

555-4031-814

Meridian SL-100 SE

Commercial Systems

Operational Measurements Reference Manual

MSL14 Standard 12.02 July 2002

Meridian SL-100 SE

Commercial Systems

Operational Measurements Reference Manual

Publication number: 555-4031-814

Product release: MSL14

Document release: Standard 12.02

Date: July 2002

Copyright © 1992-2002 Nortel Networks,
All Rights Reserved

Printed in the United States of America

NORTEL NETWORKS CONFIDENTIAL: The information contained in this document is the property of Nortel Networks. Except as specifically authorized in writing by Nortel Networks, the holder of this document shall keep the information contained herein confidential and shall protect same in whole or in part from disclosure and dissemination to third parties and use same for evaluation, operation, and maintenance purposes only. Changes or modifications to the Meridian SL-100 without the express consent of Nortel Networks may void its warranty and void the user's authority to operate the equipment.

Information is subject to change without notice. Nortel Networks reserves the right to make changes in design or components as progress in engineering and manufacturing may warrant.

*Nortel Networks, the Nortel Networks logo, the Globemark, Unified Networks, DMS, MAP, Meridian, MSL, Nortel, Northern Telecom, NT, SL-100, and SuperNode are trademarks of Nortel Networks.

Publication history

To comply with Nortel Networks Technical Documentation Standards, the Publication history will contain updates for the current release and two prior releases.

July 2002

Version 12.02, MSL14 Standard release. This version represents an up issue of the standard release of this document. This version includes new colored templates.

November 2000

Version 12.01, Standard, MSL14. This version represents an up issue of the standard release of this document.

May 2000

Version 11.01, Standard, MSL12. This version represents the standard release of this document and includes some minor pagination and graphics differences from the previous version.

Contents

Publication history v

About this document ix

Operational measurement groups 13

- Purpose 13
- OM group descriptions 13
- Flow charts 14
- Register descriptions 14
- OM group ASR 17
- OM group IPERNGFL 21
- OM group SITE3 23
- OM group VOW 29
- OM group WIDEBAND 41

About this document

Purpose

This document contains operational measurements (OM) descriptions for Meridian SL-100 SE switch. These OM groups provide information on switch performance and activity.

The Meridian SL-100 system organizes the collection, display, and recording of OM data. Hardware and software OM data is collected for activities such as traffic, feature use, and equipment use. Data is collected for individual pieces of equipment (such as attendant consoles), on a group basis (such as for trunk groups), or for an entire Meridian node. OM data can be used as a basis for maintenance, provisioning, network management, administration, and planning purposes.

Note: The MSL14 software delivery is part of an on-going evolution. This book is one of several transitional documents that must be used with the following DMS-100 and XPM counterparts for the full complement of documentation:

- *NA DMS-100 Operational Measurements Reference Manual*, 297-8001-814
- *XPM Operational Measurements Reference Manual*, 297-8321-814

Disregard the signaling point (SP), Traffic Operator Position System (TOPS), and SuperNode Data Manager (SDM) information as it does not apply to the MSL-100 switch.

How to check the version and issue of this document

The version and issue of the document are indicated by numbers, for example, 01.01.

The first two digits indicate the version. The version number increases each time the document is updated to support a new software release. For example, the first release of a document is 01.01. In the *next* software release cycle, the first release of the same document is 02.01.

x About this document

The version and issue of the document are indicated by numbers, for example, 01.01.

The second two digits indicate the issue. The issue number increases each time the document is revised but rereleased in the *same* software release cycle. For example, the second release of a document in the same software release cycle is 01.02.

To determine which version of this document applies to the software in your office and how documentation for your product is organized, check the release information in the *Product Documentation Directory*, 297-8991-001.

This document is written for all Meridian SL-100 Family offices. More than one version of this document may exist. To determine which version of this document applies to the software in your office, check the release information in the *Commercial Systems Master Index of Publications Documentation Directory*, 555-4031-001.

References in this document

Basic Administration Procedures, 297-1001-300 is referred to in this document.

What precautionary messages mean

The types of precautionary messages used in Nortel Networks documents include attention boxes and danger, warning, and caution messages.

An attention box identifies information that is necessary for the proper performance of a procedure or task or the correct interpretation of information or data. Danger, warning, and caution messages indicate possible risks.

Examples of the precautionary messages follow.

ATTENTION Information needed to perform a task

ATTENTION

If the unused DS-3 ports are not deprovisioned before a DS-1/VT Mapper is installed, the DS-1 traffic will not be carried through the DS-1/VT Mapper, even though the DS-1/VT Mapper is properly provisioned.

DANGER Possibility of personal injury



DANGER
Risk of electrocution

Do not open the front panel of the inverter unless fuses F1, F2, and F3 have been removed. The inverter contains high-voltage lines. Until the fuses are removed, the high-voltage lines are active, and you risk being electrocuted.

WARNING Possibility of equipment damage



WARNING
Damage to the backplane connector pins

Align the card before seating it, to avoid bending the backplane connector pins. Use light thumb pressure to align the card with the connectors. Next, use the levers on the card to seat the card into the connectors.

CAUTION Possibility of service interruption or degradation



CAUTION
Possible loss of service

Before continuing, confirm that you are removing the card from the inactive unit of the peripheral module. Subscriber service will be lost if you remove a card from the active unit.

How commands, parameters, and responses are represented

Commands, parameters, and responses in this document conform to the following conventions.

Input prompt (>)

An input prompt (>) indicates that the information that follows is a command:

>BSY

Commands and fixed parameters

Commands and fixed parameters that are entered at a MAP terminal are shown in uppercase letters:

>BSY CTRL

xii About this document

Variables

Variables are shown in lowercase letters:

```
>BSY CTRL ctrl_no
```

The letters or numbers that the variable represents must be entered. Each variable is explained in a list that follows the command string.

Responses

Responses correspond to the MAP display and are shown in a different type:

```
FP 3 Busy CTRL 0: Command request has been submitted.
```

```
FP 3 Busy CTRL 0: Command passed.
```



Operational measurement groups

Purpose

This document contains operational measurements (OM) descriptions for Meridian SuperNode. These OM groups provide information on switch performance and activity.

OM group descriptions

OM group descriptions are arranged alphabetically according to group name. Each group description includes one or more flow charts and a description of each register in the group.

OM groups are described using the following standard headings.

OM description

This section provides an expanded acronym followed by a description of what the group counts and how this data can be used.

Release history

This section shows the software release in which the group was created and lists subsequent changes by release number.

Registers

This section shows the registers in the group as they appear on a MAP display.

Group structure

This section describes the number of OM tuples, key fields, info fields, office parameters, tables, and other datafill information that pertains to the group.

Associated OM groups

This section lists related OM groups and explains how they are related.

Associated functional groups

This section lists the DMS products to which the OM group applies.

14 Operational measurement groups

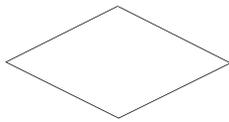
Associated functionality codes

This section lists related functionality codes and their titles.

Flow charts

A flow chart shows the sequence of events that causes the registers to be incremented and the relationship between the registers within the group. Usage registers are shown in separate flow charts. Flow charts always begin on the second page of the group description.

The following symbols are used in the flow charts:



indicates a yes/no decision



indicates an activity

Register descriptions

Register descriptions are arranged alphabetically within each group. There are three types of registers:

- *Peg* registers are incremented when an event occurs.
- *Usage* registers record activities or states at time intervals of 10 or 100 seconds.
- *High-water* registers reflect the maximum number of items in simultaneous use during the current transfer period.

Register name

This section provides an expanded acronym followed by a description of what the register counts.

If the description includes reference to registers from a different group, these are identified by the group name followed by an underscore and the register name. For example, OFZ_ORGFSET refers to register ORGFSET in group OFZ.

Register name release history

This section shows the software release when the register was created and lists subsequent changes by release number.

Associated registers

This section lists related registers and explains how they are related. This section can include validation formulae or useful equations. Registers from a different group are identified by a combination of the group name and register name, separated by an underscore: for example, OFZ_ORGFSET.

Associated logs

This section lists logs that are generated, together with events that are counted or that are related to the interpretation of OM data.

Extension register

This section provides the name of the register used when the original register is full. The value should be multiplied by 65536 and added to the original register value to get the total count.

16 Operational measurement groups

OM group ASR

OM description

Automatic Set Relocation

OM group Automatic Set Relocation (ASR) counts the number of sets that have been moved using ASR OUT and ASR IN process. Each time a set is brought back into the system using the ASR IN process, the ASR OM is incremented by one.

