Critical Release Notice

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The content of this customer NTP supports the SN06 (DMS) software release.

Bookmarks used in this NTP highlight the changes between the baseline NTP and the current release. The bookmarks provided are color-coded to identify release-specific content changes. NTP volumes that do not contain bookmarks indicate that the baseline NTP remains unchanged and is valid for the current release.

Bookmark Color Legend

Black: Applies to new or modified content for the baseline NTP that is valid through the current release.

Red: Applies to new or modified content for NA017 that is valid through the current release.

Blue: Applies to new or modified content for NA018 (SN05 DMS) that is valid through the current release.

Green: Applies to new or modified content for SN06 (DMS) that is valid through the current release.

Attention!
Adobe® Acrobat® Reader™ 5.0 is required to view bookmarks in color.

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Digital Switching Systems

UCS DMS-250

NT6X50EC Integrated Echo Canceller Application Guide

UCS11 Standard 05.02 May 1999

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UCS DMS-250

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Entered minor technical revisions.

November 1998

Standard release 04.02 for software release USC09. The following changes were made:

- added Chapter 2, “Echo canceller configurations”
- added Appendix C, “Cost-savings deployment strategies”
- moved content from the appendix, “Access and network modes” into Chapter 1, “Introduction”
- added the section, “Internal and external echo cancellers to Chapter 1, “Introduction”
- added the section “Call control software” to Chapter 1, “Introduction”
- moved content from the chapter, “Network considerations” into Chapter 1, “Introduction”
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Clarified some technical sections in the document.

April 1998

Preliminary release 03.01 for software release USC08. Added reference to redesigned Specialized Tone Receiver (STR) card NT6X62EA in Chapter 1. This card will eventually replace card NT6X62AB.

September 1997

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Preliminary release 02.04 for software release USC05.

This edition has been up-issued to clarify some technical sections in the document.

February 1997

Standard release 02.03 for software release USC05.

May 1996

Preliminary release 02.02 for software release USC05 (CSP04). The following changes were made:

- added continuous performance monitoring of echo canceller-equipped trunks
- added automatic performance monitoring of echo canceller-equipped trunks

January 1996

Preliminary release 01.01 for software release UCS04.1 (CSP01).

Contents

About this document

This document describes the NT6X50EC Integrated Echo Canceller (EC) card and provides information used for planning, installation, testing, and maintenance. Data tables, office parameters, and commands that support the NT6X50EC card are also discussed in this document.

Note: Information in this document is limited to operation of the NT6X50EC card.

Intended audience

This document is intended for personnel responsible for planning, installing, testing, and maintaining NT6X50EC cards.

This document is written with the following assumptions:

- customer switch is already installed, commissioned, and active
- personnel using this document are trained in the use of Table Editor and have completed Nortel approved datafill, translations, and maintenance training

This document applies to UCS DMS-250 offices that have software releases greater than UCS05 (CSP04). The *UCS DMS-250 Master Index of Publications* lists the latest issue version of this document and correlates issue version to software release.

How this document is organized

This section describes the document organization.

Chapter 1, Introduction

Chapter 1 describes echo, explains how it occurs, and discusses the role of the NT6X50EC card in cancelling near-end echo. It also contains necessary planning information.

Chapter 2, Echo canceller configuration

Chapter 2 describes the four methods to configure echo cancellers on a network.

Chapter 3, Installation

Chapter 3 describes how to install the NT6X50EC card within a digital trunk controller (DTC) that supports either per-trunk signaling (PTS) or common channel signaling #7 (CCS7) signaling.

Chapter 4, Upgrading to NT6X50EC

Chapter 4 describes how to replace an NT6X50AA or NT6X50AB card with the NT6X50EC card in a DTC.

Chapter 5, Echo canceller testing

Chapter 5 describes how to test the NT6X50EC card in either a lab or field environment. This chapter includes information on how to set up testing and provides information on quantitative testing, subjective testing, and in-switch testing. This chapter also provides troubleshooting information.

Chapter 6, Performance monitoring capabilities

Chapter 6 describes the Echo Canceller Monitor (ECMON) command that enables the monitoring of echo canceller performance. This chapter also lists in-service maintenance tools supported on the NT6X50EC card. Logs and operational measurements related to the EC card are also discussed.

Appendix A, NT6X50EC switch settings

Appendix A provides the switch settings for the NT6X50EC circuit pack.

Appendix B, Table descriptions

Appendix B describes the tables and the datafill to enable the echo canceller.

Appendix C, Cost-savings deployment strategies

Appendix C describes how to deploy echo cancellers on your network if your objective is to minimize initial costs or minimize future maintenance costs.

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 *second* software release cycle, the first release of the same document is 02.01.

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

This document is written for all UCS DMS-250 offices. More than one version of this document may exist. To determine whether you have the latest version of this document and how documentation for your product is organized, check the release information in *UCS DMS-250 Master Index of Publications*, 297-2643-001.

References in this document

The following documents are referred to in this document:

- CCITT Recommendation *Echo Cancellers, Blue Book, Volume III, Fascicle III.1, Recommendation G.165, ITU, Geneva 1989*
- CCITT Recommendation *Echo Suppressors, Blue Book, Volume III, Fascicle III.1, Recommendation G.164, ITU, Geneva 1989*
- *DMS-100 Family Menu Commands Reference Manual*, 297-1001-821
- *DMS-100 Family Nonmenu Commands Reference Manual*, 297-1001-820
- *Installation and Safety Manual (ISM/IMO)*
- *Maintenance System Man-Machine Interface Description*, 297-1001-520
- *NTI Installation and Administrative Practice (IAP) 701*
- *NTC Installation and Administrative Practice (IAP) 1701*
- *Peripheral Module Maintenance Guide*, 297-1001-592
- *Product Documentation Directory*, 297-8991-001
- *Trunk Selection and Compatibility*, 297-1001-152
- *Trunks Maintenance Guide*, 297-1001-595
- *UCS DMS-250 Data Schema Reference Manual*, 297-2631-851
- *UCS DMS-250 Master Index of Publications*, 297-2631-001
- *UCS DMS-250 Office Parameters Reference Manual*, 297-2631-855
- *UCS DMS-250 Operational Measurements Reference Manual*, 297-2631-814

What precautionary messages mean

The types of precautionary messages used in this document 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**
> Do not proceed until all related logs have been understood or explained.

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**
> This is a critical step that can cause outages if not performed correctly.

Document conventions

This document conforms 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
```

Variables

Variables are shown in lowercase letters:

>BSY CTRL ctrl_no

The letters or numbers 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.
```

The following excerpt from a procedure shows the command syntax used in this document:

1 Manually busy the CTRL on the inactive plane by typing

>BSY CTRL ctrl_no
and pressing the Enter key.

where

ctrl_no is the number of the CTRL (0 or 1)

Example of a MAP response:

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

Introduction

This chapter describes the echo that can occur on a voice call and explains the role of the NT6X50EC Integrated Echo Canceller (EC) card in cancelling the near-end echo. This chapter also provides necessary planning information.

What is an echo?

Hybrid transformers on telephone circuits connect the four-wire circuit (separate transmit and receive pairs) of the telephone network to the two-wire circuit of the local loop. The local loop connects most telephones to the local network.

The telephone also contains a hybrid circuit to connect the transmitter and receiver to the local loop. Because these hybrids have a finite echo return loss, some of the energy of the transmit pair is reflected back on the receive pair. This reflection of signal or energy is what causes an “echo.” The signal travels back across the network to the telephone that originated it. At the originating phone, or the far end, it turns back into sound that is heard by the far-end speaker.

