"x72" Meridian Application Cabinets. The cabinets are available in two colors: DMS-100 Brown or Meridian Gray.

The TOPS VSN system is only available in the following two configurations:

A 24-Channel, 2-Cabinet System
A 48-Channel, 3-Cabinet System

The 24-Channel system contains one (1) Meridian Applications Cabinet and one (1) Meridian Auxiliary Cabinet

The 48-Channel system contains two (2) Meridian Applications Cabinets and one (1) Meridian Auxiliary Cabinet.

The Meridian Applications Cabinet houses the Shared Resource Units (SRUs) required to perform the TOPS VSN processing and communications functions.

The Meridian Auxiliary Cabinet contains LAN hardware required to network the I/O devices (such as printers and display terminals,) alarms and the Host office. It also houses a spare storage shelf.

An Auxiliary Cabinet can be shared by two co-located TOPS VSN systems provided cable distance and provisioning rule restrictions are met.

The 24-Channel, 2-Cabinet System

For each 24-Channel, 2-Cabinet System (one Meridian Applications Cabinet and one Meridian Auxiliary Cabinet) provision the following hardware at the TOPS VSN site. If this is a new 24 channel TOPS VSN system, sharing an existing Meridian Auxiliary Cabinet, it is necessary to provision additional equipment in the Meridian Auxiliary Cabinet that is already on site. This additional equipment will be shipped in separate boxes. The Meridian Auxiliary Cabinet is described in greater detail in “Meridian Auxiliary Cabinet” on page 12-66.

Hardware List For a 24 channel TOPS VSN System, excluding:

External Cables (see “Cables” on page 12-67)
Mechanical Hardware (see “Mechanical Hardware” on page 12-73)
Software (see “Required Software Packages and Interdependencies” on page 12-94)
Auxiliary Cabinet (see “Meridian Auxiliary Cabinet” on page 12-66)

	QTY	PEC CODE	DESCRIPTION
	(2)	A0317073	Desktop Matrix Printer
	(2)	A0317078	Pedestal Stand
	(2)	C2501313	Paper Catch Tray (Desktop PRT)
	(1)	A0321335	External X-Connect Panel & Cover
+	(1)	NT0M90QA	M4120 IVD Controller
+	(1)	NT0M91BA	Keyboard
+	(1)	NT0M92DA	Monochrome Monitor
	(1)	NT1M40AK	Prime Processor to FSP Cable
	(1)	NT1M41CG	Meridian Applications Cabinet Bay 1
	(5)	NT1M41AD	1/4 Wide SRU Filler
	(2)	NT1M41DW	T1 SRU to Bulkhead Cable
	(1)	NT1M41BD	Lanlink to Bulkhead Cable
*	(1)	NT3M20BD	NT-320 Terminal
	(1)	NT4G09AE	SCSI/SCSI (2 ft) Cable
	(1)	NT4G09CE	SCSI/SCSI (5 ft) Cable
	(1)	NT4G14DB	Lanlink
	(1)	NT4G16EF	Primary Processor XP 68010-6
	(1)	NT4G20VA	1/4 W 160MB Disk/QIC-150 Tape
	(1)	NT4G20WA	1/4 W 160MB Disk
	(1)	NT1M41AE	1/2 Wide SRU Filler
	(2)	NT4G23EA	Digital Trunk Link SRU (T-1)
	(2)	NT4G23AE	DTL Connector Kit
	(5)	NT4G25GB	Application Processor 68020-10
	(5)	NT4G27CA	Voice Interface SRU
	(1)	NT4G46CA	LAN Interface Unit
	(4)	NT4G50FA	Rack Converter SRU

* Only one NT-320 Terminal is required per VSN site.
\+ One M4020 terminal is required. A second M4020 terminal is optional. An M4020 terminal is composed of the three components identified.

The 48-Channel, 3-Cabinet System

For each 48-Channel, 3-Cabinet System (two Meridian Applications Cabinets and one Meridian Auxiliary Cabinet) provision the following hardware at the TOPS VSN site. If this is a new 48 channel TOPS VSN system, sharing an existing Meridian Auxiliary Cabinet, it is necessary to provision additional equipment in the Meridian Auxiliary Cabinet that is already on site. This additional equipment will be shipped in separate boxes. The Meridian Auxiliary Cabinet is described in greater detail in section “Meridian Auxiliary Cabinet” on page 12-66.

Hardware List For a 48 channel TOPS VSN System, excluding:

External Cables (see “Cables” on page 12-67)
Mechanical Hardware (see “Mechanical Hardware” on page 12-73)
Software (see “Required Software Packages and Interdependencies” on page 12-94)
Auxiliary Cabinet (see “Meridian Auxiliary Cabinet” on page 12-66)

	QTY	PEC CODE	DESCRIPTION
	(2)	A0317073	Desktop Matrix Printer
	(2)	A0317078	Pedestal Stand
	(2)	C2501313	Paper Catch Tray (Desktop PRT)
	(1)	A0321335	External X-Connect Panel & Cover
+	(1)	NT0M90QA	M4120 IVD Controller
+	(1)	NT0M91BA	Keyboard
+	(1)	NT0M92DA	Monochrome Monitor
	(1)	NT1M40AK	Prime Processor to FSP Cable
	(1)	NT1M41CG	Meridian Applications Cabinet Bay 1
	(9)	NT1M41AD	1/4 Wide SRU Filler
	(11)	NT1M41AE	1/2 Wide SRU Filler
	(3)	NT1M41DW	T1 SRU to Bulkhead Cable
	(1)	NT1M41CH	Meridian Applications Cabinet Bay 2
	(1)	NT1M41BD	Lanlink to Bulkhead Cable
*	(1)	NT3M20BD	NT-320 Terminal
	(1)	NT4G09AE	SCSI/SCSI (2 ft) Cable
	(1)	NT4G09CE	SCSI/SCSI (5 ft) Cable
	(1)	NT4G14DB	Lanlink
	(1)	NT4G16EF	Primary Processor XP 68010-6
	(1)	NT4G20VA	1/4 W 160MB Disk/QIC-150 Tape
	(1)	NT4G20WA	1/4 W 160MB Disk
	(3)	NT4G23EA	Digital Trunk Link SRU (T-1)
	(3)	NT4G23AE	DTL Connector Kit
	(6)	NT4G25GB	Application Processor 68020-10
	(9)	NT4G27CA	Voice Interface SRU
	(1)	NT4G46CA	LAN Interface Unit
	(8)	NT4G50FA	Rack Converter SRU

* Only one NT-320 Terminal is required per VSN site.
\+ One M4020 terminal is required. A second M4020 terminal is optional. An M4020 terminal is composed of the three components identified.

Meridian Auxiliary Cabinet

Provision each Meridian Auxiliary Cabinet according to the following rules:

NOTE: If upgrading an existing Meridian Auxiliary Cabinet to share between two TOPS VSN systems, only those items indicated by '*' need to be ordered (in the quantities required).

	QTY	PEC CODE	DESCRIPTION
	(a)	NT1M41AB	Meridian Auxiliary Cabinet Upper Access
	(a)	NT1M41BL	Meridian Auxiliary Cabinet Lower Access
	(1)	NT1M41BA	UDS 16 Slot Modem Shelf
	(1)	NT1M41AN	Storage Shelf
*	(c)	NT1M41BW	ALIU Option Card
*	(d)	NT1M41AF	LIU Option Card
	(1)	NT1M41AC	LIU Shelf / 18 Slots
	(e)	P0709868	LIU Filler Face Plate
	(1)	NT0M96SD	FSP - ALIU Cable
*	(f)	A0336306	UDS 212A/D Modem Card
*	(f)	A0385558	UDS DDS/MR1 RM16M Modem Card
	(2)	NT1M41BJ	Bulkhead to Modem Shelf Cable
*	(g)	NT0M96SH	Modem Cable (2.5 ft)
	(1)	NT1M41DL	X-Connect Panel (Internal)
	(2)	NT1M41BN	LanLink/BIX-Bulkhead Cable
	(1)	NT1M41BP	BIX-Bulkhead Cable
*	(h)	NT1M41BM	Bulkhead-ALIU Cable
	(1)	P0711183	Filler Panel (7")

(a) Provision one Auxiliary Cabinet for every two VSN systems (Auxiliary Cabinet can be shared by two TOPS VSN systems).

The NT1M41AB and the NT1M41BL are identical cabinets, except that all switchboard cabling enters the NT1M41AB from the top and the NT1M41BL from the bottom. The NT1M41AB is required when overhead cable racking is used. The NT1M41BL is required when under-floor cabling is used.

(b) Provision one (1) ALIU Option Card per Auxiliary Cabinet plus one (1) additional ALIU Card for each Meridian Applications Cabinet connected to the Auxiliary Cabinet.

(c) Provision one (1) LIU Option Card per Auxiliary Cabinet plus four (4) LIU Option Cards per TOPS VSN system sharing the Auxiliary Cabinet.

(d) Provision one (1) LIU Filler Face Plate for every unused LIU Shelf Card Slot. (18 minus the number of ALIU Option Cards (Rule c) minus the number of LIU Option Cards (rule

d)). No additional Filler Face Plates are required when upgrading an Auxiliary Cabinet to share between two TOPS VSN systems.

(e) Provision two (2) of each type of modem cards for each TOPS VSN system sharing the Auxiliary Cabinet.

(f) Provision four (4) Modem Cable (2.5 ft.) for each TOPS VSN System sharing the Auxiliary Cabinet (one cable per modem card, rule (f)).

(g) Provision one (1) Bulkhead-ALIU cable for each Meridian Applications Cabinet connected to the Auxiliary Cabinet.

Cables

Provision the following cables: (Refer to Figure 9 on page 12-85)

For each TOPS VSN system, provision either (a) OR (a'):

(a) For each TOPS VSN system, provision one of:

QTY	PEC CODE	DESCRIPTION
(x)	NT4G23AD	Stranded DTL Cable (50 ft)
(x)	NT4G23BD	Stranded DTL Cable (100 ft)
(x)	NT4G23CD	Stranded DTL Cable (250 ft)
(x)	NT4G23DD	Stranded DTL Cable (500 ft)
(x)	NT4G23ED	Stranded DTL Cable (750 ft)

(a') For each TOPS VSN system, provision one of:

QTY	PEC CODE	DESCRIPTION
(x)	NT1M41DA	Solid DTL Cable (50 ft)
(x)	NT1M41DB	Solid DTL Cable (100 ft)
(x)	NT1M41DC	Solid DTL Cable (250 ft)
(x)	NT1M41DD	Solid DTL Cable (500 ft)
(x)	NT1M41DE	Solid DTL Cable (745 ft)

Where x = 2 for a 24-channel system and x = 3 for a 48-Channel System.

Solid cables must be used for U.S. applications.

Repeaters or channel banks must be used for DTL cabling distances greater than 750 feet.

(b) For each TOPS VSN system, provision one of:

QTY	PEC CODE	DESCRIPTION
(1)	NT1M41BG	Lanlink Blkhd to Aux Bay Blkhd (20 ft)
(1)	NT1M41BE	Lanlink Blkhd to Aux Bay Blkhd (50 ft)

Lanlink Connectivity from Bay 1 to the Auxiliary Cabinet for each TOPS VSN system.

SEE THE NOTE BELOW REGARDING CABLE DISTANCE LIMITATIONS.

(c) For each Auxiliary Cabinet, Provision one of:

QTY	PEC CODE	DESCRIPTION
(2)	NT4G09BC	Filtered 25-Pair Cable (15 ft)
(2)	NT4G09CC	Filtered 25-Pair Cable (30 ft)
(2)	NT4G09DC	Filtered 25-Pair Cable (70 ft)
(2)	NT4G09EC	Filtered 25-Pair Cable (100 ft)
(2)	NT4G09EF	Filtered 25-Pair Cable (200 ft)
(2)	NT4G09EG	Filtered 25-Pair Cable (350 ft)
(2)	NT4G09EH	Filtered 25-Pair Cable (500 ft)
(2)	NT4G09EJ	Filtered 25-Pair Cable (750 ft)

Modem Shelf connectivity from the auxiliary bay bulkhead to the MDF.

The maximum modem to modem separation is 17,000 ft for 26 gauge wire and 52,800 ft for 17 gauge wire. These modem to modem distances include any building wiring and the MDF to DMS modem cabling.

(d) Provision one of (per site):

QTY	PEC CODE	DESCRIPTION
(1)	NT3M20BE	Opto-Isolator Kit

Connects the NT-320 terminal to the FSP of Bay 1.

Opto-Isolator Kit connects two 25-pin RS-232 port over a short haul modem. The purpose of this Kit is to provide an ISG-compliant connection between the terminal and the TOPS VSN system for software installation.

(e) For each TOPS VSN system. provision one of:

QTY	PEC CODE	DESCRIPTION
(2)	NT0M96DT	Serial Printer Cable (10 ft)
(2)	NT0M96DU	Serial Printer Cable (25 ft)
(2)	NT0M96DS	Serial Printer Cable (50 ft)

Provision the correct cable length as required for each printer. Do not use a cable over 50 ft in length.

(f) For each Auxiliary Cabinet, provision one of:

QTY	PEC CODE	DESCRIPTION
(1)	NT4G09BC	Filtered 25-Pair Cable (15 ft)
(1)	NT4G09CC	Filtered 25-Pair Cable (30 ft)
(1)	NT4G09DC	Filtered 25-Pair Cable (70 ft)
(1)	NT4G09EC	Filtered 25-Pair Cable (100 ft)
(1)	NT4G09EF	Filtered 25-Pair Cable (200 ft)
(1)	NT4G09EG	Filtered 25-Pair Cable (350 ft)
(1)	NT4G09EH	Filtered 25-Pair Cable (500 ft)
(1)	NT4G09EJ	Filtered 25-Pair Cable (750 ft)

To connect the internal Auxiliary Cabinet BIX panel to the external BIX panel.

SEE THE NOTE BELOW REGARDING CABLE DISTANCE LIMITATIONS.

If required, provision either (g) OR (g'):

(g) If required, provision one of:

QTY	PEC CODE	DESCRIPTION
(1)	NT1M41BR	Office Alarm Cable Stranded (50 ft)
(1)	NT1M41BS	Office Alarm Cable Stranded(100 ft)
(1)	NT1M41BT	Office Alarm Cable Stranded(150 ft)
(1)	NT1M41BU	Office Alarm Cable Stranded(200 ft)

(g') If required, provision one of:

	QTY	PEC CODE	DESCRIPTION
	(1)	NT1M41EA	Alrm Scn Pnt Sgnl Cbl Solid (50 ft)
	(1)	NT1M41EB	Alrm Scn Pnt Sgnl Cbl Solid(100 ft)
	(1)	NT1M41EC	Alrm Scn Pnt Sgnl Cbl Solid(150 ft)
	(1)	NT1M41ED	Alrm Scn Pnt Sgnl Cbl Solid(200 ft)
	(1)	NT1M41EE	Alrm Scn Pnt Sgnl Cbl Solid(750 ft)

There is no defined maximum length for this cable. The maximum length that will be supplied is 750 ft.

Solid cables must be used for U.S. applications.

If each TOPS VSN system is to be monitored independently, then one cable is required for each TOPS VSN system (from Bay 1 to the MDF). If the level of alarm monitoring is per line up, then only one cable is required (connecting any BAY 1 in the lineup to the MDF).

(h1) For each TOPS VSN system, provision one of:

	QTY	PEC CODE	DESCRIPTION
	(1)	NT0X0004	Grounding Kit
	(2)	A0361880	1/0 to 6ga C-tap
*	(2)	A0328550	Adhesive Cover

For Logic Ground (not shown in Figure 9 on page 12-85).

* NOTE: For offices requiring hard cover taps, use A 355102 1/0 to 6ga H-tap Cover rather than A0328550 Adhesive Cover.

(h2) For each Meridian Applications Cabinet (Bay 1, Bay 2, Aux. Bay) provision one of:

	QTY	PEC CODE	DESCRIPTION
	(1)	NT0X0004	Grounding Kit
	(2)	A0361880	1/0 to 6ga C-tap
*	(2)	A0328550	Adhesive Cover

For Frame Ground (not shown in Figure 9 on page 12-85).

Provide a minimum of ten (10) A0361880 1/0 to 6ga C-taps and ten (10) A0328550 Adhesive Covers per system.

* NOTE: For offices requiring hard cover taps, use A0355102 1/0 to 6ga H-tap Cover rather than A0328550 Adhesive Cover.

(i) For each TOPS VSN system, provision one of:

QTY	PEC CODE	DESCRIPTION
(1)	NT0M96CA	Teledapt Cable (3 ft)
(1)	NT0M96CB	Teledapt Cable (7 ft)
(1)	NT0M96CC	Teledapt Cable (14 ft)
(1)	NT0M96CD	Teledapt Cable (25 ft)
(1)	NT0M96CE	Teledapt Cable (37 ft)
(1)	NT0M96CF	Teledapt Cable (50 ft)
(1)	NT0M96TF	Teledapt Cable (100 ft)
(1)	NT0M96TH	Teledapt Cable (150 ft)
(1)	NT0M96RB	Teledapt Cable (200 ft)

To connect the M4020 terminal to the external BIX. Each M4020 Terminal comes equipped with a 14-foot Teledapt Cable (NT0M96CC). Order one of the above cables only if cabling distance necessitates it.

SEE THE NOTE BELOW REGARDING CABLE DISTANCE LIMITATIONS.

(j) For each TOPS VSN system, provision one of:

QTY	PEC CODE	DESCRIPTION
(1)	NT0M96CA	Teledapt Cable (3 ft)
(1)	NT0M96CB	Teledapt Cable (7 ft)
(1)	NT0M96CC	Teledapt Cable (14 ft)
(1)	NT0M96CD	Teledapt Cable (25 ft)
(1)	NT0M96CE	Teledapt Cable (37 ft)
(1)	NT0M96CF	Teledapt Cable (50 ft)
(1)	NT0M96TF	Teledapt Cable (100 ft)
(1)	NT0M96TH	Teledapt Cable (150 ft)
(1)	NT0M96RB	Teledapt Cable (200 ft)

To connect the external LIU to the external BIX. Each external LIU comes equipped with a 7-foot Teledapt Cable (NT0M96CB). Order one of the above cables only if cabling distance necessitates it.

SEE THE NOTE BELOW REGARDING CABLE DISTANCE LIMITATIONS.

(k) For each Meridian Applications Cabinet (Bay 1 and Bay 2, excluding the Auxiliary Cabinet), provision one of the following:

QTY	PEC CODE	DESCRIPTION
(1)	NT0M96SC	FSP Bulkhead - Bulkhead (10 ft)
(1)	NT0M96RS	FSP Bulkhead - Bulkhead (25 ft)
(1)	NT4G46AW	FSP Bulkhead - Bulkhead (50 ft)

This cable connects Bay 1 and Bay 2 to the Auxiliary Bay for FSP-ALIU connectivity (bulkhead to bulkhead).

NOTE: REGARDING CABLE DISTANCE LIMITATIONS:

The maximum cabling distance from the Lanlink SRU to an M4020 terminal may not exceed 2000 ft.

The maximum cabling distance from the Lanlink SRU to an LIU may not exceed 2000 ft.

The above cabling distances consist of the following:

- Bay 1 to Aux Bay Lanlink cable
- Aux Bay bulkhead to internal BIX cable
- Internal BIX to external BIX cable
- External BIX to M4020 or LIU cable
- Building wiring

Mechanical Hardware

For each Brown Cabinet, provision the following:

QTY	PEC CODE	DESCRIPTION
(1)	NT1M41BC	Frame Fail Lamp (Brown)
(1)	NT1M41AT	Right Front Door (Brown)
(1)	NT1M41AU	Left Front Door (Brown)
(1)	NTNX2552	Right Front/Rear Door (Brown)
(1)	NTNX2550	Left Front/Rear Door (Brown)
(2)	P0711389	Designation Strip Bay 1 (lime)
OR		
(2)	P0711392	Designation Strip Bay 2 (lime)
OR		
(2)	P0711395	Designation Strip Aux. Bay (lime)
(2)	P0728013	NT Logo (lime)

For each new Brown Cabinet Lineup, provision the following:

QTY	PEC CODE	DESCRIPTION
(1)	NTNX2531	Right End Panel (Brown)
(1)	NTNX2532	Left End Panel (Brown)

For each Gray Cabinet, provision the following:

QTY	PEC CODE	DESCRIPTION
(1)	NT1M4104	Frame Fail Lamp (Gray)
(1)	NT1M41AV	Right Front Door (Gray)
(1)	NT1M41AW	Left Front Door (Gray)
(1)	NTNX2513	Right Front/Rear Door (Gray)
(1)	NTNX2515	Left Front/Rear Door (Gray)
(2)	P0711388	Designation Strip Bay 1 (aqua)
OR		
(2)	P0711391	Designation Strip Bay 2 (aqua)
OR		
(2)	P0711394	Designation Strip Aux. Bay (aqua)
(2)	P0728012	NT Logo (aqua)

For each new Gray Cabinet Lineup, provision the following:

QTY	PEC CODE	DESCRIPTION
(1)	NTNX2517	Right End Panel (Gray)
(1)	NTNX2518	Left End Panel (Gray)

For each Cabinet, provision the following:

QTY	PEC CODE	DESCRIPTION
(2)	P0688332	Isolation Pads
(4)	P0677746	Anchor Plate (Earthquake)

For each system, provision the following:

QTY	PEC CODE	DESCRIPTION
(1)	NT1M41CE	Information Label Kit
(1)	P0728015	Matrix Labels A-Z, 00-99 (Aqua) (for gray systems)
(1)	P0728016	Matrix Labels A-Z, 00-99 (Lime) (for brown systems)

For raised floor assembly:

For each Cabinet, provision the following:

QTY	PEC CODE	DESCRIPTION
(4)	NTNX56AA	Raised Floor Anchor Assembly for Cabinets

For overhead trough assembly:

NOTE: Gray cable rack hardware for the Meridian Applications Cabinet is not available as yet.

For each Cabinet, provision the following:

QTY	PEC CODE	DESCRIPTION
(1)	NTNX55AA	Cable Trough (brown)
(1)	NT0X21AH	Concrete Anchor Assembly shims for Cabinets in an ATC earthquake zone.

For each Cabinet, provision one of:

QTY	PEC CODE	DESCRIPTION
(4)	NT0X21AV	Concrete Anchor Assembly for Cabinets in an ATC earthquake zone 1-3.
(4)	NT0X21AW	Concrete Anchor Assembly for Cabinets in an ATC earthquake zone 4-7.

Provide one cover plate set (front and back) to cover the gap between the two adjacent NTNX55AA cable troughs. A set consists of :

QTY	PEC CODE	DESCRIPTION
(2)	P0688822	Cover Plates
(4)	P0575598	Screws
(4)	P0242132	Washers
(4)	P049C096	Washers
(2)	P099Q132	Screws

Provide one end cover set for covering the cable trough at the end of a line up. A set consists of :

QTY	PEC CODE	DESCRIPTION
(1)	P0688821	End Cover
(4)	P0575598	Screws
(6)	P0242132	Washers
(4)	P049C096	Washers
(2)	P099Q132	Screws

Example order for a 48 channel system

This is a sample order for a new 48 channel TOPS VSN system. The order includes 2 Meridian Applications Cabinets (Bay 1, Bay 2), a Meridian Auxiliary Cabinet, and all the associated cabling, mechanical hardware and software. The following assumptions have been made:

Brown cabinets with overhead cable troughs.
An ATC earthquake zone 2.
Alarm MDF connectivity is per system.

Provision the following hardware at the TOPS VSN site for the two (2) Meridian Applications Cabinets:

QTY	PEC CODE	DESCRIPTION
(2)	A0317073	Desktop Matrix Printer
(2)	A0317078	Pedestal Stand
(2)	C2501313	Paper Catch Tray (Desktop PRT)
(1)	A0321335	External X-Connect Panel & Cover
(1)	NT0M90QA	M4120 IVD Controller
(1)	NT0M91BA	Keyboard
(1)	NT0M92DA	Monochrome Monitor
(1)	NT1M40AK	Prime Processor to FSP Cable
(1)	NT1M41CG	Meridian Applications Cabinet Bay 1
(9)	NT1M41AD	1/4 Wide SRU Filler
(11)	NT1M41AE	1/2 Wide SRU Filler
(3)	NT1M41DW	T1 SRU to Bulkhead Cable
(1)	NT1M41CH	Meridian Applications Cabinet Bay 2
(1)	NT1M41BD	Lanlink to Bulkhead Cable
(1)	NT3M20BD	NT-320 Terminal
(1)	NT4G09AE	SCSI/SCSI (2 ft) Cable
(1)	NT4G09CE	SCSI/SCSI (5 ft) Cable
(1)	NT4G14DB	Lanlink
(1)	NT4G16EF	Primary Processor XP 68010-6
(1)	NT4G20VA	1/4 W 160MB Disk/QIC-150 Tape
(1)	NT4G20WA	1/4 W 160MB Disk
(3)	NT4G23EA	Digital Trunk Link SRU (T-1)
(6)	NT4G25GB	Application Processor 68020-10
(9)	NT4G27CA	Voice Interface SRU
(1)	NT4G46CA	LAN Interface Unit
(8)	NT4G50FA	Rack Converter SRU

Provision the following hardware at the TOPS VSN site for the Meridian Auxiliary Cabinet:

QTY	PEC CODE	DESCRIPTION
(1)	NT1M41AB	Meridian Auxiliary Cabinet Upper Access
(1)	NT1M41BA	UDS 16 Slot Modem Shelf
(1)	NT1M41AN	Storage Shelf
(3)	NT1M41BW	ALIU Option Card
(5)	NT1M41AF	LIU Option Card
(1)	NT1M41AC	LIU Shelf / 18 Slots
(10)	P0709868	LIU Filler Face Plate
(1)	NT0M96SD	FSP - ALIU Cable
(2)	A0336306	UDS 212A/D Modem Card
(2)	A0385558	UDS DDS/MR1 RM16M Modem Card
(2)	NT1M41BJ	Bulkhead to Modem Shelf Cable
(4)	NT0M96SH	Modem Cable (2.5 ft)
(1)	NT1M41DL	X-Connect Panel (Internal)
(2)	NT1M41BN	Lanlink/BIX-Bulkhead Cable

(1)	NT1M41BP	BIX-Bulkhead Cable
(2)	NT1M41BM	Bulkhead-ALIU Cable
(1)	P0711183	Filler Panel (7")

Provision the following cables: (Refer to Figure 9 on page 12-85).

Cabling distances will vary from site to site. In this example the shortest cable in each set will be ordered (except for the teledapt cables for the external LIU and M4020 terminal).

QTY	PEC CODE	DESCRIPTION
(3)	NT4G23AD	DTL Cable (50 ft)
(1)	NT1M41BG	Lanlink blkhd to Aux Bay blkhd (20 ft)
(2)	NT4G09BC	Filtered 25-Pair Cable (15 ft) Modem to MDF
(1)	NT3M20BE	Opto-Isolator Kit
(2)	NT0M96DT	Serial Printer Cable (10 ft)
(1)	NT4G09BC	Filtered 25-Pair Cable (15 ft) Bix panel connectivity
(1)	NT1M41BR	Office Alarm Cable (50 ft)
(4)	NT0X0004	Grounding Kit
(2)	NT0M96RB	Teledapt Cable (200 ft)
(2)	NT0M96SC	FSP Bulkhead - Bulkhead (10 ft)

Provision the following Mechanical Hardware:

QTY	PEC CODE	DESCRIPTION
(3)	NT1M41BC	Frame Fail Lamp (Brown)
(3)	NT1M41AT	Right Front Door (Brown)
(3)	NT1M41AU	Left Front Door (Brown)
(3)	NTNX2552	Right Front/Rear Door (Brown)
(3)	NTNX2550	Left Front/Rear Door (Brown)
(2)	P0711389	Designation Strip Bay 1 (lime)
(2)	P0711392	Designation Strip Bay 2 (lime)
(2)	P0711395	Designation Strip Aux. Bay (lime)
(6)	P0728013	NT Logo (lime)
(6)	P0688332	Isolation Pads
(12)	P0677746	Anchor Plate (Earthquake)
(1)	NT1M41CE	Information Label Kit

For new each Brown Cabinet Lineup, provision the following:

QTY	PEC CODE	DESCRIPTION
(1)	NTNX2531	Right End Panel (Brown)
(1)	NTNX2532	Left End Panel (Brown)
(1)	P0728016	Matrix Labels A-Z, 00-99 (Lime)

Overhead trough assembly:

QTY	PEC CODE	DESCRIPTION
(3)	NTNX55AA	Cable Trough (brown)
(12)	NT0X21AV	Concrete Anchor Assembly for Cabinets in an ATC earthquake zone 1-3.
(3)	NT0X21AH	Concrete Anchor Assembly shims for Cabinets in an ATC earthquake zone.

Provide two cover plate set's.

QTY	PEC CODE	DESCRIPTION
(4)	P0688822	Cover Plates
(8)	P0575598	Screws
(8)	P0242132	Washers
(8)	P049C096	Washers
(4)	P099Q132	Screws

Provide two end cover set.

QTY	PEC CODE	DESCRIPTION
(2)	P0688821	End Cover
(8)	P0575598	Screws
(12)	P0242132	Washers
(8)	P049C096	Washers
(4)	P099Q132	Screws

Provision the following spare hardware:

QTY	PEC CODE	DESCRIPTION
(1)	NT0M90QA	M4120 IVD Controller
(1)	NT0M91BA	Keyboard
(1)	NT0M92DA	Monochrome Monitor
(2)	NT1M41AF	LIU Option Card
(1)	NT1M41BW	ALIU Option Card
(1)	NT4G14DB	Lanlink SRU
(1)	NT4G16EF	Prime Processor - 6MB
(1)	NT4G20VA	1/4 W 160MB Disk/QIC-150 Tape
(1)	NT4G20WA	1/4 W 160MB Disk
(1)	NT4G20LC	SCSI 80 MB Storage SRU
(1)	NT4G20TB	SCSI 350 MB Disk Storage
(1)	NT4G23EA	T1 SRU
(2)	NT4G25GB	Application Processor 68020-10
(2)	NT4G27CA	Voice Interface SRU
(2)	NT4G50FA	Rack Converter SRU
(1)	A0385558	UDS DDS/MR1 RM16M Modem Card
(1)	A0336306	UDS 212A/D Modem Card
(1)	NT1M41BC	Frame Fail Lamp (Brown)
	or	
(1)	NT1M4104	Frame Fail Lamp (Gray)
(1)	NT4G51AC	FSP-Alarm Interconnect Card
(1)	NT6X36AA	FSP-Frame Fail Alarm Card
(1)	NT0X91AA	FSP-Fan Fail Alarm Card
(1)	NT1M41BX	FSP-Fuse & Lamp Spare Kit
(1)	NT1M4114	Upper Cooling Unit
(1)	NT1M4113	Lower Cooling Unit
(1)	A0351779	Air Filter Unit
(1)	NT4G42AD	Shelf Terminator Card
(1)	A0343852	Power Converter (LIU Shelf)
(1)	65001860	UDS Power Converter PS48R
(1)	NT1M41CE	Label Kit

Optional Meridian Storage Cabinet

The Meridian Storage Cabinet provides 40 1/4 slot positions to store spare SRU's. While the cabinet is not powered, it does require proper grounding to maintain ISG compliance as long as it is positioned in a lineup. The storage cabinet can be ordered in either brown or grey.

Provision each Meridian Storage Cabinet according to the following rules:

QTY	PEC CODE	DESCRIPTION
(1)	NT1M40AN	Meridian Storage Cabinet

Provision the following cables for each Meridian Storage Cabinet:

QTY	PEC CODE	DESCRIPTION
(1)	NT0X0004	Grounding Kit

For Frame Ground (not shown in Figure 9 on page 12-85).

Provision the following Mechanical Hardware for each Meridian Storage Cabinet

For each brown cabinet, provision the following:

QTY	PEC CODE	DESCRIPTION
(2)	NTNX2552	Right Front/Rear Door (Brown)
(2)	NTNX2550	Left Front/Rear Door (Brown)
(2)	P0711402	Designation Strip (lime)
(2)	P0728013	NT Logo (lime)

For each gray cabinet, provision the following:

QTY	PEC CODE	DESCRIPTION
(2)	NTNX2513	Right Front/Rear Door (Gray)
(2)	NTNX2515	Left Front/Rear Door (Gray)
(2)	P0711181	Designation Strip (aqua)
(2)	P0728012	NT Logo (aqua)

For each Cabinet, provision the following:

QTY	PEC CODE	DESCRIPTION
(2)	P0688332	Isolation Pads
(4)	P0677746	Anchor Plate (Earthquake)

For raised floor assembly:

For each Cabinet, provision the following:

QTY	PEC CODE	DESCRIPTION
(4)	NTNX56AA	Raised Floor Anchor Assembly for Cabinets

For overhead trough assembly:

NOTE: Gray cable rack hardware for the Meridian Applications Cabinet is not available as yet.

For each Cabinet, provision the following:

QTY	PEC CODE	DESCRIPTION
(1)	NTNX55AA	Cable Trough (brown)
(1)	NT0X21AH	Concrete Anchor Assembly shims for Cabinets in an ATC earthquake zone.

For each Cabinet, provision one of:

QTY	PEC CODE	DESCRIPTION
(4)	NT0X21AV	Concrete Anchor Assembly for Cabinets in an ATC earthquake zone 1-3.
(4)	NT0X21AW	Concrete Anchor Assembly for Cabinets in an ATC earthquake zone 4-7.

Provide one cover plate set (front and back) to cover the gap between the two adjacent NTNX55AA cable troughs. A set consists of:

QTY	PEC CODE	DESCRIPTION
(2)	P0688822	Cover Plates
(4)	P0575598	Screws
(4)	P0242132	Washers
(4)	P049C096	Washers
(2)	P099Q132	Screws

Provide one end cover set for covering the cable trough at the end of a line up. A set consists of :

QTY	PEC CODE	DESCRIPTION
(1)	P0688821	End Cover
(4)	P0575598	Screws
(6)	P0242132	Washers
(4)	P049C096	Washers
(2)	P099Q132	Screws

Optional Redundant Power Upgrade Kit

Meridian Applications Cabinets (Bay 1 and Bay 2) shipped after Jan 14, 1991 will be equipped with redundant power equipment for Bay 1 and Bay 2. Older systems (NT1M41AA Bay 1 and NT1M41AP Bay 2) may be upgraded by ordering the following Kit: NT1M41CM. The kit includes four (4) new rack power converters (NT4G50FA) and new FSP.

Order spares for the new power supplies by following sparing policy (b) as defined in “Sparing Information” on page 12-92.

7.2.3.2 Voice Links

Voice communications between the DMS switch and the TOPS VSN will be provided via standard T1 (DS1) interfaces. Each T1 line provides 24 full duplex voice channels. A spare T1 line shall be provided for redundancy. The T1 links shall be located on separate cards for reliability purposes.

Provide two (2) DS1 Interface CP for each 24-Channel, 2-Cabinet TOPS VSN System being ordered. Provide three (3) DS1 Interface CP for each 48-Channel, 3-Cabinet TOPS VSN System being ordered. The DS-1 packs shall be mounted in a DTC module of the associated DMS switch.

Since each DS-1 card has two T1 links available and only one is being used for TOPS VSN, the remaining T1 link can be used for another purpose. Also, existing DS-1 cards with available T1 links may also be used for TOPS VSN.

7.2.3.3 Data Links

Data communications between the DMS switch and the TOPS VSN will be provided via the X.25 interface. The data link interface will consist of an MPC or EMPC card connected to the TOPS VSN System via back-to-back modems. Two data links will be used to connect the DMS switch to the TOPS VSN. The second data link is provided for load-sharing and redundancy. If one datalink fails, the alternate datalink will automatically handle all of the traffic.

Provide two (2) MPC or EMPC CP for each TOPS VSN System being ordered. These MPC/EMPC packs must be assigned to separate IOC modules for redundancy. Each MPC/EMPC card has two (2) ports available for use. An MPC/EMPC card used for TOPS VSN must be dedicated for TOPS VSN use only, and other applications cannot be provisioned on this card. However, the same MPC/EMPC cards can be used to provide the data links for a second TOPS VSN System if so desired. The maximum call capacity of an MPC/EMPC card must considered when provisioning multiple VSNs on the same MPC/EMPC card. Refer to the System Engineering Bulletin (SEB) for detailed information.

Provide two (2) A0385558, UDS DDS/MR1 RM16M Modem Card, for each TOPS VSN System being ordered. Also, provide one (1) 62005220, UDS Modem Shelf 23-inch to mount these modem cards.

For Canadian applications the 62005220 Modem Shelf shall be mounted in an NT0X43BA Modem Equipment Frame located at the associated DMS switch.

For U.S. applications the 62005220 Modem Shelf shall be mounted in a MIS frame located at the associated DMS switch; in ISG offices, this MIS frame must be a Dedicated MIS Frame For modems. The modems shall be cabled to the DMS Distribution Frame (DF).

Note: The Engineering Manual Sections provision the NT1M41BA modem shelf, which includes the 62005220 (A0344310) plus mounting hardware.

7.2.3.4 Alarms

There are two methods of handling external alarms from the TOPS VSN.

. Alarms are integrated using X.25 protocol between the TOPS VSN and the attached DMS.

. If required, a single SD point may be provisioned:

There are two methods of alarming using an SD point.

a. The alarm is tied to an entire line up. One signal distribution (SD) point is required. Each cabinet in the line-up is daisy chained together and the alarm signal is taken from a single Bay 1 in the line up to the MDF.

b. Each TOPS VSN system is alarmed independently. One signal distribution (SD) point is required per TOPS VSN system. The alarm signal is taken from Bay 1 of each system to the MDF.

This is only required when the TOPS VSN and DMS switch are not co-located.

7.2.3.5 Multiple VSNs

A single or multiple VSNs can be connected to the same DMS switch. The DMS will support up to sixteen (16) VSNs within an office if one datalink per VSN is used. However, the recommended maximum is eight (8) VSNs within an office. This allows for two data links between the DMS switch and the TOPS VSN. The second data link is provided for reliability purposes, (i.e. if a data link fails, communications will be switched to the redundant data link automatically).

Each VSN will be separately interfaced to the DMS and identified by a unique VSN number. Trunk members will serve as voice links to the VSNs, and the DMS will need to know which trunk member, or voice link, goes to which VSN. The NTXA17AA AABS software provides the DMS with the capability to select the voice and data connections necessary to connect the DMS with a VSN. When a new call arrives to be handled by the AABS application, the selection of the voice connection is done on a 'most idle' basis (i.e. the call may be handled by any VSN which has the 'most idle' voice connection). Once the DMS has selected the most idle voice link to a VSN, it must map this particular voice link to a VSN number. The DMS uses this VSN number to ensure the voice and data links associated with a particular call go to the same VSN. The call is then processed.

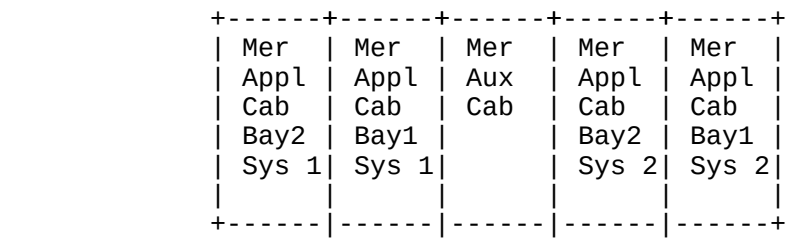
7.2.4 Office Layout Information

The following diagram shows the connections required between the DMS switch and the TOPS VSN System. Refer to the notes below when using the diagram.

NOTE 1) Letters in parentheses denote cable described under corresponding letter in section “Cables” on page 12-67.

NOTE 2) Meridian Applications Cabinet Bay 2 must ALWAYS be situated adjacent to and immediately to the LEFT of Meridian Applications Cabinet Bay 1 (facing from the front.) This is due to the jumper cable connecting Bay 1 to Bay 2.

NOTE 3) The recommended line-up for the TOPS VSN cabinets is as follows:



Cabinets designated as "Sys 2" are for a second TOPS VSN system, if it is required.

Be aware that this is a recommended lineup configuration. The only restrictions on cabinet placement are Note (2) and a maximum cabling distance of 50 feet between the Applications and Auxiliary Cabinets.

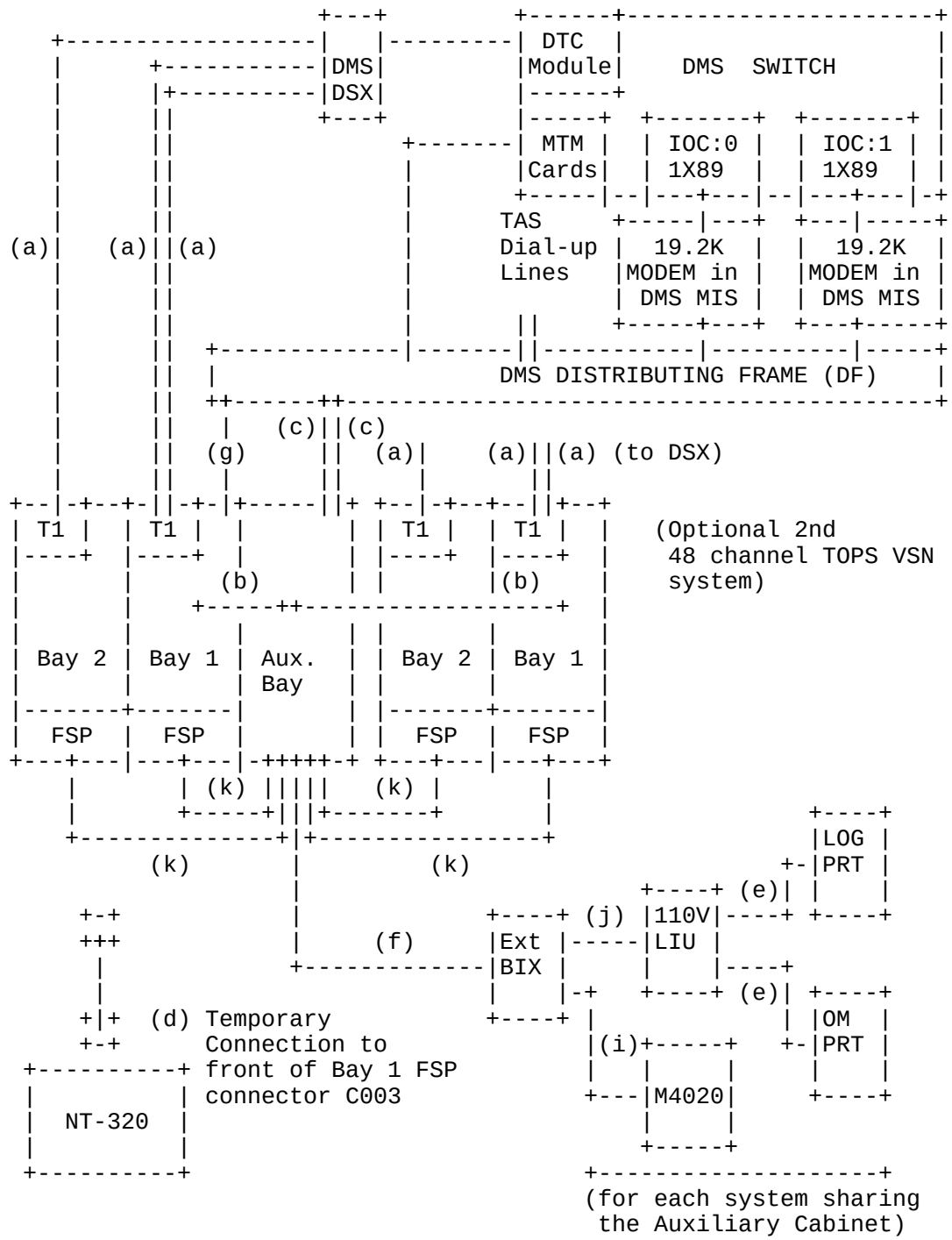


Figure 9. Typical TOPS/VSN Inter-connection for 48-Channel System

7.2.5 Traffic Tables

7.2.5.1 TOPS Voice Service Node (VSN)

The traffic throughput of the various sizes of VSNs are located in
Figure 10

NO. OF CHANNELS	TRAFFIC HANDLING CAPABILITY
24	550 CCS 15.28 Erlangs
48	1300 CCS 36.11 Erlangs

Figure 10. VSN Traffic Through-put

For traffic handling capacity above 1300 CCS, refer to an Erlang table to determine the number of channels required.

To traffic provision VSNs, it is necessary to determine how many 0+ Calls Per Hour (CPH) of each type are anticipated to be handled in the office. The call types used are Calling Card, Collect, Third Number Billing, and Time-Out To Operator. It is also necessary to calculate the Average Holding Time (AHT) of each call. The following formulas can be used in determining the amount of traffic presented by each call type:

Traffic (in CCS) = No. CPH x AHT / 100
Traffic (in Erlangs) = No. CPH x AHT / 3600

The total traffic is equal to the sum of the individual traffic amounts. Consider the customer's redundancy requirements when provisioning VSNs.

TOPS/VSN Average Holding Times

VSN Operating Language	Selected for FE	Call Scenario	AHT With Validate	AHT With No Val.
English Only	n/a	Collect	75	n/a
		CC	17	n/a
		3rd	85	31
		Time-out	18	n/a
		Handoff		
		Collect	61	n/a
		3rd	61	3
FLS En-Fr	En	Collect	94	n/a
		CC	18	n/a
		3rd	104	50
		Time-out	18	n/a
		Handoff		
		Collect	61	n/a
		3rd	61	3
FLS Fr-En	Fr	Collect	96	n/a
		CC	19	n/a
		3rd	106	50
		Time-out	18	n/a
		Handoff		
		Collect	63	n/a
		3rd	63	3
ALS En-Fr	En	Collect	94	n/a
		CC	18	n/a
		3rd	104	50
		Time-out	18	n/a
		Handoff		
		Collect	61	n/a
		3rd	61	3
ALS Fr-En	Fr	Collect	100	n/a
		CC	20	n/a
		3rd	110	50
		Time-out	18	n/a
		Handoff		
		Collect	63	n/a
		3rd	63	3

TOPS/VSN Average Call Timings

Call timings are based on the following assumptions:

Ring-No-Answer Delay 30 seconds

Ring-Answer Delay	20 seconds
Network Delay	5 seconds

Definition of Abbreviations:

FE	Front End Language: the language that the VSN uses to interact with the calling party.
Validation	Third Number Billing Validation performed (where applicable)
NV	Third Number Billing Validation not performed
FLS	Forced Language Selection
ALS	Alternate Language Selection
En	English
Fr	French
3rd	Third Number Billing Call
CC	Calling Card Call
Time-out	The calling party times out during interaction with the system; the call is routed to an operator. This call scenario will be case with users of rotary dial phones.

7.2.5.2 Three Party Conference circuits (CF3P)

The AABS feature also requires additional 3 Party Conference Circuits (CF3P). Provisioning of 3 Party Conference Circuits (CF3P) for AABS applications takes into account the particular mix of calls and is based on the following conditions:

- CF3P is not required for Credit Card Calls.
- CF3P is required 70% of the time during a Collect Call.
- CF3P is required 70% of the time during a Third Number Billing Call.

After determining the traffic for each call type, use the following equations to determine the amount of traffic on the CF3P's for Collect and Third Number Billing calls:

TC3 (in CCS)	=	Traffic On CF3P For Collect Calls	=	(Collect Call) (Traffic) x 0.7
TTN3 (in CCS)	=	Traffic On CF3P For Third Number (with Validation)	=	(Third Number) (Traffic with) validation x 0.7

Add TC3 and TTN3, then go to an Erlang B Table and use this result, with a probability of 1 percent blocking, to find the number of 3 Party Conference Circuits (CF3P) required.

NOTE: Erlang B Tables can be found in the publication >Reference Manual for Telecommunications Engineering>, Roger L. Freeman, John Wiley & Sons, 1984.

7.2.5.3 Traffic Provisioning Example: English Only

CALL TYPE (English Only)	AHT	CPH (Customer Provided)	TRAFFIC (CCS)
Collect	75 sec	1591	1193
Calling Card	17 sec	2631	447
Third Number (Verif)	85 sec	58	49
Third Number (NV)	31 sec	621	193
Time-out	18 sec	678	122
Collect Handoff	61 sec	398	243
Third Number Hndoff (Ver)	61 sec	11	7
Third Number Hndoff (NV)	3 sec	163	5

			2259

TOTAL CCS = 2259 TOTAL Erlangs = 62.8

As shown in the traffic engineering tables, in this document, two 48-channel TOPS/VSN's can adequately support the traffic in the above example.

TC3 = (Collect Call) x 0.7 = 1436 x 0.7 = 1005 CCS
(in CCS) (Traffic)

TTN3 = (Third Number) x 0.7 = 56 x 0.7 = 39 CCS
(in CCS) (Traffic with validation)

Add TC3 and TTN3 = 1005 + 39 = 1044 CCS

Then refer to an Erlang B Table at P = 1 percent and CCS = 1044

Which shows Number of CF3P's required = 41

7.3 Product/System Specification

7.3.1 Physical Characteristics

7.3.1.1 DIMENSIONS

The Meridian Applications Bay and Auxiliary Bay have the following dimensions:

Height:	72"	182.9 cm
Width:	28.5"	72.4 cm
Depth:	28.25"	71.8 cm (with doors)
:	26"	66.0 cm (without doors)

Allow for a 1/16" (0.16 cm) gap between adjacent cabinets.

The External Bix (A0321335) has the following dimensions:

Height:	19"	48.3 cm
Width:	11"	27.9 cm
Depth:	6"	15.2 cm (with cover)

The External LIU (NT4G46CA) has the following dimensions:

Height:	4"	10.2 cm
Width:	12"	30.5 cm
Depth:	14"	35.6 cm

7.3.1.2 WEIGHT

Mer. App. Cab. Bay 1:			1085 lb 493.2 kg
Mer. App. Cab. Bay 2:			910 lb 413.6 kg
Auxiliary Bay:	677	lb	307.7 kg

7.3.2 EMI/Earthquake Information

N/A

7.3.3 Sparing Information

Provision the following spare hardware:

QTY	PEC CODE	DESCRIPTION
(B)	NT0M90QA	M4120 IVD Controller
(B)	NT0M91BA	Keyboard
(B)	NT0M92DA	Monochrome Monitor
(B)	NT1M41AF	LIU Option Card
(B)	NT1M41BW	ALIU Option Card
(A)	NT4G14DB	Lanlink SRU
(A)	NT4G16EF	Prime Processor - 6MB
(A)	NT4G20VA	1/4 W 160MB Disk/QIC-150 Tape
(A)	NT4G20WA	1/4 W 160MB Disk
(B)	NT4G23EA	T1 SRU
(B)	NT4G25GB	Application Processor 68020-10
(B)	NT4G27CA	Voice Interface SRU
(B)	NT4G50FA	Rack Converter SRU
(B)	A0385558	UDS DDS/MR1 RM16M Modem Card
(B)	A0336306	UDS 212A/D Modem Card
(B)	NT1M41BC	Frame Fail Lamp (Brown)
	or	
(B)	NT1M4104	Frame Fail Lamp (Gray)
(C)	NT4G51AC	FSP-Alarm Interconnect Card
(C)	NT6X36AA	FSP-Frame Fail Alarm Card
(C)	NT0X91AA	FSP-Fan Fail Alarm Card
(C)	NT1M41BX	FSP-Fuse & Lamp Spare Kit
(1)	(B)	NT1M4114 Upper Cooling Unit
(1)	(B)	NT1M4113 Lower Cooling Unit
(2)	(C)	A0351779 Air Filter Unit
(3)	(B)	NT4G42AD Shelf Terminator Card
(4)	(B)	A0343852 Power Converter (LIU Shelf)
(C)	65001860	UDS Power Converter PS48R
(C)	NT1M41CE	Label Kit

(1) There is one (1) Upper and one lower Cooling Unit in each Meridian Applications Cabinet (Bay 1, Bay 2, and Aux.).

(2) There is one (1) Air Filter Unit for each Meridian Applications Cabinet (Bay 1, Bay 2, and Aux.). The Air Filter Unit is part of the Lower Cooling Unit.

(3) There are two (2) Shelf Terminator Cards for each TOPS VSN system (24 and 48 channel).

(4) There are two LIU shelf Power Converters in each LIU shelf (one LIU shelf in each Meridian Auxiliary Cabinet).

The quantity (A) requires a 1 to 1 sparing for the first 2 components on site, and for the next N components follow sparing policy (B).

Quantity	Spare Quantity
1	1
2	2
3-5	3
6-12	4
13-	5

The quantity (B) is determined by the quantity of the corresponding SRU at the TOPS VSN site.

Quantity	Spare Quantity
1-3	1
4-10	2
10-	3

The quantity (C) is ONE (1) spare component per TOPS VSN site.

7.3.4 Power Feed and Fusing Requirements

Power distribution must be provided for the Meridian Applications Cabinet. The power distribution hardware must be Isolated Systems Grounding (ISG) compliant. The Power Distribution Center (PDC) frame or Meridian Power Distribution Cabinet (MPDC) are recommended.

Power distribution fusing should be as follows:

Cabinet Type	No. of Feeds A	No. of Feeds B	Fuse Size (Amps)
Meridian Applic. Cabinet Bay 1	2	2	30
Meridian Applic. Cabinet Bay 2	2	2	30
Meridian Aux. Cabinet	1	1	20

7.3.5 Current Drain Information

Meridian Applications Cabinet Bay 1	26 amps
Meridian Applications Cabinet Bay 2	11 amps
Meridian Auxiliary Cabinet	8 amps
110V LIU	1 amp
Desktop Matrix Printer	2 amps
M4020 Terminal	2.5 amps
NT-320 Installation Terminal	2.5 amps

7.3.6 POWER/HEAT DISSIPATION

Meridian Applications Cabinet Bay 1	1200 watts
Meridian Applications Cabinet Bay 2	500 watts
Meridian Auxiliary Cabinet	300 watts

7.3.7 Software Provisioning

7.3.8 Required Software Packages and Interdependencies

7.3.8.1 DMS SOFTWARE

The following describes software required for the DMS in order for VSN to work. The functional group for this software is ABS00001, Alternate Billing Services.

The following packages must be ordered for all DMSs supporting AABS for English speaking markets:

- ABS00002 - Alternate Billing Services
    - Switch software that allows calls to be billed to calling card, credit cards or third parites.
    - Automates collect call and called billed to credit cards or third parties.

The following packages must ALSO be ordered for all DMSs supporting AABS for French and English speaking markets:

- ABS00005 - French/English AABS
    - Supports English and French for AABS.

The following lists VSN software that is optional for the DMS.

- ABS00003 - Operator Handoff to AABS
- ABS00004 - Account Code Billing
- ABS00006 - ABS AABS Call Screening
- ABS00007 - TOPS DN Call Screening
- ABS00008 - TOPS Commerical Credit Card Billing
- ABS00009 - Auto Room and Authorization Number
- ABS00010 - Calling Card Denial Reason
- ABS00011 - Originating Line Number Screening
- ABS00012 - ABS AABS Enhanced Services Accounting

These packages apply to standalone, host, or remote TOPS switches. These TOPS switches may be either DMS-200 or DMS-100/200.

This information is intended to provide basic software provisioning, and is believed to be accurate at the time of publication. Refer to SOLID for updates, interdependencies, and availability.

7.3.8.2 TOPS VSN Software

The following describes software required for TOPS VSN. The functional group for this software is VBS00001, Alternate Billing Services.

- ABS00001 - AABS Software for VSN-Base Support
- or
- ABS00002 - AABS Software for VSN-French Support

The following software is optional and is included in functional group VSN00002.

- ABS00003 - VSN Call Completion Enhancements

The above information is believed to be accurate at the time of publication, but SMS should be checked for updates, interdependencies, and availability.

7.3.9 Software Usage Restrictions

VSN NCL releases can only be installed with certain BCS or PCL release loads.

7.3.9.1 Compatible BCS releases

The VSN PCL can be no lower than one below the BCS (BCSX - 1) or three above the BCS (BCSX + 3).

For example, with BCS36, the VSN release must be between 3 and 36.

7.3.9.2 Compatible PCL releases

The VSN release can be equal to the PCL release (VSNxx=PCLxx) orr three greater than the PCL release (PCLxx + 3).

For example, with NA004, the VSN release must be between VSN004 and VSN007 (inclusive).

7.3.9.3 General Software Usage Restrictions

The following list software usage restrictions for VSN.

- Interchangeable NPA requires VSN-36.
- If ISUP trunks are used for AABS calls, VSN-36 must be installed before installing BCS-36.
- The NT4G91HK DVIX Operating System includes the tape cartridge, documentation, and the DVIX license. Order this package for EACH initial VSN system (24 or 48 port). NT4G91HK is for VSN 32 or higher. NT4G91HK replaced NT4G91FF, which was used with VSN 31 and lower. NT4G91FF includes the tape cartridge, documentation, and the DVIX license.
- The NT4G95HK DVIX Operating System includes the tape cartridge only. Order this package for each VSN when the customer has the earlier DVIX package (NT4G91FF), and is upgrading to VSN 32 OR HIGHER.
- DVIX VSN software (NT4G91HK and NT4G95HK) must be ordered on a 134 spec.

7.3.10 Memory Provisioning

Refer to MEMCALC.

7.4 Real Time Impact

Refer to the System Engineering Bulletins. See -- Heading id 'CROS495' unknown --

8.0 ECM582 - TOPS04 REQUIREMENTS

8.1 Overview

This ECM describes provisioning changes required for new features in TOPS04. This ECM does NOT cover the TOPS MPX IWS 04 non-CM release.

8.2 Hardware Provisioning

8.2.1 Hardware Usage Restrictions

Not Applicable

8.2.2 Hardware Dependencies

| For Toll Break In and R2-to-TOPS, IDTCs must be upgraded to PDTCs (XPM+).

8.2.2.1 P and C Side Port Requirements

Refer to SEB 90-08-001 for detailed DS-1 to DS-30 channel mapping. The channel mapping in the SEB applies to all XPMs, including the OC ETMS. The table below gives DS-30 port requirements based on the DS-1 ports used.

IF ANY OF THESE DS-1 PORTS ARE USED	ALL THESE DS-30 PORTS ARE REQUIRED
0,1,2,3,4	0,1,2,3
5,6,7,8,9	4,5,6,7
10,11,12,13,14	8,9,10,11
15,16,17,18,19	12,13,14,15

8.2.2.2 DMS BUS Port Requirements

Not Applicable

8.2.2.3 Circuits Per Card

Not Applicable

8.2.2.4 Discrimination Numbering

Not Applicable

8.2.3 Provisioning Considerations

| 8.2.3.1 Toll Break In and R2-to-TOPS (Global Applications only)

These features are part of the Global Operator Services functional group. These features require the non-CM software (TPC or MPX-IWS) to be at the TOPS04 release level.

The R2-to-TOPS feature enables R2 trunks to connect directly to PDTCs instead of going through IDTCs. Therefore, loop-around trunks between the IDTCs and the PDTCs will no longer be required. This feature requires the IDTCs to be upgraded to PDTCs (XPM+). XPM05 is required in the PDTCs to support R2 signalling.

8.2.3.2 VSN Custom Branding

This feature could impact the VSN and TOPS trunk holding times. Requirements for trunks and VSN ports should be recalculated if the AHTs are revised.

8.2.3.3 VSN Call Screening Enhancements

This feature could impact the VSN and TOPS trunk holding times. Requirements for trunks and VSN ports should be recalculated if
| the Average Holding Times (AHTs) are revised.

8.2.3.4 External Rater Interface

This feature uses SS7 links from the DMS to the Real-Time Rating System. Refer to the SS7 SEB (Systems Engineering Bulletin).

8.2.3.5 Operator Centralization Enhanced TOPS Message Switch

The OC ETMS will replace the DCM for OC data links. The OC ETMS also supports OC voice links. If desired by the customer, OC voice links can be supported on other trunking peripherals (e.g. DTC, LTC).

The OC ETMS is ONLY for OC voice/data links. It can NOT be used to interface operator positions to the DMS. Refer to ECM 468 for provisioning of the TMS for operator position interface.

DCMs and OC ETMSs can coexist on a DMS, but both ends of a given OC data link must be on the same type of peripheral.

Determine the number of OC data links as follows. (These calculations are based upon TOPS MPX IWS positions, which is a worst-case assumption, with the possible exception of an OPP 3rd party
| application/terminal, which may require more messaging than MPX
| IWS. TOPS4, MP, and MPX AOSS positions require less messaging than MPX IWS.)

The capacity of each OC data link on the OC ETMS is 25 messages/sec. Therefore,

links = Round Up ((messages per second)/25)

msg/sec = (DA BHHCV x msg/DA call + TA BHHCV x msg/TA call)/1800

| msg/DA call = 10 (Based off MPX IWS values)

| msg/TA call = 15 (Based off MPX IWS values)

| Resulting in the following combined formula

links = Round Up ((DA BHHCV x 10 + TA BHHCV x 15)/(1800 x 25))

For redundancy, provide at least two links, even if the traffic is less than the capacity of a single link. For maximum reli-
| ability, provide a minimum of two OC ETMSs, regardless of traffic.

| The capacity of an OC ETMS is 50 messages per second. Therefore, an OC ETMS can support two OC data links if each link is operating at 25 messages per second. If the links have less traffic, the OC ETMS can support more than two data links.

The absolute maximum number of OC data links an OC ETMS can support is 31. Any of the 24 DS-0 channels on any of the 20 DS-1 ports may be used for OC data links. Remaining channels/ports may be used for OC voice links. The OC ETMS can NOT support any other type of trunk. OC voice links and OC data links can be mixed on a DS-1.

Under a failure condition, a link can support 50 msg/sec, and an OC ETMS can support 100 msg/sec. Since link and OC ETMS provisioning are based on 25/50 msg/sec, most confugurations will not exceed the failure limit of 50/100 msg/sec. However, each configuration must be checked to insure that no single point failure (of a link, DS-1 card, shelf, or (optionally) OC ETMS) will exceed 50/100 msg/sec on a link/OC ETMS. Messages will experience some additional delay when operating above 25 msg/sec/link or 50 msg/sec/OC ETMS.

The maximum distance for OC voice/data links on an OC ETMS is an engineerable limit. Satellite links are permitted. Sattelite use gives a delay of 500 ms per key function. Normal concerns for speed delay and echo should be taken into consideration.

The hardware for the OC ETMS is identical to the ETMS (XPM+ version of the TMS) for slots 6 through 25. Refer to the Engineering Manual Sections. Slots 1-5 are provisioned with DS-1 or PCM-30 interface CPs as required to support the voice/data links. For PCM-30, slot 1 is always provided with a filler. As with other XPMs, slot 5 of shelf 1 is used first, then slot 5 of shelf 0, followed by slot 4 of shelf 1, etc. EDCH (NTBX02) are not required on the OC version of the ETMS.

With the Enhanced Remote Support feature, the OC ETMS allows up to 3 Remote Operator Centers off a Host Operator Center. If using Host/ Remote Networking by Queue Type, the maximum number of remotes is reduced from 31 to 30. OC ETMS DOES NOT INCREASE THE MAXIMUM NUMBER OF OPERATORS (022).

8.2.4 Office Layout Information

Not Applicable

8.2.5 Traffic Tables

Not Applicable

8.3 Product/System Specification

8.3.1 Physical Characteristics

Not Applicable

8.3.2 EMI/Earthquake Information

Not Applicable

8.3.3 Sparing Information

Not Applicable

8.3.4 Power Feed and Fusing Requirements

Not Applicable

8.3.5 Current Drain Information

Not Applicable

8.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

The information in this section is accurate at the time of publication. For updates, availability, and more complete information on inter-dependencies, refer to SMS, SOLID, and Product Content.

The TOPS04 DRU is available in the following PCLs:

LETB004	US NA100-TOPS (combo)
LTTB004	CDN NA100-TOPS (combo)
USTOPS004	TOPS US/Global (solo)
CDNTOPS004	TOPS CDN (solo)

8.4.1 Required Software Packages and Interdependencies

For the External Rater Interface feature, order the following:

ENSV0001	Enhanced Services Functional Group
ENSV0009	ENSV External Rater Interface

The Toll Break In and R2-to-TOPS features are included in the Global Operator Services functional group. Only the following code needs to be ordered:

GOS00001	Global Operator Services Functional Group

For OC ETMS, order the following:

ENSV0001	Enhanced Services Functional Group
ENSV0008	ENSV OC ETMS
ENSV0011	ENSV Enhacned Remote Support (optional - see note below)
EWSS0001	Enhanced Workstation Software Functional Group

EWSS0003	TOPS Message Switch
EWSS0007	TMS Processor Upgrade
GOS00001	GOS Functional Group (optional - only needed for PCM-30 version of OC ETMS)

ENSV0011 is required to support more than 15 remote operator centers (ROC). This SOC is required at the HOC and at remote number 16 or higher.

All features in TOPS04 which are ordered separately are listed above. All other features are included within existing order codes.

8.4.2 Software Usage Restrictions

| All DMS-100/200 switches must be upgraded to BCS-36 before converting to TOPS04.

8.4.3 Memory Provisioning

Some TOPS04 features impact memory requirements. Refer to MEMCALC.

8.5 Real Time Impact

Refer to the Systems Engineering Bulletins.

9.0 ECM583 - New Features in TOPS03

9.1 Overview

This ECM describes provisioning changes required for some of the new features in TOPS03. This ECM does NOT cover ADAS, ADAS+, or Enhanced TMS. Phase 1A of ADAS+ uses AN0880 (a new feature in TOPS03), and will be documented when ADAS+ reaches Gate 1A. Phase 1 of ADAS+ uses OPP instead of AN0880, and is documented in API 504. TMS Processor Upgrade (TMS with XPM+) is documented in ECM 468. ADAS is documented in ECM 682. Refer to ECM 620 for SS7 provisioning, which may be affected by Commercial Credit Card Support.

The Line-to-TOPS feature is MD in TOPS03, which will affect provisioning of loop-around trunks.

The following features have no impact on provisioning:

Functional Group	Feature
Enh. Workstation Software	FMCRT I/F Enhancement
Equal Access	Carrier Code Expansion
Enhanced Services	Pre-Paid Coin

9.2 Hardware Provisioning

9.2.1 Hardware Usage Restrictions

Not applicable.

9.2.2 Hardware Dependencies

Not applicable.

9.2.2.1 P and C Side Port Requirements

Not applicable

9.2.2.2 DMS BUS Port Requirements

Not applicable

9.2.2.3 Circuits Per Card

Not applicable

9.2.2.4 Discrimination Numbering

Not applicable

9.2.3 Provisioning Considerations

9.2.3.1 Cellular/IEC/LEC ADACC Screening Enhancements

Provisioning of ARU and TOPS trunks (DTCs) is affected by this feature, which allows the DA system to use customized announcements and extended dialogs, thereby increasing holding times. Holding times on TOPS trunks will also increase due to ADACC being offered to more subscribers. Use of "no announcement" ADACC (allowed with this feature) may decrease usage of ARU trunks, since these calls do not use ARU trunks.

Trunking should be re-calculated based on these changes to holding times and traffic. Refer to NTP 297-2281-155 and NTP 297-1001-450.

This feature alters the protocol on DA call control links. This may result in reduced capacity on these links. No further information is available at this time.

9.2.3.2 Automated Room and Authorization Number (ARAN)

This feature will increase the number of calls handled by the VSN. Prior to the introduction of this feature, 1+ hotel/institution calls were not processed by the VSN, and 0+ hotel calls were only processed for the billing portion. The increase in VSN voice channel requirements is proportional to the following two factors:

1) R = ratio of ARAN calls over total calls processed by VSN prior to ARAN
2) ratio of the amount of time required for room/authorization number collection over the total holding time of an average VSN call (this ratio is estimated at 0.3)

Use the following formula to estimate the increase in VSN voice channel usage:

Percentage increase of VSN voice channel usage = R * 0.3 * 100

Since a HOBIC record will now be generated for all 1+ institution calls, either a TTY will be required at the institution, or voice quote from the HOBIC will be required. This will impact provisioning for voice quote (VQ) and autoquote (AQ) equipment. Refer to ECM 247.

9.2.3.3 Commercial Credit Card Support

For some card numbers, VSN and TOPS trunk holding times will increase, because the VSN must wait after the 14th digit, to see if more digits will be intered. Recalculate requirements for VSN ports and TOPS trunks based on revised holding times.

9.2.3.4 Audiogram for MDS

This is a new feature added to the existing AABS Enhanced Service Access (NTXS37AA). Audiogram allows the caller to be connected to MDS WITHOUT first attempting connection to the called party.

Additional announcements for service selection, audiogram billing menu, VSN offer of MDS service, and messaging cost information may increase VSN and TOPS trunk holding times. Trunk requirements must be re-calculated using revised holding times.

9.2.3.5 VSN Dialog Enhancements

This feature is included with all VSN03 (TOPS03) loads. VSN and TOPS trunk holding times may be affected, thereby affecting VSN port and TOPS trunk requirements. Re-calculate trunk requirements using revised holding times.

9.2.3.6 Calling Card Denial Reasons

Since denial announcements are more specific, this may reduce the number of attempts to re-enter a calling card number, thereby reducing VSN and TOPS trunk holding times. Re-calculate trunk requirements using revised holding times.

9.2.3.7 Line-to-TOPS (MD in TOPS03)

The Line-to-TOPS feature is MD in TOPS03, which will increase the requirements for loop-around trunks. Previously, only some line-to TOPS calls required loop-around trunks; ALL line-to-TOPS calls will now require looparound trunks. Refer to ECM 273 for provisioning of looparound trunks.

9.2.4 Office Layout Information

Not applicable.

9.2.5 Traffic Tables

Not applicable.

9.3 Product/System Specification

9.3.1 Physical Characteristics

Not applicable.

9.3.2 EMI/Earthquake Information

Not applicable.

9.3.3 Sparing Information

Not applicable.

9.3.4 Power Feed and Fusing Requirements

Not applicable.

9.3.5 Current Drain Information

Not applicable.

9.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

9.4.1 Required Software Packages and Interdependencies

Refer to the TOPS CM and non-CM spreadsheets for software provisioning.

9.4.2 Software Usage Restrictions

Not applicable.

9.4.3 Memory Provisioning

Refer to MEMCALC.

9.5 Real Time Impact

Not applicable.

10.0 ECM606 - TOPS Engineering

10.1 Overview

(text deleted)

(text deleted)

TOPS MP and IWS are the only operator position products Nortel currently offers. The TOPS MP product hardware has been MD'd; however, Nortel is supporting TOPS MP with regulatory required development.

With the introduction of IWS07, NORTEL is no partners with IBM. IBM DA must be ordered through IBM. This document does NOT cover any IBM DA configuration information after IWS06.

10.2 TOPS MP

The TOPS MP hardware product has been MD.

10.3 TOPS IWS

IWS has two configuration types:

- token ring
- ethernet

10.3.1 Token ring

With the token ring configuration, operator positions are interconnected by Multi-station Access Units (MAU) so that information (from DMS, databases, etc.) can be shared within the group. Voice signals from the positions will be connected to a Channel Bank via the BIX block. Data signals are directly connected to the channel bank via RS-422.

Up to twenty positions can be on one token ring LAN. The minimum number of positions on a token-ring (for redundant configurations) is six.

Each token-ring must contain two DMS gateway positions. If used, database gateway positions should be spread across the first two clusters in each token ring to enhance reliability in the event of a MAU or MAU cable failure.

Up to eight positions may be handled by a MAU. A BIX block is provided to terminate voice and data signals. Three MAUs are provided for each Token-Ring.

For specific token ring MAU and cluster provisioning information, see ECM695.

The following figures provides an overview of the token ring configuration to the channel bank. Not all hardware is represented in this figure. For more detailed information, see ECM695.

Figure 1 shows IWS token ring LAN accesses D1.

10.3.2 . IWS Token Ring System Configuration

Figure 11. IWS SYSTEM CONFIGURATION

The channel bank puts 24 voice (DS-0 or G.703) and data (V.35 A&M'd" and RS-422) signals onto a single T1 (DS-1) span. This T-1 span terminates on the P-side of a TOPS Message Switch (TMS).

With cluster size 4, up to 16 operators can be carried on a single T1 span to the TMS (16 voice and 8 data links).

With cluster size 16 up to 20 operators can be supported on one T1 span (One full cluster with 16 voice and 2 data. One partial cluster with 4 voice and 2 data).

With cluster size 20, up to 20 positions can be supported on one T1 span (20 voice links and 2 data links).

For information on channel banks, see ECM695.

Refer to the ECM468, TOPS Message Switch, for more information on port assignments.

Figure 2 shows IWS token ring LAN accessing a CCDB database.

10.3.3 . IWS Token Ring System Overview

Figure 12. IWS SYSTEM CONFIGURATION

10.3.4 IWS maintenance

The IWS maintenance is handled from the Remote Access Maintenance Position (RAMP) and the MAP (CM terminal).

There are two types of RAMP positions:

- RAMP - controls the local token-ring on which it resides
- Remote RAMP - controls a remote token-ring

RAMP allows the maintenance of other IWS positions from a single maintenance position on the token ring. RAMP maintenance includes file transfer and software upgrades.

Remote RAMP allows the following:

- Remote status of LANs
- Remote software distribution and file transfer
- Remote tracing
- Remote reboot
- Log display (Current Log application parity)
- Enhanced profiling of position and applications
- Remote access to other token-rings through ASN routers
- Ability to Create and Edit of software distribution scripts

All CM maintenance from the TMS is handled by the MAP. The ability to Return-To-Service, Manual Busy, Test the IWS and audits which attempt to recover positions are supported. However, the IWS does not provide detailed responses for test and RTS failures but rather a pass/fail indicator. A MAP can be located at the IWS facility.
| (text deleted)

10.3.5 Ethernet

| The ethernet configuration in IWS09 is not turn-key. The customer
| must provide all LAN/WAN equipment. For more details on the IWS09
| offering for ethernet, see ECM695.

| With the ethernet configuration, operator positions are intercon-
| nected by an ethernet hub. The MAUs are no longer required for
| connectivity. The BIX will remain in the T1 channel bank market
| only. For the E1 channel bank, the BIX will not be required.
| Voice is directly connected to the MDF.

| In the T1 market, voice is connected to the channel bank via the
| BIX block. Data is directly connected to the channel bank. In the
| E1 market, both voice and data are directly connected to Channel
| Bank.

| The T 1 channel bank puts 24 voice (DS-0 or G.703) and data (V.35
| MD'd“ and RS-422) signals onto a single DS-1 span. This DS-1 span
| terminates on the P-side of a TOPS Message Switch (TMS).

| For information on channel banks, see ECM695

| Refer to the ECM468, TOPS Message Switch, for more information on
| port assignments.

10.3.6 TOPS Message Switch (TMS)

The TMS is an XPM peripheral that terminates links from Channel Banks (DS-1 signals) and interfaces them with the DMS host and various service-providing databases.

The TMS is required for all applications using TOPS IWS equipment.

Since a single TMS can support a maximum of ninety-six (96) positions, configurations with more than 96 operators will require more than one TMS. (Refer to the SEB for TMS; in some cases, a TMS has a capacity of less than 96 positions.) To maintain as balanced a traffic load as possible, operator positions should be evenly spread over available TMSs.

| (text deleted)

For a T1 channel bank, voice/data links are multiplexed onto the 24 channels of a T1 link by the channel bank and sent to the TMS on a single (DS-1) T1.

| For an E1 channel bank, voice/data links are multiplexed onto 30
| channels of an E1 link by the channel bank and sent to the TMS on
| a single (PCM-30) E1.

10.3.7 TOPS QMS

TOPS QMS (Queuing Management System) is an (optional) enhanced queuing system for TOPS which can replace the ACD (Automatic Call Distribution) queuing system. The queuing enhancements for TOPS provided by QMS include:

- TOPS QMS increases the maximum number of assignable call queues available in TOPS from 4 to 255.

TOPS QMS integrates absolute priority queuing of calls with assignable grade of service (AGS), on an operator profile basis. This allows Telephone Operating Companies to introduce the concept of primary and secondary responsibilities for its operators. For example, a group of operators support Directory Assistance service as a primary responsibility, but "help out" with Toll and Assistance service as a secondary responsibility when required.

TOPS QMS supports an enhanced set of force management statistics, and supports reporting of these statistics continuously and immediately, rather than only in periodic reports. TOPS QMS continues to provide support for backup periodic FM reports, which can be optionally activated and deactivated.

TOPS QMS allows the Telephone Operating Companies to segregate traffic across the 255 queues by a wide range of criteria, including: time of day, called digits, incoming trunk group, calling

digits, inter-LATA carrier, class of service, restricted billing index, prefix dialing and others. Furthermore, QMS is designed to allow for extending this set of criteria as new queuing capabilities are required.

The new force management capability for sending continuous statistics is implemented with an external Management Information System. The Management Information System is a Customer provided computer system capable of storing and reporting TOPS statistics. Some new enhancements to the existing force management capabilities are implemented with the current hardware including the FMCRT. Both the new MIS system and the existing FMCRT may co-exist in a TOPS host office.

The TOPS QMS set of features also allows the Telephone Operating Company to establish a new class of operators called Senior Operators. The Senior Operators have the capability to assist another operator with a call and to even complete that call. This assistance to other operators may serve as their primary task while answering subscriber initiated traffic serves as a secondary task. Access by a regular operator to a Senior Operator is accomplished via the OGT (outgoing trunk key function) causing an incoming call to be queued for a Senior Operator. Completion of a call of this type within the TOPS office requires a loop-around trunk.

Table 1 is a comparison of the Senior Operator class of operators to the Service Assistant class of operators:

Table 1. Senior Operator Class vs. Service Assistant Class

Capability	Senior Operator	Service Assistant
Use QMS queuing	Yes	No
Call completion for assistance calls	Yes	No
Serve non-assistant traffic	Yes	No
Receive directed calls	Yes	Yes
Paging capability	No	Yes
Monitor capability	No	Yes

10.4 Hardware Provisioning

10.4.1 Hardware Usage Restrictions

10.4.1.1 TOPS MP

The TOPS MP product has been MD.

10.4.1.2 TOPS IWS

See ECM695 for IWS hardware usage restrictions.

10.4.2 Hardware Dependencies

10.4.2.1 TOPS MP Position Controller Equipment (PCE)

The TOPS MP product has been MD.

10.4.2.2 TOPS MP Auxiliary Access Equipment (AAE)

The TOPS MP product has been MD.

10.4.2.3 TOPS MP Positions

The TOPS MP product has been MD.

10.4.2.4 TOPS MP Directory Assistance Application

The TOPS MP product has been MD.

10.4.2.5 TOPS MP Operator Reference Database

The TOPS MP product has been MD.

10.4.2.6 TOPS MP Stand-alone Configuration

The TOPS MP product has been MD.

10.4.2.7 TOPS MP Integrated TMS Configuration

The TOPS MP product has been MD.

10.4.2.8 TOPS MP Dual HSDA Configuration

The TOPS MP product has been MD.

10.4.2.9 TOPS IWS token ring

TOPS IWS token ring network requires the following equipment:

- timing source generator (for T1 channel bank only)

- workstation
- adapter cards
- Miscellaneous frame
- TMS
- ASN routers if D1 or CCDB are accessed
- channel bank
- RAMP mouse and printer

Timing source generator

The IWS positions in the T1 environment require a timing signal which will be supplied by a Telco-provided Time Source Generator (TSG). The | TSG should be located within 3000 ft of the position . Each Timing Output Card provides ten (10) ports, and will therefore support ten (10) MPX positions.

In IWS09 and below, the TSG is required in token ring and ethernet LANs.

The following TSG equipment manufactured by Telecom Solutions is required:

Table 2. Telecom solutions timing source generator requirements

Description	Part number
Clock Input Card	990-40010-01
DCD-400 Shelf Assembly	990-40000-01
Fuse & Alarm Card	990-40014-01
Matrix Control Card	990-40015-01
Stratum 3 Clock	990-40013-01
Timing Output Card	990-40011-01
Timing Output Card (Hot Spare)	990-40011-01

Workstation

See ECM695 for information on IWS Workstations.

Adapter cards

There are three different adapter cards for IWS:

- audio card
- token-ring card

- RTIC card

See ECM695 for information on the IWS adapter cards.

Miscellaneous frame

For IWS token ring configuration, the miscellaneous (MISC) frame contains the following hardware:

- BIX
- MAU

See TOPS IWS Layout Information for more information on the MISC frame.

TMS

For detailed information on the TOPS Message Switch (TMS), see ECM468.

ASN routers

ASN routers are used with the following databases:

- D
- CCDB

ASN routers are ordered through the Rochester division.

Channel bank

Channel bank equipment is supplied by the telephone operating company. For more information, see Channel bank and ECM695.

RAMP mouse and printer

The RAMP mouse and printer are optional and supplied by the customer. See ECM695 for more information.

10.4.2.10 TOPS IWS ethernet

For ethernet hardware dependencies, see ECM695.

10.4.2.11 TOPS QMS

The TOPS QMS software feature (NTXR50AA) that provides for an external MIS system must have the external MIS equipment provided by the Customer.

10.4.2.12 P and C Side Port Requirements

Not applicable.

10.4.2.13 DMS BUS Port Requirements

Not applicable.

10.4.2.14 Circuits Per Card

Not applicable.

10.4.2.15 Discrimination Numbering

Not applicable.

10.4.3 Provisioning Considerations

10.4.3.1 TOPS MP Provisioning

The TOPS MP product has been MD.

10.4.3.2 TOPS MPX Provisioning

For a list of equipment items and provisioning rules for TOPS MPX position equipment, refer to the IWS_Platform Engineering Manual Section .

10.4.3.3 Call Control Link Provisioning (MPC/EMPC)

The call control links from the DMS to the DAS are provided either by Multi-Protocol Controllers (MPCs) or Enhanced Multi-Protocol Controllers (EMPCs). The MPCs or EMPCs are mounted on IOC shelves. Use only one port of each MPC/EMPC; this will require one MPC/EMPC and one modem per link. Do not mix MPCs with EMPCs for this application; use exclusively MPCs or exclusively EMPCs. The maximum number of MPCs/EMPCs allowed per application is sixteen.

Links are provisioned based on traffic, baud rate, and redundancy requirements. Both IBM and NT NAS (CCI) DA systems support baud rates of 9.6K or 19.2K. The following table gives link capacities according to baud rate and type of controller (MPC/EMPC):

Table 3. Link Capacity (Calls per hour)

	MPC	EMPC
Baud Rate 9600	9,000	19,000
Baud Rate 19200	n/a	24,000
Note: MPCs are MD. All new orders are EMPCs.		

The total DA/INT traffic should be divided by 9,000/19,000/24,000 (per above table) to determine the minimum number of links/controllers required. If the customer requires redundancy (redundancy is strongly

recommended), this minimum number of links/controllers should be increased (and spread across IOC shelves) such that the failure of any link, MPC, EMPC, modem, DA gateway processor, or IOC shelf will not result in overload on any remaining link/controller or DA gateway processor.

For example, if an office needed twelve MPCs and had four IOCs, three MPCs/EMPCs per IOC (12 total) would carry the traffic. By provisioning four MPCs/EMPCs per IOC the loss of any individual IOC would still leave twelve working MPCs/EMPCs. However, the effect of a DA gateway processor failure must also be considered.

Many factors will determine the number of links, including the number of DA gateway processors, capacity of the DA gateway processors, number of IOC shelves, use of MPC vs. EMPC, baud rate, level of redundancy required, DA/INT traffic on the DMS, and traffic on other DMSs served by the same DA database. THERE IS NO FIXED FORMULA TO DETERMINE THE NUMBER OF LINKS REQUIRED TO ACHIEVE THIS. Contact the database supplier (NT-NAS or IBM) for assistance determining the number of links required.

In the past, doubling the minimum number of links was recommended. However, this could result in either too few or too many links.

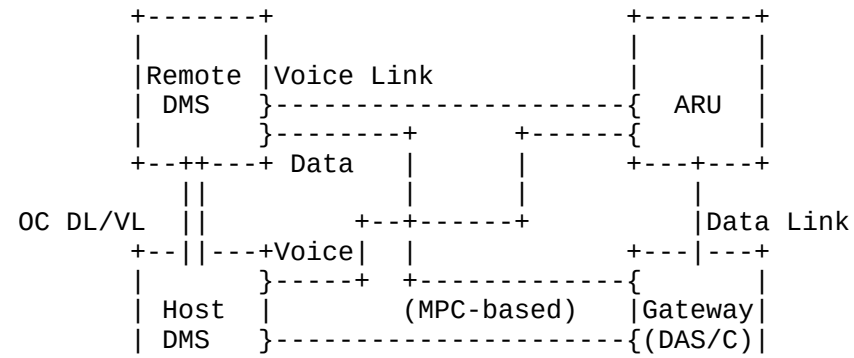
Refer to ECM 316 for additional information about EMPCs. Refer to ECM 633 for modem ordering information.

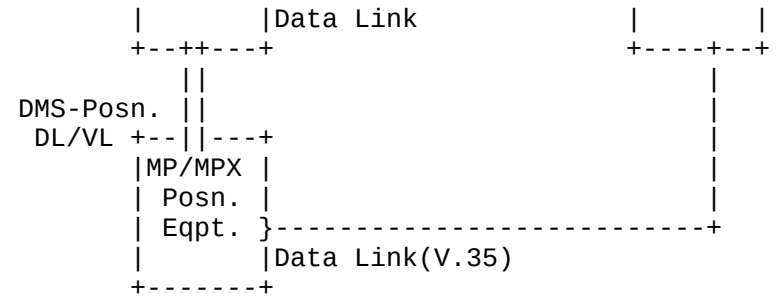
Call Control Links for DA with Operator Centralization

When the Operator Centralization (OC) feature is used, additional DMS-DAS/C data links and DMS-ARS voice links are required from the remote DMS office(s). Provisioning for these links is based on the same guidelines as the Host links performing the same functions. On an OC Directory Assistance call, DMS to Gateway (DAS/C) communication occurs between the remote office and the Gateway.

If multiple host DMSs are connected to a single gateway, closedown can be supported.

See Figure 3 for OC System configuration for TOPS with Directory Assistance.





10.4.3.4 Operator Centralization Datalinks

OC data links are required between the host DMS200 and the remote DMS200. These OC data links must be assigned to a DCM at both offices. A host OC can be assigned a maximum of 15 remote OC offices.