The count for ASRCKLN is incremented if a technician performs a CKLN on a set that performed the ASR OUT process but has not performed the ASR IN process.

To determine count, sets, and total sets

Count, sets, and total number of sets are determined as follows:

- The total number of sets that have been removed by the ASR process may be determined by looking at the count for ASROPASS.
- When completing the ASR process through ASR IN, the number of sets that have been moved to a new location may be determined by looking at the count of ASRINPAS.
- When completing the ASR process through CKLN, the number of sets that have been moved to a new location may be determined by looking at the count of ASRCKLN.
- The total number of sets that have been completed the ASR process (either through ASR OUT and ASR IN or through ASR OUT and CLKN) may be determined by adding the counts for ASRINPAS and ASRCKLN.

Release history

OM group ASR was introduced prior to BCS31.

Registers

The following OM group ASR registers display on the MAP terminal as follows:

ASRINPAS

ASROPASS

ASRCKLN

ASRCLN

Group structure

OM group ASR

18 Operational measurement groups

OM group ASR (continued)

Key field:
not applicable

Info field:
not applicable

Associated OM groups

None

Associated functional groups

None

Associated functionality codes

None

Register ASRINPAS

Register Automatic Set Relocation In Pass

Register ASRINPAS pegs once each time a sure moves a set using the ASR OUT and ASR IN process.

Register ASRINPAS release history

Register ASRINPAS was introduced prior to BCS31.

Associated registers

None

Associated logs

ASR Log ASR101 - Passed ASR IN

Extension registers

None

Register ASROPASS

Register Automatic Set Register Out Pass

Register ASROPASS counts the number of sets that have completed successfully the ASR OUT process.

Register ASROPASS release history

Register ASROPASS was introduced prior to BCS31.

Associated registers

None

Associated logs

ASR Log ASR100 - Passed ASR OUT

Extension registers

None

Register ASRCKLN

Register Automatic Set Relocation CKLN

Register ASRCKLN pegs each time a set is brought back into the system, following an ASR OUT, with the service order command CKLN.

Register ASRCKLN release history

Register ASRCKLN was introduced in BCS31.

Associated registers

None

Associated logs

None

Extension registers

None

Register ASRCLN

Register Automatic Set Relocation CLN

Register ASRCLN is for future development and is not used at this time. ASR OUT does not support Integrated Business Network (IBN) terminals; therefore, the ASRCLN counter does not peg and cannot be incremented.

Register ASRCLN release history

Register ASRCLN was introduced prior to BCS31.

Associated registers

None

20 Operational measurement groups

OM group ASR (end)

Associated logs

None

Extension registers

None

OM group IPERNGFL

OM description

Intelligent Peripheral Equipment (IPE) Ring Failure

Intelligent Peripheral Equipment (IPE) Ring Failure identifies the number of analog sets associated with the IPE that have missed getting a ringing resource from the ringing generator of the IPE

Release history

OM group IPERNGFL was introduced in release MSL07.

Registers

The following OM group IPERNGFL registers display on the MAP terminal as follows:

```
RNGFAIL
```

Each IPE (0-255) is associated with one register for each field.

Group structure

OM group IPERNGFL

Key field: <IPE_NUMBER>

Info Field: <IPERNG_FAIL_INFO>

The key field has a range of 0 to 255 where the info field has a single field that supplies the shelf and card number of the IPE.

Associated OM groups

None

Associated functional groups

None

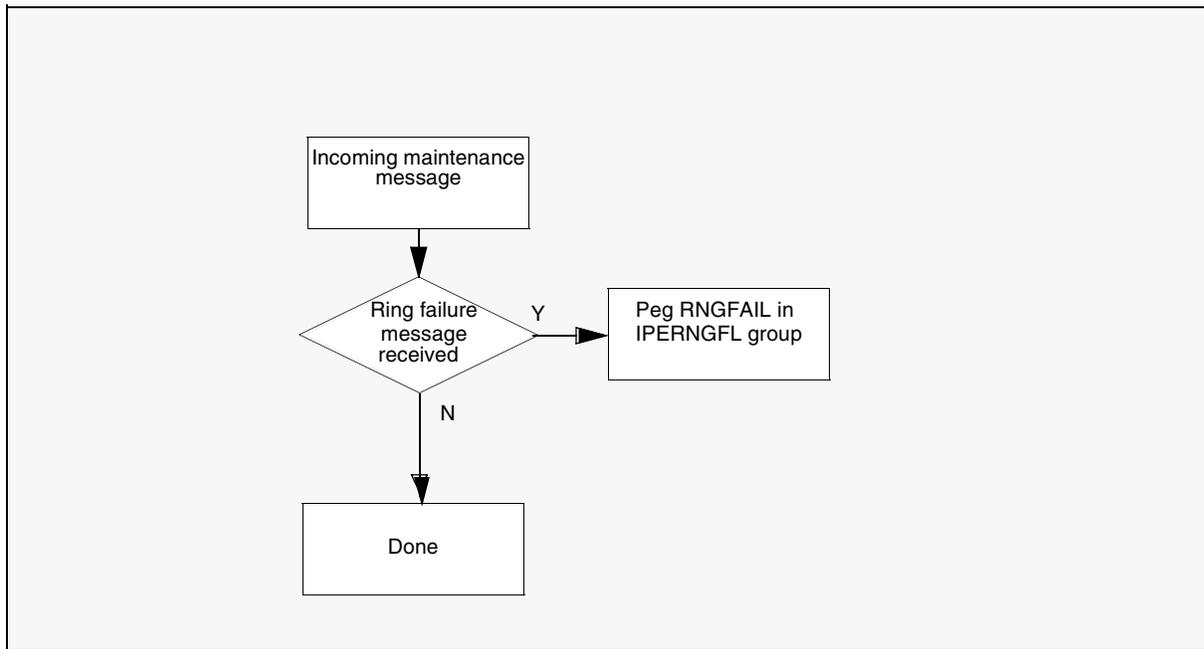
Associated functionality codes

None

22 Operational measurement groups

OM group IPERNGFL (end)

OM group IPERNGFL registers



Register RNGFAIL

Register Ring Fail

Register RNGFAIL was introduced in MSL07.

Register RNGFAIL release history

Register RNGFAIL was introduced in MSL07.

Associated registers

None

Associated logs

PM189 is generated to state which IPE and card are affected if a telephone set is denied a ringing resource.

Extension registers

None

OM group SITE3

OM description

Traffic and dial tone speed recording, remote sites 3

SITE3 provides statistics for Dial Tone Speed Recording (DTSR) on Intelligent Peripheral Equipment (IPE) for analog and digital lines. SITE3 contains 12 registers that count:

- the number of calls sampled on IPE Dial Pulse (DP) lines
- the number of calls sampled on IPE DP lines when the dial tone delay is more than 3 seconds
- the number of calls sampled on IPE Digitone (DT) lines
- the number of calls sampled on IPE DT lines when the dial tone delay is more than 3 seconds
- the number of calls sampled on IPE Key Set (KS) lines
- the number of calls sampled on IPE KS lines when the dial tone delay is more than 3 seconds

Release history

OM group SITE3 was introduced in BCS32.

Registers

OM group SITE3 registers display on the MAP terminal as follows:

IPEDP_T	IPEDP_T2	IPEDP_D	IPEDP_D2
IPEDT_T	IPEDT_T2	IPEDT_D	IPEDT_D2
IPEKS_T	IPEKS_T2	IPEKS_D	IPEKS_D2

Group structure

OM group SITE3 provides one tuple per office

Key field:
SITE_INDEX

Info field:
SITE_MODULE_COUNT

24 Operational measurement groups

OM group SITE3 (continued)