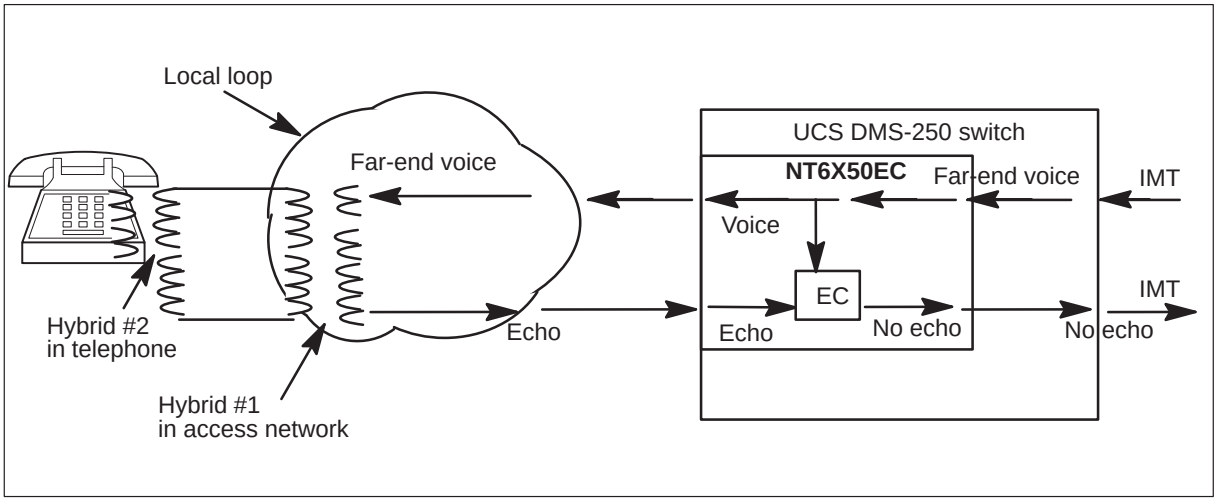
The reflection of the speech from the hybrid back to the originating phone results in a delay. If a short, 10-30 millisecond delay occurs, the speaker perceives the echo as part of the handset side tone. If the delay is greater than 10-30 milliseconds, the far-end speaker can distinguish echo from side tone. This threshold between distinguishing side tone and echo relates to the limitations of human speech and hearing mechanisms. The echo is distinguishable because it is delayed by the round-trip network delay.

Cancelling echoes

The NT6X50EC is a half EC. Half ECs cancel echoes at the near end (for example, at the telephone that originates the echo), while full ECs cancel echoes at the near and far ends. Half ECs cancel energy transmitted by the far end and reflected from the near-end hybrid, local loop, and telephone. The card cancels the echo before it leaves the UCS DMS-250 switch to enter the intermachine trunk (IMT) for transmission back to the far-end UCS DMS-250 switch, access network, and the caller.

Figure 1-1 shows the echo cancellation process.

Figure 1-1
Echo cancellation



Handling of data calls

The following types of data calls can pass through the NT6X50EC card:

- tone disabled
  - — fax, modem
  - — switched 56 kbit/s
- switch disabled

Tone-disabled data calls

When table TRKSGRP, ECSTAT parameter is set to INTERNAL, the NT6X50EC card is disabled when a 2100 Hz tone precedes a call.

The tone must be 2100 Hz as described in CCITT G.164 (no phase reversals) or CCITT G.165 (periodic phase reversals). The DIP switch settings on the NT6X50EC specify the type of tone the EC recognizes. Nortel recommends setting the NT6X50EC to recognize CCITT G.164.

Note: When in G.165 mode, the NT6X50EC does not support v.34 modems.

For fax and modem calls, silence in one or both directions can automatically enable the NT6X50EC card. If table TRKSGRP, field AUTOON is Y, the NT6X50EC automatically restarts the echo cancellation after the data call is over. The CCITT recommendation determines the criteria for the re-enabling of echo cancellation.

For switched 56 kbit/s calls, the EC remains disabled as long as the least significant bit in the channel is a binary one.

Switch-disabled data calls

Switch-disabled data calls are flagged by the UCS DMS-250 switch as data calls and the EC is not turned ON.

Modes

The NT6X50EC functions in different modes, depending on its location with respect to the UCS DMS-250 switch.

If the network contains NT6X50EC cards located on	then	which means
the network side of a UCS DMS-250 switch	each NT6X50EC functions in network mode, with a mode setting of network	echoes occurring at the near end of the EC are cancelled before they are transmitted through the network.
the access side of a UCS DMS-250 switch	each NT6X50EC functions in access mode, with a mode setting of access	echoes occuring at the near end are cancelled as they are transmitted from the local exchange carrier (LEC) to the inter-exchange carrier's (IEC) network at the far end.
both the network and access sides of the UCS DMS-250 switch	the NT6X50ECs are in mixed mode, which means each NT6X50EC functions in either network or access mode, depending on its location relative to the UCS DMS-250 switch	echoes occur and are cancelled on the network or access side, depending on the mode in which each NT6X50EC functions.

The most common location for an NT6X50EC is on the network side [also called the intermachine trunk (IMT) side] of the UCS DMS-250 switch. When the NT6X50EC is on the network side, it's usually set to the network mode.

Note: Nortel recommends you locate the NT6X50EC at the near-end of networks. If you locate the NT6X50EC at the far-end, you may encounter delays in excess of 96ms.

Figures 1-3 through 1-4 show examples of NT6X50ECs functioning in network, access, and mixed modes, respectively.

Figure 1-3 shows the NT6X50EC deployed on the access side of the UCS DMS-250 switch. In this configuration, the following occurs:

- NT6X50EC card is set for access mode.
- Near-end access side echo is cancelled.

Figure 1-2
Typical access mode configuration

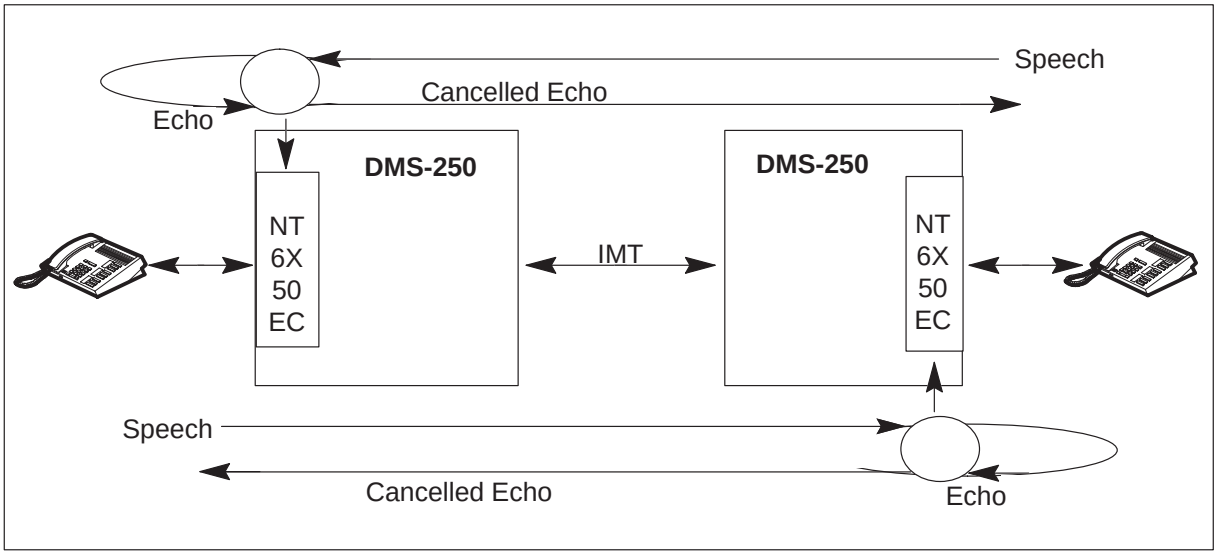


Figure 1-2 shows the NT6X50EC deployed on the network or IMT side of the UCS DMS-250 switch. In this configuration, the following occurs:

- NT6X50EC card is set for the network mode.
- Near-end access side echo is cancelled.