A minimum of two OC data links are required per remote office and a maximum of four OC data links can be assigned per OC remote office. If a remote office is connected to multiple host offices (e.g. using the feature Host/Remote Networking by Queue Type to direct calls to different hosts according to call type), the remote can have up to four OC data links per host.

Each OC datalink has a traffic capacity equal to 50 positions. Provision one datalink for redundancy. Therefore, with redundancy, two links will support up to 50 positions of traffic, three links will support up to 100 positions of traffic, and four links will support up to 150 positions of traffic. For maximum reliability, it is recommended that these links be routed over physically separate facilities.

Each link must be assigned to the first circuit of slot 0 on the DCM. Only one data link may be assigned per DCM. The other circuits on the DCM may be used for the connection of OC voice links or other type trunk circuits.

10.4.3.5 Operator Centralization Voice Links

Between each remote and its host, provide voice links (on DCMs, DTCs, and/or LTCs) as follows:

1. Using the remote-originating HDBH (high day busy hour) traffic in CCS, determine the number of trunks required from a Poisson table at .001 blocking.

2. Add approximately 5%, depending upon telco practice, for assistance (but NOT monitoring).

3. Provide an additional span (or spans) and distribute them over physically separate facilities, such that the failure of any single facility will leave a sufficient number of voice links in operation.

10.4.3.6 Three Port Conference Circuits

In a remote OC, provide one three-port conference circuit for each OC voice link between the remote and the host (including the additional links for assistance and redundancy). Because this provides three-port conference circuits for redundant links, this will allow normal operation during the failure of some three-port conference circuits, and provide additional capacity for occasional peak traffic loads (by having three-port conference circuits for all voice links).

In a host OC, provide three-port conference circuits as follows:

1. Using the host-originating HDBH traffic in CCS, determine the number of circuits required from a Poisson table at .001 blocking.

2. Add 5-10% (depending upon telco practice) for assistance on calls originating at the host, for all monitoring activity, and for functions such as third-number billing verification, which require a second three-port conference circuit (both for calls originating at the host and calls originating at the remotes).

3. For redundancy, add the LARGER of:

   - 5%

   - one additional conference circuit pack.

In a stand-alone office, provide three-port conference circuits as follows:

1. Provide one conference circuit per position (including assistance/in-charge positions).

2. Add approximately 5% (depending upon telco practice) for functions such as third-number billing verification, which require a second three-port conference circuit.

3. For redundancy, add the LARGER of:

   - 5%

   - one additional conference circuit pack.

| (text deleted) Beginning with BCS34, a single DMS can have as much traffic as can be supported by the maximum number of positions (1022).

10.4.3.7 ARU Trunk Provisioning

The number of ARUs is determined by many factors, including busy hour call volume, average holding time, GOS (grade of service, i.e. blocking probability), and redundancy requirements (customers may want no ARU redundancy, or redundancy to cover the loss of a DS-1 link, or redundancy to cover the loss of a complete ARU). The number of ARUs required to support a given DMS may also be affected by other DMSs served by the

same DA/INT database system. Contact the database supplier (NT-NAS or IBM) for assistance determining the number of ARUs. Poisson trunk capacity tables are listed in NTP Planning and Engineering Guides.

Provide trunks on DTCs/DCMs to connect the required number of ARUs. Refer to SEBs to insure that the real-time capacity of the DTCs/DCMs is not exceeded. Spread the DS1s evenly over the number of required DTC/DCM.

10.4.3.8 TOPS MP Datalinks (without TMS)

The TOPS MP product has been MD.

10.4.3.9 TOPS QMS

Force management Basic Statistics are provided to devices QTADS, QFADS and QMFADS. These devices replace the TADS, FADS and MFADS of the TOPS ACD. The QTADS, QFADS and QMFADS hardware requirements are the same the TADS, FADS and MFADS. This hardware includes a DMODEM circuit, a BELL108 or BELL202 compatible modem and a TTY. The QTADS, QFADS and QMFADS can co-exist in an office during the transition period from TOPS ACD to TOPS QMS. TOPS QMS queue information can only be reported to the QTADS, QFADS or QMFADS devices.

The FMCRT (Force Manager) provisioning rules remain the same. The Force Manager position must be a customer provided TOPS MP or TOPS 4 position. A TOPS MPX position cannot serve as a Force Manger position. Only one Force Manager can be provisioned per TOPS office.

The new external MIS system can replace the FMCRT, QTADS, QFADS and QMFADS, can be used in parallel with those devices, or not implemented at all. The external MIS system shall be provided by the customer.

The link for sending the statistics to the (optional) external MIS system is an X.25 link. This link is implemented via an Enhanced Multi-Protocol Controller (EMPC) mounted on an Input/Output Controller shelf in the TOPS host office. One EMPC is required per link (use only one of the two ports on the EMPC). Refer to the SEB to determine the number of links required. Refer to the modem ECM 633 or provisioning appropriate modems (based on the speed of the link and the interface requirements of the external MIS system).

The TOPS QMS Senior Operator feature requires a TOPS loop-around trunk for each Senior Operator established. This may require additional trunks or T1 connections in the TOPS office.

10.4.3.10 Loop-Around Trunk Requirements

ALL TOPS-to-line traffic in DMS-100/200 TOPS offices requires loop-around trunks, regardless of BCS/PCL release.

Beginning with TOPS03 (NA003), ALL line-to-TOPS traffic requires loop-around trunks. For BCS-36 and prior, a portion of the line-to-TOPS traffic requires loop-around trunks. Refer to ECM 273 for more information.

Loop-around trunks may be on DTCs or LTCs.

10.4.4 Digital Trunks

For trunking and cabling information for IWS , see ECM 695.i

10.4.5 Channel bank

Channel bank equipment is supplied by the telephone operating company. For T1 channel banks, Nortel recommends the following:

- DE-4 Enhanced (MD)
- DE-4E Smart

To support the RS-422 on a DE-4 or DE-4E Smart, the NT4S06AC data interface card must be provisioned. One NT4S06AC card is required per data interface to the T1 channel bank.

The E1 channel bank Nortel recommends is manufactured by Bayly communications, Inc.

10.4.6 Office Layout Information

10.4.6.1 TOPS MP Layout Information

The TOPS MP product has been MD.

10.4.6.2 TOPS IWS Layout Information

TOPS IWS positions must be located within 1200 feet of the MIS frame. The distance from the furthest position to the channel bank must not exceed 1500 feet.

The cables from each BIX block must be run through the Main Distributing Frame (MDF) to the outside world. Termination's for 80 pairs per Token-ring must be provided (20 pair voice receive, 20 pair voice transmit, 20 pair data receive, 20 pair data transmit). BIX to TSG cables must be terminated at the TSG (to allow grounding directly on the Timing Source Generator, and because of impedance requirements).

10.4.6.3 Miscellaneous Frame

The Misc Frame configuration depends on whether token ring or ethernet configuration is used.

Token ring

For the token ring configuration, MAUs and BIX Blocks mount on the front and back of the MIS frame. Equipment for token rings 0 and 1 mount on the front. Equipment for token ring 2 and 3 mount on the back.
With 16 position per token-ring, one MIS frame can accommodate 64 positions. With 20 position per token ring, one MIS frame can serve 80 positions.

Provide two (MAU) adapter brackets for each group of 3 MAUs (3 MAUs are required per token-ring).

Provision one (1) BIX block assembly (NTNX5103) per token ring LAN.

The following table shows the mounting positions for MAUs and BIX equipment on the MIS frame for token ring configuration.

Table 4. MAU and BIX mounting positions for token ring configuration

	Front	Back
MAU	74	71
MAU	69	66
MAU	96	60
BIX	40	40
MAU	32	29
MAU	27	24
MAU	21	18

The following figure show how the BIX and MAU will mount in the Misc Frame.

Figure 13. MISC FRAME FOR TOKEN RING

Figure 14. WIRING CLOSET MISCELLANEOUS FRAME LAYOUT

| Ethernet

| For the ethernet configuration, BIX Blocks mount on the front and back
| of the MIS frame. Their position on the front and back are the same.
| With 20 position per ethernet, one MIS frame can accommodate 16 LANs
| or 320 positions.

| Provision one (1) BIX block assembly (NTNX5103) per ethernet LAN.

| The following table shows the mounting positions for BIX equipment on the MIS frame for ethernet configuration.

Table 4. BIX mounting positions for Ethernet configuration	
BIX 0, 1	70
	60
BIX 2, 3	51
	41
BIX 4, 5	32
	22
BIX 6, 7	13
	8

| The following figure show how the BIX and MAU will mount in the Misc Frame.

Figure 15. ETHERNET MISCELLANEOUS LAYOUR

10.4.7 Traffic Tables

10.4.7.1 TOPS MP AND TOPS MPX POSITIONS

Complete Half-Hourly Force Capacity Tables are included in the following NTPs:

- 297-2271-310 - TOPS 04 Force Management Guide
- 297-2281-310 - TOPS MP Force Management Guide
- 297-2291-310 - TOPS MPX Force Management Guide
- 297-2291-311 - TOPS MPX NT DA Force Management Guide

Generally, the number of positions required will be based upon telco estimates but the Tables are available for reference.

10.5 Product/System Specification

10.5.1 Physical Characteristics

10.5.1.1 Frame and Logic Grounding

The Frame Ground is separate from the Logic Ground to conform to Isolated System Grounding (ISG) principles.

10.5.1.2 TOPS MP

The TOPS MP product has been MD.

10.5.1.3 TOPS MPX

The components used for TOPS MPX have the following physical characteristics:

(*) C/D PS/2	4" X 16" X 15.6"	21 lb.
NTNX51FB/PB	6.5" X 17.2" X 15.5"	33 lb.
Monitor 8512	10.75" X 12.4" X 15"	23 lb.
Monitor 9518	13.6" X 13.9" X 15.4"	28.6 lb.
Monitor 9524	15.8" X 14.4" X 16.2"	31 lb.
MAU	17.6" X 8" X 2.66"	5.5 lb.
MAU Housing	23" X 12" X 4"	4 lb.
DSU	2" X 8" X 10"	1 lb.
Keyboard	2" X 20.5" X 10"	7 lb.

* "C/D" PS/2 refers to NTNX51CB/CC/CD/DB/DC/DD.

10.5.2 EMI/Earthquake Information

Refer to "TOPS MP Layout Information" .

10.5.3 Sparing Information

10.5.3.1 TOPS MP

The TOPS MP product has been MD.

10.5.3.2 TOPS IWS

The TOPS IWS positions are normally spared by ordering a complete position of each type (gateway or operator) or multiples of each type. Note that database and DMS gateway positions have identical hardware - they are differentiated by datafill and function. Also note that a complete position includes items which are provisioned separately (keyboard, RTIC, DSU, power strip, headset jack assembly, and software). The quantities are determined by the Customer. Refer to the Engineering Manual Section for part numbers.

10.5.4 Power Feed and Fusing Requirements

The TOPS MP product has been MD.

10.5.5 Current Drain Information

AC power must be supplied for TOPS IWS positions. Protected AC shall be used for this application.

For current drain information for IWS equipment, see ECM695.

10.6 Software Provisioning

10.6.1 IWS software

For IWS software ordering information, see ECM695.

10.6.2 Required Software Packages and Interdependencies

All software covered in this section is CM software, except for NTG324AA. NTG324AA is ordered for the positions/TOPS office, NOT for the host office.

Packaging information is accurate at time of publication but, due to changes often made in packaging, should be checked in SMS and/or SOLID for updates, inter-dependencies, and availability.

The TPC should be treated as other peripherals and loaded two weeks prior to the CC upgrade. The TPC loads are backwards compatible with the CC for up to 3 software versions. For example, TPC05 would be compatible with TOPS05, TOPS04, TOPS03, and TOPS02. The TPC loads are NOT forward compatible with the CM. For example, TPC05 would NOT be compatible with TOPS06. These TPC-CM compatibility requirements apply to all CMs in the TOPS network (i.e. the host CM and all remote CMs). Also note that integrated TPCs should be loaded before the TMS or ETMS.

10.6.2.1 LET003 to LET006 limitation

When upgrading software (applying a One Night Process ONP“), sites CANNOT go from LET003(TOPS03) directly to LET006 (TOPS06).

Before a site is upgraded (ONP) from LET003 to LET006, an intermediate load, LET004 (TOPS04) or LET005 (TOPS05), must be installed. Since LET004 was not released in Canada, sites in Canada must upgrade to LET005 before going to LET006. US or international sites can upgrade to either LET004 or LET005 before going to LET006.

In addition, Operator Centralization (OC) configurations CANNOT handle LET003/LET006 loads in the same network.

Please note: This applies to both ONP and OC configurations. Upgrading from LET003 to LET006 will cause the ONP to abort. An OC configuration cannot handle both LET003 and LET006.

10.6.2.2 TOPS MP Software (Toll & Assist only)

The TOPS MP product has been MD.

10.6.2.3 TOPS MP NT-NAS (CCI) Directory Assistance

The TOPS MP product has been MD.

10.6.2.4 TOPS MP IBM Directory Assistance

The TOPS MP product has been MD.

10.6.2.5 TOPS MP ORDB Feature Packages

The TOPS MP product has been MD.

10.6.2.6 TOPS MPX (IBM DA AOSS) Software Packages

| TOPS MPX AOSS has been MD'd.

| (text deleted)
NTXD38AA TOPS MPX (Remote Master Package)
Prior to the introduction of the NTNX51FB position, software for MPX positions (Floppy Diskettes) was included in the host package (NTXD37AA). With NTNX51FB, NTNX51PB, and all subsequent positions, the following package must be ordered for EACH position. THIS PACKAGE MUST BE ORDERED AS A HARDWARE ITEM BY THE SAE/EAE:
NTG324AA IBM DA (AOSS)

10.6.2.7 TOPS QMS Feature Packages

| QMS software resides in the ADVQ layer of the TOPS PCL.

10.6.2.8 Additional (Optional) Feature Packages for MP and/or MPX

The features listed here must be ordered separately from the packages previously listed.

NT0X36AA TOPS Inward Validation
NTX096AA TOPS NOTIS Format
NTX035AA TOPS Remote CAMA
NTX141AA TOPS City Zone Rating
NTX188AA TOPS Bellcore AMA Format
NTXE20AA TOPS Extended Bellcore AMA Format
NTXE18AA TOPS AMA Enhancements
NTXE73AA Improved Statspac
NTXE95AA TOPS Permanent Hold
NTXJ96AA Enhanced MFADS
NTXS18AA TOPS Multiple NPA Support
NTXE34AA TOPS E911
NTXE71AA Directory Assistance Toll Branding
NTX140AA TOPS Dial-Up Autoquote
NTXN51AA TOPS Support of Internal DRAM
NTXF10AA Automated DA Call Completion with Alternate Billing
NTXE36AB Automatic DA Call Completion
NTXN49AA Automatic Intercept Call Completion
NTXN84AA Automatic OIA Session Start
NTXA60AA TOPS Close Down
NTXN54AA Host/Remote Networking by Queue Type
NTX825AB Exchange Access Alternate Billing Services

NTX552AD Exchange Access Alternate Billing Services for Canada
NTXE68AA TOPS Expanded Calling Card: Formatting and CCS7 Validation
NTXE72AA TOPS Expanded Calling Card: Formatting and CCS7 Validation
NTXS19AA TOPS DN Call Screening
NTX187AA Base TOPS Equal Access
NTX714AA TOPS Interlata Carrier Service
NTX891AA TOPS Exchange Access Operator Services Signaling
NTXA26AA TOPS Incoming Feature Group D Signaling
NTXE35AA Alternate Carrier Selection
NTXP78AA FGB Carrier Code Expansion
NTX850AB TOPS Alternate Announcement
NTXE04AA Screened Service Routing
NTXJ37AA TOPS External Audio Response System, Host and Remote
NTXN04AA TOPS External Audio Response System, Host and Remote
NTXN52AA Two Digit ANI - TOPS Office

10.6.2.9 TMS, AABS, ACTS, and ADAS

Software ordering information for TMS, AABS, ACTS, and ADAS is given in the ECMs for these products ("Cross-Reference Publications")

10.6.3 Software Usage Restrictions

10.6.3.1 TPC Software

Dual HSDA requires BCS 34 or higher. The Dual HSDA feature is included with the standard TPC software. No additional software packages need to be ordered for Dual HSDA.

The SCSI TPC shelf NTNX61AF (MD)} requires a BCS 33 or later TPC load for operation.

10.6.3.2 QMS Software

For BCS-34 and later: NTX030BA (TOPS ACD Features) must NOT exist in a load in a QMS remote only configuration. In other words, if NTXP42AA (TOPS Remote QMS) is provisioned, NTX030BA must NOT exist in the same load, unless host QMS software (NTXP41AA and NTXR48AA) is also present.

10.6.3.3 Other DMS Software

Hosts and remotes with different versions of TOPS software can be incompatible. The existing procedure for updating Operator Centralization (OC) software is that the host must be updated before the remote. This procedure will apply in TOPS MP as well as TOPS 4. Also, the host cannot have any in-service TOPS MP positions until the remote is upgraded to TOPS MP software.

A TOPS MP remote cannot communicate with a TOPS 4 host because the host is not able to tell the remote what kind of position it has the remote will not know whether to send TOPS 4 or TOPS MP commands.

A TOPS 4 remote cannot communicate with a TOPS MP host because if a TOPS MP position is associated with an OC call, the remote will not be able to send TOPS MP commands to the position. If there are no TOPS MP positions on the host this configuration does work.

Therefore, the procedure for upgrading OC offices to TOPS MP is to first update the software in the host without adding any in-service TOPS MP positions, second, update the software in all the remotes, and third, put the TOPS MP positions on the host into service.

Service monitoring must be performed by like equipment (i.e. TOPS MP monitors must monitor TOPS MP positions and TOPS 4 monitors must monitor TOPS 4 positions). The exception to this monitoring is the Force Manager Position. A TOPS MP Force Manager is able to monitor TOPS 3/4 as well as TOPS MP and a TOPS 3/4 Force Manager is able to monitor TOPS MP as well as TOPS 3/4.

10.6.3.4 DRAM Assignment Restrictions

Mechanized Calling Card Service (MCCS),provided in feature NTX171CA, requires at least one dedicated DRAM. The same DRAM is used for the Exchange Alternate Billing Service (EABS) feature (NTX825AB).

Since the controller is dedicated in software to MCCS type announcements, the other cards on that DRAM cannot be used for any other type of announcement.

10.6.4 Memory Provisioning

Refer to MEMCALC.

10.7 Real Time Impact

Refer to the SEB (Systems Engineering Bulletin).

11.0 ECM684 - TOPS MPX NT DA AOSS

11.1 Overview

With the introduction of NT DA, TOPS MPX positions can access the Network Application Systems (NAS) Directory Assistance (DA) database. Previously, the NAS DA database was accessible from TOPS MP positions (and other non-NT positions).

The development of NT DA required new software for the MPX positions, a new keyboard, an upgraded position base, and a modem and modem cable for dial-in maintenance capability. NT DA uses existing hardware and software for all other elements of the MPX system (token ring hardware, MIS frame equipment, TMS, CM, and IOE).

For NT DA AOSS, the provisioning of TOPS MPX equipment is NOT affected by the type of NT-NAS DA database (DAS/C, DDA, or Directory One).

11.2 Hardware Configurations.

In order to support the NT DA AOSS application, NTNX51CB/CC/CD/DB/DC/DD positions require an upgrade to the position base and to the keyboard. Refer to the Engineering Manual Sections for the PECs for upgrade kits. The minimum requirements for NT DA AOSS are:

486 processor
8 MB RAM
106 MB disk

All new positions provide at least the minimum requirements.

11.3 Hardware Provisioning

11.3.1 Hardware Usage Restrictions

- NT DA AOSS requires PS/2 positions with 486 processor, at least 8 MB RAM, and 106 MB or larger disk.
- Mixing MP, MPX AOSS, and MPX IWS positions in an OSC IS permitted.
- Mixing MPX AOSS and MPX IWS positions on a token ring is NOT permitted.
- Mixing MP, MPX AOSS, and MPX IWS positions on a TMS IS permitted (including mixing positions on DS-1 and DCH CPs).
- Mixing NT DA and IBM DA on a DMS is NOT permitted, except during a transition from one DA database to another.
- For NT DA AOSS, cluster size must be four.
- Redundant datalinks (two DMS gateway positions per cluster) are

STRONGLY RECOMMENDED for reliability.
- A cluster can NOT be split over more than one token ring.

11.3.2 Hardware Dependencies

Refer to ECM 606 for general TOPS MPX requirements (e.g. timing source generator, call control links, three-port conference circuits, etc.).

11.3.2.1 P and C Side Port Requirements

Not applicable.

11.3.2.2 DMS BUS Port Requirements

Not applicable.

11.3.2.3 Circuits Per Card

Not applicable.

11.3.2.4 Discrimination Numbering

Numbering: TOPS XXX

11.3.3 Provisioning Considerations

11.3.3.1 20+2 Token Ring Config (with Routers)

For redundant configurations, each cluster must have two DMS gateway (formerly called "type 2") positions (a single DMS gateway position is permitted if it is the only position in the cluster). For non-redundant configurations, each cluster must have one DMS gateway position. Non-redundant configurations are NOT recommended. Cluster size of four is the only cluster size supported for NT DA AOSS.

The other two or three positions in each cluster (depending on whether it is a redundant configuration) are operator (formerly called "type 3") positions. Optionally, one operator position on each token ring may be equipped with a dial-up modem and additional software, enabling it to function as a combined operator/maintenance position.

Two "router" positions are required on each token ring. Routers are dedicated to the task of routing messages between the NAS database and the other positions on the token ring. Routers differ from database gateway positions in the following ways:

- Routers are NOT part of any cluster.
- Routers do NOT provide operator functionality.
- Routers do NOT require connection to the TSG (Timing Source

Generator).
- Three-port conference circuits (in the DMS) are NOT required for routers.

Each token ring has a maximum of five clusters of up to four positions each. In addition, each token ring has two router positions, which are not part of any cluster. Unlike TOPS MPX IBM DA AOSS, there is no recommendation to limit the number of positions on the token ring to something less than the maximum. (TOPS MPX IBM DA AOSS recommends sixteen positions per token ring, while the maximum allowed is twenty positions per token ring.)

Position/Cluster/MAU Assignments:

Cluster	-1--	-2--	-3--	-4--	-5--	n/a
MAU #	0120	1201	2012	0120	1201	20
MAU Connection #	1112	2233	3444	5556	6677	78
Position Type	GGOO	GGOM	GGOO	GGOO	GGOO	RR
BIX Voice Conn #	0000	0000	0111	1111	1112	--
	1234	5678	9012	3456	7890	--
BIX Data Conn #	00	00	01	11	11	12
	12	56	90	34	78	60

G = DMS Gateway Position
O = Operator Position
R = Router
M = Combined Operator/Maintenance Position

A combined operator/maintenance position (optional) can be in any cluster.

11.3.3.2 Standard 20 Position Token Ring Config (no Routers)

For redundant configurations, each cluster must have two DMS gateway (formerly called "type 2") positions (a single DMS gateway position is permitted if it is the only position in the cluster). For non-redundant configurations, each cluster must have one DMS gateway position. Non-redundant configurations are NOT recommended. Cluster size of four is the only cluster size supported at this time (for NT DA AOSS).

Each token ring must contain two database gateway (formerly called "type 1") positions. If there is more than one cluster on the token ring, it is recommended that these positions be in different clusters. (It is recommended that the token ring contain at least two clusters.) Database gateway positions provide operator functionality, in addition to routing messages to the directory

assistance system. This "standard" configuration does not use dedicated routers.

The other positions in each cluster (non-gateway) are operator (formerly called "type 3") positions. Optionally, one operator position on each token ring may be equipped with a dial-up modem and additional software, enabling it to function as a combined operator/maintenance position.

Each token ring has a maximum of five clusters of up to four positions each. Unlike TOPS MPX IBM DA AOSS, there is no recommendation to limit the number of positions on the token ring to something less than the maximum. (TOPS MPX IBM DA AOSS recommends sixteen positions per token ring, while the maximum allowed is twenty positions per token ring.) The only other hardware differences between IBM DA AOSS and the "standard" NT DA AOSS configuration are:

- NT DA AOSS requires positions with a minimum of 486 processor, 8 MB RAM, and 106 MB disk.
- NT DA AOSS supports an optional maintenance position.

Other than the above differences, the hardware requirements for the standard configuration of NT DA AOSS are identical to those of IBM DA AOSS.

Position/Cluster/MAU Assignments:

Cluster	-1--	-2--	-3--	-4--	-5--
MAU #	0120	1201	2012	0120	1201
MAU Connection #	1112	2233	3444	5556	6677
Position Type	GGDO	GGDM	GGOO	GGOO	GGOO
BIX Voice Conn #	0000	0000	0111	1111	1112
	1234	5678	9012	3456	7890
BIX Data Conn #	000	000	01	11	11
	123	567	90	34	78

G = DMS Gateway Position
D = Database Gateway
O = Operator Position
M = Combined Operator/Maintenance Position

A combined operator/maintenance position (optional) can be in any cluster.

11.3.4 Office Layout Information

The modem for a combined operator/maintenance position will not be connected to the BIX block in the MIS frame; it will be cabled to a customer-provided telephone outlet using the teledapt cable provided with the modem.

In the 20+2 configuration, DSUs for the router positions will be connected to D 6 and D20 on the BIX block in the MIS frame.

11.3.5 Traffic Tables

Not applicable.

11.4 Product/System Specification

11.4.1 Physical Characteristics

Refer to ECM 606. NTNX51GB positions have the same physical characteristics as NTNX51CB/CC/CD/DB/DC/DD positions.

11.4.2 EMI/Earthquake Information

Not applicable.

11.4.3 Sparing Information

TOPS MPX positions are normally spared by ordering complete positions. The quantities are determined by the customer. Refer to the Engineering Manual Section for part numbers.

11.4.4 Power Feed and Fusing Requirements

Not applicable.

11.4.5 Current Drain Information

Refer to ECM 606.

11.5 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

At the time of writing this ECM, the packages listed provide the basic requirements for DMS and position software. Check SOLID for updates and interdependencies.

11.5.1 Required Software Packages and Interdependencies

11.5.1.1 DMS 100/200

NT DA AOSS did not require the development of any DMS software. However, new master packages were created to provide the set of features required. BCS 34 or higher is required.

Provide the following package for each standalone DMS supporting NT DA AOSS:

NTXC38AB TOPS MPX STD DA Terminal (Standalone/Host)

Provide the following packages for each host DMS supporting NT DA AOSS:

NTXC38AB TOPS MPX STD DA Terminal (Standalone/Host)
NTX039AA Host OC Data Link Handling
NTX873AA Host TOPS MP OC Data Link Handling

Provide the following package for each remote DMS supporting NT DA AOSS:

NTXC39AB TOPS MPX STD DA Terminal (Remote)

11.5.1.2 Operator Positions

Provide the following packages for EACH operator position:

PKG ID	CPC	DESCRIPTION
NTG384AA	A0601713	Operating System Module
NTG383AA	A0385823	Task Manager Module
NTG325AA	A0600691	LAN Manager Module
NTG329AA	A0600689	Network Communication Module
NTG326AA	B0238317	NAS DA Application and Base

11.5.1.3 Combined Operator/Maintenance Positions

Provide the following packages for EACH combined operator/ maintenance position:

PKG ID	CPC	DESCRIPTION
NTG384AA	A0601713	Operating System Module
NTG383AA	A0385823	Task Manager Module
NTG325AA	A0600691	LAN Manager Module
NTG329AA	A0600689	Network Communication Module
NTG326AA	B0238317	NAS DA Application and Base
NTG328AA	A0600690	LAN Access Module (maint pos only)

11.5.1.4 Gateway Positions (DMS Gwy, Database Gwy, and Router)

Provide the following packages for EACH gateway position:

PKG ID	CPC	DESCRIPTION
NTG384AA	A0601713	Operating System Module
NTG383AA	A0385823	Task Manager Module
NTG325AA	A0600691	LAN Manager Module
NTG329AA	A0600689	Network Communication Module
NTG326AA	B0238317	NAS DA Application and Base
NTG327AA	A0600692	Gateway Communication Module

11.5.2 Software Usage Restrictions

Mixing NT DA (AOSS or IWS) and IBM DA (AOSS or IWS) on a DMS is NOT permitted, except during transition from one DA database to another.

The NAS DA system requires software patch DAZ51 in order to support both MPX positions and TOPS04 positions on the same DMS.

11.5.3 Memory Provisioning

NT DA AOSS has the same DMS memory requirements as IBM DA AOSS. Refer to MEMCALC.

11.6 Real Time Impact

DMS real-time requirements are the same for NT DA AOSS as for IBM DA AOSS. There are new DCH engineering rules in the TMS for NT DA AOSS. Refer to the Systems Engineering Bulletins.

12.0 ECM695 - TOPS IWS overview and provisioning rules Release 2.93 and up

12.1 Overview

Product/System Overview

The TOPS MPX AOSS platform is a single function terminal which supports Directory Assistance (NT or IBM). TOPS IWS supports multiple services and uses industry standard software. The TOPS IWS platform refers to hardware and software, including the PC (MCA or ISA architecture) with plug-in cards, industry standard operating system and communications software, and several application and utility programs developed by BNR. TOPS IWS uses Open Position Protocol (OPP) for communications between the DMS and the positions.

The TOPS IWS platform includes the IWS Base and the Base HMI which are packaged together. Applications which run on the TOPS IWS platform include:

- Operator Assistance (OA) which includes the following:
    - OA
    - NTOA (the recommended operator assistance application)
        - provides all capabilities that OA does plus the following:
            - Scripting
            - all of the GOS features
            - Estimate of Charges
    - NTOA +
        - provides all capabilities that NTOA does plus the ability to connect to a calling card database (CCDB).

NOTE: OA and NTOA can NOT work on the same workstation. Do NOT provision both on one workstation.

- Open Information Access (OIA)
    - Allows IWS positions to access another service (e.g. ORDB).
- Northern Telecom Directory Assistance (NTDA) IWS
- IBM DA

This ECM does NOT cover provisioning of the Application Programmer Interface (API) or Software Developer's Kit (SDK). Contact TOPS Product Line Management (PLM) for information on the API/SDK.

12.1.1 IWS configuration types

With the introduction of IWS Release 9.0, two configuration types are offered:

- Token-ring
- Ethernet

All OCs with existing token ring should continue to use the token ring configuration for extensions. New offices can use either token ring or ethernet. For more information on the ethernet offering, in IWS09, see "Ethernet configuration".

12.1.2 IBM and Nortel's partnership

The IBM/Nortel relationship has evolved from a partnership to one where the two companies design, test, market, support, and distribute their products independently.

All of IBM's design and test activities are done independently through the API/SDK program and through NT's Vendor Validation Lab (VVL).

12.2 HARDWARE CONFIGURATIONS

NTNX51CB/CC/CD/DB/DC/DD (all rated MD) positions can no longer be upgraded. All upgrade kits have been MD. A new workstation must be purchased to support IWS Release 2.93 and later.

Nortel will no longer be able to support the hard drive upgrades for 5.25 inch disk drives. The 5.25 in. drives have been rated MD. The upgrade kit, NTNX51KN, is rated MD.

12.2.1 Minimum workstation configurations for IWS Release 2.93 and up

The minimum requirements for MPX-IWS Release 2.93 and up are:

- 486 processor
- 8 MB RAM
- 1 6 or 212 MB disk (rated MD)
- 540 MB disk or 1 GB disk.

The following workstations can be used in MPX-IWS Release 2.93 and up.

- NTNX51PB (MD), NTNX51FB (MD), and NTNX51GB (MD). They have positions have the following configuration:
  - 486 processor
  - 8 MB RAM
  - 1 6 or 540 MB disk
- NTNX51NB (MD). It has the following configuration.
  - 486 processor
  - 8 MB RAM
  - 540 MB disk
- NTNX51TB (MD). It has the following configuration:
  - 75 MHZ Pentium processor
  - 8 MB RAM
  - 840 MB

The following workstation can ONLY be used with IWS Release 6.0 (06BF version) and up.

- NTNX51VB (ISA Intel 'Rhinestone'). It has the following configuration:
  - 166 MHz MMX processor
  - 3 MB RAM
  - 2.5 GB disc drive

IWS Release 6.0 does NOT require the NTNX51VB however, the NTNX51VB DOES require IWS Release 6.0 (06BF version). For software release limitations and workstation limitations with the PCI audio card, see "PCI Audio Card"

The NTNX51VB is the only position available for shipment. All other positions have been MD'd.

These configurations may be used for any position and are STRONGLY RECOMMENDED for some positions and software applications. Refer to section "Hardware Usage Restrictions" to determine when these configurations are recommended. Refer to the Engineering Manual Sections for the PECs required to upgrade existing positions.

12.2.2 Integrated vs. Modular Offering

Prior to the introduction of IWS Release 2.93, Nortel offered IWS equipment only as a complete package, which always used MCA (IBM

PS/2) positions. The customer was required to purchase all the hardware from NT. With the release of IWS Release 7.0, Nortel offers two alternatives for IWS hardware:

- Integrated ISA. This is the method where all ISA hardware and software is supplied by Nortel. This position has an Industry Standard Architecture (ISA) type of BUS.

- Modular ISA. In this approach, the customer purchases the ISA CPU base unit and monitor from a third party, and Nortel supplies all other hardware and software.

Not all markets can use the integrated approach. Currently, the integrated approach is most commonly used in the North American market (US, Canada, 110V CALA). For non-North American markets, contact PLM and marketing to see if the integrated approach can be used.

If the integrated approach is used in the southern hemisphere, monitors must be sourced in country. This is due to the electromagnetic differences between the northern and southern hemisphere.

12.2.2.1 Position requirements for modular configurations

ISA positions (supplied by the customer) require a 486 processor, a minimum of 8 MB RAM, and a minimum disk size of 40MB. The position must use a 33 MHZ bus.

If the integrated approach is used in the southern hemisphere, monitors must be sourced in country. This is due to the electromagnetic differences between the northern and southern hemisphere.

12.3 Hardware Provisioning

12.3.1 Hardware Usage Restrictions

The following sections explain the hardware usage restricitons for IWS configuration types.

12.3.1.1 Hardware usage restrictions for token ring and ethernet configurations

The following lists hardware restrictions for token ring and ethernet IWS:

- Mixing IWS releases on a TMS is permitted

- Mixing IWS releases in an OSC is permitted ONLY during the cutover process. All positions in a token-ring or ethernet must be converted simultaneously.

- Mixing MP, MPX AOSS, and IWS positions in an OSC IS permitted.
- Mixing MP, MPX AOSS, and IWS positions on an ETMS IS permitted (including mixing positions on DS-1 and DCH circuit packs).
- Mixing cluster sizes on an ETMS IS permitted; however, the ONLY mixed cluster size configurations supported are those shown in "TOPS Increased Multiplexing", AF3003, in the TOPS Translation Guide. These mixed cluster configurations, shown as temporary configurations in AF3003 may be used as permanent configurations to support mixed cluster sizes.
- Mixing NTDA and IBM DA (AOSS or IWS) on a DMS is NOT permitted, except during a transition from one DA database to another.
- Redundant datalinks (two DMS gateway positions per cluster) are STRONGLY RECOMMENDED for reliability.
- Mixing 486 and Pentium positions in a cluster IS permitted.
- All positions must have a 486 or Pentium processor
- When supporting NTDA IWS and cluster size 20, redundant ASN (Access Stack Node) routers are REQUIRED. Dual port router sync cards can only support one database in a high reliability/high availability configuration.
- Cluster size of 20 positions can NOT be used with NT's DDA or DAS/C systems.
- Mixing the Maintenance Position (RAMP) and DMS Gateway/Database Gateway applications is NOT allowed on the same position.
- NTOA has not been tested to run in conjunction with the OA application; therefore, a customer should not be allowed to order both applications for use on the same position.
- The NTNX51BC/BD/BE, NTNX52BC, and NTNX52CC audio cards can be mixed within a cluster, ethernet LAN, or token ring.
- The NTNX51VB can only be used with IWS Release 6.0 (06BF version) and up.
- RS-422 in a T1 configuration requires IWS Release 7.0 and up.
- RS-422 in an E1 configuration require the following:
    - IWS Release 7.0
    - ISA RTIC card
    - PCI Audio card
- One (1) ETMS only supports 96 positions. See ECM468 for more information.

12.3.1.2 Hardware usage restrictions for token ring configurations

The following lists hardware restrictions for token ring configurations:

- Mixing MCA (PS/2), ISA and PCI positions in a cluster or token-ring IS permitted.
- Mixing MPX AOSS and IWS positions on a token-ring is NOT permitted.
- Mixing cluster sizes on a token-ring (e.g. one cluster of sixteen positions and a second cluster of four positions) is NOT permitted.
- Cluster size may be four, sixteen, or twenty.
- With cluster size of sixteen, the maximum number of positions on the token-ring is sixteen.
- A cluster can NOT be split over more than one token-ring.

12.3.1.3 Ethernet hardware usage restrictions

| The followings lists hardware usage restrictions for ethernet offices:

| - To reduce cost to customers, cluster size 20 is STRONGLY recommended; however, cluster size 4 and 16 will be supported.
| - Only RS-422 data connections to the DMS are supported with ethernet.
| - MCA positions can NOT be used in an ethernet LAN.
| - MPX AOSS positions are not supported on ethernet.
| - Only ISA and PCI audio cards are supported with ethernet.

12.3.2 Hardware Dependencies

The following lists hardware dependencies for TOPS IWS:

- E configurations with direct G.703 audio connections and RS-422 data connections require the PCI Audio card (NTNX52CC) and the ISA RTIC card (A0619543).

Refer to ECM 606 for general TOPS IWS requirements (e.g. timing source generator, call control links, three-port conference circuits, etc.).

12.3.2.1 P and C Side Port Requirements

Cluster size affects P and C side port requirements on the TMS and ETMS. Refer to ECM 468.

12.3.2.2 DMS BUS Port Requirements

Not applicable.

12.3.2.3 Circuits Per Card

Not applicable.

12.3.2.4 Discrimination Numbering

Numbering: TOPS XXX

12.3.3 Provisioning Considerations

Performance is influenced by:

- number and type of applications on the position (OA, DA, OIA).
- number of logs/swerrs received (operator/maintenance position only).
- position hardware (e.g. processor type).
- traffic mix across all positions on the LAN.
- DMS traffic load.
- LAN messaging from any additional applications (e.g. a Telco developed application via the Application Programmer Interface).
- cluster size.
- use of ASN routers vs. database gateways (applies only to IWS NTDA with D1 or CCDB). Use of ASN routers may offer decreased response times, but may be too costly for bureaus with few operator positions.

12.4 Token ring, MAU and cluster provisioning

Token-ring, MAU and cluster provisioning is dependent on the following:

- use of ASN routers to access Nortel NTDA or CCDB
- cluster size

The recommended number of positions per token-ring is sixteen. Up to twenty positions per token-ring are permitted. See section "Hardware Usage Restrictions" .

There are three cluster sizes available with token-ring provisioning:

- 4
- 16
- 2

12.4.1 ASN routers

ASN routers can only be configured with the following:

- IWS NTDA positions with Nortel D1
- NTOA+ positions with Nortel CCDB
- IWS NTDA with both D1 and CCDB
    - This configuration requires the QUAD card to be provisioned in the ASN router. The QUAD card and the ASN are ordered through Rochester.

ASN routers are NOT applicable to any other database (such as FT or IBM DA), NOR are they applicable to TOPS MPX NTDA AOSS positions with D1.

12.4.2 Token-ring position types without ASN routers

When ASN routers are NOT used to access NTDA or CCDB, there are four types of positions:

- DMS Gateway (formally type 2)
- Database Gateway (formally type 1)
- Operator
- Maintenance (RAMP)

12.4.2.1 DMS gateway

The DMS gateway position provides the token-ring with connectivity to the DMS.

With RS-422, DMS Gateway positions are not connected to the DMS via the BIX block. They are directly connected to the MDF via the NTNX36SD. For more information on RS-422 in a token-ring configuration, see "RS-422" .

For redundant configurations, two DMS gateway positions are required PER CLUSTER.

12.4.2.2 Database gateway

Two database gateway positions are required for EACH TOKEN-RING which supports DA. If there is more than one cluster on the token-ring, it is recommended that these database gateway positions be in different clusters (for reliability). Database gateway positions are ONLY required on token-rings which support DA.

NOTE: a cluster with a single DMS gateway position is permitted if the DMS gateway position is the only position in the cluster.

12.4.2.3 Operator and Maintenance positions

Positions which are not gateways (DMS or database) are called operator positions. One operator position on each token-ring may be equipped with a maintenance modem and cable. This position is referred to as an "operator/maintenance" position (RAMP), and is used for dial-in maintenance (in addition to normal operator functions). This position can be in any cluster.

A cluster is a group of positions which share common links to the DMS. Cluster size can be four, sixteen, or twenty. For cluster size four, a token-ring can have from one to five "clusters". For cluster size sixteen or twenty, the token- ring consists of a single cluster. A cluster does not have to be filled.

Note: Routers must be maintained by the Central Administration and Management System (CAMS). RAMP can not support maintenance or configuration of routers.

12.4.3 Token ring assignments without ASN routers

12.4.3.1 Assignments for Cluster Size 4

Table 1 gives position, cluster and MAU assignments for cluster size four supporting DA. For cluster size four without DA, substitute operator positions (O) for the database gateway positions (D). RAMP position will continue to be known as a Combined Operator/Maintenance position and referred to as an "M" or Maintenance position to distinguish it from a General Operator Position. With IWS, the Maintenance position is NOT optional.

Table 1. IWS token-ring cluster assignments for cluster size 4 supporting DA

position number	position type	cluster no.	MAU no.	MAU connection slot	BIX voice connection slot	V.35 BIX data connection slot	RS-422 BIX data connection slot
1	G	1	0	1	1	1	-----
2	G	1	1	1	2	2	-----
3	D	1	2	1	3	3	3
4	O	1	0	2	4	-----	-----
5	G	2	1	2	5	5	-----
6	G	2	2	2	6	6	-----
7	D	2	0	3	7	7	7
8	M	2	1	3	8	-----	-----
9	G	3	2	3	9	9	-----
1	G	3	0	4	1	1	-----
1	O	3	1	4	1	-----	-----
1	O	3	2	4	1	-----	-----
1	G	4	0	5	1	1	-----
14	G	4	1	5	14	14	-----
15	O	4	2	5	15	-----	-----
16	O	4	0	6	16	-----	-----
17	G	5	1	6	17	17	-----
18	G	5	2	6	18	18	-----
19	O	5	0	7	19	-----	-----
2	O	5	1	7	2	-----	-----

Legend: G = DMS Gateway position, O = Operator position, D = Database gateway position, M = RAMP position

NOTE: With the RS-422 configuration, the DMS gateway positions do not access the DMS via the BIX block. Data is connected directly to the MDF via cable NTNX36SD. For more information on RS-422 in a token-ring configuration, see "RS-422" .

12.4.3.2 Assignments for Cluster Size 16

Table 2 gives position/cluster/MAU assignments for cluster size sixteen supporting DA. For cluster size sixteen without DA, substitute operator positions (O) for the database gateway positions (D). RAMP position will continue to be known as a Combined Operator/Maintenance position and referred to as an "M" or Maintenance position to distinguish it from a General Operator Position. With IWS the Maintenance position is NOT optional. For cluster size four, refer to section "Assignments for Cluster Size 4" . For cluster size twenty, refer to section "Assignments for Cluster Size 20" .

Table 2. IWS token-ring cluster assignments for cluster size 16 supporting DA

position number	position type	cluster no.	MAU no.	MAU connection slot	BIX voice connection slot	V.35 BIX data connection slot	RS-422 BIX data connection slot
1	G	1	0	1	1	1	-----
2	G	1	1	1	2	2	-----
3	D	1	2	1	3	3	3
4	D	1	0	2	4	4	4
5	M	1	1	2	5	-----	-----
6	O	1	2	2	6	-----	-----
7	O	1	0	3	7	-----	-----
8	O	1	1	3	8	-----	-----
9	O	1	2	3	9	-----	-----
1	O	1	0	4	1	-----	-----
1	O	1	1	4	1	-----	-----
1	O	1	2	4	1	-----	-----
1	O	1	0	5	1	-----	-----
14	O	1	1	5	14	-----	-----
15	O	1	2	5	15	-----	-----
16	O	1	0	6	16	-----	-----

Legend: G = DMS Gateway position, O = Operator position, D = Database gateway position, M = RAMP position

NOTE: With RS-422 configuration, the DMS gateway positions do not access the DMS via the BIX block. Data is connected directly to the MDF via cable NTNX36SD. For more information on RS-422 in a token-ring configuration, see "RS-422" .

12.4.3.3 Assignments for Cluster Size 20

Table 3 gives position, cluster and MAU assignments for cluster size twenty supporting DA. For cluster size twenty without DA, substitute operator positions (O) for the database gateway positions (D). RAMP position will continue to be known as a Combined Operator/Maintenance position and referred to as an "M" or Maintenance position to distinguish it from a General Operator Position. With IWS the Maintenance position is NOT optional.

NOTE: Since cluster size 20 with NTDA IWS requires commercial routers, the configuration shown below applies only to IBM DA IWS, or to configurations without DA.

Table 3. IWS token-ring cluster assignments for cluster size 20 supporting DA

position number	position type	cluster no.	MAU no.	MAU connection slot	BIX voice connection slot	V.35 BIX data connection slot	RS-422 BIX data connection slot
1	G	1	0	1	1	1	-----
2	G	1	1	1	2	2	-----
3	D	1	2	1	3	3	3
4	D	1	0	2	4	4	4
5	M	1	1	2	5	-----	-----
6	O	1	2	2	6	-----	-----
7	O	1	0	3	7	-----	-----
8	O	1	1	3	8	-----	-----
9	O	1	2	3	9	-----	-----
1	O	1	0	4	1	-----	-----
1	O	1	1	4	1	-----	-----
1	O	1	2	4	1	-----	-----
1	O	1	0	5	1	-----	-----
14	O	1	1	5	14	-----	-----
15	O	1	2	5	15	-----	-----
16	O	1	0	6	16	-----	-----
17	O	1	1	6	17	-----	-----
18	O	1	2	6	18	-----	-----
19	O	1	0	7	19	-----	-----
2	O	1	1	7	2	-----	-----

Legend: G = DMS Gateway position, O = Operator position, D = Database gateway position, M = RAMP position

NOTE: With RS-422 configuration, the DMS gateway positions do not access the DMS via the BIX block. Data is connected directly to the MDF via cable NTNX36SD. For more information on RS-422 in a token-ring configuration, see "RS-422" .

12.4.4 Token-ring position types with ASN Routers

When ASN routers are used to access NTDA or CCDB, there are three types of positions:

- DMS Gateway (formally type 2)
- Operator
- Maintenance (RAMP)

Database gateway positions are not required. Messages are sent from positions to the DA database via ASN routers. Each token-ring is connected to two ASN routers. These ASN routers are NOT positions, and are NOT part of any cluster.

ASN routers are ordered with the Directory One (D1) DA database equipment (through NT Directory Services); this API does NOT describe provisioning for ASN routers.

12.4.4.1 DMS gateway positions

The DMS gateway position provides the token ring with connectivity to the DMS.

With RS-422, DMS Gateway positions are not connected to the DMS via the BIX block. They are directly connected to the MDF via the NTNX36SD. For more information on RS-422 in a token-ring configuration, see "RS-422" .

Redundant configurations require two DMS gateway positions PER CLUSTER.

12.4.4.2 Operator and maintenance positions

Positions that are not DMS or database gateways are operator positions. One operator position on each token-ring may be equipped with a maintenance modem and cable. This position is referred to as an "operator/maintenance" position, and is used for dial-in maintenance (in addition to normal operator functions). This position can be in any cluster.

A cluster is a group of positions that share common links to the DMS. Cluster size can be four, sixteen, or twenty. For cluster size four, a token-ring can have from one to five "clusters". For cluster size sixteen or twenty, the token- ring consists of a single cluster. A cluster does not have to be filled.

12.4.5 Token-ring assignments with ASN routers

There are three cluster sizes available with token-ring provisioning:

- 4

- 16
- 2

12.4.5.1 Assignments for cluster size 4

Table 4 gives position, cluster and MAU assignments for cluster size four supporting NT D1 or CCDB with ASN routers.

RAMP position will continue to be known as a Combined Operator/Maintenance position and referred to as an "M" or Maintenance position to distinguish it from a General Operator Position. With IWS, the Maintenance position is NOT optional. For cluster size sixteen with ASN routers, refer to section "Assignments for Cluster Size 16" . For cluster size twenty with ASN routers, refer to section "Assignments for Cluster Size 20" .

Table 4. IWS Token-ring cluster assignments for cluster Size 4 with ASN routers

position number	position type	cluster no.	MAU no.	MAU connection slot	BIX voice connection slot	V.35 BIX data connection slot	RS-422 BIX data connection slot
1	G	1	0	1	1	1	-----
2	G	1	1	1	2	2	-----
3	O	1	2	1	3	-----	-----
4	O	1	0	2	4	-----	-----
5	G	2	1	2	5	5	-----
6	G	2	2	2	6	6	-----
7	O	2	0	3	7	-----	-----
8	M	2	1	3	8	-----	-----
9	G	3	2	3	9	9	-----
1	G	3	0	4	1	1	-----
1	O	3	1	4	1	-----	-----
1	O	3	2	4	1	-----	-----
1	G	4	0	5	1	1	-----
14	G	4	1	5	14	14	-----
15	O	4	2	5	15	-----	-----
16	O	4	0	6	16	-----	-----
17	G	5	1	6	17	17	-----
18	G	5	2	6	18	18	-----
19	O	5	0	7	19	-----	-----
2	O	5	1	7	2	-----	-----
n/a	C	-----	0	8	-----	-----	-----
n/a	C	-----	2	8	-----	-----	-----

Legend: G = DMS Gateway position, O = Operator position, D = Database gateway position, M = RAMP position, C = ASN router

NOTE: With RS-422 configuration, the DMS gateway positions do not access the DMS via the BIX block. Data is connected directly to the MDF via cable NTNX36SD. For more information on RS-422 in a token-ring configuration, see "RS-422" .

12.4.5.2 Assignments for Cluster Size 16

Table 5 gives position, cluster and MAU assignments for cluster size sixteen supporting NT D1 and CCDB with ASN routers.

Table 5. TOPS IWS token ring cluster assignments for cluster size 16 with ASN routers

position number	position type	cluster no.	MAU no.	MAU connection slot	BIX voice connection slot	V.35 BIX data connection slot	RS-422 BIX data connection slot
1	G	1	0	1	1	1	-----
2	G	1	1	1	2	2	-----
3	M	1	2	1	3	-----	-----
4	O	1	0	2	4	-----	-----
5	O	1	1	2	5	-----	-----
6	O	1	2	2	6	-----	-----
7	O	1	0	3	7	-----	-----
8	O	1	1	3	8	-----	-----
9	O	1	2	3	9	-----	-----
1	O	1	0	4	1	-----	-----
1	O	1	1	4	1	-----	-----
1	O	1	2	4	1	-----	-----
1	O	1	0	5	1	-----	-----
14	O	1	1	5	14	-----	-----
15	O	1	2	5	15	-----	-----
16	O	1	0	6	16	-----	-----
n/a	C	-----	0	8	-----	-----	-----
n/a	C	-----	2	8	-----	-----	-----

Legend: G = DMS Gateway position, O = Operator position, D = Database gateway position, M = RAMP position, C = ASN router

NOTE: With RS-422 configuration, the DMS gateway positions do not access the DMS via the BIX block. Data is connected directly to the MDF via cable NTNX36SD. For more information on RS-422 in a token-ring configuration, see "RS-422" .

12.4.5.3 Assignments for Cluster Size 20

Table 6 gives position, cluster and MAU assignments for cluster size twenty supporting NT D1 and CCDB with ASN routers.

Table 6. TOPS IWS token ring cluster assignments for cluster size 20 with ASN routers

position number	position type	cluster no.	MAU no.	MAU connection slot	BIX voice connection slot	V.35 BIX data connection slot	RS-422 BIX data connection slot
1	G	1	0	1	1	1	-----
2	G	1	1	1	2	2	-----
3	M	1	2	1	3	-----	-----
4	O	1	0	2	4	-----	-----
5	O	1	1	2	5	-----	-----
6	O	1	2	2	6	-----	-----
7	O	1	0	3	7	-----	-----
8	O	1	1	3	8	-----	-----
9	O	1	2	3	9	-----	-----
1	O	1	0	4	1	-----	-----
1	O	1	1	4	1	-----	-----
1	O	1	2	4	1	-----	-----
1	O	1	0	5	1	-----	-----
14	O	1	1	5	14	-----	-----
15	O	1	2	5	15	-----	-----
16	O	1	0	6	16	-----	-----
17	O	1	1	6	17	-----	-----
18	O	1	2	6	18	-----	-----
19	O	1	0	7	19	-----	-----
2	O	1	1	7	2	-----	-----
n/a	C	-----	0	8	-----	-----	-----
n/a	C	-----	2	8	-----	-----	-----

Legend: G = DMS Gateway position, O = Operator position, D = Database gateway position, M = RAMP position, C = ASN router

NOTE: With RS-422 configuration, the DMS gateway positions do not access the DMS via the BIX block. Data is connected directly to the MDF via cable NTNX36SD. For more information on RS-422 in a token-ring configuration, see "RS-422" .

12.5 Ethernet position and cluster provisioning

The ethernet configuration does not use the MAUs. Operator workstations are connected via a customer provided ethernet hub. For more information on ethernet configuration, see "Ethernet configuration".

ASN routers are not used in the ethernet configuration. Router cards provisioned in the ethernet hub provide connectivity to the following Nortel databases:

- Calling card database (CCDB)
- FT database
- D database

12.5.1 Ethernet position types

The ethernet configuration has three types of positions:

- DMS gateway
- Operator
- Maintenance (RAMP)

12.5.1.1 DMS Gateway

The DMS gateway position provides the ethernet LAN with connectivity to the DMS. Two DMS gateway positions are required per cluster. Only RS-422 data connections are supported in the ethernet configuration.

12.5.1.2 Operator and maintenance positions

Positions that are not DMS gateways are operator positions. One operator position on each token-ring may be equipped with a maintenance modem and cable. This position is referred to as an "operator/maintenance" position, and is used for dial-in maintenance (in addition to normal operator functions). This position can be in any cluster.

12.5.2 Ethernet position clusters

The ethernet configuration supports only one cluster size: 20. Each ethernet card can support up to 20 positions; thus, each card supports one cluster. The cluster or card does not have to be filled.

12.5.2.1 Assignments for Cluster Size 20

Table 7 gives position and cluster assignments for cluster size twenty.

Table 7. Ethernet Cluster Assignments for Cluster Size 20

position number	position type	cluster no.	BIX voice connection slot	RS-422 BIX data connection slot
1	G	1	1	-----
2	G	1	2	-----
3	M	1	3	-----
4	O	1	4	-----
5	O	1	5	-----
6	O	1	6	-----
7	O	1	7	-----
8	O	1	8	-----
9	O	1	9	-----
1	O	1	1	-----
1	O	1	1	-----
1	O	1	1	-----
1	O	1	1	-----
14	O	1	14	-----
15	O	1	15	-----
16	O	1	16	-----
17	O	1	17	-----
18	O	1	18	-----
19	O	1	19	-----
2	O	1	2	-----

12.6 RAMP Functionality

RAMP stands for Remote Access Maintenance Position. There are two RAMP types:

- RAMP that controls the local LAN (token-ring and ethernet) on which it resides
- RAMP that controls a remote token-ring

- Allows the maintenance of other IWS positions from a single maintenance position if other token-rings are connected through ASN routers via MAUs. This configuration is not available to etherenet configuration since MAUs are not used.

The RAMP function is added to the Combined Operator/Maintenance OR Dedicated Maintenance Position on each LAN. The RAMP/Maintenance position allows the maintenance of other IWS positions on the LAN from the single Operator/Maintenance position.

RAMP is the Combined Operator/Maintenance Position and will continue to be known as a Combined Operator/Maintenance position and referred to as an "M" or Maintenance position to distinguish it from a General Operator Position.

The remote IWS RAMP will allow the customer to remotely perform all of the features currently available on the local RAMP.

RAMP provides the following functionality:

- Remote status of LANs
- Remote software distribution and file transfer
- Remote tracing
- Remote reboot
- Log display (Current Log application parity)
- Enhanced profiling of position and applications
- Remote access to other token-rings through ASN routers
- Ability to Create and Edit of software distribution scripts

12.6.1 RAMP Architecture

There are two possible RAMP configurations: RAMP controlling local LAN and RAMP controlling a remote token-ring. In both configurations, RAMP is loaded with the IWS software and runs on the maintenance position in each token-ring.

The attachment of an optional modem and a dedicated phone line to an IWS LAN is made through the maintenance position. RAMP does not directly use this modem for any purpose. Attaching a modem and Procomm software will allow basic file transfers using only Procomm file transfer methods. The use of a mouse and printer is also optional with RAMP.

The RAMP position determines where logs created by any application on the positions are sent. The destination must be a valid LAN destination, but it does not have to be an IWS position supporting an operator. Any machine (except a DMS gateway or Database gateway) on the LAN can

be the Combined Operator/Maintenance/RAMP position. Each IWS position LAN has a single RAMP position.

12.6.1.1 RAMP Local LAN Configuration

In this configuration, RAMP is performing maintenance on the LAN that it resides on.

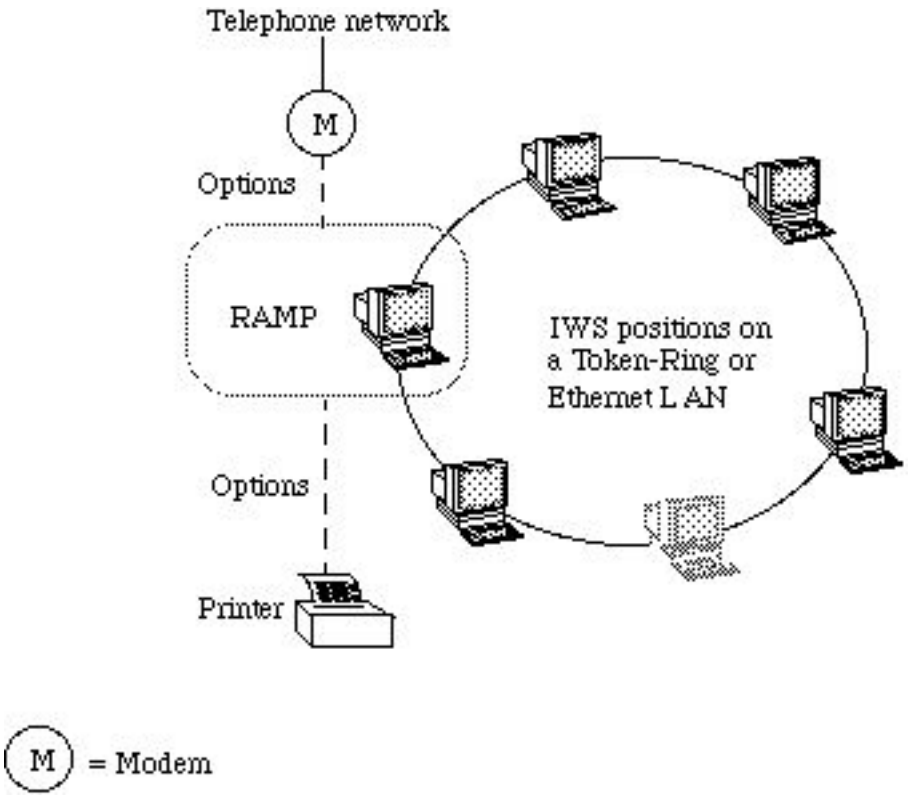


Figure 16. RAMP CONTROLLING LOCAL TOKEN RING

12.6.1.2 RAMP Controlling Remote Token-ring

Figure 8 shows the, RAMP performing maintenance on a remote token-ring that it is attached to through ASN routers. The RAMP is attached to the ASN routers through MAUs. . The token-ring that it will be connecting to must have a RAMP application running in order for connection to be established.

This configuration is not available with the ethernet configuration since MAUs are not used.

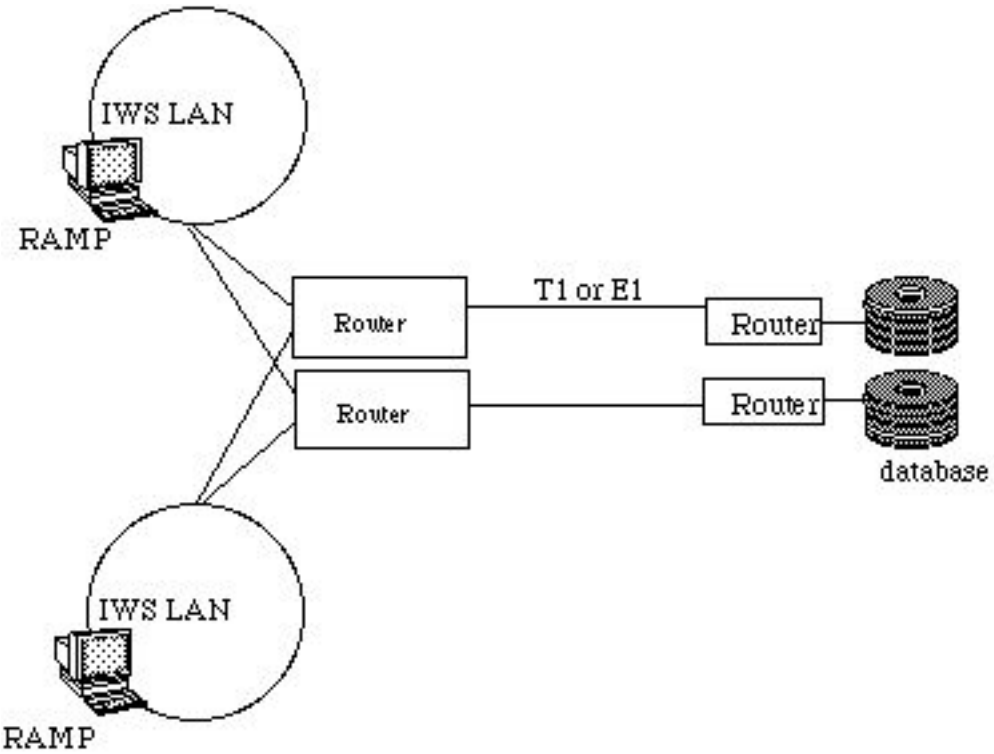


Figure 17. RAMP CONTROLLING A REMOTE TOKEN RING

12.6.1.3 Booting RAMP

Refer to NTP 297-2251-015 TOPS IWS RAMP and Provisioning User Guide for details.

12.6.1.4 Access To RAMP Application

Access to the RAMP application will be different depending on what RAMP configuration to be used.

RAMP Accessing Local LAN

After the IWS software is loaded, the user can switch between the IWS applications and the RAMP application.

Refer to NTP 297-2251-015 TOPS IWS RAMP and Provisioning User Guide for details.

RAMP Accessing Remote Token-ring

Refer to NTP 297-2251-015 TOPS IWS RAMP and Provisioning User Guide for details to access remote token-rings.

12.6.1.5 RAMP Optional Hardware

The following hardware is optional for the RAMP:

- Mouse
- Printer

Mouse

No new functionality is added with a mouse. It allows for easier navigation through the RAMP GUI. The mouse is to be customer-provided. See Table 8. Minimum Mouse Requirements for requirements of a mouse.

NOTE: The mouse is not intended to be used in conjunction with an operator position. The mouse can be used only with maintenance/RAMP position.

Table 8. Minimum Mouse Requirements

Feature	Requirement
Interface	mini-din mouse
Standard	two button

Printer

A printer allows printing of Log files and various dialog boxes from the RAMP. The printer is to be customer-provided. See Table 9. Minimum printer requirements for minimum requirements of a printer.

Table 9. Minimum Printer Requirements	
Feature	Requirement
Print	Plain paper drop on demand inkjet
Print Speed	Black minimum 3 ppm, Color minimum 1 ppm.
Resolution	300 dpi to 600 dpi (best); color 300 dpi
Character Sets	PC-8, PC-852, ECMA-94, Latin, Legal, Windows Latin 1__.
Software Compatibility	MS Windows, DOS, OS/2, Macintosh
Scaleable Fonts	Courier, Bold, Italic, Bold Italic, Letter Gothic, Italic, Bold Italic, etc.
Media Size	US letter 216x279mm (8.5x11 in), US legal 216x365mm (8.5x14 in), Executive 184x267mm (7.25x10.5 in), European A4 210x297mm, European A5, B5-JIS 182x257mm
Operating Environment	Operating temperature: +5C to +40C, Storage temperature: -40C to +60C, Operating humidity: 15+ RH to 80+ RH (non condensing)(suggested)
Interface	Centronics parallel, IEEE 1284 compliant with 1284-B receptacle
Power	AC 100-240 50/60 Hz
Printer Cable	DB-25 female to IEEE 1284-C male Length: 9.8 feet (3M) or 32.8 feet (10M)
NOTE: An inkjet printer is suggested since it is a relatively inexpensive, efficient, & readily available printer.	

12.7 Token ring configuration overview

The token ring configuration is generally available to all customers. It provides a turn-key solution with customers providing little hardware. It should be used for all extensions and can be used for all initial offices (instead of ethernet).

The following hardware is provided by Nortel with the token-ring configuration:

- workstation (if integrated approach is chosen. See Integrated vs. Modular Offering for more information)
- adapter cards
    - audio card
    - token-ring card
    - RTIC card
- BIX block (MISC bay)
- MAU (MISC bay)
- audio cables (to MDF for T1 channel banks, to channel bank for E1 channel banks)
- data cables to channel bank
- cable to TSG (T1 channel bank only)
- ASN routers, D1, F1 and CCDB (ordered through the Rochester division).

The following hardware is customer provided with the token-ring configuration:

- channel bank
- timing source generator (for T1 channel bank only)
- RAMP mouse and printer
- voice cable from MDF to channel bank (for T1 channel bank only)

12.7.1 Token ring data and voice connections

IWS token-ring can interface to T1 and E1 channel banks.

12.7.1.1 T1 Channel Bank

The following figure shows IWS token-ring configuration accessing a T1 channel bank.

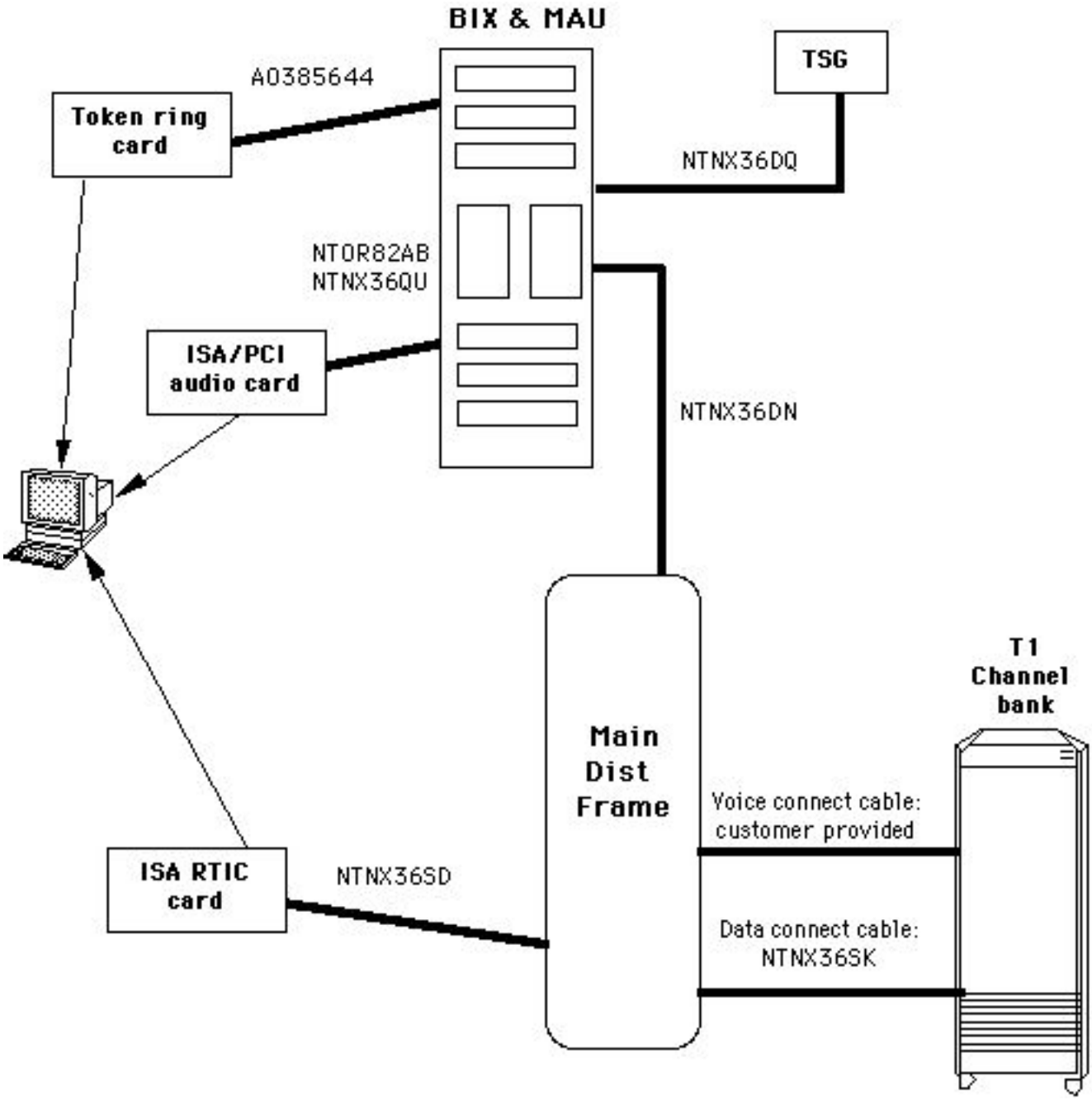


Figure 18. IWS TOKEN RING T1

The RS-422 interface to T1 channel banks requires two cables, NTNX36SD and NTNX36SK. These cables connect the RTIC card to the T1 channel bank as follows:

- NTNX36SD
    - directly connects the ISA RTIC card to the Main Distribution Frame (MDF) - MAX length 1200 ft.
- NTNX36SK
    - connects the MDF to the channel bank - MAX length 300 ft.

Token-ring voice connection to T1 channel bank

The following cables are used to interface voice connections to T1 channel banks.

- NT0R82AB and NTNX36QU
    - connects the ISA or PCI audio card to the BIX (A0385644 connects the token ring card to the MAU) - MAX length 1200 ft.
- NTNX36DN
    - connects the BIX to the MDF - MAX length (including customer provided cable to channel bank) 300 ft.
- customer provided cable
    - connects the MDF to the channel bank. Should be ordered with channel bank.

12.7.1.2 E1 Channel bank

The following figure shows IWS token-ring configuration accessing an E1 channel bank.

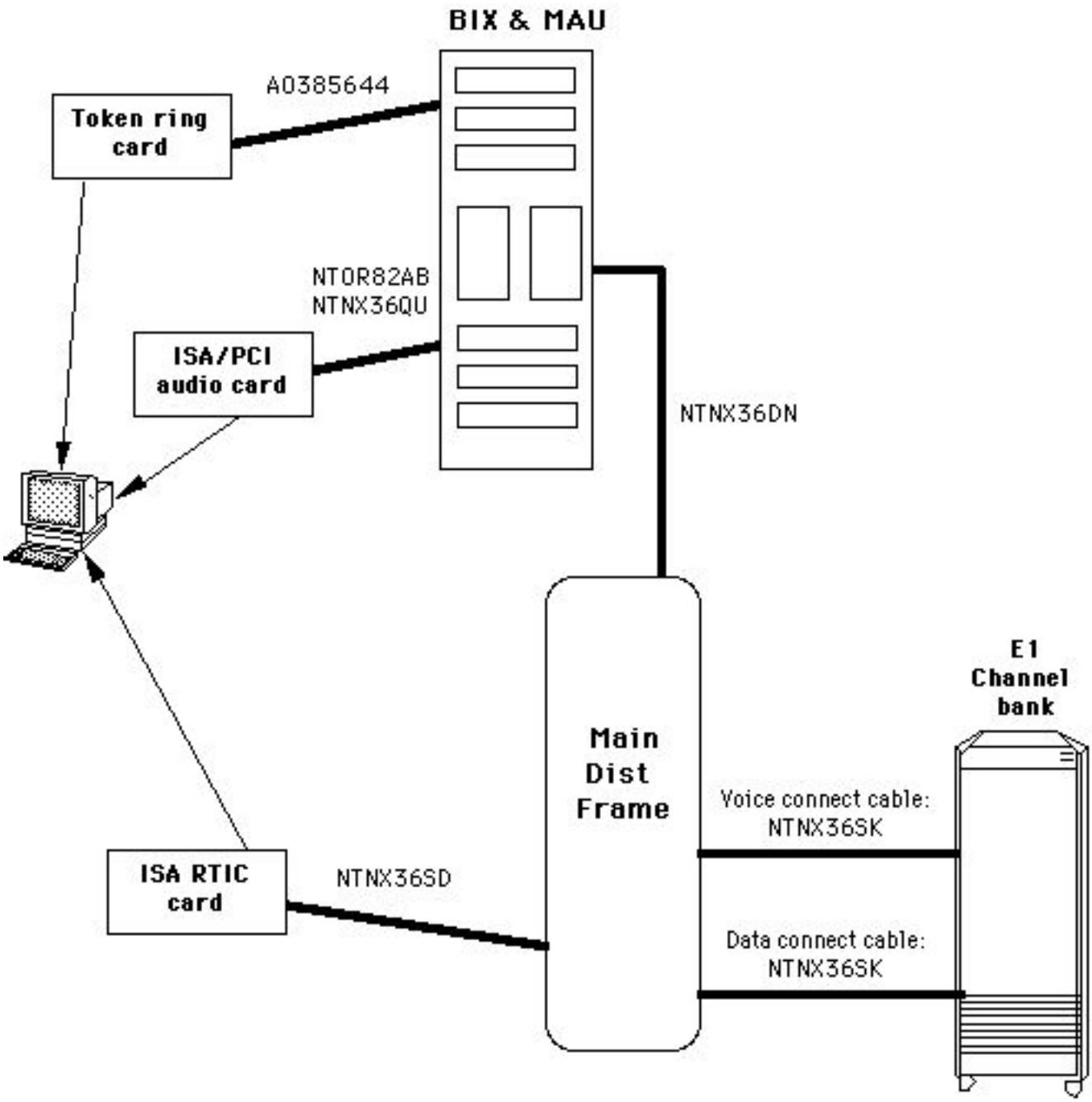


Figure 19. TOKEN RING E1 CHANNEL BANK CONFIGURATION W/ RS-422

When interfacing IWS to E1 channel banks, RS-422 (data connections) and G.703 (voice connections) are used. For RS-422 data connections to the E1 channel bank, the following cables are used.

- NTNX36SD
    - directly connects the ISA RTIC card to the MDF - MAX length 775 ft.
- NTNX36SK
    - connects the MDF to the channel bank - MAX length 300 ft.

The NTNX36SD connects the RTIC card directly to the MDF. The data does not go through the BIX. In addition, no TSG is accessed.

Token-ring voice connection to E1 channel bank

For G.703 voice connections to E1 channel banks, the PCI audio card (NTNX52CC) must be used. The following cables are used to interface G.703 voice connections to E1 channel banks.

- NT0R82AB and NTNX36QU
    - connects the PCI audio card to the BIX (A0385644 connects the token ring card to the MAU. MAX length 775 ft)
- NTNX36DN
    - connects the BIX to the MDF - MAX length 300 ft (including NTNX36SK)
- NTNX36SK
    - connects the MDF to the channel bank

Cable lenght limitations for RS-422 and E1 channel banks

The token ring cable length limitation for RS-422 and E1 channel banks is 1075 FT. The limitation is broken up as follows:

- 775 ft for RTIC card to MDF
- 775 ft for Audio card to BIX
- 3 0 ft for BIX to Channel Bank (voice connection)
- 3 0 ft for MDF to Channel Bank (data connection)

12.8 Ethernet configuration

| The complete ethernet platform solution will be introduced over several IWS releases, starting with IWS09. For the IWS09 release, ethernet can be used for initial offices. Extensions should use the token-ring configuration.

| In IWS09, the following hardware will be provided by Nortel:

- workstation (if integrated approach is chosen. See Integrated vs. Modular Offering for more information.)
- adapter cards
  - audio card
  - RTIC card
  - ethernet card (already installed in the workstation by manufacturer. Does not need to be ordered by EAE)
- BIX block (MISC bay)
- audio cable (to MDF for T1 channel banks, to channel bank for E1 channel banks)
- data cables (workstation to channel bank)

In IWS09, the following hardware will be customer provided:

- ethernet hub
- ethernet connection cables (for positions and database access)
- channel bank
- timing source generator and cable (for T1 channel bank)
- RAMP mouse and printer
- audio cable from MDF to channel bank (for T1 channel bank)

12.8.1 Ethernet data and voice connections

IWS ethernet can interface to T1 and E1 channel banks.

12.8.1.1 T1 channel bank

The following figure shows IWS ethernet configuration accessing a T1 channel bank.

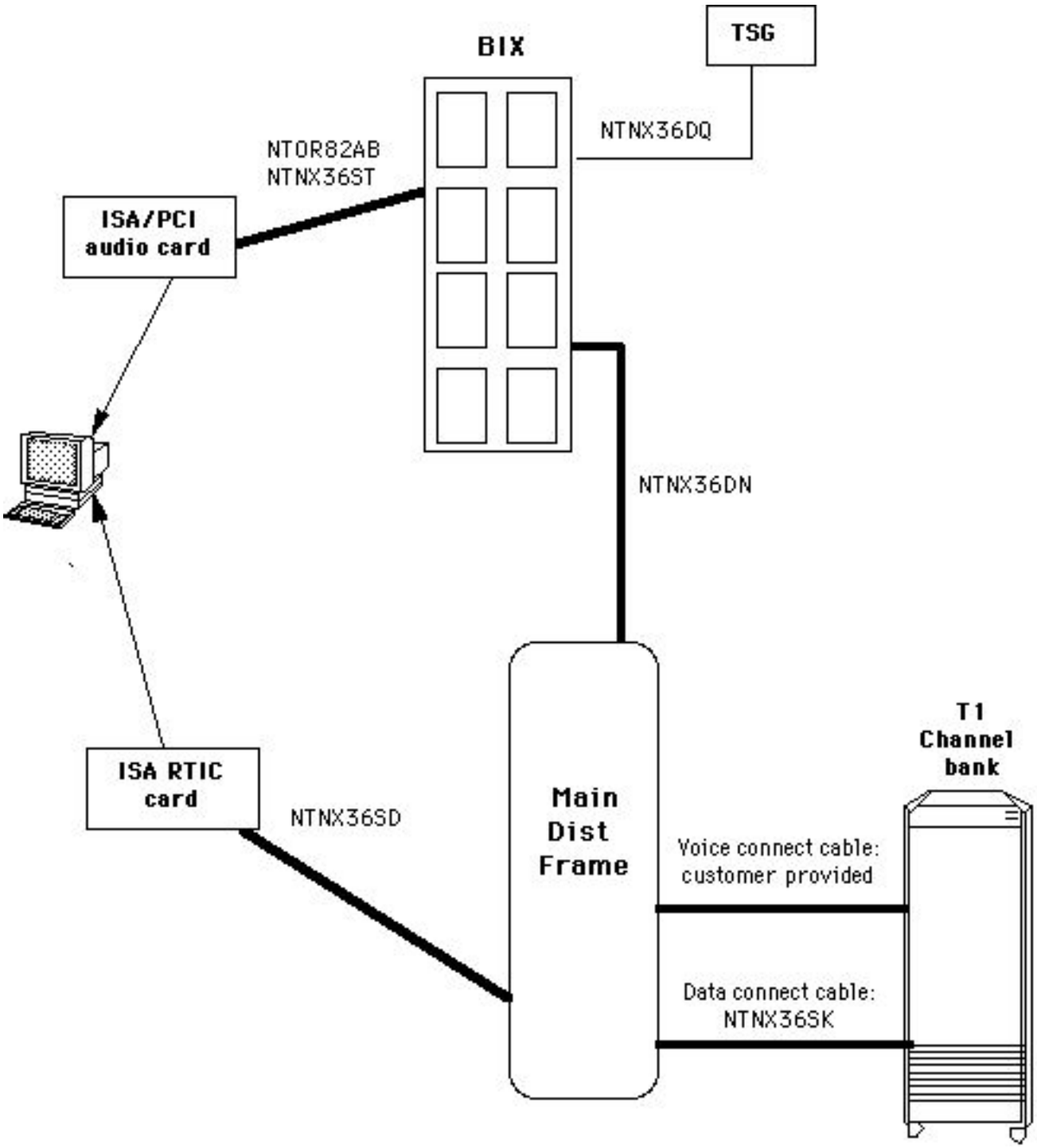

BIX
TSG
NTNX36DQ
NTOR82AB
NTNX36ST
ISA/PCI
audio card
NTNX36DN
ISA RTIC
card
NTNX36SD
Main
Dist
Frame
T1
Channel
bank
Voice connect cable:
customer provided
Data connect cable:
NTNX36SK

Figure 20.

| Note: The ethernet LAN (customer provided) connection is not shown in the figure above. Only voice and data connections are shown.

| Ethernet data connection (RS-422) to T1 channel bank

| Data connections to a T1 channel bank are identical for token ring and ethernet. See section Token-ring data connection (RS-422) to T1 channel bank for information on length requirements.

| Ethernet voice connection to T1 channel bank

| The following cables are used to interface voice connections to T1 channel banks.

| • NT0R82AB and NTNX36ST

| • connects the audio card to breakout box to the BIX

| • NTNX36DN

| • connects the BIX to the MDF

| • customer provided cable

| • connects the MDF to the channel bank. Should be ordered with channel bank.

12.8.1.2 E1 Channel bank

| The following figure shows IWS ethernet configuration accessing an E1 channel bank.

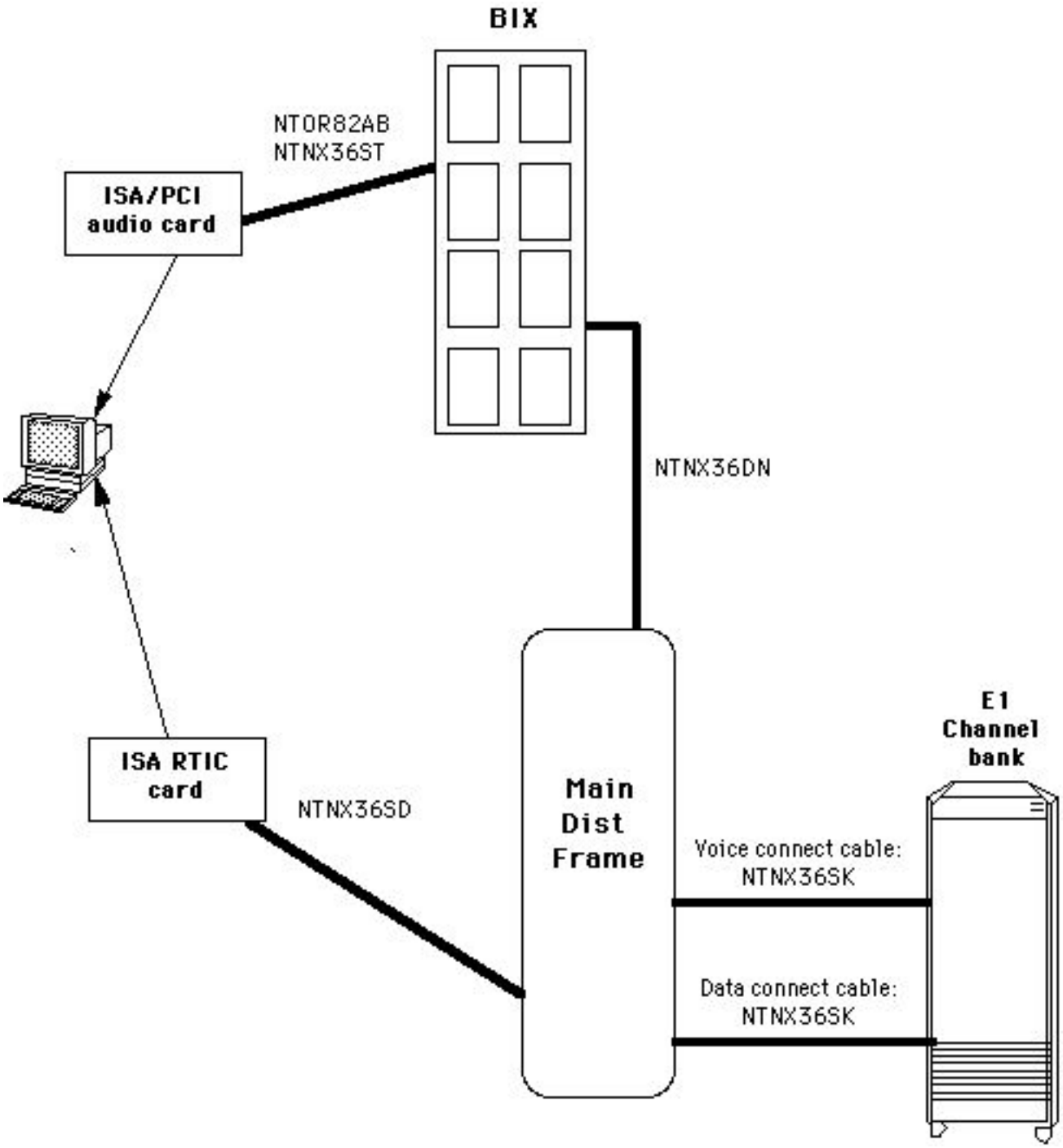


Figure 21. E1 ETHERNET CHANNEL BANK CONFIG

| Ethernet data connection (RS-422) to E1 channel bank

| Data connections to an E1 channel bank are identical for token ring and ethernet. See section Token-ring data connection (RS-422) to E1 channel banks for more information.
| Ethernet voice connection to E1 channel bank

| For G.703 voice connections to E1 channel banks, the PCI audio card (NTNX52CC) must be used. The following cables are used to interface G.703 voice connections to E1 channel banks.

| • NT0R82AB and NTNX36ST

| • connects the PCI audio card to the breakout box to the BIX

| • NTNX36DN

| • connects the BIX to the MDF

| • NTNX36SK

| • connects the MDF to the channel bank

12.9 IWS Adapter Cards

The IWS positions can be provisioned with up to three cards:

| • Token ring card (for token ring configurations only)

• RTIC card

• Audio card

| The ethernet card is installed by the workstation manufacturer. The card does not need to be ordered by the EAE.