Associated OM groups

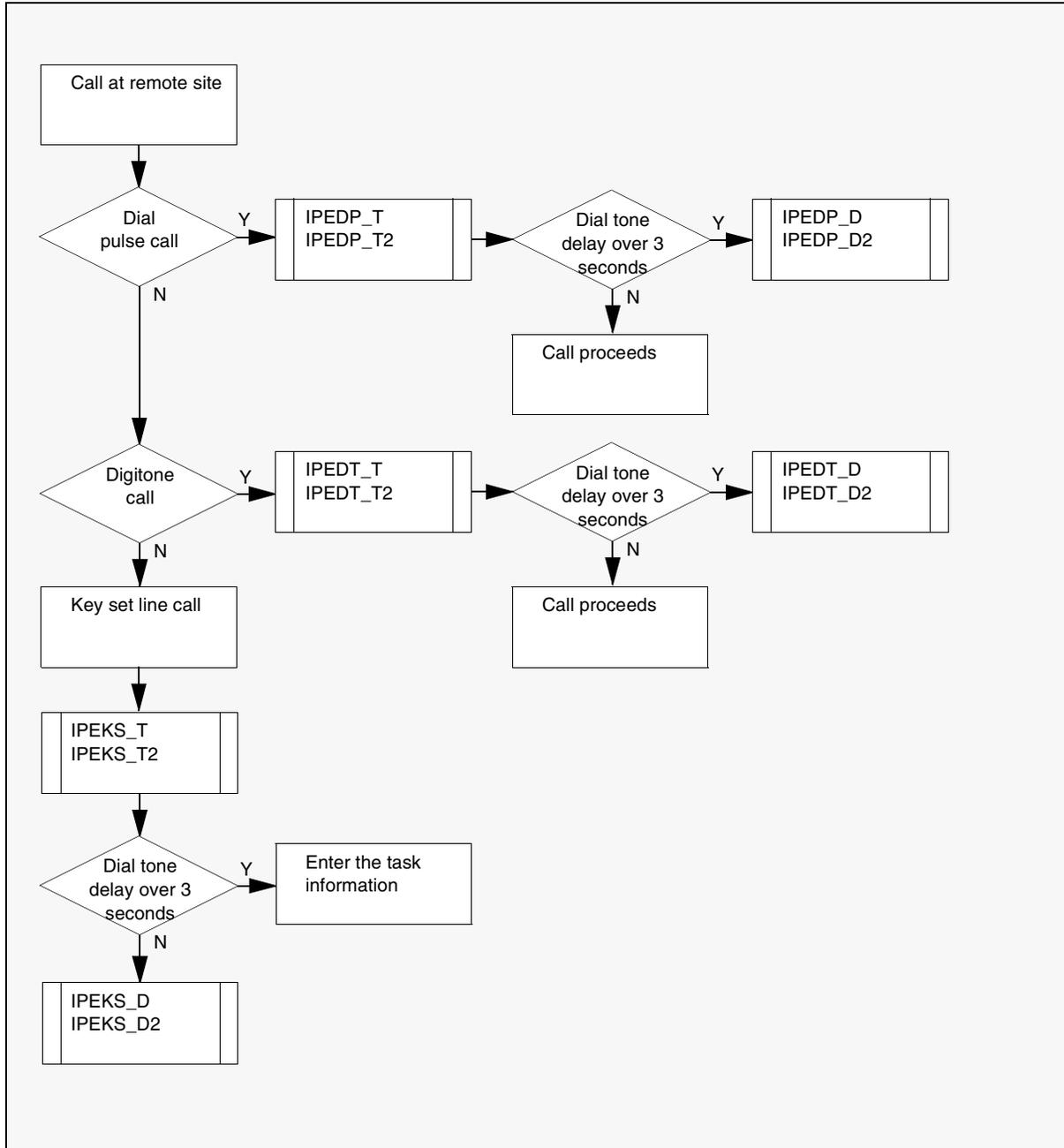
SITE and SITE2 count the number of DTSRs.

Associated functional groups

The following functional groups are associated with OM group SITE3:

- Meridian SL-100
- DMS-100
- Meridian Digital Centrex

OM group SITE3 registers



Register IPEDP_T

Intelligent Peripheral Equipment (IPE) Dial Pulse (DP) total

IPEDP_T counts the number of DTSR calls sampled on IPE DP lines.

26 Operational measurement groups

OM group SITE3 (continued)

Register IPEDP_T release history

IPEDP_T and IPEDP_T2 were introduced in BCS32.

Associated registers

None

Associated logs

None

Extension registers

IPEDP_T2

Register IPEDP_D

IPE DP delay

IPEDP_D counts the number of DTSR calls sampled on IPE DP lines when the dial tone delay is more than 3 seconds.

Register IPEDP_D release history

IPEDP_D and IPEDP_D2 were introduced in BCS32.

Associated registers

None

Associated logs

None

Extension registers

IPEDP_D2

Register IPEDT_T

IPE Digitone (DT) total

IPEDT_T counts the number of DTSR calls sampled on IPE DT lines.

Register IPEDT_T release history

IPEDT_T and IPEDT_T2 were introduced in BCS32.

Associated registers

None

Associated logs

None

Extension registers

IPEDT_T2

Register IPEDT_D

IPE DT delay

IPEDT_D counts the total number of DTSR calls sampled on IPE DT lines when the dial tone delay is more than 3 seconds.

Register IPEDT_D release history

IPEDT_D and IPEDT_D2 were introduced in BCS32.

Associated registers

None

Associated logs

None

Extension registers

IPEDT_D2

Register IPEKS_T

IPE Key Set (KS) total

IPEKS_T counts the number of DTSR calls sampled on IPE KS lines.

Register IPEKS_T release history

IPEKS_T and IPEKS_T2 were introduced in BCS32.

Associated registers

None

Associated logs

None

Extension registers

IPEKS_T2

Register IPEKS_D

IPE KS delay

IPEKS_D counts the number of DTSR calls sampled on IPE KS lines when the dial tone delay is more than 3 seconds.

28 Operational measurement groups

OM group SITE3 (end)

Register IPEKS_D release history

IPEKS_D and IPEKS_D2 were introduced in BCS32.

Associated registers

None

Associated logs

None

Extension registers

IPEKS_D2

OM group VOW

OM description

The OM group VOW tracks the use of Virtual Office Worker (VOW) functionality.

The VOW feature allows telecommuters who do not have dedicated physical phone sets to access their dedicated DN from any of a predesignated group of phone sets. Once logged in, all calls to the dedicated DN terminate to the set on which the login occurred.

The VOW group measures the following events:

- successful login
- successful login through CKLN/CLN
- successful logout
- successful logout through CKLN/CLN
- successful logout through audit process
- successful passcode change
- invalid login attempt
- invalid logout attempt
- invalid passcode change attempt

Release history

OM group VOW was introduced in MSL10.

Registers

The following OM group VOW registers display on the MAP terminal:

INPASS	INFAIL	OUTPASS	OUTFAIL
CINPASS	CINFAIL	COUTPASS	COUTFAIL
PCCPASS	PCCFAIL	AUDPASS	AUDFAIL
ROUTPASS	ROUTFAIL		

Group structure

OM group VOW

Key field:
CUSTOMER_GROUP

30 Operational measurement groups

OM group VOW (continued)

Info field:

NIL_TYPE_ID

Tuples:

1

Table VOWINV is used to store data associated with VOW functionality. It contains the physical or virtual LEN(s) associated with a VOW's dedicated DN and associated data, the VOW's personal ID code, and the VOW's primary DN. As VOWs log in and log out of their dedicated DNs, this table is automatically updated to keep the information up-to-date. VOWINV also contains information identifying the physical sets which have the VOWDN line option assigned.

Associated OM groups

No OM groups are associated with this group.

