Meridian 1

Generic central office trunk cards

Description and installation

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Contents

About this document

This document is a Supplement to 553-3001-211 *Circuit card installation.* It describes generic central office trunk cards. The cards are available with or without the Periodic Pulse Metering (PPM) feature. The cards are also available in numerous countries. Country specific information is provided in this document.

The cards are identified by a two-letter suffix to the product code called the vintage. The card vintage is based on having PPM equipped or not and the individual countries where the card is being installed.

The cards listed below are minimum vintage required to support the following countries:

- NTCK16AA generic central office trunk card with PPM
  - Ireland
- NTCK16BC generic central office trunk card without PPM.
  - Brazil
  - Ireland
  - Mexico
  - Tortolla
  - Singapore

The cards listed below are minimum vintage required to support the following countries:

- NTCK16AD generic central office trunk card with PPM
  - Turkey
- NTCK16BD generic central office trunk card without PPM.
  - Argentina
  - Turkey
  - Brazil
  - Chile
  - Indonesia
  - Korea
  - Venezuela

The Option 11 software requirements are as follows:

- X11 release 16.91 including supplementary features level ‘G’.
- X11 release 18.30 including supplementary features level ‘H’.

Throughout this document, cards with PPM will be identified by the vintage AX. Cards without PPM will be referenced by the vintage BX.

References

The following information is contained in the Meridian 1 *Planning & Engineering Guide* :

- Master index
- System overview
- Installation planning
- System engineering
- Spares planning
- Equipment identification and ordering.

The following information is contained in the Meridian 1 *Installation and Maintenance Guide* :

- Installation procedures
- Circuit card installation and testing
- System upgrades procedures
- General maintenance information
- Fault clearing
- Hardware replacement.

The following information is contained in the Meridian 1*Generic X11 Including Supplementary Features Software Guide* :

- An overview of software architecture
- Procedures for software installation and management
- A detailed description of all software features and services.

Functional description

The NTCK16AX and NTCK16BX generic central office trunk cards support up to eight analog central office trunks. They can be installed in any PE slot that supports intelligent peripheral equipment (IPE).

Both cards are exactly the same except for the periodic pulse metering (PPM) feature. The NTCK16AX card supports internal 12/16 kHz PPM but the NTCK16BX card does not.

Countries of operation

The NTCK16AX and NTCK16BX generic central office trunk cards operate in the countries listed in the previous chapter of this document.

Common features

The NTCK16AX and NTCK16BX generic central office trunk cards:

- support the North American loss plan
- support loop start signalling
- support busy tone detection and supervision on a per unit basis.
- support battery reversal detection
- provide 4 dB dynamic attenuation pads on a per call basis
- allow individual units or the entire board to be disabled by software
- provide software selectable A-law or µ-law companding
- indicate self-test status during an automatic or manual self-test
- provide card-identification for auto configuration, and for determining the serial number and firmware level of the card

- convert transmission signals from analog-to-digital and from digital-to-analog
- provide termination and trans-hybrid balance impedance to match 600 ohms

Physical description

Switch settings

There are no option switches on the NTCK16AX and NTCK16BX generic central office trunk cards. All settings are configured in software.

Hardware installation

The NTCK16AX and NTCK16BX generic central office trunk cards have eight units. Each unit connects to the shelf backplane through an 80-pin connector. The backplane is cabled to the input/output (I/O) panel which is then cabled to the cross-connect terminal.

At the cross-connect terminal, each unit connects to external apparatus by Tip and Ring leads.

Cross connections

Tables 1 to 3 provide cross connect information for the NTCK16AX and NTCK16BX generic central office trunk cards.

Table 1
NTCK16 central office trunk connections for NT8D37 I/O panel connectors A, E, K, R

Lead designations	Pins	Pair Color	I/O Panel Connector				Unit Number
COT			A	E	K	R	
T0 R0	26 1	W-BL BL-W					Unit
	27 2	W-O O-W					0
T1 R1	28 3	W-G G-W					Unit
	29 4	W-BR BR-W					1
T2 R2	30 5	W-S S-W	SL	SL	SL	SL	Unit
	31 6	R-BL BL-R	OT	OT	OT	OT	2
T3 R3	32 7	R-O O-R	0	4	8	12	Unit
	33 8	R-G G-R					3
T4 R4	34 9	R-BR BR-R					Unit
	35 10	R-S S-R					4
T5 R5	36 11	BK-BL BL-BK					Unit
	37 12	BK-O O-BK					5
T6 R6	38 13	BK-G G-BK					Unit
	39 14	BK-BR BR-BK					6
T7 R7	40 15	BK-S S-BK					Unit
	41 16	Y-BL BL-Y					7