12.9.1 Token ring card

The token ring card connects the IWS platform to the token ring LAN. The token ring card that is currently provided is A0619543.

| The token-ring card should NOT be provisioned in the ethernet configuration.

| Provision one (1) token ring card per workstation when using the token-ring configuration .

12.9.2 RTIC Card

The existing ISA RTIC card (A0619552) will support two interfaces:

| • V.35 (A&M)

- This configuration will be A&M'd 2Q98. RS-422 should be provisioned for new jobs.

- RS-422

12.9.2.1 RS-422

RS-422 is the generally available data interface for IWS.

RS-422 is used in T1 and E1 channel banks in both the token ring and ethernet configurations. Operator terminals using an RS-422 data interface eliminate the following:

- data modems between operator terminals and the E1 channel bank
- country regulatory approval for the timing source generator (TSG)
- T -to-E1 converter

For configuration information on RS-422, see the following diagrams:

- Token ring T1 channel bank configuration
- Token ring E1 channel bank configuration
- Ethernet T1 channel bank configuration
- Ethernet E1 channel bank configuration

12.9.2.2 RS-422 limitations and restrictions

RS-422 has the following limitations:

- T configuration requires IWS Release 7.0 and up.
- E configuration with G.703 voice connection requires the following:
  - IWS Release 7.0 and up
  - PCI Audio card

12.9.3 Audio Card

IWS positions can be provisioned with either the ISA audio card or the PCI audio card.

Provision one (1) audio card per workstation.

12.9.3.1 ISA Audio Card

The ISA audio card (NTNX52BC) provides a DS-0A digital trunk interface between the position and the network. It is currently the generally available audio card.

12.9.3.2 PCI Audio Card

The PCI audio card provides a network voice connection, analog headset interface and a Digital Signal Processor (DSP) to process audio data. The audio card provides many enhancements to the previous version. These include the following:

- Analog phone interface
- Stereo sound
- Higher sampling rates
- PCI bus interface
- E channel bank interface
- Flash memory for downloadable code
- Enhanced floating-point 32-bit DSP.

The high-bandwidth PCI bus and a faster DSP give the PCI audio card the DTMF detection, coin detection, playing and recording stereo-quality sound, and combined voice/data network interfaces.

| Note: Not all PCI audio card features are available with all IWS Re-
| leases. The feature may require a specific software load or additional
| hardware. For example, stereo sound requires stereo headsets and the
| stereo headjack assembly.

The PCI audio card (NTNX52CC) is only compatible with the following:

- IWS Release 7.0 and up (generally available with IWS Release 9.0 and up)
- NTNX51TB (HP XM4) -or- NTNX51VB (Intel)

Once the PCI audio card is generally available (2Q98), the ISA audio card will be MD'd and will no longer be available for initial deliveries.

The PCI audio card is required for all IWS configurations with G.703 audio connections and RS-422 data connections to an E1 channel bank.

The PCI audio card is supported in IWS Release 7.0 and up. It is available in IWS Release 9.0 and up. The support and availability dates are different due to the VO and GA of the PCI audio card. The PCI audio card will be VO'd in IWS07. It will be GA in IWS09.

12.9.3.3 IWS Audio Card software compatibility

Table 10 is a software compatibility matrix for the various IWS audio card with IWS releases:

Table 10 . IWS Software/Audio Card Compatibility			
IWS Release	NTNX51BE, MCA card (see note)	NTNX52BC, ISA card	NTNX52CC, PCI card
IWS 2.93	X	X	
IWS 4.0	X	X	
IWS 4.1	X	X	
IWS 5.0	X	X	
IWS 6.0	X	X	
IWS 7.0	X	X	X
IWS 8.0	X	X	X
IWS 9.0	X	X	X
Note: The NTNX51BE is NOT supported in any versions of IWS ethernet .			

12.10 Headset jack assemblies

IWS offers different headset jack assemblies for the ISA audio card and the PCI audio card.

Headsets are provided by customer. All headsets should be GR314 compliant.

12.10.1 ISA Audio Card Headset Jack Assembly

The ISA Audio Card (NTNX52BC) supports only mono headsets. The headset jack assembly that can be used with the ISA audio card is the NTNX5309.

Provision two (2) NTNX5309 per position when using the NTNX52BC audio card.

12.10.2 PCI Audio Card Headset Interfaces

The PCI Audio Card (NTNX52CC) supports both mono and stereo headsets. With the introduction of the PCI Audio Card, three new headset interfaces were developed:

- NTNX5312 - PCI Headset Jack Adapter, 4-pin to 6-pin
    - Allows the NTNX5309 headset jacks to be used with the PCI Audio Card
- NTNX5313 - Mono PCI Headset Jack Adapter
- NTNX5310 - Stereo PCI Headset Jack Adapter

12.10.2.1 NTNX5312

With the existing IWS Headset Jack Assemblies (NTNX5309), a 4 to 6-pin adapter (NTNX5312) is required to connect to the PCI audio card (NTNX52CC). It is required since the PCI Audio Card has a 6-pin teledapt connector while the older Headset Jack Assemblies have a 4-pin teledapt.

Provision two per workstation.

12.10.2.2 NTNX5313

For new positions using mono headsets and the PCI Audio Card, the Mono PCI Headset Jack Assembly (NTNX5313) is required. Since the NTNX5313 is already 6-pin, the 4 to 6-pin adapter (NTNX5312) is NOT required to connect to the PCI audio card (NTNX52CC).

Provision two per workstation.

12.10.2.3 NTNX5310

For new positions using stereo headsets and the PCI Audio Card, the Stereo PCI Headset Jack Assembly (NTNX5310) is required. Since the NTNX5310 is already 6-pin, the 4 to 6-pin adapter (NTNX5312) is NOT required to connect to the PCI audio card (NTNX52CC).

Provision two per workstation.

12.10.3 T Channel bank

Channel bank equipment is supplied by the telephone operating company. For T1 channel banks, Nortel recommends the following:

- DE-4 Enhanced (MD)
- DE-4E Smart

12.10.3.1 DE-4 Enhanced

One voice channel should be provisioned per position. Provision one (1) QPP-554B card per position.

One data channel should be provisioned per gateway (DMS and Database) position. Provision one (1) QPP-684A card per gateway position.

For V.35 data connection, provision one (1) QPP-684 A card per gateway position.

| Note: V.35 configuration will be A&M'd. This card should only be ordered
| for A&M.

For RS-422 data connection, provision one (1) NT4S06AC card per gateway position.

For more information, see NTPs 368-5151-111 and 368-5151-151.

12.10.3.2 DE-4E Smart

One voice channel should be provisioned per position. Provision one (1) NT4S03AA card per position.

One data channel should be provisioned per gateway (DMS and Database) position. Provision one (1) NT4S04AB card per gateway position.

For V.35 data connection, provision one (1) QPP-684 A card per gateway position.

| Note: V.35 configuration will be A&M'd. This card should only be ordered
| for A&M.

For RS-422 data connection, provision one (1) NT4S06AC card per gateway position.

For more information, see NTPs 368-5161-102 and 368-5161-220.

12.10.4 E channel bank

The E1 channel bank Nortel recommends is manufactured by Bayly Communications, Inc. Bayly can be contacted at the following locations:

- Canada
  - 1 5 Green Ct., Ajax, Ontario, Canada L1S 6W9, phone: 905-686-1011
- United States
  - CoastCom, 1151 Harbor Bay Parkway, Alameda, CA 94502-6511, phone: 1-800-433-3433

The E1 channel bank Nortel recommends is manufactured by Bayly Communications, Inc.

12.10.5 Digital Trunks

12.10.5.1 North American Digital Trunks

For DS-0A connection to a T1 channel bank, NO cable changes are required. Digital trunk cable changes are NOT required to use the PCI audio card (NTNX52CC).

For RS-422 connections, provision the following:

- ISA Audio Card (NTNX52BC) OR the PCI Audio Card (NTNX52CC)

- ISA RTIC Card (A0619552)

With the RS-422 connection, modems are not needed at the DMS gateway positions; thus, reducing position cost.

The cable length LIMITATION for token-rings in a T1 channel bank configuration is 1200 feet.

For more information on the ISA RTIC card and cable requirements, see "RTIC Card" .

12.10.5.2 International Digital Trunks

IWS supports direct G.703 audio connections and RS-422 data connections to E1 channel banks. Provision the following for this configuration:

- PCI Audio Card (NTNX52CC)
- ISA RTIC Card (A0619552)

The cable length LIMITATION for token-rings in a E1 channel bank configuration using RS-422 is 1075 feet.

For more information on the ISA RTIC card and cable requirements, see "RTIC Card" .

12.10.6 Office Layout Information

The modem for the Remote RAMP will not be connected to the BIX block in the MIS frame. It will be cabled to a customer provided telephone outlet using the teledapt cable provided with the modem.

12.10.7 Traffic Tables

Not applicable.

12.11 Product/System Specification

12.11.1 Physical Characteristics

The components used for TOPS IWS have the following physical characteristics:

Table 11. Physical characteristics for TOPS IWS		
Component	Dimension (HxWxD)	Weight
NTNX51VB	4.5" X 17.2" X 16.7"	18.2 lb.
Monitor, NTNX51LM	14.7" X 14.5" X 15.1"	30.4 lb.
Monitor, NTNX51LN	16.8" X 16" X 17.8 "	41.9 lb
MAU	17.6" X 8" X 2.66"	5.5 lb
MAU housing	23" X 12" X 4"	4 lb
DSU	2" X 8" X 10"	1 lb
Keyboard	2" X 20.5" X 10"	7 lb

12.11.2 EMI/Earthquake Information

Not applicable.

12.11.3 Sparing Information

TOPS IWS positions are normally spared by ordering complete positions. The quantities are determined by the customer. Refer to the Engineering Manual Section for part numbers.

12.11.4 Power Feed and Fusing Requirements

Not applicable.

12.11.5 Current Drain Information

The following table lists the current drain for IWS products that are currently available for shipment.

Table 12. IWS current drain			
Unit	Voltage	Frequency	Current
NTNX51LM, 15" monitor	120 VAC	60HZ	0.9 A
	240 VAC	50HZ	0.5 A
NTNX51LN, 17" monitor	120 VAC	60HZ	1.0 A
	240 VAC	50HZ	0.5 A
NTNX51VB, IWS Platform	120 VAC	60HZ	0.8 A
	240 VAC	50HZ	0.4 A
A0602029, DSU	120 VAC	60HZ	0.5 A
A0625030, Dial Modem	120 VAC	60HZ	0.5 A
A0616226, DT500n Global	220 VAC	50HZ	0.25 A
A0609602, UDS/MRS DSU	120 VAC	60HZ	0.5 A
	220 VAC	50HZ	0.25 A

12.12 Software Provisioning

The following IWS Releases have a status of MD:

- IWS Release 2.93
- IWS Release 4.0
- IWS Release 4.1
- IWS Release 5.0
- IWS Release 6.0

12.12.1 IWS CM Dependencies

12.12.1.1 IWS Release 2.93 Features with BCS-35 or Higher

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12.12.1.2 IWS Release 2.93 Features Requiring TOPS03

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12.12.1.3 IWS Release 4.0 Features with BCS-35 or Higher

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12.12.1.4 IWS Release 4.0 Features Requiring TOPS04

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12.12.1.5 IWS Release 4.1 Features Requiring TOPS04

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12.12.1.6 IWS Release 5.0 Features Requiring TOPS05

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12.12.1.7 IWS Release 6.0 Features Requiring TOPS06

| MPX-IWS Release 6.0 is MD'd.

IWS Release 6.0 contains new capabilities in the areas of CM parity with TOPS06 (such as QMSCASE and OLNS support), as well as maintenance (RAMP Robustness) and installation (GUI) enhancements.

New MPX-IWS specific capabilities that are featured in Release 6.0 but not requiring TOPS06 are as follows:

- Datafillable time-out optionally for the Make Busy/Withhold Calls functions
- Customizable and datafillable position specific text display for the LOGO window
- IWS Editing Enhancements
- Scripting for OA and NT-DA
- IWS Mouse and Printer Support on RAMP Position
- Country Direct IWS Support
- IWS Billing Display
- IWS support for (OSS7) ISUP to TOPS enhancements

12.12.1.8 IWS Release 7.0 Features Requiring TOPS07

| IWS Release 7.0 is GA to all customers.

IWS Release 7.0 contains new capabilities in the areas of CM parity with TOPS07 for Local Number Portability (LNP) and OSSAIN Simultaneous Interaction features.

TOPS IWS Release 7.0 features that require TOPS07 are as follows:

- GOS International Booked Call Database IWS/QMS CM Support
- GOS Estimated Call Charges
- IWS Support for OSSAIN Simultaneous Interactions
- IWS Support for Local Number Portability
- GOS DN Screening
- IWS Support for Branding for TOPS via SPID

TOPS IWS Release 7.0 features that DO NOT require TOPS07 are as follows:

- IWS Colorblind Support
- IWS Application Protection from Mouse Interactions
- NTOA Enhancement
- NTDA/NTOA Interworking
- X.25 Conversion for Microsoft Windows (Prework)
- File transfer (FTP, API, FTP DAEMON, GUI)(Prework)
- Network Layer Enhancements (Prework)
- IWS Support for Directory One ISIS Final Changes

12.12.1.9 IWS Release 8.0 Features Requiring TOPS08

GOS IN Fallback is the only IWS 8.0 feature that requires TOPS08.

The following IWS 8.0 features DO NOT require TOPS08:

- Display Violated Restrictions from CCDB at Call Arrival
- IWS Support for ISN EBAS 1.02 and prepaid 1.01 releases
- NTDA Enhancements - Phase 1 and 2

These features are part of IWS 8.0.

12.12.1.10 IWS Release 9.0 Features requiring TOPS09

| The following IWS 9.0 features require TOPS09:

| - IWS Attendant Pay Station Service Support
| - Simultaneously Display Trunk Group and SPID

| These features are part of IWSS0090 and are ordered through SOLID.

12.12.2 LET003 to LET006 limitation

When upgrading software (applying a One Night Process), sites CANNOT go from LET003 (TOPS03) directly to LET006 (TOPS06).

Before a site is upgraded from LET003 to LET006, an intermediate load, LET004 (TOPS04) or LET005 (TOPS05), must be installed. Since LET004 was not released in Canada, sites in Canada must upgrade to LET005 before going to LET006. US or international sites can upgrade to either LET004 or LET005 before going to LET006.

In addition, Operator Centralization (OC) configurations CANNOT handle LET003/LET006 loads in the same network.

Please note: This applies to both ONP and OC configurations. Upgrading from LET003 to LET006 will cause the ONP to abort. An OC configuration cannot handle both LET003 and LET06.

12.12.3 IWS ordering and engineering process

IWS hardware is ordered through the PCN engineering process. All software is ordering through SOLID.

The following figure shows the new IWS Software Ordering/ Engineering process. See the notes following the figure for detailed information.

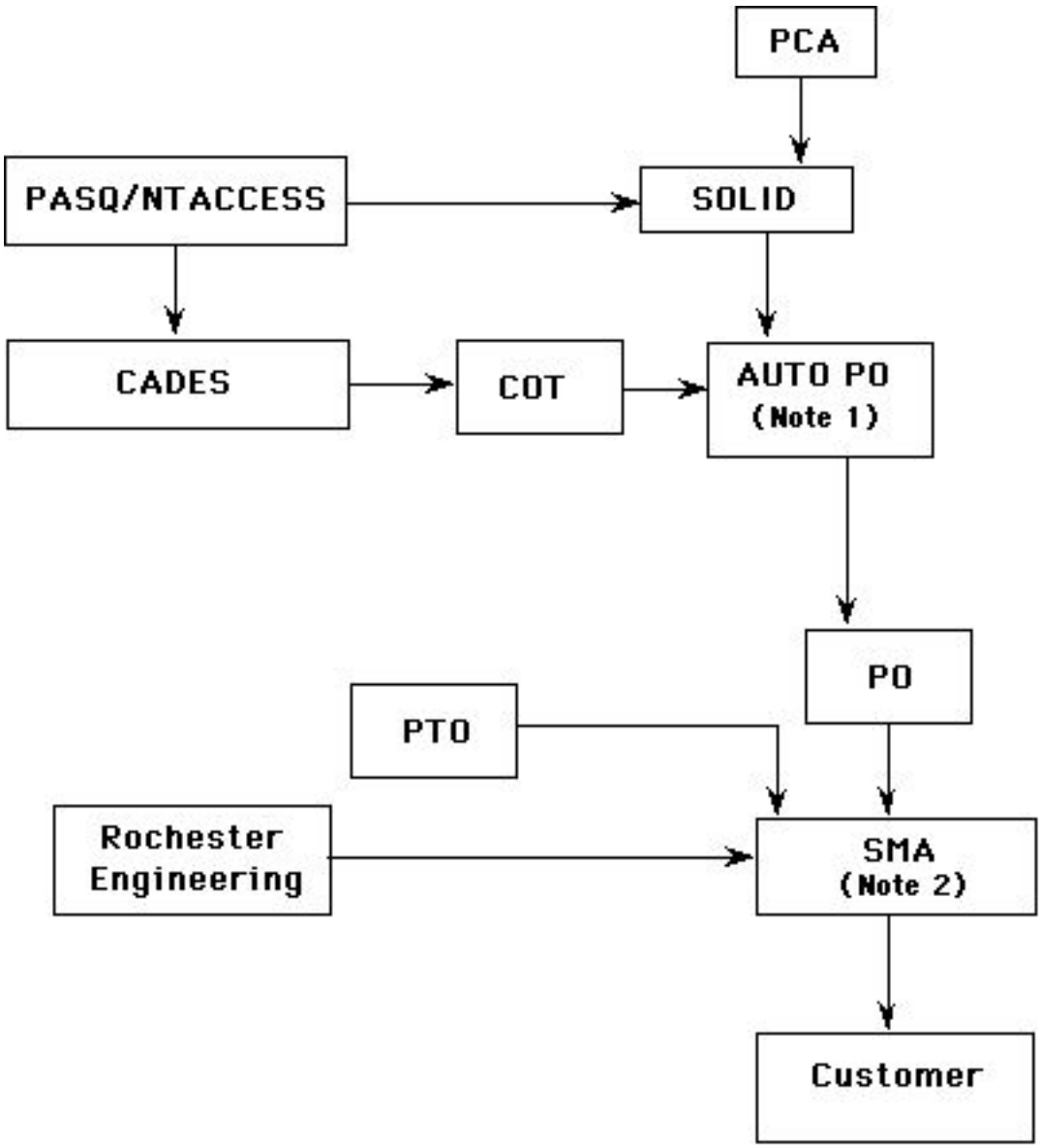

Figure 22. ENGINEERING FLOW CHART

Note 1: AutoPO will receive message file from SOLID and do the following:

- issue two purchase orders on the product to SMA, one for software and one for hardware.
- Send notification to SOLID with suitable references such as the SOLID generated PO number once the AUTOPO purchase number is issued to SMA.

Note 2: SMA will do the following:

- correlate the PO's on the software and the hardware for the same COEO number.

The NCLs will distinguish each product with a different NCL ID. For example, the NCL for TOPS IWS Release 1.0 is MPXI0001. The NCL for IWS Release 8.0 is IWSS0080.

12.12.4 Position software

The following IWS releases have been MD'd:

- 2.93
    - Release 2.93 is only compatible with HP XM2 (NTNX51NB, BB= NTZZ36GE).
- 4.0
- 4.1
- 5.0
- 6.0

The following IWS releases are available:

- 7.0
- 8.0
    - limited availability to VOs and RAMP customers only
- 9.0
    - limited availability to VOs and RAMP customers only

IWS Release 7.0 is currently the GA software release. Customers should receive Release 7.0. (text deleted)

12.12.4.1 IWS Release 6.0

The MPX-IWS Release 6.0 is MD'd.

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12.12.4.2 IWS Release 7.0 Position Software

Upgrade Rules

The following lists the upgrade rules for IWS Release 7.0.

1. IWS Release 7.0 is GA. All customers should get IWS Release 7.0.
| (text deleted)

2. It is not necessary for customers to upgrade to each TOPS IWS release. Customers can skip releases when upgrading.

3. If customers skip releases of the TOPS IWS Base, they will be charged for the incremental release that they are moving to + the incremental value for the releases that they skipped. For example, if a customer goes from 2.93 directly to 7.0, they will be charged the following:

   - the incremental fee associated with Release 7.0
   - the incremental fee associated with Release 6.0
   - the incremental fee associated with 4.1
   - the incremental fee associated with Release 4.0.
     The reasoning behind this pricing strategy is the content of the release is cumulative.

4. The most current Generally Available TOPS IWS release will be shipped. IWS Release 7.0 if GA.

5. Although only the most-current GA TOPS IWS release will be shipped, we will support workstation loads for the same interval of time that the corresponding CM loads are supported. This also includes dot releases. For example, Release 4.0 and 4.1 will be supported for the same interval that TOPS04 is supported. Conversely, once TOPS04 is no longer supported, Releases 4.0 and 4.1 will not be supported.

6. NTOA has NOT been tested for use in conjunction with the OA application. Therefore, a customer should not be allowed to order both of these applications for use on the same position.

7. TOPS IWS Release 2.93 supports the following audio cards:

   - NTNX51BC/BD/BE
   - NTNX52BC
     The drivers are part of IWS 2.93 and up. Do not provision these drivers (MPXI0708) since they are a part of IWS software.
   - When provisioning the ISA Audio Card (NTNX52BC) to a third party vendor for resale or integration into their product line without IWS software, order two (2) copies of MPXI0708.

8. IWS Release 7.0 and up also supports NTNX52CC, PCI audio card. (The PCI audio card is available with IWS Release 9.0 and up).

   - When provisioning the ISA (NTNX52BC) or PCI (NTNX52CC) audio cards with IWS 7.0 and up, do NOT order MPXI0708.

- When provisioning the ISA or PCI Audio Card to a third party vendor for resale or integration into their product line without IWS software, order two (2) copies of MPXI0708.
- When provisioning the PCI (NTNX52CC) audio card with IWS 7.0, order two (2) copies of MPXI0709 per OSC. The MPXI0709 will be installed on the PCI Audio Card prior to shipment. The disc should be ordered in case the software needs to be reloaded on to the Audio Card.
- When provisioning the PCI Audio Card to a third party vendor for resale or integration into their product line, order two (2) copies of MPXI0709.

9. For more information on selling IWS audio cards to a third party vendor, contact NT Product Line Management for the API/SDK required to support third-party applications on TOPS IWS Base Standard or TOPS IWS Base Extended.

10. Provide (1) P0844816 keytop label per existing IWS position when upgrading to IWS Release 7.0 from IWS 6.0 or below.

All Release 7.0 Positions

Provide one (1) of the following packages for EACH position:

Table 19. Required software for all positions Release 7.0

PKG ID	CPC	Description
NTWS0705	P0865811	IBM DOS V5.02
NTWS0704	P0865815	Windows V3.11
NTWS0701	P0865812	LAN Support

Provide ONLY one (1) the following packages for EACH position:

Table 20. Required base software for all positions Release 7.0

PKG ID	CPC	Description
MPXI0705	P0865805	MPX-IWS Base Standard
MPXI0704	P0865804	MPX-IWS Base Extended

Note 1: The TOPS IWS Base Standard (formerly Base4) is a specific variation of the base that supports five applications compared to sixteen provided with TOPS-IWS Base Extended.

Note 2: For each position, select either TOPS IWS Base Standard (formerly Base4) or TOPS IWS Base Extended (formerly Base16) according to the number of applications supported on the position. TOPS IWS Base

Standard supports up to five applications; TOPS IWS Base Extended supports up to sixteen applications.

Note 3: The Base itself counts toward the total number of applications; therefore, IWS Base Standard can support up to four (4) additional applications (e.g. DA, OA, and OIA). TOPS IWS Base Extended can support up to fifteen (15) additional applications.

Optional IWS Release 7.0 software

Order from the following packages for EACH position according to the application(s) supported on the position. Positions on any given token-ring may support different applications.

Table 21. Application software for Release 7.0

Functional code	CPC	Description
MPXI0703	P0865806	TOPS IWS OIA
NTWS0703	P0865813	Procomm Plus for DOS (Note 2)
MPXI0702	P0865808	TOPS IWS NTDA
MPXI0701	P0865807	TOPS IWS OA (Note 1)
MPXI0706	P0865809	TOPS IWS NTOA (Note 1)
MPXI0710	P0865810	TOPS IWS NTOA PLUS (Note 1)

Note: 1. OA and NTOA can NOT work on the same workstation. Do NOT order both packages for one workstation.

Note 2: Required when using a modem to allow basic file transfers.

Combined Operator/Maintenance (RAMP) Position (Release 7.0)

The RAMP position provides two types of maintenance functionality in IWS Release 7.0:

- RAMP Local Access
- RAMP Remote Access

The Local RAMP platform is provided on the token-ring to perform maintenance functions for all of the operator positions on that token-ring.

The Remote RAMP function provides access to one or more token-rings via IP addresses and routers, depending on the telcos' network configuration.

The RAMP cannot be combined with a DMS Gateway/Database Gateway.

The RAMP position can perform both operator call handling and maintenance on the token-ring. The RAMP software is included in IWS Base; therefore, no additional software is required for RAMP functionality.

The RAMP can provide dial-in access by use of the commercial communication package Procomm Plus. By accessing the RAMP remotely, Telco IWS support personnel and Nortel support personnel can perform the following:

- Transfer TOPS IWS Software loads
- Run the TOPS IWS Profiler
- Transfer the TOPS IWS Log file

NOTE: NO MAINTENANCE ACTIVITY CAN BE PERFORMED VIA THE MODEM CONNECTION.

It is RECOMMENDED that the communication package (Procomm Plus) be started only when access is required since the RAMP can also be used as an IWS Operator Position. Running Procomm Plus during call processing will increase Average Work Time (AWT) due to the disk access required and DOS/Windows time sharing.

If the customer requires to have dial-in access to the RAMP, provide the following package.

Table 22. RAMP dial-up software for Release 7.0

Functional code	CPC	Description
NTWS0703	P0865813	Procomm Plus for DOS (Note 2)

DMS Gateway Positions (Release 7.0)

Provide the following packages for EACH DMS gateway position:

Table 23. DMS gateway position software for Release 7.0		
Functional code	CPC	Description
NTWS0705	P0865811	IBM DOS V5.02
NTWS0702	P0865814	X.25 Communication
NTWS0704	P0865815	MS Windows V3.11
NTWS0706	P0865816	Wollongong V4 Rel 3.2.1
MPXI0705	P0865805	MPX-IWS Base Standard (Note 1)
MPXI0704	P0865804	MPX-IWS Base Extended (Note 1)
NTWS0701	P0865812	LAN Support
Note: 1. Provision either the Standard or Extended software, not both.		

Database Gateway Positions (Release 7.0)

Database gateway positions are NOT required for NTDA IWS with ASN routers. Database gateway positions ARE required for NTDA IWS with ALL 6/40 DA databases, and for NTDA IWS with D1 databases that are not using ASN routers.

Communication to the IBM database (X.25 or bisync) is provided by the IBM DA IWS application. Therefore, NTWS0702 is NOT needed for IBM DA IWS database gateway positions.

The Database Gateway Position provides LAN connectivity to the database.

NOTE: Customers requiring IBM DA software should contact IBM.

NOTE: If NTDA is used WITHOUT routers, then 2 Database Gateway Positions are required on each token-ring and the NTWS0702 package should be ordered for each Database Gateway position in the office.

Provide the following packages for EACH database gateway position:

Table 24. Database gateway position software for Release 7.0		
Functional code	CPC	Description
NTWS0705	P0865811	IBM DOS V5.02
NTWS0702	P0865814	X.25 Communication
NTWS0704	P0865815	MS Windows V3.11
NTWS0706	P0865816	Wollongong V4 Rel 3.2.1
MPXI0705	P0865805	MPX-IWS Base Standard (Note 1)
MPXI0704	P0865804	MPX-IWS Base Extended (Note 1)
NTWS0701	P0865812	LAN Support
Note: 1. Provision either the Standard or Extended software, not both.		
Note: 2. Required only if using NTDA without routers.		

SDK/API (Release 7.0)

The SDK/API is ordered and licensed through NT PLM.

12.12.5 Software Usage Restrictions

At present, OIA allows interface only to a single database. This can be ORDB or another database. Refer to section "Hardware Usage Restrictions" for other restrictions.

TOPS IWS requires BCS35 or later. Some IWS Release 2.93 and higher features require TOPS03 or TOPS04 CM software. Refer to section "IWS CM Dependencies" .

In order to use cluster size sixteen or twenty, the Increased TOPS Data Multiplexing software package (NTXR52AA) is required in the DMS.

The customer should contact IBM to order the DA software beginning with MPX-IWS Release 6.0 and higher.

12.12.6 Software Compatibility

12.12.6.1 IWS and TOPS

IWS Releases are only compatible with certain TOPS CM loads (GTOPS or LET). The following figure shows the IWS and TOP CM release dependencies. The "'X" indicates testing has already taken place. The "P" indicates testing is planned. A blank indicates it is not compatible.

Table 21. IWS and TOPS CM compatibility								
	0	04	05	06	07	8.0	8.1	09
IWS 2.93	X	X	X	X				
IWS 4.1	X	X	X	X	X			
IWS 6.0		X	X	X	X	X		
IWS 7.0		X	X	X	X	X		P
IWS 8.0				X	X	X	X	P
IWS 9.0					P	P	P	P

12.12.7 Memory Provisioning

Refer to MEMCALC.

12.13 Real Time Impact

Refer to the System Engineering Bulletins (see section "Cross-Reference Publications").

Chapter 13

TERMINALS AND WORKSTATIONS

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TERMINALS AND WORKSTATIONS
Section Contents

1.0 ECM195 - Meridian Business Sets (MBS) 13-1
1.1 Overview 13-1
1.2 Hardware Provisioning 13-2
1.2.1 Hardware Usage Restrictions 13-2
1.2.2 Hardware Dependencies 13-2
1.2.2.1 P and C Side Port Requirements . . . 13-2
1.2.2.2 DMS BUS Port Requirements 13-2
1.2.2.3 Circuits Per Card 13-2
1.2.2.4 Discrimination Numbering 13-2
1.2.3 Provisioning Considerations 13-2
1.2.3.1 ETS Line Card 13-2
1.2.3.2 Loop Range and Signal Attenuation . . 13-3
1.2.3.3 Power Supply Requirements 13-3
1.2.4 Office Layout Information 13-3
1.2.5 Traffic Tables 13-3
1.3 Product/System Specification 13-3
1.3.1 Physical Characteristics 13-3
1.3.2 EMI/Earthquake Information 13-4
1.3.3 Sparing Information 13-4
1.3.4 Power Feed and Fusing Requirements 13-4
1.3.5 Current Drain Information 13-4
1.4 Software Provisioning 13-4
1.4.1 Required Software Packages and Interdependencies 13-4
1.4.2 Software Usage Restrictions 13-4
1.4.3 Memory Provisioning 13-4
1.5 Real Time Impact 13-4

2.0 ECM218 - Attendant Consoles 13-5
2.1 Overview 13-5
2.2 Hardware Provisioning 13-8
2.2.1 Hardware Usage Restrictions 13-8
2.2.2 Hardware Dependencies 13-8
2.2.3 P and C Side Port Requirements 13-8
2.2.4 DMS BUS Port Requirements 13-8
2.2.5 Circuits Per Card 13-8
2.2.6 Discrimination Numbering 13-8
2.2.7 Provisioning Considerations 13-8
2.2.8 Office Layout Information 13-10
2.2.9 Traffic Tables 13-10
2.3 Product/System Specification 13-11
2.3.1 Physical Characteristics 13-11
2.3.2 EMI/Earthquake Information 13-11
2.3.3 Sparing Information 13-11
2.3.4 Power Feed and Fusing Requirements 13-11
2.3.5 Current Drain Information 13-11
2.4 Software Provisioning 13-11
2.4.1 Required Software Packages and Interdependencies 13-11
2.4.2 Software Usage Restrictions 13-11

2.4.3 Memory Provisioning 13-11
2.5 Real Time Impact 13-11

3.0 ECM244 - DMS100 MAP Communication Module 13-12
3.1 Overview 13-12
3.2 Hardware Provisioning 13-12
3.2.1 Hardware Usage Restrictions 13-12
3.2.2 Hardware Dependencies 13-12
3.2.3 P and C Side Port Requirements 13-12
3.2.4 Circuits Per Card 13-12
3.2.5 Discrimination Numbering 13-12
3.2.6 Provisioning Considerations 13-13
3.2.7 DMS BUS Port Requirements 13-13
3.2.8 Office Layout Information 13-15
3.2.9 Traffic Tables 13-15
3.3 Product/System Specification 13-15
3.3.1 Physical Characteristics 13-15
3.3.2 EMI/Earthquake Information 13-15
3.3.3 Sparing Information 13-16
3.3.4 Power Feed and Fusing Requirements 13-16
3.3.5 Current Drain Information 13-16
3.4 Software Provisioning 13-16
3.4.1 Required Software Packages and Interdependencies 13-16
3.4.2 Software Usage Restrictions 13-16
3.4.3 Memory Provisioning 13-16
3.5 Real Time Impact 13-16

4.0 ECM353 - TCS 1800 Key Telephone System 13-17
4.1 Overview 13-17
4.2 Hardware Provisioning 13-17
4.2.1 Hardware Usage Restrictions 13-17
4.2.2 Hardware Dependencies 13-17
4.2.2.1 P and C Side Port Requirements . . . 13-17
4.2.2.2 DMS BUS Port Requirements 13-17
4.2.2.3 Circuits Per Card 13-17
4.2.2.4 Discrimination Numbering 13-18
4.2.3 Provisioning Considerations 13-19
4.2.4 Office Layout Information 13-25
4.2.5 Traffic Tables 13-25
4.3 Product/System Specification 13-25
4.3.1 Physical Characteristics 13-25
4.3.2 EMI/Earthquake Information 13-26
4.3.3 Sparing Information 13-26
4.3.4 Power Feed and Fusing Requirements 13-26
4.3.5 Current Drain Information 13-26
4.4 Software Provisioning 13-26
4.4.1 Required Software Packages and Interdependencies 13-26
4.4.2 Software Usage Restrictions 13-26
4.4.3 Memory Provisioning 13-26
4.5 Real Time Impact 13-26

5.0 ECM681 - Building Block Engineering - OAM Workstation . . 13-27
5.1 Overview 13-27
5.1.1 Simplex Workstation 13-28
5.1.1.1 Software Downloading Modem 13-29
5.2 Hardware Provisioning 13-29
5.2.1 Hardware Usage Restrictions 13-29
5.2.1.1 Cable Length Restrictions 13-30
5.2.2 Hardware Dependencies 13-30
5.2.2.1 P and C Side Port Requirements . . . 13-30
5.2.2.2 DMS BUS Port Requirements 13-30
5.2.2.3 Circuits Per Card 13-30
5.2.2.4 Discrimination Numbering 13-30
5.2.3 Provisioning Considerations 13-30
5.2.4 Office Layout Information 13-30
5.2.5 Traffic Tables 13-30
5.3 Product/System Specification 13-31
5.3.1 Physical Characteristics 13-31
5.3.2 EMI/Earthquake Information 13-31
5.3.3 Sparing Information 13-31
5.3.4 Power Feed and Fusing Requirements 13-31
5.3.5 Current Drain Information 13-31
5.4 Software Provisioning 13-31
5.4.1 Required Software Packages and Interdependencies 13-31
5.4.2 Software Usage Restrictions 13-31
5.4.3 Memory Provisioning 13-31
5.5 Real Time Impact 13-31

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1.0 ECM195 - Meridian Business Sets (MBS)

1.1 Overview

The DMS100F Meridian Business Set (MBS), is designed to operate with Northern Telecom's Meridian Digital Centrex (MDC) Software, which provides subscribers with pushbutton access to a host of business features. Feature assignment is completely flexible because features are programmable in the DMS-100F system software.

For further information, refer to the following:

NTP 297-2011-100 Business Set Feature Description and Operation
NTP 297-2011-180 Business Set Line Engineering
NTP 297-2011-200 Business Set General Description, Installation,
-- Heading id 'ORDE195' unknown -- .

The MBS operates over a 2-wire (single pair) loop to a line card (NT6X21) controlled by the DMS-100F switching system. The extensive loop length allows the EBS to be located up to 15,000 feet (4.8 km) from the host or remote office using standard 26-guage wire. The M5009 Meridian Business Set (MBS) is equipped with a standard 1 -button telephone keypad, nine assignable keys which have LCD indicators and four dedicated feature keys for Volume Up, Volume Down, Hold, and Release.

The M5112 Meridian Business Set (MBS) is equipped with a standard 1 -button telephone keypad, 12 feature keys with LCD indicators and four dedicated feature keys for Volume Up, Volume Down, Hold, and Release. The M5112 also provides handsfree speakerphone capability which can be controlled with 2 of the feature keys for handsfree and mute.

The M5209 Meridian Business Set (MBS) is equipped with a standard 1 -button telephone keypad, nine assignable keys which have LCD indicators and four dedicated feature keys for Volume Up, Volume Down, Hold, and Release. There is a 48 character LCD tiltable display, which is made up of two lines of 24-characters. The display is controlled by an internal microprocessor, and shows information such as calling name, calling number, reason display, time and programming information.

The M5312 Meridian Business Set (MBS) is equipped with a standard 1 -button telephone keypad, 12 assignable keys which have LCD indicators and four dedicated feature keys for Volume Up, Volume Down, Hold, and Release. There is a 48 character LCD tiltable display, which is made up of two lines of 24-characters. The display is controlled by an internal microprocessor, and shows information such as calling name, calling number, reason display, time and programming information.

The M5312 also provides handsfree speakerphone capability which can be controlled with two of the feature keys for handsfree and mute. The M5212 ACD Meridian Business Set (MBS) is equipped with a standard 1 -button telephone keypad, 12 assignable keys which have LCD indicators and four dedicated feature keys for Volume Up, Volume Down, Hold, and Release. There is a 48 character LCD tiltable display, which is made up of two lines of 24-characters. The display is controlled by an internal microprocessor, and shows information such as calling name, calling number, reason display, time and programming information.

The M5212 also supports both Carbon and Electret headsets and provides hookswitch bypass for ACD agents. ADD ON MODULES: To further enhance a user's MBS, add on modules which provide additional features and functions, are available for the the entire MBS family. These modules include the (M518 18 Button Add-on) and the M536 (36 Button Add-on).

1.2 Hardware Provisioning

1.2.1 Hardware Usage Restrictions

Not Applicable

1.2.2 Hardware Dependencies

Not Applicable

1.2.2.1 P and C Side Port Requirements

Not applicable

1.2.2.2 DMS BUS Port Requirements

Not Applicable

1.2.2.3 Circuits Per Card

Not Applicable

1.2.2.4 Discrimination Numbering

Not Applicable

1.2.3 Provisioning Considerations

1.2.3.1 ETS Line Card

A special Electronic Telephone Set (ETS) Line Card (NT6X21) is required to receive and interpret ETS signalling information. The ETS line card is supported by the DMS100F advanced peripherals LCM, RLCM, and RSC.

1.2.3.2 Loop Range and Signal Attenuation

The operational range for the ETS, with or without add-ons is determined by one of two factors - either the DC Loop Range or the Signal attenuation at 8Khz.

1. For successful ETS operation, the following limits cannot be exceeded:

   Loop Resistance: 1230 Ohms Maximum

   Signal Attenuation at 8 Khz: 24 db Maximum

2. The factor which reaches the maximum limit first will determine the loop range for the Electronic Telephone Set (ETS).

3. The above DC loop resistance limit assumes that the central office battery voltage is between 42.75 volts and 56 volts. The associated cable and cabling distances used within the resistance limits above are:

GAUGE	LENGTH(Feet/Meters)	RESISTANCE (OHMS)
22	7500/2300	250
24	4800/1500	250
26	3000/1000	250
28	2000/600	250

1.2.3.3 Power Supply Requirements

The Meridian Business Set and associated add-ons can be loop powered or locally powered. When locally powered the set provides all display, handsfree and add on capabilities. When CO loop powered or during power failure mode (also loop powered) only the basic feature capabilities of button access and receiving and making calls are available.

1.2.4 Office Layout Information

Not Applicable

1.2.5 Traffic Tables

See ECM-497 - Simplified Traffic Provisioning

1.3 Product/System Specification

1.3.1 Physical Characteristics

N/A

1.3.2 EMI/Earthquake Information

N/A

1.3.3 Sparing Information

Apply standard sparing rules.

1.3.4 Power Feed and Fusing Requirements

Not Applicable

1.3.5 Current Drain Information

Not Applicable

1.4 Software Provisioning

For NTX software packages to PCL/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

1.4.1 Required Software Packages and Interdependencies

MBS SOFTWARE FEATURES Please refer to the appropriate Centrex feature packages. These include NTX100 and NTX106 Business Set Features.

1.4.2 Software Usage Restrictions

N/A

1.4.3 Memory Provisioning

Refer to MEMCALC for memory provisioning.

1.5 Real Time Impact

Refer to PRTCALC or REALQUICK for this information.

2.0 ECM218 - Attendant Consoles

2.1 Overview

The BSAC (Business Services Attendant Console) is defined as an optional feature of the Meridian Digital Centrex (MDC). It is used to answer calls placed to a specific directory number (DN), dial "0" calls from within a customer group, intercept calls, and "don't answer" recalls. The console operates in a switch loop mode, and is connected to the DMS-100F switch via standard three-pair cable through three standard line cards.

> Note, the console is not connected directly to the line and trunk circuits; a virtual loop concept is used. Refer to Figure 1 on page 13-6 and Figure 2 on page 13-7 for a conceptual block diagram of the Attendant Console/DMS system configuration.

The BSAC terminal is used in DMS100 Switching offices as an interface between the operator and the switch. The operator to DMS interface is via a keyboard, for sending information to the DMS and a combination, 16 segment display for receiving information form the DMS. At the same time the operator is in voice communication with the customer.

Additionally, this ECM consolidates and supercedes all existing Attendant Console ECM's and API's which include the following:

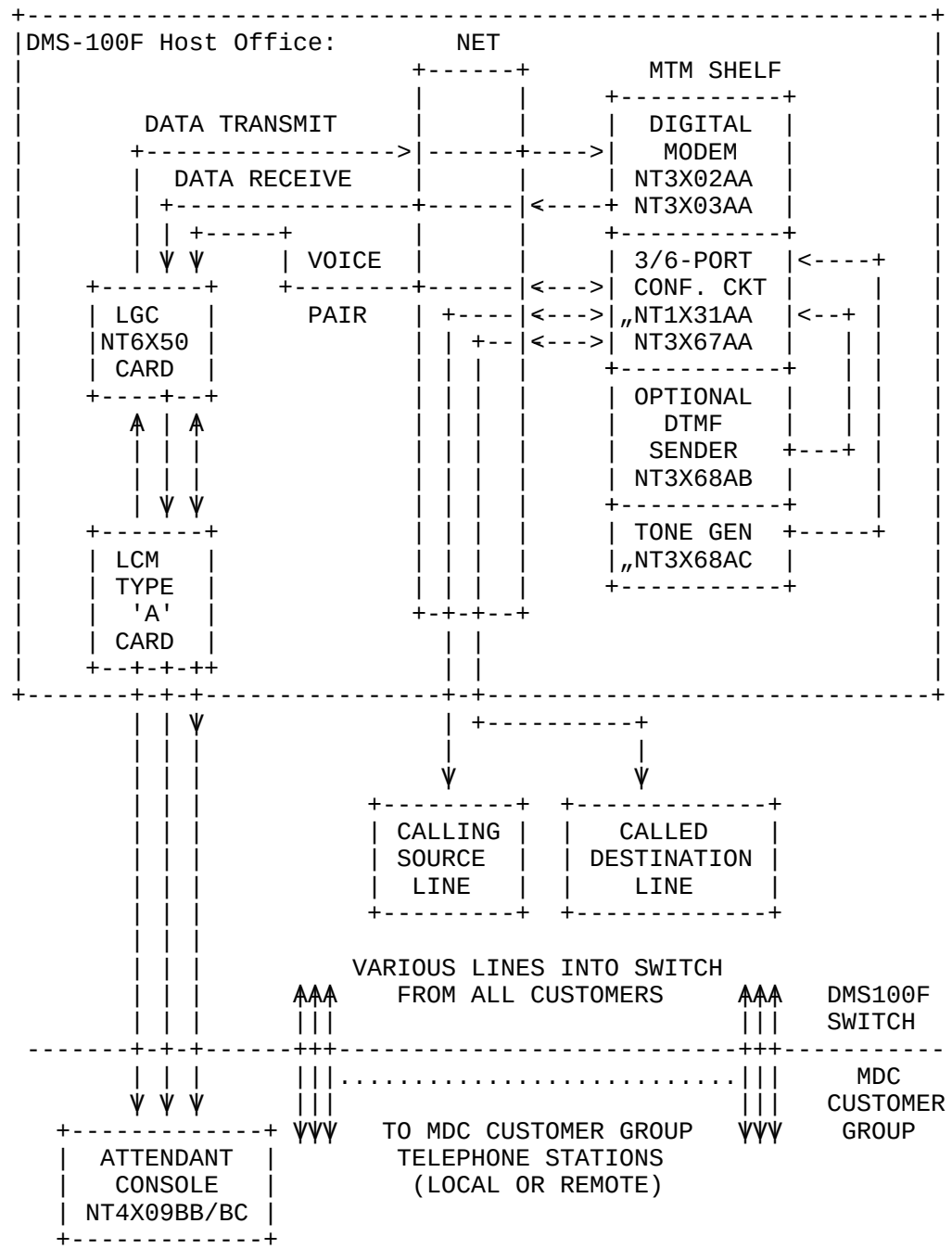
API-038 API For BSAC

ECM-090 Power Supply For BSAC & BSAC Provisioning

ECM-098 Power Supply For BSAC W/O Battery Backup

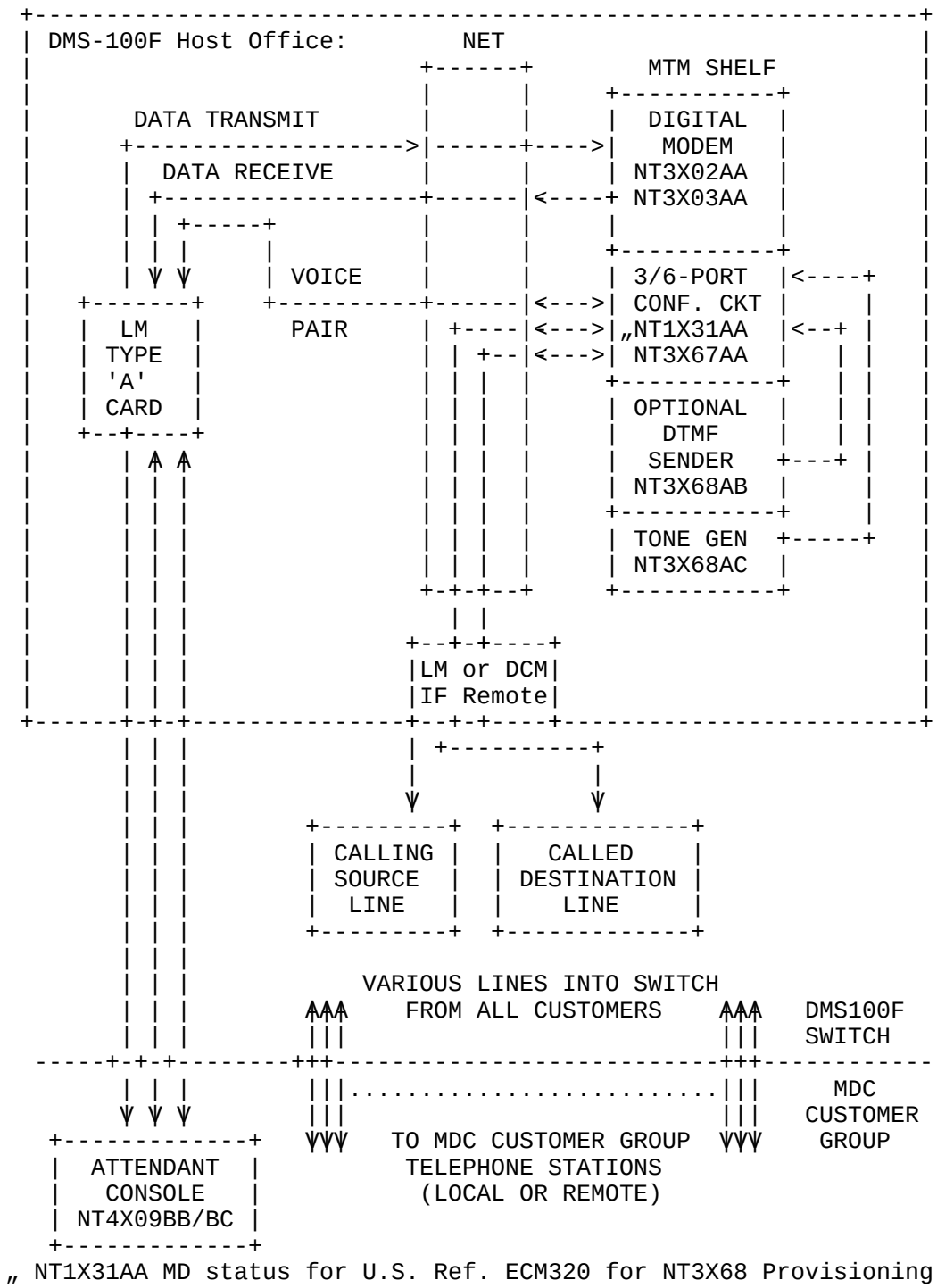
ECM-147 New BSAC And Battery Backup

ECM-21804 NT4X09AH & NT4X09AG BSAC



„ NT1X31AA MD status for U.S. Ref. ECM320 for NT3X68 Provisioning.

Figure 1. Attendant Console Current Configuration Using LGC/LCM



„ NT1X31AA MD status for U.S. Ref. ECM320 for NT3X68 Provisioning.

Figure 2. Attendant Console Existing Configuration Using LM's

2.2 Hardware Provisioning

2.2.1 Hardware Usage Restrictions

The physical location of the Attendant Console from the DMS is the only known usage restriction. In that; if the unit is placed greater than 6 0 feet from the nearest MIS Frame FSP then the Pylon power supply must be provided as defined herein.

2.2.2 Hardware Dependencies

Additional BSAC support hardware required at the host office follows:

- Conference Circuits
- Digital Modems
- Tone Generator Circuit Packs

2.2.3 P and C Side Port Requirements

N/A

2.2.4 DMS BUS Port Requirements

N/A

2.2.5 Circuits Per Card

N/A

2.2.6 Discrimination Numbering

N/A

2.2.7 Provisioning Considerations

The Attendant Console may be provisioned for any DMS-IBN System. However, different versions exist to support the different market requirements. The BSAC is shipped with a 8 foot connectorized cable assembly.

The provisioning method used for determining the number of attendant consoles is based on the CCS method derived from the Erlang C formula.

The number of attendant consoles to be provisioned should be based on the following criteria:

- the attendant console activated CCS
- the speed of answer objectives

- and the average attendant work time (AWT).

The NT4X09BB and NT4X09BC BSAC's will be provisioned in the same way as the NT4X09AG and NT4X09AH attendant consoles. Section 450/310 of NTP 297-1001-450 outlines all of the provisioning considerations for Canadian Engineering. The NT8620 Reference Manual outlines all of the provisioning for U.S. Engineering.

Provide BSAC Unit NT4X09BB for all U.S. requirements and Canadian English speaking customer requirements or NT4X09BC for French keyboard characters

The following BSAC support hardware required at Host Office:

1. Conference Circuits
2. Digital Modems
3. Tone Generator Circuit Packs

The above support hardware is provisioned as follows:

- Conference Circuits

  Provide one (1) NT3X67AA (Six Port Conference Circuit) per one (1) or two (2) BSACS provided as per customer requirements. If customer requires the NT3X67AA be used in a three (3) port configuration, then provide one (1) NT3X67AA per two (2) BSACs, otherwise provide one (1) NT3X67AA per BSAC.

- Digital Modems

  Provide one (1) NT3X02 & NT3X03 modem pair per BSAC. This modem pair provides four (4) digital modem circuits.

- Tone Generator CP

  Provide one Call Waiting Tone Generator Card per Central Office (CO). A second card may be provided per customer request for increased reliability. The card is equipped with four (4) circuits.

- Head Sets

  Due to logistics U.S. and Canadian jobs are not supplied with head sets from the same manufacturer. Provide headset as follows:

  For Canadian jobs order:
  - QSR2F2 - Hset w/T Mark Std w/o Acc
  - QSR2G1 - Hset Std w/15ft cord
  - QKP1A - Headset Acc Kit

  For U.S. jobs order:

- HSB552-1 - Supra Monaural Headset

  The following headsets have been Manufacture Discontinued (MD'ed):
- HS0552-1 - Supra Monaural Headset - Status MD'ed
- HS0554-1 - Supra Binaural Headset - Status MD'ed

- DTMF Sender CP

  One NT3X68AB - DTMF SENDER CP is optionally required when the Attendant Console must outpulse DTMF to some other switching system. This circuit is provisionable on a one per office basis two max for redundancy.

- Power Supply

  The attendant console requires -48V for the Central Office when the console is located less than 875 feet from the power source. If the console is located greater than 875 feet from the power source then provide the Pylon Power Supply with or without battery back-up. One Pylon power supply can acommodate up to two (2) attendant consoles.

  Note:

  The strap between terminals 7 and 8 must be connected on the KTS-3 power supply. The strap will be in place on the Pylon Nevafail (NF-3) as it comes from the factory.

- Line Cards

  Each attendant console requires three (3) Type-A Line Cards to connect to the integrated business network, one for Voice, Data Transmit, and Data Receive.

  Facilities connecting the console to the assigned line cards shall be 2-wire 1300 ohms and not greater than 8db loss with a maximun loop-length of 4,877m (16,000 ft.).

2.2.8 Office Layout Information

Not applicable.

2.2.9 Traffic Tables

Refer to PRTCALC/RTCALC for Traffic Tables.

2.3 Product/System Specification

2.3.1 Physical Characteristics

2.3.2 EMI/Earthquake Information

Not applicable.

2.3.3 Sparing Information

Sparing is per Telco Specifications Only.

2.3.4 Power Feed and Fusing Requirements

If the Attendant console is fused from the MIS frame FSP, a 1-1/3 amp fuse is required. Otherwise power is supplied via the Pylon Power Supply.

2.3.5 Current Drain Information

The Attendant Console current drain is 1-1/3 amps.

2.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

2.4.1 Required Software Packages and Interdependencies

The Attendant Console requires the following S/W Packages in order to function properly:

NTX100AA - Integrated Business Networks - Basic (IBN)

NTX100AA Needs:
NTX000AA - BILGE
NTX001AA - Common Basic
NTX901AA - Local Features Basic

2.4.2 Software Usage Restrictions

Not applicable.

2.4.3 Memory Provisioning

Refer to MEMCALC for CC/SN memory requirements.

2.5 Real Time Impact

Refer to RTCALC for Real Time requirements.

3.0 ECM244 - DMS100 MAP Communication Module

3.1 Overview

The MAP Voice Communication Module (VCM) is the basis of the Maintenance Administration Position (MAP). The telephone set component provides the MAP operator with telephone links into and out of the DMS100F. The MAP Voice Communication Module may consists of:

- Telephone Set
- Head Sets
- Hands-free Unit
- Automatic Dialer

The NT Logic Phones and the ITT & Comdial 30 Button Telsets serve as the Telephone set component of the VCM. These units interface to the DMS System is via communications trunks, 101 test lines, and communications lines all of which terminate on the logic phone. They are provided only on MAP type positions used for general maintenance and trunk testing functions. The communications trunks (toll office only) are used by maintenance personnel to originate calls. Two communications trunks are associated with every MAP used for trunk testing functions. The communications lines (local and toll) are tie lines and normal office telephone lines.

3.2 Hardware Provisioning

3.2.1 Hardware Usage Restrictions

Not applicable.

3.2.2 Hardware Dependencies

Not applicable.

3.2.3 P and C Side Port Requirements

Not applicable. id=DMSB244. DMS BUS Port Requirements

Not applicable.

3.2.4 Circuits Per Card

Not applicable.

3.2.5 Discrimination Numbering

Not applicable.

3.2.6 Provisioning Considerations

Not applicable.

3.2.7 DMS BUS Port Requirements

The NT Logic Phones serve as the only provisionable Telephone set component of the Map Voice Communication Module. These units interface the DMS System via communications trunks, 101 test lines, and communications lines all of which terminate on the telset. They are provided only on MAP type positions used for general maintenance and trunk testing functions.

The communications trunks (toll office only) are used by maintenance personnel to originate calls. Two communications trunks are associated with every MAP used for trunk testing functions. The communications lines (local and toll) are tie lines and normal office telephone lines.

Six telephone lines (lines 0 to 5) have standard assignments as illustrated in Figure 3 on page 13-14

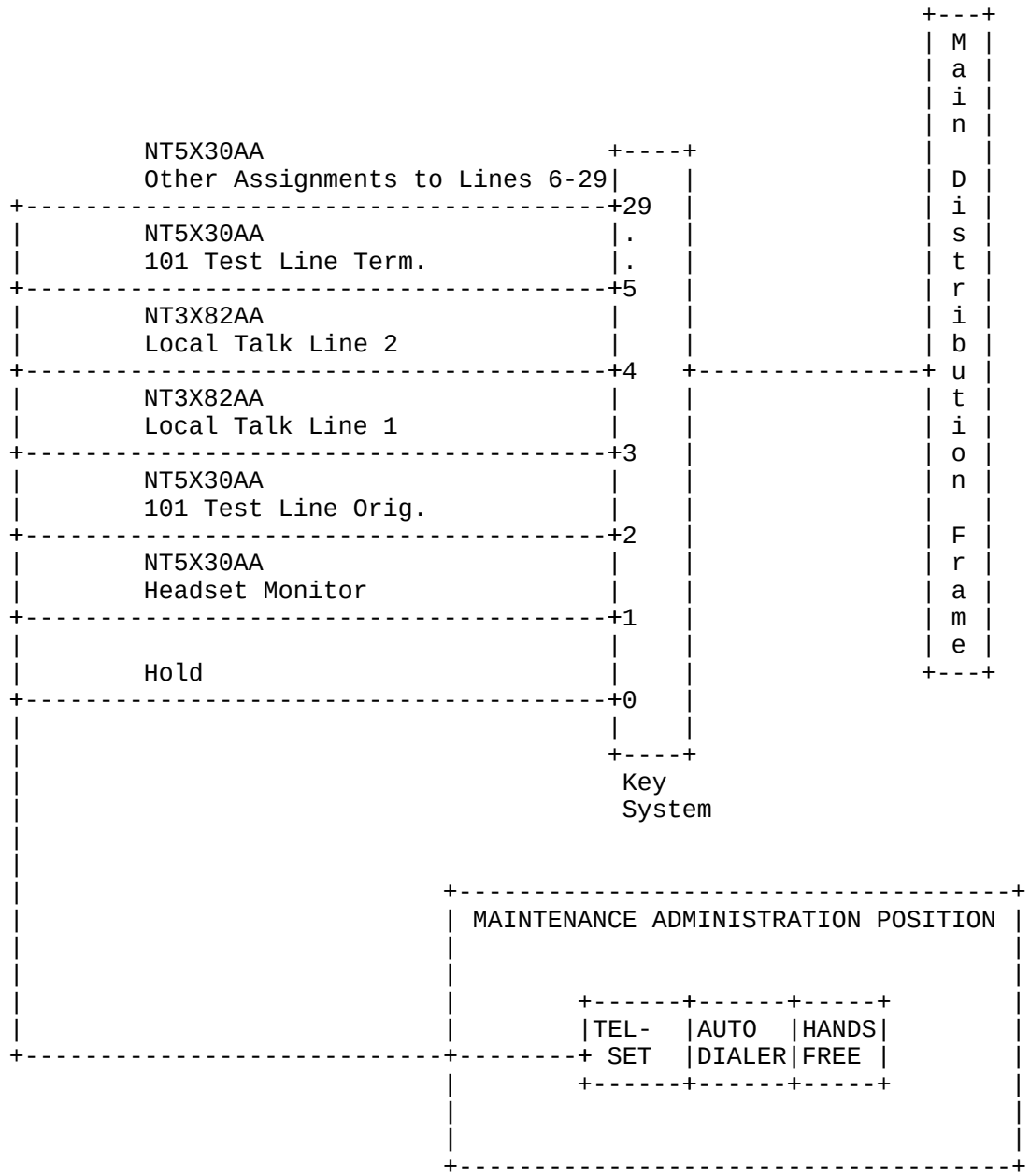


Figure 3. RELATIONSHIP OF TELEPHONE SET TO THE MAP & DMS100F

LINE ASSIGNMENT	***DESCRIPTION***
Line Zero	Assigned to the Key System's HOLD function
Line One	HeadSet Monitor assignment is provided for service analysis monitors and test monitors at the MAP, and loading the DRAM. Use the NT5X30AA for North American jobs or the NT5X30BA for International jobs.
Lines Two & Five	101 Test Line - Two Key Set lines are assigned to this function, one for incomming traffic and the other for outgoing traffic -- use the NT5X30AA for North American jobs or the NT5X30BA for International jobs.
Lines Three & Four	Local Talk Line - Two Key Set lines are assigned to this function for local communications between the FSPs and the MAP.
Lines six - Twenty-Nine	These Key Set lines are available for Telco assignments as required

3.2.8 Office Layout Information

Not applicable.

3.2.9 Traffic Tables

Not applicable.

3.3 Product/System Specification

3.3.1 Physical Characteristics

Not applicable.

3.3.2 EMI/Earthquake Information

Not applicable.

3.3.3 Sparing Information

Standard Sparing algorithms apply.

3.3.4 Power Feed and Fusing Requirements

Not applicable.

3.3.5 Current Drain Information

Not applicable.

3.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

3.4.1 Required Software Packages and Interdependencies

Not applicable.

3.4.2 Software Usage Restrictions

Not applicable.

3.4.3 Memory Provisioning

Not applicable.

3.5 Real Time Impact

Not applicable.

4.0 ECM353 - TCS 1800 Key Telephone System

4.1 Overview

The TCS 1800 Key Telephone System is ordered when a 1A2 Key Telephone System is required in a DMS-100 Family switch. The Key System may be considered as ancilliary equipment to the Maintenance and Administration Position (MAP). Its primary function is to provide voice communications at the MAP and interface other circuits such as FSP voice and data jacks, loudspeaker, and paging systems.

The TCS 1800 Key Telephone System consists of the following:

1. TCS 1800A-1 L1
   1A2 Line Card Shelf

2. and TCS 1800B-1 L1
   BIX Shelf

   - if required

   The above two shelves can mount on the MIS/RSE/RME Frame

4.2 Hardware Provisioning

4.2.1 Hardware Usage Restrictions

Not applicable.

4.2.2 Hardware Dependencies

Not applicable.

4.2.2.1 P and C Side Port Requirements

Not applicable

4.2.2.2 DMS BUS Port Requirements

Not applicable

4.2.2.3 Circuits Per Card

The TCS 1800AA-1 List 1 Line Card contains a single Central Office or Private Branch Exchange (CO/PBX) line circuit which provides the following features:

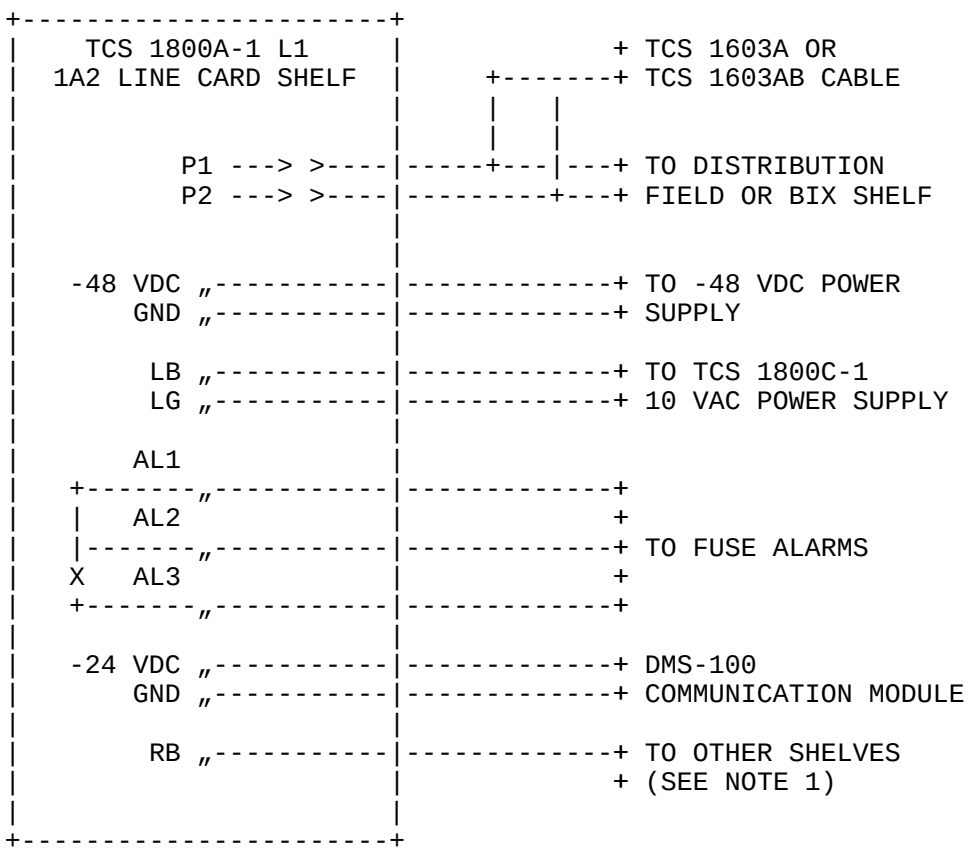
- CO/PBX line pickup and hold
- Flashing line lamp
- Wink or steady hold lamp indicators (Y or X option)

- Individual line time out, of audible and visual signals, with a long delay of 30 seconds or an optional short delay of 6 seconds (Z option)
- Common audible control on incoming calls (W,T, or V option)
- Talking circuit is maintained during power failure
- Delayed release from hold, of one second or optional 90 milliseconds (R option)
- Fully balanced loop in all states
- Light Emitting Diode (LED) for line status indication

4.2.2.4 Discrimination Numbering

Not applicable

4.2.3 Provisioning Considerations



P1	CONNECTOR P1	P2	CONNECTOR P2
VDC	VOLTS DC	GND	GROUND
LB	LAMP BATTERY	LG	LAMP GROUND
AL1	ALARM LEAD 1	AL2	ALARM LEAD 2
AL3	ALARM LEAD 3	RB	RING BATTERY

NOTE 1: The TCS 1800AC Ringing Generator can ring up 6 telephone sets. Depending on the specific installation needs, one card may supply two (2) shelves or more.

NB: For further information, see TCS 1800 1A2 Key Telephone System Customer Manual.

Figure 4. BLOCK DIAGRAM OF TCS 1800A-1 L1 1A2 LINE CARD SHELF

1A2 LINE CARD SHELF
TCS 1800A-1 L1

CONN. P1 PIN NO.	LEAD DESIG.	CARD CONNECTOR J1	J2	J3	J4	J5
26	T-1	14				
1	R-1	9				
27	T1-1	12				
2	R1-1	13				
28	A-1	16				
3	A1-1	15				
29	LG-1	6				
4	L-1	8				
30	B-1					
5	RC-1	1				
31	T-2		14			
6	R-2		9			
32	T1-2		12			
7	R1-2		13			
33	A-2		16			
8	A1-2		15			
34	LG-2		6			
9	L-2		8			
35	B-2					
10	RC-2		1			
36	T-3			14		
11	R-3			9		
37	T1-3			12		
12	R1-3			13		
38	A-3			16		
13	A1-3			15		
39	LG-3			6		
14	L-3			8		

Figure 5. PIN NUMBERS AND LEAD DESIGNATIONS FOR CONNECTOR P1 OF 1A2 LINE CARD SHELF (Continued on Next Page)

40	B-3					
15	RC-3			1		
41	T-4				14	
16	R-4				9	
42	T1-4				12	
17	R1-4				13	
43	A-4				16	
18	A1-4				15	
44	LG-4				6	
19	L-4				8	
45	B-4					
20	RC-4				1	
46	T-5					14
21	R-5					9
47	T1-5					12
22	R1-5					13
48	A-5					16
23	A1-5					15
49	LG-5					6
24	L-5					8
50	B-5					
25	RC-5					1

NOTE: For further information, see TCS 1800 1A2 Key Telephone System Customer Manual.

Figure 6. PIN NUMBERS AND LEAD DESIGNATIONS FOR CONNECTOR P1 OF 1A2 LINE CARD SHELF

1A2 LINE CARD SHELF TCS 1800A-1 L1							
CONN. P2 PIN NO.	LEAD DESIG.	CARD CONNECTOR J6	J7	J8	J9	J10	
26	T-6	14					
1	R-6	9					
27	T1-6	12					
2	R1-6	13					
28	A-6	16					
3	A1-6	15					
29	LG-6	6					
4	L-6	8					
30	B-6						
5	RC-6	1					
31	T-7		14				
6	R-7		9				
32	T1-7		12				
7	R1-7		13				
33	A-7		16				
8	A1-7		15				
34	LG-7		6				
9	L-7		8				
35	B-7						
10	RC-7		1				
36	T-8			14			
11	R-8			9			
37	T1-8			12			
12	R1-8			13			

Figure 7. PIN NUMBERS AND LEAD DESIGNATIONS FOR CONNECTOR P2 OF 1A2 LINE CARD SHELF (Continued on Next Page)

38	A-8			16		
13	A1-8			15		
39	LG-8			6		
14	L-8			8		
40	B-8					
15	RC-8			1		
41	T-9				14	
16	R-9				9	
42	T1-9				12	
17	R1-9				13	
43	A-9				16	
18	A1-9				15	
44	LG-9				6	
19	L-9				8	
45	B-9					
20	RC-9				1	
46	T-10					14
21	R-10					9
47	T1-10					12
22	R1-10					13
48	A-10					16
23	A1-10					15
49	LG-10					6
24	L-10					8
50	B-10					
25	RC-10					1

NOTE: For further information, see TCS 1800 1A2 Key Telephone System Customer Manual.

Figure 8. PIN NUMBERS AND LEAD DESIGNATIONS FOR CONNECTOR P2 OF 1A2 LINE CARD SHELF

BIX MODULE TCS 1800BA-1 L1	
CONNECTOR P2 PIN NO.	CONNECTOR P1 PIN NO.
26	26
1	1
27	27
2	2
28	28
3	3
29	29
4	4
30	30
5	5
31	31
6	6
32	32
7	7
33	33
8	8
34	34
9	9
35	35
10	10
36	36

Figure 9. PIN NUMBERS FOR CONNECTORS P1 AND P2 OF BIX MODULE
(Continued on Next Page)

	11	11	
	37	37	
	12	12	
	38	38	
	13	13	
	39	39	
	14	14	
	40	40	
	15	15	
	41	41	
	16	16	
	42	42	
	17	17	
	43	43	
	18	18	
	44	44	
	19	19	
	45	45	
	20	20	
	46	46	
	21	21	
	47	47	
	22	22	
	48	48	
	23	23	
	49	49	
	24	24	
	50	50	
	25	25	

NOTE: For further information, see TCS 1800 1A2 Key Telephone System Customer Manual.

Figure 10. PIN NUMBERS FOR CONNECTORS P1 AND P2 OF BIX MODULE

4.2.4 Office Layout Information

Not applicable.

4.2.5 Traffic Tables

Not applicable.

4.3 Product/System Specification

4.3.1 Physical Characteristics

Not applicable.

4.3.2 EMI/Earthquake Information

Not applicable.

4.3.3 Sparing Information

Not applicable.

4.3.4 Power Feed and Fusing Requirements

The following fuse and feeds are required: The TCS1800A-1 L1 requires 1 3.0 Amp fuse, QFF-1C, and the power is fed from the FSP of the frame it is mounted on.

4.3.5 Current Drain Information

The maximum current drain for the TCS 1800AA-1 is 60mA (at -24V). The maximum drain occurs in the "hold" state.

4.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

4.4.1 Required Software Packages and Interdependencies

Not applicable.

4.4.2 Software Usage Restrictions

Not applicable.

4.4.3 Memory Provisioning

Not applicable.

4.5 Real Time Impact

Not applicable.

5.0 ECM681 - Building Block Engineering - OAM Workstation

5.1 Overview

OA&M workstation provisioning is accomplished using various configurations of the following building blocks:

- Simplex Workstation

5.1.1 Simplex Workstation

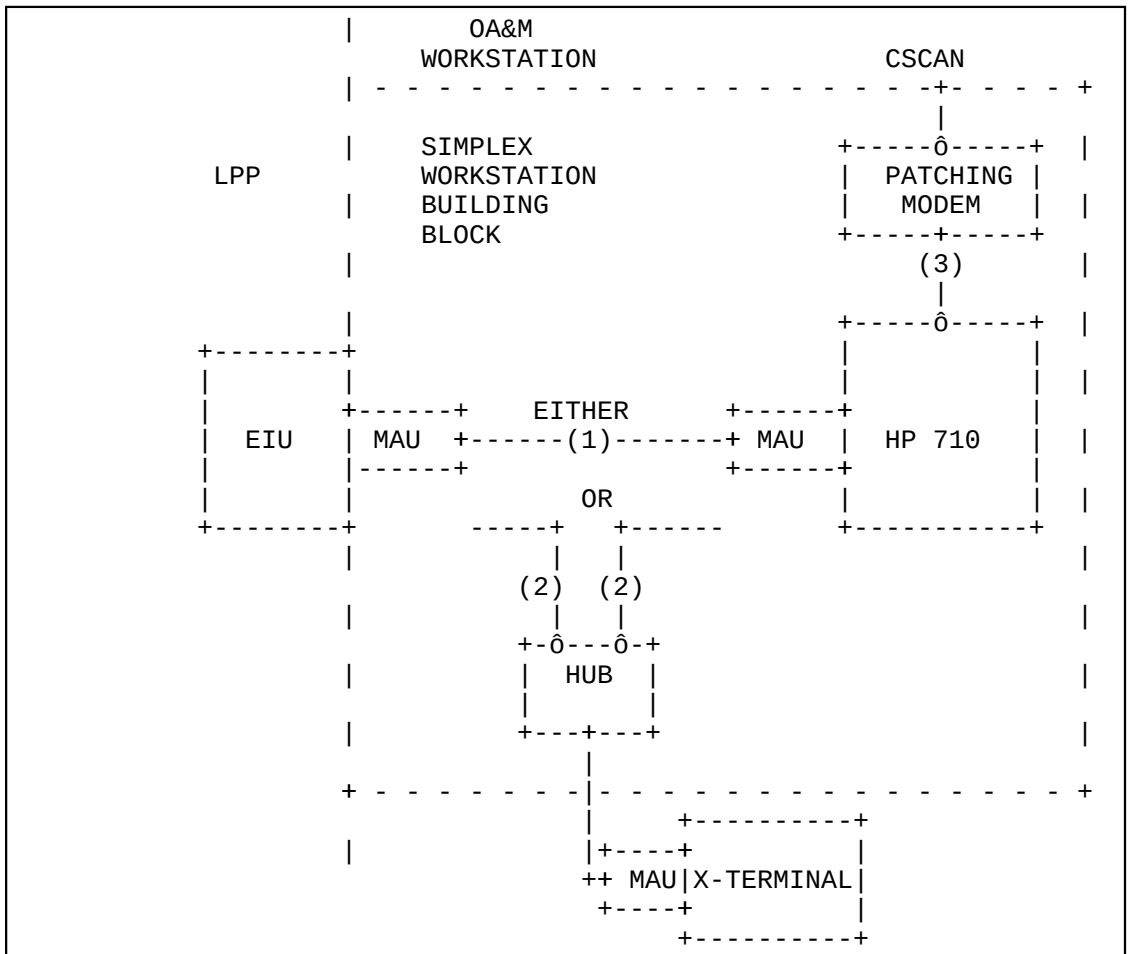


Figure 11. OA&M Workstation - Simplex Configuration

Key to cables in Figure 11

1. NT9X8510 MAU to MAU Cable (1 to 225 Metres)

2. NT9X511 Hub to MAU Cable (1 to 100 Metres)

3. Patching Modem Cable A0601464 (fixed 10ft)

5.1.1.1 Software Downloading Modem

The workstation has one RS-232 port enabling the connection of a modem to the workstation. This port has a bandwidth of 9600/19.2K baud and is used for software downloading.

A modem is required to enable software downloading to the Workstation via the RS-232 port. The modem may either be ordered as required or supplied by the customer.

5.2 Hardware Provisioning

5.2.1 Hardware Usage Restrictions

The following limitations and engineering rules apply to OA&M applications:

The OA&M Workstation communicates with the DMS host switch through an Ethernet LAN. An EIU is required for a DMS-100 switch to communicate with an Ethernet LAN. EIUs are optional equipment forming part of the SuperNode Multicomputing Base (SMB), Fiberized Link Interface Shelf (FLIS), and SuperNode SE. These platforms operates only in DMS-100 SuperNode equipped switches. Therefore, the OA&M Workstation operates only with SuperNode DMS-100.

Currently, there is a provisioning maximum of 4 EIU's per office.

The configuration of the OA&M Workstation is based on a LAN using 1 BaseT. Only 10BaseT components are supported.

Mount the MAUs directly to the bulkhead of the LPP and directly to the HP 712 workstation base. The cable from the EIU to the bulkhead, NT9X0190, is included in the EIU Building Block.

The MAU to Hub cable is limited to 100 metre. This cable length is custom engineered to length in the range 1 to 100 metre.

Ethernet Hubs and MAUs from different vendors shall not be mixed on the same LAN.

The HP 712 workstation operates reliably when powered directly from commercial power. However an AC UPS power supply may be used, for greater reliability, if required.

The Patching Modem must be located within 10 feet of the workstation because the 1CATSM8 cable is limited to 10 feet.

In applications in which the Workstation or any other devices connected to the same Ethernet Hub are not used directly in call processing functions, the Ethernet Hub should be co-located with the HP 712 Workstation and should be placed on a desktop if the distance from the EIU to the workstation is 1 0 metres or less.

Mounting the Ethernet Hub on a desk top allows the use of very short cables between the Hub and additional X-terminals or workstations. Mounting the Hub in this manner eliminates the need for a separate mounting frame. Note the 12 Port Hub includes miscellaneous mounting hardware for an EIA 19 inch width frame and rubber feet for desktop mounting. This hardware is used with a Hub Mounting bracket for mounting the Hub in a LAN Bay shelf.

5.2.1.1 Cable Length Restrictions

NT9X8510 (CPC: B0237649) Crossover Cable (MAU to MAU or Hub to Hub) is restricted to between 1 meter and 225 meters in length. This cable can be up to 225 meters only when used as a MAU to MAU cable with HP28685B MAU's, with the "long cable" switch on the MAU's selected. The cable length restriction is 100 meters in any other configuration.

NT9X8511 (CPC: B0237650) MAU to Hub Cable is restricted from 1 meter to 100 meter length. These Cables are engineered according to the CARX15 drawing.

5.2.2 Hardware Dependencies

None identified.

5.2.2.1 P and C Side Port Requirements

5.2.2.2 DMS BUS Port Requirements

5.2.2.3 Circuits Per Card

5.2.2.4 Discrimination Numbering

5.2.3 Provisioning Considerations

Each OA&M Workstation requires an eight-user workstation license to enable the operation of an 8-user run-time environment. A minimum of 3 users, i.e. Workstation Keyboard, Serial Port and the LAN are defined as workstaion users.

5.2.4 Office Layout Information

5.2.5 Traffic Tables

5.3 Product/System Specification

5.3.1 Physical Characteristics

5.3.2 EMI/Earthquake Information

5.3.3 Sparing Information

Standard sparing algorithms apply.

5.3.4 Power Feed and Fusing Requirements

5.3.5 Current Drain Information

5.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

5.4.1 Required Software Packages and Interdependencies

5.4.2 Software Usage Restrictions

None identified.

5.4.3 Memory Provisioning

| Not Applicable

5.5 Real Time Impact

| Not Applicable

Chapter 14

NETWORK APPLICATION VEHICLE

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NETWORK APPLICATION VEHICLE
Section Contents

1.0 ECM584 - Advanced Call Management Server (ACMS) 14-1
1.1 Overview 14-1
1.1.1 ACMS NODE 14-2
1.1.2 ACMS on MicroNAV 14-3
1.2 Hardware Provisioning 14-4
1.2.1 Hardware Usage Restrictions 14-4
1.2.2 Hardware Dependencies 14-5
1.2.2.1 P and C Side Port Requirements . . . 14-5
1.2.2.2 DMS BUS Port Requirements 14-5
1.2.2.3 Circuits Per Card 14-5
1.2.2.4 Discrimination Numbering 14-5
1.2.3 Provisioning Considerations 14-5
1.2.3.1 ACMS on CO-NAV 14-5
1.2.3.2 ACMS on MicroNAV 14-12
1.2.4 Office Layout Information 14-16
1.2.5 Traffic Tables 14-16
1.3 Product/System Specification 14-18
1.3.1 Physical Characteristics 14-18
1.3.2 EMI/Earthquake Information 14-18
1.3.3 Sparing Information 14-18
1.3.4 Power Feed and Fusing Requirements 14-19
1.3.5 Current Drain Information 14-19
1.4 Software Provisioning 14-19
1.4.1 Required Software Packages and Interdependencies 14-19
1.4.1.1 ACMS Software (CO-NAV) 14-19
1.4.1.2 ACMS SOFTWARE (MicroNAV) 14-24
1.4.1.3 DMS-CLASS Service Software 14-27
1.4.2 Software Usage Restrictions 14-28
1.4.3 Memory Provisioning 14-28
1.5 Real Time Impact 14-28

2.0 ECM696 - Audiogram Delivery Services (ADS) on the NAV Base. 14-29
2.1 Overview 14-29
2.1.1 Service Overview 14-29
2.1.1.1 0+ Audiogram Service 14-30
| 2.1.1.2 Services Node Intentional AudioGram Service 14-30
| 2.1.1.3 Direct Access Intentional AudioGram Service 14-31
2.1.1.4 1+ and Local Audiogram Service . . . 14-31
2.1.1.5 Millennium Audiogram Service: 14-31
2.1.1.6 Automated Status Query 14-32
2.1.2 Product Overview 14-33
2.1.2.1 ADS functions 14-34
2.1.3 ADS H/W Architecture 14-34
| 2.1.3.1 ADS Node 14-35
2.1.3.2 Integrated Storage Node 14-43
2.2 Hardware Provisioning 14-45

2.2.1 Hardware Usage Restrictions 14-45
2.2.2 Hardware Dependencies 14-46
2.2.2.1 P and C Side Port Requirements . . . 14-46
2.2.2.2 DMS BUS Port Requirements 14-46
2.2.2.3 Circuits Per Card 14-46
2.2.2.4 Discrimination Numbering 14-46
2.2.3 Provisioning Considerations 14-47
2.2.3.1 Requirements for the 0+ GATEWAY . . . 14-47
2.2.3.2 Messaging Controller Provisioning . . 14-54
2.2.3.3 Number of TOPS Attendants 14-63
2.2.3.4 Number of Attendant Controllers . . . 14-68
2.2.3.5 Number of Operations Controllers . . 14-70
2.2.3.6 Configure one pair of Storage Shelves 14-70
2.2.3.7 Modem Provisioning 14-76
2.2.3.8 LAN Provisioning 14-76
2.2.3.9 Requirements for the DMS 14-79
2.2.3.10 Controller Bays 14-81
2.2.3.11 Local Area Network (LAN) Bay 14-81
2.2.3.12 DMS Related Items for ADS 14-84
2.2.3.13 400 Spec Items 14-86
2.2.4 Office Layout Information 14-86
2.2.5 Traffic Tables 14-87
2.3 Product/System Specification 14-87
2.3.1 Physical Characteristics 14-87
2.3.2 EMI/Earthquake Information 14-87
2.3.3 Sparing Information 14-88
2.3.4 Power Feed and Fusing Requirements 14-88
2.3.5 Current Drain Information 14-89
2.4 Software Provisioning 14-90
2.4.1 Required Software Packages and Interdependencies 14-90
| 2.4.1.1 Packages required for all ADS service 14-90
| 2.4.1.2 Packages required for 0+ service . . 14-92
| 2.4.1.3 Packages required for 1+ and local service 14-93
| 2.4.1.4 Packages required for Direct Access Intentional Audigram 14-94
| 2.4.1.5 Packages required for Services Node Intentional 14-94
| 2.4.1.6 Packages required for Millennium Audiogram service 14-95
2.4.2 Software Usage Restrictions 14-95
2.4.3 Memory Provisioning 14-95
2.5 Real Time Impact 14-95

3.0 ECM708 - PowerView Tools (PVTL) 14-96
3.1 Overview 14-96
3.2 MacOS Tools 14-96
3.2.1 Dialog Generator 14-97
3.2.2 Voice-prompt Development System (VDS) 14-97
3.2.3 ADSI Developer 14-98
3.2.4 Transaction Manager 14-99

3.3 ACMS Development Kit 14-99
3.3.1 ACMS Vocabulary 14-99
3.3.2 ACMS Dialog 14-99
3.3.3 ACMS Generic Library 14-99
3.4 Hardware Provisioning 14-100
3.4.1 Hardware Usage Restrictions 14-100
3.4.2 Hardware Dependencies 14-100
3.4.2.1 Macintosh Platform Requirements . . 14-101
3.4.2.2 File Transfer Provisioning 14-101
3.4.2.3 PowerView Test Beds 14-102
3.4.2.4 P and C Side Port Requirements . . 14-104
3.4.2.5 DMS BUS Port Requirements 14-104
3.4.2.6 Circuits Per Card 14-104
3.4.2.7 Discrimination Numbering 14-104
3.4.3 Provisioning Considerations 14-104
3.4.3.1 System Interfaces 14-104
3.4.4 Office Layout Information 14-105
3.4.5 Traffic Tables 14-105
3.5 Product/System Specification 14-105
3.5.1 Physical Characteristics 14-105
3.5.2 EMI/Earthquake Information 14-105
3.5.3 Sparing Information 14-105
3.5.4 Power Feed and Fusing Requirements 14-105
3.5.5 Current Drain Information 14-105
3.6 Software Provisioning 14-105
3.6.1 Required Software Packages and Interdependencies 14-105
3.6.1.1 Software Packages Required For Power Tools Development 14-105
3.6.2 Software Usage Restrictions 14-106
3.6.3 Memory Provisioning 14-106
3.7 Real Time Impact 14-106

4.0 ECM807 - Intelligent Peripheral/Media Resource Unit . . 14-107
4.1 Overview 14-107
4.1.1 Service Description 14-108
4.1.1.1 Advanced Intelligent Network architecture 14-109
4.1.1.2 Stand-alone architecture 14-112
4.1.2 IP/MRU functionality 14-112
4.1.2.1 Announcement types 14-112
4.1.2.2 Managing announcements 14-114
4.1.2.3 Playing announcements 14-114
4.1.2.4 DTMF collection 14-115
4.1.2.5 Speech recognition 14-115
4.1.2.6 Call processing capabilities . . . 14-115
4.1.2.7 Connectivity options 14-116
4.1.2.8 Dialogs 14-116
4.1.2.9 Error handling 14-117
4.1.3 Service-independent building blocks 14-117
4.1.4 Service Groups 14-118
4.1.5 User perspective 14-120

4.1.5.1 Caller perspective 14-121
4.1.5.2 Service provider perspective . . . 14-121
4.1.6 Open interfaces 14-123
4.1.7 LAN and WAN networking 14-123
4.1.8 The IP/MRU Node 14-123
4.1.8.1 Network connectivity 14-124
4.1.8.2 Hardware architecture 14-124
4.1.8.3 LAN bay 14-126
4.1.8.4 Controller bay 14-127
4.1.9 Component Failure 14-128
4.1.9.1 LAN 14-129
4.1.9.2 Media Controllers 14-129
4.1.9.3 SS7/ISUP Controllers 14-129
4.1.9.4 Operations Controllers 14-129
4.2 Hardware Provisioning 14-129
4.2.1 Hardware Usage Restrictions 14-129
4.2.2 Hardware Dependencies 14-130
4.2.2.1 P and C Side Port Requirements . . 14-130
4.2.2.2 DMS BUS Port Requirements 14-130
4.2.2.3 Circuits Per Card 14-130
4.2.2.4 Discrimination Numbering 14-130
4.2.3 Provisioning Considerations 14-130
4.2.3.1 Define service groups 14-131
4.2.3.2 Determine call/transaction traffic projections 14-132
4.2.3.3 Calculate channel capacity requirements 14-134
4.2.3.4 Formula 1. Channel Capacity Calculation 14-134
4.2.3.5 Determine the distribution of service groups 14-135
4.2.3.6 Determine the grade of service . . 14-136
4.2.3.7 Select and optimize controller shelves and circuit cards 14-136
4.2.3.8 Provisioning example 14-141
4.2.3.9 Order shelves and circuit cards . . 14-146
4.2.3.10 Order bays, modules, and network hardware 14-152
4.2.3.11 Routers 14-156
4.2.3.12 Select software 14-156
4.2.3.13 NAV Bay software 14-156
4.2.3.14 Media controller software 14-156
4.2.3.15 Operations controller software . . 14-159
4.2.3.16 SS7/ISUP controller software . . . 14-160
4.2.3.17 Software for the service design environment 14-161
4.2.3.18 External connectivity 14-161
4.2.4 Office Layout Information 14-161
4.2.5 Traffic Tables 14-161
4.3 Product/System Specification 14-162
4.3.1 Physical Characteristics 14-162
4.3.2 EMI/Earthquake Information 14-162

4.3.3 Sparing Information 14-162
4.3.4 Power Feed and Fusing Requirements 14-162
4.3.5 Current Drain Information 14-162
4.4 Software Provisioning 14-162
4.4.1 Required Software Packages and Interdependencies 14-162
4.4.1.1 NAV Bay software 14-162
4.4.1.2 Media Controller software 14-162
4.4.1.3 Operations Controller software . . 14-165
4.4.1.4 SS7/ISUP Controller shelf software 14-166
4.4.1.5 Software for the service design environment 14-167
4.4.2 Software Usage Restrictions 14-167
4.4.3 Memory Provisioning 14-169
4.5 Real Time Impact 14-169

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1.0 ECM584 - Advanced Call Management Server (ACMS)

1.1 Overview

Product/System Overview

Advanced Call Management Server (ACMS) is an application used by service providers to enhance custom calling, Custom Local Area Subscriber Services (CLASS), and pay-per-use residential services. ACMS is used to download scripts to Analog Display Services Interface (ADSI) terminals. Nortel offers an ADSI-compatible telephone which is known as the PowerTouch 350 in the U.S. or Vista 350 in Canada.