Associated functional groups

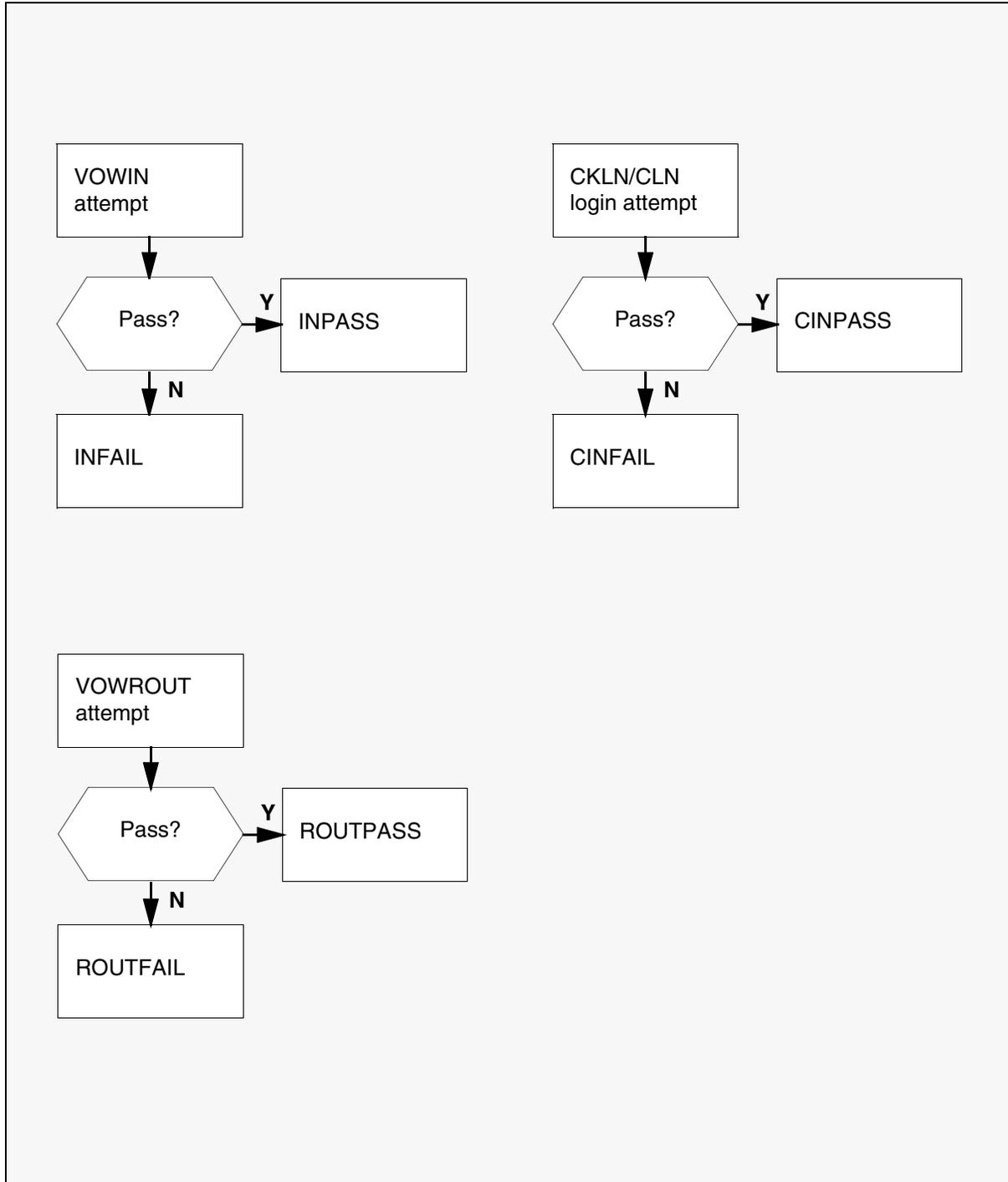
Associated functionality codes

The functionality codes associated with OM group VOW are shown in the following table.

Functionality codes associated with OM group VOW

Functionality	Code
MSL Virtual Office Worker	MSL00007

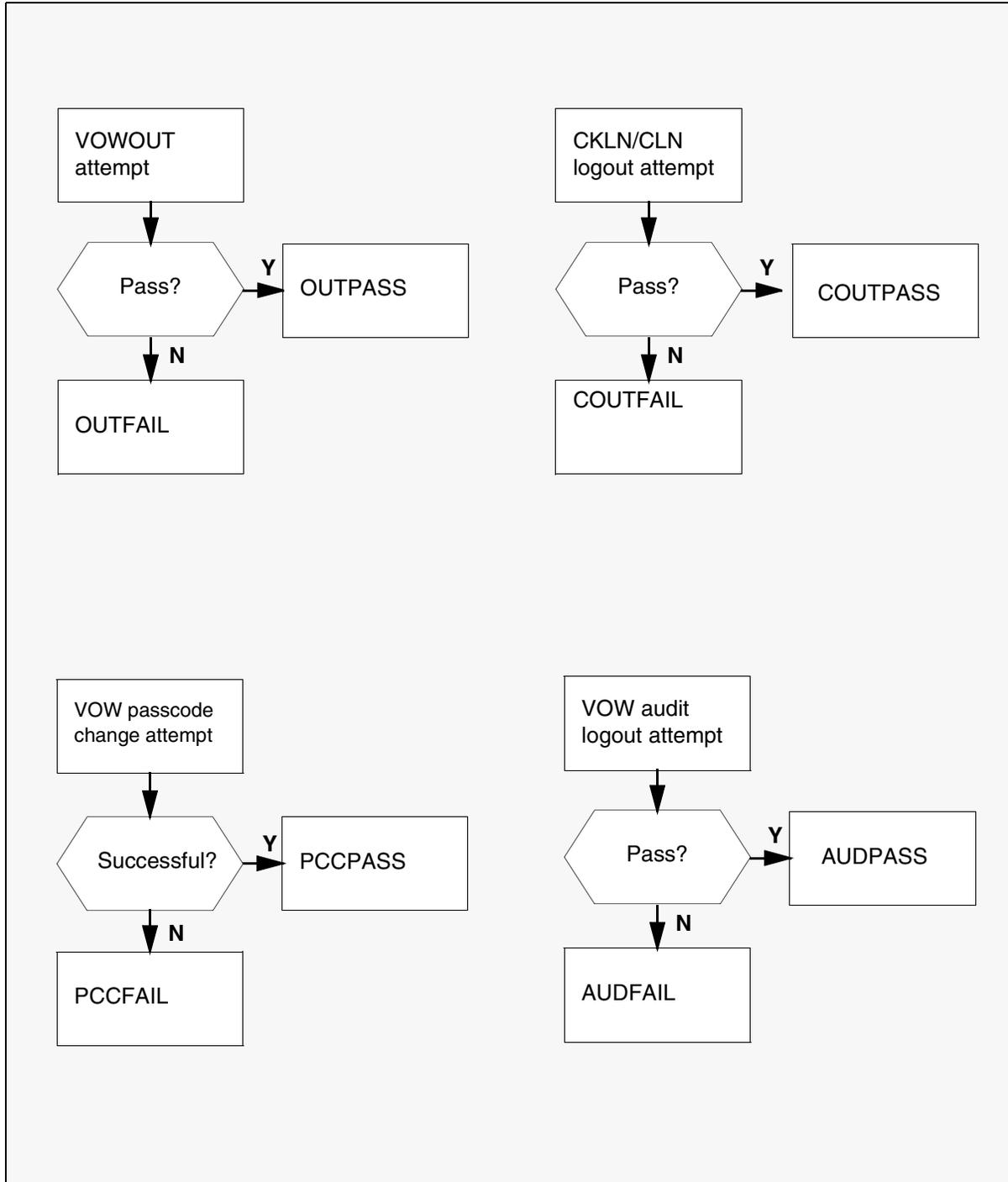
OM group VOW registers



32 Operational measurement groups

OM group VOW (continued)

OM group VOW registers



Register INPASS

VOWIN pass (INPASS)

Register INPASS counts the number of successful login attempts made through the VOWIN access code. It is used in association with register INFALL. Together, registers INPASS and INFALL account for the total number of VOWIN login attempts.

Register INPASS release history

Register INPASS was introduced in MSL10.

Associated registers

This register is associated with register INFALL.

Associated logs

This register is associated with log report VOW501. The log report is generated when a successful VOWIN login attempt occurs.

Extension registers

There are no extension registers.

Register INFALL

VOWIN fail (INFALL)

Register INFALL counts the number of failed login attempts made through the VOWIN access code. It is used in association with register INPASS. Together, registers INPASS and INFALL account for the total number of VOWIN login attempts.

Register INFALL release history

Register INFALL was introduced in MSL10.

Associated registers

This register is associated with register INPASS.

Associated logs

This register is associated with log report VOW502. The log report is generated when a failed VOWIN login attempt occurs.

Extension registers

There are no extension registers.

34 Operational measurement groups

OM group VOW (continued)

Register OUTPASS

VOWOUT pass (OUTPASS)

Register OUTPASS counts the number of successful logout attempts made through the VOWOUT access code. It is used in association with register OUTFAIL. Together, registers OUTPASS and OUTFAIL account for the total number of VOWOUT logout attempts.

Register OUTPASS release history

Register OUTPASS was introduced in MSL10.

Associated registers

This register is associated with register OUTFAIL.

Associated logs

This register is associated with log report VOW501. The log report is generated when a successful VOWOUT logout attempt occurs.

Extension registers

There are no extension registers.

Register OUTFAIL

VOWOUT fail (OUTFAIL)

Register OUTFAIL counts the number of failed logout attempts made through the VOWOUT access code. It is used in association with register OUTPASS. Together, registers OUTPASS and OUTFAIL account for the total number of VOWOUT logout attempts.

Register OUTFAIL release history

Register OUTFAIL was introduced in MSL10.

Associated registers

This register is associated with register OUTPASS.

Associated logs

This register is associated with log report VOW502. The log report is generated when a failed VOWOUT logout attempt occurs.

Extension registers

There are no extension registers.