Table 2
NTCK16 central office trunk connections for NT8D37 I/O panel connectors B, F, L, S

Lead designations	Pins	Pair Color	I/O Panel Connector				Unit Number
COT			B	F	L	S	
T0	26	W-BL					
R0	1	BL-W					Unit
	27	W-O					0
	2	O-W					
T1	28	W-G					
R1	3	G-W					Unit
	29	W-BR					1
	4	BR-W					
T2	30	W-S	S	S	S	S	
R2	5	S-W	L	L	L	L	Unit
	31	R-BL	O	O	O	O	2
	6	BL-R	T	T	T	T	
T3	32	R-O					
R3	7	O-R	1	5	9	13	Unit
	33	R-G					3
	8	G-R					
T4	34	R-BR					
R4	9	BR-R					Unit
	35	R-S					4
	10	S-R					
T5	36	BK-BL					
R5	11	BL-BK					Unit
	37	BK-O					5
	12	O-BK					
T6	38	BK-G					
R6	13	G-BK					Unit
	39	BK-BR					6
	14	BR-BK					
T7	40	BK-S					
R7	15	S-BK					Unit
	41	Y-BL					7
	16	BL-Y					
T0	42	Y-O					
R0	17	O-Y					Unit
	43	Y-G					0
	18	G-Y					
T1	44	Y-BR					
R1	19	BR-Y	S	S	S	S	Unit
	45	Y-S	L	L	L	L	1
	20	S-Y	O	O	O	O	
T2	46	V-BL	T	T	T	T	
R2	21	BL-V					Unit
	47	V-O	2	6	10	14	2
	22	O-V					
T3	48	V-G					
R3	23	G-V					Unit
	49	V-BR					3
	24	BR-V					

Table 3
NTCK16 central office trunk connections for NT8D37 I/O panel connectors C, G, M, T

Lead designations	Pins	Pair Color	I/O Panel Connector				Unit Number
COT			C	G	M	T	
T4	26	W-BL					
R4	1	BL-W					Unit
	27	W-O					4
	2	O-W					
T5	28	W-G					
R5	3	G-W	S	S	S	S	Unit
	29	W-BR	L	L	L	L	5
	4	BR-W	O	O	O	O	
T6	30	W-S	T	T	T	T	
R6	5	S-W					Unit
	31	R-BL	2	6	10	14	6
	6	BL-R					
T7	32	R-O					
R7	7	O-R					Unit
	33	R-G					7
	8	G-R					
T0	34	R-BR					
R0	9	BR-R					Unit
	35	R-S					0
	10	S-R					
T1	36	BK-BL					
R1	11	BL-BK					Unit
	37	BK-O					1
	12	O-BK					
T2	38	BK-G					
R2	13	G-BK					Unit
	39	BK-BR					2
	14	BR-BK					
T3	40	BK-S					
R3	15	S-BK	S	S	S	S	Unit
	41	Y-BL	L	L	L	L	3
	16	BL-Y	O	O	O	O	
T4	42	Y-O	T	T	T	T	
R4	17	O-Y					Unit
	43	Y-G	3	7	11	15	4
	18	G-Y					
T5	44	Y-BR					
R5	19	BR-Y					Unit
	45	Y-S					5
	20	S-Y					
T6	46	V-BL					
R6	21	BL-V					Unit
	47	V-O					6
	22	O-V					
T7	48	V-G					
R7	23	G-V					Unit
	49	V-BR					7
	24	BR-V					

Self-test

When the NTCK16AX and NTCK16BX trunk cards are installed and power is applied to them, a self-test is performed on each card. The red LED on the faceplate flashes three times, then remains continuously lit until the card is enabled in software. If the self-test fails, the LED remains lit.

Trunk configuration

NTCK16AX Central office trunk card

Route Data Block

Respond to the prompts in overlay 16 as shown in Table 4.

Table 4
LD 16 Route Data Block—NTCK16AX

Prompt	Response	Comments
REQ	NEW	Define a new unit
TYPE	COT	Define a new Route Data Block
CUST	0-99	Enter customer number
ROUT	0-511	Enter route number
TKTP	COT	Define trunk type as Central Office
ICOG	IAO	Incoming and Outgoing trunk
CNTL	YES	Change a trunk timer
TIMER	RGV 256	Set Ring Validation Timer to 128 ms
MR	(NO), PPM, XLD	PPM is off, buffered, or unbuffered on this route.