Figure 1-3
Typical network mode configuration

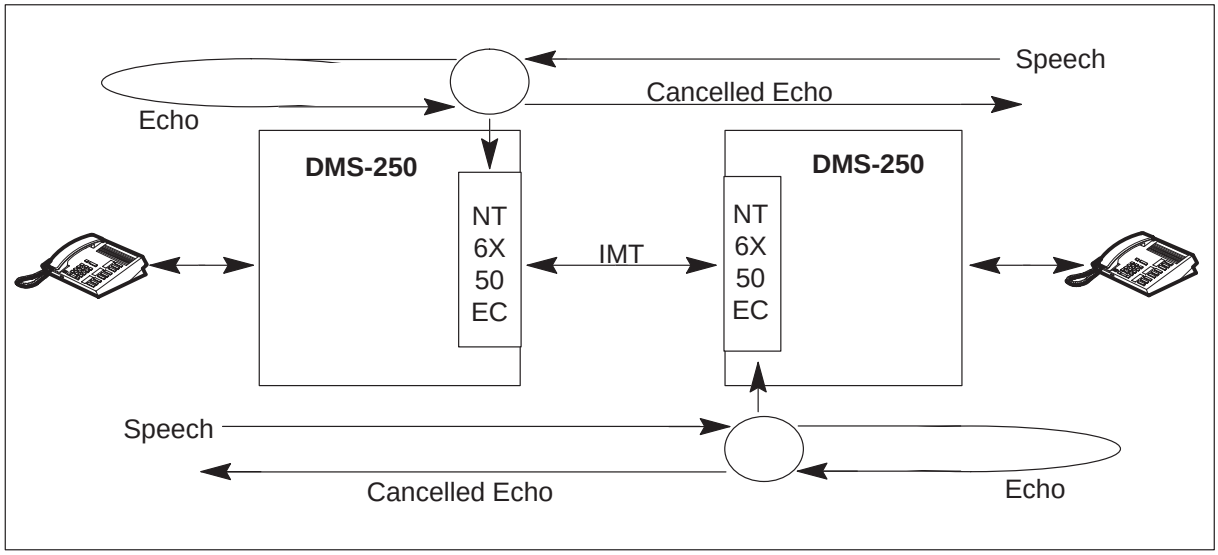
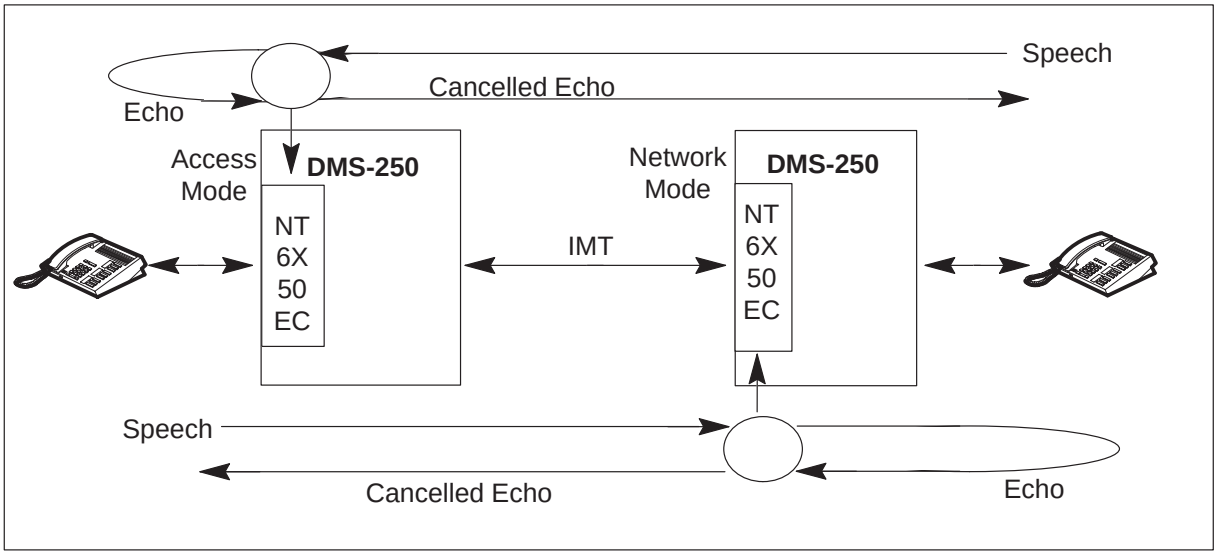


Figure 1-4 shows NT6X50ECs deployed on both the network and access sides of the UCS DMS-250 switch. In this configuration, the following occurs:

- NT6X50EC card on the network side is set for the network mode.
- NT6X50EC card on the access side is set for the access mode.
- Near-end access and network side echoes are cancelled.

Figure 1-4
Mixed mode configuration



Internal and external echo cancellers

The NT6X50EC card is Nortel's internal echo canceller. It is an optional card that resides within the UCS DMS-250 switch. Other vendors sell external echo cancellers that reside outside the UCS DMS-250 switch. Because many customers use both NT6X50ECs and external echo cancellers, this document shows both types of echo cancellers configured on a network. In some configurations, use of an external echo canceller is required. For example, if you set to access mode an NT6X50EC that resides on the network side of the switch, you must also deploy an external echo canceller on the network side.

Call control software

The originating and terminating trunks contain datafill that relates to echo cancellation. The call control software uses this datafill to determine which ECs to activate during a call.

Note: For more information on the datafill required for echo cancellation, see Appendix B, "Table descriptions."

The call control software does not consider whether an EC's mode is access or network. It also assumes the IMT trunks connect to another digital trunk controller (DTC) or an end office, which perform echo cancellation on the echo generating from the near end.

For best results, adhere to the following rules:

- If you are not using an external EC, set the EC of the trunk on the access side to access mode.
- If you are deploying an external EC on a trunk on the access side, you can set an EC on the access side to the network mode.
- Always set an EC on an IMT trunk to the network mode.
- If a trunk on the access side has a long delay, do one of the following:
  - — Deploy ECs for all trunks on the access side, even though some trunks have short delays.
  - — Deploy an internal EC in the network mode and an external EC on the trunk that has the long delay.
- If you are using an IMT trunk to connect to a local exchange carrier (LEC) that does not have an EC, you must deploy an external EC on the IMT trunk.

Note: For specific strategies to deploy the NT6X50EC card, see Appendix C, "Cost-savings deployment strategies."

Echo canceller activation

Figures 1-5 through 1-10 show which ECs the call control software activates during a call. The figures are arranged under four sections:

- "IMT to IMT" describes EC activation when both the originating and terminating trunks are IMTs.
- "Access to IMT" describes EC activation when the originating trunk is an access trunk and the terminating trunk is an IMT
- "IMT to access" describes EC activation when the originating trunk is an IMT trunk and the terminating trunk is an access trunk
- "Access to access" describes EC activation when both the originating terminating trunks are access trunks

Each figure contains three scenarios:

- EC activation when ECs are located on both the originating and terminating sides of the UCS DMS-250 switch.
- EC activation when ECs are located only on the originating side of the UCS DMS-250 switch.
- EC activation when ECs are located only on the terminating side of the UCS DMS-250 switch.