Register CINPASS

VOW CKLN/CLN login pass (CINPASS)

Register CINPASS counts the number of failed VOW login attempts made through Change Keypad LEN/Change LEN (CKLN/CLN). It is used in association with register CINFAIL. Together, registers CINPASS and CINFAIL account for the total number of VOW login attempts made through CKLN/CLN.

Register CINPASS release history

Register CINPASS was introduced in MSL10.

Associated registers

This register is associated with register CINFAIL.

Associated logs

This register is associated with log report VOW501. The log report is generated when a successful VOW login attempt through CKLN/CLN occurs.

Extension registers

There are no extension registers.

Register CINFAIL

VOW CKLN/CLN login fail (CINFAIL)

Register CINFAIL counts the number of failed VOW logout attempts made through CKLN/CLN. It is used in association with register CINPASS. Together, registers CINPASS and CINFAIL account for the total number of VOW logout attempts made through CKLN/CLN.

Register CINFAIL release history

Register CINFAIL was introduced in MSL10.

Associated registers

This register is associated with register CINPASS.

Associated logs

This register is associated with log report VOW502. The log report is generated when a failed VOW logout attempt through CKLN/CLN occurs.

36 Operational measurement groups

OM group VOW (continued)

Extension registers

There are no extension registers.

Register COUTPASS

VOW CKLN/CLN logout pass (COUTPASS)

Register COUTPASS counts the number of successful VOW logout attempts made through CKLN/CLN. It is used in association with register COUTFAIL. Together, registers COUTPASS and COUTFAIL account for the total number of VOW logout attempts made through CKLN/CLN.

Register COUTPASS release history

Register COUTPASS was introduced in MSL10.

Associated registers

This register is associated with register COUTFAIL.

Associated logs

This register is associated with log report VOW501. The log report is generated when a successful VOW logout attempt through CKLN/CLN occurs.

Extension registers

There are no extension registers.

Register COUTFAIL

VOW CKLN/CLN logout fail (COUTFAIL)

Register COUTFAIL counts the number of failed VOW logout attempts made through CKLN/CLN. It is used in association with register COUTPASS. Together, registers COUTPASS and COUTFAIL account for the total number of VOW logout attempts made through CKLN/CLN.

Register COUTFAIL release history

Register COUTFAIL was introduced in MSL10.

Associated registers

This register is associated with register COUTPASS.

Associated logs

This register is associated with log report VOW502. The log report is generated when a failed VOW logout attempt through CKLN/CLN occurs.

Extension registers

There are no extension registers.

Register PCCPASS

VOW passcode change pass (PCCPASS)

Register PCCPASS counts the number of successful passcode change attempts made through the VOWPCC access code. It is used in association with register PCCFAIL. Together, registers PCCPASS and PCCFAIL account for the total number of VOWPCC attempts.

Register PCCPASS release history

Register PCCPASS was introduced in MSL10.

Associated registers

This register is associated with register PCCFAIL.

Associated logs

This register is associated with log report VOW501. The log report is generated when a successful VOWPCC attempt occurs.

Extension registers

There are no extension registers.

Register PCCFAIL

VOW passcode change fail (PCCFAIL)

Register PCCFAIL counts the number of failed passcode change attempts made through the VOWPCC access code. It is used in association with register PCCPASS. Together, registers PCCPASS and PCCFAIL account for the total number of VOWPCC attempts.

Register PCCFAIL release history

Register PCCFAIL was introduced in MSL10.

Associated registers

This register is associated with register PCCPASS.

38 Operational measurement groups

OM group VOW (continued)

Associated logs

This register is associated with log report VOW502. The log report is generated when a failed VOWPCC attempt occurs.

Extension registers

There are no extension registers.

Register AUDPASS

VOW audit logout pass (AUDPASS)

Register AUDPASS counts the number of successful VOW logout attempts made by the VOW audit. It is used in association with register AUDFAIL. Together, registers AUDPASS and AUDFAIL account for the total number of VOW logout attempts made by the VOW audit.

Register AUDPASS release history

Register AUDPASS was introduced in MSL10.

Associated registers

This register is associated with register AUDFAIL.

Associated logs

This register is associated with the following log reports:

- VOW501 is generated when a successful VOW logout attempt made by the VOW audit occurs
- VOW601 is generated when the VOW audit is complete

Extension registers

There are no extension registers.

Register AUDFAIL

VOW audit logout fail (AUDFAIL)

Register AUDFAIL counts the number of failed VOW logout attempts made by the VOW audit. It is used in association with register AUDPASS. Together, registers AUDPASS and AUDFAIL account for the total number of VOW logout attempts made by the VOW audit.

Register AUDFAIL release history

Register AUDFAIL was introduced in MSL10.

Associated registers

This register is associated with register AUDPASS.

Associated logs

This register is associated with the following log reports:

- VOW502 is generated when a failed VOW logout attempt made by the VOW audit occurs
- VOW601 is generated when the VOW audit is complete.

Extension registers

There are no extension registers.

Register ROUTPASS

VOWROUT pass (ROUTPASS)

Register ROUTPASS counts the number of successful remote logout attempts made through the VOWROUT access code. It is used in association with register ROUTFAIL. Together, registers ROUTPASS and ROUTFAIL account for the total number of VOWROUT attempts.

Register ROUTPASS release history

Register ROUTPASS was introduced in MSL10.

Associated registers

This register is associated with register ROUTFAIL.

Associated logs

This register is associated with log report VOW501. The log report is generated when a successful VOWROUT attempt occurs.

Extension registers

There are no extension registers.

Register ROUTFAIL

VOWROUT fail (ROUTFAIL)

Register ROUTFAIL counts the number of failed remote logout attempts made through the VOWROUT access code. It is used in association with register ROUTPASS. Together, registers ROUTPASS and ROUTFAIL account for the total number of VOWROUT attempts.

40 Operational measurement groups

OM group VOW (end)

Register ROUTHAIL release history

Register ROUTHAIL was introduced in MSL10.

Associated registers

This register is associated with register ROUTHASS.

Associated logs

This register is associated with log report VOW502. The log report is generated when a failed VOWROUT attempt occurs.

Extension registers

There are no extension registers.

OM group WIDEBAND

OM description

Wideband

WIDEBAND counts the number of wideband call attempts on PRI trunks. There are 23 different wideband possibilities defined by $n \times 64$ kbytes, where the value of n is 2 to 24. For each wideband call attempt, the appropriate WBAT n register is incremented.

Note: Register WBAT1 is not used.

Release history

OM group WIDEBAND was introduced in BCS34.

BCS36

Registers TWBINTRA, TWBINTER, and TWBSWTCH are added. In the initial release of MSL-100 DWS, TWBINTRA and TWBINTER registers are not used.

BCS35

Registers TWBCONNT, TWBFAIL, TWBATB, and TWBGLR are added for new measurements.

Registers

OM group WIDEBAND registers display on the MAP terminal as follows:

TWBATMPT	TWBCONNT	WBAT2	WBAT3
WBAT4	WBAT5	WBAT6	WBAT7
WBAT8	WBAT9	WBAT10	WBAT11
WBAT12	WBAT13	WBAT14	WBAT15
WBAT16	WBAT17	WBAT18	WBAT19
WBAT20	WBAT21	WBAT22	WBAT23
WBAT24	TWBFAIL	TWBATB	TWBGLR
TWBSWTCH	TWBINTER	TWBINTRA	TNBLOCK

Group structure

OM group WIDEBAND provides one tuple per office.