Scripts are defined for each individual subscriber based on which features (Call Waiting, 3-Way Calling, etc.) are configured for the subscriber. The scripts are downloaded, stored in memory on the ADSI terminal, and executed by the terminal until they are overwritten. The script provides context-sensitive softkeys and displays that give the subscriber a visual display of the subscriber's options at appropriate times during the call.

The initial ACMS solution includes 16 scripts in a generic library for CLASS and custom calling features including:

- Three-Way Calling
- Call Waiting Display TR-Compliancy (SCWID)
- TR-Compliant Call Waiting Deluxe
- Auto Call Back (Repeat Dialing)
- Automatic Recall
- Customer-Originated Trace (Call Trace)
- Calling Name and Number Display
- Calling Number Delivery Blocking
- Speed Call 8
- Speed Call 30
- Call Forward
- Selective Call Forwarding
- Selective Call Rejection (Block Caller)
- Distinctive Ringing
- Message Waiting

- Call Forward Don't Answer

The generic library can be replaced by the service provider if the service provider elects to create custom service scripts. Services are customized by contracting services from Nortel Customer Services at Rochester, NY.

Advanced Call Management Server (ACMS) resides on either the Network Application Vehicle (NAV) platform, or the MicroNav platform. ACMS on either platform is also referred to as an ACMS Node.

The ACMS Node uses standard voice and data interfaces and protocols, such as DMS-100 compliant ISDN PRI, T1, and IEEE 802.3 to connect to the service provider's switching equipment, OSS equipment, and alarm subsystem.

1.1.1 ACMS NODE

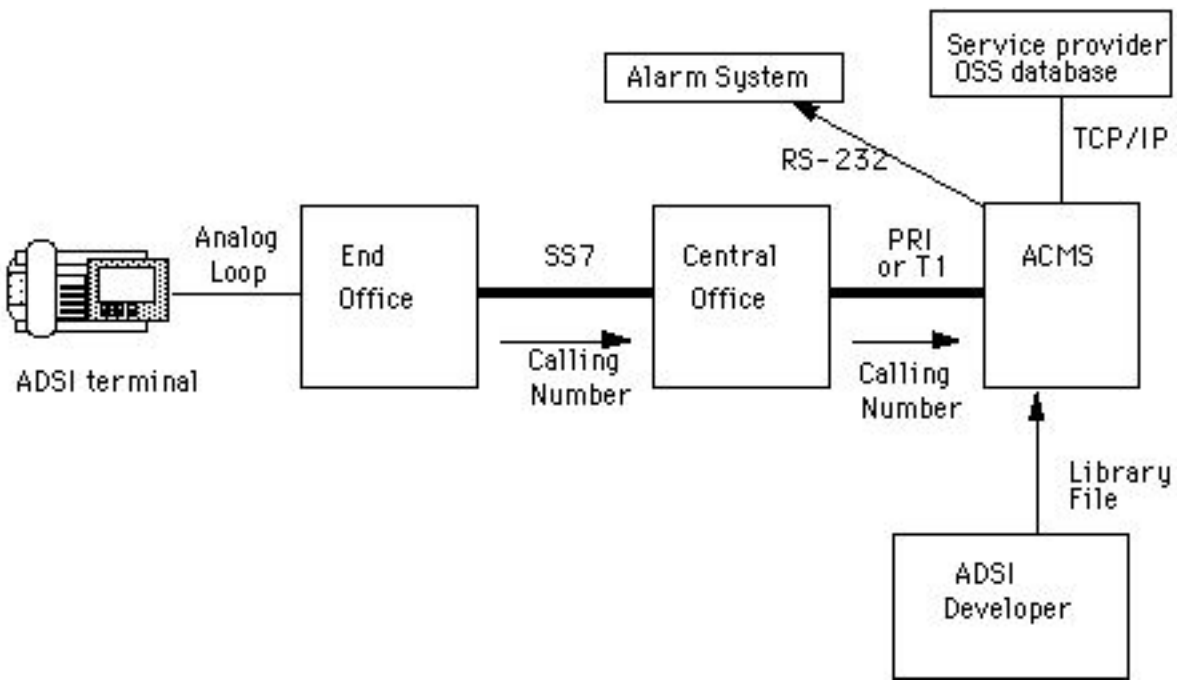


Figure 1. ACMS NODE NETWORK CONNECTIVITY

The ADSI terminal component is any customer-premised equipment (CPE) device that meets Bellcore standard for ADSI devices.

The switching network routes subscriber connections to ACMS. ACMS connects to the service provider switching equipment (Central Office in diagram) by means of either DMS-100 PRI or T1 connections.

The subscriber must manually enter the calling line number if a T1 interface is used.

The OSS database is a service provider database that contains information about each subscriber's custom calling features. ACMS accesses the OSS database by means of TCP/IP protocol over IEEE 802.3 (Ethernet). For ACMS on NAV, the ACMS controller shelf needs no additional hardware to facilitate this link because the MSP Ethernet connection can be used. At the node level, a path for this link must be established. If customer equipment is not collocated, the link must be established over a wide area network (WAN). To connect from a local area network (LAN) to a WAN, a router must be used. Routers are customer premise equipment and are not part of ACMS offered by Nortel. If an OSS is not Telco provided, then the customer must contact Customer Service at Rochester, NY for a custom modification to provide the OSS simulation capability.

In both collocated and non-collocated cases there are always two LANs established, and in the non-collocated case two WANs must also be configured. The two LANs used for transporting operations, administration, and maintenance (OAM) information are the same LANs used to transport call control information.

ACMS is connected to a dedicated alarms printer by means of RS-232. If the service provider's alarm system can accept this input format, ACMS alarms can be routed to the service provider's alarm system. Alarms can also be connected to the central office alarm system.

1.1.2 ACMS on MicroNAV

ACMS on MicroNAV provides ACMS services to calls routed to the MicroNAV by the switch. ACMS on MicroNAV is connected to the telephone network, an OSS database and an alarm system. The ACMS configuration for MicroNAV contains the following interfaces:

- one 10BaseT twisted pair (RJ45)
- one console port
- eight RS-232 ports

The following figure illustrates the connections between ACMS on MicroNAV, the network, and the peripheral equipment.

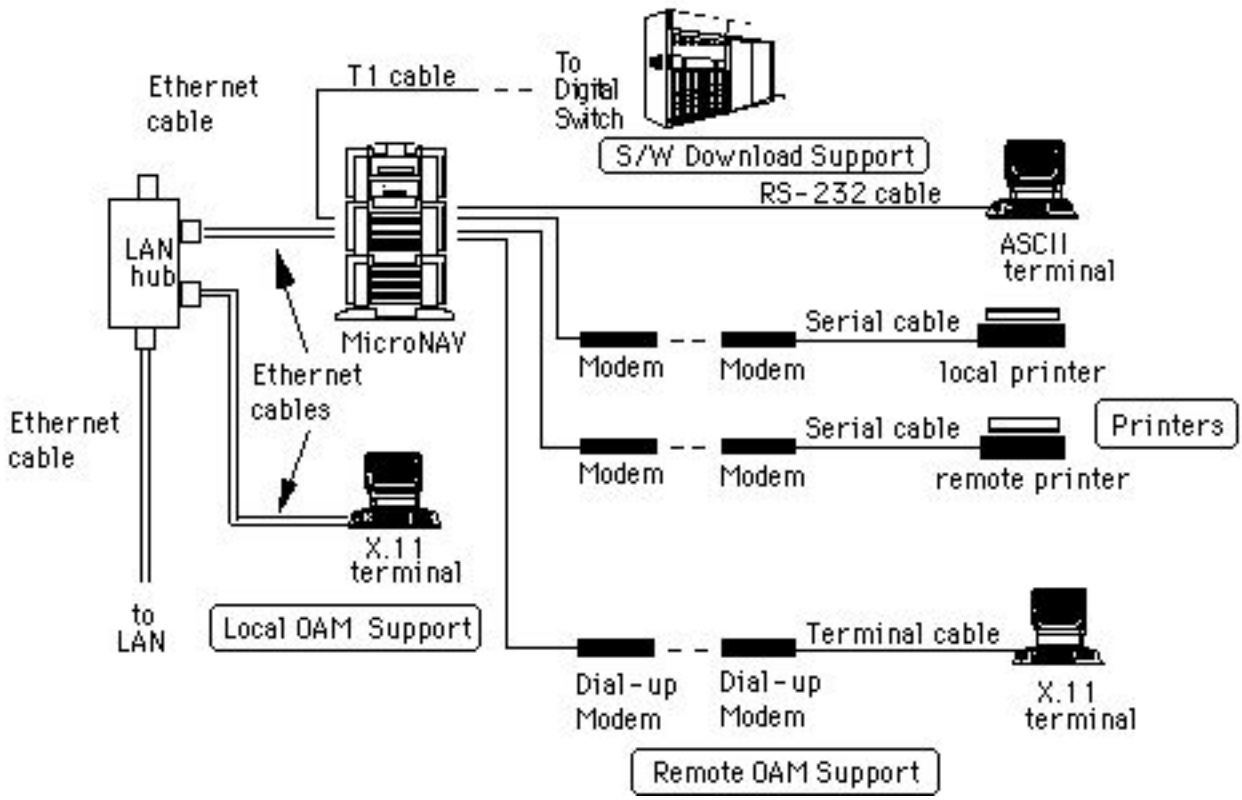


Figure 2. ACMS ON MICRONAV PERIPHERAL EQUIPMENT CONNECTIONS

1.2 Hardware Provisioning

1.2.1 Hardware Usage Restrictions

The CO-NAV can be provisioned with a maximum of twenty-four (24) Service Controllers.

To support the maximum configuration of twenty-four Service Controllers, no more than 10 IOC RS-232 ports are to be provisioned for modems, consoles, and printers.

The MicroNAV can be provisioned with a minimum of six (6) ports and a maximum of twenty-four (24) ports. Port size is dependent on the number of right to use software licenses (licenses are ordered in six port increments). For customers requiring twelve or fewer ports, the 6/12-port MicroNAV is ordered. The 18/24-port model is ordered for customers requiring more than thirteen ports. An upgrade package is available for expansion from the 6/12-port to the 18/24-port MicroNAV.

1.2.2 Hardware Dependencies

ACMS has the following requirements of the DMS switch at the Central Office:

- If PRI is the desired interface between the ACMS node and the Central Office, then either an LTCI or DTCI needs to be installed and datafilled for PRI capability at the Central Office. Refer to ECM 616 for provisioning information on LTCI or DTCI.
- XPM+ feature is required on the DMS Central Office that the ACMS Node is linked to. Refer to ECM 678 for XPM+ information.
- The Call Waiting Display/Call Waiting Deluxe package requires the provisioning of a CLASS Modem Resource pack (NT6X78), a Universal or Global Tone Receiver (NT6X92), and a Combined Message and Tone Generator CP (NT6X69AD minimum).
- The DMS-100 requires either DRAM or EDRAM capability to support CLASS services.

ACMS requires a NCD X Window terminal for full OAM functionality.

1.2.2.1 P and C Side Port Requirements

ACMS supports industry-standard interfaces for voice and data. For voice interfaces, ACMS supports DMS-100 ISDN PRI and T1 between the ACMS node and the host office. For data, ACMS supports TCP/IP over IEEE 802.3 and asynchronous RS-232. ACMS connects to the service provider's OSS using TCP/IP. ACMS connects to the service provider's alarms subsystem using an asynchronous RS-232 connection.

1.2.2.2 DMS BUS Port Requirements

Not Applicable

1.2.2.3 Circuits Per Card

Not Applicable

1.2.2.4 Discrimination Numbering

Not Applicable

1.2.3 Provisioning Considerations

1.2.3.1 ACMS on CO-NAV

The Network Application Vehicle (NAV) Node can be provisioned to support Advanced Call Management Server (ACMS) which is then referred to as a CO-NAV. A CO-NAV node comprises the following bays:

- as many as seven controller bays
- a LAN bay
- peripheral equipment, which comprises terminals, printers and remote access equipment

A CO-NAV comprises the system components required to deliver ACMS functionality, OAM capability, and network connectivity. The system comprises the following components:

- one or more ACMS service controller shelves
- an operations controller shelf
- a redundant LAN
- one or more modem shelves

ACMS Shelf

The ACMS shelf is a NAV Service Controller (SC) shelf configured for the ACMS application. Each ACMS shelf can be provisioned with a maximum of 24 ports. A 24 channel DTL interface card is supported in the ACMS shelf to provide the ports to download scripts to ADSI terminals.

There are two methods to support the interface between the ACMS server and the switch: standard T1 and Primary Rate ISDN. For standard T1 interface, there are 24 channels available per DTL for downloading. The DMS shelves in the switch that support this network configuration are DTC, LTC, DTCI, and LTCI.

The ACMS server PRI configuration requires 24 channels (23 B + 1 D) allowing a total of 23 B channels for downloading and 1 D channel for signaling per DTL card. The DMS shelves in the switch that support the PRI network configuration are DTCI and LTCI.

To determine the number of ports required based on number of subscribers, refer to the Table 13 in "Traffic Tables" This table shows the relationship between subscribers, port capacity, and shelf requirements.

N + 1 redundancy is optional, where N refers to the number of ACMS shelves required plus one additional ACMS shelf. N + 1 redundancy assumes that all ACMS shelves are active under normal conditions. If an ACMS shelf is out of service for any reason, including software upgrades, the remaining ACMS shelves in the ACMS Node handle the traffic presented. In a non-redundant 24-port configuration, an out-of-service shelf will result in complete loss of service.

Each NAV ACMS Shelf required shall be provisioned with the following equipment:

Table 3. ACMS Shelf Provisioning

Type	Quantity	Description	Slot Pos
ACMS Shelf	1	Service Controller Shelf	
ACMS Shelf	1	ACMS Shelf Front Label	
ACMS Shelf	1	ACMS Shelf Rear Label	
MSP	1	Service Proc. 33MHz/64MByte	1
MSPTM	1	Service Proc. MSP TM	1R
RSP	1	Service Proc. 33MHz/32MByte	2
RSPTM	1	Service Proc. RSP TM	2R
TSI	1	Time Slot Interchange	21
DTL	1	Standard DTL Kit	5
MTL	1 for 24-Port & T1 option	Multi-Channel Tel Link 56MHz	20
MTL	2 for 24-Port & PRI option	Multi-Channel Tel Link 56MHz	20,19
SCSI Disk	1	2.4GB Dual Disk Drive	22

Configuration steps:

1. Select one MSP for slot 1, then fill rear slot with an SPTM.
2. Select one RSP for slot 2, then fill rear slot with an RSPTM.
3. Provision a TSI for slot 21.
4. Provision one DTL kit in slot 5 for a 24-port configuration.
5. Provision one MTL card in slot 20 if using T1 option for a 24 port configuration. Provision one MTL card in slot 20 and one MTL card in slot 19 if using PRI option for a 24 port configuration.
6. Select one SCSI module for slot 22.

7. Refer to ACMS shelf EMS for filler cards to fill remaining empty slots.

Operations Controller (OC) Shelf

Each NAV Node requires one (1) Operations Controller (OC) Shelf. The Operations Controller (OC) Shelf must be mounted in the first NAV Controller Bay. The OC Shelf shall be provisioned with the following equipment:

Table 4. OC Shelf Provisioning

Type	Quantity	Description	Slot Pos
Required Items:			
OC Shelf	1	Operations Controller Shelf	
MSP	1	Service Proc. 33MHz/64MByte	1
SCSI Disk	1	2.4GB Disk/DAT	22
Terminator	1	SCSI Terminator	conn P4
Optional items needed per rule:			
IOC RS232	1 if nAP <= 8	I/O Controller RS232	10,12
IOC RS232	2 if nAP > 8	I/O Controller RS232	10,12

There are three IOC cards that are already provided with the OC Shelf. There are eight (8) RS-232 ports per IOC for a total of twenty-four (24) ports provided. Eight of the ports are used for maintenance links for devices such as printers, consoles and modems, and are assigned on one IOC card. The remaining sixteen (16) ports are referred to as remote serial links (RSL) and provide links for the service controller shelves and MFSPs. The IOC ports are provision ed according to the following rules:

- One port is required for each bay in the node for the MFSP
- One port is required for each ACMS SC shelf
- One port is required for each RS-232 modem, console or printer

Once all 24 ports are provisioned, up to 2 additional IOCs can be provided in the OC shelf based on the following equation where nAP is the number of Additional Ports required:

nAP = (number of SC + number of Controller bays) - 12“ + number of RS-232 modems, consoles or printers - 8“

Hence, if ten (10) SCs, three (3) Bays, nine (9) modems, one (1) console and two (2) printers are configured for a ACMS NAV, then nAP = (10+3) - 12“ + (9+1+2) - 8“.

The number of SCs and Controller bays exceed 12 by 1 and the number of modems, consoles and printers exceed 8 by 4. Five more Input/Output Controller ports are required. Therefore, this configuration requires a total of four (4) IOCs to provide the RS232 ports.

OC Shelf Configuration steps:

1. Select one MSP for slot 1, then fill rear slot with an SPTM.
2. If required, provision one IOC (RS-232) kit in slot 10 and a second IOC (RS-232) kit in slot 12.
3. Select one SCSI module for slot 22.
4. Refer to Operations Controller Shelf EMS for filler cards to fill remaining empty front slots and filler TMs for empty rear slots.

Modem Shelf

The ACMS Node can be configured with a modem shelf to house remote access modems. The modem shelf holds 16 modems. A maximum of eight devices as shown below can be supported. The Modem Shelf shall be provisioned with the following equipment:

Table 5. Modem Shelf Provisioning

Type	Quantity	Description	Slot Pos
Modem Shelf	1	Modem Shelf	
Modem Shelf	2	Modem Shelf Air Plenum	
Modem Shelf	1	Modem Shelf Power Kit	
Modem	1 per Local Dedicated Terminal (maximum 2)	Universal Modem 4-Wire	1,9
Modem	1 per Remote Terminal (maximum 2)	Universal Modem 4-Wire	1,9
Modem	1 per Printer (maximum 4)	Universal Modem 4-Wire	2,3,10,11
Modem	1 per Remote Dial-Up Terminal (maximum 2)	Modem 9600 Dial-Up	4,12

LAN Provisioning

The LAN Bay can be configured with two 24-Port Hubs or two 48-Port Hubs, one for each LAN, based on the number of the following ACMS components required:

- ACMS service controller shelves
- Local X Window terminals
- Hub for another LAN
- Router (customer supplied)
- Operations Controller shelves

To identify the correct hub for the ACMS Node, use the following equations to determine the total number of LAN devices and the appropriate hub required:

LAN Devices = SC + Local X Terminals + Other Hub + Router + OC

Provide (24-Port Hub) when: 1 <= LAN Devices <= 23
Provide (48-Port Hub) when: 24 <= LAN Devices <= 48

The initial hub is provisioned to supply LAN functionality. An additonal hub is required for LAN redundancy.

Table 6 shows the items to provision for the LAN Bay. Refer to to the NAV LAN Bay Engineering Manual Section (EMS) via ECM 697 for the remaining items to provision and for spare hub requirements.

Table 6. Optional Items Provisioned on the LAN Bay

Quantity	Description
2	Inverter
2	Hub Unit 24-port
or	
2	Hub Unit 48-port

Peripheral equipment

Table 7 shows the peripheral equipment that is required for ACMS.

Table 7. Peripheral equipment for the ACMS	
Quantity	Description
nP + nRT where nP is the number of printers and nRT is the number of remote terminals	Universal Modem 4-Wire
1	Local X.11 Terminal
1	Roll-Up Terminal
2	Printer
2 maximum	Remote dial-up X.11 Term.
2 maximum	Remote dedicated X.11 Term.

For system cabling and cable tags, refer to CAFX50BA drawing.

Printers

Provide two printers for ACMS, where one is a dedicated log and alarm printer, and the other is for operational measurement (OM) reports. Each printer requires one Universal Modem Kit. The Universal modems are configured as RS-232, 19.2 Kbps asynchronous for these local printers. The local printers are configured with modems to maintain the isolated grounding scheme. The BIX to modem cable is not required.

Local Terminals

Provide one Local X.11 terminal, that contains an NCD X Window terminal, for OAM access. The X terminal supports a graphical user interface.

Provide one Roll-up terminal for direct console access. Console access is required for initial software downloading.

Remote Terminals

Remote terminals are optional. If customer required, ACMS can be configured with the following remote terminal options:

- remote dial-up X.11 terminals
- remote dedicated X.11 terminals

Each terminal requires one Universal Modem Kit. The modem should be configured as an RS-232, 19.2 Kbps asynchronous modem. The BIX to modem cable is not required.

Remote LAN Access

A router is used to extend a LAN across a WAN to another LAN. The router performs the electrical interface conversions from IEEE 802.3 to a serial interface. A router must be configured at both sites. The serial interface out of the router must then be connected to customer supplied equipment to bridge the distance between the two sites. Routers are not provided as part of ACMS.

The extension of the LAN may be required for remote call control. If the node receives call control information from a remote site, modems are used to bridge the distance. The type of modem that is used to extend the serial links is a 56 Kbps modem. This is a synchronous modem that is equipped with a V.35 interface. One modem will support one serial link.

ACMS CO-NAV Upgrade

To upgrade ACMS on CO-NAV, additional SC and Modem shelves can added wherever space is available in a cabinet (max. of 4 shelves per cabinet). If cabinet space is not available, an additional NAV cabinet equipped with the required number of shelves can be ordered. The upgrade cannot exceed the NAV limitations of twenty-four (24) SCs and seven (7) controller bays.

An upgrade for an ACMS on CO-NAV requires additional ACMS002 Functional Group software. Refer to "ACMS Software (CO-NAV)" for provisioning rules for ACMS software on CO-NAV.

1.2.3.2 ACMS on MicroNAV

The MicroNAV can be provisioned to support Advanced Call Management (ACMS) which is referred to as an ACMS Node. There are two system configurations and four port sizes available for ACMS on MicroNAV:

- ACMS on MicroNAV 6/12-port system - NTMN57AA, which supports 6, 12, 18 or 24 ports with a T1 connection, and 6 or 12 ports with a PRI connection.
- ACMS on MicroNAV 18/24-port system - NTMN57AB, supports 18 or 24 ports with a PRI connection.

ACMS on MicroNAV systems can be ordered as one of two types:

- Lab System - a lab use/development platform for NAV applications.
- Deployment System - a MicroNAV that is deployed in a customer's network and providing mulitmedia services.

Both systems are identical except for the type and quantities of recommended peripherals. The MicroNAV size is independent of the system type, ie. a lab can be a 6/12-port or a 18/24-port configuration and the same is true for a deployment system.

The T1 cable must be terminated to the DTL on the MicroNAV with the 15 pin D-shell female connector.

There are two methods to support the interface between the ACMS MicroNav and the switch: standard T1 and DMS-100 Primary Rate ISDN (PRI). For standard T1 interface, there are 12 channels available for the 6/12-port system and 24 channels available for the 18/24-port system for down-loading. The DMS shelves in the switch that support this network con-figuration are DTC, LTC, DTCI, and LTCI.

If ACMS on MicroNAV is configured for PRI connection, a n-port system provides (n-1)B + 1 D channels. A 24-port system provides 23 B + 1 D channels. Note that the switching equipment must always be configured for 23 B + 1 D channels, regardless of whether ACMS on MicroNAV is a 6/12-port or 18/24-port system. The DMS shelves in the switch that support this network configuration are DTCI and LTCI.

To determine the number of ports required based on number of subscrib-ers, refer to Table 14 in "Traffic Tables" .

Local OAM Access

For local operations, administration, and maintenance (OAM) access, ACMS on MicroNAV requires an X Window terminal connected to the customer LAN or LAN hub. The LAN is connected to ACMS on MicroNAV via Ethernet.

The X Window terminal that is compatible with the MicroNAV system is the NCD 19R X terminal. If the customer cannot provide this particular X terminal, then provide one Local X.11 Terminal kit per ACMS MicroNAV.

Table 8. Local OAM Access Hardware

Description	Quantity for Lab Systems	Quantity for Deploy-ment Systems
Local X.11 Terminal Kit	1	1

Remote OAM Access

For remote OAM access, ACMS on MicroNAV is configured locally with a modem connected to the MicroNAV. For compatibility, the modem must be the type listed in the table below. The remote location must be con-figured with an X Window terminal connected to a modem. If the equip-ment described is not customer provided, order a modem, cable, and remote X.11 Terminal kit as shown in Table 9.

Table 9. Remote OAM Access Hardware		
Description	Quantity for Lab Systems	Quantity for Deployment Systems
V.3229 Dial-out Stand-alone modem, RM16M, RS232 interface, V.42BIS error correction, baud rates from 1200 to 19200.	0	1
Modem Cable, 15 feet	0	1
Remote Dial-up X.11 Terminal kit	0	1

Software Download Support

Access to an ASCII terminal is required to download software to MicroNAV. This terminal is only required for the initial installation of software or subsequent software upgrades. If customer required, order one VT terminal as shown in Table 10.

Table 10. Terminal Option		
Description	Quantity for Lab Systems	Quantity for Deployment Systems
VT320 display terminal	1	1
Printer cable, 25 feet (optional)	1	1
or		
Printer cable, 50 feet (optional)	1	1

One 15 foot terminal/printer cable is provided with the MicroNAV hardware to connect to an ASCII terminal. If a longer cable is required, provision one printer cable, 25 or 50 feet.

Printer Options

One dedicated line printer for logs and alarms is required for customer development or service environments. A second dedicated printer is required for operational measurements (OMs). The table below indicates the printer hardware to provide if customer required.

Table 11. Printer Hardware		
Description	Quantity for Lab Systems	Quantity for Deployment Systems
Printer, dot matrix	1	2
Pedestal	1	2
Printer cable, 15 feet	1	2
or		
Printer cable, 25 feet	1	2
or		
Printer cable, 50 feet	1	2

If the cable distance between a line printer and the MicroNAV is greater than 50 feet, then modem access is required for the printer. The table below lists additional modem hardware required in this situation. If modems are used, then the printer cable is not required for each printer. Instead, provide the modem cable and serial cable in the quantities shown in Table 12.

Table 12. Additional Modem Hardware		
Description	Quantity for Lab Systems	Quantity for Deployment Systems
Dual interface RS232/V.35 stand-alone modem	2 per printer	2 per printer
Modem Cable, 15 feet	1 per printer	1 per printer
Serial Cable, 10 feet	1 per printer	1 per printer

If modems are ordered, the customer needs to supply one 4-wire cross connection between the modem pair.

ACMS MicroNAV Upgrade

To upgrade from an ACMS on MicroNAV 6/12-port configuration with T1 to a 18/24-port configuration with T1, no additional hardware is needed.

To upgrade from an ACMS on MicroNAV 6/12-port configuration with PRI to an ACMS on MicroNAV 18/24-port configuration with PRI, order one NTMN56AB upgrade kit. Refer to Table 14 to determine when a 24-port configuration is needed.

An upgrade for an ACMS on MicroNAV requires additional ACMS002 Functional Group software. Refer to "ACMS SOFTWARE (MicroNAV)" for provisioning rules for ACMS software on MicroNAV.

1.2.4 Office Layout Information

The maximum cable length for the RS232 interfaces between the Operations Controller and the Service Controllers is limited to 30ft (9m). This is a technical limitation for this type of signal.

The TCP/IP connection, which uses IEEE 802.3 10baseT twisted pair, between a LAN bay hub and customer routers is limited to 328 feet (100 m).

1.2.5 Traffic Tables

Assumptions used for the both Capacity configuration tables:

- 2 % of subscribers make 80% of the calls
- calls are made in 12-hour days
- 6 calls are made per year
- calls are 5 minutes in duration
- peak call rate is 4 times the normal rate
- call blocking probability of 0.001

Table 13. ACMS on CO-NAV Capacity Configuration Table:				
Number of Subscribers	Non-redundant configuration Ports	Non-redundant configuration Shelves	N*1 redundant configuration Ports	N*1 redundant configuration Ports
100,000	24	1	48 (24*24)	2
260,000	48	2	72 (48*24)	3
440,000	72	3	96 (72*24)	4
620,000	96	4	120 (96*24)	5
800,000	120	5	144 (120*24)	6
990,000	144	6	168 (144*24)	7
1,180,000	168	7	192 (168*24)	8
1,370,000	192	8	216 (192*24)	9
1,560,000	216	9	240 (216*24)	10
1,750,000	240	10	264 (240*24)	11
1,950,000	264	11	288 (264*24)	12
2,140,000	288	12	312 (288*24)	13
2,330,000	312	13	336 (312*24)	14
2,530,000	336	14	360 (336*24)	15
2,730,000	360	15	384 (360*24)	16
2,920,000	384	16	408 (384*24)	17
3,120,000	408	17	432 (408*24)	18
3,320,000	432	18	456 (432*24)	19

3,520,000	456	19	480 (456*24)	20
3,720,000	480	20	504 (480*24)	21
3,910,000	504	21	528 (504*24)	22
4,110,000	528	22	552 (528*24)	23
4,310,000	552	23	576 (552*24)	24

Table 14. ACMS on MicroNAV Capacity Configuration Table:

Number of Subscribers	Ports
0 - 10,000	6
10,001 - 37,000	12
37,001 - 70,000	18
70,001 - 100,000	24

1.3 Product/System Specification

1.3.1 Physical Characteristics

Not Applicable

1.3.2 EMI/Earthquake Information

Not Applicable

1.3.3 Sparing Information

Apply standard sparing algorithms for ACMS on CO-NAV. The NAV Spares Bay can be used to store spare equipment. Reference ECM-697 for CO-NAV spares.

If sparing is desired for ACMS on MicroNAV, order one ACMS on MicroNAV Spares Kit, NTMN56AA, for either the 6/12-port or 18/24-port ACMS on MicroNAV configuration. The Spares kit consists of the following:

- One (1) I/O distribution card
- One (1) real-time service processor (RSP)
- One (1) master service processor (MSP)
- One (1) multi-channel telecommunications link (MTL)

- One (1) time-slot interchange (TSI)
- One (1) digital trunk link (DTL)
- One (1) power converter, 100 W
- One (1) power converter, 190 W

1.3.4 Power Feed and Fusing Requirements

Not Applicable

1.3.5 Current Drain Information

Not Applicable

1.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

1.4.1 Required Software Packages and Interdependencies

ACMS on CO-NAV or MicroNAV runs on NAVB002 base software. Software order codes required for ACMS on CO-NAV or MicroNAV are listed as follows with the optional NAVB002 software descriptions. DMS-100 CLASS services software packages required for the ACMS Generic Library are also listed:

1.4.1.1 ACMS Software (CO-NAV)

Table 15 and Table 16 list the software required to support ACMS on CO-NAV functionality.

Table 15. ACMS on CO-NAV OC Software:

Part Number	Description
NAV10001	General Controller Base
NAV20001	Operations Controller

Table 16. ACMS on CO-NAV SC Software:

Part Number	Description
NAV10001	General Controller Base
NAV30001	Service Controller
ACMS0002	AVP Advanced Call Management Server

ACMS on CO-NAV OPERATIONS CONTROLLER SOFTWARE

Software decisions for each operations controller (OC) involve selecting options from two functional groups: General Controller Base and Operations Controller.

General Controller Base (NAV10001) must be ordered when configuring any type of controller shelf. This group includes one copy of each of the following non-optional functionalities:

- NAV1 UNIX Base
- NAV1 Local Resource Management
- NAV1 Local Operational Measurements
- NAV1 Local Logs and Alarms
- NAV1 Local Datafill Management
- NAV1 Communication

On OC shelves, the following provisionable functionalities are ordered according to the following rules:

- NAV1 UNIX 187 Base License (NAV10002) - order one copy for each OC shelf
- NAV1 Time Synchronization (NAV10005) - order one copy for each OC shelf
- NAV1 Disk Monitor (NAV10006) - order one copy for each OC shelf
- NAV1 ISI pSOS License (NAV10017) - order one copy for each OC shelf.

The Operations Controller (NAV20001) group is required for each OC shelf. This group includes one copy of each of the following non-optional functionalities:

- NAV2 OC Resource Management
- NAV2 OC Logs and Alarms
- NAV2 OC Operational Measurements
- NAV2 OC Datafill Management
- NAV2 Security
- NAV2 Informix RDMS Base
- NAV2 Kermit Software

The following provisionable functionalities are ordered according to the following rules:

- NAV2 Informix OC License (NAV20004) - order one copy for each OC shelf
- NAV2 OC Software Delivery (NAV20002) - order one copy for each OC shelf
- NAV2 OC Backup (NAV20003) - order one copy for each OC shelf
- NAV2 OC Tokenizing Subsystem (NAV20007) - order one copy for each OC shelf
- NAV2 Kermit License (NAV20013) - order one copy of this license for each ACMS Node

ACMS on CO-NAV SERVICE CONTROLLER SOFTWARE

Software decisions for each ACMS service controller (SC) involve selecting from two functional groups: General Controller Base and Service Controller Base.

General Controller Base (NAV10001) must be ordered when configuring any type of controller shelf. This group includes one copy of each of the following non-optional functionalities:

- NAV1 UNIX Base
- NAV1 Local Resource Management
- NAV1 Local Operational Measurements
- NAV1 Local Logs and Alarms
- NAV1 Local Datafill Management
- NAV1 Communication

On SC shelves, the following provisionable functionalities are ordered according to the following rules:

- NAV1 UNIX 187 Base License (NAV10002) - order one copy for each SC shelf
- NAV1 Motorola VMEexec (NAV10003) - order one copy for each SC shelf.
- NAV1 Motorola VMEexec License (NAV10004) - order one copy for each SC shelf
- NAV1 Time Synchronization (NAV10005) - order one copy for each SC shelf
- NAV1 Disk Monitor (NAV10006) - order one copy for each SC shelf
- NAV1 ObjecTime License (NAV10011) - order one copy for each SC shelf
- NAV1 ISI pSOS License (NAV10017) - order one copy for each DTL, TSI, and FSP

Service Controller Base (NAV30001) is required on each SC shelf. This group includes one copy of each of the following non-optional functionalities:

- NAV3 Call Processing Server

The following provisionable functionalities are ordered according to the following rules:

- NAV3 Digital Signal Processing (NAV30008) - order one copy for each SC shelf
- NAV3 Network Interface (NAV30009) - order one copy for each DTL card supporting a T1 trunk in the SC shelf
- NAV3 Network Interface (NAV30009) - in ACMS nodes that use the primary rate interface (PRI), order one copy for each DTL card supporting a PRI trunk in the SC shelf
- NAV3 MTL (NAV30010) - order one copy for each SC shelf
- NAV3 IVR MMVI (NAV30017) - order one copy for each DS-0 channel in the SC shelf
- NAV3 PRI for DMS-100 (NAV30021) - in ACMS nodes that use PRI, order one copy for each distinct PRI D-channel in the SC shelf
- NAV3 ISDN Bundle Retix License (NAV30022) - in ACMS nodes that use PRI, order one copy for each SC shelf that uses one or more PRI D-channels
- NAV3 Voice-prompt File System (NAV30028) - order one copy for each SC shelf
- NAV3 Audio Processing Module (NAV30029) - order one copy for each SC shelf

ACMS nodes that use PRI trunks must allocate one MTL island to each PRI D-channel.

ACMS SOFTWARE FUNCTIONALITIES FOR CO-NAV

The ACMS software is comprised of the Advanced Voice Processing (AVP) Advanced Call Management Server software (ACMS0002) package for ACMS functionality.

ACMS0002 contains the following non-optional functionalities:

- ACMS Application
- ACMS Dialog
- ACMS Vocabulary
- ACMS Generic Library

The ACMS0002 Functional Group software is ordered according to the combined ACMS Service Controller port size of the CO-NAV. Each SC is provided with the ACMS0002 Functional Group in four (4), six (6) port increments, ie. one (1) ACMS SC shelf requires four (4) ACMS0002 Functional Groups. As the customer expands beyond the initial port size, additional ACMS0002 Functional Groups must be ordered. Order ACMS0002 Functional Groups per the following:

Table 17. CO-NAV ACMS002 Provisioning

CO-NAV ACMS Ports	CO-NAV ACMS SC Shelves	ACMS0002 Functional Group Quantity Required
24	1	4
48	2	8
72	3	12
96	4	16
120	5	20
144	6	24
168	7	28
192	8	32
240	10	40
264	11	44
288	12	48
312	13	52
336	14	56
360	15	60
384	16	64
408	17	68
432	18	72
456	19	76
480	20	80
504	21	84
528	22	88
552	23	92
576	24	96

1.4.1.2 ACMS SOFTWARE (MicroNAV)

CO-NAV and MicroNAV use the same NAV Base 002 functional groups and functionalities. Some of the software information listed below has been repeated in this "MicroNAV" section for clarity and ease of use.

Software for ACMS on MicroNAV is provided by software release ACMS001 (order code: ACMS0001). ACMS0001 includes base and application software.

The base software included in order code ACMS0001 for a stand-alone MicroNAV comprises the following:

- NAV1 General Controller Base - NAV10001
- NAV2 Operations Controller - NAV20001
- NAV3 Service Controller - NAV30001

ACMS requires all three base software functional groups.

MicroNAV GENERAL CONTROLLER SOFTWARE

NAV1 General Contoller Base (NAV10001) is an applications base containing software for MicroNAV. NAV1 General Contoller Base provides required and optional functionality. Listed below are the non-optional and optional MicroNAV Base functionalities that must be ordered to support ACMS software.

Order one copy of the Non-optional NAV1 General Controller Base (NAV10001) per MicroNAV. NAV10001 consists of the following:

- NAV1 UNIX Base
- NAV1 Local Resource Management
- NAV1 Local Operational Measurements
- NAV1 Local Logs and Alarms
- NAV1 Local Datafill Management
- NAV1 Communication

The following provisionable NAV10001 functionalities are ordered according to the following rules:

- NAV1 UNIX 187 Base License (NAV10002) - order one copy for each MicroNAV
- NAV1 Motorola VMEexec (NAV10003) - order one copy for each MicroNAV
- NAV1 Motorola VMEexec License (NAV10004) - order one copy for each MicroNAV

- NAV1 Time Synchronization (NAV10005) - order one copy for each MicroNAV
- NAV1 Disk Monitor (NAV10006) - order one copy for each MicroNAV
- NAV1 ObjecTime License (NAV10011) - order one copy for each MicroNAV
- NAV1 ISI pSOS License (NAV10017) - order one copy for each MicroNAV

MicroNAV OPERATIONS CONTROLLER SOFTWARE

NAV2 Operations Controller (NAV20001) is an applications base containing software that runs on the MicroNAV operation platform.

Order one copy of the NAV2 Operations Controller (NAV20001) per MicroNAV. NAV2 Operations Controller consists of the following non-optional functionalities.

- NAV2 OC Resource Management
- NAV2 OC Logs and Alarms
- NAV2 OC Operational Measurements
- NAV2 OC Datafill Management
- NAV2 Security
- NAV2 Informix RDMS Base
- NAV2 Kermit Software

The provisionable NAV20001 functionalities are ordered according to the following rules:

- NAV2 Informix OC License (NAV20004) - order one copy for each MicroNAV
- NAV2 OC Software Delivery (NAV20002) - order one copy for each MicroNAV
- NAV2 OC Backup (NAV20003) - order one copy for each MicroNAV
- NAV2 OC Tokenizing Subsystem (NAV20007) - order one copy for each MicroNAV
- NAV2 Kermit License (NAV20013) - order one copy of this license for each ACMS MicroNAV

MicroNAV SERVICE CONTROLLER SOFTWARE

NAV3 Service Controller (NAV30001) is an applications base containing software that supports the application software running on MicroNAV. The content of NAV3 Service Controller depends on which application is

running on MicroNAV. Listed below are the optional MicroNAV Base functionalities that must be ordered to support ACMS software.

- NAV3 Digital Signal Processing (NAV30008) - order one copy for each MicroNAV
- NAV3 Network Interface (NAV30009) - order one copy for MicroNAV
- NAV3 MTL (NAV30010) - order one copy for each MicroNAV
- NAV3 IVR MMVI (NAV30017) - order one copy for each MicroNAV port ordered minimum of 1, maximum of 24.
- NAV3 PRI for DMS-100 (NAV30021) - order one copy for each PRI D-channel
- NAV3 ISDN Bundle Retix License (NAV30022) - order one copy for each MicroNAV that uses the PRI D-channel
- NAV3 Voice-prompt File System (NAV30028) - order one copy for each MicroNAV
- NAV3 Audio Processing Module (NAV30029) - order one copy for each MicroNAV

ACMS SOFTWARE FUNCTIONALITIES FOR MicroNAV

The ACMS software included in order code ACMS0001 comprises the Advanced Voice Processing (AVP) Advanced Call Management Server software (ACMS0002) package for ACMS functionality.

ACMS0002 contains the following non-optional functionalities:

- ACMS Application
- ACMS Dialog
- ACMS Vocabulary
- ACMS Generic Library

The ACMS0002 Functional Group software is ordered according to the port size of the MicroNAV. Each MicroNAV is provided with the ACMS0002 Functional Group in six (6) port increments. As the customer expands beyond the initial port size, additional ACMS0002 Functional Groups must be ordered. Order ACMS002 Functional Groups per the following:

Table 18. MicroNAV ACMS002 Provisioning	
MicroNAV Port Sizes	ACMS0002 Functional Group Quantity Required
6-ports	1
12-ports	2
18-ports	3
24-ports	4

Nortel's Customer Services provides customized updates to the following ACMS software packages, depending on service provider requirements:

- ACMS Dialog
- ACMS Vocabulary
- ACMS Generic Library

If a customer wants the ability to modify ACMS, the PowerView Tools package can be ordered from Nortel. The PowerView Tools package comprises software programs, such as ADSI Developer and the Voice-Prompt Development System (VDS), that are used to modify the ACMS application.

1.4.1.3 DMS-CLASS Service Software

The service provider can choose to use the ACMS generic library or create a custom library. For the ACMS Generic Library, the following software packages are required at the switch for DMS support:

- Three-Way Calling
- Call Waiting Display TR-Compliancy (SCWID)
- TR-Compliant Call Waiting Deluxe
- Automatic Call Back
- Automatic Recall
- Customer-Originated Trace
- Calling Name and Number Display
- Calling Number Delivery Blocking
- Speed Call 8
- Speed Call 30
- Call Forward

- Selective Call Forwarding
- Selective Call Rejection
- Distinctive Ringing
- Message Waiting
- Call Forward Don|t Answer*

* This package is required only if the voice mail disposition softkey is used with Call Waiting Deluxe.

For details on these CLASS services, and for further order information including current order codes, refer to the latest version of the DMS Feature Planning Guide.

1.4.2 Software Usage Restrictions

ACMS001 requires a DMS running BCS36 or higher for Call Waiting.

ACMS001 can receive calls from any telephone, but can only download scripts to ADSI telephones.

ACMS001 does not support an integrated controller

ACMS001 depends on NAVB002.

Full application backup and restore is not currently supported. It will be available in NAVB003.

1.4.3 Memory Provisioning

Not Applicable

1.5 Real Time Impact

Not Applicable

2.0 ECM696 - Audiogram Delivery Services (ADS) on the NAV Base.

2.1 Overview

Audiogram Delivery Services (ADS) enables the Telephone Operating Companies to address the market needs for incomplete calls (Busy & Ring-No-Answer) by offering a Message Delivery Service to the calling party. ADS provides a non-subscription, without prior arrangement, pay-as-you-use service which exploits the existing network infrastructure for increased telco revenues.

ADS actively prospects usage by intercepting incomplete calls and offering Audiogram Delivery Service to the calling party. This service provides a needed alternative when:

- The caller has tried, but just cannot get through
- The caller is in transit and too busy to try again
- The caller needs to get a confidential message across

ADS also serves those customers with a pre-established need for sending a message (Intentional Audiogram). Intentional Audiogram service has high value to the user when:

- The caller knows no one is available to answer
- Time zones get in the way of communications
- The caller prefers to keep it short

|

2.1.1 Service Overview

ADS is a set of automated message delivery services for caller recorded voice messages. There are many market offerings targeted at the recipient of a telephone call, for example, telephone answering devices, voice mail systems, and answering services. ADS provides voice messaging services to the caller without prior arrangement.

ADS comprises the following messaging services:

- 0+ Audiogram Service
- | Direct Access Intentional AudioGram Service
- | Services Node Intentional AudioGram Service
- 1+ and Local Audiogram Service
- Millennium Audiogram Service

Additionally, ADS provides Automated Status Query.

2.1.1.1 0+ Audiogram Service

0+ Audiogram Service provides a message capture and delivery capability for 0+ dialed, alternately billed calls. For calls that reach busy or ring-no-answer, the caller is provided an opportunity to leave a message for the called party. ADS captures the message and then attempts to deliver it. A Audiogram is delivered successfully if the message recipient answers a message delivery attempt and accepts the audiogram by saying "Yes" or "Oui". Speech recognition is used to validate the response. Alternatively, the caller can press DTMF keys to validate the response.

While the 0+ Audiogram Service can be offered as a Standalone service, it is designed to run on the same shelf as the other Audiogram Delivery Services.

The 0+ Audiogram Service is a premium message delivery service which offers:

- Full-context attendant backing for callers, which allows callers to reach an ADS attendant by dialing "0" after the offer of service, or the caller can be transferred for assistance with registered delivery or scheduled delivery. Callers are automatically transferred to attendants after a time-out period.

- Scheduled Delivery, which allows the caller to specify the start date and hour for ADS to begin delivery attempts. This is useful when the caller knows that the recipient is not available until a certain time. An ADS attendant is linked into the call during message capture to schedule delivery of the message.

- Registered Delivery, which allows the caller to specify the name of the intended audiogram recipient. An ADS attendant handles every delivery attempt for registered audiograms. The attendant ensures that the intended recipient is on the line before playing the message.

2.1.1.2 Services Node Intentional AudioGram Service

Services Node Intentional AudioGram Service addresses the needs of increasingly busy and mobile consumers who are unwilling or unable to make repeated attempts to reach the called party. Services Node Intentional AudioGram Service enhances the ability of service providers to offer a message delivery service to callers outside their immediate service area.

The caller can access automated status query through the Services Node Intentional AudioGram Service call flow. The service relays the status of the message to the caller. ADS produces billing and record details for status queries.

2.1.1.3 Direct Access Intentional AudioGram Service

Direct Access Intentional AudioGram Service addresses the needs of increasingly busy and mobile consumers who are unwilling or unable to make repeated attempts to reach the called party. Direct Access Intentional AudioGram Service enhances the ability of service providers to offer a message delivery service to callers outside their immediate service area.

The caller can access automated status query through the Direct Access Intentional AudioGram Service call flow. The service relays the status of the message to the caller. ADS produces billing and record details for status queries.

2.1.1.4 1+ and Local Audiogram Service

The 1+ and Local Message Service provides a message capability for direct dialed 1+ and local calls from residential or single line business numbers.It is accessed via new DMS 100 software.

The 1+ and Local Messaging Service offer of service is made at the end office switch.

2.1.1.5 Millennium Audiogram Service:

The Millennium intelligent payphone system has many enhanced payphone features that when combined with ADS provides a Audiogram service that complements the existing residential offering for both local and long distance calling. It provides a solution that is independent of the end office or network configuration, which allows for a wider product deployment. The Millennium Audiogram Service offer of service is made at the Millennium payphone.

The Millennium public terminal handles the verification and billing of some call types via the terminal's local processing and the Millennium Manager. Millennium payphones enhanced to support messaging provide the ADS Service offer and selection mechanism for locally processed calls.

The Payment Methods provided at the terminal that determine whether a call is handled as a Millennium call are listed below:

* Coin deposited (local or toll)

* Cash Card(local or toll)

* Calling Card inserted (local or toll)

Validation of inserted calling cards is controlled by Millennium Manager datafill. If the datafill is set to Millennium Manager validation, then the terminal dials the call as 1+. If the datafill is set to network validation, the terminal dials the call as 0+ and spills the calling card number in response to the AABS bong tone.

All other alternate billed calls placed from a Millennium payphone are dialled out as 0- or 0+ and rely on AABS plus TOPS for validation and billing. Treatment of Millennium 0- and 0+ calls placed from the Millennium payphone is identical to the treatment of calls placed from other public telephones, including the offer of messaging.

2.1.1.6 Automated Status Query

Automated Status Query provides the status of captured messages to callers calling from DTMF sets.

The caller accesses automated status query through the PSTN by dialing a local DN or a 1-800 number, or at the appropriate point in the 1-800 Audiogram Service call flow. Using a DTMF voice response interface the service prompts the caller to provide one of the following:

* Calling card number

* Called number and transaction ID

The service relays the status of the audiogram to the caller. ADS produces billing and record details for status queries.

The caller can query for the status of all audiograms recorded by that caller in any of the ADS services for which the service provider has automated status query activated.

The status of a particular audiogram is available immediately after the message is successfully captured until some time interval after the last scheduled delivery attempt. The time interval is specified by the service provider.

The following information is provided by the ADS automated attendant during a status query session:

- Called number, for messages billed to a calling card

- Status: pending, successful, expired, canceled, refused

- Date and time of last delivery attempt if the status is successful, refused, or expired
- Date and time of a cancelled delivery
- Date and time of next delivery attempt if the status is pending
- Number of attempts made and total attempts

The caller can cancel delivery of the audiogram during an automated status query session.

2.1.2 Product Overview

| ADS is part of a distributed network of functional nodes, or network components, that network with Northern Telecom's DMS family of digital switches to provide specific enhanced services.

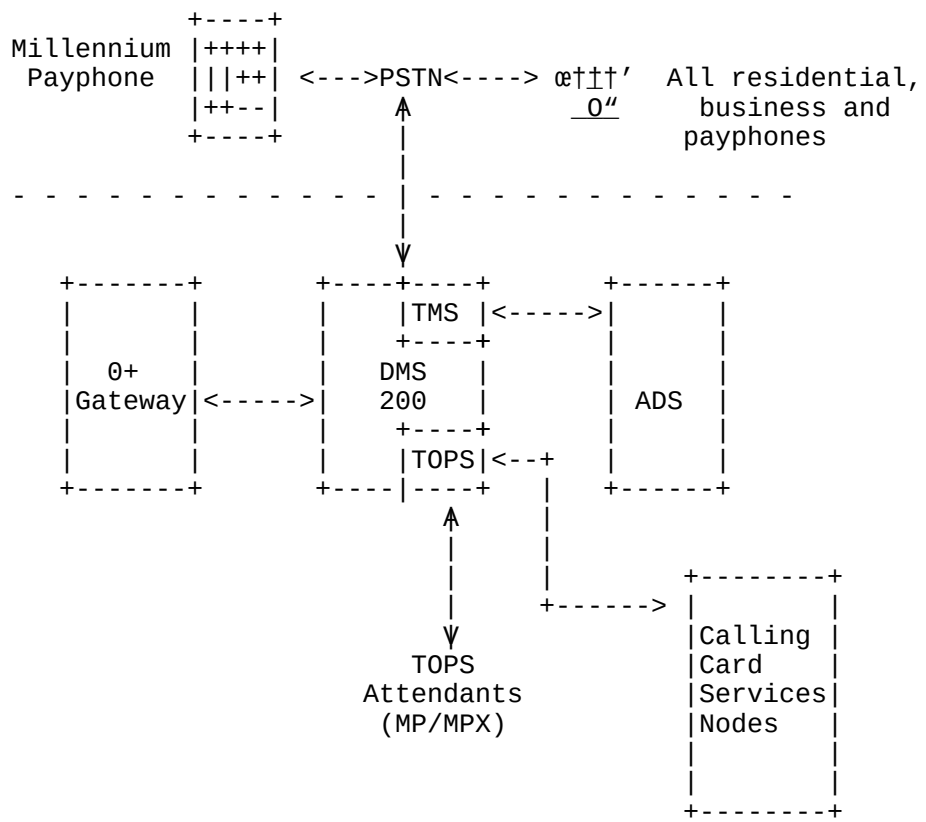


Figure 3. ADS Network Connectivity

An integral component of ADS is attendant backing. TOPS MP/MPX is used to provide this functionality.

2.1.2.1 ADS functions

ADS performs the following key functions:

- Audiogram Capture: Subscriber interaction, selection of service options, digital speech recording, speech compression and initiation of Call Detail Recording (CDR) are functions in the message capture phase. These functions are performed by the Messaging Controller (MC) shelf.

- Audiogram Delivery: Includes scheduling, retrieving, decompressing, obtaining delivery acceptance using speech recognition and delivering the message. These functions are performed by the Messaging Controller (MC) Shelf.

- Attendant Services: Attendant positions provide assistance to both callers and recipients of audiograms when required, and provide premium service (e.g. personal messages). These functions are performed by the Attendant Controller (AC) in conjunction with the DMS TOPS system, 0+ and Intentional services only.

- OA&M: Operations, Administrations and Maintenance are centralized on a per message node basis. All Messaging Shelves and Attendant Shelves are OA&Med via a single Operations Controller (OC).

- Storage: ADS includes a reliable storage facility that stores message recordings and CDRs in an efficient format. This facility is provided by the Storage Node (SN). A Storage Node is a pair of Storage Shelves running as a high availability pair.

- Billing: The ADS Messaging Controller (MC) retrieves CDRs for delivered or expired audiograms, collates and formats these records and transfers them to the DMS for subsequent EBAF (Extended Bellcore AMA Format) record generation.

2.1.3 ADS H/W Architecture

ADS hardware comprises of the following nodes:

- One or more Controller Bays, which contain service controller shelves, an operations controller shelf, or modem shelves.

- One LAN bay, which contains 24 or 48 port hubs, power inverters, and one optional modem shelf.

A multiple bay ADS Node consists of as many as seven Controller Bays and a LAN bay. The controller bays contain an operations

controller shelf, ADS controller shelves, and one to two modem shelves.

| The naming conventions for NAV Service Controller shelves vary depending on the applications used within a NAV Node. When refering to a service controller from a strictly hardware perspective, the term used is SC or Service Controller. For the NAV ADS node, service controllers are also named according to their functions based on their software loads. For ADS, SC shelves are MCs (Messaging Controllers), SSs (Storage Shelves) or ACs (Attendant Controllers).

| 2.1.3.1 ADS Node

| A ADS Node is a collection of Messaging Controllers (MC), Storage Shelves (SS), and optional Attendant Controllers (AC) administered by a single Operations Controller (OC) shelf and interconnected via the LAN Bay by Ethernet links. Messaging Controllers, Attendant Controllers, and Storage Shelves (SS) are housed in Controller Bays, while the Operations Controller is housed in the first Controller Bay. Each Controller Bay may contain one (1) to (4) Controller Shelves (MC and AC).

| Controller Shelves in the ADS Node are equipped with Circuit Packs (CPs) shown later in this section. Empty slots not equipped with CPs MUST be provisioned with Filler Cards NTFX66AA at the front and NTFX67AA at the rear. The Filler Cards daisy-chain backplane signals through empty slots and are required for the backplane to function properly. Controller Shelves do not function without them.

| A ADS Node can comprise one (1) LAN Bay, one (1) Controller Bay and one (1) to six (6) additional Controller Bays. The line-up can start either from the left or right and additional Controller Bays can be added to the end of the line-up, up to a total of six (6), with no disruption of service.

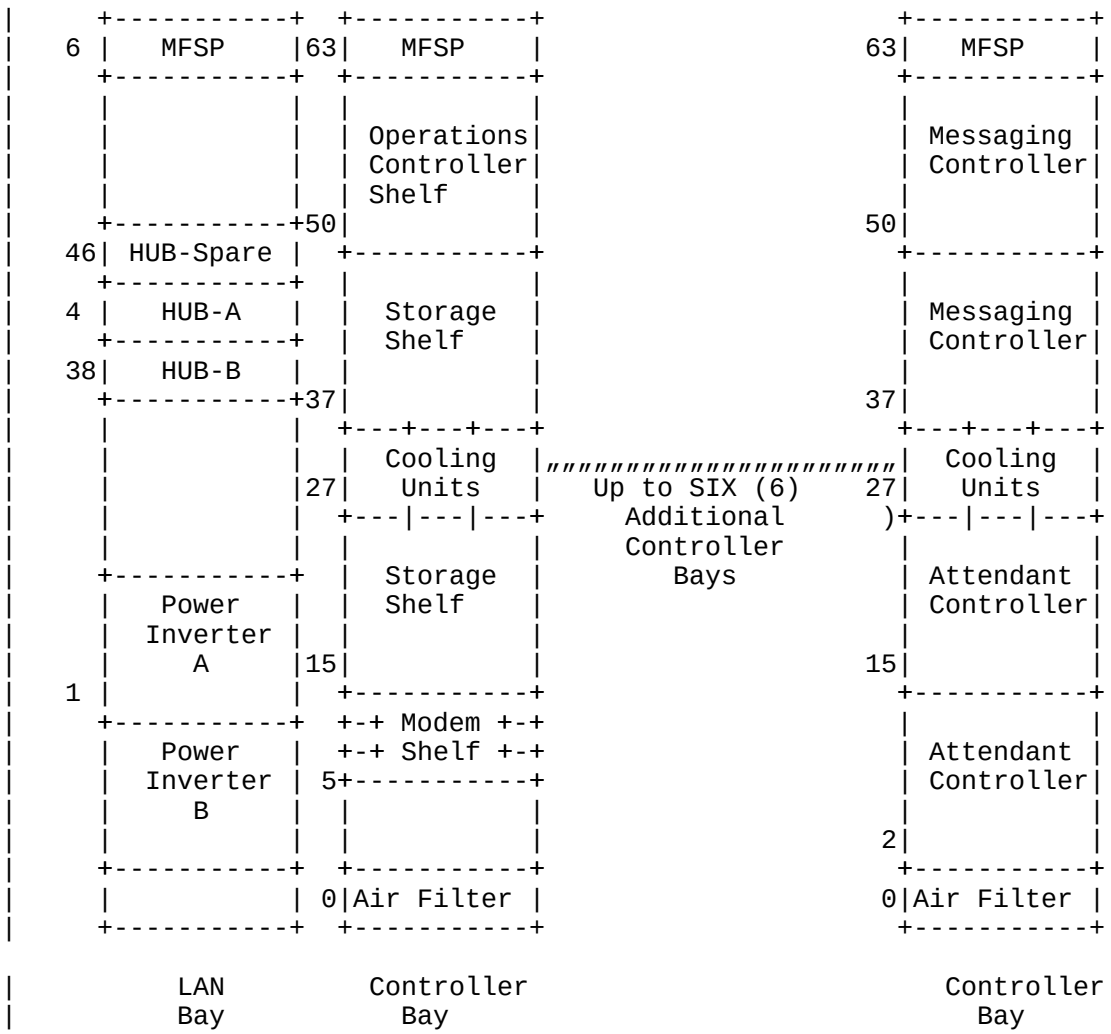


Figure 4. ADS Node

Messaging Controller (MC) Shelf

A messaging controller (MC) is connected to the PSTN through the DMS-200 TOPS over T1 to capture and deliver recorded audiograms. The MC interacts with the calling and called parties using voice prompts and receives feedback using DTMF key presses and speech recognition.

The MC is connected to other network elements in a ADS lineup using a dual-redundant Ethernet LAN.

The Messaging Controller Shelf is available in one configuration:

- 48 ports

In the (48) port configuration there is one connectivity option:

- Messaging controller connectivity to the PSTN is over T1. A data channel uses a DS-0 of the T1. This T1 is connected directly into the MC shelf and the data portion is extracted from the DS-0 channel using the multichannel telecommunications link (MTL) card (NTFX64BA).

Redundancy is achieved by N+1 sparing. The MC is a real-time voice processing component with no memory of the call once the call is processed. All call history will either remain within the Storage Node or will result in billing data within the DMS. The Controller performs IVR (Interactive Voice Response) dialogue with the callers and recipients, including speech recognition functions, and is responsible for recording and playing back of voice messages. Each MC is connected to a single DMS. Redundancy is provided at the shelf level to ensure high service availability. That is, while an MC going down will cause all the calls currently being processed to be lost, new calls destined to the Message Node will be processed by the N+1 spared shelf with no loss of capacity.

The messaging controller shelf is the real-time voice processing network component central to audiogram delivery service. The messaging controller shelf performs the Interactive Voice Response (IVR) dialogue with callers and message recipients, including the speech recognition function, and is responsible for recording and play back of voice messages. Messaging controller shelves interface with the Storage Node to manage voice files and call detail records.

Messaging controller shelves are statically configured to have some incoming and outgoing ports. The ratio of outgoing ports to incoming ports is configurable and depends on which audiogram delivery services the service provider offers. Typically, the ratio of outgoing ports to incoming ports is approximately 2 to 1. Redundancy is achieved by N + 1 sparing at the shelf level. For example, if two shelves are required to satisfy the traffic requirements, then a third shelf would be provisioned. All the shelves share in processing the load. If one of the shelves was taken out of service or became faulty, the other two shelves would continue processing.Shelves are provisioned on a per DMS basis.

Attendant Controller (AC) Shelf

Attendant controller shelves support up to 12 open interface access (OIA) links. Each attendant controller shelf is capable of supporting up to 24 simultaneous operator sessions. Attendant controller shelves provide access to attendant backing for assistance and premium delivery service. An attendant controller shelf is a centralized component which can be shared by many messaging controllers. Redundancy is achieved by 2N sparing.

Attendant controller shelves interact with storage shelves to provide call context, status information, and call control to the ADS attendant. The operator voice component and the operator position is provided by Nortel's TOPS system. The ADS attendant user interface is fully integrated into the TOPS look-and-feel by using standard pop-up windows and softkey control on the TOPS position. TOPS-MP and TOPS-MPX are supported.

Attendant controller shelves are only required for 0+ Audiogram Service, and optionally for Intentional Audiogram.

The attendant controller (AC) is the ADS component that connects to the TOPS MP/MPX attendant positions for ADS attendant support and to provide connectivity to multiple ORDB. The ADS attendant controller application is one example of an ORDB.

The configuration of an AC is as follows:

- Number of OIA data links supported (MAX 12).
- Number of operator login sessions per link (within the limitations of TPC (4), TMS (96), or ETMS (96) connectivity).
- Number of active ADS attendant sessions (MAX 24).
- Number of active OIA software sessions (MAX 24).

The connectivity to TOPS is either to a TPC (TOPS Position Controller), to a TMS (TOPS Message Switch), or to a ETMS (Enhanced TOPS Message Switch). In all instances, the data communication uses X.25 at layer 3 and LAP-B at layer 2. Layer 1 is transmitted over a DS0 channel on a T1 span. Channel banks and DSUs (supplied by the Telco) are incorporated in the network in order to convert V.35 Layer 1 from TPCs to DS0 over a T1 to connect with the AC. The TMS and ETMS connect directly to the AC over T1.

The AC connects to multiple ORDB using X.25 at layer 3 and LAP-B at Layer 2. Layer 1 is transmitted over a DS0 on a T1 span. Channel banks and DSUs (supplied by the Telco) are incorporated in the network in order to convert V.35 Layer 1 from ORDB to DS0 over a T1 to connect with the AC.

Tops supports redundant X.25 connections for OIA interaction. This redundancy is optional. When both links are operational, the OIA traffic is distributed over the two links. If one of the links goes down, then the traffic is automatically routed to the other equivalent link. This link carries all the OIA traffic until such time as the other link comes back up.

The AC extends this redundancy to apply at the shelf level. That is, each of the redundant OIA links can be terminated on separate shelves. These shelves are equivalent in terms of the functionality which they can provide to the Tops attendant. If

either of the links goes down or if an entire shelf goes down, the other shelf will take over the handling of all the TOPS attendant sessions.

The following provides an outline of the AC shelf redundancy:

* The redundant X.25 OIA links from the TMS or the TPC are directed to two separate AC shelves. This provides 2N shelf redundancy for the OIA access as well as link redundancy.

* The redundant X.25 OIA links to 3rd party ORDB are from two separate AC shelves. This provides 2N shelf redundancy for the OIA access as well as link redundancy.

* Under normal conditions, the two shelves will share the total load. This is consistent with the way TOPS uses the redundant links, the load is shared over the two links at the time a session is started.

* Under failure conditions, all OIA traffic will be directed to a single shelf. In this mode, the active shelf will handle its configured maximum number of active ADS sessions.

* Upon recovery, traffic will automatically be re-distributed over the two links and hence, over the two shelves.

Operations Controller Shelf

The Operations Controller (OC) Shelf is housed in the first Controller Bay. It provides one central view into the ADS Node for fault detection and correction, logs, alarm, shelf/board resource management, diagnostics, and Operational Measurements. It is responsible for monitoring all the shelves in the ADS Node to ensure sanity of all shelves. The OC provides one common location to perform system level administration of all components in the ADS Node. The OC also supports printing facilities and remote access via dial-up modem.

- The OA&M services performed are:
- fault or trouble detection
- fault recovery
- operation measurements collection and reporting
- log/alarm collection and notification
- diagnostic testing

The Operations Controller Shelf comes equipped to support two (2) Controller Bays. An additional IOC (RS232) interface card is required for each additional two (2) Controller Bays supported. It also supports six (6) serially connected I/O devices (local/remote X.11

terminals, local/remote printers) connected through dedicated 56K baud modems running at 9600 baud (rate-adjusted) and two (2) serially connected X.11 terminals connected through 9600 baud dial-up modems.

The Controller Bay also houses 1 modem shelf that is used for dial-up modems, printers, and remote maintenance and ETAS functions.

The operations controller shelf provides centralized operations, administration, and maintenance for the entire ADS Node. The operations controller shelf is housed in the first Controller Bay. The Operations controller shelf provides the following:

General processing environment (UNIX operating system). This is provided by a single master service processor (MSP) single board computer.

Data connectivity, which is provided by input-output controller (IOC) RS-232 cards

Ethernet LAN connectivity, which is provided by the MSP

Disk storage, which is provided by the disk /DAT unit

LAN Overview

The LAN Bay provides the facilities for networking of intra-site, between shelves of the ADS Node, and inter-site with the use of WAN. The data exchanged across the network comprises per-call related information, control information related to the administration of the service, administrative data, and a status monitoring 'heartbeat' from the Operations Controller.

A LAN bay houses one modular frame supervisory panel (MFSP), which contains breakers, alarm indicator lights, fuses, and frame supervisory control.

Hubs, which provide Ethernet 10BaseT connectivity between controller shelves and other LAN peripherals.

Power inverters, which provide 120-V ac power for the hubs from the -48V operating company power plant.

All ADS equipment is packaged in Northern Telecom's C28 Mod B cabinets designed for central office compliance.

LAN Equipment

HUB

The role of the HUB is to provide connectivity between several IEEE 802.3 10BASET drops and other IEEE P802 LAN equipment. The LAN is realized by physically interconnecting the peripherals to the HUBs

with IEEE 10BASET twisted pair cable. The redundant 10BASET drops originate directly from each controller shelf in the ADS Node. The redundant 1 BASET MAUs (Media Access Unit) are integral to the controller shelf. Each shelf is connected to each of the two hubs, one of which is deemed the primary hub, the other, the secondary.

The Hub in the LAN Bay supports the following:

- support for IEEE 802.3 10BASET specification
- support for 24 or 48 10BASET ports
- minimum configuration required
- support for remote monitoring/administration via SNMP (Simple Network Management Protocol)
- auto-segmentation to isolate problems
- support for 10BASET standard link beat signal as a reliable indicator of hub status

The Hubs selected for ADS are:

- 24-port Ethertwist Hub
- HP 28699A NPS51151-01L4 48-port Ethertwist Hub

The 24-port Hub will support ADS Nodes containing up to 21 controller shelves (including the Operations Controller).

The 48-port Hub will support ADS Nodes containing more than 2 controller shelves, up to the maximum supported capacity.

MAU (Media Access Unit)

The role of the MAU is to provide connectivity between the AUI (Attachment Unit Interface) ports on the LAN or computer equipment, and the other LAN media (e.g. 10BASET twisted pair). For the ADS Controller shelves, the 10BASET MAU is integrated and no external MAU is required.

The MAU selected for ADS LAN is the HP 28685B NPS51151-02L1. It supports the following:

- support for IEEE 802.3 10BASET specification
- support for IEEE standard 15 pin AUI interface
- adequate status indication through external LEDs

MULTI-PORT BRIDGE/ROUTER (Optional,Customer Provided)

The bridge/routers provide isolation between the nodal subnets (LANs) at the OSI datalink address level (when configured in bridging mode). The bridge/routers learn which addresses are associated with which port, forwarding only the necessary traffic. The provision of duplicate paths between nodes is achieved using two physically separate bridge/routers at each node and provisioning physically separate WAN facilities. Software control over which of the redundant 10BASET drops on a given shelf is active handles failure scenarios (communications facility failure, port failure, bridge/router failure, failure of a directly connected Hub) by flipping to the secondary path.

Nortel does not supply or support routers in an ADS node. If routers are required, they must be selected, supplied and supported by the service provider. Routers are required to interconnect up to 2 ADS nodes, if required for remote audiogram status query.

SPARES CABINET

The Spares Cabinet consists of one (1) or more Auxiliary Shelves with or without a Modem Shelf. It allows ADS spare CPs to be stored.

The Spares Cabinet must not be located within the ADS line-up because it is non EMI-compliant.

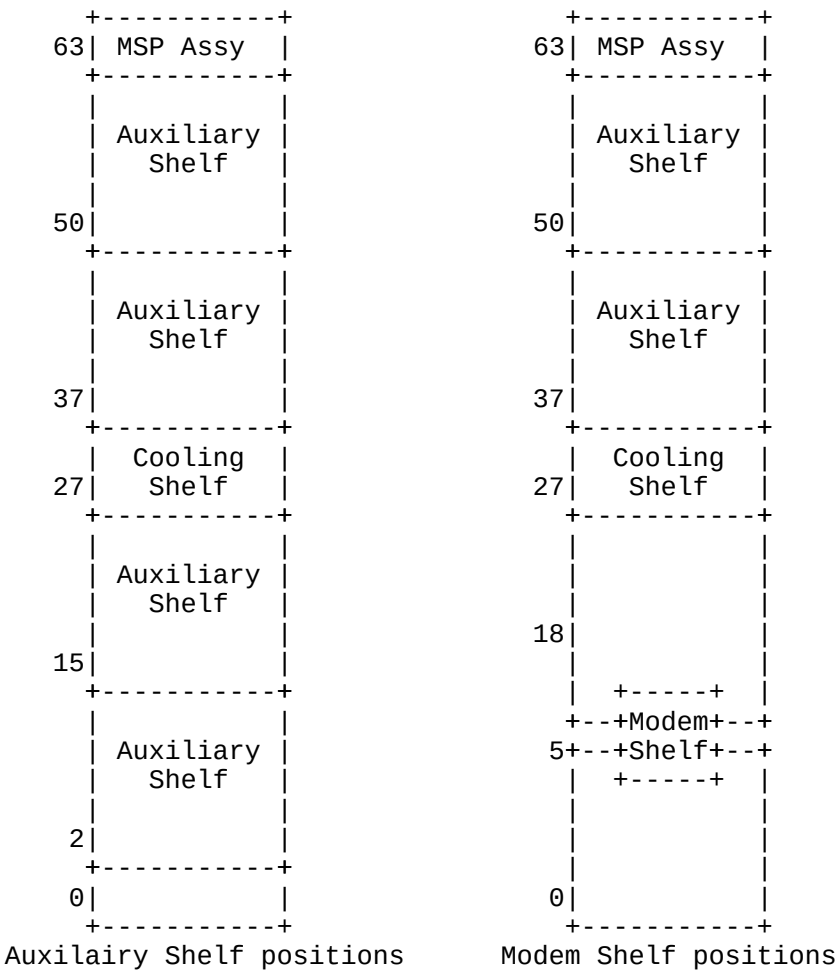


Figure 5. ADS Spares Cabinet

2.1.3.2 Integrated Storage Node

The Storage Node is responsible for the storage of voice audiograms and their related information. For each message, information stored includes a voice file (a binary file containing the compressed speech data), and the associated call detail record which contains all information pertaining to that message (delivery status, destination, event time stamps, billing method, delivery method, etc.).

ADS Storage Nodes are implemented by paired storage shelves.

STORAGE SHELF

Storage shelves are provisioned in pairs. Each pair is configured for high availability database access to voice message informa-

tion, such as delivery status, destination, event time stamps, billing method, and delivery method. High availability is a term used to describe a configuration that has loosely coupled redundancy. High availability is not transparent to application or client processes.

Storage shelves operate as independent processing components with a partitioned workload. Each shelf must be capable of providing full or partially provisioned service if one of the shelves should fail. When a storage shelf in a storage shelf pair fails, database and file storage activity is taken on by the other shelf. Client processes are required to release connections with the failed shelf, and reconnect with the functioning shelf. In-progress transactions must be repeated.

ADS uses Informix high availability data replication (HDR) to achieve reliable database storage and high availability database access. Informix release 7.1 implements nearly transparent data replication of entire database servers. All the data managed by an Informix OnLine database server is replicated and dynamically updated on another Informix OnLine dataserver. Data replication provides a means of maintaining a backup copy of the entire database server that applications can access quickly in the event of a catastrophic failure.

Each storage shelf in a pair is configured with a processor and disk storage. Informix OnLine replicates each message and master database between the two shelves. Recorded voice messages and name recordings are stored once locally on the messaging controller shelf where the message was captured and once on one of the storage shelves in a storage shelf pair.

| NOTE - The ADS Release 4.2 uses a pair of NAV shelves equipped with PowerPC processor circuit cards, service processor transition modules (NTFX91AA) and dual disk drives (NTFX61EA). The PowerPC processors operate using the AIX 4.1.2 operating system. The PowerPC card and AIX 4.1.2 are not yet qualified/productized as part of a NAV base platform. This configuration is not currently supported by the NAVB002 platform. Until the PowerPC processor and AIX 4.1.2 are formally supported, the storage shelves will be equipped with 187 processor cards and UNIX SVR4. A swap of the processor card will be performed on site prior to software commissioning and the 187 cards will be used as spares. After formal introduction and productization of the PowerPC processor and AIX 4.1.2, a formal upgrade will be performed and the office records will be updated. The intentional omission of the use of the PowerPC and AIX 4.1.2 in the ADS Release 4.2 Product Specification is to eliminate the impact to downstream processes.

The storage shelf(SS) provides centralized data base and file storage for an ADS line up. ADS provisions storage shelves as a
| pair to become a high availability server pair. High availablility

| does not require any special or additional software, but is ob-
| tained through software.

| A pair of storage shelves supports up to nine MC shelves with full redundancy, that is, should a single SS fail the second SS is capable of providing data base and file storage without loss of MC shelf support.

2.2 Hardware Provisioning

2.2.1 Hardware Usage Restrictions

All (up to six) Controller Bays serviced by a single Operations Controller must be restricted to the same lineup and physically contiguous with each other in order to meet cabling and grounding requirements.

|

| Nortel does not supply or support routers in an ADS node. If
| routers are required, they must be selected, supplied and sup-
| ported by the service provider.

| Routers are required to interconnect up to two ADS Nodes, if re-
| quired for remote message status query.

| NAV node hardware can be upgraded in the field for both the C28A and C28B types of cabinets by adding or replacing components at three levels:cards,shelves, and cabinets.

Cards on a shelf can be upgraded by simple replacement. New cards can also be added by replacing filler cards, in which case additional cabling may be required between transition modules and the bulkhead.

Each NAV cabinet is prewired at the factory to support up to four NAV controller shelves. Wherever space is available in a cabinet, another shelf can be added. Power from the MFSP is always provided in the bay, but it must be connected to the rear of the shelf. Other system-level cabling to the bulkhead is installed according to the configuration of the controller shelf.

A modem shelf is most easily added to a cabinet that already contains one. In this case, the only requirement is that power be jumpered from the existing modem shelf. Adding the first modem shelf to a cabinet requires an associated breaker card in the modular frame supervisory panel (MFSP) and cabling as described in the installation manual.

The C28B NAV cabinet can be added to a lineup that contains other C 8B or C28A cabinets. If both cabinet types are in the same lineup, both cable assignment drawings (CAFX50AA and CAFX50BB) must be consulted for connector designations.

| For each T1 connection to the DMS-200 TOPS one DS0 is required for data, and 20 DS0 channels for voice. Three DS0 channels are not used. Messaging controller provisioning is based on 20 active channels.

| A pair of storage shelves for ADS Release 4.2 supports up to nine messaging controller shelves.

| When a storage shelf fails, there is a maximum time of two minutes during which database access will not be available. Any calls in progress during this time will be lost and no new calls will be accepted.

| ADS requires WAN connectivity if the Automated Status Query feature is used to query messages which may have been recorded on multiple ADS Nodes. WAN hardware is not provided by ADS or NAV.

| Attendant controller supports 7-11 messaging controllers running 0+ traffic only.

| Dedicated LAN supports up to 23 messaging controllers.

| Switch routing delays (for 1+ and Local, Intentional, and Millennium) from end office to DMS-200 TOPS is network dependent.

| Directory Number user interface has a limitation of 10,000 entries.

2.2.2 Hardware Dependencies

Refer to “ Requirements for the DMS” on page 14-79 and “ DMS Related Items for ADS” on page 14-84.

2.2.2.1 P and C Side Port Requirements

Not applicable

2.2.2.2 DMS BUS Port Requirements

Not applicable

2.2.2.3 Circuits Per Card

Not applicable

2.2.2.4 Discrimination Numbering

Not applicable

2.2.3 Provisioning Considerations

This section provides the guidelines for software and hardware provisioning of the Audiogram Delivery System (ADS) according to service provider specifications. Release 4.2 of ADS is built on the NAVB002 platform. The NAV Base ECM 697 should be referenced for detailed hardware provisioning rules. This ECM will provide sizing and high level system configuration rules.

For an alternate method for provisioning a ADS NAV node, reference -- Heading id 'ENGF696' unknown --. This method mirrors the provisioning steps listed in the NT-ACCESS order tool.

ADS should be provisioned in the following phases:

- Determine the requirements for the 0+ Gateway.
- Determine the number of messaging controllers.
- Determine the number of TOPS attendants.
- Determine the number of attendant controllers.
- Determine the number of storage shelf pairs.
- Determine the overall system requirements.
- Determine the requirements for the DMS.
- Select base and application-specific software for each controller.
- Select bays,modules and network hardware to support the controllers.
- Determine exact quantities and part numbers of hardware and software.

2.2.3.1 Requirements for the 0+ GATEWAY

0+ Gateway provisioning is required only for the 0+ audiogram service. It is not required for other ADS audiogram services.

All qualified 0+ and 0- handoff calls are routed to the Automated Alternate Billing Service (AABS) on the Voice Service Node (VSN) for screening and billing. Optional feature package VABS0001 "0+ Gateway Screening 2" provides eligibility screening for ADS calls, and sets the TOPS Busy and Ring No Answer trigger in the TOPS DMS-200, feature package ENSV0013 "ADS Offer of Service Prompt".

Provisioning of 0+ Gateways is based on the Erlang B formula. This formula assumes:

- Traffic sources are infinite
- Calls occur at random
- Holding times are distributed exponentially about an average value
- Lost calls are blocked

Table 2-1 is an Erlang B table showing the traffic provisioning from 1 to 96 channels where N is the number of channels and A(N) is the traffic capacity of N channels measured as CCS.

A(N) (CCS)	N	A(N) (CCS)	N	A(N) (CCS)	N	A(N) (CCS)	N
0.36	1	580.50	25	1332.14	49	2119.64	73
5.49	2	610.52	26	1364.44	50	2152.91	74
16.40	3	640.69	27	1396.80	51	2186.21	75
31.30	4	671.01	28	1429.20	52	2219.51	76
48.99	5	701.53	29	1461.67	53	2252.84	77
68.72	6	732.13	30	1494.18	54	2286.22	78
90.03	7	762.88	31	1526.72	55	2319.62	79
112.59	8	793.73	32	1559.34	56	2353.07	80
136.17	9	824.72	33	1591.99	57	2386.51	81
160.60	10	855.79	34	1624.68	58	2419.99	82
185.76	11	886.97	35	1657.40	59	2453.47	83
211.54	12	918.25	36	1690.20	60	2486.88	84

Table 2-1 ERLANG B (GOS 1 percent)

A(N) (CCS)	N	A(N) (CCS)	N	A(N) (CCS)	N	A(N) (CCS)	N
237.85	13	949.61	37	1723.00	61	2520.72	85
264.67	14	981.07	38	1755.86	62	2554.20	86
291.89	15	1012.64	39	1788.77	63	2587.68	87
319.50	16	1044.25	40	1821.71	64	2621.16	88
347.47	17	1075.97	41	1854.65	65	2655.00	89
375.73	18	1107.76	42	1887.66	66	2688.48	90
404.28	19	1139.62	43	1920.71	67	2722.32	91
433.12	20	1171.55	44	1953.79	68	2756.16	92
462.17	21	1203.55	45	1986.88	69	2789.64	93
491.44	22	1235.59	46	2020.03	70	2823.48	94
520.92	23	1267.74	47	2053.19	71	2857.32	95
550.62	24	1299.92	48	2086.42	72	2891.16	96

Table 2-1 ERLANG B (GOS 1 percent) Cont.

VSN as 0+ Gateway (TOPS03/VSN03)

ADS 0+ AudioGram is not supported.

VSN as 0+ Gateway (TOPS04/VSN04)

ADS 0+ AudioGram is not supported.

VSN as 0+ Gateway (TOPS05/VSN05)

This section applies to the following ADS installations:

- The ADS is providing 0+ audiogram service.
- Access to ADS uses 0+ Gateway feature AN1578 or DMS-200 TOPS feature AN1542 (offer of service is presented by the DMS-200 TOPS).