IMT to IMT

Figure 1-5 and 1-6 show which ECs the call control software activates during a call when both the originating and terminating trunks are IMTs:

- PTS IMT originating agent to PTS IMT terminating agent
- PTS IMT originating agent to SS7 IMT terminating agent
- SS7 IMT originating agent to PTS IMT terminating agent
- SS7 IMT originating agent to SS7 IMT terminating agent

Figure 1-5 shows EC activation when the office parameter IMT_TANDEM_EC_ENABLE is set to Y. Figure 1-6 shows EC activation when the office parameter IMT_TANDEM_EC_ENABLE is set to N.

Figure 1-5
EC activation on IMT to IMT when IMT_TANDEM_EC_ENABLE = Y

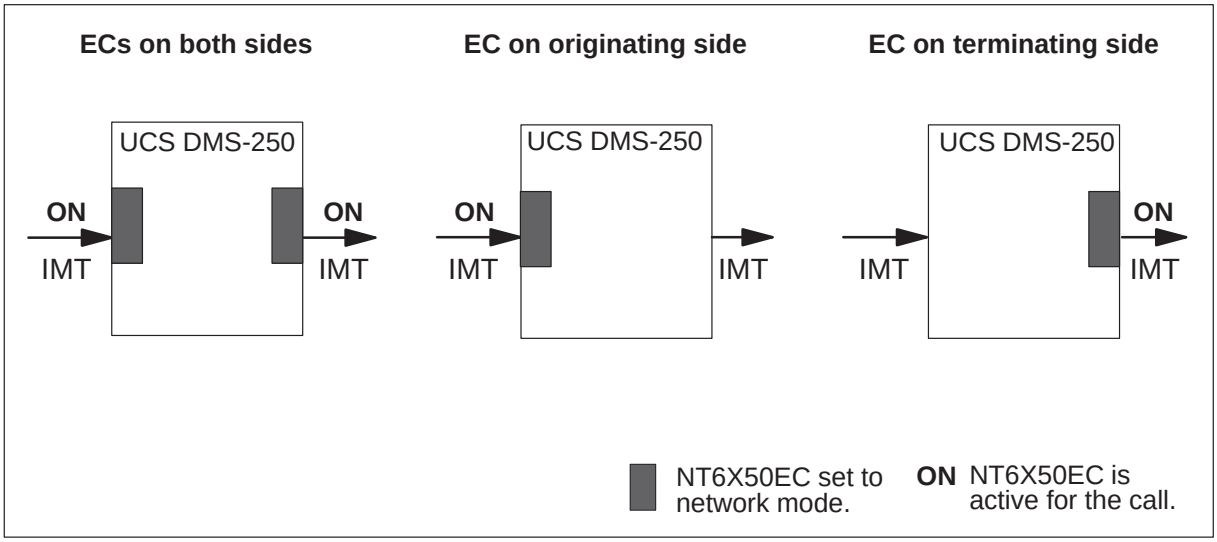
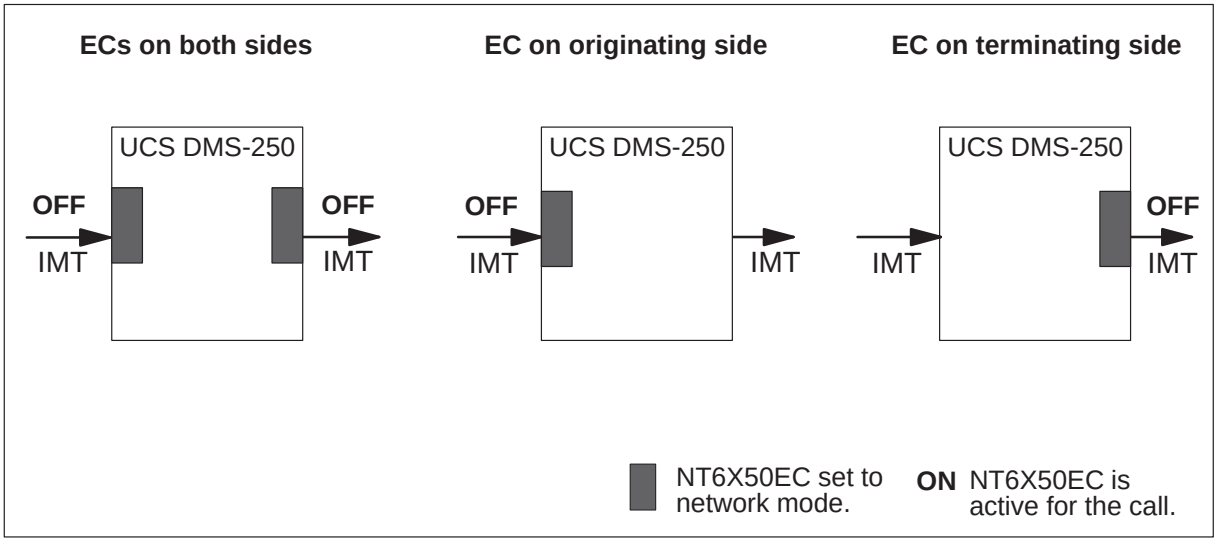


Figure 1-6
EC activation on IMT to IMT when IMT_TANDEM_EC_ENABLE = N

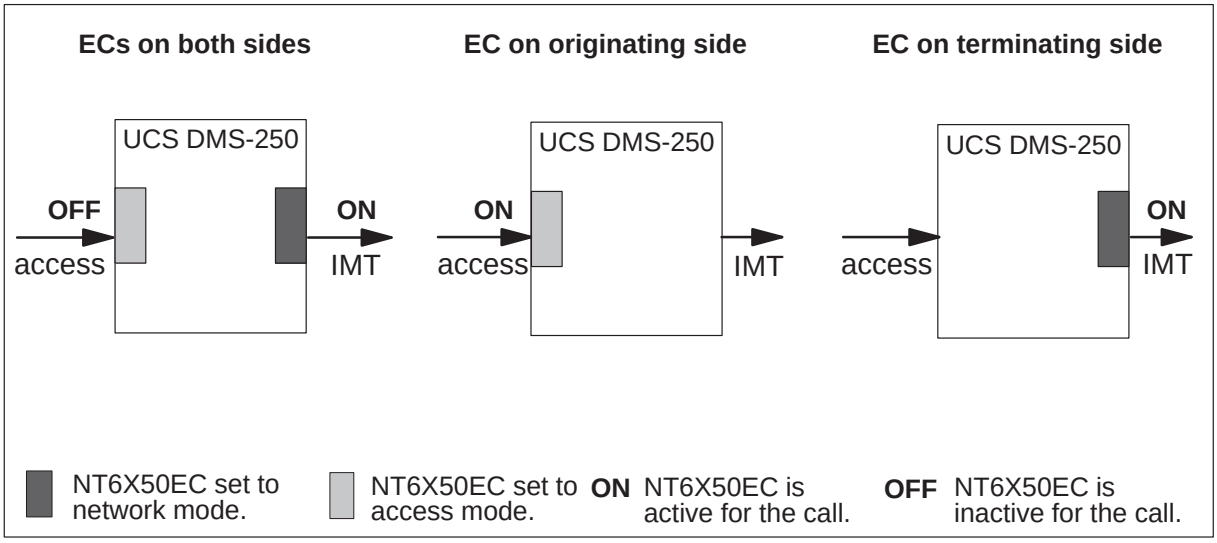


Access to IMT

Figure 1-7 shows which ECs the call control software activates during a call when the originating trunk is an access trunk and the terminating trunk is an IMT:

- PTS access originating agent to PTS IMT terminating agent
- PTS access originating agent to SS7 IMT terminating agent
- SS7 access originating agent to PTS IMT terminating agent
- SS7 access originating agent to SS7 IMT terminating agent

Figure 1-7
EC activation on access to IMT



IMT to access

Figure 1-8 shows which ECs the call control software activates during a call when the originating trunk is a PTS IMT trunk and the terminating trunk is an access trunk:

- PTS IMT originating agent to PTS access terminating agent
- PTS IMT originating agent to SS7 access terminating agent

Note 1: When the originating agent is a PTS IMT and the terminating agent is an access agent, the PTS IMT behaves as an access agent.