Key field:
None

42 Operational measurement groups

OM group WIDEBAND (continued)

Info field:

None

Associated OM groups

None

Associated functional groups

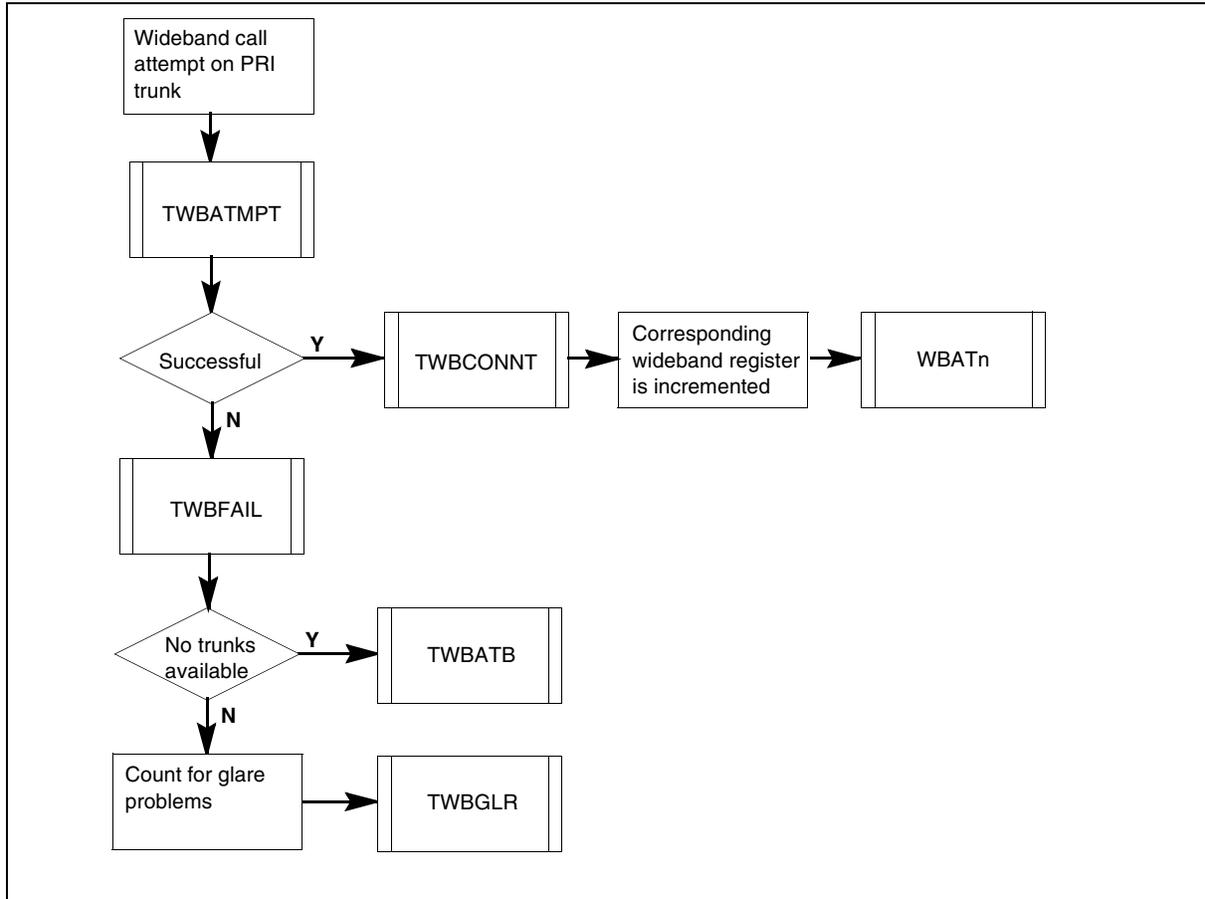
The following functional groups are associated with OM group WIDEBAND:

- LEC wideband

Associated functionality codes

The functionality code associated with OM group WIDEBAND is NI000004 NI0 NI-2 DWS.

OM group WIDEBAND registers



Register TNBLOCK

Total number blocked

TNBLOCK counts the total number of narrowband calls that are blocked from originating or terminating on a DWS ISUP IT or ISUP ATC trunk group due to option BLOCKNB having been selected.

Associated registers

None

Associated logs

None

Register TWBATB

Total wideband call attempts blocked

44 Operational measurement groups

OM group WIDEBAND (continued)

TWBATB counts the total number of wideband calls rejected due to no trunks available.

Register TWBATB release history

TWBATB was introduced in BCS35.

Associated registers

None

Associated logs

None

Register TWBATMPT

Total wideband call attempts

TWBATMPT counts the total number of wideband call attempts, regardless of type.

Register TWBATMPT release history

TWBATMPT was introduced in BCS34.

Associated registers

WBAT2 through WBAT24

TWBATMPT = the sum of all WBATn

Associated logs

None

Register TWBCONNT

Total wideband call connections

TWBCONNT counts the number of successful wideband call connections.

Register TWBCONNT release history

TWBCONNT was introduced in BCS35.

Associated registers

TWBATMPT counts the total number of wideband attempts, regardless of type.

TWBFALL counts the number of wideband attempts that fail.

$TWBCONNT = TWBATMPT - TWBFAIL$

Associated logs

None

Register TWBFAIL

Total wideband call failures

TWBFAIL counts the total number of wideband call attempts that fail.

Register TWBFAIL release history

TWBFAIL was introduced in BCS35.

Associated registers

TWBATMPT counts the total number of wideband attempts, regardless of type.

TWBCONNT counts the number of successful wideband call connections.

$TWBFAIL = TWBATMPT - TWBCONNT$

Associated logs

None

Register TWBGLR

Total wideband call glare problems

TWBGLR counts the number of wideband calls that encounter glare problems. Glare occurs when different users seize both ends of a line or trunk simultaneously. These calls may still complete through route advance.

Register TWBGLR release history

TWBGLR was introduced in BCS35.

Associated registers

None

Associated logs

None

46 Operational measurement groups

OM group WIDEBAND (continued)

Register TWBINTER

Total number of wideband interLATA call attempts. In the initial release of MSL-100 DWS, this register is not used.

TWBINTER is incremented for each wideband interLATA call attempt.

Register TWBINTER release history

TWBINTER was introduced in BCS36.

Associated registers

None

Associated logs

None

Register TWBINTRA

Total number of wideband intraLATA call attempts. In the initial release of MSL-100 DWS, this register is not used.

TWBINTRA is incremented for each wideband intraLATA call attempt.

Register TWBINTRA release history

TWBINTRA was introduced in BCS36.

Associated registers

None

Associated logs

None

Register TWBSWTCH

Total number of wideband intraswitch call attempts

TWBSWTCH is incremented for each wideband intraswitch call attempt.

Register TWBSWTCH release history

TWBSWTCH was introduced in BCS36.

Associated registers

None

Associated logs

None

Register WBAT2

2 × 64 kbyte wideband call attempts

WBAT2 is incremented for each 2 × 64 kbyte wideband call attempt.

Register WBAT2 release history

WBAT2 was introduced in BCS34.

Associated registers

TWBATMPT

Associated logs

None

Register WBAT3

3 × 64 kbyte wideband call attempts

WBAT3 is incremented for each 3 × 64 kbyte wideband call attempt.

Register WBAT3 release history

WBAT3 was introduced in BCS34.

Associated registers

TWBATMPT

Associated logs

None

Register WBAT4

4 × 64 kbyte wideband call attempts

WBAT4 is incremented for each 4 × 64 kbyte wideband call attempt.

Register WBAT4 release history

WBAT4 was introduced in BCS34.

Associated registers

TWBATMPT

48 Operational measurement groups

OM group WIDEBAND (continued)

Associated logs

None

Register WBAT5

5 × 64 kbyte wideband call attempts

WBAT5 is incremented for each 5 × 64 kbyte wideband call attempt.

Register WBAT5 release history

WBAT5 was introduced in BCS34.

Associated registers

TWBATMPT

Associated logs

None

Register WBAT6

6 × 64 kbyte wideband call attempts

WBAT6 is incremented for each 6 × 64 kbyte wideband call attempt.

Register WBAT6 release history

WBAT6 was introduced in BCS34.

Associated registers

TWBATMPT

Associated logs

None

Register WBAT7

7 × 64 kbyte wideband call attempts

WBAT7 is incremented for each 7 × 64 kbyte wideband call attempt.

Register WBAT7 release history

WBAT7 was introduced in BCS34.

Associated registers

TWBATMPT

Associated logs

None

Register WBAT8

8 × 64 kbyte wideband call attempts

WBAT8 is incremented for each 8 × 64 kbyte wideband call attempt.

Register WBAT8 release history

WBAT8 was introduced in BCS34.

Associated registers

TWBATMPT

Associated logs

None

Register WBAT9

9 × 64 kbyte wideband call attempts

WBAT9 is incremented for each 9 × 64 kbyte wideband call attempt.

Register WBAT9 release history

WBAT9 was introduced in BCS34.

Associated registers

TWBATMPT

Associated logs

None

Register WBAT10

10 × 64 kbyte wideband call attempts

WBAT10 is incremented for each 10 × 64 kbyte wideband call attempt.

Register WBAT10 release history

WBAT10 was introduced in BCS34.

Associated registers

TWBATMPT

50 Operational measurement groups

OM group WIDEBAND (continued)

Associated logs

None

Register WBAT11

11 × 64 kbyte wideband call attempts

WBAT11 is incremented for each 11 × 64 kbyte wideband call attempt.

Register WBAT11 release history

WBAT11 was introduced in BCS34.

Associated registers

TWBATMPT

Associated logs

None

Register WBAT12

12 × 64 kbyte wideband call attempts

WBAT12 is incremented for each 12 × 64 kbyte wideband call attempt.