The decrease in traffic handling capacity for a TOPS VSN supporting ADS is less than 1%. There is no noticeable change in AHT as all additional processing is in the background, and is not reflected in user prompts or actions.

Table 2-2 shows the expected maximum ADS 0+ AudioGram traffic generated by the 0+ Gateway.

System	Unilingual (CPH)	Bilingual (CPH)
24 port 0+ Gateway	12	10
48 port 0+ Gateway	28	24

Figure 6. Table 2-2 Expected Maximum ADS Traffic Generated by 0+ Gateway (VSN05)

Each Telco must determine the volume of 0+ AudioGram traffic based on their particular network and traffic patterns.

This section provides an example of how to determine the maximum 0+ AudioGram traffic that can be expected per 0+ Gateway. 0+ traffic calculations are based on the Erlang B formula.

Call Type	AHT unilingual prompts (SEC)	AHT bilingual prompts (SEC)	Percent of Gateway Traf.
Automated calling card	17	19	43
Automated collect	75	96	20
Collect handoff	61	63	6
Automated third party	85	106	8
Third Party handoff	61	63	1
Timeout/request operator	18	18	22

Figure 7. Table 2-3 0+ Gateway Traffic Assumptions

Table 2-4 shows the average holding times for the 0+ Gateway based on the traffic assumptions in Table 2-8.

System	Unilingual Prompts	Bilingual Prompts
0+ Gateway	37	44

Figure 8. Table 2-4 Average Holding Times

Table 2-4 shows the maximum calls per hour capability of 0+ Gateways using the holding times in Table 2-4 and a 1% probability of blocking.

System	Unilingual	Bilingual
24 port 0+ Gateway	1473	1244
48 port 0+ Gateway	3483	2940

Figure 9. Table 2-5 Maximum calls per hour with 1 percent probability of blocking

In determining the amount of ADS traffic generated by a single 48 port 0+ Gateway, the following assumptions are made:

- 0+ Gateway traffic is distributed as described in Table 2-3.
- (A) 0+ Gateways are operating at capacity (e.g. 3483 calls/hr for unilingual).
- (B) 17% of 0+ calls result in busy or ring no answer.
- (C) 91% of 0+ calls are fully automated.
- (D) 9% of 0+ calls are handed off from TOPS attendants.
- (E) 5% of fully automated calls resulting in busy or ring no answer select the audiogram delivery option.
- (F) 2% of calls handed off to the 0+ Gateway by operators which resulted in busy or ring no answer select the audiogram delivery option.

Traffic is calculated according to the following formula:

(AxBxCxE)+(AxBxDxF)

Table 2-6 shows the maximum ADS traffic generated by the 0+ Gateway using the holding times and call mix as shown in Table 2-3.

System	Unilingual(CPH)	Bilingual(CPH)
24 port 0+ Gateway	12	10
48 port 0+ Gateway	28	24

Figure 10. Table 2-6 Maximum ADS traffic generated by 0+ Gateway (VSN05)

2.2.3.2 Messaging Controller Provisioning

The goal of this section is to determine for each DMS-200 TOPS switch, the number of messaging controllers required to satisfy the expected ADS traffic.

Provisioning of messaging controllers is based on the Erlang C formula. This formula assumes:

- Traffic sources are infinite
- Calls occur at random
- Holding times are distributed exponentially about an average value
- Lost calls are queued

Table 2-7 is an Erlang C Table showing the traffic provisioning from 1 to 96 channels where N is the number of channels and A(N) is the traffic capacity of N channels measured as CCS.

A(N) (CCS)	N	A(N) (CCS)	N	A(N) (CCS)	N	A(N) (CCS)	N
0.36	1	529.95	25	1223.00	49	1955.00	73
5.27	2	557.49	26	1252.90	50	1986.00	74
15.45	3	585.19	27	1282.90	51	2017.10	75
29.16	4	613.04	28	1313.00	52	2048.20	76
45.33	5	641.04	29	1343.10	53	2079.30	77
63.30	6	669.17	30	1373.20	54	2110.40	78
82.67	7	697.43	31	1403.40	55	2141.60	79
103.16	8	725.82	32	1433.70	56	2172.80	80
124.58	9	754.33	33	1464.00	57	2204.00	81
146.77	10	782.90	34	1494.40	58	2235.30	82
169.62	11	811.70	35	1524.80	59	2266.60	83
193.05	12	840.50	36	1555.30	60	2297.90	84

Table 2-7 ERLANG C P(Delay>0)=1 Percent

Figure 11. Table 2-7 ERLANG C P(Delay>0)=1 Percent

A(N) (CCS)	N	A(N) (CCS)	N	A(N) (CCS)	N	A(N) (CCS)	N
216.99	13	869.40	37	1585.80	61	2329.30	85
241.38	14	898.40	38	1616.30	62	2360.70	86
266.18	15	927.60	39	1646.90	63	2392.10	87
291.34	16	956.80	40	1677.50	64	2423.50	88
316.83	17	986.00	41	1708.20	65	2454.90	89
342.63	18	1015.40	42	1738.90	66	2486.40	90
368.70	19	1044.90	43	1769.70	67	2517.90	91
395.03	20	1074.40	44	1800.50	68	2549.50	92
421.60	21	1104.00	45	1831.30	69	2581.00	93
448.39	22	1133.60	46	1862.20	70	2612.60	94
475.39	23	1163.40	47	1893.10	71	2644.20	95
502.58	24	1193.20	48	1924.10	72	2675.80	96

Figure 12. Table 2-7 ERLANG C P(Delay>0)=1 Percent Cont.

Provisioning of messaging controllers does not include any redundancy. Redundancy is provided by N + 1 spareing.

To determine the number of messaging controllers required for a given configuration, do the following:

1. Determine the number of calls per hour for each of the audiogram delivery services to be configured on a given MC.

2. Determine the AHT for each audiogram delivery service.

Table 2-8 gives expected incoming call holding times for each service based on an average 20 second recorded message length.

ADS SERVICE	Successful Incoming call Atpt AHT(a)	Abandoned Incoming call Atpt AHT (b)	Percent Successful Incoming Call Attempts (c)	Total Incoming Call AHT (d)	Incoming Attempt AHT (e)
0+ audiogram service	63	37	50	100	50
1+ and local audiogram service m	60	28	75	69	52
1-800 audiogram service	70	38	90	74	67
Millenium audiogram serv.	60	28	75	69	52
Automated status query (ASQ)	75	0	100	75	75

Figure 13. Table 2-8 0+ Gateway Traffic Assumptions

Successful incoming call attempt AHT (a) is the average holding time for each successful incoming call attempt. Abandoned incoming call attempt AHT (b) is the average holding time for each unsuccessful or abandoned (caller hangs up) incoming call attempt. The percentage successful incoming call attempts (c) is the percentage of incoming call attempts for which a audiogram is successfully recorded or service has been performed.

The total incoming call AHT is the average holding time for a successful incoming call including the time processing incoming call attempts for which no audiogram was left or service performed.

Total incoming call AHT (d) = (a x c)+(b x (1-c)“/c.

Incoming Attempt AHT (e) is the AHT of a single capture attempt regardless of whether the attempt was successful or not.

Incoming Attempt AHT (e) = (a x c)+(b x (1-c)).

To calculate the average holding time associated with a audiogram delivery, the following assumptions are made:

(A) An average of 5 delivery attempts per audiogram capture is required.

(B) 40% of successful deliveries will require the audiogram to be played a second time.

(C) Unsuccessful delivery attempts will take 47 seconds.

(D) Successful delivery attempts will require 53 (D1) or 73 (D2) seconds depending on whether the audiogram must be played a second time.

These assumptions result in a delivery holding time of 253 seconds (combined attempts).

(C x (A-1))+(B x D1)+((1-B) x D2)= 253 seconds.

The delivery part of all messaging services is essentially the same, except registered deliveries. Registered deliveries are assumed to be a small number of cases, and were not used to determine the average delivery holding time.

3.Calculate the weighted average holding time for each audiogram delivery service,including successful capture, unsuccessful capture, successful delivery, and unsuccessful delivery. This holding time is the total time required to capture and deliver a single audiogram, including unsuccessful captures, and unsuccessful deliveries.

ADS SERVICE	Capture AHT	Delivery AHT	Percent of calls
0+ audiogram service	100	253	5
1+ and local audiogram serv.	69	253	60
1-800 audiogram service	74	253	10
Millenium audiogram serv.	69	253	5
Automated status query (ASQ)	75	0	20

| **Figure 14. Table 2-9 Expected holding times for each** audiogram delivery service

4. Determine the allocation of ports between incoming and outgoing. The number of incoming ports versus the number of outgoing ports is determined by finding the closest match between capture calls per hour and delivery calls per hour, with with capture traffic always less than delivery.

Incoming calls per hour(#incoming ports) <= Outgoing calls per hour (#outgoing ports).

Incoming traffic is based on Erlang C and 1% probability of blocking. Outgoing traffic is a function of the delivery holding time and delivery port utilization. Port utilization is less than 100% due to call setup and tear down for AMA billing generation, and call setup and delivery scheduling. The expected port utilization for ADS delivery ports is 80%.

The maximum number of audiogram deliveries per port is

3600 second/hour / 253 seconds/msg AHT“ x 0.8 = 11.4 messages/hour

| or

| CCS(#incoming ports) / capture AHT <= 11.4X (#outgoing ports)

Capture traffic is measured using Table 2-8. Holding times include successful and unsuccessful attempts.

| Table 2-10 shows the results for each messaging service based on a single 40 port messaging controller and for six messaging controllers.

ADS SERVICE	Port ratio capture vs delivery
0+ audiogram service	1:1.67 (1MC) 1:2.4 (6MC)
1+ and local audiogram serv.	1:2.33 (1MC) 1:3.29 (6MC)
1-800 audiogram service	1:2.08 (1MC) 1:3.07 (6MC)
Millenium audiogram serv.	1:2.33 (1MC) 1:3.29 (6MC)
Automated status query (ASQ)	1:0 (1MC) 1:0 (6MC)

| **Figure 15. Table 2-10 Capture VS Delivery ports allocation by service**

| For the example traffic mix in Table 2-11, the port ratio between capture and delivery for a single MC is:

ADS SERVICE	Percent of Calls
0+ audiogram service	5
1+ and local audiogram serv.	60
1-800 audiogram service	10
Millenium audiogram serv.	5
Automated status query (ASQ)	20

Figure 16. Table 2-11 Example Service Mix

1.67 x .05 + 2.33 x .60 + 2.08 x .10 + 2.33 x .05 + 0 x .20 = 1.8

For a single messaging controller with 40 ports, this ratio requires 14 incoming ports and 26 outgoing ports.

5. Calculate the traffic handling capacity required to handle expected traffic.

Traffic (CCS) = AHT x CPH/100.

Example: 1000 capture call attempts per hour with the traffic pattern described in Table 2-8, and incoming call attempt AHT from Table 2-9.

Weighted incoming call attempt AHT = 58 seconds

Traffic (CCS) = 58 x 1000/100 = 580

Using Table 2-7, the required number of incoming ports is 27.

Using the port ratio between capture and delivery ports of 1.8 calculated in step 4, the number of delivery ports is 49. The total number of ports is 76.

6. Determine the number of messaging controllers (non-redundant) to handle the expected traffic. Each MC provides 40 ports.

Number of MCs = number of ports/40 (rounded up)

76/40 = 2 messaging controllers (For N+1 redundancy, a third shelf would be necessary).

The MC Shelf is a NAV Service Controller (SC) shelf configured for the ADS application. Each MC Shelf can handle a maximum of (48) ports where each shelf can be provisioned with either (24) or (48) ports. Each MC Shelf required shall be provisioned with the following equipment:

Type	Quantity	Description	Slot Pos	Note
MC Shelf	1	Service Controller Shelf	--	1
	1	MC Shelf Front Label	--	
	1	MC Shelf Rear Label	--	
MSP	1	Service Proc. 33MHz/32MByte	1F	3
	1	Service Proc. TM	1R	
	1	SCSI Cable (NTFX8586)	1R	
RSP	1	Service Proc. 33MHz/64MByte	2F	4
	1	Service Proc. TM	2R	
	1	SCSI Cable (NTFX8587)	2R	
	1	SCSI Terminator (A0664610)		
SRP	1	Speech Recognition Processor	3F	
TSI	1	Time Slot Interchange	21F	
DTL	2	Standard DTL Kit	5F,6F 5R,6R	
MTL	4	Multi-Channel Tel Link 56MHz	20F,19F 18F,17F	
SCSI Disk	1	2.4GB Dual Disk	22F	2

Figure 17. MC Shelf Configuration

Note 1: Fill empty slots with appropriate fillers(NTFX66AA front, NTFX67AA rear)
Note 2: Use NTFX61EA
Note 3: Use NTFX76CA
Note 4: Use NTFX75CA

2.2.3.3 Number of TOPS Attendants

The goal of this section is to determine the number of TOPS attendants, which implies the attendant positions (MP or MPX) required to support the ADS service.

There are two types of attendant support provided for ADS services which involve TOPS attendants.

| Full context attendant backing (requires Attendant Controllers). Attendant backing provides, service assistance (capture only), message schedule (capture only), registered delivery handling (capture and delivery).

| Attendant deflect. Attendant deflect provides non specific attendant services (does not require Attendant Controllers).

Full context Attendant backing

To determine the number of attendants required do the following:

1. Determine the volume of calls for which full context attendant backing has been enabled including registered and scheduled delivery options.

2. Estimate the attendant traffic for, service assistance (capture only), message schedule (capture only), and registered delivery handling (capture and delivery).

Table 2-12 lists the types of calls that require attendant assistance, and the expected percentage of total calls that these calls represent. Also, this table shows the expected average holding time of each attendant session.

Call Type	Percent of Traffic	AHT (sec)
Calls requiring assistance during capture	30	25
Calls requesting registered delivery	2	25
Calls requesting scheduled delivery	1	25
Registered delivery attempts	2	45

Figure 18. Table 2-12 Percentage of 0+ attempts requiring operator assistance and their AHT

Using the expected trafic mix and holding times in Table 2-12, and incoming call attempts of 532 call per hour, the attendant traffic (CCS) generated is:

Traffic (CCS) = AHT x CPH/100

Capture Traffic (CCS)= (25x.3)+(25x.02)+(25x.01)“x 532/100 = 43.9

Delivery Traffic (CCS)= (45x.02)x(532x5)“/100 = 24.0

Total traffic (CCS) per messaging controller = 67.9 CCS

3.Using Erlang C tables, determine the number of attendants required to support this traffic. Because of the nature of attendant

backing, each customer needs to determine the level of service response time.

The number of attendants required to support the traffic from a single messaging controller (based on Erlang C with 1% probability of delay) is 7.

A single 24 session AC supports traffic handling capacity (based on Erlang C with 1% probability of delay) of 502 CCS. A single AC is capable of supporting 7 MC shelves with no delay and each MC running at full capacity.

A single 24 session AC supports traffic handling capacity (based on Erlang C with 5% probability of delay) of 802 CCS. A single AC is capable of supporting 11 MC shelves with no delay, each MC running at full capacity.

| Attendant Deflect

To determine the number of TOPS attendants required for attendant
| deflect do the following.

| 1. Determine the volume of calls for which attendant Deflect has
| been enabled and the percentage of those calls for which it is
| anticipated that the caller will transfer to an attendant. The
| expected percentage of callers deflecting to an attendant is 30%.
|

2. Determine the AHT for a TOPS attendant for capture assistance. The expected AHT for capture assistance is 25 seconds.

3. Determine the number of TOPS attendants required for attendant transfer traffic.

| Example: 131 CPH for attendant deflect and 25 seconds AHT

Traffic (CCS) = AHT x CPH/100 = 25 x 131/100 = 32.75 (CCS)

The number of attendants required to support 32.75 CCs of traffic is 5 based on Erlang C with 1% probability of delay.

2.2.3.4 Number of Attendant Controllers

Configure two attendant controllers per ADS node if full context attendant backing is required, otherwise, configure zero.

ADS supports a maximum of two attendant controllers configured for 2N redundancy. Each attendant controller supports:

- 24 concurrent TOPS ADS sessions, distributed across seven TOPS Position Controller (TPCs) or a single TOPS Message Switch (TMS).
- Access to three ORDB for up to 24 TOPS attendant positions connected using the OIA Gateway application distributed across seven TPC or a single TMS.
- Both of the above. In this case, the 24 ADS sessions use the OIA Gateway and the ADS is one of the three ORDB.

Using the maximum attendant traffic expected per messaging controller (0+ intercept), Table 2-13 shows the number of MCs which can be supported by a single attendant controller.

Level of service measured by response time	Number of messaging controllers
24 session attendant controller P(delay>0) = 1 Percent	7
24 session attendant controller P(delay>0) = 5 Percent	11

Figure 19. Table 2-13 Number of messaging controllers supported by a single attendant controller

The AC Shelf is a NAV Service Controller (SC) shelf configured for the ADS application.

Each AC Shelf required shall be provisioned with the following equipment:

Type	Quantity	Description	Slot Pos	Note
AC Shelf	1	Service Controller Shelf	--	1
	1	AC Shelf Front Label	--	
	1	AC Shelf Rear Label	--	
MSP	1	Service Proc. 33MHz/32MByte	1F	3
	1	Service Proc. TM	1R	
	1	SCSI Cable (NTFX8586)	1R	
RSP	1	Service Proc. 33MHz/32MByte	2F	3
	1	Service Proc. TM	2R	
	1	SCSI Cable (NTFX8587)	2R	
	1	SCSI Terminator (A0664610)		
DTL	1	Standard DTL Kit	5F,5R	
MTL	1	Multi-Channel Tel Link 56MHz	20F	
TSI	1	Time Slot Interchange	21F	
SCSI Disk	1	2.4GB Dual Disk	22F	2

Figure 20. AC Shelf Provisioning

Note 1: Fill empty slots with appropriate fillers (NTFX66AA front, NTFX67AA rear)
Note 2: Use NTFX61EA
Note 3: Use NTFX75BA

2.2.3.5 Number of Operations Controllers

Each NAV Node requires one (1) Operations Controller (OC) Shelf. The OC Shelf shelf shall be provisioned with the following equipment:

Type	Quantity	Description	Slot Pos
OC Shelf	1	Operations Controller Shelf	--
	1	Oper. Contr. SH Front Label	--
	1	Oper. Contr. SH Rear Label	--
MSP	1	Service Proc. 33MHz/64MByte	1F
	1	Service Proc. TM	1R
	1	SCSI Cable (NTFX8586)	1R
	1	SCSI Terminator (A0664610)	
IOC RS232	1 if more than 11 ADS Shelves	I/O Controller RS232 kit	10
	2 if more than 18 ADS shelves	I/O Controller RS232	12
SCSI Disk	1	2.4GB Disk/DAT (NTFX61BA)	22F

Figure 21. OC Shelf Provisioning

The IOC (RS-232) cards provided as part of the operations controller shelf supports as many as 8 serial links (RSL). Each bay requires one RSL link for the MFSP. Therefore, the IOC cards provided support a total of two bays and 6 ADS service controller shelves. Each additional IOC supports eight RSL links and can be provisioned as needed. A maximum of two additional IOC cards can be provisioned in the operations controller shelf. If no optional IOC cards are selected, the positions are filled with filler cards.

2.2.3.6 Configure one pair of Storage Shelves

Configure one pair of storage shelves per ADS Node. ADS supports a maximum of one pair of storage shelves configured for 2N redundancy. One pair of storage shelves supports a maximum of nine messaging controllers.

The provisioning of the ADS storage shelf pairs is based on a combination of the capacity (storage and traffic) and performance requirements.

Capacity and performance requirements

The capacity and performance requirements imposed on the ADS storage shelf are a function of the number of messaging controller shelves in an ADS Node. Because all of the interactions (on both message capture, and message delivery) between ADS and the storage shelf are non real-time, the requirements are dictated by the average traffic generated by all of the ADS controllers (messaging controller and attendant controller), and can be expressed as a linear function of the number of incoming ports. Table 2-15 summarizes these requirements. The assumptions listed in Table 2-14 quantify the storage and traffic capacity/performance requirements, based on 0+ and 1+ and local trial results.

Variable	Description of Variable	Value
a1	Average messages per hour generated by each incoming port (71 incoming ports in 6 MC shelves)	39
a2	Average message length	20 sec
a3	Message encoding efficiency	2KB/sec
a4	Average message retention time	2 hours
a5	Call detail data size	2 Kbytes message
a6	Number of ADS database transactions required per message captured	9
a7	Number of ADS database transactions required per message delivery attempt	14
a8	Average number of message delivery attemps per message	5
a9	Average length of recorded name with a message	2 sec
a10	Length of time call details for a message are retained (length of time message can be queried)	48 hours

Figure 22. Table 2-14 Assumed storage and traffic capacity/performance requirements

AHT for a single 1+ and local audiogram capture is 69 seconds from Table 2-9. Capture CPH = capacity (# ports)/capture AHT" x 100 =

893.10/69“ x 100 = 2744 calls per hour. The number of calls per port is 2744/71 = 39 calls per hour.

| The following expressions provide the per incomming port requirements:

voice storage (KB) = (a1 x (a2+a9) x a3 x a4)

CDR storage (KB) = (a1 x a5 x a10)

traffic (messages/sec)= a1/3600

capture database perf. (ADS db trans/sec) = (a6 x a1) / 3600

delivery database perf. (ADS db trans/sec) = (a7 x a1 x a4 x a8)/ (600 x a4)

capture NFS perf. (KB/sec writes) = (a1 x (a2+a9) x a3) / 3600

delivery NFS perf. (KB/sec reads) = 0

| The total requirements imposed by a given ADS can be derived by mutiplying the figures in Table 2-12 by the number of incoming ports in the network. The requirements placed on a storage shelf are quite sensitive to the accuracy of the assumptions listed above. In particular increasing a4 the message retention time, has a large impact on storage capacity requirements. As a result, the storage shelf provisioning must be re-examined for ADS installations where the assumptions do not hold.

Capacity/Performance Metric	Per Incoming Port Requirement
Storage Capacity:(non-replicated)	
Voice (Mbytes)	6.9
CDRs (Mbytes)	3.7
NFS (network) Performance:	
Capture (KB/sec)	0.48
Delivery (KB/sec)	0.0
Note: In a normal situation all recorded voice messages are read from local storage	
Database Performance:	
Capture (ADS transactions/sec)	0.1
Delivery (ADS transactions/sec)	0.76
DBASE network traffic (KB/sec)	0.86
Based on an average 1 KB per transaction	

Figure 23. Table 2-15 Storage shelf capacity/performance requirements

The Storage Shelf is a Service Controller (SC) shelf configured for the ADS application.

Each Storage Shelf required shall be provisioned with the following equipment:

Type	Quantity	Description	Slot Pos	Note
SS Shelf	1	Service Controller Shelf	--	1
	1	Database Shelf Front Label	--	
	1	Database Shelf Rear Label	--	
MSP	1	Service Proc. 33MHz/32MByte	1F	3
	1	Service Proc. TM	1R	
	1	SCSI Cable (NTFX8586)	1R	
	1	SCSI Terminator (A0664610)	1R	
SCSI Disk	1	2.4GB Dual Disk	22F	2

Figure 24. Storage Shelf Provisioning

Note 1: Fill empty slots with appropriate fillers(NTFX66AA front, NTFX67AA rear)
Note 2: Use NTFX61EA
Note 3: Use NTFX75BA

NAV Storage Node

The requirements contained in Table 2-16 are expressed on a per incoming port basis. These values allow the calculation of the upper limits on the number of incoming ports in the network imposed by the ADS storage node.

The storage capacity figure is determined by taking the total addressable disk space less the overheadof the UNIX, NAV BASE and database software (300MB) and the overhead of disk formatting information (10% of unformatted capacity).

Performance figures have been empirically measured under heavy simulated load. Performance measurements were made with one storage shelf running as the primary server handling all DBASE and NFS traffic. The second storage was running as a secondary server with DBASE replicated transactions. The load on the primary server is reported.

Capacity/Performan Metric	Capacity/ Performance
Storage Capacity: Based on dual 2.5G drives. One drive for file storage, the other for database storage and boot volume.	
„ Voice	2160 (26)
„ CDR	1860 (42)
Network Traffic (Kbytes/sec) Assuming MAX (25 Percent) Ethernet Efficiency	250 (23)
Transactions per second (TPS)	9

Notes:
(1) In all cases, it's the TPS that limits the maximum number of shelves supported by a pair of NAV shelves.
(2) Numbers in parenthesis () indicate the maximum number of MCs supported.

Figure 25. Table 2-16 Storage shelf capacity/performance

2.2.3.7 Modem Provisioning

Each NAV Node requires one (1) Modem Shelf to be mounted in the first NAV Controller Bay with the Operations Controller (OC) Shelf. The Modem Shelf shall be provisioned with the following equipment:

Type	Quantity	Description	Slot Pos
Modem Shelf	1	Modem Shelf	05
	2	Modem Shelf Air Plenum	--
	1	Modem Shelf Power Kit	--
	1 per Local/Remote Dedicated Terminal (Maximum 2)	Universal Modem	1,9
	1 per Printer (Maximum 4)	Universal Modem	2,3, 10,11
	1 per Remote Dial-Up Terminal (Maximum 2)	Modem 9600 Dial-Up	4,12

Figure 26. Modem Shelf Provisioning

2.2.3.8 LAN Provisioning

Inter shelf network traffic including NFS traffic and SQL traffic for messaging services use the NAV 10BT Ethernet LAN. The maximum data throughout for an ADS lineup is 250 Kbytes per second. This assumes a 25% Ethernet efficiency.

LAN Bandwidth Considerations

To determine the bandwidth requirements of the LAN, the following factors must be considered.

| The number of message capture ports in the system.
| The messaging controller to storage shelf bandwidth per message
| capture port.
The incremented NAV OA & M LAN traffic (OMs/logs/alarms/sh. audits)
| attendant controller status query traffic.

Each message capture port imposes a 1.62 Kbytes/sec communication requirement on average between the messaging controller and the

storage node. The 1.62 Kbytes/sec is made up of 0.51 Kbytes/sec for capture and 1.11 Kbytes/sec for Dbase transaction.

| Further, it is assumed (based on examination of current implementation) that shelf to shelf, and shelf to OAM shelf bandwidth requirements are negligible relative to the file transfer requirements.

To err on the conservative side, an efficiency of 25% is assumed for IEEE 802.3 (802.3 efficiency is a function of the number of shelves competing for the network, the efficiency of the interface driver on each shelf and the average packet size, among other | things). Applying this assumption, the 802.3 technology will support 154 message capture ports on a given 802.3 network of up to 19 MC shelves.

LAN Port Capacity Considerations

For the ADS application, IEEE 802.3 (10BASET) technology has been selected. There are 24 port and 48 port variants of the hub. The particular hub configured into the LAN bay dictates the number of service and operations controllers and LAN peripherals (X-terminals only) required. Table 2-17 summarizes the capacities of each of the LAN bay configurations, for each of the supported LAN/WAN architectures:

LAN BAY config	Capacity
24-port Hub	up to 21 controllers up to 2 LAN peripherals
48-port Hub	Supports a maximum ADS configuration

Figure 27. Table 2-17 LAN Bay Capacities

Each LAN Bay may be provisioned with the following equipment:

Type	Quantity	Description	Slot Pos
Hub A	1	Hub Port	46
Hub B	1	Hub Port	36
Hub Spare	1	Hub Port	41
Pwr Inv A	1	Power Inverter	12
Pwr Inv B	1	Power Inverter	2

Figure 28. Table 2-18 LAN Bay Provisioning

Note that the capacities indicated in Table 2-17, are the upper limits imposed by the hub port capacities, and LAN bay connector plate design constraints only.

2.2.3.9 Requirements for the DMS

TMS/ETMS

When not specified TMS also refers to ETMS. TMS must be dedicated ADS. This section describes the TMS provisioning required for messaging controller shelf connectivity to the DMS. Messaging controllers require T (DS-1) links to carry both voice and data
| channels. Each DS-1 carries 2 voice channels and 1 data channel. A 48 port messaging controller has 4 voice channels and 2 data channels.

| For ADS Release 4.2, a TMS will supports 2 Message Controller (MC)
| shelves, 40 voice channels per MC shelf via two DS-1 links.

| For ADS Release 4.2, an ETMS will supports 2 Message Controller
| (MC) shelves, 40 voice channels per MC shelf via two DS-1 links.

| TMS/ETMS Voice

| Each DS-1 card (NT6X50) supports two DS-1 links. Each messaging
| controller is connected to a single DS-1 card in the TMS. Hence,
| a 48 port MC will occupy both links of an NT6X50. Connectivity in
| this manner ensures that a single point of failure within the DS-1
| card or the links themselves effect only one MC.

| The following equipment is provisioned as required:

| • n NT6X50

| where n2 is the number of messaging controller shelves.

A TMS supports 96 voice channels. These voice channels are accessed using DS-1 links (four per TMS). Each DS-1 card supports two DS-1 links. Each messaging controller is connected to a single DS-1 card in the TMS. Hence, a 48 port MC will occupy both links of a DS-1 card. Connectivity in this manner ensures that a single point of failure within the DS-1 card or the links themselves effect only one MC.

TMS Data

| A TMS supports two data cards (NTBX02), each of which is capable of handling 16 data circuits. Each messaging controller connects to a single data card. Each 48 port MC and 24 position AC will occupy two data channels within one data card.

ETMS Data

| An ETMS supports two data cards (NTBX02), each of which is capable of handling 16 data circuits. Each messaging controller connects

| to a single data card. Each 48 port MC will occupy two data channels within one data card.

TMS Frame

A TMS frame can accommodate two TMSs. Each TMS occupies two shelves within the TMS frame. Therefore, a TMS frame can provide connectivity to four 48 port MC shelves. Common equipment that comprises a frame is listed in ECM 468. Each TMS frame comes with all the shelves installed. If one of the TMSs is not used filler cards must be installed. Provision 48 filler cards and two power converter filler cards for each empty TMS.

DMS Conference Circuits

Forty 3-way conference bridges per 48 port MC is required.(one per voice channel, remembering that all of the DS-0 channels cannot be used within the T1 span.)

DTMF Recievers (0+ only)

One DTMF reciever is required per 0+ Gateway port (required for 0+ traffic intercept).

Operator ID

One operator ID per messaging controller capture/delivery port and one operator team ID per ADS system (Billing Region) are required.

Loop-around trunks (0+ only)

| One loop-around trunk on the DMS-200 per MC for handoff of registered delivery calls from the MC to an attendant is required. The loop-around trunk must be an Intertoll (IT) to TOPS trunk which is configured to send and receive ANI.

Channel Bank/Cross Connects (0+ only)

Channel bank and cross connect requirements are site and configuration specific. A channel bank is required in the case of direct connection to TPCs for attendant backing.

Modems/DSUs (0+ only)

| Two 56kb/s DSUs in the TOPS AAE for V.35 connectivity are required per TPC.

TPC (0+ only)

One high speed data access (HSDA) card is required per TPC per pair of attendant controllers. Note that for TPC direct connect, this is a HSDA card designated for ORDB access. For connectivity via

the TMS, this is the HSDA card which carries all data PVCs between the TMS and the TPC (only one is required. It carries call control, DA and ORDB messaging).

2.2.3.10 Controller Bays

Each ADS node requires one operations controller shelf, one modem shelf and up to 24 service controller shelves. These shelves are housed in up to seven controller bays. The optimal number of the controller bays equals the number of shelves divided by four and rounded up to the nearest integer. For each controller bay, order the following:

- one controller bay

- three cooling modules (NTFX58AB)

- one MFSP (NTFX5510)

Up to four of any of the following shelf types:

- messaging controller shelf

- attendant controller shelf

- storage shelf

- operations controller shelf (one per system is required)

- modem shelf (MAX 2)

- one NAV shelf air plenum (NTFX5605) to fill each unused shelf position.

2.2.3.11 Local Area Network (LAN) Bay

In each ADS node, a 10BaseT Ethernet local area network (LAN) interconnects service controllers, operations controllers, LAN-connected terminals and customer-provided routers.

The master service processor (MSP) in every controller shelf has a 1 BaseT Ethernet LAN interface. Each controller shelf connects to an Ethernet hub port through a twisted pair cable of less than 100m (328ft). The resulting LAN can sustain a theoretical maximum bandwidth of 10-Mb/s. In practice, the usable bandwidth of 10BaseT is from 25-35% of the theoretical maximum.

For ADS, system redundancy is provided by a pair of hubs, where one hub is called 'Hub A' and the other is called 'Hub B'. Every ADS controller shelf has two separate LAN ports where 'port A' is connected to 'hub A' and 'port B' is connected to 'hub B'.

Depending on the size of the ADS node, either 24 or 48 port hubs are used. Use Table 2-19 to determine which hub is required. Fill in the number of each type of LAN-connected device. Then multiply that number by the rule for allocating hub ports to determine how many hub A and hub B ports are required for each type of LAN-connected device. If the total number of hub A or hub B ports is less than or equal to 23, order 24 port hubs. Otherwise, order 48 port hubs.

Lan-connected Device	Quantity of LAN-connected devices in node	Rule for allocating hub ports	Number of ports on hub A	Number of ports on hub B
X-terminal		1 port on either hub A or hub B		
Messaging Controller		1 port on hub A and 1 port on hub B		
Attendant Controller	2	1 port on hub A and 1 port on hub B	2	2
Storage Shelf	2	1 port on hub A and 1 port on hub B	2	2
Operations Cotroller	1	1 port on hub A and 1 port on hub B	1	1
Router (cust. supp.)		1 port on either hub A or hub B		

| **Figure 29. Table 2-19 Hub Port Allocations**

For each ADS node, order:

- one LAN bay (NTFX52BA)
- one MFSP (NTFX5510)

|

| • Two 24 port hub kits or two 48 port hub kits based on the calculation in Table 2-19.

| • one optional 24 port or 48 port hub kit.

- two -48 V, 500 W power inverter building blocks

- one optional modem shelf can be provisioned.

NOTE: The first modem shelf in a node must be located in the same controller bay as the operations controller shelf. A modem shelf in the LAN bay can only be the second or subsequent modem shelf in the node. Also, putting a modem shelf in the LAN bay limits the number of bays that can be supported in the node.

ROUTERS

Nortel does not supply or support routers in an ADS node. If routers are required, they must be selected, supplied and supported by the service provider.

Routers are required to interconnect up to two ADS Nodes, if required for remote message status query.

2.2.3.12 DMS Related Items for ADS

This section lists the ADS system impacts on the DMS in an existing office. This section provides more details for the DMS requirements that were briefly discussed in section " TMS/ETMS" on page 14-79 . These resources are required to be provided by the customer.

Messaging Controller Implications:

- 4 3-way conference bridges per 48 port MC
- 1 Operator ID per MC capture/delivery port and 1 Operator Team ID per ADS system (Billing region)
- 1 DTMF receiver per Gateway port (0+ only)
- 1 loop-around trunk (1 DS0- Channel per Message Controller) on the DMS-200 per MC for handoff of registered delivery calls from the Messaging Controller to an attendant. The loop-around trunk must be a InterToll (IT) to TOPS trunk which is configured to send and receive ANI.

Attendant Controller Implications:

- 1 Channel Bank to map each of the X.25 OIA links onto their respective DS-0 channels on a T1. Note that for TPC direct connect, this is only required if the AC and the TPC are remote. For connectivity via TMS, it is always required.
- 1 Channel Bank on the TPC side, to extract the X.25 signal from the DS-0, which may or may not have gone through a TMS. Note

that for TPC direct connect, this is only required if the AC and the TPC are remote.

- 2 56kb/s DSU in the TOPS AAE for V.35 connectivity per TPC.

- 1 HSDA card per TPC per pair of ACs. Note that for TPC direct connect, this is the HSDA card designated for ORDB access. For connectivity via the TMS, this is the HSDA card which carries all data PVCs between the TMS and the TPC (i.e. only one is required. It carries Call Control, DA and ORDB messaging).

Software and QMS Requirements:

- TOPS Operator ID: 1 per ADS voice channel

- ADS Team ID: 1 for the entire network. This must be unique throughout the entire network.

- Languages: ADS specific languages must be added to table TOPSLANG.

- Queues - Messaging Controller: 1 queue is required for all calls which are to be routed to the MC. This queue, called ADSMCQ, is datafilled in table QMSCQDEF.

- Queues - Attendant Controller: These are regular TOPS MP TOLL and Assist positions which have ADS capability. The queue requirement is specific to the individual office configuration.

  Minimally, one extra queue is required to handle ADS calls. This queue, can be called ADSATTQ, is datafilled in table QMSCQDEF.

  Depending on office requirements (e.g. queueing by language or time of day), there may be a requirement for more than one queue, serviced by different pools of operator with ADS capability.

- Call Type for Queueing (CT4Q) - Messaging Controller: Two new CT4Q are required for ADS. They are ADSAUTO and ADSXFER, datafilled in table CT4QNAMS.

- Call Type for Queueing (CT4Q) - Attendant Controller: This is dependent on the specific TOPS office QMS configuration. Minimally, 1 new CT4Q is required. More CT4Qs are required when refinements (e.g. language or time of day) become required.

- QMS Service: 1 QMS service is required for billing purposes. This is ADSACPT, datafilled in table TQMSSERV.

- Charge Adjust Type: 1 value in table CHGADJKY must be reserved for billing purposes. This value is to appear in the Charge Adjust record generated to record billing details.

For further details on datafill, see Cross-Reference Section.

2.2.3.13 400 Spec Items

| Spec writers should reference CAFX50BA (Cable Assembly) Drawing for the cables connecting the ADS to DMS. The following 400 Spec items are required for ADS:

Interline-up cables

- T Cables from ADS to TMS or Channel Bank/Digital Cross Connect
- Modem Cables to Channel Bank/Digital Cross Connect, Switched Data Network, Switched Voice Network, Dedicated Lines.
- Each Modem shelf will have up to two 25-pair cables.
- Alarm scan point cables from first NAV cabinet in lineup to DMS. The frame fail connection is mandatory, others are optional.
- External LAN cable for the router or other LAN equipment.
- ABS daisy chain cable.
- ABS to CPDC or to PDC. This cable is required for the first cabinet in lineup.
- BIX to standalone modem for printer and local modem connected terminal.

Miscellaneous Cabinet Hardware

- Power cables
- Floor mounts and shims. For Zone 4 installation, use kit NTRX2512. For others, use kit NTRX2509.
- End guards (see MSRX73 and MSRX07 documents)
- BIX Panel
- 4X25 pair BIX panel or equivalent. The BIX panel can be located anywhere in the Office.

2.2.4 Office Layout Information

ADS Message Node can comprise one (1) LAN Bay, one (1) Controller Bay and one (1) to six (6) additional Controller Bays. The line-up can start either from the left or right and additional Controller

Bays can be added to the end of the line-up, up to a total of six (6), with no disruption of service.

The maximum cable length for the RS232 interfaces between the Operations Controller and the Service Controllers is limited to 30ft (9m). This is a technical limitation for this type of signal.

2.2.5 Traffic Tables

ADS Traffic information is described in Section 2.4 Provisioning Considerations.

2.3 Product/System Specification

2.3.1 Physical Characteristics

ADS equipment is packaged in MODEL B cabinets which are 72 inches high, 28 inches deep and 28.5 inches wide. The cabinet is designed for both the concrete floor and raised floor applications. For overhead installations, the cable trough must be provisioned to be mounted at the top for cable support.

The Messaging Controller Shelves, Attendant Controller Shelves, Operations Controller Shelf,Storage shelves, as well as the OEM modems and networking equipment are mounted in the MODEL B cabinets. The shelves comprise of plug-in hardware modules that mount within a proprietary cage called the NAV (Network Applications Vehicle) shelf.

The MODEL B cabinets used by ADS have the following special requirements:

- Only one bulkhead is installed (at the left side when viewed from the rear).
- External (bulkhead) connectors for power are provided, as well as provisioned for power cable runs within the lineup.

2.3.2 EMI/Earthquake Information

The ADS equipment meets the FCC part 15B Class A specification for EMI in the United States, the DOR SOR 475.88 in Canada, and the emissions requirements of Bellcore TR-NWT-1089.

The ADS equipment remains operational when subjected to floor response spectra simulating Zone 4 earthquake loading for concrete floor installation (all levels) without additional bracing and for raised floor installation with subfloor structure.

2.3.3 Sparing Information

ADS product requires spares to be provisioned. These spares can be mounted in the Auxiliary or Modem shelves of the Spares Cabinet. The spares are partitioned into two (2) categories:

Category 1

All ADS components should follow this policy unless otherwise listed in Category 2.

- For every 1-3 similar components, one (1) spare will be provided.
- For every 4-10 similar components, two (2) spares will be provided.
- More than 10 similar components, three (3) spares will be provided.

Category 2

This category is for components that have a high MTBF or are non critical if a failure does occur. A single spare will only be required on a site basis. Components in this category are:

- Router/Bridge (Service Provider or Customer provided)
- Printer
- X.11 terminal

2.3.4 Power Feed and Fusing Requirements

Alternate ADS shelves are powered by -48V A and B feeds. The Cooling Shelf NTFX5805 is powered by both the -48V A and B feeds. Each feed requires a 30 amps fuse at the PDC or a 20 amps breaker at the CPDC.

A single 15 amps fuse at the PDC or 10 amps circuit breaker at the CPDC is required for the first MFSP and daisy-chained to subsequent cabinets.

Figure 30 on page 14-89 shows the power feed arrangement for ADS. Note that both the Modem shelf in the Controller Bay is powered from the both A and B feeds.

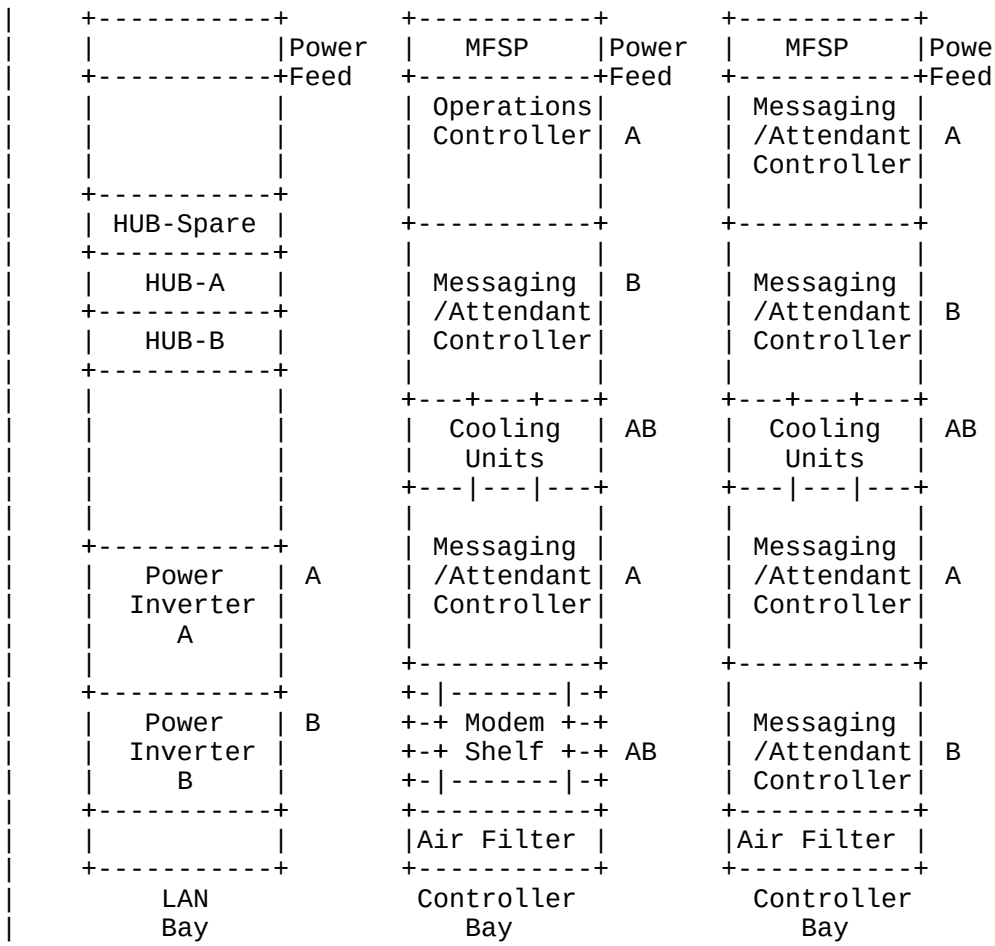


Figure 30. Power Feed Arrangement

2.3.5 Current Drain Information

The maximum internal temperature rise of cooling air from ambient is limited to 20 degrees Celsius. The thermal loading does not exceed 1 0 watts per square foot.

The followings are the thermal dissipation for NAV Base 2 shelves:

FSP	50 Watts
Cooling Unit	120 Watts
Operations Controller Shelf	230 Watts
Service Controllers	750 Watts (maximum)

Modem Shelf	10 Watts
Inverter	75 watts
Hub	50 Watts
Router	TBD

The service controller thermal dissipations depends on the configuration of the controller shelf.

2.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

2.4.1 Required Software Packages and Interdependencies

Select NAV base software and application specific software for each service type being provided. ADS consists of application layer software built on top of the NAV base software.

2.4.1.1 Packages required for all ADS service

Packages required for all ADS service

The following packages are required as a pre-requisites to providing any ADS messaging service:

In DMS:

OSB00001	Operator Services, Basic
EWSS003	EWS TOPS DA Subten TMS
ADVQ0001	Advanced Queueing
EWSS001	Enhanced Workstation Services

In VSN:

No VSN packages are required

In ADS NAV:

NAV software within the ADS00042 non-CM load (NCL) is divided into two development release units (DRU). ADS04 DRU contains the ADS application software. NAVBAS02 contains all the NAV Base 2 soft-

ware. The following lists the software within these DRUs that is required as a base set with all ADS sites:

ADS04 DRU

ADS10001	ADS1 Messaging
ADS20001	ADS2 Attendant (Optional)
ADS30001	ADS3 Operations
ADS40001	ADS4 Storage

The above software packages must be ordered for each hardware shelf being used for a specific function, for example, five messaging controller shelves require five ADS10001.

The following NAV Base software is required with each of the ADS functional groups listed above.

NAVBAS02 DRU

With each ADS10001 (ADS1 Messaging) order the following. Unless specified, the quantity required is 1:

NAV10001	General Controller Base (FG)
NAV10002	UNIX Base License - 187 Processor
NAV10003	Motorola pSOS+
NAV10004	Motorola pSOS+ License
NAV10005	Time Synchronization
NAV10006	Disk Monitor
NAV30009	Network Interface
NAV30010	Multi Channel Telecommunications Link
NAV30012	FVISR (qty. 2)
NAV30013	X.25 on T1 (qty. 2)
NAV30014	X.25 Retix License (qty. 2)
NAV30017	Interactive Voice MMVI (qty. 48)
NAV30018	Recognition MMVI (qty. 48)
NAV30019	Encoding MMVI (qty. 48)
NAV30049	FVR License (qty. 48)
NAV30053	Informix License (qty. 48)

With each ADS20001, (ADS2 Addendant) order the following. Unless specified, the quantity required is 1.

NAV10001	General Controller Base (FG)
NAV10002	UNIX Base License - 187 Processor
NAV10003	Motorola pSOS+
NAV10004	Motorola pSOS+ License
NAV10005	Time Synchronization
NAV10006	Disk Monitor
NAV30008	Digital Signal Processing

NAV30009 Network Interface
NAV30010 Multi Channel Telecommunications Link
NAV30013 X.25 on T1 (qty. 1)
NAV30014 X.25 Retix License (qty. 1)
NAV30053 Informix License (qty. 12)

With each ADS30001 (ADS3 Operations) order the following. Unless specified, the quantity required is 1:

NAV10001 General Controller Base (FG)
NAV10002 UNIX Base License - 187 Processor
NAV10005 Time Synchronization
NAV10006 Disk Monitor
NAV20001 Operational Controller-non optional software (FG)
NAV20002 NAV2 OC S/W Delivery
NAV20003 NAV2 OC Backup
NAV20004 NAV2 Informix OC License
NAV20007 NAV2 OC FVR Tokenizing Subsystem
NAV20013 NAV2 KERMIT License

With each ADS40001 (ADS4 Storage) order the following. Unless specified, the quantity required is 1:

NAV10001 General Controller Base (FG)
NAV10005 Time Synchronization
NAV10006 Disk Monitor
NAV20004 NAV2 Informix OC License

2.4.1.2 Packages required for 0+ service

For networks in which the DMS-200 is at software release TOPS05 and VSN is at VSN05, in addition to the software packages listed in “Packages required for all ADS service” on page 14-90 , 0+ audiogram service requires the following software:

In DMS200:

ENSV0013 ADS Offer of Service Prompt

In VSN:

VABS0001 ADS 0+ Gateway Screening 2

| For networks in which the DMS-200 is at or above software release TOPS06 and the Calling Card Services nodes is at or above ECC 1.03, in addition to the software packages listed in “Packages required for all ADS service” on page 14-90 , 0+ AudioGram service requires the following software:

| In DMS200:

| ENSV0014 Operator Services Advanced Intelligent Network

| For all networks:

| In ADS NAV:

| ADS10002 ADS1 0+ Audiogram Service (qty. 1 per 48 ports of service)
| ADS10005 ADS1 Auto Status Query (optional, qty. 1)
| ADS20001 ADS2 Attendant (qty. 1 per Attendant shelf)
| ADS20002 ADS2 OIA Gateway (optional, qty 1)

| 2.4.1.3 Packages required for 1+ and local service

|

ADS 1+ audiogram service requires DMS-100 software release NA02 or greater.

| In addition to the software packages listed in “Packages required for all ADS service” on page 14-90 , 1+ audiogram service requires the following software:

In DMS:

MDS00001 Call Messenger
|

| In ADS NAV:

| ADS10003 ADS1 1+/Local audiogram service (qty. 1 per 48 ports of service)
| ADS10005 ADS1 Auto Status Query (optional, qty. 1)

| 2.4.1.4 Packages required for Direct Access Intentional Audigram

| In addition to the software packages listed in “Packages required for all ADS service” on page 14-90 , Direct Access Intentional Audigram requires the following software:

| In DMS:

| No additional DMS-200 packages are required for Direct Access Intentional Audigram.

| In ADS NAV:

| ADS10004 ADS1 Intentional AudioGram (qty. 1 per 48 ports of service)
| ADS10005 ADS1 Auto Status Query (optional, qty 1)
| ADS20001 ADS2 Attendant (optional qty. 1 per Attendant shelf)
| ADS20002 ADS2 OIA Gateway (optional, qty 1 per Attendant shelf)

| 2.4.1.5 Packages required for Services Node Intentional

| In addition to the software packages listed in “Packages required for all ADS service” on page 14-90, u 2vices Node Intentional requires the following software:

| In Calling Card Service Node:

| In DMS:

| ENSV0014 Operator Services Advanced Intelligent Network

| In ADS NAV:

| ADS10002 ADS1 0+ AudioGram (qty. 1 per 48 ports of service)
| ADS10005 ADS1 Auto Status Query (optional, qty. of 1)
| ADS10007 ADS1 Services Node Intentional (qty. 1 per 48 ports of service)
| ADS20001 ADS2 Attendant (optional, qty. 1 per Attendant shelf)
| ADS20002 ADS2 OIA Gateway (optional, qty. 1 per Attendant shelf)

| 2.4.1.6 Packages required for Millennium Audiogram service

| In addition to the software packages listed in “Packages required
| for all ADS service” on page 14-90 , Millennium audiogram service
| requires the following software:

| In DMS:

| No additional DMS-200 packages are required for Millennium
| audiogram service.

| In ADS NAV:

| ADS10005 ADS1 Auto Status Query (optional, qty.1)
| ADS10006 ADS1 Millennium Audiogram Service (qty. 1 per
| 48 ports of service)

2.4.2 Software Usage Restrictions

None at this time.

2.4.3 Memory Provisioning

Not applicable.

2.5 Real Time Impact

Real time impact on the DMS 0+ Gateway running software required for ADS is less than 0.5 percent.

3.0 ECM708 - PowerView Tools (PVTL)

3.1 Overview

The PowerView Tools application (NCL = SMTL0001) is a set of software tools used in combination with a Macintosh computer and the MicroNAV or CO NAV to create a customization environment for the ACMS application. ACMS allows the service provider to provide network services to subscribers by transferring ACMS feature scripts to Analog Display Services Interface (ADSI) telephones. ADSI telephones running ACMS feature scripts display messages and softkeys which help subscribers use their CLASS features.

The ACMS Development kit (NCL=ACDK0001) is also available and includes the Advances Call Management Server (ACMS) Dialog, ACMS Vocabulary, and ACMS Generic Library to provide customized ACMS service. ACMS allows the service provider to provide network services to subscribers by transferring ACMS feature scripts to Analog Display Services Interface (ADSI) telephones. ADSI telephones running ACMS feature scripts display messages and softkeys which help subscribers use their CLASS features.

PowerView Tools is designed to complement ACMS, which is part of Nortel's ADSI product portfolio. The ADSI product portfolio also includes the PowerTouch/Vista 350 telephone, and the CLASS, CCF, and ADSI features on the DMS product line. It is a software package that allows service providers (telephone companies, enhanced service providers, and value added developers) to modify ACMS, and it can be used by Nortel to create custom ADSI interactive applications.

The key features of PowerView Tools are:

- easy development of custom dialogs, vocabularies, and library files
- ready-to-run execution environment
- support for interactive ADSI service
- support for ADSI feature downloads
- support for feature download script merge
- built-in operational support system (OSS) interface
- built-in operations, administration, and maintenance (OAM)

3.2 MacOS Tools

The customization environment consists of a set of software tools:

- Dialog Generator

- Voice-prompt Development System (VDS)
- ADSI Developer
- Transaction Manager

3.2.1 Dialog Generator

Dialog Generator is an icon-based service configuration tool that is used to develop interactive audio scripts for new audio services. This tool is used to customize telephony services that use audio announcements. It incorporates an intuitive, icon-based graphical user interface into a programming language that allows script designers to create dialogs faster than conventional linear programming methods. Dialog Generator runs on a Macintosh platform.

Dialog Generator icons support the following features and functionalities:

- play announcement
- collect caller's response (DTMF or speech recognition)
- branch, depending on caller input
- complete call
- hang up
- handle caller input errors
- log statistical events (OMs)
- generate logs and alarms
- repeat to specified place in call flow
- go to specified place in call flow
- collect information in buffers
- service simulation
- invoke non-Dialog Generator functions
- simple calculations and statistics gathering
- decision-making
- call completion / connect to operator

3.2.2 Voice-prompt Development System (VDS)

Voice-prompt Development System (VDS) allows the service provider to customize voice prompts and announcements according to specific

requirements of a given application. This tool provides the ability to create, manage, and update audio announcements for services such as directory assistance, intercept, and automated alternate billing services. It runs on a Macintosh computer, and has a simple, menu- driven user interface to facilitate feature access. The announcement files it creates can be used with Dialog Generator to modify the phone downloader portions of ACMS.

The input to VDS can be from a microphone, from an existing tape recording, or as digitized voice files in PCM. The output of the files can be in PCM, ADPCM, MP-LPC format. Additionally, PCM format supports mu-law encoding.

Recorded voice announcements can be edited to remove unwanted segments, such as noise or silence. The editing functionality is implemented through a graphical user interface, including a full waveform display of the announcement and cut-and-paste edit capability. Recorded voice announcements can be played back on the Macintosh to ensure the announcement is of sufficient quality for service deployment. The VDS software consists of:

- an audio digitizer, which allows users to input speech from an analog source, edit the digitized speech, and test the result with playback functions
- a vocabulary builder, which allows users to assemble the building blocks created by the audio digitizer into complete announcements. Gives a fast method of playing back stored speech files in announcement format, to test announcement prototypes before actually placing them online.
- communications software modules, which permit the transfer of announcements to MicroNAV
- system utilities, which are used for backing up and restoring the VDS database

3.2.3 ADSI Developer

ADSI Developer is an icon-based tool used to create, delete, edit, and manage ADSI feature scripts. ADSI Developer creates a library of feature scripts that an application can transfer to the ADSI telephone, depending on the subscribed features.

ADSI Developer is used to create individual scripts, each of which identify the features configured for a given subscriber. Depending on the application using the scripts, some of these features may be call forwarding, three-way calling, and automatic recall. ADSI Developer then compiles all the scripts into a library, which is accessed by the application to download a subscriber's feature information to an ADSI telephone.

3.2.4 Transaction Manager

Transaction Manager is used to integrate the products of VDS with MicroNAV.

Transaction Manager translates the files created with VDS tools into a format compatible with MicroNAV. The files are installed in a Vocabulary File System (VFS), which resides on MicroNAV and forms the framework for the storage of all voice prompts. Once files are stored in VFS, they can be accessed by callers or other applications running on MicroNAV and incorporated into larger services.

3.3 ACMS Development Kit

The ACMS Development kit is required when a customer wants to modify their ACMS offerings. ACDK includes the following:

- ACMS Vocabulary - the audio portion of the ACMS product
- ACMS Dialog
- ACMS Script Library

3.3.1 ACMS Vocabulary

Audio announcements are the voice prompts and messages heard by the end user during an ACMS call session. The source form of audio announcements are called vocabulary files. Vocabulary files are edited by the Voice-prompt Development System (VDS). Vocabulary files that are ready for deployment on an ACMS system are prepared by Transaction Manager.

3.3.2 ACMS Dialog

The source of a call flow is called a dialog. Dialogs are edited by Dialog Generator.

3.3.3 ACMS Generic Library

Phone scripts are the programming that is stored in an ADSI phone's memory. The source of the phone scripts are called scripts. They are edited by ADSI Developer. Phone scripts that are ready for deployment on an ACMS system are prepared by ADSI Developer which transforms them into a feature library file. Scripts from the feature library are downloaded into the end user's phone by the ACMS Application. The phone scripts are experienced by the end user as context sensitive displays and soft keys displayed on the phone during normal calling.

3.4 Hardware Provisioning

3.4.1 Hardware Usage Restrictions

Not Applicable.

3.4.2 Hardware Dependencies

PowerView Tools is dependent on Macintosh and MicroNAV/CO NAV hardware to provide PowerView Tools functionality.

3.4.2.1 Macintosh Platform Requirements

PowerView Tools run on an off-the-shelf Macintosh platform. It is the responsibility of the customer to obtain the correct hardware platform. Refer to Figure 31 for Macintosh hardware requirements for the PowerView Tools application.

Macintosh Platform Provisioning				
	Dialog Generator	ADSI Developer	Voice Dev. System	Transaction Manager
Operating System	System 7.5 or higher	System 7.5 or higher	System 7.5 or higher	System 7.5 or higher
RAM min. 4 Mbyte plus 4 to 31 additional	10 Mb	4 Mb	7 Mb	10 Mb
Disk Space	3.4 Mb	2.1 Mb	3.8 Mb	1.7 Mb
Processor (Optimal)	68030 or higher (PowerPC)	68030 or higher (PowerPC)	PowerPC	68030 or higher (PowerPC)
Monitors	20 IN. (min.)	17 IN. (min.)	14 IN. (min.)	14 IN. (min.)
Backup Size	1.4 Mbyte	1.4 Mbyte	100 Mbyte	100 Mbyte

Figure 31. Macintosh Platform Provisioning

3.4.2.2 File Transfer Provisioning

PowerView Tools can transfer files between a Macintosh platform and NAV or MicroNAV by any of the following methods:

- Modem
- DAT tape
- Network (NFS)
- Network (FTP)

The file transfer method must be selected specifically for each customer site. Figure 32 on page 14-102 lists the third-party hardware and software required for each communication method.

File Transfering Provisioning		
Communication Method	Required third-party software	Required third-party hardware
Modem	None Note: Kermit software supplied with NAV, MicroNAV and SMTL001.	Macintosh compatible modem with a minimum baud rate of 19200.
DAT tape	None Note: AudioTransfer Program is supplied with SMTL001.	Macintosh compatible DAT drive with a 4 mm DDS-60 tape cartridge.
Network (NFS)	MacOS 7.5 and a Macintosh compatible NFS package.	Macintosh Ethernet 10BaseT connector. This is standard on some Macintosh models.
Network (FTP)	MacOS 7.5 and a Macintosh compatible FTP package.	Macintosh Ethernet 10BaseT connector. This is standard on some Macintosh models.

Figure 32. File Transfering Provisioning

3.4.2.3 PowerView Test Beds

PowerView Tools create applications that will run on ACMS compatible NAV or MicroNAV platforms, but is itself Macintosh based. Nortel provides the customer several options when deciding which platform to use.

MicroNAV Development System

The ACMS ECM (ECM584) documents the requirements for a MicorNAV development system. The MicroNAV system can be used for small scale market trials and service prototyping. This development system includes a discounted price for ACMS lab license. They will be eligible for "lab level" discount pricing if they do not want to deploy services on their MicroNAV system. The typical MicroNAV test bed will be the 6/12 port system configuration.

Nortel highly recommends a MicroNAV development system for those customers who will be using PowerView Tools on a regular basis to customize their ACMS offering.

The MicroNAV hardware requirements are contained in the MICRONAV Engineering Manual Section. Refer to that section for provisioning information.

The peripheral hardware requirements are contained in the MICRONAV Engineering Manual Section. Refer to that section for provisioning information.

NAV Development Option

Most customers who purchase a NAV will keep it in service 24 hours a day. Any ACMS shelf in a NAV, however, will support applications created with PowerView Tools. Of course, while the NAV shelf is being used for development and test purposes, it is unavailable for end-user access.

3.4.2.4 P and C Side Port Requirements

Not Applicable.

3.4.2.5 DMS BUS Port Requirements

Not Applicable.

3.4.2.6 Circuits Per Card

Not Applicable.

3.4.2.7 Discrimination Numbering

Reference the NAV Base 003, ECM 699 for CO NAV discriminating numbering.

3.4.3 Provisioning Considerations

PowerView Tools comprises a development kit for Advanced Call Management Server (ACMS) which provides a customization environment for selected components of the ACMS source code. The customized parts of the ACMS application run on an ACMS platform. The ACMS platform runs on central office (CO) NAV or MicroNAV hardware. PowerView Tools runs on an Apple Macintosh computer

SMTL0001 is the NCL which contains the Macintosh tools and ACDK0001 is the NCL which contains the ACMS Source Dialog, Vocabularies and Generic Library Scripts. This software with MicroNAV or NAV hardware will allow customers to customize parts of the ACMS application.

3.4.3.1 System Interfaces

PowerView Tools communicates with the ACMS MicroNAV or CO NAV via the MacOS platform using a TCP/IP protocol connection.

3.4.4 Office Layout Information

Not Applicable.

3.4.5 Traffic Tables

Not Applicable.

3.5 Product/System Specification

3.5.1 Physical Characteristics

Not Applicable.

3.5.2 EMI/Earthquake Information

Not Applicable.

3.5.3 Sparing Information

Refer to the referenced MICRONAV Engineering Manual Section.

3.5.4 Power Feed and Fusing Requirements

Not Applicable.

3.5.5 Current Drain Information

Not Applicable.

3.6 Software Provisioning

3.6.1 Required Software Packages and Interdependencies

The software packaging associated with PowerView Tools is compatible with the non-computing module (non-CM) software product definition process. Under the non-CM process, each Nortel software product is packaged into a non-CM load (NCL). An NCL is composed of functional groups, each residing on one or more software loading tapes. Functional groups can be optional or non-optional. A functional group is composed of a set of functionalities.

3.6.1.1 Software Packages Required For Power Tools Development

Software for PowerView Tools comprises two (NCLs):

- SMTL0001, which contains the development release unit (DRU) STAPP01.
- ACDK0001, which contains the development release unit (DRU) STDEV01.

Optional functional groups and/or functionalities in both DRUs are ordered based on customer needs for using PowerView Tools to customize ACMS. An existing ACMS MicroNAV system or CO NAV service controller shelf is required to run the customized ACMS application. PowerView Tools does not contain the ACMS application.

In the Software Quantity column, MacOS indicates the Macintosh platform used for PowerView Tools. The Common (PST60001) functionality for PowerView Tools is ordered based on the number of MacOS platforms the customer plans to use for PowerView Tools deployment.

STAPP01 DRU Software Options

Non-CM order code	Description	Quantity
PST30001	ADSI Developer (optional)	N/A
PST40001	Dialog Generator (optional)	N/A
PST50001	VDS (optional)	N/A
PST60001	Common (3rd part licenses - always required if a STAPP01 DRU functionality is ordered)	1 per MacOS

STDEV01 DRU Software Options

Non-CM order code	Description	Quantity
PST70001	Source (optional)	N/A

N/A: These items are not ordered by quantity but by answering 'Y' or 'N' next to the functional group in the SOLID ordering tool.

3.6.2 Software Usage Restrictions

SMTL0001 and ACDK0001 are restricted to use with NAV Base002 software.

3.6.3 Memory Provisioning

Not Applicable.

3.7 Real Time Impact

Not Applicable.

4.0 ECM807 - Intelligent Peripheral/Media Resource Unit

4.1 Overview

Product/System Overview

Within emerging intelligent network architectures, services are deployed by means of a well-defined set of network components. Each component plays a specialized role in the overall enhanced services platform. The fundamental components of an intelligent network platform include a switching network, a computing environment where the service logic may reside, and a combination of media resources, such as databases and voice resources.

This document uses the term External Control Unit (ECU) to refer to these external computing entities. Some examples of an ECU are SCPs in AIN architecture, Bellcore's Integrated Service Control Point (ISCP) and the NAV Service Control Unit (SCU).

Simple services may be implemented by providing a mechanism through which the switch resources may be controlled by means of externally defined service logic. This is the case in an advanced intelligent network (AIN), where the service control point (SCP) can influence the flow of the call within the switch based on the service logic and customer data stored in its database.

As the created services become more and more complex, there is a need to interact with the caller by using more sophisticated media resources than those available in the switch. The IP/MRU provides this capability by means of a well-defined set of service-independent building blocks (SIBBs), and protocols with which to invoke the SIBBs.

The IP/MRU supports a number of protocols for communicating with other network components. Voice connectivity is available by means of standard T1 links, primary rate interface (PRI), or SS7 trunks. Media control is provided by means of:

- GR1129, which is a Bellcore protocol for communication between a service switching point (SSP) and an intelligent peripheral (IP) in an AIN architecture. When GR1129 is used, there is no direct connection between the SCP and the IP.
- SR3511, which is the a Bellcore protocol defining the interface between an ISCP and an IP and is also used between other ECUs and the IP/MRU

The IP/MRU provides

- interactive voice response (IVR) capabilities, which include playing announcements and collecting DTMF input

- the ability for an end user to record announcements
- call processing-related capabilities, which include initiating outgoing calls and bridging calls at the switch or within the IP/MRU
- small vocabulary speaker independent speech recognition

Tools for the service design environment are available through Nortel's Voice Prompt Development System (VDS) and Dialog Generator. These tools allow the service provider to define composite SIBBs which run on the IP/MRU. Portions of a service definition can be moved from the ECU to the IP/MRU, which can potentially improve performance and promote the reuse of proven functionality.

The long term purpose of the IP/MRU is to provide the foundation for the evolution of Nortel's media resource capabilities in both AIN and non-AIN markets. As NAV technology evolves, the IP/MRU will continue to take advantage of NAV capabilities by incorporating them into the set of SIBBs available for service deployment.

The NAV IP/MRU addresses a number of North American market opportunities:

- any network with existing ISCP can take advantage of the SR3511 interface on the NAV IP/MRU for existing services while using the GR1129 interface for new services.
- networks using programmable switches such as the DMS250 can deploy intelligent network services using the NAV IP/MRU with an SR3511 interface and a NAV based SCU.

4.1.1 Service Description

Intelligent Peripheral/Media Resource Unit (IP/MRU) is a component of an intelligent network which provides advanced media processing capabilities used to interact with callers over the public telephone network. It provides remote access to well- defined service-independent building blocks (SIBB) to enable interaction with callers. Each building block is an independent function that can be incorporated into existing services, based on the requirements of the service application.

The IP/MRU can be a component of the following architectures:

- Advanced Intelligent Network architecture
- Non-AIN distributed Programmable Services Architecture

4.1.1.1 Advanced Intelligent Network architecture

In an AIN architecture, the IP/MRU can be a component of

- AIN 0.2 with GR1129 interface to the Service Switching Point (SSP)
- pre-AIN 0.2 with SR3511 interface to the Integrated Service Control Point (ISCP)

AIN 0.2 with GR1129 interface to SSP

In an Advanced Intelligent Network (AIN), the IP/MRU plays the part of the Intelligent Peripheral (IP). In an AIN, the switch is referred to as a Service Switching Point (SSP). The service logic resides on the Service Control Point (SCP). There is no direct connection between the SCP and the IP. Instead, commands from the SCP are routed from the SCP to the IP by means of the SSP. The protocol between the SSP and the IP is GR1129 which runs over NI-2 PRI. Figure 1 shows the AIN architecture.

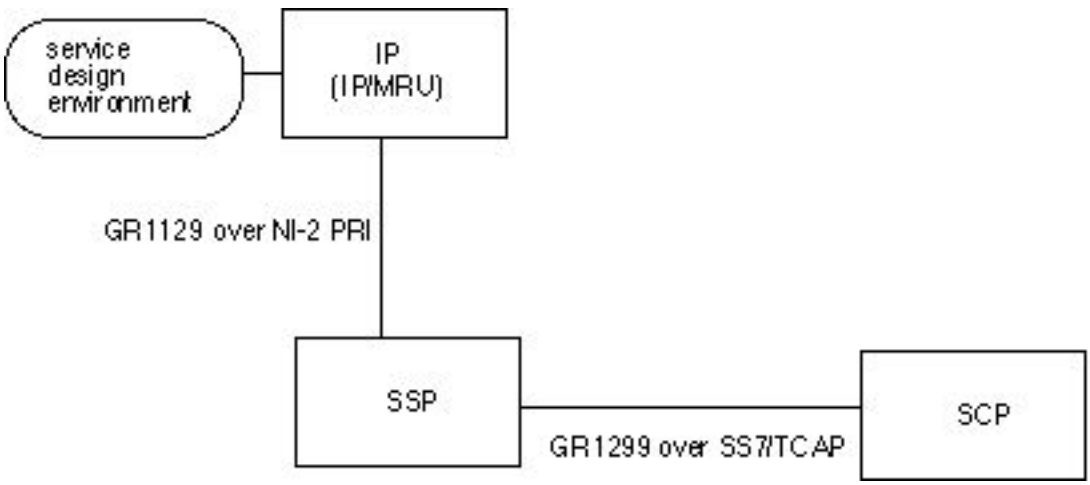


Figure 33. AIN ARCHITECTURE

As with the programmable switch architecture, the switch, in this case the SSP, reaches a trigger point. The SSP notifies the SCP of the call and waits for instructions. The SCP then drives the interaction with the user. In the AIN architecture the SSP remains in control of the call from a call processing perspective within a well-defined call model.

Pre-AIN 0.2 with SR3511 interface to ISCP

Bellcore has defined an architecture which is very similar to the AIN architecture. It includes their SCP called the ISCP, a SSP and an IP. The IP/MRU can play the role of the IP in this archi-

tecture. To do this, the IP/MRU supports the SR3511 protocol. This protocol is loosely based on the GR1129 protocol. Unlike GR1129 however, SR3511 requires a direct connection between the ISCP and the IP. This is shown in Figure 2.

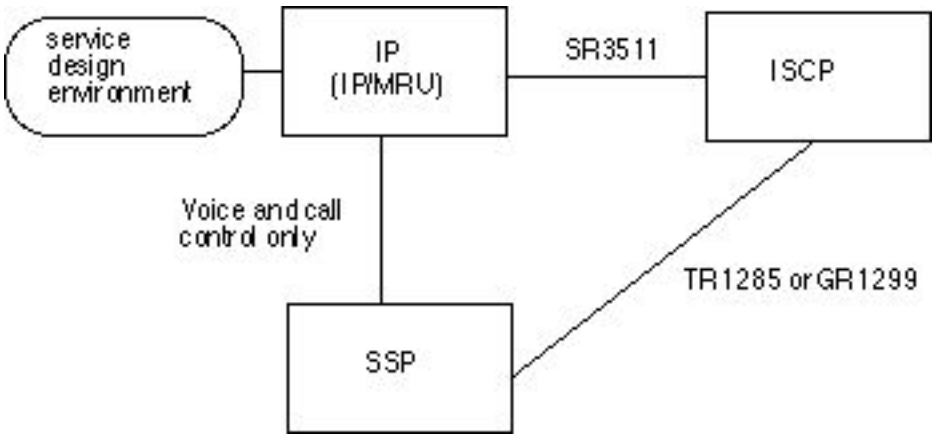


Figure 34. ISCP NETWORK ARCHITECTURE

The high level call flow for the ISCP architecture, for the case where the call is presented to the ISCP by the SSP, is as follows

- Incoming call reaches the initial trigger point.
- SSP relinquishes control of the the call to the ISCP
- ISCP requests that a connection be made to IP/MRU
- SSP presents the call to IP/MRU
- IP/MRU sends request for instructions to ISCP
- ISCP requests function from IP/MRU (for example, play)
- IP/MRU returns result of function to ISCP (for example, done)
- SSP releases the connection
- IP/MRU releases connection

The high level call flow for the ISCP architecture, for the case where the call is first presented to the IP/MRU by the SSP, is as follows:

- Incoming call reaches the initial trigger point
- SSP presents call to IP/MRU
- IP/MRU sends request for instructions to ISCP
- ISCP requests function from IP/MRU (for example, play)

- IP/MRU returns result of function to ISCP (for example, done)
- SSP releases the connection
- IP/MRU releases connection

Non-AIN distributed Programmable Services Architecture

The IP/MRU can be deployed in a programmable services architecture. One example of such an architecture uses Nortel's DMS-250 as the programmable switch and the NAV Service Control Unit (SCU) as the ECU. In this architecture, the ECU controls the call.

Figure 3 shows a simple programmable services architecture with the IP/MRU as an integral component. Note that there may be multiple instances of each network element.

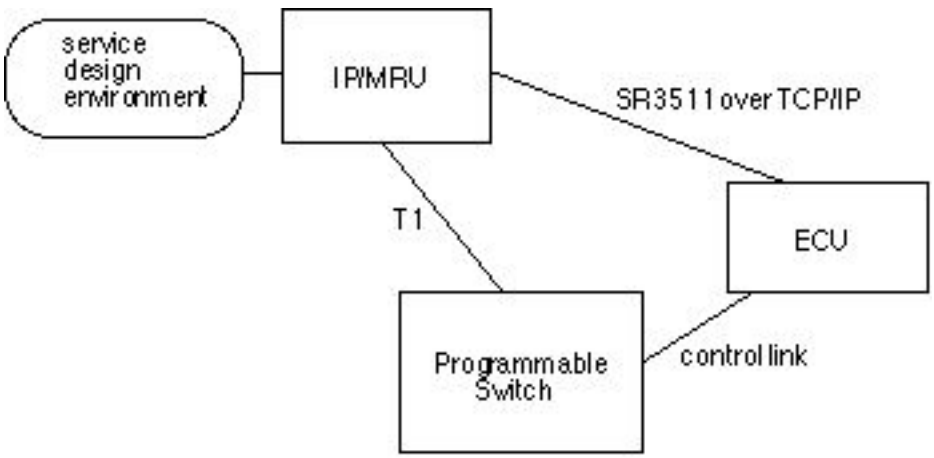


Figure 35. PROGRAMMABLE SERVICE ARCHITECTURE

The following example is provided to illustrate the role of the IP/MRU in the programmable services architecture.

- As a call is routed to a programmable switch, initial triggering capabilities in the switch determine whether call processing control is handed off to an external component.
- A message containing the call characteristics is sent to the external control unit (ECU). The ECU determines which service is to be provided, and executes the service logic based on its specification within the ECU.
- The control link between the programmable switch and the ECU is determined by the switch vendor.

- If the IP/MRU is required, the ECU instructs the programmable switch to connect the call to the IP/MRU. When the IP/MRU receives the call over the T1 connection, this is indicated to the ECU. The IP/MRU waits for instructions from the ECU over SR3511.

- Once a call has been established, a series of SIBBs are invoked by the ECU. Upon completion of the execution of each SIBB, the IP/MRU waits for further instructions from the ECU. The service logic, along with all control of the media resources, is under the control of the ECU. The IP/MRU has a mechanism that allows connection by specific ECUs. The IP/MRU passively provides access to its resources and services to the specific ECUs. The ECU may request that the IP/MRU connection be terminated, or it may request that other SIBBs be executed on the same call.

4.1.1.2 Stand-alone architecture

The IP/MRU is able to run services that are not controlled using a control protocol. These services, which consist of a dialog, are said to run in stand-alone mode. The IP/MRU allows stand-alone services to be configured in the DN to Service Mapping table. This table maps called numbers to services. When a call is received, the IP/MRU looks up the called DN in the DN to Service Mapping table. If it is found, the appropriate dialog is invoked. If the DN is not found in the table and the IP/MRU shelf is also configured to handle SR3511 calls, the call is assumed to be an SR3511 call. Stand-alone services cannot be run on controllers that have been configured for GR1129. Any of the supported switch connectivity protocols can be used by controller shelves running in stand-alone mode.

4.1.2 IP/MRU functionality

The following section describes the functionality available on the IP/MRU. Not all functionality is available through each of the protocols supported by the IP/MRU.

4.1.2.1 Announcement types

The IP/MRU supports the following announcement types:

- system announcements
- transient announcements
- user announcements
- digit announcement segments

Any announcements can be concatenated to build the desired announcement.

The difference between the announcement types is the way in which they are recorded and managed.

System announcements

System announcements are recorded by the service provider and stored on the IP/MRU to be played as part of the interaction with the end user. These are typically defined as part of the service definition as fixed portions of the user dialog. System announcements are referenced during the service execution and are played to the end user. These announcements are persistent on the IP/MRU from one call to the next.

System announcements can be recorded in the following ways:

- using Nortel voice services: Nortel works with the customer to define a set of customized announcements required for service deployment on the IP/MRU. These are permanent announcement segments which are recorded by Nortel, in close consultation with the customer, and are delivered to the IP/MRU for deployment on the system.

- using other voice service providers: voice prompts recorded by other voice service providers using any of the following formats can be transferred to the VDS system for editing and management:
  - Audio Interchange File Format (AIFF), which is the Macintosh standard format
  - ADPCM, which is a compression format
  - ADPCM without header
  - MuLaw PCM, which is a compression format
  - MuLaw PCM without header
  - Waveform, which is the Windows standard format
  - MPLPC, which is the NAV compression format

- using Nortel's Voice Prompt Development System (VDS): the customer purchases VDS, a Macintosh-based tool for recording and editing announcements

Transient announcements

Transient announcements are deleted from the system at the end of the call in which they were recorded. For example, a transient announcement may be the caller's name, where this announcement segment is concatenated with system announcement segments or user announcement segments to specify to the called party the identity of who is calling.

User announcements

User announcements are recorded and deleted by users during calls, and are accessible beyond the scope of a single call. An example of a user announcement is a message in a voice mail system.

Digit announcement segments

Digit announcement segments provide specific functionality for handling the speaking of digits by the IP/MRU, in a single language. The only language for which digit rules have been defined is North American English. The IP/MRU inserts proper intonation and announcement segments to produce the appropriate announcement.

Digits may be spoken with any one of the following interpretations:

- digit string, consisting of a simple list of digits
- telephone number
- money, with the words "dollar(s)" and "cent(s)" inserted as required.
- date, consisting of the calendar date with day, month and year.
- time of day, consisting of the hours and minutes in a 12 hour format.

4.1.2.2 Managing announcements

The following capabilities are available on the IP/MRU for managing user announcements:

- record announcement, which allows transient and user announcements to be recorded over the IP/MRU voice connections. Transient announcements are stored in RAM and user announcements are stored to the local file system.
- store user announcement, which allows announcements to be copied from the local file system to a remote file system. This is required in order to provide a high level of data integrity.
- retrieve announcement, which allows an announcement to be prepared for subsequent playing. The IP/MRU copies the announcement to the local file system in order to minimize potential delays when the announcement is played.
- delete announcement, which allows user announcements to be removed from the system. Note that the IP/MRU does not delete a user announcement until it is explicitly instructed to do so.

4.1.2.3 Playing announcements

The IP/MRU is capable of playing announcements which may be made up of a concatenation of several smaller segments. These segments

may be different announcement types. Each segment may be either interruptible or not by DTMF input.

4.1.2.4 DTMF collection

DTMF collection is available when prompts are being played, speech is being recorded, or speech recognition is taking place. When DTMF is detected, the action being performed by the IP/MRU is typically stopped unless the action is playing a non- interruptible prompt. These announcements are allowed to complete before any action is taken.

The way in which the DTMF is collected is protocol-specific.

4.1.2.5 Speech recognition

Flexible Vocabulary Recognition (FVR) is available on the IP/MRU. FVR is speaker-independent phoneme-based speech recognition technology.

FVR models and vocabularies need to be fine-tuned in order to achieve optimum performance of a newly deployed service. The tuning occurs on the basis of data collected during the initial weeks of service deployment. This data collection, called tokenizing, is performed automatically on NAV and archived on tape. The collected tokens are analyzed off-line by Nortel speech specialists and the updated models and lexicons are fed back into the FVR system.

The default vocabulary supported by the IP/MRU are the English words "yes" and "no". Since this will not meet the requirements of most services requiring speech recognition, Nortel will work with customers to develop appropriate vocabularies.

4.1.2.6 Call processing capabilities

The IP/MRU provides the following call processing capabilities:

- incoming call notification, which notifies the ECU that an incoming call has been received at the IP/MRU.
- initiate call, which initiates calls from the IP/MRU to a specified directory number (DN).
- join, which bridges two calls within the IP/MRU. Both calls must already be in the same call context, and either two outgoing calls or an incoming and an outgoing call.
- The following call processing capabilities are supported when the IP/MRU is connected to an MTX switch by means of SS7/ISUP:
  - confirmed bridge and release, which connects tan incoming and an outgoing call at the switch. Once the called party has answered, the application has the opportunity to play prompts

to either the calling or called parties before the IP/MRU drops out of the call.
- non-confirmed bridge and release, which is similar to the confirmed bridge and release except that when the called party answers, the IP/MRU is dropped from the call. The application is not given the opportunity for additional caller interaction.
- blind transfer, which transfers a call to a specified DN. After a blind transfer has been initiated, the IP/MRU is no longer involved in the call.

4.1.2.7 Connectivity options

IP/MRU supports several connectivity options to switches:

- T with inband E and M signaling
- SS7/ISUP with Release Link Trunk (RLT) for MTX
- NI-2 PRI
- NTNA PRI

The connectivity options available are protocol-dependent. Table 1 shows the connectivity options available with GR1129 and SR3511. A Y indicates that the option is available, and an N indicates that the option is not available.

Table 1. Connectivity options available with GR1129 and SR3511

Connectivity option	SR3511	GR1129
T1 with inband E and M signaling	Y	N
SS7/ISUP	Y	N
NI-2 PRI	Y	Y
NTNA PRI	Y	N

The connectivity used impacts the call processing capabilities available. For example, the bridge and release capabilities are not available if T1 with inband E and M signaling is used.

4.1.2.8 Dialogs

The IP/MRU provides an execution environment for the dialogs created using Nortel's DialogGenerator. DialogGenerator is a Macintosh-based point-and-click interface that provides access to various actions (building blocks) and control primitives. The dialogs can be invoked from the ECU.

One reason to create dialogs is to reduce the amount of interaction between the IP/MRU and the ECU, thereby reducing network traffic and improving user response time. The use of dialogs may also increase reuse between services. For example, a dialog could be created which prompts the user for a speech response. The dialog could handle all of the error handling such that a response is only sent to the service application once there has been a successful recognition response or it is time to give up trying.

4.1.2.9 Error handling

Within the IP/MRU SIBBs, all user and ECU interaction anomalies are detected and recovery procedures are invoked.

In the case of interaction with the user, examples of error conditions which are detected include no input, invalid input, unrecognized input, spoke too soon, spoke too long, and connection terminated. Each of these conditions is detected and can be handled in some predetermined manner as specified in the appropriate IP/MRU SIBB. In addition, DialogGenerator provides the ability to specify how each of these conditions are handled, for example, re-prompt with announcement up to a maximum number of times, play error announcements, or terminate dialog.

For interaction with the ECU, all communications are monitored and if no response or an inappropriate response is returned, the IP/MRU automatically initiates recovery procedures. This can mean re-attempting the failed interaction (for example, re- sending the original message) or abandoning the interaction and providing the user with an appropriate response to indicate that the service is not currently available. All errors which cause an action to be abandoned automatically by the IP/MRU are logged.

4.1.3 Service-independent building blocks

The functionality provided by the IP/MRU is bundled into protocol-specific SIBBs which are then made accessible to remote service applications by means of protocols. In MRU002, SR3511 and GR1129 are available.

Table 2 indicates what functionality is available for each of these protocols. A Y indicates that the functionality is available; a N indicates that the functionality is not available

Table 2. SIBB Availability		
Functionality	SR3511	GR1129
Play announcement	Y	Y
DTMF collection	Y	Y
Speech recording (user and transient)	Y	N
Digit verification	Y	N
Store user announcement	Note 3	N
Retrieve user announcement	Note 3	N
Delete user announcement	Y	N
Speech recognition	Y	N
Outgoing call	Y	Note 2
Join calls	Y	N
Bridge and release	Note 1	Note 2
Blind transfer	Note 1	Note 2
T1 with inband E and M signaling	Y	N
SS7/ISUP	Y	N
NI-2 PRI	Y	Y
NTNA PRI	Y	N
Dialogs	Y	N

Note 1: not available if using T1 with inband E and M signaling to connect to the switch

Note 2: not applicable for GR1129 because bridging can be performed directly on the switch by the service application

Note 3: not available by means of the protocol. The system will perform these actions automatically.

4.1.4 Service Groups

It may be desirable to run different service mixes in different shelves of a single IP/MRU node. Possible reasons for doing this include:

- different hardware requirements
- different connectivity requirements

- provisioning of shared resources such as disk and RAM

To allow this, the IP/MRU supports the concept of service groups. Service groups are customer-managed shelf groups. A shelf group is a concept supported by the NAV base which allows a number of controllers to be treated in the same way. For example, there is a shelf group which contains all of the IP/MRU media controllers. The installation procedures use this shelf group to determine to which controllers to download the IP/MRU files. Service groups are used to determine to which controllers to download VFS and POF files.