Trunk Data Block

Respond to the prompts in LD 14 as shown in Table 5.

Table 5
LD 14 Trunk Data Block—NTCK16AX

Prompt	Response	Comments
REQ	NEW	Define a new trunk unit
TYPE	COT	Central Office Trunk
TN	LL SS CC UU	Terminal number of the unit: Loop, Shelf, Card, Unit
XTRK (see note 1)	XCOT	Type is IPE COT
CDEN	(8D)	Card density is 8D (default)
SIGL	LOP	Loop start signaling
PPID (see note 1, next page)	xx	04 Ireland/Turkey 12KHz 03 Turkey 16KHz/ (see note 2, next page)
BTID (see note 3, next page)	xx	Enter the country busy tone ID: Tortola, Brazil = 10 Mexico = 10 or 08(depending on CO) Singapore = 11 Ireland = 3 or 9 (depending on CO) Chile, Venezuela, Thailand, Korea = 06. Argentina = 12 or 07, Turkey = 14
Prior to Release 20A:		
CLS	SHL, (LOL)	Attenuation Pads In, (Out)
	BTS, (XBTS)	Busy tone supervision enabled, (disabled)
	DTN, (DIP)	Digitone signaling, (digipulse)

	BAT , (X BAT)	Loop break supervision enabled, (disab le d)
	P20, P12, (P10)	Make-break ratio for pulse dialing speed.

Table 5 (continued)
LD 14 Trunk Data Block—NTCK16AX

Prompt	Response	Comments
Release 20A and later:		
SUPN	YES, (NO)	Supervision yes (no)
STYP	BTS	Busy tone supervision enabled
	BAT	Loop break supervision enabled
CLS	SHL, (LOL)	Attenuation Pads In, (Out)
	DTN, (DIP)	Digitone signaling, (digipulse)
	P20, P12, (P10)	Make-break ratio for pulse dialing speed.

Note 1: These prompts are required only for the first unit defined on each NTCK16AX card.

Note 2:

	PPID	Freq	Min pulse detection
	03	16Kz	>70ms
	04	12Kz	>70ms

Note 3:

	Country	BTID	Cadence
	Brazil, Tortola	10	250 ms +/- 50 ms on/off
	Mexico	10	250 ms +/- 50 ms on/off
	Mexico	8	375 ms on/off
	Singapore	11	750 ms on/off
	Ireland	3	500 +/- 50 ms on/off
	Ireland	9	375 - 750 ms on/off
	Kuwait,		

Chile	6	500 +/- 50 ms on/off	Venezuela,
Indonesia	12	300 ms on, 200 ms off	Thailand, Korea
	12	300 ms on, 200 ms off	Argentina
12	300 ms on, 200 ms off		
Argentina	07	250 - 500 ms on/off	
Turkey	14	10 seconds of Tone 1: 200 ms off, 200 ms on; 200 ms off, 200 ms on; 200 ms off, 200 ms on; followed by Tone 2: 200 ms off, 200 ms on.	

NTCK16BX Central office trunk card

Route Data Block

Respond to the prompts in overlay 16 as shown in Table 6.

Table 6
LD 16 Route Data Block—NTCK16BX

Prompt	Response	Comments
REQ	NEW	Define a new unit
TYPE	COT	Define a new Route Data Block
CUST	0-99	Enter customer number
ROUT	0-511	Enter route number
TKTP	COT	Define trunk type as Central Office
ICOG	IAO	Incoming and Outgoing trunk
CNTL	YES	Change a trunk timer
TIMER	RGV 256	Set Ring Validation Timer to 128 ms
MR	(NO)	PPM is off on this route

Trunk Data Block

Respond to the prompts in LD 14 as shown in Table 7.