Register WBAT12 release history

WBAT12 was introduced in BCS34.

Associated registers

TWBATMPT

Associated logs

None

Register WBAT13

13 × 64 kbyte wideband call attempts

WBAT13 is incremented for each 13 × 64 kbyte wideband call attempt.

Register WBAT13 release history

WBAT13 was introduced in BCS34.

Associated registers

TWBATMPT

Associated logs

None

Register WBAT14

14 × 64 kbyte wideband call attempts

WBAT14 is incremented for each 14 × 64 kbyte wideband call attempt.

Register WBAT14 release history

WBAT14 was introduced in BCS34.

Associated registers

TWBATMPT

Associated logs

None

Register WBAT15

15 × 64 kbyte wideband call attempts

WBAT15 is incremented for each 15 × 64 kbyte wideband call attempt.

Register WBAT15 release history

WBAT15 was introduced in BCS34.

Associated registers

TWBATMPT

Associated logs

None

Register WBAT16

16 × 64 kbyte wideband call attempts

WBAT16 is incremented for each 16 × 64 kbyte wideband call attempt.

Register WBAT16 release history

WBAT16 was introduced in BCS34.

Associated registers

TWBATMPT

52 Operational measurement groups

OM group WIDEBAND (continued)

Associated logs

None

Register WBAT17

17 × 64 kbyte wideband call attempts

WBAT17 is incremented for each 17 × 64 kbyte wideband call attempt.

Register WBAT17 release history

WBAT17 was introduced in BCS34.

Associated registers

TWBATMPT

Associated logs

None

Register WBAT18

18 × 64 kbyte wideband call attempts

WBAT18 is incremented for each 18 × 64 kbyte wideband call attempt.

Register WBAT18 release history

WBAT18 was introduced in BCS34.

Associated registers

TWBATMPT

Associated logs

None

Register WBAT19

19 × 64 kbyte wideband call attempts

WBAT19 is incremented for each 19 × 64 kbyte wideband call attempt.

Register WBAT19 release history

WBAT19 was introduced in BCS34.

Associated registers

TWBATMPT

Associated logs

None

Register WBAT20

20 × 64 kbyte wideband call attempts

WBAT20 is incremented for each 20 × 64 kbyte wideband call attempt.

Register WBAT20 release history

WBAT20 was introduced in BCS34.

Associated registers

TWBATMPT

Associated logs

None

Register WBAT21

21 × 64 kbyte wideband call attempts

WBAT21 is incremented for each 21 × 64 kbyte wideband call attempt.

Register WBAT21 release history

WBAT21 was introduced in BCS34.

Associated registers

TWBATMPT

Associated logs

None

Register WBAT22

22 × 64 kbyte wideband call attempts

WBAT22 is incremented for each 22 × 64 kbyte wideband call attempt.

Register WBAT22 release history

WBAT22 was introduced in BCS34.

Associated registers

TWBATMPT

54 Operational measurement groups

OM group WIDEBAND (continued)

Associated logs

None

Register WBAT23

23 × 64 kbyte wideband call attempts

WBAT23 is incremented for each 23 × 64 kbyte wideband call attempt.

Register WBAT23 release history

WBAT23 was introduced in BCS34.

Associated registers

TWBATMPT

Associated logs

None

Register WBAT24

24 × 64 kbyte wideband call attempts

WBAT24 is incremented for each 24 × 64 kbyte wideband call attempt.

Register WBAT24 release history

WBAT24 was introduced in BCS34.

Associated registers

TWBATMPT

Associated logs

None

DWS performance factors

DWS performance factors are the individual components of overall performance of DWS. Performance factors indicate how well the DWS hardware and software fulfill the purpose for which they are designed. Performance is measured by indicators such as OMs. Performance factors include:

- *grade of service*, which is a measurement of the calls blocked. It is calculated by counting overflowed (or all trunks busy) calls and

OM group WIDEBAND (continued)

dividing that by the number of attempts made during the study interval.

- *glare*, which occurs when a call is dropped because the circuits seized were also seized at the other end of the trunk. It is directly measured.
- *call failures*, which occur when software or hardware errors cause a call to drop without a valid disconnect sequence. They are directly measured.

The DWS performance factors are listed along with their associated OM groups.

DWS performance factors and their associated OM groups

Performance factors	OM groups
Wideband traffic	WIDEBAND and TRK
Grade of service	WIDEBAND
Glare	WIDEBAND
Percentage of call failures	WIDEBAND

Monitoring DWS performance factors

The following procedure explains how to create and execute a procedure to monitor the performance of DWS.

Creating a DWS performance monitoring procedure

1. *Select the appropriate performance indicators.*

The operational measurement registers defined at the beginning of this section are performance indicators.

2. *Activate the performance indicators.*

After choosing the appropriate measurement options, activate them in the switch and collect the outputs. To set up OMs and route OM reports to output devices, refer to the procedures in *Basic Administration Procedures*, 297-1001-300.

56 Operational measurement groups

OM group WIDEBAND (continued)

The following parameters are required to set up OMs:

- class names and register assignments
- data collection schedules
- reporting schedules
- output devices

3. *Analyze the results.*

Review the output associated with the OMs reported in accordance with the reporting schedules set up in the previous step by:

- looking for service indicators that exceed the established engineering criteria for DWS
- looking for service indicators that may indicate a maintenance or datafill problem
- capturing the appropriate OM readings that project when to add more facilities to continue meeting the engineering criteria

4. *Report the results.*

Notify the engineering and maintenance organizations of any service indications that require their attention.

DWS performance factor—wideband traffic

Monitoring wideband traffic helps analyze trends for the bandwidth requested by end users and determines trunk requirements.

The bandwidth preferred by end users impacts traffic engineering, as shown in the following table.

Bandwidth impacts on traffic engineering

	Switch A	Switch B
Total number of calls	20	20
Number of 6 by 64 kbit/s calls	2	18
Number of 24 of 64 kbit/s calls	18	2
Number of DS-0s required	444 [(2×6)+(18×24)]	156 [(18×6)+(2×24)]

In switch A, most calls request a 24 by 64 kbit/s bandwidth, while the 6 by 64 kbit/s bandwidth is requested more often in switch B. As a result,

OM group WIDEBAND (continued)

444 DS-0 channels are required in switch A compared to 156 in switch B. The impact on traffic engineering is obvious: more equipment is needed to handle 20 calls in switch A than to handle 20 calls in switch B.

Northern Telecom recommends that administrators convert wideband traffic into DS-0 units and use narrowband traffic engineering tables, preferably tables that can account for peaks. Because of high traffic growth, changing application mixes, and the fact that all DS-0s in a wideband call must reside on the same T1, administrators should add a safety margin of 20% to 30% initially. The following section describes the typical calculations used to evaluate wideband traffic.

Wideband traffic is monitored through the OM groups WIDEBAND and TRK. The following table shows the registers to be monitored. Refer to OM group TRK.

Monitor Wideband traffic through OM groups WIDEBAND and TRK

Group	Register	Log reports
WIDEBAND	TWBATMPT	None
	WBATn	None
TRK	NATTMPT	None

How to evaluate wideband traffic

To identify trends for bandwidth requested by end users, monitor registers WBAT2 to WBAT24 and register TWBATMPT.

Calculations used to evaluate wideband traffic

Use the following calculations to determine the relative percentage of total n by 64 kbit/s call attempts, for each value of n, where n=2 to 24.

$$\frac{\text{WBATn}}{\text{TWBATMPT}} \times 100 = \text{percentage of n by 64 kbit/s call attempts, where n = 2 to 24}$$

Using traffic engineering tables, Erlangs may be used to calculate the proper number of trunks required to carry the offered traffic at specific grades of service.

For narrowband traffic engineering, the following formula is used:

58 Operational measurement groups

OM group WIDEBAND (continued)

number of calls x average holding time (in hours) = Erlangs

For wideband traffic engineering, the formula for narrowband is modified. The following formula is used:

24

$$\sum_{n=2} \text{number of calls (at bandwidth } n) \times \text{avg hold time (in hours at bandwidth } n) \times n = \text{Erlangs}$$

In the example on the following page, the table shows that 129 wideband calls were placed. If these calls had been narrowband, at an average holding time of 3 min (.05 h), the total Erlangs would be 6.45 (calculated using 129 X .05). According to narrowband traffic engineering tables, 13 DS-0 trunks—fewer than in one T1 link—are needed to handle 6.45 Erlangs with a blocking rate of 1%.