The IP/MRU allows customers to define service groups and add controllers to or remove controllers from service groups. A service group may consist of one or more services. If more than one service is grouped into a service group then all of the services in that group will be managed together; there is no mechanism to allow them to be separated at a later time should it be decided that they should no longer be in the same media controllers. Therefore the recommended, and most flexible approach, is to define a service group for each service.

Each service group may be deployed on one or more media controller shelves. A group of media controllers running the same mix of service groups is referred to as a subnode.

Table 3 illustrates how the following services might be deployed in the media controller shelves within an IP/MRU node:

- Debit Card
- Sim Ring
- Voice Mail
- Call Center 1
- Call Center 2

Assume the customer provisioned a system and decided to run Debit Card and Sim Ring in one subnode consisting of two media controllers, the two call center services in one subnode consisting of three media controllers and the Voice Mail service in its own subnode consisting of four controllers. Assume the media controllers are named MC1 through MC9.

Using the recommended approach of defining a service group for each service each of these services would also be the name of a service group.

Table 3. Service group deployment in media controllers	
Service Group	Media Controller
Debit Card	MC1, MC2
Sim Ring	MC1, MC2
Voice Mail	MC3, MC4, MC5, MC6
Call Center 1	MC7, MC8, MC9
Call Center 2	MC7, MC8, MC9

Figure 4 shows the service groups and subnodes in the above example

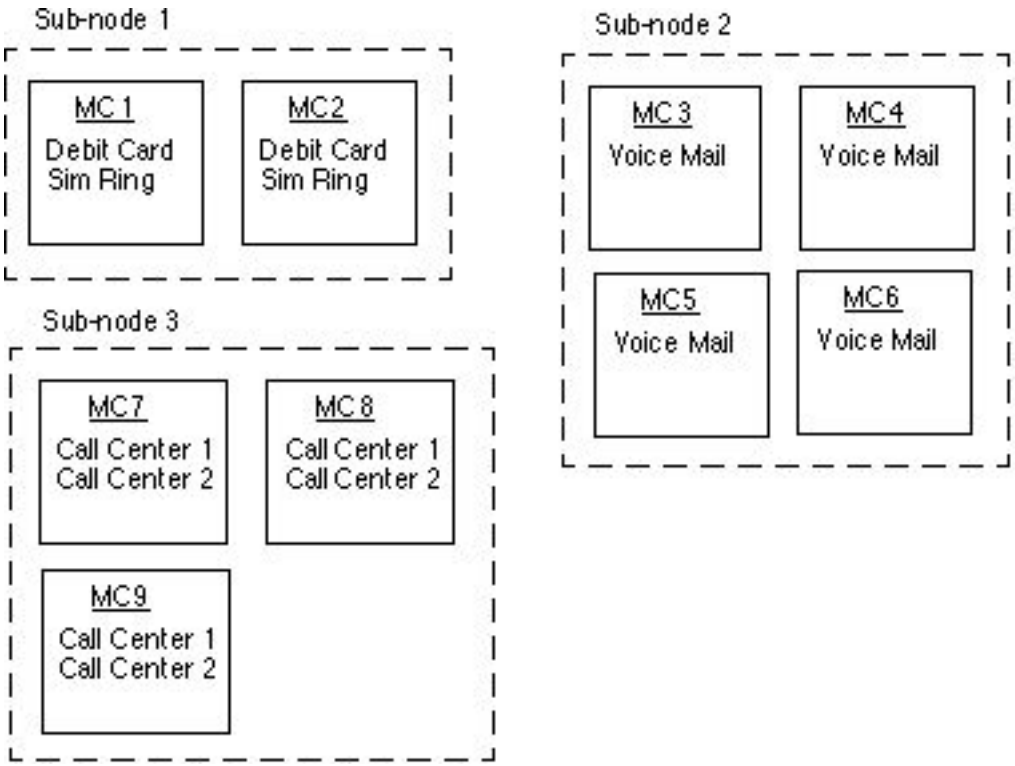


Figure 36. EXAMPLE OF SERVICE GROUPS AND SUB-NODES

4.1.5 User perspective

The following summarizes the services and functionality available to each class of user that interacts with the IP/MRU.

4.1.5.1 Caller perspective

The caller interacts with the IP/MRU through dialogs, which consist of the caller providing input to be collected by the IP/MRU for interpretation, and the IP/MRU providing feedback to the caller.

The services provided by the IP/MRU must allow access to the variations of input and feedback techniques in such a way that these can be strung together to form a seamless, natural dialog between the caller and the IP/MRU.

Caller input

The IP/MRU supports caller input to be provided by the following mechanisms:

- call context, such as the dialed number, which is provided by the switch and ECU with the call, upon call presentation to the IP/MRU
- DTMF tones, which are input by the user at specified points in the service flow
- speech segments, which are spoken by the user at specified points in the service flow

Caller feedback

The feedback to the caller is typically provided by means of voice recorded announcements that are played back to the caller at the appropriate points in the service flow. These announcements can provide information, status of actions that have taken place, or can request further input from the user. They can also be voice messages recorded by other users of the system.

The feedback to the caller may also be implicit, through action which takes place as a result of the response being sent to the ECU. For instance, some database update may have taken place by means of the ECU, or the call may be re-routed to an alternate destination based on the user's interaction.

4.1.5.2 Service provider perspective

Within the service provider's environment, there are two classes of users who will interact with the IP/MRU:

- service designer and manager, who are responsible for defining new services using VDS and DialogGenerator, which are available as part of Nortel's tool set.
- administrator and craftsperson, who is responsible for the operations, administration, and maintenance (OAM) of the IP/MRU as a network element

Service designer and manager perspective

The service designer and manager create and manage the service data. Service data consists of voice announcements and dialog specification files.

The service designer and manager must have the ability to create voice announcements and be able to tailor these to the specific service being defined. The service designer and manager must also have the ability to create dialogs.

The following tools are used by the service designer and manager:

- DialogGenerator, which is an icon-based dialog creation tool
- Voice Prompt Development System (VDS), which is a set of software tools that provides the user with complete control over announcement prompts. The user can record, edit, and manage announcements.
- TransactionManager, which translates the audio files created with the VDS software tools into a format compatible with the IP/MRU.

Administrator and craftsperson perspective

From the point of view of the administrator and craftsperson, access to the system is by means of standard NAV OAM capabilities. This is a series of Motif-based graphical user interfaces (GUIs) which provide access to the OAM subsystems necessary to administer the system.

Incremental functionality has been added to the OAM capabilities available on the IP/MRU to be able to properly administer the interaction with the ECU. This includes the following administrative user interfaces:

- Message Storage, which allows an administrator to specify the storage locations of user messages recorded by the IP/MRU
- DN to Service Mapping, which allows an administrator to specify the called DNs that will map to stand-alone services
- Shelf Group Management Interface, which allows an administrator to configure new services and indicate on which media controller shelves they are to run
- Dialing Plan User Interface, which allows an administrator to define a local table to perform digit verification using the dialing plan format comparison method
- Protocol-specific configuration, which allows an administrator to specify datafill used for SR3511 and GR1129
- A few miscellaneous parameters, which are required on a shelf basis, have been placed in a separate UI

4.1.6 Open interfaces

The IP/MRU uses the following industry-standard interfaces:

- T with inband E and M signaling
- NTNA PRI to DMS-100
- NI-2 PRI
- SS7/ISUP with Release Link Trunk (RLT) for MTX
- SR3511 versions 4 and 5
- GR1129
- IEEE 802.3 Ethernet for internal data communications, ECU and terminals
- RS-232 for internal maintenance communications, printers, terminals, and modems

4.1.7 LAN and WAN networking

With the exeption of the way in which the OSI protocol applies to the IP/MRU, the LAN and WAN networking for IP/MRU is identical to NAV LAN and WAN networking. Table 4 shows how the OSI protocol applies to the IP/MRU.

Table 4. IP/MRU network protocols

OSI layer	IP/MRU LAN protocol layer
Application	SR3511
Presentation	ASN.1
Session	Null
Transport	TCP
Network	Internet Protocol (IP)
Datalink	IEEE 802.2
Physical	IEEE 802.3 10 BaseT

4.1.8 The IP/MRU Node

The IP/MRU functionality is provided by an IP/MRU Node, which runs on NAVB005. An IP/MRU Node consists of one to 24 controller shelves, which are media controllers or SS7/ISUP controllers, linked by common operations, administration, and maintenance (OAM) on an operations controller shelf. Each media controller shelf has 96 ports. Each IP/MRU Node supports 96 to 2304 ports.

4.1.8.1 Network connectivity

The IP/MRU is integrated into the service provider's network. It uses standard interfaces, such as T1, and IEEE 802.3 to connect to

- service provider switching equipment, such as a Digital Multiplex System (DMS)
- an external control unit (ECU), for example, an Integrated Service Control Point (ISCP)

4.1.8.2 Hardware architecture

The IP/MRU uses NAV hardware. An IP/MRU Node consists of

- one LAN bay, which contains hubs, power inverters, and one optional modem shelf
- one or more controller bays, which contain media controller shelves, an operations controller shelf, SS7/ISUP controller shelves or modem shelves
- one or more spares bays, which contain auxiliary shelves, MFSP shelf assembly, cooling assembly, or a modem shelf

All IP/MRU equipment is packaged in Nortel's C28 Mod B cabinets designed for central office compliance.

The exact contents of a bay depend on the type of bay, and on the size of the system.

Figure 5 provides an example of a small IP/MRU Node. A small IP/MRU Node consists of a controller bay and a LAN bay. The controller bay contains an operations controller shelf and up to three media controller shelves. The small IP/MRU Node is scalable from 96 to 288 ports depending on the functionality being provided.

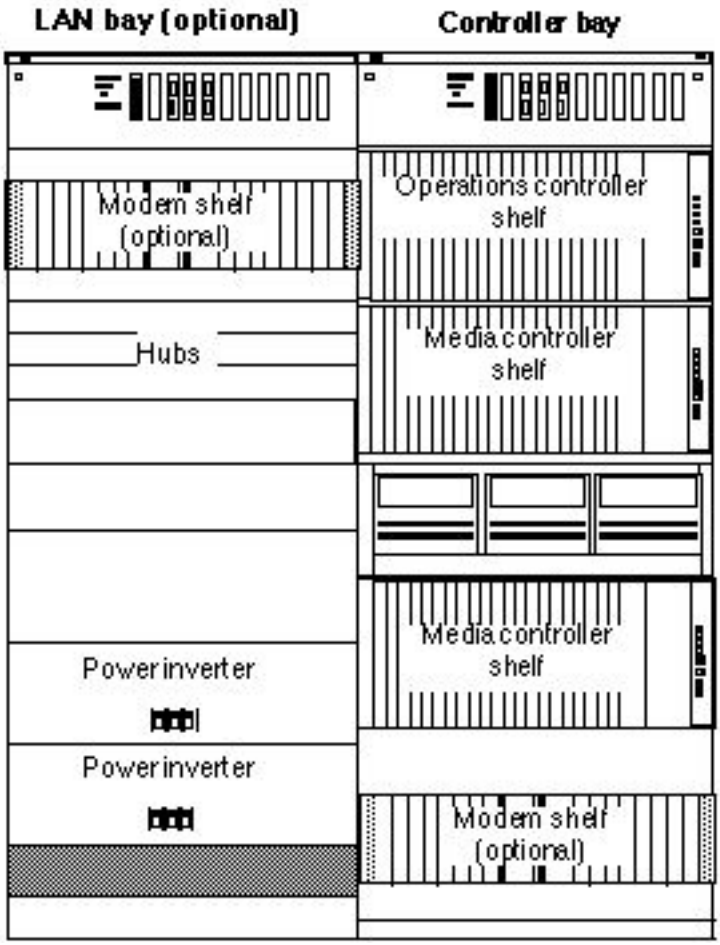


Figure 37. EXAMPLE OF A SMALL IP/MRU NODE

Figure 6 shows an example of a large IP/MRU Node. A multiple bay IP/MRU Node consists of as many as seven controller bays and a LAN bay. The controller bays contain one operations controller shelf, multiple media controller shelves, two SS7/ISUP controller shelves and two modem shelves. The SS7/ISUP controller shelves, a SS7 switchbox and a modem shelf are provided in a controller bay known as the SS7 Server Bay. The SS7 Server Bay has a fixed configuration. A multiple bay IP/MRU Node can be scaled to provide up to 2304 ports.

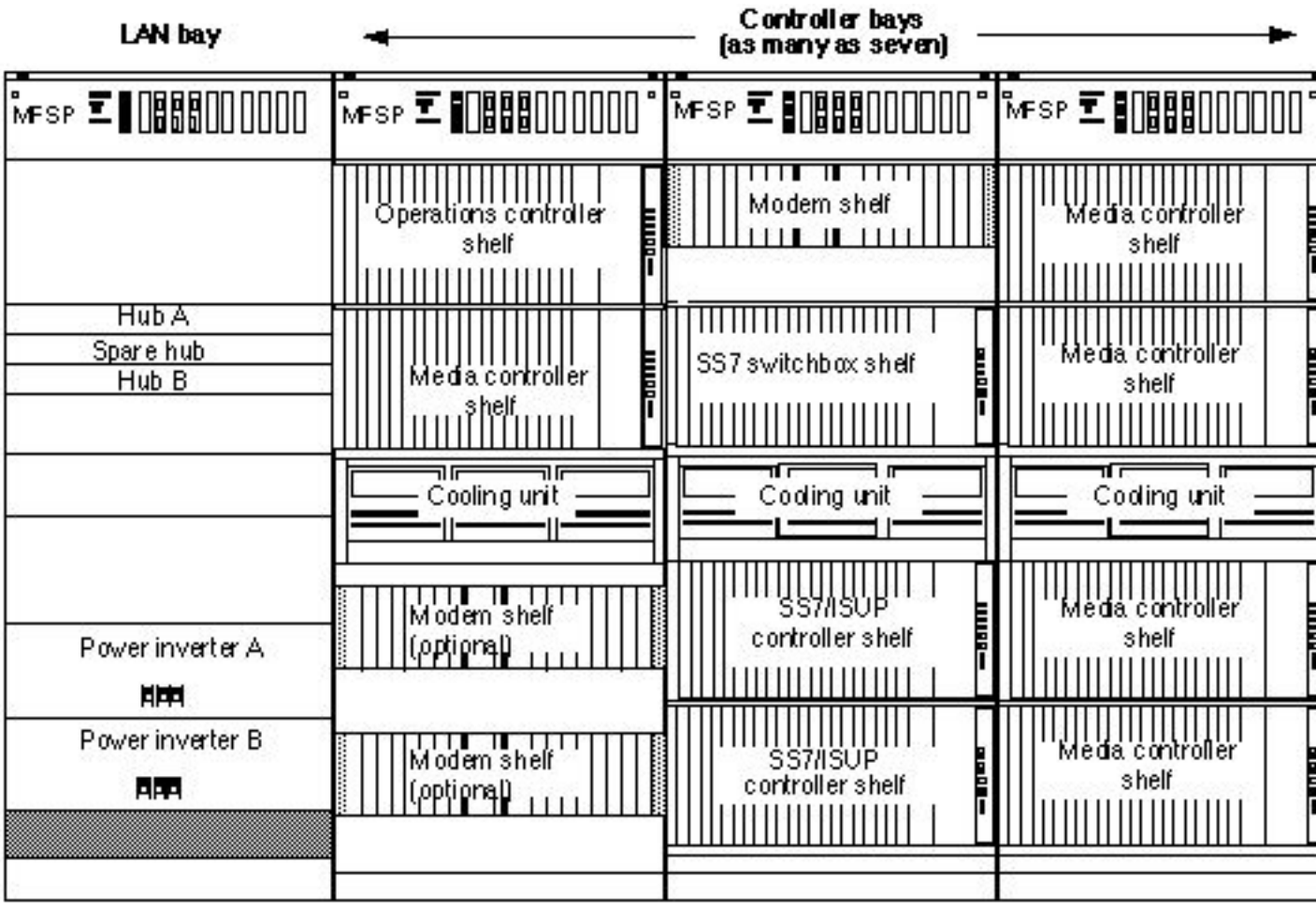


Figure 38. EXAMPLE OF A LARGE IP/MRU NAV NODE

4.1.8.3 LAN bay

A LAN bay is mandatory. A LAN bay houses the following components:

- one modular frame supervisory panel (MFSP), which contains breakers for each controller shelf, alarm indicator lights, fuses, and frame supervisory control
- three to five hubs (depending of port requirements), which provide Ethernet 10BaseT connectivity between controller shelves and other LAN peripherals
- two power inverters, which provide 120-V AC power for the hubs from the -48-V operating company power plant

- one optional modem shelf, which contains modems that provide ground isolation or network connectivity for data interfaces

4.1.8.4 Controller bay

Each controller bay houses the following components:

- up to four IP/MRU controller shelves, which provide application and OAM functionality
- one modular frame supervisory panel (MFSP), which contains breakers for each controller shelf, alarm indicator lights, fuses, and frame supervisory control
- cooling units, which provide air flow for system cooling
- optional modem shelves, which contain modems that provide ground isolation or network connectivity for data interfaces

The IP/MRU controller shelves are based on the NAV bus, which combines an industry standard data bus (VME) with a Nortel proprietary voice bus. These controller shelves use third-party processing cards running a UNIX operating system or a pSOS+ system, and are connected by means of a LAN. The IP/MRU controller shelf has 21 VME slots for cards. The voice bus spans slots 5 to 21, and the VME data bus spans slots 1 to 21.

The IP/MRU controller shelves are provisioned to meet specific service provider requirements.

There are three types of IP/MRU controller shelves:

- media controller shelf
- SS7/ISUP controller shelf
- operations controller shelf

Media controller shelf

The media controller shelf provides the hardware and software to support the IP/MRU functional requirements. A media controller shelf provides

- general processing environment (UNIX operating system). This is provided by one master service processor (MSP) single board computer.
- real-time processing environment (pSOS+ operating system). This is provided by one real-time service processor (RSP) single board computer.
- signal processing resources, such as DTMF detection, play and record. These are provided by multichannel telecommunications link (MTL) digital signal processing cards.

- digital signal processing resources for speaker-independent speech recognition. This is provided by network media engine (NME) cards or speech recognition processor (SRP) cards.
- switching matrix, which is provided by one time-slot interchange (TSI) card
- voice connectivity, which is provided by digital trunk link (DTL) cards
- Ethernet LAN connectivity, which is provided by the MSP
- disk storage, which is provided by one dual disk unit

A media controller shelf is configured to provide voice functions. A media controller shelf supports 96 ports.

Multiple media controller shelves operating independently provide high availability and load independence.

SS7/ISUP controller shelf

The SS7/ISUP controller shelf is based on the NAV AIX general controller shelf. It provides SS7 connectivity by means of the following functions:

- general processing environment (AIX operating system), using a single PowerPC MSP
- data connectivity, provided by SS7 cards
- Ethernet LAN connectivity, provided by the MSP
- disk storage, which is provided by one dual disk unit

Operations controller shelf

The operations controller shelf provides centralized operations, administration, and maintenance for the entire IP/MRU Node. The operations controller shelf provides the following:

- general processing environment (UNIX operating system). This is provided by one master service processor (MSP) single board computer.
- data connectivity, which is provided by input-output controller (IOC) RS-232 cards
- Ethernet LAN connectivity, which is provided by the MSP
- disk storage, which is provided by one disk/DAT module

4.1.9 Component Failure

In the event of a component failure, a comprehensive set of alarms is generated to indicate component failure. Where possible, the archi-

tecture provides for automatic recovery from failures. For example, a failed controller is automatically rebooted.

4.1.9.1 LAN

Each controller shelf has two physical 802.3 (Ethernet) network connections referred to as LAN A and LAN B. Each controller shelf is normally active on one of these two LANs. If any single component on the active LAN fails, the controller shelf automatically detects this condition and switches to the alternate LAN, with no loss of service. It is also possible to switch the LAN being used by a particular controller from a maintenance position.

4.1.9.2 Media Controllers

Media controllers are normally over provisioned such that any single failure or planned outage does not impact the ability of the IP/MRU to handle expected traffic. The over provisioned controllers are actively handling calls at all times.

Under critical failure conditions, traffic on the controller shelf that is out of service may be affected, which means that calls may be dropped. When service is restored to the controller shelf, all channels become available.

4.1.9.3 SS7/ISUP Controllers

Two SS7/ISUP controllers are provisioned on an IP/MRU requiring this capability. One controllers is active, the other is in standby mode. In the event of a switchover, the data selector switch switches the standby controller into active mode.

4.1.9.4 Operations Controllers

The operations controller is not involved in the processing of any calls. In the event that it is out of service, data destined for the operations controller is buffered on the individual controllers until the operations controller returns to service.

4.2 Hardware Provisioning

4.2.1 Hardware Usage Restrictions

The following lists some implementation-specific hardware usage restrictions imposed by the IP/MRU application:

- When MRU002 is initially deployed, the NME board will not be available. The SRP board must be used for speech recognition until the NME board is available.
- The maximum number of voice channels is 92 when PRI trunks are used, and 96 channels in all other cases.

- There are space limitations on various announcement types. Eight hours of system announcements can be kept in memory for fast access. A further 100 hours of system announcements can be stored on disk. There is enough disk space available for close to 300 hours of user announcements. This includes user announcements recorded on the shelf, announcements backed up on the shelf, if any, as well as all announcements currently cached on the shelf.

The IP/MRU is not fully compliant to SR3511 version 5. Areas of non or partial compliancy include:

- According to SR3511 version 5, each ISCP site can consist of up to 3 hosts. When a host sends a request to the IP, the IP should attempt to respond to the same host. If the host is unreachable, the IP may respond to any other host at that site. The IP/MRU does not distinguish between ISCP sites. If a host is unreachable, the IP will respond to another host which may be at the same site or a different site from the original, requesting host.

- Multiple IP/MRU shelves can not be configured as being in the same site. Each IP/MRU must be treated as a separate site. IPs in the same site must be able to take over a call in progress from each other.

Reference ECM 699 Network Application Vehicle (NAV) for NAV Base hardware restrictions that may affect the IP/MRU application.

4.2.2 Hardware Dependencies

Not applicable.

4.2.2.1 P and C Side Port Requirements

Not applicable

4.2.2.2 DMS BUS Port Requirements

Not applicable

4.2.2.3 Circuits Per Card

Not applicable

4.2.2.4 Discrimination Numbering

Reference ECM 699 Network Application Vehicle (NAV) for NAV Base.

4.2.3 Provisioning Considerations

This section provides the guidelines for software and hardware provisioning of an IP/MRU Node according to service provider specifications. MRU00020 is built on the NAVB005 platform.

Reference ECM 699 and its associated Engineering Manual Sections (EMS) for detailed information to provision the NAV Controller Bay, SS7 Bay, LAN Bays and their associated shelves.

Anyone using these guidelines requires an understanding of the commercial requirements of the services being deployed on the IP/MRU Node and of the general scale of the node on which these services will be deployed. The guidelines include forms that must be completed by the service provider and the algorithms to determine the system configuration.

Provision the IP/MRU in the following phases:

- define the service groups which are to be provided by the IP/MRU Node
- determine the call/transaction traffic projections for each service
- calculate the channel capacity requirements based on call/transaction traffic projections for each service
- determine the distribution of the service groups within the node
- determine the grade of service
- select and optimize controller shelves and circuit cards
- determine overall system requirements
- order shelves and circuit cards
- order bays, modules, and network hardware
- select base and application-specific software for each controller

Note: The amount of memory and disk space required for the service provider's IP/MRU application is not known by Nortel unless specifically requested during a quotation process. It is the responsibility of the provisioner to ensure that adequate equipment is provisioned to meet the needs of the service provider based on information given as part of customer input (CI) and the provisioning rules found within the Product Specification.

4.2.3.1 Define service groups

For the purposes of provisioning, IP/MRU service groups are functional components which can be assigned to different controllers. From an operations perspective, an IP/MRU service group is a user-defined shelf group.

The first step in provisioning the IP/MRU is to determine what services will be defined for the node. The most flexible approach is to define a service group for each service provided to the end user. In this approach, services are mixed by running multiple service groups on the

same media controllers. Services may also be combined into service groups in order to reduce deployment costs. Some considerations when combining services in the same service group are:

- services with different busy periods are good candidates
- services with similar resource requirements, for example, FVR and recording are good candidates
- services should not be combined if they will overload shared resources, for example, RAM, disk, and FVR ports
- GR1129 services cannot be combined with any non-GR1129 services.

The provisioning steps described in sections "Determine call/transaction traffic projections" and "Calculate channel capacity requirements" are performed for each service group.

A media controller can be configured to run multiple service groups. The provisioning of several service groups can impact the provisioning of individual controllers.

4.2.3.2 Determine call/transaction traffic projections

For the following calculations, service groups must be broken into their various call flows. The term service assumes single-channel access. For example, in a service group with one type of incoming and one type of outgoing call, the incoming and outgoing calls are treated as two distinct services. For each desired service, the service provider must specify:

- dialog characteristics
- the expected traffic of the specific type for the node

The service provider must complete the service specification form provided in Table 5

Table 5. Service Specification Form			
Parameter	Service 1	Service 2	Service 3
Protocol to be used	.	.	.
Switch connectivity	.	.	.
Is there speech recognition	.	.	.
Average utterance length for speech recognition	.	.	.
Average number of speech recognition requests per call	.	.	.
Is there speech recording	.	.	.
Average call length (call holding time) hi (sec)	.	.	.
Busy hour traffic Ci (calls/hour)	.	.	.
Speech recognition processor being used	.	.	.

For two services to reside on the same media controller, they must use the same protocol and the same switch connectivity. Disk and RAM usage, as well as speech recognition and speech recording requirements, are some of the factors to be considered when deciding which services will co-reside on the same media controllers.

The following are the parameters for use with table 5:

- Protocol = SR3511, GR1129 or Standalone
- Switch Connectivity = SS7, NI-2 PRI, NTNA PRI, or T1 with inband E and M signaling
- Speech Recognition = Yes or No
- Average utterance length for speech recognition = .5 to 3.0 seconds in .25 second intervals

- Average number of speech recognition request per call = This is a service provider input and it is based on the type of service being deployed.
- Speech recording = Yes or No
- Average Call length (call holding time) = 0 to 600 seconds
- Busy hour traffic (calls/hour) = This parameter is a service provider input and it is based on the type of service being deployed.

4.2.3.3 Calculate channel capacity requirements

For the purposes of provisioning the IP/MRU the following simplifying assumptions have been made:

- A single media controller can handle the number of configured ports of voice processing with no degradation in performance under heavy load.
- The IP/MRU is port-bound, that is, the number of ports is the only resource which needs to be considered as part of shelf provisioning.
- All ports within a single media controller are equivalent in terms of the services which can be handled.

All provisioning of the IP/MRU is based on the Erlang B model with a 1% blocking rate. This model assumes the following:

- Traffic sources are infinite.
- Calls occur at random.
- Holding times are distributed exponentially about an average value.
- Calls for which resources are not available are dropped and will not return to the system.

Using this model, a media controller with 96 ports has a Cent Call Second (CCS) value of 2891. A CCS is the traffic intensity represented by one 100-second call. This is equivalent to saying that a media controller can handle 2891 100-second calls in an hour.

Formula 1 provides the standard method of calculating the CCS value for a given busy hour call volume (C) and average holding time (h).

For each service group, the following calculation must be made:

4.2.3.4 Formula 1. Channel Capacity Calculation

$$C_s = \sum C_i \qquad h_s = \frac{1}{C_s}\sum h_i C_i \text{ , and}$$

$$A(N_s) = \frac{C_s \cdot h_s}{100}$$

Figure 39. FORMULA 1, CHANNEL CAPACITY CONFIGURATION

where the summation is over the services in the service group and

Ci	is the number of calls in a busy hour for each service
Cs	is the aggregate number of calls in a busy hour for the service group
hi	is the average hold time for each service
hs	is the aggregate hold time of the shared trunk group
A(Ns)	is the CCS value over all services

4.2.3.5 Determine the distribution of service groups

The next step in the provisioning process is to determine which service groups will be combined on media controllers. The reason for combining particular service groups is basically the same as the reasons for placing services in the same service group, to reduce deployment costs. Some considerations when combining service groups on the same media controller are:

- services with different busy periods are good candidates
- services with similar resource requirements, for example, FVR and recording are good candidates
- services should not be combined if they will overload shared resources, for example, RAM, disk, and FVR ports
- GR1129 services cannot be combined with any non-GR1129 services

It is possible to create a service mix which results in extremely non-homogenous nodes. For example, a node with three media controllers with service groups A, B and C. One option would be to run service groups A and B on the first media controller, B and C on the second media controller, and A and C on the third media controller. This would result in difference service mixes on each controller. While this is a valid approach, it is more difficult to provision.

Subnodes

The remainder of this section will assume that if two service groups are provisioned together on any controller, they are always provisioned together. This means that an IP/MRU Node can be logically divided into several subnodes. Each of these subnodes is homogeneous in terms of the services provided. For each subnode, the CCS of each of the service groups in the node must be added to provide the overall CCS for the subnode.

For a blocking probability of 1%, a media controller with 96 ports can handle 2891 CCS. To find the number of media controllers required for a subnode, add the CCS values for each of the service groups, and divide it by 2891. Round up to the nearest integer to arrive at the number of media controllers required.

4.2.3.6 Determine the grade of service

For every product, the grade of service includes blocking factors and response time targets. Throughout this document a probability of blocking access of 1% during busy hour is assumed.Other blocking rates could be used, which would result in different grades of service. Table 6 provides examples of other blocking rates and their associated CCS.

Table 6. Blocking Rates

Blocking rate	CCS
0.1 %	2581
0.5 %	2781
1.0 %	2891
2.0 %	3028

Most configurations require fault tolerance or high availability. The IP/MRU provides high availability by provisioning one extra media controller shelf for each of the M subnodes in a node with an otherwise requirement for N media controllers (N+M redundancy model). This is a reason for reducing the number of subnodes.

4.2.3.7 Select and optimize controller shelves and circuit cards

One or more of the following shelf types may be provisioned:

- media controller, which runs the application-specific service logic in an IP/MRU
- operations controller, which runs the operations, administration, and maintenance (OAM) functions for an entire IP/MRU Node
- SS7/ISUP controller, which provide SS7 connectivity to Signal Transfer Points (STPs).
- modem shelf, which can house up to 16 rack-mounted modems

Every IP/MRU Node must have an operations controller shelf to manage operations, administration and maintenance (OAM).

The required services are usually distributed across several controller shelves. The media controller shelves are grouped in such a way that, within a shelf group, all ports are equivalent, that is, they can provide the same set of services.

Determine the total number of shelves required

For a blocking probability of 1%, a media controller with 96 ports can handle 2891 CCS. To find the number of media controllers required for a subnode, add the CCS values for each of the service groups, and divide it by 2891. Round up to the nearest integer to arrive at the number of media controllers required.

Sum up the number of media controller shelves for each shelf group defined, excluding N+1 redundancy requirements within each subnode, to determine the total number (k) of media controller shelves required.

Order one additional media controller if redundancy is required.

Order one operations controller and the quantity k + optional redundant media controllers. If k + optional redundant media controller is greater than 24, you have exceeded the capacity of a single IP/MRU Node and should add another node and additional optional redundant media controller.

If SS7 is required order a SS7 Server Bay e/w two SS7/ISUP controllers. One controller is active, the other is in standby mode. The use of SS7 limits the number of controller shelves, including the SS7/ISUP controller shelves to 22.

Determine the number of NME or SRP cards in each subnode

The network media engine (NME) and speech recognition processor (SRP) cards implement flexible vocabulary speaker-independent speech recognition. NME is replacing SRP in this role. Currently only SRP cards are supported for MRU00020. As NME cards become available, they will be integrated into the system. As a result both cards are included here.

Provisioning of these cards depends on a number of factors including:

- vocabulary size
- number of recognition attempts per call
- call volumes
- length of the utterance being recognized

Determining NME or SRP requirements

Provisioning of NME or SRP boards is done on a subnode basis. Hence the calculations in this section must be performed once for each subnode.

MRU00020 supports only a single SRP or NME card. If the following calculations show that additional cards are required, the service mix will have to be adjusted.

The following notation is used:

k	number of IP/MRU shelves, not including any redundant shelves
S	number of speech recognition servers on a shelf
B	number of NME or SRP cards on a shelf
h	average call holding time in seconds
q	average number of speech recognition requests in a dialog
r	average duration of each utterance to be recognized in seconds
C	number of calls expected in a busy hour
N	number of speech recognition servers per card

A speech recognition server can be thought of as a "port" of speech recognition capability. The number of servers which are supported on each SRP or NME depends on the size of the vocabulary and the processing power of the card.

Compute aggregate parameters

Compute combined parameters for all services as follows

$$C = \sum C_i \qquad h = \frac{1}{C}\sum h_i C_i \qquad q = \frac{1}{C}\sum q_i C_i$$

Figure 40. FORMULA 3. COMPUTING COMBINED PARAMETERS

It is important to include all services, including those which do not use speech recognition, in these calculations. All services impact the value of C, the aggregate number of calls expected in a busy hour.

$$C'' = \sum C_j$$

Figure 41. FORMULA 4. CALCULATION FOR C

Only those services which use speech recognition are included in the calculation of C".

$$r = \frac{1}{C''}\sum r_j C_j$$

Figure 42. FORMULA 5. CALCULATION FOR R

Only those services which use speech recognition are included in the calculation of r, the average duration of each utterance to be recognized in seconds.

Find the number of speech recognition servers

The number of speech recognition servers depends on the hold time of each speech recognition request and the required response time. The assumptions are that the hold time of each speech recognition request is an exponentially distributed random variable with the average equal to the length of the speech utterance plus a certain post-processing delay.

The number of speech servers is derived using Erlang-C computation. It is assumed that each request is queued no longer than 0.5 seconds 99% of the time. The number of speech recognition servers required per media controller S satisfies the following equation:

The number of speech servers is derived using Erlang-C computation. It is assumed that each request is queued no longer than 0.5 seconds 99% of the time. The number of speech recognition servers required per media controller S satisfies the following equation:

$$Q(S,r) = \frac{qC}{k}$$

Figure 43. FORMULA 6. DETERMINING SPEECH RECOGNITION SERVERS

qC/k is the effective number of r-long speech recognition requests per hour that can be processed by S servers for the Erlang-C model. The value of Q(S, r) is given in Table 8.

Table 8. Speech recognition requests per hour
(Queuing delay <0.5 sec. 99%)

	Length of utterance										
S	0.5	0.75	1.0	1.25	1.5	1.75	2.0	2.25	2.5	2.75	3.0
2	797	577	449	364	308	264	232	206	186	169	155
3	2370	1740	1370	1130	960	830	730	652	590	538	490
4	4410	3260	2580	2120	1810	1570	1390	1240	1120	1020	940
5	6740	5030	4000	3290	2800	2440	2150	1920	1750	1590	1460
6	9300	6970	5550	4580	3900	3390	3000	2690	2430	2220	2050
7	12020	9030	7200	5960	5080	4430	3910	3500	3170	2900	2670
8	14860	11210	8940	7410	6320	5510	4870	4370	3950	3610	3330
9	17800	13440	10750	8930	7610	6630	5870	5270	4780	4360	4010
1	20780	15750	12600	10480	8950	7810	6910	6200	5610	5130	4720
1	23840	18110	14550	12070	10320	9000	7970	7150	6480	5920	5460
1	26940	20520	16480	13720	11720	10220	9050	8130	7380	6740	6200
1	30110	22950	18460	15370	13140	11470	10170	9130	8280	7570	6970
14	33300	25450	20460	17060	14600	12740	11300	10140	9200	8420	7740
15	36540	27950	22500	18780	16070	14030	12450	11170	10130	9270	8530
16	39770	30460	24550	20500	17560	15350	13600	12220	11080	10140	9340
17	43050	33020	26630	22260	19070	16660	14780	13280	12040	11010	10150
18	46330	35580	28730	24020	20580	18000	15970	14350	13010	11900	10970
19	49700	38180	30850	25810	22120	19350	17160	15420	14000	12810	11800
2	53040	40800	32970	27590	23670	20690	18370	16510	14980	13710	12630
2	56360	43410	35130	29390	25230	22070	19590	17590	15980	14630	13470
2	59730	46080	37290	31210	26790	23440	20830	18710	16970	15540	14320
2	63120	48690	39470	33030	28380	24830	22050	19830	18000	16470	15190
24	66520	51320	41620	34870	29960	26210	23300	20940	19010	17400	16040
25	69880	54030	43810	36720	31560	27630	24540	22060	20030	18330	16900
26	73280	56700	45990	38580	33170	29040	25790	23190	21050	19280	17790
27	76700	59400	48190	40440	34760	30440	27060	24320	22090	20240	18650
28	80150	62090	50400	42310	36380	31860	28340	25470	23150	21180	19540

The right-hand side of the equation is computed to find the effective number of speech recognition requests per busy hour. Then, this number

together with the average speech utterance length is used to determine the number of required speech recognition servers from Table 8. The result is equal to the required number of speech recognition ports.

Find the number of NME or SRP cards on a media controller

The number of speech recognition ports supported on each NME or SRP card depends on the size of the vocabulary. This is shown by the constant N in the following formula. For the small vocabulary currently supported on the IP/MRU, this number is four for NME and three for SRP. Therefore:

$$B = \frac{S}{N}$$

Figure 44. FORMULA 7. DETERMINING THE NUMBER OF NMES AND SRPS

Determine the number of MTL cards

The multi-channel telecommunications link (MTL) card implements speech detection and low-level speech conditioning. The quantity of MTL cards depends on the IP/MRU functionality and the number of DTL cards.

For each media controller, use Table 9 to determine the number of MTL cards required on each shelf. Where multiple entries apply, use the higher number of cards.

Table 9. Number of ports supported by MTL

Type of SIBBs on media controller	Number of MTL cards
simple interactive voice response (IVR)	4
simple IVR and voice recording	6
speech recognition	8

If PRI connectivity is used, an additional MTL card must be provisioned on each shelf.

4.2.3.8 Provisioning example

This section provides a provisioning example for three services. Table 10 indicates the assumptions for each service required to perform the provisioning.

Since all three services either use SR3511 or are standalone and use the same connectivity to the switch, they are candidates to be run on the same media controllers.

Table 10. Sample service specification form			
Parameter	Service 1	Service 2	Service 3
Protocol to be used	SR3511	SR3511	S tand Alone
Switch connectivity	SS7	SS7	SS7
Is there speech recognition	Yes	No	No
Average utterance length for speech recognition	0.5	N/A	N/A
Average number of speech recognition requests per call	0.6	N/A	N/A
Is there speech recording	No	Yes	No
Average call length (call holding time) hi (sec)	30	60	5
Busy hour traffic Ci (calls/hour)	20,000	5,000	200,000
Speech recognition processor being used	NME	N/A	N/A

Define service groups

Assuming that the customer may want to run these services on different media controllers, assume that each will be in its own service group.

Determine call traffic projections

The traffic projections for each service, which consist of the average holding time and the busy hour traffic, are listed in Table 10. These assumptions must be obtained from the service planners.

Calculate channel capacity

Since each service is in its own service group, the equations in Formula 1 are the degenerate form, that is the summations are over single val-

ues. Therefore the aggregate values, Cs and hs are simply the values from Table 10.

For service group Service 1

$$A(N_s) = \frac{20,000 \times 30}{100} = 6,000$$

Figure 45. FORMULA 8. CALCULATION FOR SERVICE 1

For service group Service 2

$$A(N_s) = \frac{5,000 \times 60}{100} = 3,000$$

Figure 46. FORMULA 9. CALCULATION FOR SERVICE 2

For service group Service 3

$$A(N_s) = \frac{200,000 \times 5}{100} = 10,000$$

Figure 47. FORMULA 10. CALCULATION FOR SERVICE 3

Determine the distribution of service groups

Assume that it has been determined that Service1 and Service2 will reside in the same subnode (SN1), while Service3 will be the only service group in another subnode (SN2).

For SN1 the number of media controllers required is

$$SN1 = \frac{6,000 + 3,000}{2,891} = 3.1$$

Figure 48. FORMULA 11. CALCULATING MCS FOR SN1

Rounding up, the number of media controllers required is 4.

For SN2 the number of media controllers required is

$$SN2 = \frac{10,000}{2,891} = 3.5$$

Figure 49. FORMULA 12. CALCULATING MCS FOR SN2.

Rounding up, the number of media controllers required is 4.

Determine the grade of service

Assuming that a high availability is required, one extra media controller is required for each subnode. This brings to the total number of media controllers required to 10, five for each subnode.

Determine the total number of shelves required

The number of media controllers required has been calculated to be 10. Since SS7 is being used, two SS7/ISUP controllers are required. This brings the total number of media controllers required to 12. Since this is less than 24, a single node is required. This means a single OC is required.

Determine the number of NME or SRP cards

The calculations in this example are for the subnode SN1. No NMEs or SRPs are required for SN2.

$$C = \sum C_i = 25{,}000$$

$$h = \frac{1}{C}\sum h_i C_i = 36$$

$$q = \frac{1}{C}\sum q_i C_i = 0.48$$

$$r = \frac{1}{C}\sum r_j C_j = 0.5$$

$$Q(S,r) = \frac{qC}{k} = \frac{0.48 \times 25{,}000}{4} = 3{,}000$$

Figure 50. FORMULA 13. CALCULATING NMES OR SRPS FOR SN 1

The number 3,000 can now be looked up in Table 8, in the column with a length of utterance of 0.5. This results in a value of S, the number of speech recognition servers required, which is 4.

For SRPs (rounded up),

$$B = \frac{4}{3} = 2$$

Figure 51. FORMULA 14. CALCULATING SRPS

For NMEs,

$$B = \frac{4}{4} = 1$$

Figure 52. FORMULA 15. CALCULATING NMES

Therefore a single NME will be able to handle the speech recognition requirements, however two SRPs would be required. In MRU00020, only a single SRP or NME may be provisioned.

Determine the number of MTL cards

Since speech recognition is required by one of the services residing in subnode SN1, eight MTL boards are required for each media controller in this subnode. Since the only service residing in subnode SN2 uses neither speech recognition nor speech recording, four MTL boards are required for each media controller in this subnode.

Determine overall system requirements

For each system, the service provider must specify the following system requirements:

- the number of LAN-connected terminals
- the number of dedicated modem-connected terminals
- the number of dial-up modem-connected terminals
- the number of Macintosh with service design environment software installed
- the method of file transfer from the service design environment to the IP/MRU (tape, dial-up modem, or LAN)
- the number of dedicated log printers
- the number of report printers
- the number of NAV LAN ports required to connect to the customer LAN or WAN

The service-provider must complete the system specification form provided in Table 11

Table 11. System specification form	
Parameter	Factor or quantity
LAN-connected terminals	.
Dedicated modem-connected terminals	.
Dial-up modem-connected terminals	.
Macintosh with service design environment software	.
File transfer through tape, dial-up modem or LAN?	.
Dedicated log printers	.
Report printers	.
NAV LAN ports to connect to customer LAN or WAN	.

4.2.3.9 Order shelves and circuit cards

IP/MRU has three shelf types: IP/MRU operations controller shelf, IP/MRU media controller shelf, and an SS7/ISUP shelf. The IP/MRU operations controller shelf is the standard NAV operations controller (OC) shelf with additional IP/MRU operations software. The IP/MRU media controller is a NAV service controller (SC) shelf with IP/MRU application software. The SS7/ISUP shelf is a NAV general controller (GC) with the NAV SS7/ISUP software. In the remainder of this section, the reference is made to the IP/MRU name of the shelf.

The following sections list the items to order for each controller shelf.

Media controller shelf

For each media controller, order the following:

- one media controller, which contains
  - one shelf assembly
  - one power converter assembly
- one MRU MC shelf front label, P0883615
- one MRU MC shelf rear label, P0883616
- one dual disk module which contains two 9 Gbyte formatted SCSI disk drives
- one 50 MHz, 64 MByte master service processor (MSP)
- one 50 MHz, 128MByte real-time service processor (RSP)

- one MSP transition module
- one RSP transition module
- one time-slot interchange card (TSI)

Populate the remaining media controller slots with circuit cards identified in the "Select and optimize controller shelves and circuit cards" section:

- four T1 digital trunk links (DTL), DTL transistion modules, and DTL cables
- four to nine signal processing cards (MTL)
- zero or one speaker-independent speech recognition card (NME or SRP)
- front filler cards, as required to fill every remaining front slot
- rear filler transition modules, as required to fill every remaining rear slot

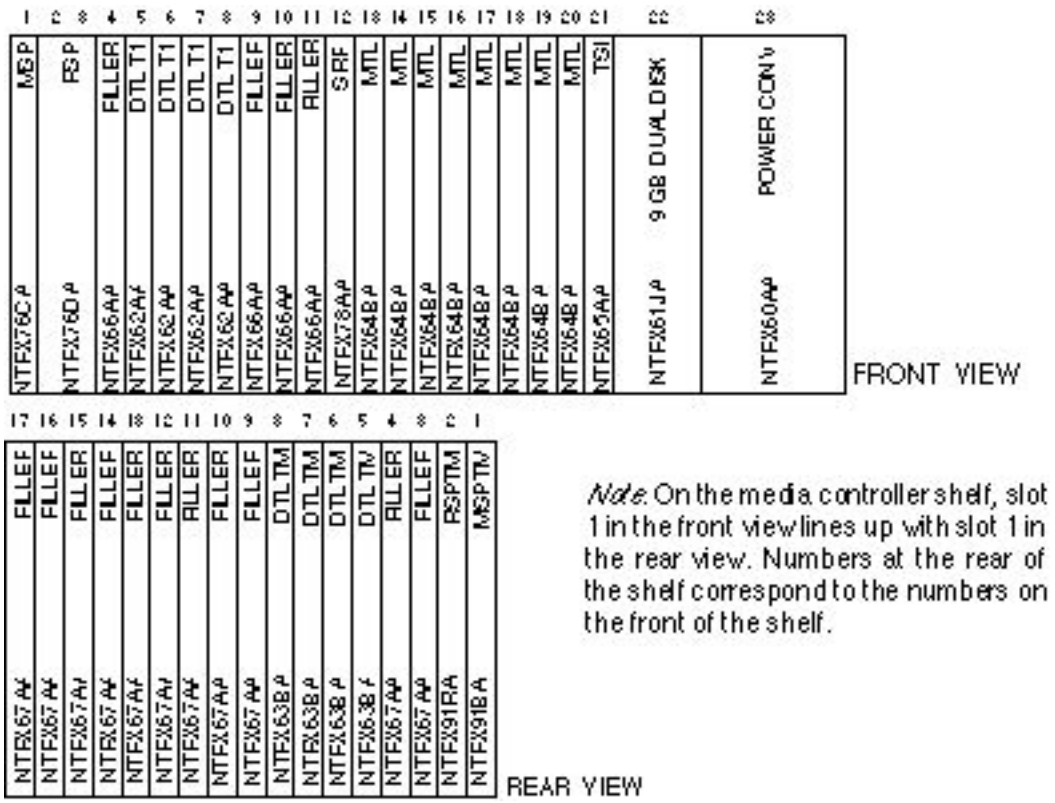


Figure 53. EXAMPLE MEDIA SHELF LAYOUT

Media Shelf Layout Legend	
Power converter (POWER CONV)	NTFX60AA
9 -Gbyte dual disk module (9 GB DUAL DISK)	NTFX61JA
Digital trunk link (DTL T1)	NTFX62AA
Digital trunk link transition module (DTL TM)	NTFX63BA
Multichannel telecommunications link, 56 MHz (MTL)	NTFX64BA
Time-slot interchange (TSI)	NTFX65AA
Front filler card (FILLER)	NTFX66AA
Rear filler card (FILLER)	NTFX67AA
Master service processor, 64 Mbyte, 50 MHz (MSP)	NTFX76CA
Real-time service processor, 128 Mbyte, 50 MHz (RSP)	NTFX76DA
Speech recognition processor (SRP)	NTFX78AA
Master service processor transi-tion module (MSPTM)	NTFX91BA
Real-time service processor TM (RSPTM)	NTFX91RA

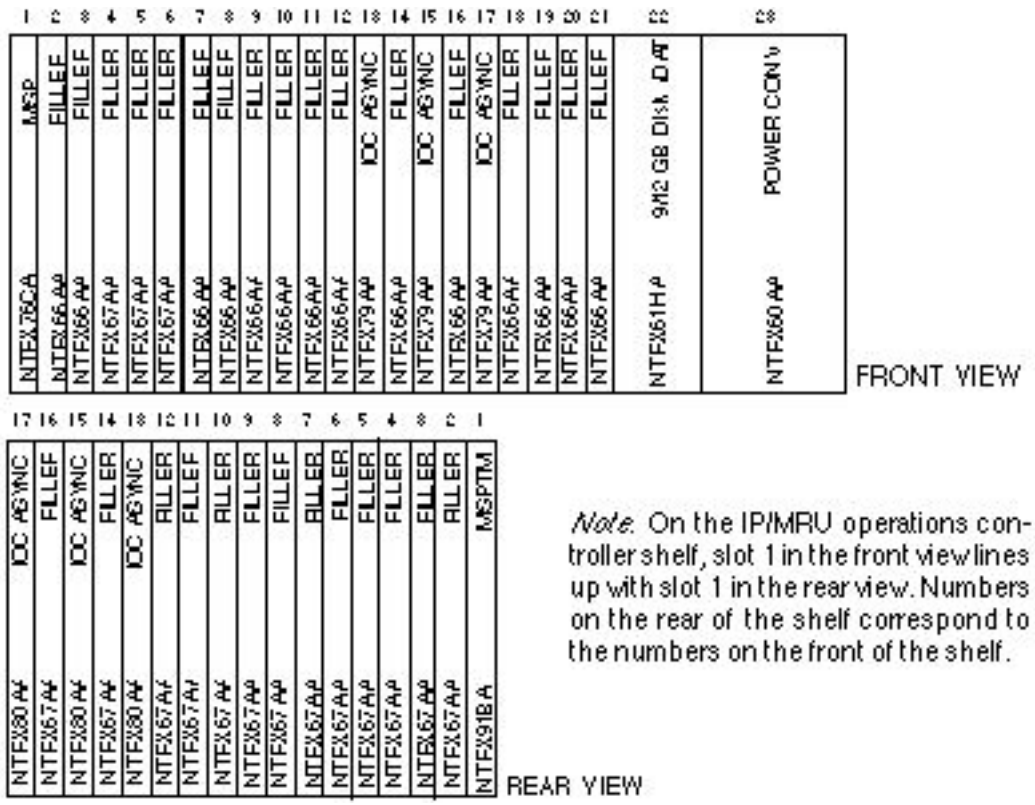
IP/MRU operations controller shelf

For each IP/MRU operations controller, order the following:

- one operations controller, which contains
  - one shelf assembly
  - one power converter assembly
  - one MSP transition module
  - one IOC (RS-232) card
  - one IOC transition module (RS-232) card
- one master service processor (MSP)
- one 9/12-Gbyte disk/DAT module which contains one 9 Gbyte formatted SCSI disk unit and one 12-Gbyte digital audio tape (DAT) drive
- up to two optional input-output controllers (IOC) RS-232, IOC RS-232 transistion modules, and telemetry cables as required according to the following rules:
  - each IOC card contains eight RS-232 ports
  - one port is required for each bay in the node

- an additional port is required for each controller shelf
- an additional port is required for each RS-232 modem
- each operations controller shelf can contain a maximum of five IOC cards

- front filler cards, as required to fill every remaining front slot
- rear filler transition modules, as required to fill every remaining rear slot



Note: On the IP/MRU operations controller shelf, slot 1 in the front view lines up with slot 1 in the rear view. Numbers on the rear of the shelf correspond to the numbers on the front of the shelf.

Figure 54. EXAMPLE IP/MRU OPERATIONS SHELF LAYOUT

IP/MRU Operations Shelf Layout Legend	
Power converter	NTFX60AA
9/12-Gbyte disk/DAT module	NTFX61HA
Front filler card (FILLER)	NTFX66AA
Rear filler card (FILLER)	NTFX67AA
Master service processor, 64 Mbyte, 50 MHz (MSP)	NTFX76CA
Asynchronous input-output controller (IOC ASYNC)	NTFX79AA
Asynchronous input-output transition module (IOC ASYNC TM)	NTFX80AA
Master service processor transition module (MSPTM)	NTFX91BA

SS7/ISUP controller shelf

If SS7/ISUP is being used to transport call processing signaling information, a pair of SS7/ISUP controller shelves must be provisioned.

For each SS7/ISUP controller, order the following:

- one SS7/ISUP controller, which contains
  - one shelf assembly
  - one power converter assembly
- one dual disk module which contains two 9 Gbyte formatted SCSI disk units
- one 100 MHz, 64 Mbyte master service processor (PowerPC MSP)
- one MSP transition module
- one to four SS7 IOC cards, SS7 IOC transistion modules, and SS7 cables
- front filler cards, as required to fill every remaining front slot
- rear filler transition modules, as required to fill every remaining rear slot

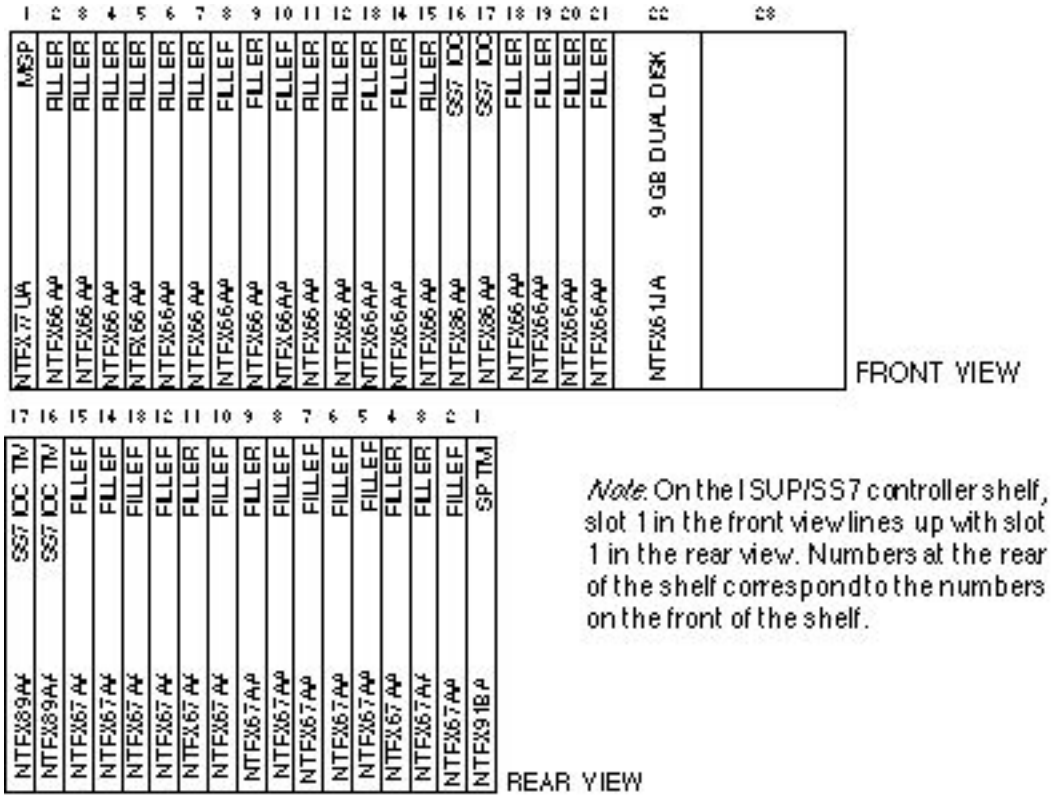


Figure 55. EXAMPLE SS7/ISUP SHELF LAYOUT

SS7/ISUP Shelf Legend	
Power converter (POWER CONV)	NTFX60AA
9-Gbyte dual disk module (9 GB DUAL DISK)	NTFX61JA
Front filler card (FILLER)	NTFX66AA
Rear filler card (FILLER)	NTFX67AA
PowerPC master service processor (MSP)	NTFX77UA
SS7 input-output controller (IOC)	NTFX86AA
SS7 IOC transition module	NTFX89AA
Service processor TM (SPTM)	NTFX91BA

IP/MRU modem shelf

Each modem shelf provides up to 16 peripheral ports. One rack-mounted modem must be provided for each printer and terminal that is not connected to the LAN.

A modem shelf can be provisioned in the LAN bay, the controller bay with the OC or an additional controller bay. If the modem shelf is provisioned in a bay other than the bay with the OC shelf, the number of IOC (RS-232) card sets provisionable in the OC is reduced by one to a total of four card sets. This reduces the number of RS-232 links available for telemetry of bays and shelves by 8 ports. This reduces the number of bays and shelves provisionable by 8 items, for example 2 bays and 6 shelves. It is recommended that the modem shelf be provisioned in the controller bay with the OC unless it is known at the time of customer input that the growth requirement of the IP/MRU node will not exceed 5 bays, including the bay with the OC, and 18 shelves.

Table 12 lists items that require a rack-mounted modem. Additionally, filler cards (A0650426) are required to fill every remaining slot.

Table 12. Items that require a rack-mounted modem

Item	Modem	CPC
dedicated log printer	64kbit/s modem	NTFY01AA
reports printer	64kbit/s modem	NTFY01AA
dedicated modem-connected terminal	64kbit/s modem	NTFY01AA
dial-up modem-connected terminal	9600-baud 2-wire dial-up	A0600472
SS7 link	64kbit/s modem	NTFY01AA

The SS7 Server Bay contains one required modem shelf. This shelf provides modem connections for the SS7 Switchbox Shelf. Only the NTFY01AA, 64kbit/s modem, is provisioned in the SS7 Server Bay modem shelf.

4.2.3.10 Order bays, modules, and network hardware

Select the IP/MRU controller bays and LAN equipment to support the controllers selected in the previous sections.

IP/MRU controller bays

Each IP/MRU Node can contain one operations controller shelf, up to two modem shelves, and up to 24 media controller shelves. The limit of 24 shelves includes any controller shelves associated with other applications running on the node. If the node is equipped with SS7/ISUP, one complete bay is used for this purpose. This will limit the number of controller shelves, including SS7/ISUP controller shelves to 22. The controller shelves are housed in up to seven controller bays. The op-

timal number of controller bays equals the number of shelves divided by four and rounded up to the nearest integer.

For each media controller bay, order the following:

- one controller bay which contains:
  - one controller bay
  - three cooling modules
  - one MFSP
- up to four of any of the following shelf types:
  - media controller shelf
  - operations controller shelf
  - modem shelf
  - one NAV shelf air plenum to fill each unused shelf position

For the SS7/ISUP controller bay, order the following:

- one controller bay which contains:
  - three cooling modules
  - one MFSP
- one modem shelf
- one SS7 switch box
- two SS7/ISUP controller shelves
- one 64kbit/s modem per SS7 link (NTFY01AA)

Printers and terminals

Based on Table 12, order the following:

- two LAN-connected X.11 terminals
- up to four printers
- up to one roll-up terminal
- two external LAN interface cables
- up to two remote dial-up X.11 terminals
- up to two remote dedicated X.11 terminals

Service management tools

The IP/MRU product offers optional tools which run on any Macintosh model driven by the PowerPC microprocessor with built-in audio capabilities. Refer to ECM 708, PowerView Tools, for provisioning guidelines.

Local area network

In each IP/MRU Node, a 10BaseT Ethernet local area network (LAN) interconnects media controllers, operations controllers, LAN-connected terminals and customer-provided routers.

The master service processor (MSP) in every controller shelf has a 10BaseT Ethernet LAN interface. Each controller shelf connects to an Ethernet hub port through a twisted pair cable of less than 100 m (328 ft). The resulting LAN can sustain a theoretical maximum bandwidth of 10-Mbit/s. In practice, the usable bandwidth of 10BaseT is less than 50% of the theoretical maximum.

IP/MRU LAN

System redundancy is provided by a pair of hubs, where one hub is called hub A and the other is called hub B. Every IP/MRU controller shelf has two separate LAN ports where port A is connected to hub A and port B is connected to hub B.

Depending on the size of the IP/MRU node, hubs can be deployed to provide either 24-or 48-ports. Use Table 13 to determine port requirements. Fill in the number of each type of LAN-connected device. Then multiply that number by the rule for allocating hub ports to determine how many hub A and hub B ports are required for each type of LAN-connected device. If the total number of hub A or hub B ports is less than or equal to 24, order three 24-port hubs (one spare and two working). Otherwise, order five 24-port hubs (one spare and four working).

Table 13. Hub port allocations

LAN-connected device	Quantity of LAN-connected devices in node	Rule for allocating hub ports	Number of ports on hub A	Number of ports on hub B
X- terminal	.	1 port on either hub A or hub B	.	.
Macintosh for the service design environment	.	1 port on either hub A or hub B	.	.
Media controller	.	1 port on hub A and 1 port on hub B	.	.
Operations controller	.	1 port on hub A and 1 port on hub B	.	.
Router	.	1 port on hub A and 1 port on hub B	.	.
TOTAL hub ports	.	.	.	.

The Macintosh must be connected to the LAN for files to be transferred electronically, otherwise a DAT tape must be used.

For each IP/MRU Node, order:

- one LAN bay which contains:
  - one LAN bay
  - one MFSP
- three or five 24-port hub kits based on the calculation in Table 13
- two -48 V, 500 W power inverters
- one optional modem shelf

A modem shelf can be provisioned in the LAN bay, the controller bay with the OC or an additional controller bay. If the modem shelf is provisioned in a bay other than the bay with the OC shelf, the number of IOC

(RS-232) card sets provisionable in the OC is reduced by one to a total of four card sets. This reduces the number of RS-232 links available for telemetry of bays and shelves by 8 ports. This reduces the number of bays and shelves provisionable by 8 items, for example 2 bays and 6 shelves. It is recommended that the modem shelf be provisioned in the controller bay with the OC unless it is known at the time of customer input that the growth requirement of the IP/MRU node will not exceed 5 bays, including the bay with the OC, and 18 shelves.

4.2.3.11 Routers

Nortel does not supply or support routers in an IP/MRU Node. If routers are required, they must be selected, supplied, and supported by the service provider.

4.2.3.12 Select software

Select base and application-specific software for each controller type identified in the previous section.

Software within the MRU00020 non-CM load (NCL) is divided into two development release units (DRU). MRU02 DRU contains the IP/MRU application software. NAVB005 contains all the NAV Base 5 software.

4.2.3.13 NAV Bay software

For each bay (LAN bay, controller bay) that is equipped with an FSC order the following:

- NAV1 ISI pSOS License (NAV10017): order one copy per FSC.

4.2.3.14 Media controller software

Media controller software comprises NAVB005 software and IP/MRU software.

Media controller NAVB005 software -

For each media controller, order one of the following functional groups:

- NAV1 General Controller Base (NAV10000)
- NAV3 Media Controller (NAV30000)

In addition, order the following optional NAV base functionalities:

- NAV1 UNIX 197-base License (NAV10009): order one copy per shelf.
- NAV3 Motorola VMEexec 3.0 License (NAV30065): order one copy per shelf.
- NAV3 Informix SC License (NAV30053): order one copy per DS0.

- NAV1 ISI pSOS License (NAV10017): order one copy for each DTL, and TSI card.
- NAV1 Local File Update (NAV10020): order one copy of this functionality for each shelf.
- NAV1 Time Synchronization (NAV10005): order one copy per shelf.
- NAV1 Disk Monitor (NAV10006): order one copy per shelf.
- NAV1 Generic Data Manager (NAV10021): order one copy per node.
- NAV3 IVR MMVI (NAV30017): order one copy for each DS-0 channel.
- NAV3 Digital Signal Processing (NAV30041): order one copy per shelf.
- NAV3 MTL (NAV30042): order one copy for each shelf equipped with one or more MTL card.
- NAV3 Network Interface (NAV30009): order one copy for each DTL card.
- NAV3 ISDN Bundle Retix License: (NAV30022): order one copy per shelf with PRI.
- NAV3 Voice-Prompt File System (NAV30028): order one copy for each shelf.
- NAV3 Audio Processing Module (NAV30029): order one copy for each shelf.

In addition, order the following optional functionality on each media controller shelf when PRI functionality is required:

- NAV3 DMS-100 Primary Rate Interface (NAV30021): order one copy per PRI D-channel.

In addition, order the following optional functionalities on each media controller shelf when speech recording functionality is required:

- NAV3 Encoding MMVI(NAV30019): order one copy for each DS-0 channel if speech recording is used.

In addition, order the following optional functionalities on each media controller shelf when FVR functionality is required.

- NAV3 Recognition MMVI (NAV30061): order one copy for each DS-0 channel if speech recognition is used.
- NAV3 Enhanced Talk-Through (NAV30072): order one copy for each DS-0 channel if speech recognition is used.
- NAV3 FVR License (NAV30049): order one copy for each FVSIR channel. The number of channels on each NME or SRP is engineered based on the vocabulary size.

- NAV3 FVSIR (NAV30054): order one copy for each FVSIR channel.
- NAV3 SC Tokenizing Subsystem (NAV30051): order one copy for each shelf.

In addition, order the following optional functionalities on each media controller shelf when SS7 functionality is ordered:

- NAV3 SS7 ISUP (NAV30067): order one copy for each media controller shelf that will be communicating with SS7/ISUP controllers.
- NAV3 MMS MC Transport (NAV30077): order one copy for each media controller shelf that will be communicating with SS7/ISUP controllers.

In addition, order the following optional functionality on each media controller shelf when SS7 functionality is required for use with an MTX switch.

- NAV3 SS7 ISUPRLT MTX 1 Port (NAV30070): order one copy per T1

Media controller IP/MRU Software -

Order the following optional functional groups:

- MRU Media Controller (MRU00200): order one copy per shelf.
- MRU SIBBS (MRU00300): order one copy per shelf.

Depending on the protocol being used, order at most one of the following for each media controller shelf:

- SR3511 (MRU00206): order one copy for each DS-0 channel of IP/MRU functionality.
- GR1129 (MRU00207): order one copy for each DS-0 channel of IP/MRU functionality.

If SS7/ISUP signalling protocol is being used, order the following

- ISUP (MRU00208): order one copy per media controller shelf.
- MRU General Controller (MRU00400): order one copy per General Controller on the SS7/ISUP Bay.

If no protocol software package is ordered, the IP/MRU can run as a standalone service node.

In addition, order the following optional IP/MRU functionalities on each media controller depending on IP/MRU interface requirements:

- MRU T1 Interface (MRU00203): order one copy per DS-0 channel of IP/MRU functionality when simple T1 connection is required.

- MRU PRI Interface (MRU00204): order one copy per DS-0 channel of IP/MRU functionality when PRI connection is required.

- MRU RLT (MRU00209): order one copy per DS-0 channel of IP/MRU functionality when Release Link Trunk is required.

In addition, order the following optional IP/MRU functionalities on each media controller depending on service requirements:

- MRU SIBBs - Basic IVR Package (MRU00301): order one copy for each DS-0 channel of IP/MRU functionality.

- MRU SIBBs - Speech Recording Package (MRU00302): order one copy for each DS-0 channel. Requires NAV30019.

- MRU SIBBs - Dialogs (MRU00303): order one copy for each DS-0 channel of IP/MRU functionality when DialogGenerator integration is required.

- MRU SIBBs - Call Processing (MRU00304): order one copy for each DS-0 channel of IP/MRU functionality when call processing, such as transfer, bridging, or outcall is required.

- MRU SIBBs - FVSIR Package (MRU00305): order one copy for each FVSIR channel. Requires NAV30049 and NAV30054.

- MRU SIBBs - Get TOD (MRU00306): order one copy for each DS-0 channel of IP/MRU functionality.

4.2.3.15 Operations controller software

Operations controller software for the IP/MRU comprises NAVB005 software and IP/MRU software.

Operations controller NAVB005 software -

For each operations controller, order one of each of the following functional groups:

- NAV1 General Controller Base (NAV10000)

- NAV2 Operations Controller (NAV20001)

In addition, order the following optional software functionalities each operations controller shelf:

- NAV1 UNIX 197-base License (NAV10009)

- NAV1 Time Synchronization (NAV10005)

- NAV1 Disk Monitor (NAV10006)

- NAV2 OC Patching Subsystem (NAV20008)

- NAV2 OC Backup (NAV20009)

- NAV2 OC File Update (NAV20014)
- NAV2 Informix OC License (NAV20004)
- NAV2 Kermit License (NAV20013)

In addition, order the following optional functionality on each operations controller shelf when FVR functionality is required:

- NAV2 OC Tokenizing (NAV20007)

Operations controller IP/MRU software -

Order the following non-optional IP/MRU functional group:

- MRU1 Operations (MRU00100): order one copy for each IP/MRU Node.

4.2.3.16 SS7/ISUP controller software

The following optional SS7 functionalities are required for each SS7/ISUP controller:

SS7/ISUP controller NAVB005 software -

For each SS7/ISUP controller, order one of each of the following functional groups:

- NAV40 General Controller Base (NAV40000)

In addition, order the following optional software functionalities on each SS7/ISUP controller shelf:

- NAV40 AIX 1600 Gen License (NAV40006)
- NAV40 Time Synchronization (NAV40002)
- NAV40 Disk Monitor (NAV40003)

In addition, order the following optional software functionalities on each SS7/ISUP controller:

- NAV40 MTP-L2 (NAV40011)
- NAV40 SS7 ISUP XCOM (NAV40015)
- NAV40 MTP-L3 (NAV40022)
- NAV40 SS7 GUI (NAV40026)

In addition, order the following optional software functionalities on each pair of SS7/ISUP controller shelves:

- NAV40 MTP-L3 Redundant License (NAV40014)
- NAV40 SS7 GUI Redundant License (NAV40029)

In addition, order two of the following optional software functionality on each pair of SS7/ISUP controller shelves:

- NAV40 MTP-L2 Redundant License (NAV40012)

SS7/ISUP controller IP/MRU software -

No additional software is required.

4.2.3.17 Software for the service design environment

Refer to ECM 708, PowerView Tools Product for details about provisioning software for the service design environment.

This information is preliminary. The functionality to be ordered is based on the way in which the tools are to be used with the IP/MRU product. IP/MRU interworks with the VDS, FTP, AudioTransfer and Transaction Manager of the PowerView Tools. The software packaging of tools is being driven independently of the IP/MRU program.

4.2.3.18 External connectivity

NAV IP/MRU can run in a number of architectures connected to a number of different network components. Table 14 lists several of the architectures in which the IP/MRU can reside along with possible components.

Table 14. External connectivity

Protocol	Required Connectityt	Quantity Required
SR3511	PRI trunk	4 per IP/MRUmedia controller
SR3511	T1 trunk	4 per IP/MRU media controller
GR1129	PRI trunk	4 per IP/MRU media controller
SS7-ISUP	V.35 channel	1-4 per SS7/ISUP controller

4.2.4 Office Layout Information

Reference ECM 699 Network Application Vehicle (NAV) for NAV Base.

4.2.5 Traffic Tables

Reference Table 8 in this document.

4.3 Product/System Specification

4.3.1 Physical Characteristics

Not applicable.

4.3.2 EMI/Earthquake Information

Not applicable.

4.3.3 Sparing Information

For critical sparing, order one of each field replaceable unit (FPU) of the CPs provisioned in the shelves and cabinets (MFSP), one cooling module and one air filter module.

For recommended sparing, follow the rules as indicated in ECM 699, Network Application Base (NAV).

4.3.4 Power Feed and Fusing Requirements

Reference ECM 699 Network Application Vehicle (NAV) for NAV Base.

4.3.5 Current Drain Information

Reference ECM 699 Network Application Vehicle (NAV) for NAV Base.

4.4 Software Provisioning

4.4.1 Required Software Packages and Interdependencies

Select base and application-specific software for each controller type identified in the previous section.

Software within the MRU00020 non-CM load (NCL) is divided into two development release units (DRU). MRU02 DRU contains the IP/MRU application software. NAVB005 contains all the NAV Base 5 software.

4.4.1.1 NAV Bay software

For each bay (LAN bay, controller bay) that is equipped with an FSC order the following:

- NAV1 ISI pSOS License (NAV10017): order one copy per FSC.

4.4.1.2 Media Controller software

Media controller software comprises NAVB005 software and IP/MRU software.

Media Controller NAVB005 Software -

For each media controller, order one of the following functional groups:

- NAV1 General Controller Base (NAV10000)
- NAV3 Media Controller (NAV30000)

In addition, order the following optional NAV base functionalities:

- NAV1 UNIX 197-base License (NAV10009): order one copy per shelf.
- NAV3 Motorola VMEexec 3.0 License (NAV30065): order one copy per shelf.
- NAV3 Informix SC License (NAV30053): order one copy per DS0.
- NAV1 ISI pSOS License (NAV10017): order one copy for each DTL, and TSI card.
- NAV1 Local File Update (NAV10020): order one copy of this functionality for each shelf.
- NAV1 Time Synchronization (NAV10005): order one copy per shelf.
- NAV1 Disk Monitor (NAV10006): order one copy per shelf.
- NAV1 Generic Data Manager (NAV10021): order one copy per node.
- NAV3 IVR MMVI (NAV30017): order one copy for each DS-0 channel.
- NAV3 Digital Signal Processing (NAV30041): order one copy per shelf.
- NAV3 MTL (NAV30042): order one copy for each shelf equipped with one or more MTL card.
- NAV3 Network Interface (NAV30009): order one copy for each DTL card.
- NAV3 ISDN Bundle Retix License: (NAV30022): order one copy per shelf with PRI.
- NAV3 Voice-Prompt File System (NAV30028): order one copy for each shelf.
- NAV3 Audio Processing Module (NAV30029): order one copy for each shelf.

In addition, order the following optional functionality on each media controller shelf when PRI functionality is required:

- NAV3 DMS-100 Primary Rate Interface (NAV30021): order one copy per PRI D-channel.

In addition, order the following optional functionalities on each media controller shelf when speech recording functionality is required:

- NAV3 Encoding MMVI(NAV30019): order one copy for each DS-0 channel if speech recording is used.

In addition, order the following optional functionalities on each media controller shelf when FVR functionality is required.

- NAV3 Recognition MMVI (NAV30061): order one copy for each DS-0 channel if speech recognition is used.
- NAV3 Enhanced Talk-Through (NAV30072): order one copy for each DS-0 channel if speech recognition is used.
- NAV3 FVR License (NAV30049): order one copy for each FVSIR channel. The number of channels on each NME or SRP is engineered based on the vocabulary size.
- NAV3 FVSIR (NAV30054): order one copy for each FVSIR channel.
- NAV3 SC Tokenizing Subsystem (NAV30051): order one copy for each shelf.

In addition, order the following optional functionalities on each media controller shelf when SS7 functionality is ordered:

- NAV3 SS7 ISUP (NAV30067): order one copy for each media controller shelf that will be communicating with SS7/ISUP controllers.
- NAV3 MMS MC Transport (NAV30077): order one copy for each media controller shelf that will be communicating with SS7/ISUP controllers.

In addition, order the following optional functionality on each media controller shelf when SS7 functionality is required for use with an MTX switch.

- NAV3 SS7 ISUPRLT MTX 1 Port (NAV30070): order one copy per T1

Media Controller IP/MRU Software -

Order the following optional functional groups:

- MRU Media Controller (MRU00200): order one copy per shelf.
- MRU SIBBS (MRU00300): order one copy per shelf.

Depending on the protocol being used, order at most one of the following for each media controller shelf:

- SR3511 (MRU00206): order one copy for each DS-0 channel of IP/MRU functionality.
- GR1129 (MRU00207): order one copy for each DS-0 channel of IP/MRU functionality.

If SS7/ISUP signalling protocol is being used, order the following

- ISUP (MRU00208): order one copy per media controller shelf.
- MRU General Controller (MRU00400): order one copy per General Controller on the SS7/ISUP Bay.

If no protocol software package is ordered, the IP/MRU can run as a standalone service node.

In addition, order the following optional IP/MRU functionalities on each media controller depending on IP/MRU interface requirements:

- MRU T1 Interface (MRU00203): order one copy per DS-0 channel of IP/MRU functionality when simple T1 connection is required.
- MRU PRI Interface (MRU00204): order on copy per DS-0 channel of IP/MRU functionality when PRI connection is required.

In addition, order the following optional IP/MRU functionalities on each media controller depending on service requirements:

- MRU SIBBs - Basic IVR Package (MRU00301): order one copy for each DS-0 channel of IP/MRU functionality.
- MRU SIBBs - Speech Recording Package (MRU00302): order one copy for each DS-0 channel. Requires NAV30019.
- MRU SIBBs - Dialogs (MRU00303): order one copy for each DS-0 channel of IP/MRU functionality when DialogGenerator integration is required.
- MRU SIBBs - Call Processing (MRU00304): order one copy for each DS-0 channel of IP/MRU functionality when call processing, such as transfer, bridging, or outcall is required.
- MRU SIBBs - FVSIR Package (MRU00305): order one copy for each FVSIR channel. Requires NAV30049 and NAV30054.

4.4.1.3 Operations Controller software

Operations controller software for the IP/MRU comprises NAVB005 software and IP/MRU software.

Operations Controller NAVB005 software -

For each operations controller, order one of each of the following functional groups:

- NAV1 General Controller Base (NAV10000)
- NAV2 Operations Controller (NAV20001)

In addition, order the following optional software functionalities each operations controller shelf:

- NAV1 UNIX 197-base License (NAV10009)
- NAV1 Time Synchronization (NAV10005)
- NAV1 Disk Monitor (NAV10006)
- NAV2 OC Patching Subsystem (NAV20008)
- NAV2 OC Backup (NAV20009)
- NAV2 OC File Update (NAV20014)
- NAV2 Informix OC License (NAV20004)
- NAV2 Kermit License (NAV20013)

In addition, order the following optional functionality on each operations controller shelf when FVR functionality is required:

- NAV2 OC Tokenizing (NAV20007)

Operations Controller IP/MRU software -

Order the following non-optional IP/MRU functional group:

- MRU1 Operations (MRU00100): order one copy for each IP/MRU Node.

4.4.1.4 SS7/ISUP Controller shelf software

The following optional SS7 functionalities are required for each SS7/ISUP controller:

SS7/ISUP Controller NAVB005 software -

For each SS7/ISUP controller, order one of each of the following functional groups:

- NAV40 General Controller Base (NAV40000)

In addition, order the following optional software functionalities on each SS7/ISUP controller shelf:

- NAV40 AIX 1600 Gen License (NAV40006)
- NAV40 Time Synchronization (NAV40002)
- NAV40 Disk Monitor (NAV40003)

In addition, order the following optional software functionalities on each SS7/ISUP controller:

- NAV40 MTP-L2 (NAV40011)
- NAV40 SS7 ISUP XCOM (NAV40015)
- NAV40 MTP-L3 (NAV40022)

- NAV40 SS7 GUI (NAV40026)

In addition, order the following optional software functionalities on each pair of SS7/ISUP controller shelves:

- NAV40 MTP-L3 Redundant License (NAV40014)
- NAV40 SS7 GUI Redundant License (NAV40029)

In addition, order two of the following optional software functionality on each pair of SS7/ISUP controller shelves:

- NAV40 MTP-L2 Redundant License (NAV40012)

SS7/ISUP Controller IP/MRU software -

No additional software is required.

4.4.1.5 Software for the service design environment

Refer to ECM 708, PowerView Tools Product for details about provisioning software for the service design environment.

This information is preliminary. The functionality to be ordered is based on the way in which the tools are to be used with the IP/MRU product. IP/MRU interworks with the VDS, FTP, AudioTransfer and Transaction Manager of the PowerView Tools. The software packaging of tools is being driven independently of the IP/MRU program.

4.4.2 Software Usage Restrictions

The following lists some implementation-specific restrictions imposed by the IP/MRU application:

- The only default announcement segments provided by Nortel in MRU002 are telephone number digits. Other speech segments are not provided by Nortel.
- If a shelf is configured to use the GR1129 protocol, it must be dedicated to this role.
- There is a limit of one transient recording per call. These recordings are limited to five seconds.
- Flexible vocabulary recognition (FVR) support is limited to small vocabularies. The customer must work with Nortel to define these vocabularies. There are no tools supported which would allow customers to define their own vocabularies.
- The IP/MRU in an AIN 0.0/0.1 or 0.2 environment is restricted to interwork with a Bellcore ISCP or Nortel SCU using the SR3511 interface.

- The IP/MRU in an AIN 0.2 environment using the GR1129 interface is restricted to interwork with an AIN0.2 compliant SSP.

- The IP/MRU with an SS7/ISUP interface is restricted to interwork with an ANSI-ISUP compliant network.

The IP/MRU is not fully compliant to SR3511 version 5. Areas of non or partial compliancy include:

- The protocol does not indicate a maximum number of digits when saying digits. The IP/MRU supports 11 digits for phone numbers, money values of up to $9,999.99 and non-conversational numbers of up to 30 digits.

- Only a single language is supported in playing the various forms of digits (date, time, money, phone, non-conversational). Also, the format for the playing of these digits will be based on North American English standards.

- The IP/MRU only supports a single language for digit playback. The language indicator field is ignored.

- Text-to-Speech is not supported.

- All DTMF key maps must commence with either '*' or '#'. Also, all key map elements present in a given request must be of the same length.

- DTMF Start Timeout, Interdigit Timeout and Total Timeout are not definable on a per message basis. A user interface will be provided which allows an administrator to define the first two of these parameters for each shelf. Total Timeout is not supported.

- For RecordUser, the Voice key map elements present in a given request may only be of length one.

- Digit verification requires a caller to enter their password before continuing with a service. The protocol allows for the password to be configured on the IP or to be sent from the ECU. The IP/MRU only supports the password being supplied by the ECU.

The IP/MRU is not fully compliant to GR1129. Areas of non or partial compliancy include:

- Connect to Resource (CTR) connections will not be supported. These are used for non-call related and asynchronous transactions between the IP and the SSP. This capability is not supported by the DMS GR1129 implementation.

- Speech recognition is not supported.

- Text-to-speech is not supported.

- The maximum number of digits that can be specified for playback is 61. The GR1129 specification allows for up to 128 digits. Typical

use of these digits is for the playback of time, date, money and phone numbers.

- The number of DTMF keycodes is limited to two and the first key is restricted to '*' or'#'. Keycodes are used to indicate such things as abort collection, terminate collection, reset collection, ignore digits and backspace.
- The maximum number of digits which can be collected at once by the IP/MRU is 32.
- Hookflash indications and resource measurement parameters are ignored by the IP/MRU. The protocol does not indicate a specific handling for these parameters.

4.4.3 Memory Provisioning

Not applicable.

4.5 Real Time Impact

Not applicable.