Table 7
LD 14 Trunk Data Block—NTCK16BX

Prompt	Response	Comments
REQ	NEW	Define a new trunk unit
TYPE	COT	Central Office Trunk
TN	CC UU	Terminal number of the unit: Card, Unit
XTRK (see note 1, next page)	XCOT	Type is IPE COT
CDEN	(8D)	Card density is 8D (default)
SIGL	LOP	Loop start signaling
BTID (see note 2, next page)	xx	Enter the country busy tone ID: Tortola, Brazil = 10 Mexico = 10 or 8(depending on CO) Singapore = 11 Ireland = 3 or 9 (depends on CO) Kuwait, Chile, Venezuela, Indonesia, Thailand, Korea = 6 Argentina = 12 or 07, Turkey = 14
Prior to Release 20A:		
CLS	SHL, (LOL)	Attenuation Pads In, (Out)
	BTS, (XBTS)	Busy tone supervision enabled, (disabled)
	DTN, (DIP)	Digitone signaling, (digipulse)
	BAT, (XBAT)	Loop break supervision enabled, (disabled)

	P20, P12, (P10)	Make-break ratio for pulse dialing speed.

Table 5 (continued)
LD 14 Trunk Data Block—NTCK16BX

Prompt	Response	Comments
Release 20A and later:		
SUPN	YES, (NO)	Supervision yes (no)
STYP	BTS	Busy tone supervision enabled
	BAT	Loop break supervision enabled
CLS	SHL, (LOL)	Attenuation Pads In, (Out)
	DTN, (DIP)	Digitone signaling, (digipulse)
	P20, P12, (P10)	Make-break ratio for pulse dialing speed.

Note 1: These prompts are required only for the first unit defined on each NTCK16BX card.

Note 2:

Country	BTID	Cadence
Brazil Tortola	10	250 ms +/- 50 ms on/off
Mexico	10	250 ms +/- 50 ms on/off
Mexico	8	375 ms on/off Singapore 11 750 ms on/off
Ireland	3	500 +/- 50 ms on/off
Ireland	9	375 - 750 ms on/off
Kuwait, Chile	6	500 +/- 50 ms on/off
Venezuela, Indonesia	12	300 ms on, 200 ms off
Thailand, Korea	12	300 ms on, 200 ms off Argentina 12 300 ms on, 200 ms off Argentina 07 250 - 500 ms on/off
Turkey	14	10 seconds of Tone 1: 200 ms off, 200 ms on; 200 ms

off,	200 ms on; 200 ms off, 200 ms on; 200 ms off, 600 ms on; followed
by	Tone 2: 200 ms off, 200 ms on.

Technical description

Power requirements

Table 8 shows the power requirements for the NTCK16AX and NTCK16BX generic central office trunk cards.

Table 8
NTCK16 circuit card power requirements

Voltage	Idle current	Maximum current
+15.0 V dc (see note 1)	170 ma	330 ma
-15.0V dc (see note 1)	170 ma	249 ma
+ 8.5 V dc (see note 2)	101 ma	100 ma
+ 5.0 V dc	160 ma	322 ma

Note 1: Analog circuitry is powered with +/- 12V generated from +/- 15V. The maximum current imbalance between the +/- 15V rails is 100 ma per circuit pack.

Note 8.5V is regulated to give 5V.

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Environmental specifications

Table 9 lists the environmental specifications of the NTCK16AX and NTCK16BX generic central office trunk cards.

Table 9
NTCK16 circuit card environmental specifications

Parameter	Specifications
Operating temperature	10 to 45 degrees C
Operating humidity	20 to 80 % Relative Humidity
Storage temperature	- 20 to + 60 degrees C
Storage humidity	5 to 95% Relative Humidity

Pad switching

The NTCK16AX and NTCK16BX generic central office trunk cards support the North American loss plan. Software configuration allows the selection of 4 dB loss pads on a per unit basis.

Table 10
NTCK16 pad switching

	Pad out	Pad in
Analog-to-Digital loss	0 dB	+4.0 dB
Digital-to-Analog loss	-3.0 dB	+1.0 dB

Note: The tolerance for the above nominal values is +0.3 dB, ***e***0.7 dB.

Trunk signalling and features description

Each NTCK16AX and NTCK16BX generic central office trunk card supports:

- Loop start operation
- Battery reversal detection
- Busy tone detection and supervision
- Loss Switching
- Trunk-to-Trunk connections
- Call Disconnect

In addition, the NTCK16AX circuit card supports internal 12/16 kHz PPM detection.

Loop start operation

Loop start operation is configured in software and is implemented in the card through software download messages.

Idle state

In the idle state, the ringing detector is connected across the tip and ring wires, providing a high impedance loop toward the central office.

Call placed by central office

The central office initiates a call by applying ringing between the tip and ring wires. If the call is answered, the ringing detector on the trunk card is switched out and a low resistance dc loop is placed between the tip and ring leads.