Note 2: See Figure 1-9 for EC activation on SS7 IMT to SS7 and PTS access agents.

Figure 1-8
EC activation on PTS IMT to access

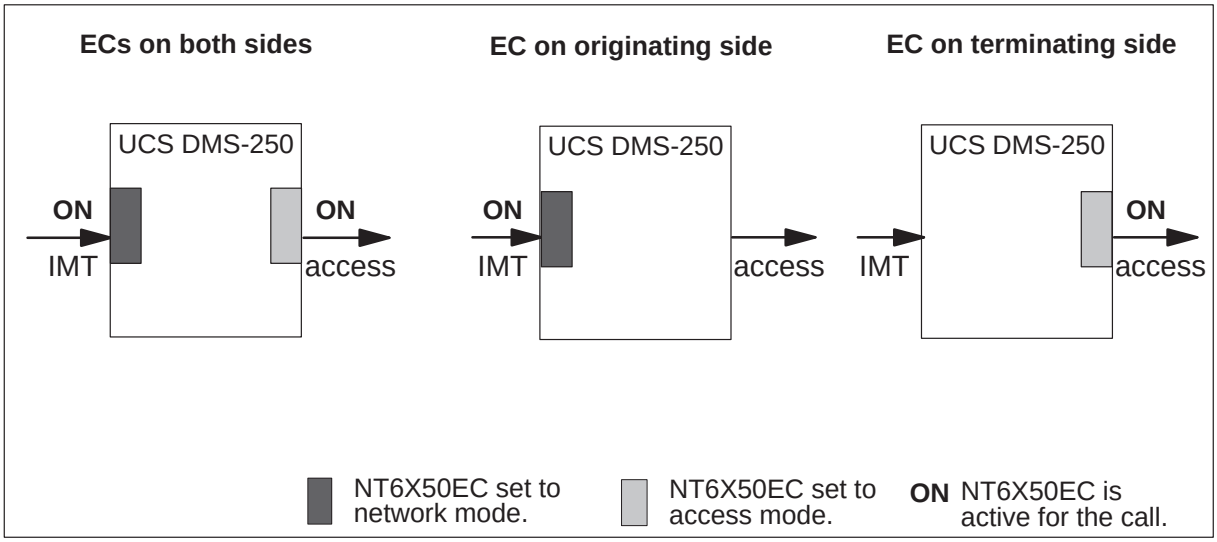
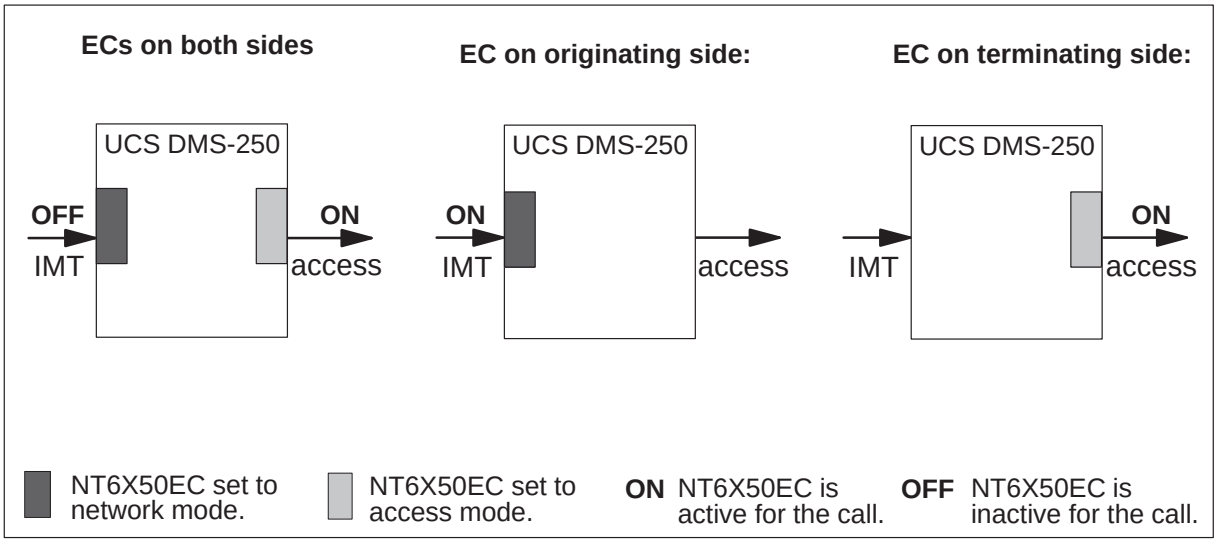


Figure 1-9 shows which ECs the call control software activates during a call when the originating trunk is an SS7 IMT trunk and the terminating trunk is an access trunk:

- SS7 IMT originating agent to PTS access terminating agent
- SS7 IMT originating agent to SS7 access terminating agent

Figure 1-9
EC activation on SS7 IMT to access

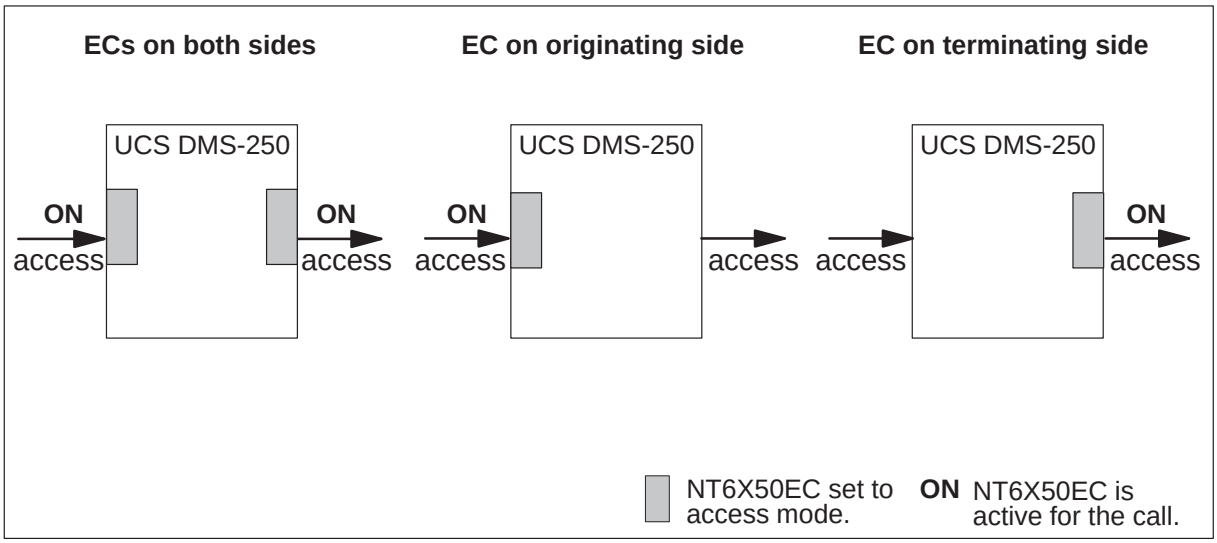


Access to access

Figure 1-10 shows which ECs the call control software activates during a call when both the originating terminating trunks are access trunks:

- PTS access originating agent to PTS access terminating agent
- PTS access originating agent to SS7 access terminating agent
- SS7 access originating agent to PTS access terminating agent
- SS7 access originating agent to SS7 access terminating agent

Figure 1-10
EC activation on access to access



Related datafill

Tables that control the NT6X50EC card and echo cancellers include

- Table CARRMTC – The ECHO field sets the operating mode of the NT6X50EC DS1 carrier. Set the ECHO field to either ACCESS or NETWORK mode.
- Table LTCPSINV – The CARRIDX field selects a template name from the TMPLTNM field in table CARRMTC. This table also lets you specify T1–specific tail delay values, which apply to all T1s on the switch that have an EC.
- Table TRKSGRP – The ECSTAT fields allows call processing to enable or disable the NT6X50EC card.
- Table OFCVAR – The office parameter IMT_TANDEM_EC_ENABLE controls whether tandem IMT calls enable the ECs equipped in table TRKSGRP.
- Table OFCENG – The office parameter ECHO_CANCELLER_TAIL_DELAY lets you specify a switch–wide, default value for the tail delay.