Chapter 15

POWER EQUIPMENT AND GROUNDING

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POWER EQUIPMENT AND GROUNDING
Section Contents

1.0 ECM194 - -48V DC Distribution Pane - NT4X75AA 15-1
1.1 Overview 15-1
1.2 Hardware Provisioning 15-1
1.2.1 Hardware Usage Restrictions 15-1
1.2.2 Hardware Dependencies 15-1
1.2.2.1 P and C Side Port Requirements . . . 15-1
1.2.2.2 DMS BUS Port Requirements 15-1
1.2.2.3 Circuits Per Card 15-1
1.2.2.4 Discrimination Numbering 15-1
1.2.3 Provisioning Considerations 15-1
1.2.4 Office Layout Information 15-1
1.2.5 Traffic Tables 15-1
1.3 Product/System Specification 15-2
1.3.1 Physical Characteristics 15-2
1.3.2 EMI/Earthquake Information 15-2
1.3.3 Sparing Information 15-2
1.3.4 Power Feed and Fusing Requirements 15-2
1.3.5 Current Drain Information 15-2
1.4 Software Provisioning 15-2
1.4.1 Required Software Packages and Interdependencies 15-2
1.4.2 Software Usage Restrictions 15-2
1.4.3 Memory Provisioning 15-2
1.5 Real Time Impact 15-2

2.0 ECM208 - AC Ground Isolation 15-3
2.1 Overview 15-3
2.2 Hardware Provisioning 15-3
2.2.1 Hardware Usage Restrictions 15-3
2.2.2 Hardware Dependencies 15-12
2.2.2.1 P and C Side Port Requirements . . . 15-12
2.2.2.2 DMS BUS Port Requirements 15-12
2.2.2.3 Circuits Per Card 15-12
2.2.2.4 Discrimination Numbering 15-12
2.2.3 Provisioning Considerations 15-12
2.2.4 Office Layout Information 15-12
2.2.5 Traffic Tables 15-12
2.3 Product/System Specification 15-12
2.3.1 Physical Characteristics 15-12
2.3.2 EMI/Earthquake Information 15-12
2.3.3 Sparing Information 15-12
2.3.4 Power Feed and Fusing Requirements 15-12
2.3.5 Current Drain Information 15-12
2.4 Software Provisioning 15-12
2.4.1 Required Software Packages and Interdependencies 15-12
2.4.2 Software Usage Restrictions 15-12
2.4.3 Memory Provisioning 15-12
2.5 Real Time Impact 15-12

3.0 ECM215 - AC Hardware for 240V, 50 Hz Outlets 15-13
3.1 Overview 15-13
3.2 Hardware Provisioning 15-13
3.2.1 Hardware Usage Restrictions 15-13
3.2.2 Hardware Dependencies 15-13
3.2.2.1 P and C Side Port Requirements . . . 15-13
3.2.2.2 DMS BUS Port Requirements 15-13
3.2.2.3 Circuits Per Card 15-13
3.2.2.4 Discrimination Numbering 15-13
3.2.3 Provisioning Considerations 15-14
3.2.4 Office Layout Information 15-14
3.2.5 Traffic Tables 15-14
3.3 Product/System Specification 15-14
3.3.1 Physical Characteristics 15-14
3.3.2 EMI/Earthquake Information 15-14
3.3.3 Sparing Information 15-14
3.3.4 Power Feed and Fusing Requirements 15-14
3.3.5 Current Drain Information 15-14
3.4 Software Provisioning 15-14
3.4.1 Required Software Packages and Interdependencies 15-14
3.4.2 Software Usage Restrictions 15-14
3.4.3 Memory Provisioning 15-14
3.5 Real Time Impact 15-14

4.0 ECM289 - Isolated System Grounding (ISG) 15-15
4.1 Overview 15-15
4.2 Hardware Provisioning 15-23
4.2.1 Hardware Usage Restrictions 15-23
4.2.2 Hardware Dependencies 15-23
4.2.2.1 P and C Side Port Requirements . . . 15-23
4.2.2.2 DMS BUS Port Requirements 15-23
4.2.2.3 Circuits Per Card 15-23
4.2.2.4 Discrimination Numbering 15-23
4.2.3 Provisioning Considerations 15-23
4.2.3.1 Provisioning - Non-ISG Method 15-24
4.2.3.2 Provisioning - ISG Method 15-25
4.2.3.3 Provisioning Hardware - Host Office 15-27
4.2.3.4 Provisioning Hardware - Remote Office 15-29
4.2.3.5 NT0X0013 - Isolation Hardware 15-29
4.2.3.6 NT0X0018 - Cable Termination Hardware 15-30
4.2.3.7 Digital Carrier Equipment Frame (DCE) Provisioning (NT0X46AB) 15-30
4.2.3.8 PDC Equalizer Cables 15-30
4.2.3.9 Power Plant Provisioning 15-31
4.2.3.10 Switchboard Cabling 15-31
4.2.3.11 Switchboard Cabling Remarks 15-33
4.2.3.12 Switchboard Cabling Notes: 15-34
4.2.3.13 Miscellaneous Frame Equipment . . . 15-36
4.2.4 Office Layout Information 15-37
4.2.5 Traffic Tables 15-37
4.2.6 ISG Upgrade Information 15-37

4.3 ISG Upgrade Tables (Host Office Frames) 15-39
4.3.1 TO UPGRADE: NT0X41AC/AJ 15-39
4.3.2 TO UPGRADE: NT3X45AA/CA/DA/DW/EA/EW 15-40
4.3.3 TO UPGRADE: NT0X41AB 15-40
4.3.4 TO UPGRADE: NT0X41AK 15-41
4.3.5 TO UPGRADE: NT3X45AB/CB/DB 15-41
4.3.6 TO UPGRADE: NT0X43AA 15-42
4.3.7 TO UPGRADE: NT0X43AB/AC/AD 15-42
4.3.8 TO UPGRADE: MAGNETIC TAPE DRIVES MOUNTED ON 15-43
4.3.9 TO UPGRADE: DISK DRIVE UNITS MOUNTED ON IOE FRAME: 15-44
4.3.10 TO UPGRADE: OTHER EQUIPMENT MOUNTED ON IOE FRAME: 15-45
4.3.11 TO UPGRADE: NT0X42AA 15-46
4.3.12 TO UPGRADE: NT0X48AA/AB/AC/AG/AH/AJ 15-47
4.3.13 TO UPGRADE: NT5X13AA/BA 15-47
4.3.14 TO UPGRADE: NT8X10AA 15-48
4.3.15 TO UPGRADE: NT0X56AA 15-48
4.3.16 TO UPGRADE: NT0X18AA/CB 15-48
4.3.17 TO UPGRADE: NT0X46AA/AB 15-49
4.3.18 TO UPGRADE: NT0X46AA/AB 15-49
4.3.19 TO UPGRADE EQUIPMENT MOUNTED ON TME FRAME: 15-50
4.3.20 TO UPGRADE: NT6X01AA LGE/DTE/LTE/SME 15-51
4.3.21 TO UPGRADE: NT6X01AA (200 OFFICES ONLY) . . 15-52
4.3.22 TO UPGRADE: NT0X45AA/AB/AC/AD/AE 15-52
4.3.23 TO UPGRADE: NT6X03AA/CA/RA/RB 15-53
4.3.24 TO UPGRADE: NT6x06AA/AB/AC 15-53
4.3.25 TO UPGRADE: NT6X09AA 15-54
4.3.26 TO UPGRADE: NT6X31AA 15-54
4.3.27 TO UPGRADE: NT6X09AA 15-55
4.3.28 TO UPGRADE: NT6X29AA 15-55
4.3.29 TO UPGRADE: NT5X56AA 15-56
4.3.30 TO UPGRADE EQUIPMENT MOUNTED ON KSE FRAME: 15-57
4.3.31 TO UPGRADE: NT5X12AA/AB 15-57
4.3.32 TO UPGRADE: NT0X85AA 15-58
4.3.33 TO UPGRADE: NT0X02AA/AB 15-58
4.3.34 TO UPGRADE EQUIPMENT MOUNTED ON DEDICATED MIS 15-59
4.3.35 TO UPGRADE: NT0X02AA/AB 15-60
4.3.36 TO UPGRADE EQUIPMENT MOUNTED ON STANDARD MIS FRAME: 15-61
4.3.37 MISCELLANEOUS EQUIPMENT REQUIRING NO 15-62
4.3.38 OTHER OUTSIDE VENDOR SUPPLIED EQUIPMENT ON MIS 15-64
4.3.39 TO UPGRADE: NTFX40BA 15-64
4.4 ISG Upgrade Tables (Supernode Frames) 15-65
4.4.1 TO UPGRADE SUPERNODE FRAMES IN THEIR OWN LINE-UP: 15-65
4.4.2 TO UPGRADE SUPERNODE FRAMES IN THEIR OWN LINE-UP: 15-65
4.4.3 TO UPGRADE SUPERNODE FRAMES IN LINE-UP WITH 15-66
4.4.4 TO UPGRADE: NT9X01FA 15-66
4.5 ISG Upgrade Tables (Remote Office Frames) 15-67
4.5.1 TO UPGRADE: NT0X02AB 15-67

4.5.2 TO UPGRADE EQUIPMENT MOUNTED ON RME/RSE FRAME: 15-67
4.5.3 TO UPGRADE: NT6X10AC 15-69
4.5.4 TO UPGRADE: NT6X14AA 15-69
4.5.5 TO UPGRADE: NT0X45BA/BB/BE/BH 15-70
4.5.6 TO UPGRADE: NT0X45BC/BF/BJ 15-70
4.5.7 TO UPGRADE: NT0X45BD/BG/BK 15-71
4.6 Product/System Specification 15-71
4.6.1 Physical Characteristics 15-71
4.6.2 EMI/Earthquake Information 15-71
4.6.3 Sparing Information 15-71
4.6.4 Power Feed and Fusing Requirements 15-71
4.6.5 Current Drain Information 15-71
4.7 Software Provisioning 15-71
4.7.1 Required Software Packages and Interdependencies 15-72
4.7.2 Software Usage Restrictions 15-72
4.7.3 Memory Provisioning 15-72
4.8 Real Time Impact 15-72

5.0 ECM496 - Power Plant Provisioning (Host and Remote) . . . 15-73
5.1 Overview 15-73
5.2 Hardware Provisioning 15-74
5.2.1 Hardware Usage Restrictions 15-74
5.2.2 Hardware Dependencies 15-74
5.2.2.1 P and C Side Port Requirements . . . 15-74
5.2.2.2 DMS BUS Port Requirements 15-74
5.2.2.3 Circuits Per Card 15-74
5.2.2.4 Discrimination Numbering 15-74
5.2.3 Provisioning Considerations 15-74
5.2.4 Office Layout Information 15-76
5.2.5 Power Plant Calculations 15-76
5.2.6 Traffic Tables 15-81
5.3 Product/System Specification 15-81
5.3.1 Physical Characteristics 15-81
5.3.2 EMI/Earthquake Information 15-81
5.3.3 Sparing Information 15-81
5.3.4 Power Feed and Fusing Requirements 15-81
5.3.5 Current Drain Information 15-82
5.4 Software Provisioning 15-82
5.4.1 Required Software Packages and Interdependencies 15-82
5.4.2 Software Usage Restrictions 15-82
5.4.3 Memory Provisioning 15-82
5.5 Real Time Impact 15-82

6.0 ECM542 - MERIDIAN POWER DISTRIBUTION CENTER (MPDC) 15-83
6.1 Overview 15-83
6.2 Hardware Provisioning 15-83
6.2.1 Hardware Usage Restrictions 15-83
6.2.2 Hardware Dependencies 15-83
6.2.2.1 P and C Side Port Requirements . . . 15-84
6.2.2.2 DMS BUS Port Requirements 15-84

6.2.2.3 Circuits Per Card 15-84
6.2.2.4 Discrimination Numbering 15-84
6.2.3 Provisioning Considerations 15-84
6.2.4 Office Layout Information 15-84
6.2.4.1 FRONT ELEVATIONS OF THE NTNX16AA AND AB MPDC 15-84
6.2.4.2 INSTALLATION ENGINEERING RULES FOR MAIN POWER FEEDS 15-86
6.2.5 Traffic Tables 15-87
6.3 Product/System Specification 15-87
6.3.1 Physical Characteristics 15-87
6.3.2 EMI/Earthquake Information 15-90
6.3.3 Sparing Information 15-90
6.3.4 Power Feed and Fusing Requirements 15-90
6.3.5 Current Drain Information 15-91
6.3.5.1 NOISE LIMITATION 15-92
6.4 Software Provisioning 15-92
6.4.1 Required Software Packages and Interdependencies 15-92
6.4.2 Software Usage Restrictions 15-92
6.4.3 Memory Provisioning 15-92
6.5 Real Time Impact 15-93

7.0 ECM631 - Power Distribution Centers 15-94
7.1 Overview 15-94
7.1.1 Power Distribution Center Ordering with Building Blocks 15-95
7.2 Hardware Provisioning 15-95
7.2.1 Hardware Usage Restrictions 15-95
7.2.2 Hardware Dependencies 15-97
7.2.2.1 P and C Side Port Requirements . . . 15-97
7.2.2.2 DMS BUS Port Requirements 15-97
7.2.2.3 Circuits Per Card 15-97
7.2.2.4 Discrimination Numbering 15-97
7.2.3 Provisioning Considerations 15-97
7.2.3.1 PDC Building Block Definition 15-97
7.2.4 Office Layout Information 15-103
7.2.5 Traffic Tables 15-103
7.3 Product/System Specification 15-103
7.3.1 Physical Characteristics 15-103
7.3.2 EMI/Earthquake Information 15-103
7.3.3 Sparing Information 15-104
7.3.4 Power Feed and Fusing Requirements 15-104
7.3.5 Current Drain Information 15-104
7.4 Software Provisioning 15-104
7.4.1 Required Software Packages and Interdependencies 15-104
7.4.2 Software Usage Restrictions 15-104
7.4.3 Memory Provisioning 15-104
7.5 Real Time Impact 15-104

8.0 ECM800 - DMS-100 Product Current Drain 15-105

8.1 Overview 15-105
8.2 Hardware Provisioning 15-105
8.2.1 Hardware Usage Restrictions 15-105
8.2.2 Hardware Dependencies 15-105
8.2.2.1 P and C Side Port Requirements . . 15-105
8.2.2.2 DMS BUS Port Requirements 15-105
8.2.2.3 Circuits Per Card 15-105
8.2.2.4 Discrimination Numbering 15-105
8.2.3 Provisioning Considerations 15-106
8.2.4 Office Layout Information 15-106
8.2.5 Traffic Tables 15-106
8.3 Product/System Specification 15-106
8.3.1 Physical Characteristics 15-106
8.3.2 EMI/Earthquake Information 15-106
8.3.3 Sparing Information 15-106
8.3.4 Power Feed and Fusing Requirements 15-106
8.3.5 Current Drain Information 15-106
8.4 Software Provisioning 15-108
8.4.1 Required Software Packages and Interdependencies 15-108
8.4.2 Software Usage Restrictions 15-108
8.4.3 Memory Provisioning 15-108
8.5 Real Time Impact 15-108

1.0 ECM194 - -48V DC Distribution Pane - NT4X75AA

1.1 Overview

A new -48V DC Distribution Panel, the NT4X75AA, is available. This fuse panel was designed for remote TOPS locations, but can be used for other applications. The panel contains fuse positions to support 62 TOPS positions. The panel also contains two (2) fuses used for alarms.

The NT4X75AA is a wall (or column) mounted fuse panel. The S.A.E. should order the NT4X75AA's in the CI MEL. The E.A.E. will then order the panel(s) and fuses (fuses are ordered per the MS4X75AA). The E.A.E. will also cable from the fuse panel to the TOPS positions. The alarm leads will be cabled by the E.A.E. to the DF. Power Engineering will cable from the power board to the fuse panel. B.S.E.'s will locate the fuse panel on the on the floor plan.

Attached are copies of the MS, AD, IS, and SL drawings.

1.2 Hardware Provisioning

1.2.1 Hardware Usage Restrictions

1.2.2 Hardware Dependencies

1.2.2.1 P and C Side Port Requirements

1.2.2.2 DMS BUS Port Requirements

Not applicable

1.2.2.3 Circuits Per Card

1.2.2.4 Discrimination Numbering

1.2.3 Provisioning Considerations

1.2.4 Office Layout Information

Not applicable.

1.2.5 Traffic Tables

Not applicable.

1.3 Product/System Specification

1.3.1 Physical Characteristics

1.3.2 EMI/Earthquake Information

1.3.3 Sparing Information

Not applicable.

1.3.4 Power Feed and Fusing Requirements

1.3.5 Current Drain Information

1.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

1.4.1 Required Software Packages and Interdependencies

1.4.2 Software Usage Restrictions

1.4.3 Memory Provisioning

Not applicable.

1.5 Real Time Impact

2.0 ECM208 - AC Ground Isolation

2.1 Overview

2.2 Hardware Provisioning

2.2.1 Hardware Usage Restrictions

Non Isolated Ground AC Hardware

Light Fixture Assemblies

NT0X49AF
NT0X49AG
NT0X49AH
NT0X49AU
NT0X49AV

In ECM156 the above light fixture assemblies were shown to be manufacture discontinued. However, they are a standard product and can be ordered when required.

Frame Common Assemblies

NT0X07BA
NT0X07BB
NT0X07BC
NT0X07BD
NT0X07BE
NT0X07BF
NT0X07BG
NT0X07BH
NT0X07BJ
NT0X07BK
NT0X07BL
NT0X07BM
NT0X07AY

In ECM156 the above frame common assemblies were shown to be manufacture discontinued. However, they are a standard product and can be ordered when required.

Frame End Guard Assemblies

| NT0X73AA (MD)

NT0X73AB
NT0X73AD

In ECM156 the above frame end guard assemblies were shown to be manufacture discontinued. However, they are a standard product and can be ordered when required. Per EC 018-47273, the NT0X73AA is now MD'd.

Frame Common Installation Assemblies

NT0X08AZ

In ECM158 the above frame common installation assembly was shown to be manufacture discontinued. However, it is a standard product and can be ordered when required.

Product Change Kits To Provide AC Ground Isolation

Isolation Kit For AC Hardware NT0X07EA

This product change kit provides hardware modifications to AC hardware (NT0X07BA-BM) in order to achieve AC ground isolation.

This kit can be applied to NT0X07BA-BM in the field if desired by the customer.

This kit should be applied in conjunction with NT1X69EA-EF (isolation kits for end guard inserts) and NT0X49EF,EG,EU,EV (isolation kits for light fixtures).

Order the above on spec 116.

Attached are the following:

PC0X07EA
SL0X07EA

Isolation Kit For Frame Appliance Outlets NT0X07EY

This product change kit provides hardware modifications to Frame Appliance Outlets (NT0X07AY) in order to achieve AC ground isolation.

This kit can be applied to NT0X07AY in the field if desired by the customer.

This kit should be applied in conjunction with NT1X69EA-EF (isolation kits for end guard inserts) and NT0X49EF,EG,EU,EV (isolation kits for light fixtures).

Order the above on spec 116.

Attached are the following:

PC0X07EY
SL0X07EY

Isolation Kit For 2 Foot Dummy Light Fixture NT0X49EF

This product change kit provides hardware modifications to 2 foot dummy light fixture (NT0X49AF) in order to accomplish AC ground isolation.

This kit can be applied to NT0X49AF in the field if desired by the customer.

Order the above on spec 411 or 116 (U.S.) as appropriate.

Attached are the following:

PC0X49EF
SL0X49EF

Isolation Kit For 4 Foot Dummy Light Fixture NT0X49EG

This product change kit provides hardware modifications to 4 foot dummy light fixture (NT0X49AG) in order to accomplish AC ground isolation.

This kit can be applied to NT0X49AG in the field if desired by the customer.

Order the above on spec 411 or 116 (U.S.) as appropriate.

Attached are the following:

PC0X49EG
SL0X49EG

Isolation Kit For 2 Foot Light Fixture NT0X49EU

This product change kit provides hardware modifications to 2 foot light fixture (NT0X49AU) in order to accomplish AC ground isolation.

This kit can be applied to NT0X49AU in the field if desired by the customer.

Order the above on spec 411 or 116 (U.S.) as appropriate.

Attached are the following:

PC0X49EU
SL0X49EU

Isolation Kit For 4 Foot Light Fixture NT0X49EV

This product change kit provides hardware modifications to 4 foot light fixture (NT0X49AV) in order to accomplish AC ground isolation.

This kit can be applied to NT0X49AV in the field if desired by the customer.

Order the above on spec 411 or 116 (U.S.) as appropriate.

Attached are the following:

PC0X49EV
SL0X49EV

Ground Isolation Kit For End Guard Insert Assembly NT1X69AA NT1X69EA

This product change kit provides hardware modifications to end guard insert assembly (NT1X69AA) in order to accomplish AC ground isolation.

This kit can be applied to NT1X69AA in the field if desired by the customer.

Order the above on spec 116.

Attached are the following:

PC1X69EA
SL1X69EA

Ground Isolation Kit For End Guard Insert Assembly NT1X69AC NT1X69EC

This product change kit provides hardware modifications to end guard insert assembly (NT1X69AC) in order to accomplish AC ground isolation.

This kit can be applied to NT1X69AC in the field if desired by the customer.

Order the above on spec 116.

Attached are the following:

PC1X69EC
SL1X69EC

Ground Isolation Kit For End Guard Insert Assembly NT1X69AD NT1X69ED

This product change kit provides hardware modifications to end guard insert assembly (NT1X69AD) in order to accomplish AC ground isolation.

This kit can be applied to NT1X69AD in the field if desired by the customer.

Order the above on spec 116.

Attached are the following:

PC1X69ED
SL1X69ED

Ground Isolation Kit For End Guard Insert Assembly NT1X69AE NT1X69EE

This product change kit provides hardware modifications to end guard insert assembly (NT1X69AE) in order to accomplish AC ground isolation.

This kit can be applied to NT1X69AE in the field if desired by the customer.

Order the above on spec 116.

Attached are the following:

PC1X69EE
SL1X69EE

Ground Isolation Kit For End Guard Insert Assembly NT1X69AF NT1X69EF

This product change kit provides hardware modifications to end guard insert assembly (NT1X69AF) in order to accomplish AC ground isolation.

This kit can be applied to NT1X69AF in the field if desired by the customer.

Order the above on spec 116.

Attached are the following:

PC1X69EF
SL1X69EF

PRODUCT CHANGE KIT REQUIRED TO PROVIDE AC GROUND ISOLATION	NON ISOLATED GROUND AC HARDWARE TO WHICH PC KIT WILL BE APPLIED	EQUIVALENT AC GROUND ISOLATION HARDWARE
NT0X07EA	NT0X07BA	NT0X07DA
NT0X07EA	NT0X07BB	NT0X07DB
NT0X07EA	NT0X07BC	NT0X07DC
NT0X07EA	NT0X07BD	NT0X07DD
NT0X07EA	NT0X07BE	NT0X07DE
NT0X07EA	NT0X07BF	NT0X07DF
NT0X07EA	NT0X07BG	NT0X07DG
NT0X07EA	NT0X07BH	NT0X07DH
NT0X07EA	NT0X07BJ	NT0X07DJ
NT0X07EA	NT0X07BK	NT0X07DK
NT0X07EA	NT0X07BL	NT0X07DL
NT0X07EA	NT0X07BM	NT0X07DM
NT0X07EY	NT0X07AY	NT0X07DY
NT0X49EF	NT0X49AF	NT0X49DF
NT0X49EG	NT0X49AG	NT0X49DG
NT0X49EU	NT0X49AU	NT0X49DU
NT0X49EV	NT0X49AV	NT0X49DV
NT1X69EA	NT1X69AA	NT1X69DA
NT1X69EC	NT1X69AC	NT1X69DC
NT1X69ED	NT1X69AD	NT1X69DD
NT1X69EE	NT1X69AE	NT1X69DE
NT1X69EF	NT1X69AF	NT1X69DF

TABLE 1

SUMMARY OF WHICH PRODUCT CHANGE KIT CAN BE APPLIED TO WHICH NON ISOLATED GROUND AC HARDWARE AND EQUIVALENT AC GROUND ISOLATION HARDWARE

NON ISOLATED GROUND FRAME COMMON ASSEMBLIES	NON ISOLATED GROUND END GUARD INSERT ASSEMBLY	AC ISOLATED GROUND FRAME COMMON ASSEMBLIES	AC ISOLATED GROUND END GUARD INSERT ASSEMBLY
NT0X07BA	NT1X69AA	NT0X07DA	NT1X69DA
NT0X07BB	NT1X69AB	NT0X07DB	NT1X69DB
NT0X07BC	NT1X69AA	NT0X07DC	NT1X69DA
NT0X07BD	NT1X69AB	NT0X07DD	NT1X69DB
NT0X07BE	NT1X69AC	NT0X07DE	NT1X69DC
NT0X07BF	NT1X69AC	NT0X07DF	NT1X69DC
NT0X07BG	NT1X69AD	NT0X07DG	NT1X69DD
NT0X07BH	NT1X69AE	NT0X07DH	NT1X69DE
NT0X07BJ	NT1X69AD	NT0X07DJ	NT1X69DD
NT0X07BK	NT1X69AE	NT0X07DK	NT1X69DE
NT0X07BL	NT1X69AF	NT0X07DL	NT1X69DF
NT0X07BM	NT1X69AF	NT0X07DM	NT1X69DF

TABLE 2

NON ISOLATED GROUND AND AC ISOLATED GROUND VERSIONS OF FRAME COMMON ASSEMBLIES AND END GUARD INSERT ASSEMBLIES

Notes for Table 2:

1. The end guard insert assemblies are contained in the stock lists of the previous corresponding frame common assemblies.
2. Since the NT1X69AB end guard insert assembly is a dummy unit, no product change kit is required to provide AC ground isolation.

2.2.2 Hardware Dependencies

2.2.2.1 P and C Side Port Requirements

2.2.2.2 DMS BUS Port Requirements

Not applicable

2.2.2.3 Circuits Per Card

2.2.2.4 Discrimination Numbering

2.2.3 Provisioning Considerations

2.2.4 Office Layout Information

Not applicable.

2.2.5 Traffic Tables

Not applicable.

2.3 Product/System Specification

2.3.1 Physical Characteristics

2.3.2 EMI/Earthquake Information

2.3.3 Sparing Information

Not applicable.

2.3.4 Power Feed and Fusing Requirements

2.3.5 Current Drain Information

2.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

2.4.1 Required Software Packages and Interdependencies

2.4.2 Software Usage Restrictions

2.4.3 Memory Provisioning

Not applicable.

2.5 Real Time Impact

3.0 ECM215 - AC Hardware for 240V, 50 Hz Outlets

3.1 Overview

This ECM introduces AC hardware for 240 volt, 50 Hertz outlets (isolated ground) in the end guards of offices in the United Kingdom.

Frame base appliance outlets are not required on the base of frames for U.K. offices.

3.2 Hardware Provisioning

3.2.1 Hardware Usage Restrictions

3.2.2 Hardware Dependencies

AC ISOLATED GROUND FRAME COMMON ASSEMBLIES	AC ISOLATED GROUND END GUARD INSERT ASSEMBLY	AC ISOLATED GROUND FRAME COMMON ASSEMBLIES (U.K.)	AC ISOLATED GROUND END GUARD INSERT ASSEMBLY (U.K.)
NT0X07DG	NT1X69DD	NT0X07GG	NT1X69GD
NT0X07DH	NT1X69DE	NT0X07GH	NT1X69GE
NT0X07DJ	NT1X69DD	NT0X07GJ	NT1X69GD
NT0X07DK	NT1X69DE	NT0X07GK	NT1X69GE
NT0X07DL	NT1X69DF	NT0X07GL	NT1X69GF
NT0X07DM	NT1X69DF	NT0X07GM	NT1X69GF

TABLE 1

CURRENT AC ISOLATED GROUND AND U.K. AC ISOLATED GROUND VERSIONS OF FRAME COMMON ASSEMBLIES AND END GUARD INSERT ASSEMBLIES

Notes for Table 1:

1. The end guard insert assemblies are contained in the stock lists of the previous corresponding frame common assemblies.

3.2.2.1 P and C Side Port Requirements

3.2.2.2 DMS BUS Port Requirements

Not applicable

3.2.2.3 Circuits Per Card

3.2.2.4 Discrimination Numbering

3.2.3 Provisioning Considerations

3.2.4 Office Layout Information

Not applicable.

3.2.5 Traffic Tables

Not applicable.

3.3 Product/System Specification

3.3.1 Physical Characteristics

3.3.2 EMI/Earthquake Information

3.3.3 Sparing Information

Not applicable.

3.3.4 Power Feed and Fusing Requirements

3.3.5 Current Drain Information

3.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

3.4.1 Required Software Packages and Interdependencies

3.4.2 Software Usage Restrictions

3.4.3 Memory Provisioning

Not applicable.

3.5 Real Time Impact

4.0 ECM289 - Isolated System Grounding (ISG)

4.1 Overview

Presently, in the stocklist of most DMS-100F frames there is a busbar assembly called a logic return (where shelf logic grounds are connected) which runs vertically up but electrically isolated within each frame. This busbar is terminated with a braid connection to another copper busbar located above each frame called the frame ground. Each overhead frame ground busbar is connected to an adjacent frame's overhead busbar in an equipment lineup. Each lineup's frame ground is connected to a local Power Distribution Center (PDC) where a final connection is made to the Central Office (CO) ground.

A new grounding topology is being applied to DMS family systems. The basic principles of the new grounding system are as follows:

1. The logic return is to be isolated from the framework ground overhead busbar.

2. Miscellaneous hardware such as HP MTDs, Digital Alarm Scanner (DAS) etc. must be electrically isolated from the framework upon which they are mounted.

3. Individual frame line ups must be electrically isolated by the use of isolation hardware.

4. LCE, RLCM, LME, RLM, ISLM and TME frames have the logic return referenced to the battery return at the frame.

5. When ISG is being applied to an office, LCE frames and their associated controller frames (i.e. LGE/LTE/RCE/RCME/SME) must be served by the same PDC frame.

   Similarly, the MS7E frames and their associated ST7E frames must be powered from the same PDC frame. However, the MS6E frames and the ST6E frames do not need to be powered from the same PDC frame.

   In an ISDN application, the ISLM and the IAC controller frame must be grouped together on the same PDC frame.

   In addition, the LTE, LGE, DTE, RCE, SME, RCME, IAC, MS7E and ST7E frame logic returns must be connected to the battery return plate of the same PDC from which they are powered.

   Also, the CCC, MEX, IOE, MOE, Dedicated MIS, and Supernode frames must all be cabled to the same LRB. This LRB shall be located above the IOE frame, and dedicated to the above mentioned frames only. No other frame type can ever be cabled to this particular LRB. Other frame types in the same lineup

must be cabled to a separate LRB. Both of these LRBs must be separately cabled to the LRE.

6. Only current loop VDU or printers may be connected directly to the IOC modules. Current loop devices may be powered from non-isolated inverters located in Standard MIS Frames.

   EIA ports (for VDU or printers) must be connected through modems. No direct connections from VDU or printers to EIA ports are allowed. (Note - If a local EIA modem to modem arrangement is desired, both the DMS modem and the device end modem cannot co-exist in DMS frames. The device modem must be located away from any DMS frame.) The device end modem may be powered from a non-isolated inverter located in a Standard MIS Frame. However, the DMS modem must be powered from an isolated inverter located in a Dedicated MIS/Modem Frame. This Dedicated MIS/Modem Frame can only contain modems and the inverters used to power these modems.

7. For the isolation of modem equipment, the following provisioning guidelines must adhere;

   Canadian Applications - (Host & Remote Offices)

   Provision modem shelves on either an Input/Output Equipment Frame (IOE) or a Modem Equipment Frame (MOE). Refer to ECM 321 for provisioning guidelines on the Modem Equipment frame. For mounting modems on IOE frames the following rules apply:

   a. DC Modem Shelves must be isolated from the equipment frame and the shelf chassis must be connected to the logic return busbar. One (1) NT4X2591 Data Unit Grounding and Mounting Hardware Kit must be provided per DC modem shelf provisioned to isolate the shelf from the frame and to connect the chassis to the logic return busbar. The DC modem shelves must be fused directly to the PDC.

   b. AC Modem Shelves must be powered from an inverter that is mounted on the same frame. The inverter must be isolated from the framework and its chassis must be connected to the logic return busbar. Provision one (1) NT0X0009 Cable assembly for an inverter located in position 04 on an IOE frame. Provision one (1) NT0X4306 Cable Assembly for an inverter located in any other position on the IOE Frame.

   U.S. Applications - (Remote Offices)

   Initial Remote offices (RLCM,RLM,RSC) can provide modem equipment and associated inverters in any RME/RSE frame only if a logic ground bar is provisioned with the frame. Note that modems,VDU,printers or other devices connected to modems (through the EIA connection) must be powered from isolated DMS-100F supplied inverters. For the modems and inverters in

a Remote Office, apply the same grounding rules that are used in Host Offices.

U.S. Applications - (Host Offices)

Provision modem equipment on a Miscellaneous Equipment Frame (MIS), NT0X02AB, dedicated for modem equipment, and enhanced for ISG as follows;

a. A Ground Material Assembly, NT0X9594, which contains a logic return busbar must be provisioned for each MIS Frame that is dedicated for modem equipment.

b. DC Modem Shelves must be isolated from the equipment frame and the shelf chassis must be connected to the logic return busbar. One (1) NT0X0050 Modem Shelf Grounding Hardware Kit must be provided per DC modem shelf to isolate the shelf from the frame and to connect the chassis to the logic return busbar.

c. AC Modem Shelves must be isolated from the equipment frame and the shelf chassis must be connected to the logic return busbar. One (1) NT0X0050 Modem Shelf Grounding Hardware Kit must be provided per AC modem shelf to isolate the shelf from the frame and to connect the chassis to the logic return busbar.

   AC Modem Shelves must be powered from an inverter that is mounted on the same frame. The inverter must be isolated from the framework and its chassis must be connected to the logic return busbar. Provision one (1) NT0X0009 Cable assembly per NT0X87AA inverter or one NTMX1665 isolation kit per LaMarche inverter located in a MIS frame.

d. The Digital Alarm Scanner (DAS) unit must be mounted on a Dedicated MIS/Modem Frame enhanced for ISG. The DAS unit must be isolated from the equipment frame and the unit chassis must be connected to the logic return busbar using a NT0X9502 cable assembly.

e. Common Equipment Shelves must be isolated from the equipment frame and the shelf chassis must be connected to the logic return busbar. For this purpose, one (1) NT0X0009 cable assembly has been provided in the stocklist of each common equipment shelf.

   Common Equipment Shelves must be powered from an inverter that is mounted on the same frame. The inverter must be isolated from the framework and its chassis must be connected to the logic return busbar. Provision one (1) NT0X0009 Cable assembly per NT0X87AA inverter or one NTMX1665 isolation kit per LaMarche inverter located in a MIS frame.

8. If a Supernode is equipped with the Enhanced RTIF circuit pack (NT9X26AB) and the 20mA current loop local port is used, an approved 2 mA current loop equipped VDT can be cabled directly to the Supernode RTIF. This connection is ISG compliant. (NOTE: The local port of the Enhanced RTIF circuit pack (NT9X26AB) can be used as either a 20mA current loop or RS232C EIA port.)

   If the Supernode is equipped with the NT9X26AA RTIF circuit pack or the RS232C local port of the NT9X26AB is used, the following paragraph still applies to maintain ISG compliance:

   RTIF terminals connected to a Supernode via EIA must be connected through back to back modems or RAD units (U.S. Only). In addition, the terminal and the stand alone modem must be powered from an inverter mounted on a MIS frame, See Figure 1.

   NT recommends provisioning one (1) inverter for each RTIF terminal, and these inverters shall alternate between A-power and B-power.

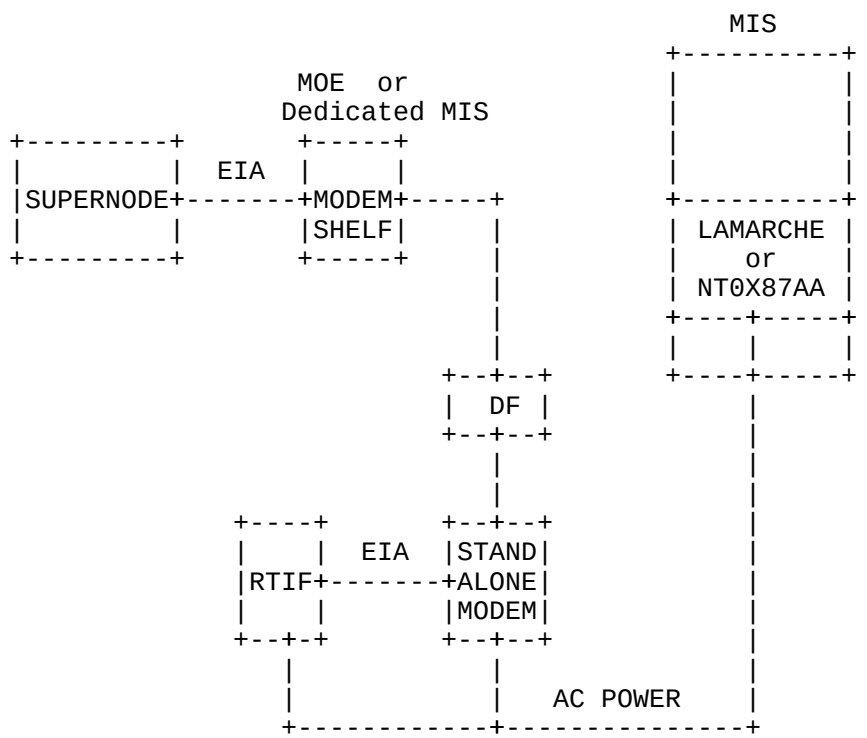

Figure 1. RTIF Terminal Connection

9. Digital Packet Network (DPN) equipment that is colocated with DMS equipment must conform to the DMS Family grounding requirements:

   - - signal ground isolated from framework
   - - battery return isolated from framework
   - - framework isolated from incidental ground

   DPN equipment power must be obtained from a source referenced to the DMS ground window.

   Also, DPN equipment requires its own separate FBE and LRE.

10. Provide cable braid assy NT0X9587 and hardware NT4X0040 for the NT4X00AF shelf's first DDU if its serving NT1X55DA IOC circuit pack is in the same frame as the DDU Shelf.

    Provide cable braid assy NT0X9501 and hardware NT4X0040 for the NT4X00AF shelf's second DDU if its serving NT1X55DA IOC circuit pack is in the same frame as the DDU Shelf.

    When the serving NT1X55DA IOC CP is in a different frame from the DDU Shelf, refer to CA0X15 item 1AZ.

| 11. The LIM Frame logic ground is to be referenced to the LIM LRB when it is located in a DMS-100 frame equipment row utilizing DMS-100 frame style cable troughs. The first LIM is connected to the LRB, which is then connected to a LRE. When the LIM is located in a typical equipment row with Supernode frames only, reference the logic ground to the LRB which is located above the LIM cabinet. Provide NT0X0008 ground straps to be used to strap the logic grounds of each succeeding LIM cabinet to the preceeding LIM cabinet beside it. Only the first LIM will be connected directly to the LRB.

12. For the isolation of SCP equipment, the following provisioning guidelines must adhere;

    Canadian Applications (SCP Offices)

    a. Service Control Point (SCP) MIS frames containing Lan Interface Units (LIU) and associated modem equipment shall be treated as a separate equipment lineup with respect to Logic Return and be referenced to a separate LRB. Each SCP MIS Frame containing an LIU must have its frame Logic Return Bar referenced back to the LRB over the MIS frame containing the modems that serve it. No other equipment may share or be associated with LIU Modems or its LRB. DC-AC inverters used to power modems and LIU equipment

must be located within DMS MIS frames. MIS frames equipped with LIU and associated modems must not be used to contain non-LIU equipment.

b. All SCP and DNC equipment shall be powered from the same DC Power Plant. All AC powered equipment and facilities interfacing with DMS must conform with IS0X07ZA.

c. For raised floor applications, the floor framework shall be referenced to the Integrated Collector Bus (ICB) from diagonal points with at least two (2) #6 Awg cables. For floor mounted applications, the metallic pedestals associated with the DNC equipment must be isolated from any incidental contact with ground in accordance with DMS specifications.

d. The DNC FBE is local to the DNC equipment and is intended to serve as a collector point for all DNC cables that must be connected to the SPG. It is intended to facilitate cabling whenever the DNC equipment is located away from SPG or quantity of cables to be terminated is large. DMS FBE cables can not be referenced to the DNC FBE or vice versa since the DNC operates as a separate entity. However, it may be omitted and cables taken directly to the SPG if the specific configuration permits.

e. All signal interconnections, such as RS232, within DMS or between DMS and any other equipment must be configured to avoid metallic connections that form ground loops.

f. The ICB is an isolated copper busbar that serves as a ground reference point for all non-DMS metallic objects that are within 2 meters (7 ft.) of DMS but originate outside the DMS area and are not already connected to the SPG. All sections of cable rack and auxilliary framing shall have all sections that are located within 7 ft. of DMS electrically connected to adjacent sections and bonded to the ICB. Bonding between adjacent sections may be accomplished by using a #6Awg cable and two hole lug terminated at each end to a paint free, clean and dry area on each section, or other approved mechanical methods. An oxide inhibiting compound such as Burndy NO-OX-ID shall be applied to each connection. This bonding together forms a continuous electrical path. The closest section to the ICB shall be connected to the ICB with #6Awg cable and two hole lugs.

13. The preferred method for new installations of Maintenance and Administration Positions (MAP) is to locate the MAP in the Common Bonding Network (IMAP). The alternative installation method is to locate the MAP in the Isolated Bonding Network (MAP). It is recommended that the IMAP be located on the same floor with the DMS and grounded to the DMS-SPG. When providing

MAP/IMAP equipment, the following provisioning guidelines must adhere:

Canadian and U.S. Applications (MAP/IMAP)

a. MAP PAC poles must be isolated from foreign grounds such as walls, ceilings, non-DMS metallic objects. Applies to ISG and NON-ISG offices.

b. IMAP PAC poles must be isolated from DMS, referenced to non-DMS esential or protected A.C. ground through the PAC pole green wire. Isolation from foreign grounds is not required. Applies to ISG and NON-ISG offices.

c. MAP and IMAP PAC poles cannot be fed from two A.C. sources simultaneously.

d. IMAP furniture must be isolated from DMS and grounded to the C.O. Ground Bus when DMS inverters are required when RS-232 communications are used. Applies to ISG and NON-ISG offices.

e. MAP furniture must be isolated from foreign grounds and grounded to the DMS SPG. Applies to ISG and NON-ISG offices.

f. All communication links between IBN and CBN equipment should be made by using AC coupled subsystems such as back to back modems, isolation transformers, current loops or fiber optic links.

g. IMAP/MAP communication links shall be current loop or modem to modem. In NON-ISG offices, power for the MAP can be obtained from the DMS inverters or protected AC providing the feeder for the protected A.C. is referenced to the DMS SPG. All communication links to and from Isolated Bonding Network (IBN) equipment shall be A.C. coupled. When modem to modem connection connects equipment in different buildings, the modem line should be protected against esposure to power contact or lighting activity.

h. A.C. power for the MAP shall be obtained from within the IBN DMS-based inverters preferably located in a MIS frame and referenced to Framework Bonding Bus (FGB).

i. A.C. power for the IMAP shall be obtained from within the Common Bonding Network (CBN). If the customer requires protected AC for the IMAP equipment it shall be provided by using an inverter, or an inverter with AC transfer switch, or a UPS system. If the inverter is used, the Battery Return (BR) and -48V lead shall be insulated from any part of the IMAP CBN unless fed from a power plant dedicated to CBN equipment or unless the BR bus of the power plant is used as the DMS SPG.

j. The IMAP furniture is to be referenced to a recognized grounding bus such as the closest Framework Bonding Network (FBN). This bus shall be located outside of the DMS SPG. IMAP shall not share the same enclosed floor area with the MAP. If this is requested by the customer, the 2 meter rule must be adhered to.

k. A PAC pole shall not be fed from two AC power sources simultaniously unless they originate from the same AC panel and are controlled by a double pole breaker. For U.S. installations, the AC wiring of PAC poles and inverters shall be fixed wiring in accordance with NEC rules for facility wiring.

System Application Engineering is to provision the VDU's, printers, and IMAP/MAP furniture. Building Stidies will furnish the PAC pole, conduit, wiring, miscellaneous hardware, etc.

14. Commercial AC Free (Canada and U.S. Applications)

The Commercial AC Free System is being introduced to allow the installation and reconfiguration of DMS-100 switching systems in which no commercially derived AC power is permitted within the DMS-100 switching system.

Commercial AC Free system has three major componets which are:

- Center Aisle Lighting
- Low voltage controlled lighting
- Inverter powered end aisle outlets

The Center Aisle Lights are isolated from the DMS switching equipment and controlled by low voltage relays operated by switches mounted on the end guards. End aisle recepticals are powered from LaMarche inverters mounted in MIS frames located in every other lineup. Base outlets are not provided or supported by AC Free.

AC Free can be applied to both ISG and NON-ISG grounded systems. Existing offices with DMS frame mounted lighting can be converted to AC Free lighting by removing commercial AC circuits for lighting and base outlets, replacing end guard assemblies and installing inverters and MIS frames as required.

In an AC Free system no Alternating Current Equipment Ground (ACEG) conductor, enclosure, raceway, box or fitting containing an ACEG conductor that is connected to the commercial AC system shall be allowed to be bonded to any part of the IBN equipment. Center aisle lighting with low voltage control

switching or customer provided lighting not connected to the DMS equipment is a prerequisite for the AC Free option.

The recommended configuration for AC outlets is to locate LaMarche 500 watt inverter in a MIS frame in every odd lineup. Standard (brown) AC outlets shall be installed on the end guards of every odd lineup along with optional low voltage control switch.

If the AC Free option is to be provided, the MIS frame and inverters are to be provisioned by the SAE. The end guards, center aisle lighting, low voltage control, switches, outlets, etc. are to be provisioned by Building Studies.

4.2 Hardware Provisioning

4.2.1 Hardware Usage Restrictions

Not applicable.

4.2.2 Hardware Dependencies

Not Applicable

4.2.2.1 P and C Side Port Requirements

Not Applicable

4.2.2.2 DMS BUS Port Requirements

Not Applicable

4.2.2.3 Circuits Per Card

Not Applicable

4.2.2.4 Discrimination Numbering

Not Applicable

4.2.3 Provisioning Considerations

ISG shall be applied to all new Host and Remote DMS-100F offices.

Existing U.S. offices have the option of provisioning ISG or maintaining the current office grounding method. Refer to the ISG UPGRADE Section in this ECM for information on upgrading existing offices to ISG (Isolated System Grounding). Also, refer to availability reports to identify valid ordering dates.

For all other extensions to offices that use old grounding methods, Isolated System Grounding will not be applied. The office will be extended using current grounding methods.

ISG will initially be applied to non-EMI offices. This document will be updated when information is available on ISG for EMI offices.

4.2.3.1 Provisioning - Non-ISG Method

Prior to the implementation of ISG, DMS frames were equipped with (always provided) ground straps that tied the logic return ground to the frame ground. These straps have now been removed from the frame stocklist and are now provisionable. When ISG is being applied, these straps do not have to be provisioned. When extending an office using old grounding methods, these straps must be provisioned per the following table.

FRAME	DESCRIPTION	PROVISIONABLE CABLE ASSEMBLY
APC	Application Processor Cabinet	NT0X0008
CCC	Central Control Frame	NT0X0008 & NT0X0012
DCE	Digital Carrier Equipment Frame	NT0X0009
DME	Data Modem Extension Frame	NT0X0008
DPCC	Supernode Cabinets	NT0X9501
DSNE	Double Shelf Network Equipment Frame	NT0X0008
* DTE/SME	Common Peripheral Controller Equip. Frame	NT0X0009
ENET	Enhanced Network	NT0X0008
ILGE/IDTE	Intl Common Periph Controller Equip. Frame	NT0X0009
IOE	I/O Equipment Frame	NT0X0008
* LGE/LTE	Common Peripheral Controller Equip. Frame	NT0X0009
LIM/LPP	Link Interface Module/Link Peripheral Proc.	NT0X0008
MEX	Memory Extension Frame	NT0X0011
MS6E	Message Switching 6 Equipment Frame	NT0X0008
* MS7E	Message Switching 7 Equipment Frame	NT0X0009
MVIE	Multi-Vendor Interface Equipment Frame	NT0X0009
NETC	Combined Network Frame	NT0X0008
N6E	No. 6 Signalling Frame	NT0X0008
* RCE	Remote Controller Equipment Frame	NT0X0009
* RCME	Remote Control & Maintenance Equip. Frame	NT0X0010
SCC	Supernode SE Combined Cabinet	NT0X9501
* ST6E/ST7E	Signalling Terminal 6/7 Extension Frame	NT0X0009
TAE	Test Access Network Equipment Frame	NT0X0008

Frames not included above have no Logic Ground Bus Bar assembly as part of their frame stocklist. As a result, no provisionable cable assembly is required.

* For U.S. offices, these frames do not require the provisionable cable assembly when extending a non-ISG office with current

grounding methods. Instead a provisionable switchboard cable is run from the Logic Ground bus bar assembly in each frame to the PDC battery return plate. (Refer to item 1GZ in the switchboard cabling section of this ECM)

4.2.3.2 Provisioning - ISG Method

ISG provisioning is divided into two (2) sections; Logic Return and Frame Ground Return.

Logic Return

1. Each equipment row must have a Logic Return Busbar (LRB) provisioned for connection of logic return. If the following frames exist in a lineup, provision a LRB for that lineup.

	ABBR	DESCRIPTION
	APC	Application Processor Cabinet
	CCC	Central Control Complex
	DCE	Digital Carrier Eqpt Frame
	DME	Data Modem Expansion Frame
	DPCC	Supernode Cabinets
	DSNE	Double Shelf Network Frame
*	DTE	Digital Trunk Eqpt Frame
	ENET	Enhanced Network
	IOE	Input Output Eqpt Frame
	LIM/LPP	Link Interface Module/Link Peripheral Proc.
	MEX	Memory Extension Frame
#	MIS	Miscellaneous Equipment Frame
	MS6E	Message Switch 6 Eqpt Frame
	MTC	Mag Tape Center
	MVIE	Multi-Vendor Interface Equipment Frame
	NETC	Network Combined Frame
	N6E	No. 6 Signalling Frame
	SCC	Supernode SE Combined Cabinet
	SCSE	Simplex Cell Site Eqpt Frame
	TAE	Test Access Eqpt Frame

* (applicable only on DMS-200,DMS-250 offices)

(applicable to U.S. offices on MIS frames dedicated to modem equipment)

The LRB must never be mounted above a PDC frame or above the first frame of an eqpt row (with the exception of a single frame line-up).

The CCC, MEX, IOE, MOE, Dedicated MIS, and Supernode frames must all be cabled to the same LRB. This LRB shall be located above the IOE frame, and dedicated to the above mentioned frames only. No other frame type can ever be cabled to this

particular LRB. Other frame types in the same lineup must be cabled to a separate LRB. Both of these LRBs must be separately cabled to the LRE.

All LRB will terminate to the Logic Return Equalizer assembly (LRE).

Each LRE provides termination capabilities for 14 eqpt rows. A busbar extension plate assembly (NT0X0017) may be provisioned for each additional 14 equipment rows required.

2. The following list of frames require a logic return but do not require a connection to the LRB. Instead, a switchboard cable is run from the Logic Ground Bus Bar assembly at each frame to the PDC battery return plate which supplies their power.

	ABBR	DESCRIPTION
*	DTE	Digital Trunk Equipment Frame
	IAE	Integrated Access Control Frame
	ILGE	International Line Group Equipment Frame
	ILTE	International Line Trunk Equipment Frame
	LTE	Line Trunk Equipment Frame
	LGE	Line Group Equipment Frame
	MS7E	Message Signalling 7 Frame
	RCE	Remote Controller Equipment Frame
	RCME	Remote Control & Maintenance Eqpt Frame
	RME	Remote Miscellaneous Equipment Frame
	SME	Subscriber Carrier Equipment Frame
	ST6E	Signalling Terminal 6 Extension Frame
	ST7E	Signalling Terminal 7 Extension Frame

* (applicable in DMS-100 & DMS-100/200 Offices only)

3. The following list is the remainder of frames which either have no logic return and thus no connection to the LRB or have the logic return referenced to the battery return of the frame and thus circumvent connection to the LRB. No provisioning action is required to terminate the logic return to any frame listed below.

1. FRAMES WITHOUT A LOGIC RETURN

ABBR	DESCRIPTION
DNI	Digital Network Interconnect Frame
IAE	Integrated Access Control Frame
KSE	1A2 Key System Frame
MIS	Miscellaneous Eqpt Frame
MRFF	Master Reference Frequency Frame
MSS	Maintenance Spare Storage
SLC	Speech Link Connector Frame

2. FRAMES WITH A LOGIC RETURN REFERENCED TO BATTERY RETURN

ABBR	DESCRIPTION
ISLE	ISDN Service Line Module Frame
ISLE	ISDN1A Service Line Module Frame
ISME	Integrated Services Module Frame
LCE	Line Concentrating Eqpt Frame
LME	Line Module Eqpt Frame
RLCM	Remote Line Concentrating Eqpt Module
RLM	Remote Line Module Eqpt Frame
TME	Trunk Module Eqpt Frame

Framework Ground

In each equipment row the framework grounds are consecutively terminated to the overhead busbars. Each equipment row requires a switchboard cable to the Framework Bonding Equalizer (FBE) splice plate assembly in the following arrangement:

For equipment rows not containing a PDC, the first overhead busbar (located above the first frame) in each lineup is cabled to the FBE splice plate assembly.

For equipment rows containing a PDC, the overhead busbar (located above the PDC) is cabled to the FBE splice plate assembly regardless of location within the equipment lineup.

4.2.3.3 Provisioning Hardware - Host Office

The following is a list of hardware required for Isolated System Grounding (ISG):

NT0X00BB - ISG Label

Provision one (1) per host office. ISG label to be placed at the center left hand side of Frame Supervisory Panel (FSP) at Power Distribution Center - 00 (PDC 00). (Provisioned by Equipment Application Engineering)

NT0X00ZA - Splice Plate Assemblies

Provision one (1) per host office. Provides hardware for Logic Return Equalizer (LRE) and Framework Bonding Equalizer (FBE) Splice Plate Assemblies.

Provide one (1) NT0X00ZA for Digital Packet Network (DPN) equipment colocated with DMS-100 Family equipment.

The DPN LRE and FBE busbars shall be located in close proximity to the DMS LRE and FBE busbars.

The DMS LRE and FBE will mount adjacent to cable trough. The NT0X00ZA provides capability to terminate 14 equipment rows requiring logic ground (not every row will require logic ground) and 14 equipment rows requiring frame ground (every equipment row will require frame ground). Equipment rows physically broken by a column shall be considered as separate equipment row with respect to ISG. (Provisioned by Building Studies Engineering)

NT0X00WA - Splice Plate Assembly

Provision one (1) per host office equipped with DNC equipment. The NT0X00WA is an Framework Bonding Equalizer (FBE) specified for DNC equipment only. The DNC framework and logic ground are tied together and therefore must be kept separate from DMS equipment grounds. No DMS equipment ground cables may be referenced to DNC-FBE or vice versa. The DNC-FBE is to reference the same SPG as associated host office equipment.

NT0X0013 - Isolation Hardware

Provision Isolation Hardware for each mounting screw required for all Miscellaneous frame mounted equipment. Quantity will vary with the number of mounting holes required. Some NT manufactured miscellaneous equipment have had their stocklist updated to always provide the Isolation Hardware. Review the Miscellaneous Frame Equipment section of this document for a complete list. (Provisioned by Equipment Application Engineering)

NT0X0015 - Logic Return Busbar Assembly (LRB)

One (1) LRB is provisioned per equipment row equipped with frames requiring logic return. Each LRB can terminate up to 10 equipment bays (maximum five (5) bays on either side of the LRB). LRB assemblies may be multipled together in a single equipment row to accommodate longer line-ups. The furthest point of the logic return run from the LCE splice plate to the last equipment frame requiring logic shall not exceed 28.4 MT. LRBs are located at "convienent" locations above each line-up not above PDC or over first frames in eqpt rows except single bay lineups. (Provisioned by Building Studies Engineering)

NT0X0017 - Busbar Hardware (LRE & FBE extension plate assemblies)

Provision one (1) NT0X0017 for each additional 14 equipment rows beyond the original capacity supplied in NT0X00ZA. (Provisioned by Building Studies Engineering)

NT0X0018 - Cable Termination Hardware

One (1) NT0X0018 is provisioned for each application as follows;

- each FBE connection to the first frame/PDC in line up
- each LRB to LRE connection

(Provisioned by Equipment Application Engineering)

NT0X0042 - Cable Termination Hardware

One (1) NT0X0042 is provisioned for each DMS frame (from the Logic Ground Busbar assembly) to LRB connection requiring logic return. (Provisioned by Equipment Application Engineering)

NT0X0043 - Cable Termination Hardware

One (1) NT0X0043 is provisioned for each DMS frame (from the Logic Ground Busbar assembly) to PDC connection requiring logic return. (Provisioned by Equipment Application Engineering)

NT0X0020 - Cable Termination Hardware

One (1) NT0X0020 is provisioned for each LRB to LRB connection (for long equipment row application).

4.2.3.4 Provisioning Hardware - Remote Office

The following is a list of hardware required for Isolated System Grounding (ISG):

NT0X00DA - ISG Label

Provision one (1) per remote office. ISG label to be placed at the center left hand side of Frame Supervisory Panel (FSP) at Power Distribution Center - 00 (PDC 00/RME 00). (Provisioned by Equipment Application Engineering)

NT0X0021 - FBE Remote Splice Plate Assembly

Provision one (1) per remote office. Provides hardware for Framework Bonding Equalizer (FBE) Splice Plate Assembly.

The DMS FBE will mount adjacent to cable trough. The NT0X0021 provides capability to terminate six (6) equipment rows requiring frame ground (every equipment row will require frame ground). Equipment rows physically broken by a column shall be considered as separate equipment row with respect to ISG. Also, colocated ISG remotes can share a FBE splice plate assembly. (Provisioned by Building Studies Engineering)

4.2.3.5 NT0X0013 - Isolation Hardware

Provision Isolation Hardware for each mounting screw on all miscellaneous frame-mounted equipment requiring isolation from framework. Quantity will vary with the number of mounting holes

required. Some NT manufactured miscellaneous equipment have had their stocklist updated to always provide the Isolation Hardware. Review the Miscellaneous Frame Equipment section of this document for a complete list. (Provisioned by Equipment Application Engineering)

4.2.3.6 NT0X0018 - Cable Termination Hardware

One (1) NT0X0018 is provisioned for each application as follows;

- each FBE connection to the first frame/PDC in line up

(Provisioned by Equipment Application Engineering)

4.2.3.7 Digital Carrier Equipment Frame (DCE) Provisioning (NT0X46AB)

The Logic ground bus bar assembly has been removed from the stocklist of the DCE frame and is now a provisionable item. As a result, the following items must be added to DCE provisioning;

Non-ISG Applications

PEC	DESCRIPTION
NT0X46AB	Digital Carrier Equipment Frame
NT0X9504	Bus Bar Assembly
NT0X0009	Cable Assembly (non-ISG)

ISG Applications

PEC	DESCRIPTION
NT0X46AB	Digital Carrier Equipment Frame
NT0X9504	Bus Bar Assembly

Digital Carrier Module (DCM) and circuit pack provisioning remain unchanged for ISG or non-ISG.

NOTE: If the NT0X46AB equipment frame is configured as a Trunk Module Equipment Frame (TME), it is not necessary to provision the preceding equipment.

4.2.3.8 PDC Equalizer Cables

Each PDC provides an interface between A and B primary distribution feeders and up to 150 individual load within the DMS-100F. In non-ISG systems where more than one (1) PDC is provisioned, the primary distribution battery return feeders are interconnected

with 750 MCM cables at the PDC to equalize the potential differences. In DMS-100F offices with ISG the 750 MCM equalizer cables are no longer required.

4.2.3.9 Power Plant Provisioning

In Canadian applications, the power plant engineering is subcontracted to the Power Division by means of a Power Division Subcontract Memo. The Customer Engineer must specify on this memo whether or not Isolated System Grounding is to be applied to the office. The Power Division is responsible, in an office equipped with ISG, for the cabling from the DMS-Ground Window to the LRE and FBE plates.

4.2.3.10 Switchboard Cabling

The switchboard cabling required for ISG implementation follows. Reference CA0X04 01 22 or later.

ITEM	CABLE	WIRE	ORIGINATION	TERMINATION	NOTE
1GT	LREP00		DMS LRE PLATE	DMS GROUND WINDOW	2
1GV	FGEP00		DMS FBE PLATE	DMS GROUND WINDOW	2
1GZ	DTPD00	NS5482-01 1/6 AWG WIRE	LTE,LGE,SME,DTE, MS7E,ST7E,ST6E, RCE,RCME,IAE,ILTE, ILGE FRAME (from Logic Grd Busbar assembly)	PDC (battery return plate)	1
1GW	ERFG00	NS5482-01 1/0 AWG STRD WIRE	PDC or FIRST FRAME EQPT ROW	FBE PLATE	
1HE	ERFG01	NS5482-01 1/0 AWG STRD WIRE	PDC or RME IN REMOTE	FBE PLATE	
1HF	ERLR02	NS5482-01 1/0 AWG STRD WIRE	FIRST LRB PLATE IN EQPT ROW or FIRST LIM FRAME IN EQPT ROW	LRE PLATE	5,12

1HG	ERLR03	NS5482-01 1/0 AWG STRD WIRE	SUCCEEDING LRB PLATE IN EQPT ROW	PRECEEDING LRB PLATE	5
1HH	ERLR04	NS5482-01 1/6 AWG STRD WIRE	LRB PLATE	FRAMES WITH LOGIC GROUND BUSBAR ASSY	1(b),4, 5,6,7
1JC	ERLR09	NPS90508-03 1/0 AWG STRD WIRE	FIRST SUPERNODE FRAME IN EQPT ROW WITH SUPERNODE FRAMES ONLY	LRB PLATE ASSOCIATED WITH THE IOE FRAME	3,4,7
1JD	ERLR10	NPS90508-03 1/0 AWG STRD WIRE	LRB PLATE ASSOCIATED WITH SUPERNODE FRAMES	LRB PLATE ASSOCIATED WITH THE IOE FRAME	3,4,7
1HN	ERFG02	NPS90508-03 1/0 AWG STRD WIRE	FIRST NM FRAME IN EQPT ROW	DPN FRAMEWORK GROUND EQUALIZER PLATE DPN FBE	8
1HP	ERFG03	NPS90508-03 1/6 AWG STRD WIRE	SUCCEEDING NM FRAME	PRECEEDING NM FRAME	9
1HQ	ERFG04	NPS90508-03 1/0 AWG STRD WIRE	FIRST AM/DIU FRAME IN EQPT ROW	DPN FRAMEWORK GROUND EQUALIZER PLATE DPN FBE	
1HR	ERFG05	NPS90508-03 1/6 AWG STRD WIRE	SUCCEEDING AM/DIU FRAME OR SUCCEEDING AM FRAME	PRECEEDING AM/DIU FRAME OR PRECEEDING AM FRAME	9
1HS	ERLR05	NPS90508-03 1/6 AWG STRD WIRE	DPN NET MODULE (NM)	DPN LOGIC RETURN EQUALIZER PLATE DPN LRE	10
1HT	ERLR06	NPS90508-03 1/6 AWG STRD WIRE	DPN AM/DIU FRAME DIU PDU	DPN LOGIC RETURN EQUALIZER PLATE DPN LRE	11
1HU	ERLR07	NPS90508-03 1/6 AWG STRD WIRE	SUCCEEDING AM/DIU FRAME	PRECEEDING AM/DIU FRAME OR PRECEEDING AM FRAME	9,11
1HV	ERLR08	NPS90508-03 1/6 AWG	SUCCEEDING AM FRAME	PRECEEDING AM FRAME OR	9,11

STRD WIRE PRECEEDING
AM/DIU FRAME

4.2.3.11 Switchboard Cabling Remarks

Item 1GZ - Provide qty (1) NT0X0043 cable termination hardware.

Item 1HE - For eqpt rows with PDC frames, run from PDC frames. For eqpt rows without PDC frames, run from first frame in eqpt row. Provide qty one (1) NT0X0018 cable term hardware. In Remotes, run from PDC or RME frame.

Item 1HF - Provide qty one (1) NT0X0018 cable term hardware.

Item 1HG - Multiple of item 1HF. Provide qty one (1) NT0X0020 cable term hardware.

Item 1HH - Maximum cable length 4.60 meters. For a Dedicated MIS or MOE Frame the maximum cable length is 15.0 meters. Provide qty one (1) NT0X0042 cable term hardware.

Item 1JC - Provide qty (1) NT0X0020 cable termination hardware.

Item 1JD - Provide qty (1) NT0X0020 cable termination hardware.

Item 1HN,1HP,1HQ,1HR,1HS,1HT,1HU,1HV - These items are for application of Isolated System Grounding to Digital Packet Network equipment located with DMS equipment.

Item 1HN - Provide 2 terminal lugs A0297944, 2 screws P0689176 and 2 washers P0183152.

Item 1HP - Multiple cable of item 1HN. Provide 2 terminal lugs A0297943, 2 screws P097F814 and 2 washers P0423636.

Item 1HQ - Provide 2 terminal lugs A0297944, 2 screws P0689176 and 2 washers P0183152.

Item 1HR - Multiple cable of item 1HQ. Provide 2 terminal lugs A0297943, 2 screws P097F814 and 2 washers P0423436.

Item 1HS - Provide one P0594332 and one A0344530 terminal lugs.

Item 1HT - Provide 2 terminal lugs as follows: A0344530 for LRE plate, A0297943 for NT9P23AA, A0288200 for NT9P11AA. Terminate on CONN TP4 PDU NT9P23AA and TB1 (1-4) for PDU NT9P11AA.

Item 1HU - Originate and terminate on CONN PT4 for PDU NT9P23AA and TB1 (1-4) for PDU NT9P11AA. Provide 2 terminal lugs as follows: A0297943 for NT9P23AA, A0288200 for NT9P11AA, A0297943 for AM.

Item 1HV - Originate on CONN PT3 and terminate on CONN PT4 for PDU NT9P23AA and TB1 (1-4) for PDU NT9P11AA. Provide 2 terminal lugs as follows: A0297943 for NT9P23AA, A0288200 for NT9P11AA, A0297943 for AM.

Items 1GT & 1GV will be provisioned by Power Engineering.

Items 1GZ & 1HE-1HH will be provisioned by Equipment Application Engineering.

4.2.3.12 Switchboard Cabling Notes:

1. LCE - LGE/LTE/RCME/RCE clusters, ISLE - IAE clusters, MS7E - ST7E and MS6E - ST6E clusters must be served by the same PDC. The LGE, LTE, DTE, IAE, RCME, RCE, MS7E, ST7E and ST6E frame logic return shall be connected to the battery return bus of the PDC that serves their power.

   Do not run cable per item 1GZ for IDTE and DTE frames in DMS-250/200 offices (only for DMS-100 and 100/200 offices). Run per item 1HH instead.

   Logic return and framework grounding conductors shall conform to the following:

   Logic Return: From Single LR Bus to LRB: #6 AWG
   From LRB to LRE: 1/0AWG
   From LRE to SPG: 2/0 AWG up to 50 FT
   350MCM from 51 to 150 FT
   750MCM > 150 FT

   Framework Ground: Single Conductor from Frame: #6 AWG
   From Lineup to FBE: 1/0AWG
   From FBE to SPG: 2/0 AWG up to 50 FT
   350MCM from 51 to 150 FT
   750MCM > 150 FT

   ICB to SPG: 2/0 AWG up to 50 FT
   350MCM from 51 to 150 FT
   750MCM > 150 FT

   Provide the following hardware;

for 1/0 AWG cable qty 2 A0286794 term lugs
for 2/0 AWG cable qty 2 A0297945 term lugs
for 350 MCM cable qty 2 A0297951 cable lugs
for 750 MCM cable qty 2 A0297954 cable lugs

2. The Supernode cabinets are equipped to meet EMI specifications.

3. Supernode cabinets in equipment rows with other DMS-100 frames are connected using the established rules for grounding regular DMS-100 frames. An LRB plate mounted above the Supernode cabinets is a requirement for the ERLR10 cable run.

4. The total cable length of cables ERLR02, ERLR03 and ERLR04 from the furthest equipment frame (Logic Ground Busbar) requiring logic return shall not exceed 28.4 meters.

5. See “Provisioning Considerations” on page 15-23. in this ECM for a list of frames equipped with a Logic Ground Busbar.

6. The CCC, MEX, IOE, MOE, Dedicated MIS, and Supernode frames must all be cabled to the same LRB. This LRB shall be located above the IOE frame, and dedicated to the above mentioned frames only. No other frame type can ever be cabled to this particular LRB. Other frame types in the same lineup must be cabled to a separate LRB. Both of these LRBs must be separately cabled to the LRE.

7. When cable entry to the Network Module frame is from the top of the frame all power and ground cables must be shielded with a screening jacket. Connect ground screening jacket to upright of cabinet at a point as close to the entry point of these cables as possible. Provide the screening jacket and grounding hardware per DPN provisioning rules.

8. These cables run directly across the back of the frame without entering the cable trough.

9. Network Module Signal Ground cable must be shielded with a screening jacket. Connect ground screening jacket to upright of cabinet at a point as close to the exit point of signal ground cable as possible. Provide a ground screen cable jacket and grounding hardware per DPN provisioning rules.

10. When Access Module (AM) is equipped on the same frame as the DIU, instruct the installer to multiple SIG GRD from AM shelf terminal PT3 to DIU PDU terminal PT4 for NT9P23AA or TB1 (1-4) for NT9P11AA.

    Provide the following material:

    1 Awg Strd Wire Black per NPS 90508-03 compression connectors as follows: A0297943 for AM shelf, A0297943 for NT9P23AA, A0288200 for NT9P11AA.

| 11. Only the first LIM cabinet in an equipment row needs to be
| cabled directly to the LRB assembly. For each succeeding LIM
| cabinet in the lineup, provide one (1) NT0X0008 ground strap.
| The NT0X0008 shall be used to strap the logic grounds of each
| succeeding LIM cabinet to the preceeding LIM cabinet beside
| it.

4.2.3.13 Miscellaneous Frame Equipment

The Digital Alarm Scanner (DAS) unit must be mounted on a Dedicated MIS/Modem Frame enhanced for ISG. The DAS unit must be isolated from the equipment frame and the unit chassis must be connected to the logic return busbar.

Miscellaneous hardware such as HP MTDs, Digital Alarm Scanner (DAS), etc. must be electrically isolated from the framework upon which they are mounted.

Provision one (1) NT0X0013 Isolation Hardware in place of each mounting screw for each piece of miscellaneous equipment with a non-NT_X__ Product Engineering Code (PEC) that is mounted in Miscellaneous Frame (NT0X02AB).

The following equipment (which mounts on a Miscellaneous Frame) have isolation hardware always provided as part of their stocklist. Any piece of equipment with a NT_X__ PEC which mounts on a MIS frame that is not on this list must have NT0X0013 Isolation Hardware provisioned to accommodate ISG.
(PLEASE NOTE: ALL isolated equipment in a MIS Frame must have one inch above and below the unit to accomodate the NT0X0013 requirement. This is to prevent the unit shorting against another unit.)

PEC DESCRIPTION

NT5X69AA - Inactive System Timing Circuit
NT5X58AA - 1A2 Key Telephone System
NT5X55AA - 1A2 Key Telephone System Module
NT5X09AA - Data Set (Modem) Shelf
NT5X08AA - AC Modem Assy Modified Shelf
* NT0X87AA - Inverter Unit
NT3X25AA - Common Equipment Shelf

* For NT0X87AA Inverter Units (on non-dedicated Mis frames) the following hardware must be ordered:
qty 4 - P0284154 - Metallic Regular Washer
4 - P0183220 - External Tooth Lock Washer
4 - P097F813 - Mounting Screws
This hardware replaces the Isolation Hardware NT0X0013 which is to be discarded.

* For ISG applications of the LaMarche Inverter, provide one NTMX1657 kit for the first inverter installed in a

Non-Modem MIS Frame. Provide one NTMX1658 kit for each additional inverter installed in the same Non-Modem MIS Frame. These kits provide all the mounting hardware required, therefore no other isolation kits are required.

The inactive system timing circuit must be powered from an inverter mounted on the same MIS frame. The inverter shall be grounded to MIS framework per normal grounding procedures, (i.e. No NT0X0013 required). The inactive system timing circuit shall also be grounded to MIS framework using the following hardware:

qty 1 - P0284154 - Metallic Regular Washer
1 - P0183220 - External Tooth Lock Washer
4 - P097F813 - Mounting Screws

This hardware replaces the Isolation Hardware NT0X0013 which is to be discarded.

Isolation on cross aisle ducts is always provided as part of the stocklist for the Cross Aisle Duct Assemblies NT0X75AA, NT0X75AB, NT0X75AC, NT0X75AD, NT0X75AE, NT0X75AF and NT0X75AG.

4.2.4 Office Layout Information

Not Applicable

4.2.5 Traffic Tables

Not Applicable

4.2.6 ISG Upgrade Information

1. An ISG Upgrade refers to upgrading and reconfiguring an existing office to the new Isolated System Grounding (ISG) method. Procedures are now available to upgrade to ISG the following frames in a DMS-100F office:

NT0X02AA,AB	MIS	Frame	NT3X45AA,CA	CCC	Frame
NT0X18AA,CB	DNI	Frame	NT3X45AB,CB	MEX	Frame
NT0X41AB,AK	MEX	Frame	NT3X45DA,DW	CCC	Frame
NT0X41AC,AJ	CCC	Frame	NT3X45DB	MEX	Frame
NT0X42AA	PDC	Frame	NT3X45EA,EW	CCC	Frame
NT0X43AA	IOE	Frame	NT5X12AA,AB	TAE	Frame
NT0X43AB,AC	MTC	Frame	NT5X13AA,BA	NETC	Frame
NT0X43AD	IOE	Frame	NT5X56AA	1A2 Key System Fr	
NT0X45AA,AB	LME	Frame	NT6X01AA	LGE,DTE,LTE,SME Fr	
NT0X45AC,AD	LME	Frame	NT6X03AA,CA	LCE	Frame
NT0X45AE	LME	Frame	NT6X03RA,RB	LCE	Frame
NT0X45BA,BB	RLM	Frame	NT6X06AA,AB	MS6E	Frame
NT0X45BC,BD	RLM	Frame	NT6X06AC	MS6E	Frame
NT0X45BE,BH	RLM	Frame	NT6X09AA	ST6E,ST7E Frame	
NT0X45BF,BG	RLM	Frame	NT6X10AC	RCE	Frame

NT0X45BJ,BK	RLM	Frame	NT6X14AA	RLCM	Frame
NT0X46AA,AB	DCE	Frame	NT6X29AA	DME	Frame
NT0X46AA,AB	TME	Frame	NT6X31AA	MS7E	Frame
NT0X48AA	NET	Frame	NT8X10AA	DSNE	Frame
NT0X48AB,AC	NET	Frame	NT9X01AA	CMDC	Frame
NT0X48AG	NET	Frame	NT9X01BA	DPCC	Frame
NT0X48AH,AJ	NET	Frame	NT9X01CA	MSSC	Frame
NT0X56AA	SLC	Frame	NT9X01FA	SSC	Frame
NT0X85AA	MSS	Frame	NT9X01GA	MSDC	Frame

(PLEASE NOTE: All miscellaneous hardware ordered per an ISG Upgrade is to be shipped loose to site.)

2. Provide one (1) NT0X00YA, ISG Upgrade Kit Host, for each host office being upgraded to Isolated System Grounding (ISG). This Kit contains one (1) NT0X00BB ISG Label.

   Provide one (1) NT0X00XA, ISG Upgrade Kit Remote, for each remote office being upgraded to Isolated System Grounding (ISG). This Kit contains one (1) NT0X00DA ISG Label.

3. Provide one (1) NT0X00ZA, LRE & FBE Splice Plate Assembly, for each host office being upgraded to Isolated System Grounding (ISG).

   Provide one (1) NT0X0021, FBE-Remotes Splice Plate Assembly, for each remote office being upgraded to Isolated System Grounding (ISG).

   The NT0X00ZA and NT0X0021 shall be provisioned by Building Studies Engineering.

4. The CCC, MEX, IOE, MOE, Dedicated MIS, and Supernode frames must all be cabled to the same LRB. This LRB shall be located above the IOE frame, and dedicated to the above mentioned frames only. No other frame types can ever be cabled to this particular LRB. Other frame types in the same lineup must be cabled to a separate LRB.

5. The PDC frames shall be reconfigured and recabled so that the LCE frames and their associated controller frames (i.e. LGE/LTE/RCE/RCME/SME/DTE) are powered from the same PDC frame. Also remove the Equalizer Cables between PDC Battery Return Busbars.

   The PDC frames shall be reconfigured and recabled so that the MS7E frames and their associated ST7E frames are powered from the same PDC frame. However, the MS6E frames and the ST6E frames do not need to be powered from the same PDC frame.

6. The MIS frames shall be reconfigured and recabled so that one (1) MIS frame can be dedicated for modem equipment. Only

modems and the inverters used to power these modems can be mounted in this Dedicated MIS Frame. The Dedicated MIS Frame must also be located within a 50ft cabling distance of the IOE frames. All other miscellaneous equipment shall be mounted on Standard MIS Frames.

Local MAP VDU and printers must be current loop devices. When these devices are powered by NT0X87AA inverters, the inverter must be a dedicated inverter mounted on a Standard MIS Frame. The inverter shall be grounded to the MIS framework per normal grounding procedures, (i.e. No NT0X0013 Required).

7. The hardware needed to upgrade an existing office shall be ordered on a per frame basis. Refer to the ISG UPGRADE TABLES in the following sections of this ECM for the type of hardware and cable needed for each frame:

- “ISG Upgrade Tables (Host Office Frames)”
- “ISG Upgrade Tables (Supernode Frames)” on page 15-65
- “ISG Upgrade Tables (Remote Office Frames)” on page 15-67

4.3 ISG Upgrade Tables (Host Office Frames)

4.3.1 TO UPGRADE: NT0X41AC/AJ

FRAME		REMOVE			LOCATION
NT0X41AC CCC	2	NT0X9502	CABLE ASSY	POS. 76	
NT0X41AJ CCC	2	NT0X9503	CABLE ASSY	POS. 76	
	8	P0069242	SCR HHC	POS. 76	
	8	P0065747	NUT HEX	POS. 76	
	16	P097Y579	WS LOCK	POS. 76	
	8	P0160739	WS FL	POS. 76	
	8	P0183028	WS SPR	POS. 76	
		ADD		LOCATION	
	2	CA0X04	ITEM 1HH	POS. 76	
	2	NT0X0042	CABLE TERM HW	POS. 76	
	2	NT0X0012	CABLE ASSY	POS. 10	

4.3.2 TO UPGRADE: NT3X45AA/CA/DA/DW/EA/EW

FRAME		REMOVE			LOCATION
NT3X45AA CCC NT3X45CA CCC NT3X45DA CCC NT3X45DW CCC NT3X45EA CCC NT3X45EW CCC		1	NT0X9502	CABLE ASSY	POS. 76
		1	NT0X9503	CABLE ASSY	POS. 76
		4	P0069242	SCR HHC	POS. 76
		4	P0065747	NUT HEX	POS. 76
		8	P097Y579	WS LOCK	POS. 76
		4	P0160739	WS FL	POS. 76
		4	P0183028	WS SPR	POS. 76
		ADD			LOCATION
		2	CA0X04	ITEM 1HH	POS. 76
		2	NT0X0042	CABLE TERM HW	POS. 76

4.3.3 TO UPGRADE: NT0X41AB

FRAME		REMOVE			LOCATION
NT0X41AB MEX		1	NT0X9503	CABLE ASSY	POS. 76
		1	NT0X9536	CABLE ASSY	POS. 76
		4	P0069242	SCR HHC	POS. 76
		4	P0065747	NUT HEX	POS. 76
		8	P097Y579	WS LOCK	POS. 76
		4	P0160739	WS FL	POS. 76
		4	P0183028	WS SPR	POS. 76
		ADD			LOCATION
		1	CA0X04	ITEM 1HH	POS. 76
		1	NT0X0042	CABLE TERM HW	POS. 76
		1	NT0X0012	CABLE ASSY	POS. 10

4.3.4 TO UPGRADE: NT0X41AK

FRAME		REMOVE			LOCATION
NT0X41AK MEX		2	NT0X9503	CABLE ASSY	POS. 76
		4	P0069242	SCR HHC	POS. 76
		4	P0065747	NUT HEX	POS. 76
		8	P097Y579	WS LOCK	POS. 76
		4	P0160739	WS FL	POS. 76
		4	P0183028	WS SPR	POS. 76
		ADD			LOCATION
		1	CA0X04	ITEM 1HH	POS. 76
		1	NT0X0042	CABLE TERM HW	POS. 76
		1	NT0X0012	CABLE ASSY	POS. 10

4.3.5 TO UPGRADE: NT3X45AB/CB/DB

FRAME		REMOVE			LOCATION
NT3X45AB MEX		1	NT0X9503	CABLE ASSY	POS. 76
NT3X45CB MEX	OR	1	NT0X9536	CABLE ASSY	POS. 76
NT3X45DB MEX					
		2	P0069242	SCR HHC	POS. 76
		2	P0065747	NUT HEX	POS. 76
		4	P097Y579	WS LOCK	POS. 76
		2	P0160739	WS FL	POS. 76
		2	P0183028	WS SPR	POS. 76
		ADD			LOCATION
		1	CA0X04	ITEM 1HH	POS. 76
		1	NT0X0042	CABLE TERM HW	POS. 76

4.3.6 TO UPGRADE: NT0X43AA

FRAME	REMOVE			LOCATION
NT0X43AA IOE	2	NT0X9502	CABLE ASSY	POS. 76
	4	P0069242	SCR HHC	POS. 76
	4	P0065747	NUT HEX	POS. 76
	8	P097Y579	WS LOCK	POS. 76
	4	P0160739	WS FL	POS. 76
	4	P0183028	WS SPR	POS. 76
	ADD			**LOCATION**
	1	CA0X04	ITEM 1HH	POS. 76
	1	NT0X0042	CABLE TERM HW	POS. 76
	1	NT0X0012	CABLE ASSY	POS. 10

4.3.7 TO UPGRADE: NT0X43AB/AC/AD

FRAME	REMOVE			LOCATION
NT0X43AB MTC NT0X43AC MTC NT0X43AD IOE	1	NT0X9502	CABLE ASSY	POS. 76
	2	P0069242	SCR HHC	POS. 76
	2	P0065747	NUT HEX	POS. 76
	4	P097Y579	WS LOCK	POS. 76
	2	P0160739	WS FL	POS. 76
	2	P0183028	WS SPR	POS. 76
	ADD			**LOCATION**
	1	CA0X04	ITEM 1HH	POS. 76
	1	NT0X0042	CABLE TERM HW	POS. 76

4.3.8 TO UPGRADE: MAGNETIC TAPE DRIVES MOUNTED ON

IOE FRAME:

EQUIPMENT	REMOVE	ADD
COOK MAG TAPE DRIVES		
NT0X44AB NT0X44BB A0277744 & NT0X44AD A0326502 & NT0X44AD	NO CHANGES REQUIRED	1 NT0X0052 COOK DRIVE ISOLATION HARDWARE
HEWLETT PACKARD MAG TAPE DRIVES		

NT0X44AA		8	P097F813	SCREW HHT	1	NT0X0051	HP DRIVE	
		1	P0284154	WS FL			ISOLATION	
C0048498	&	1	P0183220	WS LOCK			HARDWARE	
NT0X44AC		1	P0575258	MTG BKT LH				
		1	P0575257	MTG BKT RH				
		1	NT0X4401	FRT MSK ASY				

4.3.9 TO UPGRADE: DISK DRIVE UNITS MOUNTED ON IOE FRAME:

EQUIPMENT	REMOVE	ADD
NT4X00AA DDU	REMOVE THE NT4X00AA DISK DRIVE UNIT	REPLACE WITH NT4X00AC OR LATER DISK DRIVE UNIT
NT4X00AB DDU	NO CHANGES	1 NT4X00BZ DDU

	REQUIRED		GRD H/W
NT4X00AC DDU	NO CHANGES	NO CHANGES	
	REQUIRED	REQUIRED	

4.3.10 TO UPGRADE: OTHER EQUIPMENT MOUNTED ON IOE FRAME:

EQUIPMENT		REMOVE			ADD		
DC	12	P097F813	SCREW HHT	1	NT0X0050	MODEM SH	
MODEM SHELVES	1	P0284154	WS FL			GROUNDING	
	1	P0183220	WS LOCK			HARDWARE	
NT5X09AA	1	NT5X0806	COVER PNL				
A0319455	2	NT5X0810	SUPPORT BKT				
AC	12	P097F813	SCREW HHT	1	NT0X0050	MODEM SH	
MODEM SHELVES	1	P0284154	WS FL			GROUNDING	
	1	P0183220	WS LOCK			HARDWARE	
NT5X08AC	1	NT5X0806	COVER PNL				
NT5X08AD	2	NT5X0810	SUPPORT BKT				

INVERTERS	4	P097F813	SCREW HHT	1	NT0X0053	INVERTER		
	1	P0284154	WS FL			GROUNDING		
NT0X87AA	1	P0183220	WS LOCK			HARDWARE		

4.3.11 TO UPGRADE: NT0X42AA

FRAME	REMOVE	LOCATION
NT0X42AA PDC	REMOVE THE EQUALIZER CABLES BETWEEN PDC BATTERY RETURN BUSBARS.	POS. 76
	ADD	
	1) RECABLE AND RECONFIGURE THE PDC FRAMES SO THAT THE LCE FRAMES AND THEIR ASSOCIATED CONTROLLER FRAMES (i.e. LGE/LTE/RCE/RCME) ARE POWERED FROM THE SAME PDC FRAME.	
	2) RECABLE AND RECONFIGURE THE PDC FRAMES SO THAT THE MS7E FRAMES AND THEIR ASSOCIATED ST7E FRAMES ARE POWERED FROM THE SAME PDC FRAME.	
	NOTEô The MS6E frames and the ST6E frames do not need to be powered from the same PDC frame.	

4.3.12 TO UPGRADE: NT0X48AA/AB/AC/AG/AH/AJ

FRAME		REMOVE			LOCATION
NT0X48AA NET NT0X48AB NET NT0X48AC NET NT0X48AG NET NT0X48AH NET NT0X48AJ NET		2 4 4 8 4 4	NT0X9502 P0069242 P0065747 P097Y579 P0160739 P0183028	CABLE ASSY SCR HHC NUT HEX WS LOCK WS FL WS SPR	POS. 76 POS. 76 POS. 76 POS. 76 POS. 76 POS. 76
		ADD			LOCATION
		1 1 1	CA0X04 NT0X0042 NT0X0012	ITEM 1HH CABLE TERM HW CABLE ASSY	POS. 76 POS. 76 POS. 10

4.3.13 TO UPGRADE: NT5X13AA/BA

FRAME		REMOVE			LOCATION
NT5X13AA NETC NT5X13BA NETC		1 2 2 4 2 2	NT0X9502 P0069242 P0065747 P097Y579 P0160739 P0183028	CABLE ASSY SCR HHC NUT HEX WS LOCK WS FL WS SPR	POS. 76 POS. 76 POS. 76 POS. 76 POS. 76 POS. 76
		ADD			LOCATION
		1 1	CA0X04 NT0X0042	ITEM 1HH CABLE TERM HW	POS. 76 POS. 76

4.3.14 TO UPGRADE: NT8X10AA

FRAME	REMOVE			LOCATION
NT8X10AA DSNE	1	NT0X9502	CABLE ASSY	POS. 76
	2	P0069242	SCR HHC	POS. 76
	2	P0065747	NUT HEX	POS. 76
	4	P097Y579	WS LOCK	POS. 76
	2	P0160739	WS FL	POS. 76
	2	P0183028	WS SPR	POS. 76
	ADD			LOCATION
	1	CA0X04	ITEM 1HH	POS. 76
	1	NT0X0042	CABLE TERM HW	POS. 76

4.3.15 TO UPGRADE: NT0X56AA

FRAME	REMOVE	LOCATION
NT0X56AA SLC	NO CHANGES REQUIRED	
	ADD	LOCATION
	NO CHANGES REQUIRED	

4.3.16 TO UPGRADE: NT0X18AA/CB

FRAME	REMOVE	LOCATION

NT0X18AA DNI NT0X18CB DNI		NO CHANGES REQUIRED		
		ADD		LOCATION
		NO CHANGES REQUIRED		

4.3.17 TO UPGRADE: NT0X46AA/AB

FRAME		REMOVE			LOCATION
NT0X46AA DCE NT0X46AB DCE	1	NT0X9502	CABLE ASSY		POS. 76
	2	P0069242	SCR HHC		POS. 76
	2	P0065747	NUT HEX		POS. 76
	4	P097Y579	WS LOCK		POS. 76
	2	P0160739	WS FL		POS. 76
	2	P0183028	WS SPR		POS. 76
		ADD			LOCATION
	1	CA0X04	ITEM 1HH		POS. 76
	1	NT0X0042	CABLE TERM HW		POS. 76

4.3.18 TO UPGRADE: NT0X46AA/AB

FRAME		REMOVE			LOCATION
NT0X46AA TME NT0X46AB TME	1	NT0X9502	CABLE ASSY		POS. 76
	2	P0069242	SCR HHC		POS. 76
	2	P0065747	NUT HEX		POS. 76
	4	P097Y579	WS LOCK		POS. 76
	2	P0160739	WS FL		POS. 76
	2	P0183028	WS SPR		POS. 76

	ADD	LOCATION
	NO CHANGES REQUIRED	

4.3.19 TO UPGRADE EQUIPMENT MOUNTED ON TME FRAME:

EQUIPMENT	REMOVE	ADD
NT2X52AA TM2	2 NT0X9501 CABLE ASSY	
AB TM4		
AC TM8	OR	1 NT0X9501 CABLE ASSY
AD DMS300		
AE TM2	2 NT0X9538 CABLE ASSY	
AF TM4		
AG TM8		
BB ITM8		
	REMOVE FROM BETWEEN	ADD TO CONNECT
NT2X52AK TM2	LOGIC GRD AND	LOGIC GRD TO
AN TM4	LOGIC RETURN BUSBAR	FLT GRD ON SHELF
AP TM8		
AR DMS300		
BD ITM8		
NT2X58AA MTM		

	AB	OAU		
NT2X58AC		MTM		
	AD	OAU		
	AF	OAU		
	AG	DRA		
	AK	DRA		
	AT	MTM		
	AU	DRA		
	AN	MTM		
NT2X58CA		MTM		
	CB	MTM		

4.3.20 TO UPGRADE: NT6X01AA LGE/DTE/LTE/SME

FRAME		REMOVE		LOCATION
NT6X01AA LGE, DTE, LTE, SME	1	NT0X9502	CABLE ASSY	POS. 76
	1	P0069242	SCR HHC	POS. 76
	1	P0065747	NUT HEX	POS. 76
	2	P097Y579	WS LOCK	POS. 76
	1	P0160739	WS FL	POS. 76
	1	P0183028	WS SPR	POS. 76
		ADD		LOCATION
	1	CA0X04	ITEM 1GZ	POS. 76

	1	NT0X0043	CABLE TERM HW	POS. 76

4.3.21 TO UPGRADE: NT6X01AA (200 OFFICES ONLY)

FRAME		REMOVE		LOCATION
NT6X01AA DTE (DMS-200 OFFICES ONLY)	1	NT0X9502	CABLE ASSY	POS. 76
	1	P0069242	SCR HHC	POS. 76
	1	P0065747	NUT HEX	POS. 76
	2	P097Y579	WS LOCK	POS. 76
	1	P0160739	WS FL	POS. 76
	1	P0183028	WS SPR	POS. 76
		ADD		LOCATION
	1	CA0X04	ITEM 1HH	POS. 76
	1	NT0X0042	CABLE TERM HW	POS. 76

4.3.22 TO UPGRADE: NT0X45AA/AB/AC/AD/AE

FRAME		REMOVE		LOCATION
NT0X45AA LME NT0X45AB LME NT0X45AC LME NT0X45AD LME NT0X45AE LME	2	NT0X9502	CABLE ASSY	POS. 76
		ADD		LOCATION
	1	NT0X4550	CABLE ASSY	POS. 45
	1	NT0X4551	CABLE ASSY	POS. 45

4.3.23 TO UPGRADE: NT6X03AA/CA/RA/RB

FRAME	REMOVE
NT6X03AA LCE NT6X03CA LCE NT6X03RA LCE NT6X03RB LCE	NO CHANGES REQUIRED
	ADD
	RECABLE AND RECONFIGURE THE PDC FRAMES SO THAT THE LCE FRAMES AND THEIR ASSOCIATED CONTROLLER FRAMES (i.e. LGE/LTE/RCE/RCME) ARE POWERED FROM THE SAME PDC FRAME.