Wideband calls have different average holding times per bandwidth, as shown in the table on the following page. The total traffic for these calls is 397 Erlangs. According to narrowband traffic engineering tables, 528 DS-0 trunks (calculated using 422 trunks plus a 25% safety margin) are needed to handle 397 Erlangs, for a blocking rate of 1%. About 22 T1 trunks are thus needed.

The following example shows the impact of average holding time on wideband engineering. This example should be used as a reference only, since it will not be indicative of your traffic. It is provided to show the importance of understanding the holding times and distribution of bandwidth (that is, values of n) used.

Impact of average holding time on wideband traffic engineering (Sheet 1 of 2)

DS-0	DWS attempts	NATTMPT (Col 1 x Col 2)	Average holding time (hours)	Erlangs (Col 1 x Col 2 x Col 4)
Column 1	Column 2	Column 3	Column 4	Column 5
1	0	0	0	0
2	50	100	0.5	50
3	4	12	0.25	3

OM group WIDEBAND (continued)

Impact of average holding time on wideband traffic engineering (Sheet 2 of 2)

4	3	12	0.016	0.192
5	3	15	0.016	0.24
6	50	300	0.5	150
7	0	0	0	0
8	1	8	0.25	2
9	0	0	0	0
10	3	30	0.25	7.5
11	0	0	0	0
12	10	120	0.75	90
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	1	18	1	18
19	0	0	0	0
20	0	0	0	0
21	0	0	0	0
22	0	0	0	0
23	9	207	0.25	51.75
24	1	24	1	24
Total	129	708		397

60 Operational measurement groups

OM group WIDEBAND (continued)

The impact of the average holding time on traffic engineering shows that while less than one T1 is needed to handle 129 narrowband calls, 22 T1 links are needed to handle 129 wideband calls.

The registers in the OM group WIDEBAND are not measured on a trunk group basis but on a per office basis. Thus, when evaluating specific wideband trunk groups, administrators can only use the OM group WIDEBAND as a guide.

For OM group TRK, existing trunk usage OMs are recorded on each DS-0. For example, a narrowband call that lasts an entire hour generates 36 CCS (hundred call seconds). A wideband call that lasts an hour generates 36 CCS times the number of channels used in that call.

Peg counts in OM group TRK for wideband calls follow the same flow as for existing OM fields, and peg once regardless of the bandwidth of the call. For example, a narrowband call will peg NATTMP and CONNECT each time a call is completed. A similar wideband call, regardless of the number of channels used, will also peg these registers once per call.

Thus, the key registers of OM group TRK, when examining a wideband trunk, are NOVFLATB and TRU.

NOVFLATB indicates if any calls have overflowed the trunk group due to an insufficiency of trunks for offered traffic. If the value is zero, the number of trunks available was sufficient to meet the offered load. If the register is pegged, further investigation may need to be performed. On PRI trunks, if NOVFLATB is pegged, more access trunks may be required by the end user.

TRU provides a raw CCS count of traffic on the trunk group indicating how many of the DS-0s in that trunk group were being used for traffic. This count can be compared with traffic engineering tables to provide a view of the theoretical performance of the trunks. This value should be examined against actual overflow recorded by NOVFLATB. Traffic tables should take into consideration the probable peakedness of wideband traffic and the long holding times of videoconferencing - one of the main applications driving wideband traffic.

In the previous example, if there were no call failures or all trunk busy conditions, registers NATTMT and INCATOT equal the total number of DS-0 attempts (708, column 3) and register TRU is the total traffic (397 Erlangs, column 5).

DWS performance factor—grade of service

Monitoring grade of service helps ensure that the customer receives a high-quality service. The grade of service indicates the probability of a call attempt receiving a busy signal. Operating companies may use different grades of service; this document assumes the operating company is using a grade of service of 1%.

To determine the grade of service, monitor OM group WIDEBAND, registers TWBATMPT and TWBATB. TWBATMPT counts the number of times a wideband call is placed. TWBATB counts the number of times a wideband call is dropped because no trunks are available (all trunks busy).

Monitor these Registers from OM group WIDEBAND to determine the grade of service

Group	Register	Log reports
WIDEBAND	TWBATMPT	None
	TWBATB	None

Calculations used to evaluate grade of service

Use the following calculation to determine the grade of service.

$$\frac{\text{TWBATB}}{\text{TWBATMPT}} \times 100 = \text{grade of service}$$

Data evaluation procedure

Use the following procedure to evaluate grade of service.

Evaluating grade of service

1. Calculate the grade of service for the current study period.
2. If the grade of service is lower than 1%, go to step 4.
3. If the grade of service exceeds 1%, notify the provisioning engineers so corrective action can be taken.
4. You have completed this procedure.

DWS performance factor—glare

Glare occurs when two ends of a trunk are seized at the same time. Glare is not desirable for wideband calls because cleaning up and

62 Operational measurement groups

OM group WIDEBAND (continued)

reselecting multiple channels requires CPU resources and real time. The trunk selection algorithm is designed to prevent glare, so excessive glare indicates potential provisioning problems.

The OM group WIDEBAND measures the percentage of calls dropped because of glare. To evaluate glare, monitor registers TWBATMPT and TWBGLR. Register TWBATMPT counts the number of times a wideband call is placed. Register TWBGLR counts the number of times a wideband call is dropped because of glare.

Monitor these Registers from OM group WIDEBAND to evaluate glare

Group	Register	Log reports
WIDEBAND	TWBATMPT	None
	TWBGLR	None

Calculations used to evaluate glare

Use the following formula to evaluate the percentage of blockage due to glare.

$$\frac{\text{TWBGLR}}{\text{TWBATMPT}} \times 100 = \text{percentage of blockage due to glare}$$

Ideally, there is no glare. A percentage of glare higher than 0 should be reported to maintenance personnel and provisioning engineers. This percentage may vary from one operating company to the other.

Data evaluation procedure

Use the following procedure to evaluate glare.

Evaluating glare

1. Calculate the percentage of glare for the current study period.
2. If the percentage of glare is zero, go to step 4.
3. If the percentage of glare is not zero, notify the provisioning engineers so corrective action can be taken.
4. You have completed this procedure.

DWS performance factor—call failures

Monitoring call failures helps ensure that the customer receives a high-quality service. A percentage of call failures higher than 1% should be reported to maintenance personnel and provisioning engineers. This percentage may vary from one operating company to the other.

To determine the percentage of call failures, monitor OM group WIDEBAND, registers TWBATMPT and TWBFAIL. TWBATMPT counts the wideband calls placed. TWBFAIL counts the number of times a wideband call is dropped.

Monitor these Registers from OM group WIDEBAND to determine the percentage of call failures

Group	Register	Log reports
WIDEBAND	TWBATMPT	None
	TWBFAIL	None

Calculations used to evaluate percentage of call failures

Use the following calculation to determine the percentage of wideband call attempt failures.

$$\frac{\text{TWBFAIL}}{\text{TWBATMPT}} \times 100 = \text{percentage of call failures}$$

Data evaluation procedure

Use the following procedure to evaluate percentage of call failures.

Evaluating percentage of call failures

1. Calculate the percentage of percentage of call failures for the current study period.
2. If the percentage of percentage of call failures is lower than 1%, go to step 4.
3. If the percentage of percentage of call failures exceeds 1%, notify the maintenance personnel and provisioning engineers so corrective action can be taken.
4. You have completed this procedure.

Meridian SL-100 SE

Commercial Systems

Operational Measurements Reference Manual

Copyright © 1992-2002 Nortel Networks,
All Rights Reserved

NORTEL NETWORKS CONFIDENTIAL: The information contained in this document is the property of Nortel Networks. Except as specifically authorized in writing by Nortel Networks, the holder of this document shall keep the information contained herein confidential and shall protect same in whole or in part from disclosure and dissemination to third parties and use same for evaluation, operation, and maintenance purposes only. Changes or modifications to the Meridian SL-100 without the express consent of Nortel Networks may void its warranty and void the user's authority to operate the equipment.

Information is subject to change without notice. Nortel Networks reserves the right to make changes in design or components as progress in engineering and manufacturing may warrant.

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules, and the radio interference regulations of the Canadian Department of Communications. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at the user's own expense. Allowing this equipment to be operated in such a manner as to not provide for proper answer supervision is a violation of Part 68 of the FCC Rules, Docket No. 89-114, 55FR46066.

*Nortel Networks, the Nortel Networks logo, the Globemark, Unified Networks, DMS, MAP, Meridian, MSL, Nortel, Northern Telecom, NT, SL-100, and SuperNode are trademarks of Nortel Networks.

Publication number: 555-4031-814
Product release: MSL14
Document release: Standard 12.02
Date: July 2002
Printed in the United States of America