Note: For more information on these tables, see Appendix B, "Table descriptions."

Supported trunk types

The following trunk types are supported on the NT6X50EC:

- PTS
- SS7
- PRI

Configuration types

You can deploy the echo cancellers on your network using one of four configurations:

- IMT only
- access only
- access, IMT, and external ECs
- pure tandem

Note: For detailed descriptions of these configurations, see Chapter 2, "Echo canceller configurations."

When deploying the NT6X50EC card, the following configuration is required:

- Deploy the NT6X50EC as close as possible to the echo's source.
- Face the NT6X50EC card toward end circuits.
- Do not have one EC face another EC over long-distance IMTs.
- Activate only two ECs per call.

  Note: Make sure one EC faces one customer and one EC faces the other customer.

Network considerations

This section explains

- Transmission speed and echo
- Transmission levels
- Maximum tail and tail circuit lengths

Transmission speed and echo

Transmission speeds across a network are a minimum of 60 miles per millisecond. Because echo may be perceptible for delays as low as 10 milliseconds, a round trip of 600 miles could produce noticeable echo.

Transmission levels

Transmission levels of both echo return loss (ERL) and incoming signals must be controlled to provide effective echo cancellation. For example:

- NT6X50EC card works with an ERL of six decibels or higher. If there is insufficient loss in the tail, the echo canceller may be unable to distinguish between echo and double talk.
- Incoming signals must be controlled when they first enter the telephone network so that loud speech is not distorted. These signals must not exceed –3 dBm0.

Note: The six decibel loss, which most carriers apply to the incoming signal, addresses both of these concerns.

Tail delay circuit length

The distance from the NT6X50EC to the hybrid (from the switch to the phone) is the tail delay length. The distance from the NT6X50EC to the hybrid and back again (a round–trip) is the tail delay circuit length.

The following types of tail delay values exist:

- maximum allowable tail delay
- default tail delay for the XPM
- tail delays you can adjust for your needs using datafill

The next few sections explain these different tail delay values and how they affect each other.

Maximum allowable tail delay values

The maximum allowable distance for the tail delay circuit depends on

- the echo canceller's tail delay setting
- the transmission speed in the path.

For example, if the transmission speed is 60 miles per millisecond, an echo canceller provisioned with a maximum tail delay of 48 milliseconds can cancel a tail circuit of up to 2880 miles round trip. Table 1-1 shows the maximum allowable round-trip tail circuit lengths (in miles) for several transmission speeds at tail delay settings that range from 32 to 96 milliseconds.

Note: The network delay does not impact the echo canceller, and may be longer than the maximums shown in Table 1–1.

Table 1-1
Maximum allowable round-trip tail circuit lengths

Transmis–sion speed	Maximum Round-trip miles at 32 ms tail delay	Maximum Round-trip miles at 48 ms tail delay	Maximum Round-trip miles at 64 ms tail delay	Maximum Round-trip miles at 80 ms tail delay	Maximum Round-trip miles at 96 ms tail delay
60 mi/m	1 ,920	2,880	3,840	4,800	5,760
90 mi/m	2,880	4,320	5,760	7,200	8,640

—continued—

Table 1-1
Maximum allowable round-trip tail circuit lengths (continued)

Transmis–sion speed	Maximum Round-trip miles at 32 ms tail delay	Maximum Round-trip miles at 48 ms tail delay	Maximum Round-trip miles at 64 ms tail delay	Maximum Round-trip miles at 80 ms tail delay	Maximum Round-trip miles at 96 ms tail delay
120 mi/m	3,840	5,760	7,680	9,600	11,520
150 mi/m	4,800	7,200	9,600	12,000	14,400

—end—

Table 1-2 shows the maximum allowable one-way tail circuit length for various transmission speeds at maximum tail delay settings of 48 and 96 milliseconds.

Table 1-2
Maximum allowable one-way tail circuit length

Transmission speed	Maximum one-way miles at 48 ms setting	Maximum one-way miles at 96 ms setting
60 mi/m	1440 miles	2880 miles
90 mi/m	2160 miles	4320 miles
120 mi/m	2880 miles	5760 miles
150 mi/m	3600 miles	7200 miles

—end—

Default tail delay values

The NT6X50EC automatically uses a switch–wide default tail delay of 48 ms, which is set in the XPM layer. This value applies to all T1s on the switch that include an NT6X50EC card, *unless you use datafill to override the default with an adjustable tail delay value.*

Adjustable tail delay values

You can enter datafill to adjust the tail delay values to fit your needs. Specifically, you can set

- a different tail delay value for the switch–wide default (Table OFCENG)

- a tail delay value for specific T1s, which overrides all other defaults (Table LTCPSINV)

Although you can datafill many types of XPMs, the ability to set adjustable tail delay values applies to the following XPM types *only*:

- Digital Trunk Controller (DTC)
- Digital Trunk Controller ISDN (DTCI)

The following table explains the relationship between the default tail delay values set in the XPM layer and the two types of adjustable tail delay values.

If you	and you	then
do not use Table OFCENG to set a switch–wide, default tail delay value	do not use Table LTCPSINV to set a T1–specific tail delay value,	the default tail delay value set in the XPM layer applies, switch–wide.
use Table OFCENG to set a switch–wide, default tail delay value	do not use Table LTCPSINV to set a T1–specific tail delay value,	all T1s on the switch with NT6X50EC cards use the tail delay value you set in Table OFCENG (it overrides the value set in the XPM layer).
use Table OFCENG to set a switch–wide, default tail delay value	use Table LTCPSINV to set a tail delay value ranging from 32 ms to 96 ms for a specific T1,	that T1 uses the tail delay value from Table LTCPSINV (it overrides the value set in the XPM layer and the switch–wide default you set in Table OFCENG).
use Table OFCENG to set a switch–wide, default tail delay value	use Table LTCPSINV to set a tail delay value of $ for a specific T1,	that T1 uses the switch–wide tail delay value from Table OFCENG (the $ means use the default that currently applies switch–wide, which you set in Table OFCENG).

—continued—

If you	and you	then
do not use Table OFCENG to set a switch–wide, default tail delay value	do use Table LTCPSINV to set a tail delay value of $ for a specific T1,	that T1 uses the switch–wide tail delay value set in the XPM (the $ means use the default that currently applies switch–wide, which is the XPM's default).
—end—		

Note: For information on how to datafill Tables OFCENG and LTCPSINV to set tail delay defaults, see Appendix B, "Table descriptions."

Required resources

This section lists the tools, hardware, software, and personnel you needed to perform the following:

- install a new NT6X50EC card
- replace an NT6X50AA or NT6X50AB card with the NT6X50EC card

Note: For instructions on how to install a new NT6X50EC card, see Chapter 3, "Installing a new NT6X50EC." For instructions on how to replace an existing card with the NT6X50EC card, see Chapter 4, "Upgrading to the NT6X50EC card."