4.3.24 TO UPGRADE: NT6x06AA/AB/AC

FRAME	REMOVE			LOCATION
NT6X06AA MS6E	1	NT0X9502	CABLE ASSY	POS. 76
NT6X06AB MS6E	2	P0069242	SCR HHC	POS. 76
	2	P0065747	NUT HEX	POS. 76
NT6X06AC MS6E	4	P097Y579	WS LOCK	POS. 76
	2	P0160739	WS FL	POS. 76
	2	P0183028	WS SPR	POS. 76
	2	NT6X0601	SUPP BRKT RIGHT	POS 09,24
	2	NT6X0603	SUPP BRKT LEFT	POS 09,24
	2	NT5X0806	COVER PNL ASSY	POS 04,19
	8	P097F813	SCREW HHT	POS. 19
	1	P0284154	WS FL	POS. 19
	1	P0183220	WS LOCK	POS. 19
	4	P097F813	SCREW HHT	POS. 11
	1	P0284154	WS FL	POS. 11
	1	P0183220	WS LOCK	POS. 11
	4	P097F813	SCREW HHT	POS. 04
	1	P0284154	WS FL	POS. 04
	1	P0183220	WS LOCK	POS. 04

		ADD		LOCATION
	1	CA0X04	ITEM 1HH	POS. 76
	1	NT0X0042	CABLE TERM HW	POS. 76
	4	P097F813	SCREW HHC	POS 37,46
	1	NT0X0008	CABLE ASSY	POS 37,46
	1	NT0X0050	MODEM SH GRD HW	POS. 19
	1	NT6X0602	28 INCH BUSBAR	POS. 16
	1	NT0X0053	INVERTER GRD HW	POS. 11
	1	NT0X0053	INVERTER GRD HW	POS. 04

4.3.25 TO UPGRADE: NT6X09AA

FRAME		REMOVE		LOCATION
NT6X09AA ST6E	1	NT0X9502	CABLE ASSY	POS. 76
	2	P0069242	SCR HHC	POS. 76
	2	P0065747	NUT HEX	POS. 76
	4	P097Y579	WS LOCK	POS. 76
	2	P0160739	WS FL	POS. 76
	2	P0183028	WS SPR	POS. 76
		ADD		LOCATION
	1	CA0X04	ITEM 1HH	POS. 76
	1	NT0X0042	CABLE TERM HW	POS. 76

4.3.26 TO UPGRADE: NT6X31AA

FRAME		REMOVE		LOCATION
NT6X31AA MS7E	1	NT0X9502	CABLE ASSY	POS. 76
	1	P0069242	SCR HHC	POS. 76

	1	P0065747	NUT HEX	POS. 76
	2	P097Y579	WS LOCK	POS. 76
	1	P0160739	WS FL	POS. 76
	1	P0183028	WS SPR	POS. 76
	ADD			LOCATION
	1	CA0X04	ITEM 1GZ	POS. 76
	1	NT0X0043	CABLE TERM HW	POS. 76

4.3.27 TO UPGRADE: NT6X09AA

FRAME		REMOVE		LOCATION
NT6X09AA ST7E	1	NT0X9502	CABLE ASSY	POS. 76
	1	P0069242	SCR HHC	POS. 76
	1	P0065747	NUT HEX	POS. 76
	2	P097Y579	WS LOCK	POS. 76
	1	P0160739	WS FL	POS. 76
	1	P0183028	WS SPR	POS. 76
	ADD			LOCATION
	1	CA0X04	ITEM 1GZ	POS. 76
	1	NT0X0043	CABLE TERM HW	POS. 76

4.3.28 TO UPGRADE: NT6X29AA

FRAME		REMOVE		LOCATION
NT6X29AA DME	1	NT0X9502	CABLE ASSY	POS. 76
	2	P0069242	SCR HHC	POS. 76
	2	P0065747	NUT HEX	POS. 76
	4	P097Y579	WS LOCK	POS. 76
	2	P0160739	WS FL	POS. 76
	2	P0183028	WS SPR	POS. 76
	8	P097F813	SCREW HHT	POS 52,66

		1	P0284154	WS FL	POS 52,66
		1	P0183220	WS LOCK	POS 52,66
		8	P097F813	SCREW HHT	POS. 33
		1	P0284154	WS FL	POS. 33
		1	P0183220	WS LOCK	POS. 33
		4	P097F813	SCREW HHT	POS. 18
		1	P0284154	WS FL	POS. 18
		1	P0183220	WS LOCK	POS. 18
		4	P097F813	SCREW HHT	POS 04,11
		1	P0284154	WS FL	POS 04,11
		1	P0183220	WS LOCK	POS 04,11
	ADD				LOCATION
		1	CA0X04	ITEM 1HH	POS. 76
		1	NT0X0042	CABLE TERM HW	POS. 76
		1	NT0X0050	MODEM SH GRD HW	POS 52,66
		1	NT0X0050	MODEM SH GRD HW	POS. 33
		1	NT0X9594	BUS BAR ASSY	POS. 20
		6	P097F813	SCREW HHT	POS. 20
		1	NT0X0053	INVERTER GRD HW	POS. 18
		1	NT0X0053	INVERTER GRD HW	POS 04,11

4.3.29 TO UPGRADE: NT5X56AA

FRAME	REMOVE
NT5X56AA KSE - 1A2 KEY SYSTEM FRAME	NO CHANGES REQUIRED
	ADD
	1) THIS FRAME CAN BE POWERED BY COMMERCIAL AC OR INVERTER POWERED.

		IF POWERED FROM AN NT0X87AA INVERTER, THE INVERTER SHALL BE A DEDICATED INVERTER MOUNTED ON A STANDARD MIS FRAME. THE INVERTER SHALL BE GROUNDED TO THE MIS FRAMEWORK PER NORMAL GROUNDING PROCEDURES, (i.e. NO NT0X0013 REQUIRED).

4.3.30 TO UPGRADE EQUIPMENT MOUNTED ON KSE FRAME:

EQUIPMENT	REMOVE	ADD
1A2 KEY SYS. NT5X55AA NT5X55AB	28 P097F813 SCREW HHT	28 NT0X0013 ISOLATION MTG HDWARE

4.3.31 TO UPGRADE: NT5X12AA/AB

FRAME	REMOVE			LOCATION
NT5X12AA TAE NT5X12AB TAE	1	NT0X9502	CABLE ASSY	POS. 76
	2	P0069242	SCR HHC	POS. 76
	2	P0065747	NUT HEX	POS. 76
	4	P097Y579	WS LOCK	POS. 76
	2	P0160739	WS FL	POS. 76
	2	P0183028	WS SPR	POS. 76
ADD				**LOCATION**
	1	CA0X04	ITEM 1HH	POS. 76

	1	NT0X0042	CABLE TERM HW	POS. 76

4.3.32 TO UPGRADE: NT0X85AA

FRAME	REMOVE	LOCATION
NT0X85AA MSS	NO CHANGES REQUIRED	

ADD	LOCATION
NO CHANGES REQUIRED	

4.3.33 TO UPGRADE: NT0X02AA/AB

FRAME	REMOVE
NT0X02AA MIS NT0X02AB MIS (DEDICATED FOR MODEMS)	REMOVE ALL MISCELLANEOUS EQUIPMENT EXCEPT FOR - AC AND DC MODEM SHELVES - ASSOCIATED INVERTERS - NT3X25AA EQUIP. SHELVES - DIGITAL ALARM SCANNER (DAS)

ADD		
1	NT0X9594	LOGIC GROUND BUSBAR ASSY
6	P097F813	SCREW HHT
1	NT0X0042	CABLE TERM HW

	1	CA0X04 ITEM 1HH (see NOTE)
		NOTEô Cable CA0X04, ITEM 1HH to the same LRB as the IOE/MTC/CCC frames containing the IOC modules.
		NOTEô The Dedicated MIS Frame must be located within a 50ft cabling distance of the IOE frames.

4.3.34 TO UPGRADE EQUIPMENT MOUNTED ON DEDICATED MIS

FRAME:

EQUIPMENT	REMOVE			ADD		
INVERTERS	4	P097F813	SCREW HHT	1	NT0X0053	INVERTER
	1	P0284154	WS FL			GROUNDING
NT0X87AA	1	P0183220	WS LOCK			HARDWARE
AC MODEM SHELVES	12	P097F813	SCREW HHT	1	NT0X0050	MODEM SH
	1	P0284154	WS FL			GROUNDING
	1	P0183220	WS LOCK			HARDWARE
NT5X08AC	1	NT5X0806	COVER PNL			
NT5X08AD	2	NT5X0810	SUPPORT BKT			

DC		12	P097F813	SCREW HHT		1	NT0X0050	MODEM SH
MODEM SHELVES		1	P0284154	WS FL				GROUNDING
		1	P0183220	WS LOCK				HARDWARE
NT5X09AA		1	NT5X0806	COVER PNL				
A0319455		2	NT5X0810	SUPPORT BKT				
RIXON RM40A/B								
(905-5121-004)								
EQUIPMENT SH		6	P097F813	SCREW HHT		6	NT0X0013	ISOLATION
ASSY								MTG HDWARE
		1	P0183220	WS LOCK				
NT3X25AA		1	P0284154	WS FL		1	NT0X4311	CABLE ASSY

4.3.35 TO UPGRADE: NT0X02AA/AB

FRAME	REMOVE
NT0X02AA MIS NT0X02AB MIS (STANDARD MIS EQUIP.)	REMOVE ALL MODEM SHELVES AND THEIR ASSOCIATED EQUIPMENT TO A MIS FRAME DEDICATED FOR MODEMS, SEE SECTION 3.28

RECONFIGURE FRAMES SO THATô
1) 1A2 KEY SYSTEMS AND THEIR ASSOCIATED INVERTERS ARE LOCATED ON THE SAME MIS FRAME.
2) NT0X03__ RECORDED ANNOUNCEMENT MODULES AND THEIR ASSOCIATED INVERTERS ARE LOCATED ON THE SAME MIS FRAME.
3) LOCAL MAP VDU AND PRINTERS MUST BE CURRENT LOOP DEVICES. WHEN THESE DEVICES ARE POWERED BY NT0X87AA INVERTERS, THE INVERTER MUST BE A DEDICATED INVERTER MOUNTED IN A STANDARD MIS FRAME. THE INVERTER SHALL BE GROUNDED TO THE MIS FRAMEWORK PER NORMAL GROUNDING PROCEDURES, (ie. NO NT0X0013 REQUIRD)

4.3.36 TO UPGRADE EQUIPMENT MOUNTED ON STANDARD MIS FRAME:

EQUIPMENT	REMOVE	ADD
COGNITRONICS 646, 649 689	4 P097F813 SCREW HHT	4 NT0X0013 ISOLATION MTG HDWARE

1A2 KEY SYS. NT5X55AA NT5X55AB	28	P097F813	SCREW HHT	28	NT0X0013	ISOLATION MTG HDWARE	
1A2 KEY SYS. NT5X58AA	12	P097F813	SCREW HHT	12	NT0X0013	ISOLATION MTG HDWARE	
INVERTERS NT0X87AA	NO CHANGES REQUIRED. GROUND INVERTER TO MIS FRAMEWORK PER NORMAL GROUNDING PROCEDURES, (i.e. NO NT0X0013 REQUIRED).						

4.3.37 MISCELLANEOUS EQUIPMENT REQUIRING NO

MODIFICATIONS FOR ISG:

PEC	PRODUCT DESCRIPTION
NT2X46AB	METALLIC TEST ACCESS (MTA) UNIT

NT5X26AA	GROUND DETECTOR FOR 911 APPLICATION
NT5X27AA	SLEEVE LEAD APPLIQUE CIRCUIT
NT5X50AA	AUX CKT FOR INTERFACE W/STROMBERG CARLSON
NT5X51AA	CONVERSION OF N. ELECTRIC TSD TO CAMA POS
NT5X57AA	AUXILIARY RECORDING COMPLETING TRUNK
NT5X59AA	ALARM INDICATION APPLIQUE
NT5X59AB	ALARM INDICATION APPLIQUE
NT5X63AA	APPLIQUE CKT FOR AUTO. ELEC. FIRE REPORT
NT5X64BA/BC	COMMUNICATIONS MODULE, RACKMOUNT
NT5X65AA	APPLIQUE CKT FOR INCOMING TEST UNIT TRNK
NT5X66AA	APPLIQUE CKT FOR OUTGOING TEST TRUNK
NT5X69AA	INACTIVE SYSTEM TIMING CIRCUIT
NT5X74AA	UNIVERSAL CAMA POSITION CIRCUIT
NT5X75AA	AUXILIARY CAMA POSITION CIRCUIT
NT5X75AB	AUXILIARY CAMA POSITION CIRCUIT
NT5X76AA	AUXILIARY CAMA POSITION CIRCUIT
NT5X77AA	AUXILIARY CAMA POSITION CIRCUIT
NT5X78AA	AUXILIARY TRUNK CIRCUIT
NT5X79AA	BOARD TO BOARD TEST APPLIQUE
NT5X85AA	AUDIBLE AND VISUAL ALARM EXTENSION UNIT
NT5X86AA	AUDIBLE ALARM CUTOFF CONTROL UNIT

NT5X88AA	ABBT APPLIQUE
NT5X90AA	AUXILIARY TEST CIRCUIT TO AECO
NT5X91AA	AUX TRNK FOR TOPS ACCESS FROM MOBILE 1280
NT5X92AB	ALARM EXTENSION PANEL
NT5X93AA	TEST ACCESS APPLIQUE CIRCUIT
NT5X94AA	APPLIQUE CKT TO SWITCHING SYSTEM NO. 309
1066/1056	ROTL UNIT E/W 52A RESPONDER & PWR SUPPLY
TCS 1800	KEY TELEPHONE SYSTEM

4.3.38 OTHER OUTSIDE VENDOR SUPPLIED EQUIPMENT ON MIS

FRAMES
must be checked for grounding criteria.
Reference Installation Manual 925, Section 2100 for ground testing and hardware requirements.

4.3.39 TO UPGRADE: NTFX40BA

FRAME		REMOVE		LOCATION
NTFX40BA ISME	1	NT0X9590	CABLE ASSY	POS. 76
	2	P0069242	SCR HHC	POS. 76
	2	P0065747	NUT HEX	POS. 76
	4	P097Y579	WS LOCK	POS. 76
	2	P0160739	WS FL	POS. 76
	2	P0183028	WS SPR	POS. 76
		ADD		LOCATION
		NO CHANGES		

		REQUIRED	

4.4 ISG Upgrade Tables (Supernode Frames)

4.4.1 TO UPGRADE SUPERNODE FRAMES IN THEIR OWN LINE-UP:

FRAME	REMOVE			LOCATION
NT9X01AA CMDC NT9X01CA MSSC NT9X01GA MSDC NT9X01BA DPCC	NO CHANGES REQUIRED			
(FIRST FRAME IN LINE-UP)	ADD			LOCATION
	1	CA0X04	ITEM 1JC	POS. 52
	1	NT0X0020	CABLE TERM HW	POS. 52

4.4.2 TO UPGRADE SUPERNODE FRAMES IN THEIR OWN LINE-UP:

FRAME	REMOVE			LOCATION
NT9X01AA CMDC NT9X01CA MSSC NT9X01GA MSDC NT9X01BA DPCC	NO CHANGES REQUIRED			
(OTHER FRAME IN LINE-UP)	ADD			LOCATION
	1	NT0X0008	CABLE ASSY	POS. 52

4.4.3 TO UPGRADE SUPERNODE FRAMES IN LINE-UP WITH

OTHER DMS-100F FRAMES:

FRAME	REMOVE	LOCATION
NT9X01AA CMDC NT9X01CA MSSC NT9X01GA MSDC NT9X01BA DPCC	NO CHANGES REQUIRED	
	ADD	**LOCATION**
	1 CA0X04 ITEM 1JD	POS. 52
	1 NT0X0020 CABLE TERM HW	POS. 52

4.4.4 TO UPGRADE: NT9X01FA

FRAME	REMOVE	LOCATION
NT9X01FA SSC	NO CHANGES REQUIRED	
	ADD	**LOCATION**
	NO CHANGES REQUIRED	

4.5 ISG Upgrade Tables (Remote Office Frames)

4.5.1 TO UPGRADE: NT0X02AB

FRAME		REMOVE			LOCATION
NT0X02AB RME	1	NT0X9502	CABLE ASSY		POS. 76
	2	P0069242	SCR HHC		POS. 76
NT0X02AB RSE	2	P0065747	NUT HEX		POS. 76
	4	P097Y579	WS LOCK		POS. 76
	2	P0160739	WS FL		POS. 76
	2	P0183028	WS SPR		POS. 76
		ADD			LOCATION
	1	NT0X9549	28 INCH BUSBAR		POS. 19
	1	CA0X04	ITEM 1GZ		POS. 42
	1	NT0X0043	CABLE TERM HW		POS. 42

4.5.2 TO UPGRADE EQUIPMENT MOUNTED ON RME/RSE FRAME:

EQUIPMENT	REMOVE			ADD		
INVERTERS	4	P097F813	SCREW HHT	1	NT0X0053	INVERTER
	1	P0284154	WS FL			GROUNDING
NT0X87AA	1	P0183220	WS LOCK			HARDWARE
AC	12	P097F813	SCREW HHT	1	NT0X0050	MODEM SH
MODEM SHELVES	1	P0284154	WS FL			GROUNDING

		1	P0183220	WS LOCK				HARDWARE
NT5X08AC		1	NT5X0806	COVER PNL				
NT5X08AD		2	NT5X0810	SUPPORT BKT				
DC MODEM SHELVES		12	P097F813	SCREW HHT	1	NT0X0050	MODEM SH GROUNDING	
		1	P0284154	WS FL				
		1	P0183220	WS LOCK				HARDWARE
NT5X09AA		1	NT5X0806	COVER PNL				
A0319455		2	NT5X0810	SUPPORT BKT				
EQUIPMENT SH ASSY		6	P097F813	SCREW HHT	1	NT0X0054	EQPT SHELF GROUNDING	
		1	P0183220	WS LOCK				HARDWARE
NT3X25AA		1	P0284154	WS FL				
RSM SHELVES		2	NT0X9538	CABLE ASSY	1	NT0X9501	CABLE ASSY	
NT2X58AE		REMOVE FROM BETWEEN			ADD TO CONNECT			
NT2X58CF		LOGIC GRD AND			LOGIC GRD TO			

	LOGIC RETURN BUSBAR	FLT GRD ON SHELF

4.5.3 TO UPGRADE: NT6X10AC

FRAME	REMOVE			LOCATION
NT6X10AC RCE	1	NT0X9502	CABLE ASSY	POS. 76
	1	P0069242	SCR HHC	POS. 76
	1	P0065747	NUT HEX	POS. 76
	2	P097Y579	WS LOCK	POS. 76
	1	P0160739	WS FL	POS. 76
	1	P0183028	WS SPR	POS. 76
	ADD			**LOCATION**
	1	CA0X04	ITEM 1GZ	POS. 76
	1	NT0X0043	CABLE TERM HW	POS. 76

4.5.4 TO UPGRADE: NT6X14AA

FRAME	REMOVE	LOCATION
NT6X14AA RLCM	NO CHANGES REQUIRED	
	ADD	**LOCATION**
	NO CHANGES REQUIRED	

4.5.5 TO UPGRADE: NT0X45BA/BB/BE/BH

FRAME	REMOVE			LOCATION
NT0X45BA RLM	2	NT0X9502	CABLE ASSY	POS. 76
NT0X45BB RLM	2	P0069242	SCR HHC	POS. 76
	2	P0065747	NUT HEX	POS. 76
NT0X45BE RLM	4	P097Y579	WS LOCK	POS. 76
NT0X45BH RLM	2	P0160739	WS FL	POS. 76
	2	P0183028	WS SPR	POS. 76
	ADD			LOCATION
	1	NT0X4550	CABLE ASSY	POS. 45
	1	NT0X4551	CABLE ASSY	POS. 45

4.5.6 TO UPGRADE: NT0X45BC/BF/BJ

FRAME	REMOVE			LOCATION
NT0X45BC RLM	1	NT0X9502	CABLE ASSY	POS. 76
NT0X45BF RLM	1	P0069242	SCR HHC	POS. 76
	1	P0065747	NUT HEX	POS. 76
NT0X45BJ RLM	2	P097Y579	WS LOCK	POS. 76
	1	P0160739	WS FL	POS. 76
	1	P0183028	WS SPR	POS. 76
	ADD			LOCATION
	1	NT0X4551	CABLE ASSY	POS. 45

4.5.7 TO UPGRADE: NT0X45BD/BG/BK

FRAME		REMOVE			LOCATION
NT0X45BD RLM	1	NT0X9502	CABLE ASSY		POS. 76
NT0X45BG RLM	1	P0069242	SCR HHC		POS. 76
	1	P0065747	NUT HEX		POS. 76
NT0X45BK RLM	2	P097Y579	WS LOCK		POS. 76
	1	P0160739	WS FL		POS. 76
	1	P0183028	WS SPR		POS. 76
		ADD			LOCATION
	1	NT0X4550	CABLE ASSY		POS. 45

4.6 Product/System Specification

4.6.1 Physical Characteristics

Not Applicable

4.6.2 EMI/Earthquake Information

ISG will initially be applied to non-EMI offices. This document will be updated when information is available on ISG for EMI offices.

4.6.3 Sparing Information

Not Applicable

4.6.4 Power Feed and Fusing Requirements

Not Applicable

4.6.5 Current Drain Information

Not Applicable

4.7 Software Provisioning

For NTX software packages to PCL/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

4.7.1 Required Software Packages and Interdependencies

Not Applicable

4.7.2 Software Usage Restrictions

Not Applicable

4.7.3 Memory Provisioning

Not Applicable

4.8 Real Time Impact

Not Applicable

5.0 ECM496 - Power Plant Provisioning (Host and Remote)

5.1 Overview

The DC Power Plant supplies controlled and protected DC power to DMS-100 frames and equipment. The principal components of a power plant are as follows:

- Power Board
- Rectifiers
- Batteries

The power board assembly is required to provide main control for the battery plant system and distribute protected DC power. Power board maximum capacities are not as incremental as rectifiers and batteries so the power board rating must exceed the ultimate peak hour amperage drain for the particular office it is being engineered for. Power boards may be housed in either a relay rack or box framework. Rear and side protective covers should always be provided to maintain safety for personnel and protect against accidental contact with protective components of power board.

The rectifier is the source of -48V power for the power plant. They convert commercial AC electrical power to DC voltage and current demands based on telephone system requirements. Rectifiers also maintain the batteries at a fully charged state plus battery recharge following a commercial AC power failure. Unless otherwise specified by the customer, rectifier redundancy should always be provided with redundant rectifier capacity being equal to the largest rectifier in the group.

The batteries provide a source of uninterrupted -48V power for the telephone system in the event the rectifiers fail. Battery manufacturers size cells in ampere hours. Ampere hours are derived with regard to the number of plates, size and electrolyte. The typical battery cells presently being used are lead calcium or lead antimony. Sealed maintenance free batteries are also available. Sizing of the battery is based on the busy hour drain and number of hours reserve requested with initial and ultimate current drains observed.

Reference “Provisioning Considerations” on page 15-74 for detailed information pertaining to the above equipment.

5.2 Hardware Provisioning

5.2.1 Hardware Usage Restrictions

Not Applicable

5.2.2 Hardware Dependencies

Not Applicable

5.2.2.1 P and C Side Port Requirements

Not Applicable

5.2.2.2 DMS BUS Port Requirements

Not Applicable

5.2.2.3 Circuits Per Card

Not Applicable

5.2.2.4 Discrimination Numbering

Not Applicable

5.2.3 Provisioning Considerations

Power board mounted components can vary based on Central Office requirements. Basic components are:

- Control Panel Assembly equipped with power plant metering, alarm indicating and sending capability, charger sensing fuses, etc.
- Distribution fuses required for DMS-100 and other forms of telephone related equipment.
- Rectifier Termination Panel (power boards 0 - 1600 amps)
- Isolated Return Ground Bar Assembly

When engineering an initial power plant, the total peak hour load imposed on a power board should never exceed 80% of the power board rating (i.e. 1200A X .80 = 960A). If the ultimate current drain does exceed 80%, the next incremental rated power board should be furnished.

Power boards can be connected to rectifiers and batteries via cable or busbar. If the capacity of the power board exceeds 2000 amps, the plant is normally arranged with busbar over the rectifiers and batteries and connected to the busbar riser of the power board.

When provisioning rectifiers, the ultimate busy hour drain must be taken into account. Rectifier quantity and size should be arranged for the

ultimate plan and provided based on initial, intermediate or ultimate plans as specified by the customer. Rectifier redundancy should always be provided with the output of the redundant rectifier being equal to or greater than the largest rectifier in the group. Another consideration when provisioning rectifiers is the commercial AC input voltage, phase (single or three) and frequency (50 or 60 Hz).

Provisioning of the battery arrangements should take careful consideration. Some basic guides are as follows:

- Initial, intermediate and final busy hour drain plan. The busy hour drain to include switch busy hour amperage plus customer equipment amps.
- Battery provisioning should start with the ultimate Busy Hour Drain plan and work back to the initial Busy Hour Drain plan. Engineering can, by this method, observe when additional strings would be required in plan years other than initial or ultimate.
- The hour reserve is also a prime factor when selecting battery ampere hour capacity. The following multiplying factors are to be used to determine battery capacity.

Hour Reserve	Multiplying Factor
3	5.3
4	6.3
5	7.2
6	8.1
7	9.0
8	9.8
9	10.6
10	11.4

Example: BSHA = 1000A @ 4 Hour Reserve

1000A X 6.3 = 6300 Amp Hour Required

- After determining the above, consideration of floor space and number of 24 cell arrangements are to be provisioned.
- Select a battery capacity (in ampere hours) equal to but not less than the ampere hours determined above. Battery rack required for support of cell arrangements are also selected, as dictated by floor plan plus customer preference. Standard commercial racks are as follows:

  a. (2) Step Rack
  b. (1) Row (2) Tier Rack
  c. (1) Row (3) Tier Rack
  d. (2) Row (2) Tier Rack

NOTE: Length of battery rack is determined by size and arrangement of battery cells.

Power engineering shall carefully interpret power information in NTI CI document to ensure proper battery provisioning and also if earthquake seismic protection is required. Special attention is required when Bell Companies request roll steel or fiberglass type battery stands normally provided by AT&T Technology Company.

5.2.4 Office Layout Information

Power equipment should be located per job floor plan or as requested by the customer. If there is any deviation from job drawings, installation is to mark drawing and return per the JIM 6 0 process.

5.2.5 Power Plant Calculations

Power Plant equipment required on a per job basis can be determined by completing the following table:

DMS 100 FAMILY POWER REQUIREMENT WORKSHEET							
			UNIT QTY			TOTAL DRAIN	
EQUIPMENT	UNIT DRAIN (AMPS)	X	INIT	EOPP	=	INITIAL	END PLAN PERIOD
DPP	4.0	X			=		
DATA SET SHELF	6.0	X			=		
DISC DRIVE UNIT	7.0	X			=		
MAG TAPE DRIVE UNIT	3.5	X			=		
BMC	5.0	X			=		
LCE	8.2+4W	X			=		Note 1
LGC MODULE	8.5	X			=		
SMR MODULE	13.32	X			=		
SMS MODULE	13.32	X			=		
SMU MODULE	13.32	X			=		
MS6E	23.0	X			=		
TOPS MS	36.0	X			=		
MS7E	14.0	X			=		
DCM SHELF	2.3	X			=		
DES SHELF	2.7	X			=		
DTC MODULE	8.5	X			=		
LTC MODULE	8.5	X			=		
MTA UNIT (2X46AB)	0.8	X			=		
MTM SHELF	3.3	X			=		
PAGE TOTALS							

Figure 2. DMS 100 FAMILY POWER REQUIREMENT WORKSHEET (Continued)

Note 1: W = 2-Way CCS per line in unit drain formula

EQUIPMENT	UNIT DRAIN (AMPS)	X	UNIT QTY INIT	UNIT QTY EOPP	=	TOTAL DRAIN INITIAL	TOTAL DRAIN END PLAN PERIOD
1ST PAGE TOTALS							
TM SHELF	2.2	X			=		
LMS	7.8	X			=		
LIS	18.7	X			=		
ENET SHELF	21.0	X			=		
ENET CABINET FAN	6.0	X			=		
NETWORK MOD (DSNE)	7.0	X			=		
CMPS NT9X06AA	20.0	X			=		
MSPS NT9X04AA	20.0	X			=		
SLM NT9X07AA	12.9	X			=		
DTH ROTL	5.0	X			=		
INVERTER UNIT	5.0	X			=		
PDC ALARM FUNCTIONS	6.5	X			=		
COOLING UNIT	1.0	X			=		
HLE	8.0	X			=		
RLE (shelf)	8.0	X			=		
LCEI	26.0	X			=		
CPEI	35.0	X			=		
IAE	23.0	X			=		
PAGE TOTALS							

Figure 3. DMS 100 FAMILY POWER REQUIREMENT WORKSHEET (Continued)

EQUIPMENT	UNIT DRAIN (AMPS)	X	UNIT QTY INIT	UNIT QTY EOPP	=	TOTAL DRAIN INITIAL	TOTAL DRAIN END PLAN PERIOD
2ND PAGE TOTALS							
STE	19.0	X			=		
NMM	26.0	X			=		
DIU	20.0	X			=		
PHAM	26.0	X			=		
2-PORT LME FRAME	21.8	X			=		
3-PORT LME FRAME	24.4	X			=		
4-PORT LME FRAME	26.7	X			=		
NT-40 COMMON	N/A		60	60			Note 2
NET	21.0	X			=		
NETC	24.0	X			=		Note 3
MISCELLANEOUS							
TOTAL DMS AMPS							
TELCO AMPS REQUIRED							
TOTAL AMPS REQUIRED							

Figure 4. DMS 100 FAMILY POWER REQUIREMENT WORKSHEET (Continued)

Note 2: This entry is for NT-40 offices only

Note 3: NETC entry for extension offices only

PROTECTED INVERTER POWER REQUIREMENTS						
EQUIPMENT	UNIT DRAIN (AMPS)	X	UNIT QTY	X	(VA) 120	VOLT AMPS (AC)
TOPS MP	.85	X			=	
TOPS MPX	2.1	X			=	
TOPS MPX DSU	.4	X			=	
CBT UNIT	12.0	X			=	
CBT VDU	1.0	X			=	
SUN WKSTN.	.77	X			=	
SUN TAPE DR.	.77	X			=	
NORSTAR DKSU	.42	X			=	
NORSTAR NTM/NSM	.2	X			=	
PRINTER		X			=	
VDUs		X			=	
MODEMS		X				
TOTAL VA REQUIRED						

Figure 5. DMS 100 FAMILY POWER REQUIREMENT WORKSHEET

1.1 Total VA required _____

1.2 Total KVA required _____
(Total VA/1000)

1.3 Inverter Conversion Efficiency Percent _____
(Enter as decimal)

1.4 Equivalent DC Power Drain _____
((Item 1.1/(48 x Item 1.3))

1.5 Total DC Power Drain _____
(Item 1.4 + Total AMPS Required)

5.2.6 Traffic Tables

N/A

5.3 Product/System Specification

5.3.1 Physical Characteristics

Reference job specifications/drawings for dimensions of equipment on a per job basis.

5.3.2 EMI/Earthquake Information

Relay rack type power boards and rectifier frames will require additional top bracing to meet most companies earthquake requirements. Battery racks can be specified as earthquake type to meet or exceed earthquake zones as required. Reference EMI section of this document for more information pertaining to seismic protection of power related equipment.

5.3.3 Sparing Information

Unless otherwise specified, NTI Power Engineering will provide a minimum of 2 spare fuses for each size required. One rectifier and power board spare parts kit will also be furnished if not otherwise specified on initial jobs.

5.3.4 Power Feed and Fusing Requirements

Please refer to the other sections of this ECM and the referenced EM Sections. All of this document describes Power Plant Provisioning.

5.3.5 Current Drain Information

When engineering an initial power plant, the total peak hour load imposed on a power board should never exceed 80% of the power board rating (i.e. 1200A X .80 = 960A). If the ultimate current drain does exceed 80%, the next incremental rated power board should be furnished.

5.4 Software Provisioning

For NTX software packages to PCL/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

5.4.1 Required Software Packages and Interdependencies

Not Applicable

5.4.2 Software Usage Restrictions

Not Applicable

5.4.3 Memory Provisioning

Not Applicable

5.5 Real Time Impact

Not Applicable

6.0 ECM542 - MERIDIAN POWER DISTRIBUTION CENTER (MPDC)

6.1 Overview

The Meridian Power Distribution Center(MPDC) is essentially a modified PDC packaged in an NTNX25 Meridian Cabinet bay.

The MPDC has been divided into two separate ordering codes: one for bottom feed (NTNX16AA) and one for top feed (NTNX16BA).

The MPDC is designed to provide a -48V DC power source within the Meridian Cabinet product line for the various non- Meridian cabinets that interface a Meridian Cabinet line-up. The products that the MPDC is designed to support include: ENET, DPCC, IPE, SNSE, DICP , LPP, HSI.

Up to six(6) fuse panels can be provided in the MPDC with a total useable fuse positions of 88. Two (2) fuse panels come "always provided" with the bay and four (4) are provisionable.

6.2 Hardware Provisioning

6.2.1 Hardware Usage Restrictions

The MPDC is capable of being bolted to a C28, C42 or Meridian Cabinet lineup.

The maximum usable fuse positions on all the panels combined is 88. If added up the figure comes to 90, but two fuses are used to provide current to the ABS alarm system.

| Fuse position "0" on the "Always Provided" fuse panels is reserved for the ABS alarm system. The two "Always Provided" fuse panels of both the top and bottom feed MPDC's will have a 20a fuse (A feed) and a dummy fuse (B feed) already provided in the stocklist for fuse position F 0 and will not need to be provisioned.

The MPDC can handle a maximum of 750 MCM cable on the main power feeds from the -48V office battery.

When powering an DPCC, SNSE, LPP, ENET off and MPDC provide 30a fuses for the shelf powering and 10a for the cooling units.

6.2.2 Hardware Dependencies

The MPDC should be anchored to the floor when using 750 MCM power feeds to ensure that the cabinet does not move.

6.2.2.1 P and C Side Port Requirements

Not applicable

6.2.2.2 DMS BUS Port Requirements

Not applicable

6.2.2.3 Circuits Per Card

Not applicable

6.2.2.4 Discrimination Numbering

The fuse panels and frame numbering follows standard Engineering practices.

6.2.3 Provisioning Considerations

The MPDC can support 7 NT9X01 cabinets, or 28 IPE columns. The MPDC will also provide power for ICP, DICP, HSI, IPE.

The fuse panels are ordered as required with a minimum of two and a maximum of 6, 0-30A, 4" fuse panels.

| Fuses in the first two "always provided" fuse panels must be provisioned by job engineer. Note, the fuse in position F00 (ABS) is always provided. With each fuse panel provisioned add one to 16 fuses as required for the equipment being powered.

6AWG terminal lugs are provided on the return plate. For every fuse provided provide two (2) A0288176 lugs one for BATTERY or MPDC end and one for LOAD or cabinet end.

6.2.4 Office Layout Information

6.2.4.1 FRONT ELEVATIONS OF THE NTNX16AA AND AB MPDC

The front view of the MPDC is shown in figure 1.

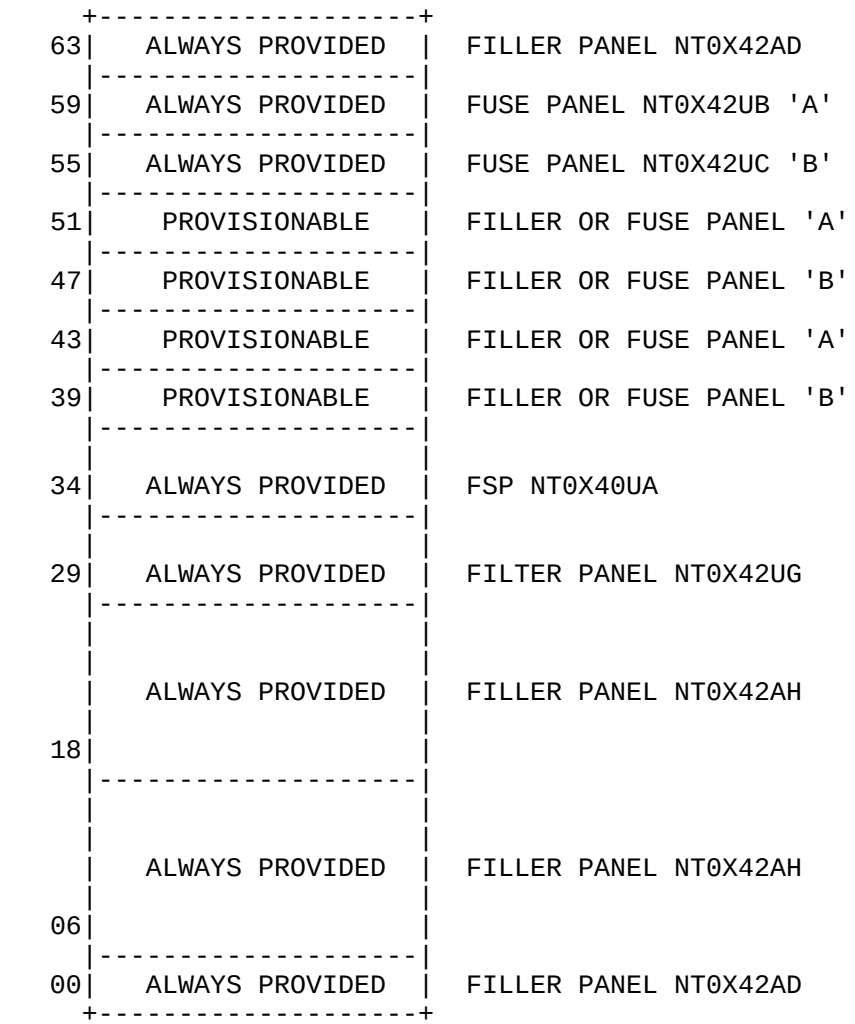

Figure 6. NTNX16AA Bottom Feed.

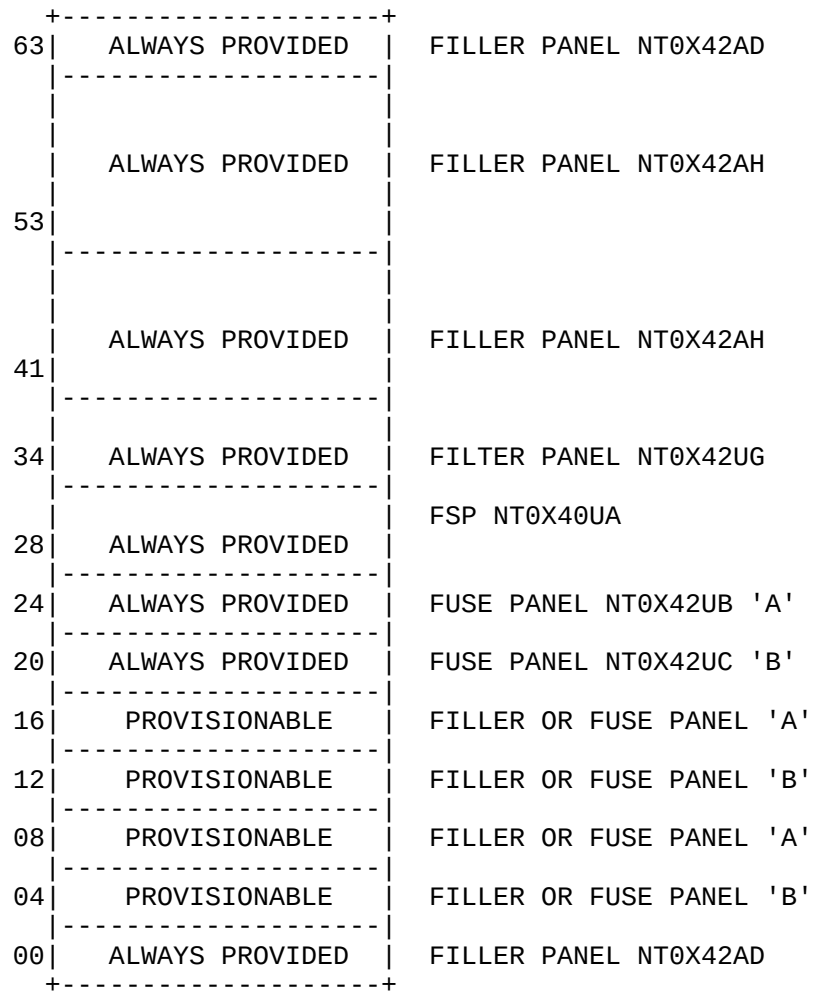

Figure 7. NTNX16BA Top Feed.

6.2.4.2 INSTALLATION ENGINEERING RULES FOR MAIN POWER FEEDS

The Lug Kits listed below are to be ordered by INSTALLATION DESIGN ENGINEERING or BUILDING STUDIES.

Provide one (1) NTNX16DA hardware kit for each 750MCM cable that will feed TO the Battery from the Battery Return Plate. Also provide one ( ) NTNX16DA hardware kit for every 750MCM cable that will feed FROM the Battery to the -48V busplate (extension plate). Maximum runs of cable are four feeding and four returning. SPECIAL NOTE : LUG KITS TO BE ORDERED BY INSTALLATION DESIGN ENGINEERS OR BUILDING STUDIES ENGINEERS.

Provide one (1) NTNX16DF hardware kit for each 500MCM cable that will feed TO the Battery from the Battery Return Plate. Also provide one ( ) NTNX16DF hardware kit for every 500MCM cable that will feed FROM the Battery to the -48V busplate (extension plate). Maximum runs of cable are four feeding and four returning. SPECIAL NOTE : LUG KITS TO BE ORDERED BY INSTALLATION DESIGN ENGINEERS OR BUILDING STUDIES ENGINEERS.

Provide one (1) NTNX16DB hardware kit for each 350MCM cable that will feed TO the Battery from the Battery Return Plate. Also provide one ( ) NTNX16DB hardware kit for every 350MCM cable that will feed FROM the Battery to the -48V busplate (extension plate). Maximum runs of cable are four feeding and four returning. SPECIAL NOTE : LUG KITS TO BE ORDERED BY INSTALLATION DESIGN ENGINEERS OR BUILDING STUDIES ENGINEERS.

Provide one (1) NTNX16DC hardware kit for each 250MCM cable that will feed TO the Battery from the Battery Return Plate. Also provide one ( ) NTNX16DC hardware kit for every 250MCM cable that will feed FROM the Battery to the -48V busplate (extension plate). Maximum runs of cable are four feeding and four returning. SPECIAL NOTE : LUG KITS TO BE ORDERED BY INSTALLATION DESIGN ENGINEERS OR BUILDING STUDIES ENGINEERS.

Provide one (1) NTNX16DD hardware kit for each Logic ground 1/O cable termination on the ground return plate in the MPDC. The 1/O cable will run to each C42 line- up. The ground return plate in the MPDC will support up to 4 (four) C42 line-ups. The kit contains compression lugs, washers, and nuts.

6.2.5 Traffic Tables

Not Applicable

6.3 Product/System Specification

6.3.1 Physical Characteristics

The MPDC is essentially a modified PDC in a Meridian (NTNX25) cabinet.

REAR VIEW SHOWING LOCATION OF
MAIN POWER FEED EXTENSION PLATE AND
GROUND RETURN PLATE

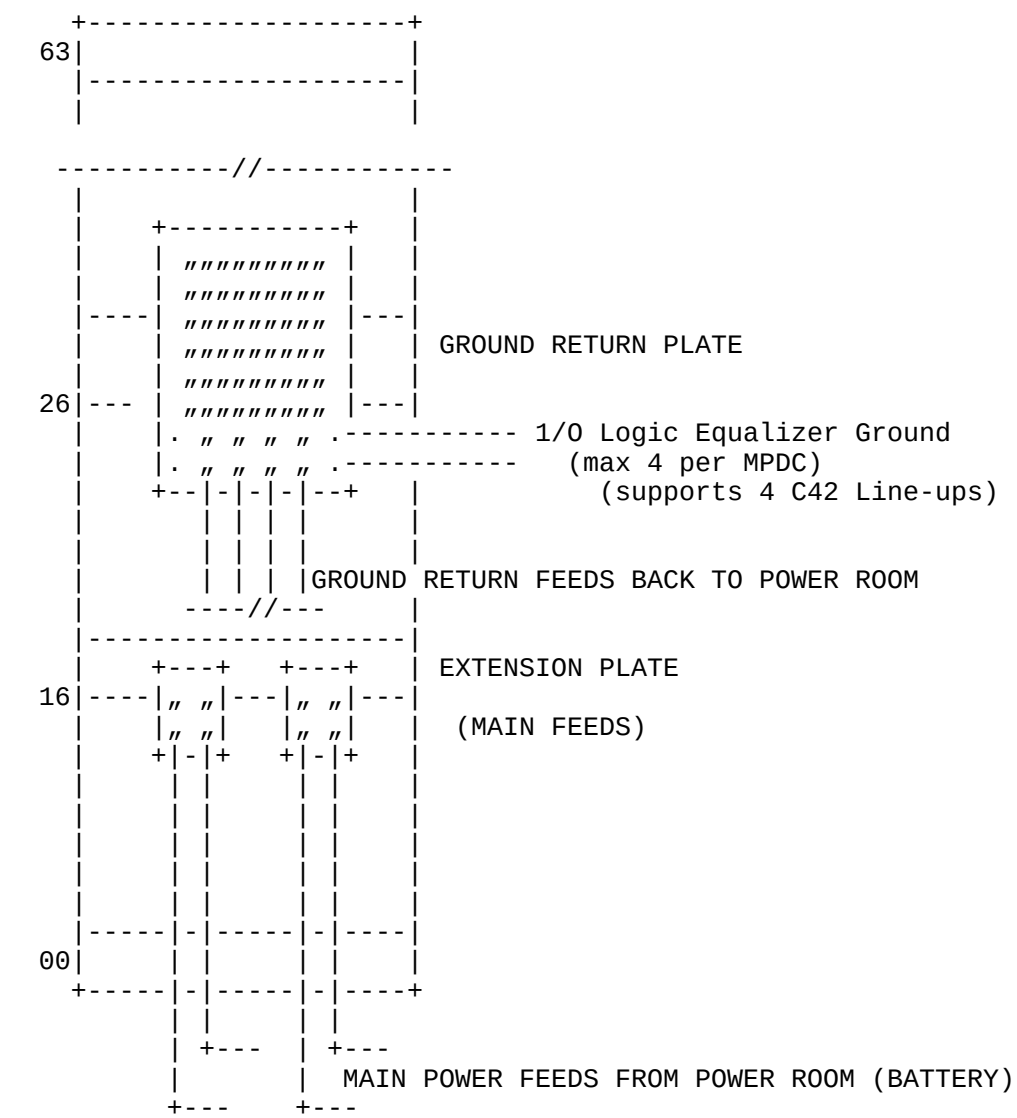

Figure 8. NTNX16AA Bottom Feed.

REAR VIEW SHOWING LOCATION OF
MAIN POWER FEED EXTENSION PLATE AND
GROUND RETURN PLATE

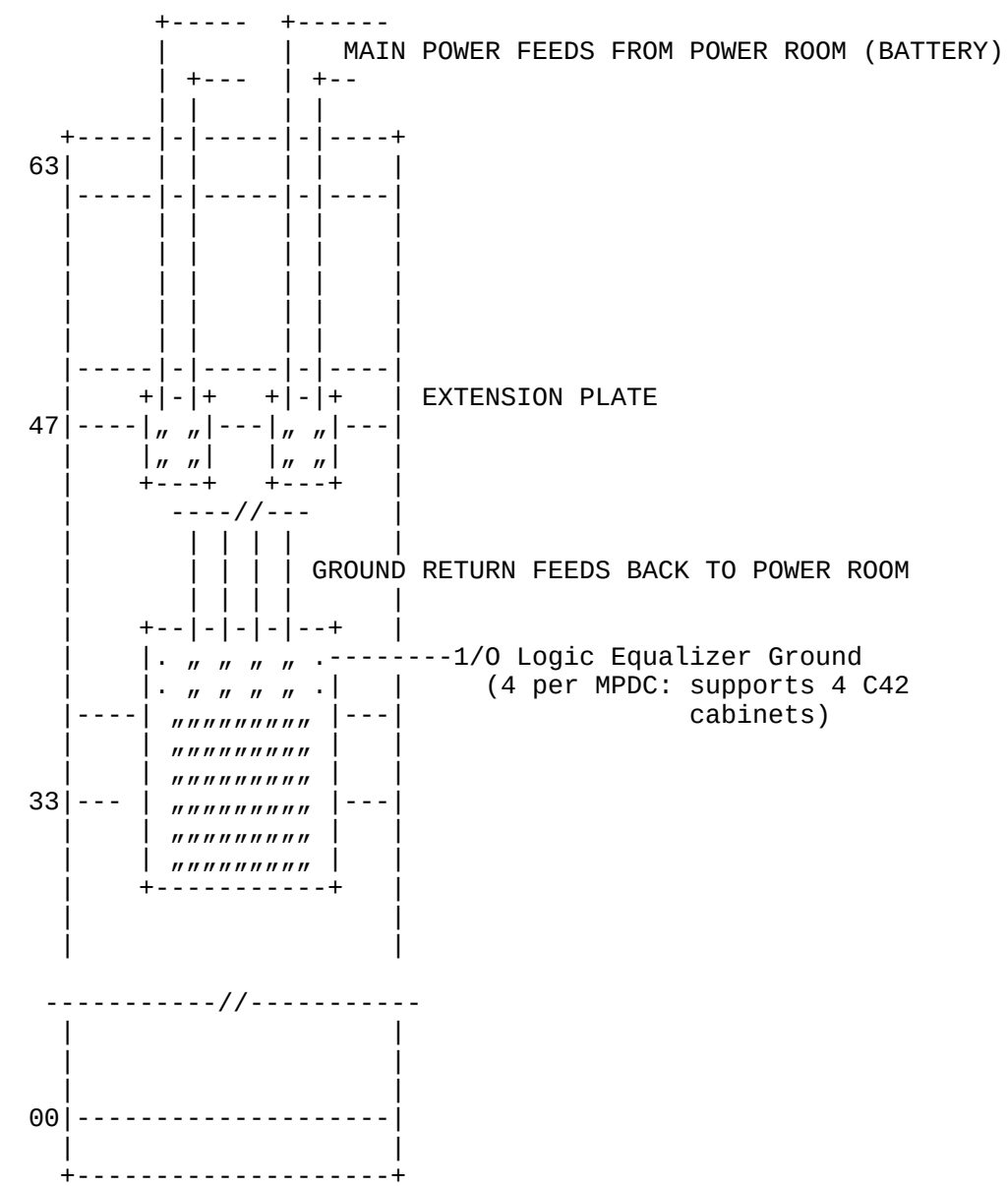

Figure 9. NTNX16BA Top Feed.

6.3.2 EMI/Earthquake Information

The MPDC is not an EMI cabinet. The standard guidelines for earthquake bracing of NTNX cabinets applies when providing the MPDC in an earthquake zone.

The MPDC will meet the requirements of NEBS 4 Specifications for ATC region 7 earthquake requirements. When bolted to a concrete floor or computer floor with sub-floor bracing meets ATC requirements for region 4 with no external bracing.

The MPDC does not require floor anchoring in non-earthquake environments, EXCEPT when using 750 MCM cable. There is danger of the cabinet moving if the the cabinet is not anchored to the floor.

6.3.3 Sparing Information

Use the following scenarios for providing spare fusing:

1) For ONE PAIR of fuse panels: (TWO PANELS)

(4) NT0X42AN 5A FUSE KIT
(9) NT0X42AS 30A FUSE KIT
(3) NT0X42AJ 10A FUSE KIT
(4) NT0X42AK 20A FUSE KIT

2) For TWO PAIR of fuse panels: (FOUR PANELS)

(9) NT0X42AN 5A FUSE KIT
(19) NT0X42AS 30A FUSE KIT
(3) NT0X42AJ 10A FUSE KIT
(4) NT0X42AK 20A FUSE KIT

3) For THREE PAIR of fuse panels: (SIX PANELS)

(12) NT0X42AN 5A FUSE KIT
(30) NT0X42AS 30A FUSE KIT
(3) NT0X42AJ 10A FUSE KIT
(8) NT0X42AK 20A FUSE KIT

6.3.4 Power Feed and Fusing Requirements

The total distribution capability of the MPDC is 800A, (400A per bus). (400A per bus on feeder "A" and 400A on feeder "B").

Although 400A is the Maximum amperage per feeder, NT Installation design Engineering fuses the MPDC in the Power Room at 600A per feeder.

The nominal voltage is-48V, with the nominal voltage range, measured at the equipment cabinet, is -49V to -53.5V. The extreme range is -42.5V to -55.8V.

* Two fuse panels, one "A" and one "B" are always provided when ordering the NTNX16AA and NTNX16BA MPDC. In addition to the two panels always provided with the cabinet, four (4) more can be provisioned (job engineered) for a total of 3 "A" and 3 "B" panels.

* Fuses on all fuse panels are provisionable. Provide A and B fuses as required to fuse the equipment provided. The maximum current available per feed is 400a and the demand on the MPDC should be calculated on the basis of the aggregate of the maximum steady load of the individual equipment. The load on each feed from the MPDC should be balanced as close as possible.

* 15 fuse positions per panel.(Total useable fuses is 88)
  If added up the figure comes to 90, but two fuses are used to provide current to the ABS alarm system (fuse position "0")

* Fuse ratings for cabinet loads: 5A/30A
  Alarm battery supply: 10A
  noise suppression capacitor: 10A

The MPDC Ambient Conditions:

	Temperature	Relative Humidity
* Operating range	10C to 30C	20 to 55%
* Short-term range	5C to 49C	20 to 80%

6.3.5 Current Drain Information

The electrical specifications for the MPDC are as follows:

NOMINAL VOLTAGE	-48V
* NORMAL VOLTAGE RANGE	-49V TO -53.5V
* EXTREME VOLTAGE RANGE	-42.5V TO -55.8V

*Measured at the MPDC

LOOP VOLTAGE DROP LIMITATIONS:

A. Between battery terminals and power plant discharge bus 0.25V

B. Maximum permissible between power plant discharge bus and MPDC busbars 0.75V

C. Maximum permissible between MPDC busbars and individual loads. 1.0V

MAXIMUM CURRENT CAPABILITY 800A TOTAL
(400A per battery bus, A&B)

6.3.5.1 NOISE LIMITATION

The following pecifications are measured in the bridging position at the load side of the battery feeder.

NOISE LEVEL - NOT EXCEEDING 56 dBrnC with a Max. single-tone level of less than 240mVp-p

NOISE SUPPRESSION CAPACITORS 36,000 Microfarads

6.4 Software Provisioning

For NTX software packages to PCL/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

Not Applicable

6.4.1 Required Software Packages and Interdependencies

Not Applicable

6.4.2 Software Usage Restrictions

Not Applicable

6.4.3 Memory Provisioning

Not Applicable

6.5 Real Time Impact

Not Applicable

7.0 ECM631 - Power Distribution Centers

7.1 Overview

Product/System Overview

Power Distribution Center (PDC)

Power Distribution Center (PDC) frame or the Cabinetized Power Distribution Center (CPDC) provides an interface between the office batteries and central office equipment requiring DC power. The PDC/CPDC is connected to the office battery splice plate via two separate feeders (A and B) and battery return cables. It is equipped with fuse/breaker panels to distribute filtered DC power to the equipment lineups.

The total DC distribution capacity of the PDC is 800 amperes (400 amps on A feed plus 400 amps on B feed). The maximum DC distribution capacity of the CPDC is 8 0 amperes (4 0 amps on A feed plus 4 0 amps on B feed).

UL PDC

In order to ensure the marketability of the DMS Family of switches, it is imperative that the System, as a whole, is regulatory compliant. The major regulatory agency being addressed is Underwriters Laboratories (UL). The document which U.L. produces in association with telephone manufacturers is the U.L. 1459 standard for telephone equipment.

It is a U.L. requirement that the Power Distribution Center (PDC) be listed under U.L. 1459 before proceeding with other frames of the system. The PDC frame (NT0X42AA) has been modified to comply with U.L. listing 1459. This PDC frame is the new U.L. listed (NT0X42UA) frame. The following modifications have been performed on the NT0X42AA frame to make it the NT0X42UA frame:

- 1. New Fuse Holders with Longer Terminal Studs.
- 2. All Components (Lamps,Lamp Holders,Fuses etc.) are U.L. listed.
- 3. Elimination of Double Connections on Battery Return Studs. (up to 166 Ground Terminations).
- 4. Introduction of Belleville Washers to Eliminate Loose Pressure Connections.

Cabinetized Power Distribution Center (CPDC)

The NTRX31CA Cabinetized PDC houses equipment required to interface between the -48V office batteries and up to 84 individual

loads within the DMS-100 system. The CPDC will contain power distribution shelves, an FSP which includes DC distribution filtering and one optional inverter shelf which will serve convenience outlets.

The CPDC will provide the capability to use circuit breakers rather than fuses, connectors in place of bolted connections and the ability to add CPDC shelves as required. EMI compliance is achieved at the cabinet level for all input power cabling and at the system level for all power distribution.

The maximum capacity of the CPDC is 400 Amps per feed. Refer to ECM-600 for additional cabinetized equipment restrictions and information.

For Canadian and U.S. applications, the NTRX31CA is always provided in the NTZZ47CB CPDC building block.

For international applications, the NTRX31CA is always provided in the NTZZ37MA International CPDC building block. For each International CPDC, one (1) NTRX31AF UK Insulator Kit is provided as required. The UK Insulator Kit, which includes covers for terminal boards and busbars, must be provisioned for UK markets and may be provisioned on customer request in other markets.

7.1.1 Power Distribution Center Ordering with Building Blocks

Equipment can be ordered either in detail by specifying each code required or in Building Blocks, which group equipment according to function. The Building Block method reduces the number of codes which must be ordered, simplifying the order procedure for the customer. The various available PDC Building Blocks are described in Section 2.4.1. of this ECM.

The CPDC is always ordered in Building Blocks.

7.2 Hardware Provisioning

7.2.1 Hardware Usage Restrictions

1. On DMS-100 Extensions, a mix of the NT0X42AA frame and NT0X42UA frame is allowed.

2. For every LGC Module with a clustering of (on the same PDC/CPDC):

LCMs per LGC	QTY FUSE POSITIONS TO PROVIDE	FUSE LOCATIONS
2	14 fuse positions	7A and 7B
3	18 fuse positions	9A and 9B
4	2 fuse positions	1 A and 11B
5	26 fuse positions	1 A and 13B
6	3 fuse positions	15A and 15B

3. For every LGE Frame or Cabinet with a clustering of (on the same PDC/CPDC):

LCMs per LGC	QTY FUSE POSITIONS TO PROVIDE	FUSE LOCATIONS
2	2 fuse positions	1 A and 11B
3	3 fuse positions	15A and 15B
4	38 fuse positions	19A and 19B
5	46 fuse positions	2 A and 23B
6	54 fuse positions	27A and 27B

- These fuse allocations must be grouped together on the same PDC/CPDC to conform to ISG power clustering requirements.
- In the event that the site or office requirement does not specify use of all LCM modules that can be utilized off of a LGE, the fuse locations must be reserved in the event of future growth for the LGE. Any power requirements for these unused fuse positions other than subtending LCEs must be located elsewhere on the PDC/CPDC or must be located on an additional PDC/CPDC. To use these reserve fusing positions for other equipment would violate the ISG Clustering rules of LCM to LGC to PDC requirements and could cause potential rework.

- If a LCM can not be powered from the same PDC/CPDC as the subtending LGC, then all subtending LCMs and LGC have to be moved to another PDC/CPDC to support ISG. Failing to follow this guideline presents a possibility that an outage can occur when reclustering has to be performed.

7.2.2 Hardware Dependencies

Not applicable.

7.2.2.1 P and C Side Port Requirements

Not applicable.

7.2.2.2 DMS BUS Port Requirements

Not applicable.

7.2.2.3 Circuits Per Card

Not applicable.

7.2.2.4 Discrimination Numbering

Not applicable.

7.2.3 Provisioning Considerations

The Power Distribution Centers are provisioned through PDC Building Blocks.

7.2.3.1 PDC Building Block Definition

The available PDC Building Blocks are described below. Optional top or bottom fed PDC's can be selected. Electro Magnetic Interference (EMI) protection can be optionally provided with the top feed PDC. The PDC can accommodate up to 150 provisionable fuses for distribution of power to the DMS-100F frames that are equipped in the office.

A fully-equipped PDC contains ten (10) standard fuse panels equipped for 15 fuses each. For US applications, fully-equipped PDC (U.L. Listed) configurations are standard, which are provisioned through Fully-Equipped PDC Building Blocks or through other PDC Building Blocks when the required features cannot be provided by Fully-Equipped PDC Building Blocks.

NTZZ13AA (PDC Top-Feed) (Replaced by NTZZ13HA)

The NTZZ13AA contains four (4) panels for 15 fuses each (total 60) and a filter panel. The remaining required type A and B fuse panels are provisionable in pairs based on frame calculations. A fully equipped PDC contains 10 panels equipped for 15 fuses each. Options to the PDC

include an NT0X42AU ISDN fuse panel for Packet Handler fusing, and an NT0X42AT EMI Logic Return Equalizer Busbar for the first equipped PDC. All fuses types must be provisioned separately.

NTZZ13BA (PDC Bottom-Feed) (Replaced by NTZZ13JA)

The NTZZ13BA contains four (4) panels of 15 fuses each (total 60) and a filter panel. The remaining required type A and B fuse panels are provisionable in pairs based on frame calculations. A fully loaded PDC contains 10 panels each equipped for 15 fuses. Options to the PDC include an NT0X42AU ISDN fuse panel for Packet Handler fusing. EMI is not an available option with a bottom fed PDC. All fuses types must be provisioned separately.

NTZZ13CA (A and B Fuse Panels)

The NTZZ13CA contains one (1) A and one (1) B type Fuse panel for assignment to NTZZ13AA, NTZZ13BA, NTZZ13HA, NTZZ13JA and NTZZ13RE. Both panels have a capacity for 15 fuses each.

NTZZ13DA (PDC Top-Feed Fully-Equipped) (Replaced by NTZZ13KA)

The NTZZ13DA contains ten (10) panels for 15 fuses each (total 150) and filter panels. There are no available options such as ISDN Fuse panel or the EMI option. All fuse types must be provisioned separately.

NTZZ13EA (PDC Top-Feed, International Applications Only)

The NTZZ13EA contains four (4) panels for 15 fuses each (total 60) and a filter panel. The remaining required type A and B fuse panels are provisionable in pairs based on frame calculations. A fully equipped PDC contains 10 panels equipped for 15 fuses each. Options to the PDC include an NT0X42AU ISDN fuse panel for Packet Handler fusing, an NT0X42XC Enhanced Alarm Service Upgrade Kit, NT0X42XA ISG Auxiliary Bar, NT0X42XB Non-ISG Auxiliary Bar, and an NT0X42AT EMI Logic Return Equalizer Busbar for the first equipped PDC. All fuses types must be provisioned separately except for the (2) 5 Amp fuses supplied in the NT0X42XC Kit.

NTZZ13FA (A and B Fuse Panels, Canadian Applications Only)

The NTZZ13FA contains one (1) A and one (1) B type Fuse panel for assignment to either NTZZ13AA or NTZZ13BA. Both panels have a capacity for 15 fuses each.

NTZZ13HA (U.L. PDC Top-Feed, US Applications Only) (Replaced by NTZZ13RA.)

The NTZZ13HA contains four (4) panels for 15 fuses each (total 60) and a filter panel. The remaining required type A and B fuse panels are provisionable in pairs based on frame calculations. A fully equipped PDC contains 10 panels equipped for 15 fuses each. Options to the PDC

include an NT0X42AU ISDN fuse panel for Packet Handler fusing, an NT0X42XC Enhanced Alarm Service Upgrade Kit, an NT0X42XA/XB Auxiliary Battery Return Panel Kit, and an NT0X42AT EMI Logic Return Equalizer Busbar for the first equipped PDC. All fuses types must be provisioned separately except for the (2) 5 Amp fuses supplied in the NT0X42XC Kit.

NTZZ13JA (U.L. PDC Bottom-Feed, US Applications Only) (Replaced by NTZZ13VA)

The NTZZ13JA contains four (4) panels of 15 fuses each (total 60) and a filter panel. The remaining required type A and B fuse panels are provisionable in pairs based on frame calculations. A fully loaded PDC contains 10 panels each equipped for 15 fuses. Options to the PDC include an NT0X42AU ISDN fuse panel for Packet Handler fusing, an NT0X42XC Enhanced Alarm Service Upgrade Kit and an NT0X42XA/XB Auxiliary Battery Return Panel Kit. EMI is not an available option with a bottom fed PDC. All fuses types must be provisioned separately except for the (2) 5 Amp fuses supplied in the NT0X42XC Kit.

NTZZ13KA (U.L. PDC Top-Feed, Fully-Equipped, US Applications Only)(Replaced by NTZZ13TA)

The NTZZ13KA contains ten (10) panels for 15 fuses each (total 150) and filter panels. Options to the PDC include an NT0X42XC Enhanced Alarm Service Upgrade Kit and an NT0X42XA/XB Auxiliary Battery Return Panel Kit. All fuses types must be provisioned separately except for the (2) 5 Amp fuses supplied in the NT0X42XC Kit.

NTZZ13RA (Earthquake U.L. PDC Top-Feed, US Applications Only) (Replaced by NTZZ13RE)

The NTZZ13RA contains four (4) panels for 15 fuses each (total 60) and a filter panel. The remaining required type A and B fuse panels are provisionable in pairs based on frame calculations. A fully equipped PDC contains 10 panels equipped for 15 fuses each. Options to the PDC include an NT0X42AU ISDN fuse panel for Packet Handler fusing, an NT0X42XC Enhanced Alarm Service Upgrade Kit, an NT0X42XA/XB Auxiliary Battery Return Panel Kit, and an NT0X42AT EMI Logic Return Equalizer Busbar for the first equipped PDC. All fuses types must be provisioned separately except for the (2) 5 Amp fuses supplied in the NT0X42XC Kit.

NTZZ13TA (Earthquake U.L. PDC Top-Feed Fully-Equipped, US Only) (Replaced by NTZZ13TE)

The NTZZ13TA contains ten (10) panels for 15 fuses each (total 150) and filter panels. Options to the PDC include an NT0X42XC Enhanced Alarm Service Upgrade Kit and an NT0X42XA/XB Auxiliary Battery Return Panel Kit. All fuses types must be provisioned separately except for the (2) 5 Amp fuses supplied in the NT0X42XC Kit.

NTZZ13UA (PDC Bottom-Feed, for International Applications)

The NTZZ13UA contains four (4) panels for 15 fuses each (total 60) and a filter panel. The remaining required type A and B fuse panels are provisionable in pairs based on frame calculations. A fully equipped PDC contains 10 panels equipped for 15 fuses each. Options to the PDC include an NT0X42AU ISDN fuse panel for Packet Handler fusing and an NT0X42XC Enhanced Alarm Service Upgrade Kit. All fuses types must be provisioned separately except for the (2) 5 Amp fuses supplied in the NT0X42XC Kit.

NTZZ13VA (Earthquake U.L. PDC Bottom-Feed, US Applications Only) (Replaced by NTZZ13VE)

The NTZZ13VA contains four (4) panels of 15 fuses each (total 60) and a filter panel. The remaining required type A and B fuse panels are provisionable in pairs based on frame calculations. A fully equipped PDC contains 10 panels each equipped for 15 fuses. Options to the PDC include an NT0X42AU ISDN fuse panel for Packet Handler fusing, an NT0X42XC Enhanced Alarm Service Upgrade Kit and an NT0X42XA/XB Auxiliary Battery Return Panel Kit. EMI is not an available option with a bottom fed PDC. All fuses types must be provisioned separately except for the (2) 5 Amp fuses supplied in the NT0X42XC Kit.

NTZZ13WA (Earthquake U.L. PDC Bottom-Feed Fully-Equipped, US Only) (Replaced by NTZZ13WE)

The NTZZ13WA contains ten (10) panels of 15 fuses each (total 150) and a filter panel. Options to the PDC include an NT0X42XC Enhanced Alarm Service Upgrade Kit and an NT0X42XA/XB Auxiliary Battery Return Panel Kit. EMI is not an available option with a bottom fed PDC. All fuses types must be provisioned separately except for the (2) 5 Amp fuses supplied in the NT0X42XC Kit.

NTZZ47CB (Cabinetized PDC, for Canadian and US applications)

The NTZZ47CB contains one NTRX31CA CPDC and door labels. Additional equipment required depends on office configuration and must be provisioned per rules in the NTZZ47CB Engineering Manual section.

NTZZ37MA (International Cabinetized PDC)

The NTZZ37MA contains one NTRX31CA CPDC and door labels. Additional equipment required depends on international office configuration and must be provisioned per rules in the NTZZ37MA Engineering Manual section. In NTZZ37MA, one (1) NTRX31AF UK Insulator Kit must be provisioned for UK markets and may be provisioned on customer request in other markets.

NTZZ13RB (EQ U.L. PDC Top-Feed, US Applications Only) (Replaced by NTZZ13RE)

The NTZZ13RB contains four (4) panels for 15 fuses each (total 60) and a filter panel. The remaining required type A and B fuse panels are

provisionable in pairs based on frame calculations. A fully equipped PDC contains 10 panels equipped for 15 fuses each. The NTZZ13RB is equipped with the Enhanced Alarm System equipment. Options to PDC include an NT0X42AU ISDN fuse panel for Packet Handler fusing, the NT0X42XA/XB Auxiliary Battery Return Panel Kit, and an NT0X42AT EMI Logic Return Equalizer Busbar for the first equipped PDC. All fuses types must be provisioned separately.

NTZZ13TB (EQ U.L. PDC Top-Feed Fully-Equipped e/w EAS, US Only) (Replaced by NTZZ13TE)

The NTZZ13TB contains ten (10) panels for 15 fuses each (total 150) and filter panels. The NTZZ13TB is equipped with the Enhanced Alarm System equipment. Options to the PDC include NT0X42XA/XB Auxiliary Battery Return Panel Kit. All fuse types must be provisioned separately.

NTZZ13UB (EQ PDC Bottom-feed, for International Applications)

The NTZZ13UB contains four (4) panels for 15 fuses each (total 60) and a filter panel. The remaining required type A and B fuse panels are provisionable in pairs based on frame calculations. A fully equipped PDC contains 10 panels equipped for 15 fuses each. Options to the PDC include an NT0X42AU ISDN fuse panel for Packet Handler fusing and the NT0X42XA/XB Auxiliary Battery Return Panel Kit. All fuses types must be provisioned separately.

NTZZ13VB (EQ U.L. PDC Bottom-Feed e/w EAS, US Applications Only) (Replaced by NTZZ13VE)

The NTZZ13VB contains four (4) panels of 15 fuses each (total 60) and a filter panel. The remaining required type A and B fuse panels are provisionable in pairs based on frame calculations. A fully equipped PDC contains 10 panels each equipped for 15 fuses. The NTZZ13VB is equipped with the Enhanced Alarm System equipment. Options to the PDC include an NT0X42AU ISDN fuse panel for Packet Handler fusing and an NT0X42XA/XB Auxiliary Battery Return Panel Kit. EMI is not an available option with a bottom fed PDC. All fuses types must be provisioned separately.

NTZZ13WB (EQ U.L. PDC Bottom-Feed Fully-Equipped e/w EAS, US Only)

The NTZZ13WB contains ten (10) panels of 15 fuses each (total 150) and a filter panel. The NTZZ13WB is equipped with the Enhanced Alarm System equipment. Options to the PDC include the NT0X42XA/XB Auxiliary Battery Return Panel Kit. EMI is not an available option with a bottom fed PDC. All fuse types must be provisioned separately.

NTZZ13RE (Earthquake U.L. PDC Top-Feed, US Applications Only)

The NTZZ13RE contains four (4) panels for 15 fuses each (total 60) and a filter panel. The remaining required type A and B fuse panels are provisionable in pairs based on frame calculations. A fully equipped

PDC contains 10 panels equipped for 15 fuses each. Options to the PDC include an NT0X42AU ISDN fuse panel for Packet Handler fusing, an NT0X42UB Enhanced Alarm Service FSP, an NT0X42XC Enhanced Alarm Service Upgrade Kit, an NT0X42XA/XB Auxiliary Battery Return Panel Kit, and an NT0X42AT EMI Logic Return Equalizer Busbar for the first equipped PDC. All fuses types must be provisioned separately except for the (2) 5 Amp fuses supplied in the NT0X42XC Kit.

NTZZ13TE (Earthquake U.L. PDC Top-Feed Fully-Equipped, US Only)

The NTZZ13TE contains ten (10) panels for 15 fuses each (total 150) and filter panels. Options to the PDC include an NT0X42UB Enhanced Alarm Service FSP, an NT0X42XC Enhanced Alarm Service Upgrade Kit, and an NT0X42XA/XB Auxiliary Battery Return Panel Kit. All fuses types must be provisioned separately except for the (2) 5 Amp fuses supplied in the NT0X42XC Kit.

NTZZ13VE (Earthquake U.L. PDC Bottom-Feed, US Applications Only)

The NTZZ13VE contains four (4) panels of 15 fuses each (total 60) and a filter panel. The remaining required type A and B fuse panels are provisionable in pairs based on frame calculations. A fully equipped PDC contains 10 panels each equipped for 15 fuses. Options to the PDC include an NT0X42AU ISDN fuse panel for Packet Handler fusing, an NT0X42UB Enhanced Alarm Service FSP, an NT0X42XC Enhanced Alarm Service Upgrade Kit and an NT0X42XA/XB Auxiliary Battery Return Panel Kit. EMI is not an available option with a bottom fed PDC. All fuses types must be provisioned separately except for the (2) 5 Amp fuses supplied in the NT0X42XC Kit.

NTZZ13WE (Earthquake U.L. PDC Bottom-Feed Fully-Equipped, US Only)

The NTZZ13WE contains ten (10) panels of 15 fuses each (total 150) and a filter panel. Options to the PDC include an NT0X42UB Enhanced Alarm Service FSP, an NT0X42XC Enhanced Alarm Service Upgrade Kit, and an NT0X42XA/XB Auxiliary Battery Return Panel Kit. EMI is not an available option with a bottom fed PDC. All fuses types must be provisioned separately except for the (2) 5 Amp fuses supplied in the NT0X42XC Kit.

NTZZ13GB (Earthquake U.L. PDC Bottom or Top Feed Fully- Equipped, US Only)

The NTZZ13GB contains ten (10) panels of 15 fuses each (total 150) and a filter panel. The NT0X42XE Battery Return kit is always provided. Options to the PDC include an NT0X42UB Enhanced Alarm Service FSP, an NT0X42XC Enhanced Alarm Service Upgrade Kit. EMI is not an available option with the PDC Bottom or Top Feed Fully-Equipped. All fuses types must be provisioned separately except for the (2) 5 Amp fuses supplied in the NT0X42XC Kit.

7.2.4 Office Layout Information

Normally, the PDC is located at the non-growth end of an equipment lineup. It may be located in the middle of a lineup upon customer's request, subject to cable distance versus current capacity and wire gauge limitations. Several equipment lineups may share one CPDC, connected by cross-aisle power cabling.

The CPDC is normally located at the non-growth end of an equipment lineup, but it can be located in the middle of a lineup if required. The DMS-100 Cabinetization equipment are restricted to lineups of no more than eleven (11) 28" cabinets or five (5) 42" cabinets. Refer to ECM-600 for more details of office layout rules.

7.2.5 Traffic Tables

Not applicable.

7.3 Product/System Specification

7.3.1 Physical Characteristics

For information on the physical characteristics of the CPDC, refer to ECM-600 DMS-100 Cabinetized.

7.3.2 EMI/Earthquake Information

Non-UL PDC

For Isolated System Grounding (ISG) compliant and Electromagnetic Interference (EMI) protected applications, an Isolated System Grounding Logic Return Equalizer Bus Bar Assembly, NT0X42AT is provisioned at position 5 of PDC 00. In this particular case, no NT0X42AH Filler Panel will be provisioned and the Ground Panel must be equipped in position 68.

Furthermore, for all packaged EMI applications, NT0X42UE Ground Panel - Top Feed is to be provided for either top or bottom power cable feed (despite the panel's name).

For non-packaged (custom switch) EMI applications, NT0X42UE Ground Panel - Top Feed is to be provided and power cables run through the top of the frame only. Bottom cable feed is not available for these applications.

When filtered EMI protection is required, provide one (1) EMI Rear Cabling Housing Assembly and associated hardware.

UL PDC

With the implementation of Isolated System Grounding(ISG) for Electromagnetic Interference(EMI) applications, an isolated system

grounding logic return equalizer bus bar assembly (NT0X42AT) is now mountable at position 05 of the U.L. PDC. Only one ( ) NT0X42AT is required per office and should be mounted in U.L. PDC 00.

For offices with both EMI and ISG the ground panel (NT0X42UE) must be mounted in pos 68 of Top Feed U.L. PDC 00. Therefore, no Filler Panel (NT0X42AH) will be required for PDC 00. The remaining PDC's will require a Filler Panel in pos 05 of PDC 01 and upwards.

When Electromagnetic Interference (EMI) protection is required, provide one (1) NT0X42AT ISG/EMI Logical Return Ground Equalizer Busbar in position 05 of PDC 00 only. Only one (1) NT0X42AT is required per office and should be mounted in the first PDC.

Cabinetized PDC

The Cabinetized PDC is now being provided only as EMI-compliant. Refer to the Engineering Manual sections for NTZZ47CB and NTZZ37MA for details.

7.3.3 Sparing Information

As a recommendation, provide 10% spare fuses.

7.3.4 Power Feed and Fusing Requirements

Not applicable.

7.3.5 Current Drain Information

Not applicable.

7.4 Software Provisioning

For NTX software packages to PCL/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

7.4.1 Required Software Packages and Interdependencies

Not applicable.

7.4.2 Software Usage Restrictions

Not applicable.

7.4.3 Memory Provisioning

Not applicable.

7.5 Real Time Impact

Not applicable.

8.0 ECM800 - DMS-100 Product Current Drain

8.1 Overview

DMS-100 Product Current Drain ratings for the DMS-100 product line are enclosed within this document. All current drain values have been pulled from a tool in CADES that was developed from individual product measurements for ckt. packs. Additional tools were built to achieve upper level assembly codes such as frames, cabinets, modules, etc.. Each product has been assigned a cur rent rating when fully configured for the largest current drain ing configuration. All current drain information contained within this ECM overrides all other published current drain information contained within other ECMs, EMSs, and other product rules documentation.

8.2 Hardware Provisioning

8.2.1 Hardware Usage Restrictions

Not Applicable

8.2.2 Hardware Dependencies

8.2.2.1 P and C Side Port Requirements

Not Applicable

8.2.2.2 DMS BUS Port Requirements

Not Applicable

8.2.2.3 Circuits Per Card

Not Applicable

8.2.2.4 Discrimination Numbering

Not Applicable

8.2.3 Provisioning Considerations

Not Applicable

8.2.4 Office Layout Information

Not Applicable

8.2.5 Traffic Tables

Not Applicable

8.3 Product/System Specification

8.3.1 Physical Characteristics

Not Applicable

8.3.2 EMI/Earthquake Information

Not Applicable

8.3.3 Sparing Information

Not Applicable

8.3.4 Power Feed and Fusing Requirements

Not Applicable

8.3.5 Current Drain Information

The following current drain information was taken from measured current values and algorithums exclusively with a few exceptions as indicated below. Each current drain value represents a fully loaded configuration. The estimated current drains for the various DMS-100 equipment are as follows:

EQUIPMENT	(AMPS)
CCC Double Fr./NT3X45	20.2
SLU/ NT9X44AD	1.0
NETC/ NT5X13AA	24.0

DSNE/ NT8X10AA	11.4	
ENET/LIU SHELF/ NT9X7204	28.7	
ENET/ NT9X05AC/AD	60.5	
FLIS/ NTEX01AB	15.3	
LIM/ NT9X70BB	99.4	
SLM SHELF/ NT9X0701	5.0	
SDM/ NTRX50BA	7.0	*
MTD/ NT0X44AH	3.5	*
DDU/ NT4X00AF	2.6	
BMC/ NT8M04AG	2.1	
DPP/ NT8X48BD	3.5	*
IOC/ NT1X61AG	8.0	
APC/ NT9X80BA	96.0	*
DCM SHELF / NT2X31	2.1	
TM SHELF/ NT2X52AB	5.0	
MTM SHELF/ NT2X58AL	4.3	
ISME FR./CISM CAB./ NTFX40AA/BA	21.0	
MTAE FR./CMTA CAB./ NTFX40FA/EA	16.0	
OAU SHELF/ NT2X58AF	5.8	
INVERTER/ NT0X87AA	5.0	*
PDC/ NT0X42UA	4.2	
XPM FR./ SMS/SMU/SMR/LGC/DTC/ LGCI/DTCI/LTCI/ NT6X01/NTRX46	33.0	
XPM MODULE/ SMS/SMU/SMR/LGC/DTC/ LGCI/DTCI/LTCI/ NT6X0211/NT6X0216	16.5	
BSAC/ NT4X09	0.5	*
ST6E/ST7E/ NT6X09AA	10.0	
MS7E/ NT6X31AA	14.0	
PCE/ NTNX60AA	6.1	
AAE/ NTNX57AC	3.0	
ROTL/ NT7F18AD	4.3	
IAE/ NTBX40AA	13.7	
SPM/ NTLX50AA	50.0	*
RLCC/ NTNX14AA	26.0	
RLCM/ NT6X14AA	25.0	
RCE/ NT6X10AD	23.5	
LCE/ NT6X03AA	12.1	
LCM MODULE/ NT6X0371	6.0	
LCEI/ NTBX30AB	23.0	
LCME MODULE/ NTBX3104	11.5	
CLCE/ NTRX30CA	21.3	
CLMI/ NTRX30DA	20.7	
RCC SHELF/ NT6X1201	6.8	
CRSC/ NTMX89FA/FB	25.0	
CEXT/ NTMX89FC	25.0	
MIS. FR./ NT0X02AB	21.5	
CMIS/ NTRX56AA	29.8	
RSE FR./NT0X02AB	16.0	*
RME FR./ NT0X02AB	16.0	*
CRME/ NTRX31EA	16.0	*
OPM/ NT8X01AC	75.0	*
OPAC/ NTRX60AA	75.0	*

MVIE FR./ NTMX90BA	24.5
CMVI CAB./ NTQX90AA	24.5

* Source-Information furnished through earlier ECMs. New source of information incomplete.

8.4 Software Provisioning

Not Applicable

8.4.1 Required Software Packages and Interdependencies

Not Applicable

8.4.2 Software Usage Restrictions

Not Applicable

8.4.3 Memory Provisioning

Not Applicable.

8.5 Real Time Impact

Not Applicable

Volume Separator - Back Page

DMS-100 FAMILY
NORTH AMERICAN DMS-100
Provisioning Guide Volume 2 of 3

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