On trunks configured for battery supervision, the battery detector records the polarity of the tip and ring wires and sends an answer acknowledge signal to software.

Call placed by Meridian 1

To initiate a call, the Meridian 1 switches out the ringing detector and places a low resistance loop across the tip and ring leads. On trunks configured for battery supervision, the trunk card sends a seize acknowledge signal to software.

The Meridian 1 sends digits in the form of Dual Tone Multifrequency (DTMF) tones or pulse digits. When the far end answers, the central office reverses polarity. If the trunk is configured for battery supervision, it sends a polarity reversal message to software.

Central office disconnect

There are two ways the central office can disconnect the call:

- by applying busy tone toward the Meridian 1. If the trunk card is configured to detect busy tone, it will send a disconnect message to software.
- by reversing battery. If the trunk card is configured to detect battery reversal, it will send a disconnect message to software. When the unit on the trunk card has been idled, the trunk card sends a release confirm message to software.

Meridian 1 disconnect

The Meridian 1 disconnects the call by removing the loop between the tip and ring leads and replacing the ringing detector. Trunks configured for battery supervision send a release confirm message to software.

Features description

Periodic Pulse Metering (PPM)

All trunk units on the NTCK16AX trunk card can be individually configured to support the Periodic Pulse Metering (PPM) feature.

N ***o*** ***t*** ***e*** PPM is available on the NTCK16AX trunk card, but not the NTCK16BX trunk card.

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Periodic Pulse Metering allows the user of a telephone on a Meridian 1 to keep an accurate record of central office calls for billing or administration purposes.

Detection limits

Pulses detected by the NTCK16AX circuit card must be within the following limits:

Frequency	11 880 to 12 120 Hz
Level	105 to 1100 mVrms Note: The pack should not be used to detect levels of 1100 mVrms or greater a Tip and Ring, as this may result in noise.
Pulse length	dependant on PPID—see LD 14

Busy tone detect

Busy tone is sent by the central office to indicate the release of an established call.

Detection limits

The NTCK16AX and NTCK16BX generic central office trunk cards can detect busy tone within the following limits:

Frequency	400 to 620 Hz
Level	-30 to 0 dBm
Cadence	see note 3 Table 5.

Loss Switching

The Generic XFCOT is based on the XFCOT design, which is using a static pad download algorithm by default for its loss plan.

The generic XFCOT has to be set explicitly to a Dynamic Pad Switching mode to make it compliant with the standard North American Dynamic Pad Switching mode.

Therefore the following steps must be followed when the Generic XFCOT is installed:

Step 1 Define Loss Switching mode.

Respond to the prompts in LD 97 as shown in Table 11.

Table 11
LD 97—Defining Loss Switching mode

Prompt	Response	Comments
REQ	CHG	
TYPE	SYSP	IPE system parameters configuration
•		
•		
NATP	YES	select North American transmission plan

Note: The default to the NATP prompt is NO, and therefore this prompt must always be checked during installation.

Step 2 Define Loss Switching Class Of Service

Respond to the prompts in LD 14 as shown in Table 12.

Table 12
LD 14—Defining Loss Switching Class Of Service

Prompt	Response	Comments
REQ	CHG	

TY PE	COT	IPE system param eters configuration
XT RNK	XC OT	
SIGL	LOP	
CL S	LOL	LOL= Long Line

N The XFCOT uses the CLS Long Line (LOL) and Short Line
o (SHL) for Loss Switching purposes and that the card and trunk type is
t different from the XUT.
e
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Equivalencies

The following equivalencies do apply:

- XFCOT COT SHL is equivalent with XUT COT TRC

- XFCOT COT LOL is equivalent with XUT COT NTC.

The entries TRC and NTC will no longer be allowed for the Generic XFCOT.

Trunk to Trunk connection.

When any disconnect supervision is configured (CLS = BAT, BTS) the Loop Start Trunk of the Generic XFCOT will be marked as having disconnect supervision and will therefore follow the same rules as a Ground Start Trunk (see feature description "Access Restrictions" in the NTP's).

There is no configuration involved for this operation.

Call Disconnect.

When any disconnect supervision is configured (CLS = BAT, BTS) the Loop Start Trunk will be released when the disconnect signal is received. This will apply also in call states as ringing, camp-on, DISA, M. Mail etc.

There is no configuration involved for this operation.

Meridian 1

Generic central office trunk cards

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