Tools

Installing the NT6X50EC circuit pack requires one of the following tools:

- T9908 Electrostatic Wrist Grounding Strap (US tool)
- ITA9813 Electrostatic Wrist Grounding Strap (Canadian tool)

Hardware requirements

This section provides the hardware requirements for installing an NT6X50EC card and for replacing existing NT6X50AA or NT6X50AB cards with the NT6X50EC card. The card is installed or replaced according to the following:

- new card installation—one NT6X50EC card is required for every two T1 lines.
- card replacement—one NT6X50EC circuit pack is required for each existing NT6X50AA or NT6X50AB circuit pack.

Note: The NT6X50EC card must be release 16 or higher.

Packfills

Table 1-3 shows the shows the product engineering codes (PECs) and the card slots for digital trunk controller plus (DTC+) packfills.

Table 1-3
DTC+ packfills

DTC+ packfill PEC	Card slot
NT6X50AA/AB/EC	1–5
NTMX77AA	12
NTMX71AA	12R
NT6X70AA	13
NT6X44AB or AX78AA	14
NT6X92BB	15
NT6X62EA (most current) or NT6X62AB	16
NT6X69MA/AC	18
NT6X42AA	20
NT6X41AA	21
NT6X40CA/FA	22
NT6X40DA/GA	22R
NT2X70AF/AD/AE	25
—end—	

Frame type

The NT6X50EC card must be installed in an NT6X01AB or NT6X01AD frame.

Note: The NT6X01AA frame is not supported.

Power supply

The NT6X50EC circuit pack connects to 5 V, +/- 12 V, and -48 V power supplies. The majority of power is derived from the -48 V power supply.

Software requirements

The NT6X50EC circuit pack is not supported in software loads prior to BCS36 and XPM02.

UCS08

A special patch is required to support 96 ms tail delay option. Contact UCS DMS-250 Technical Assistance Service at 1-800-846-9507 for help on EC equipment and operation.

Personnel requirements

The procedures in this application guide can be performed by one person.

Restrictions and limitations

The following list of hardware and software restrictions and limitations apply to the NT6X50EC Integrated Echo Canceller (EC) card and the Echo Canceller Monitor (ECMON) command:

- NT6X50EC circuit pack is not supported in software loads prior to BCS36 and XPM02.
- NT6X50EC card must be installed in either an NT6X01AB or NT6X01AD frame.

  Note: Do not install NT6X50EC the card into a type NT6X01AA frame.

- ECMON command can be used to query only one trunk member per carrier at a time.
- Network echo canceller performance cannot be guaranteed unless the transmission levels and maximum tail circuit lengths are within the parameters specified in the section “Network considerations” in this chapter.
- See the section “Software Requirements” in this chapter for information on tail delay software requirements.
- For accurate ERL and ERLE readings, use the ECMON READ command 30 seconds after the call is established. However, for determination of 2100 Hz tone detection, the ECMON READ command may be used immediately.

Technical support

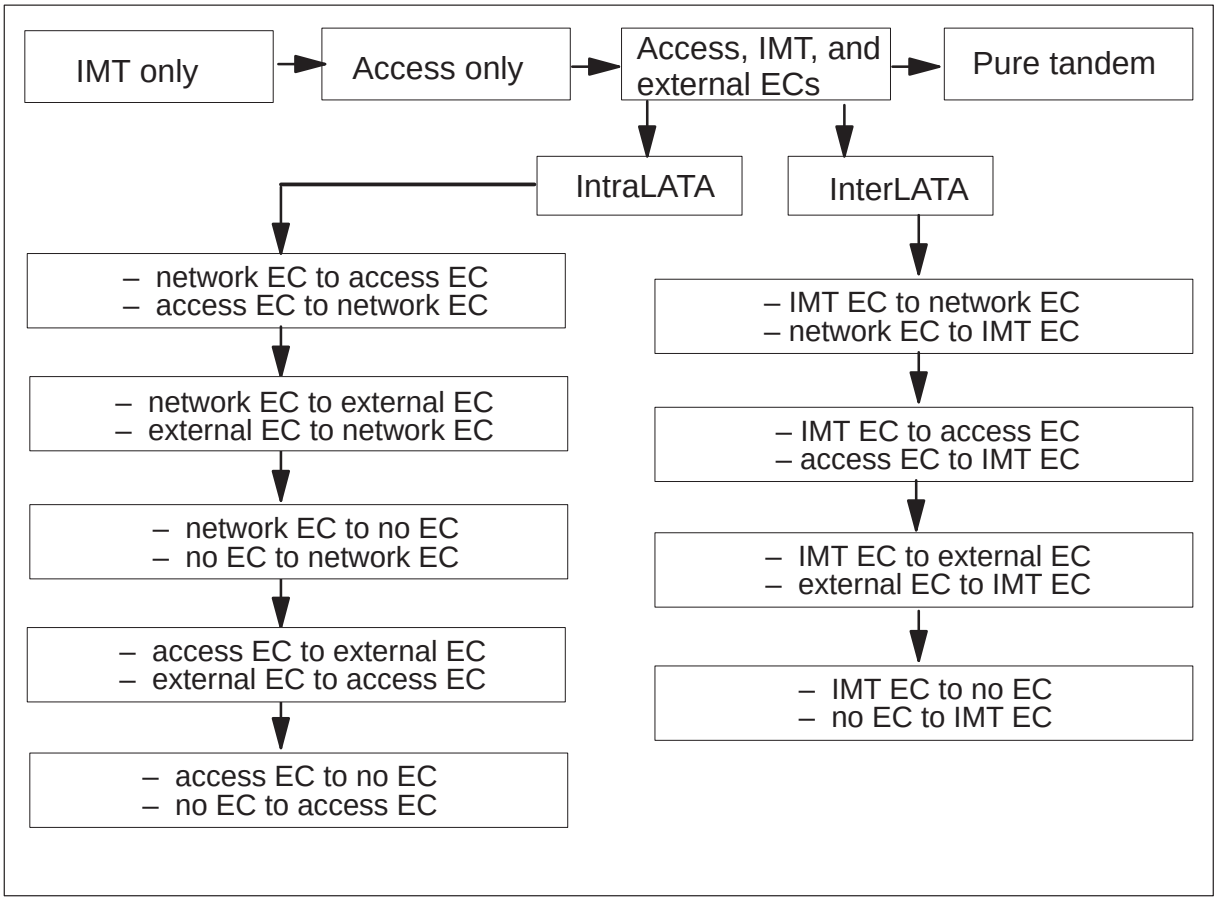
Contact UCS DMS-250 Technical Assistance Service at 1-800-846-9507 for help on EC equipment and operation.

Echo canceller configuration

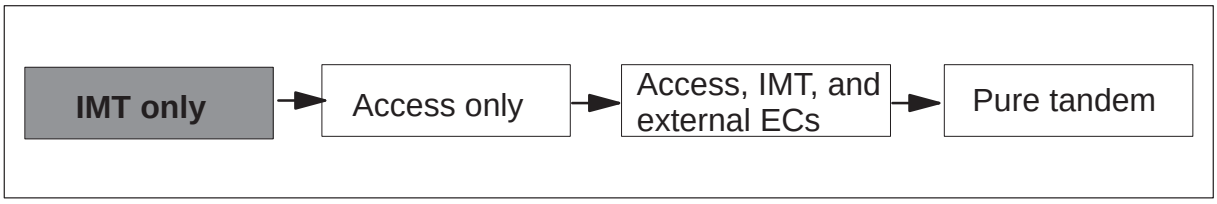
This chapter is organized into four main sections according to the four ways you can configure echo cancellers (EC) on your network:

- IMT only
- Access only
- Access, IMT, and external ECs
- Pure tandem

The following map shows the organization of this chapter:



A similar map appears at the beginning of each main section and sub–section to show where you are within this chapter. The only main section containing sub–sections is “Access, IMT, and external ECs.” It’s sub–sections are “IntraLATA” and “InterLATA.” These sub-sections contain their own sub-sections. The maps illustrate this hierarchy.

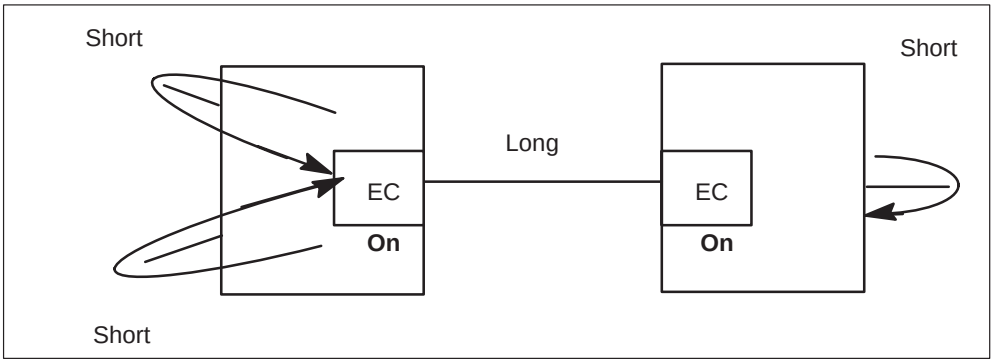


IMT only

Figure 2-1 shows ECs deployed only on IMTs. Since IMTs are likely to be the longest distance connections in a carrier's network, they are more likely to have a delay long enough to cause perceptible echo. Deploying ECs on the IMTs ensures that calls over long distance have EC coverage. Because a network has fewer IMTs than access trunks, this configuration minimizes the number of ECs required.

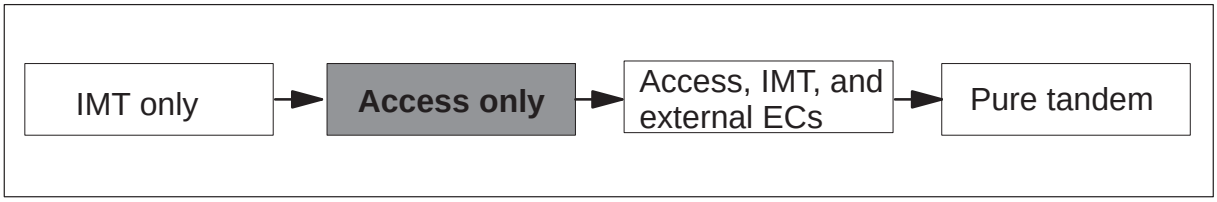
Note: IMT-only configurations should be used if all access network connections are low in delay. In this example, ECs are not required for intraLATA calls.

Figure 2-1
IMT only configuration



Mode setting

ECs must be set to the network mode in an IMT-only configuration.

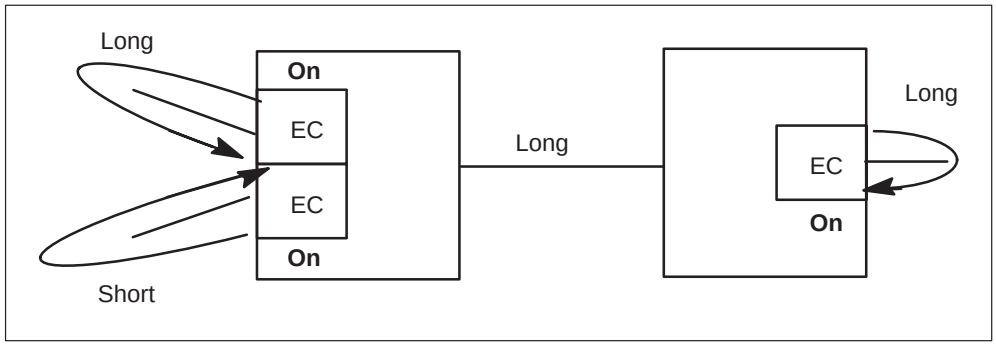


Access only

Figure 2-2 shows ECs deployed on access trunks only. Since long access network delays require ECs for both interLATA and intraLATA calls, this configuration allows EC coverage of both intraLATA calls and interLATA calls.

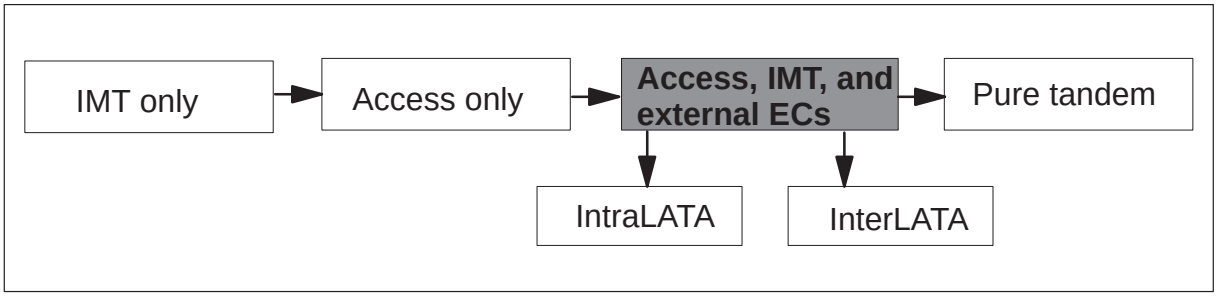
Note: This configuration should be used any time there are long delays in the access network.

Figure 2-2
Access only configuration



Mode setting

ECs must be set for access mode in an access-only configuration.

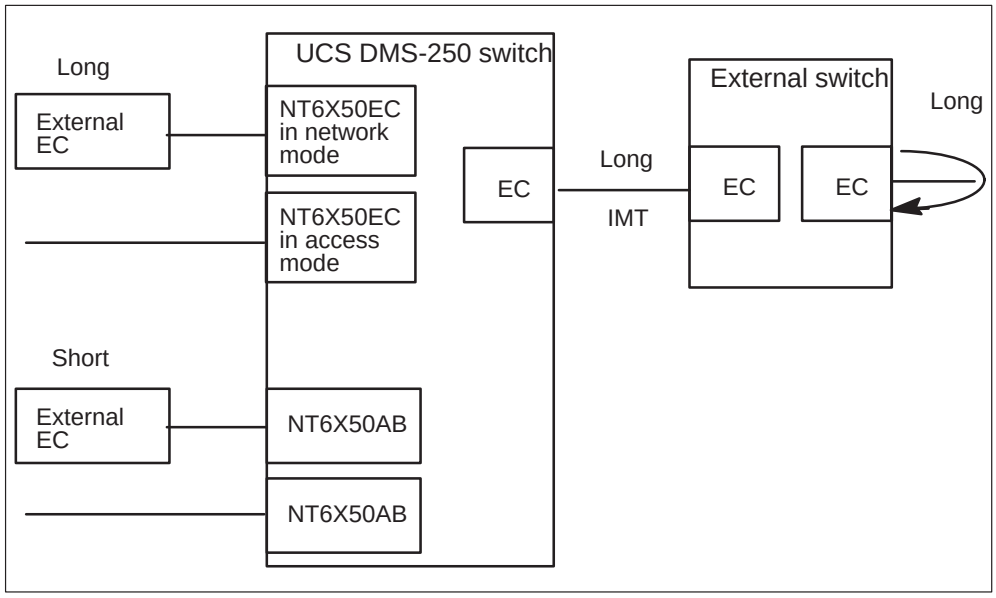


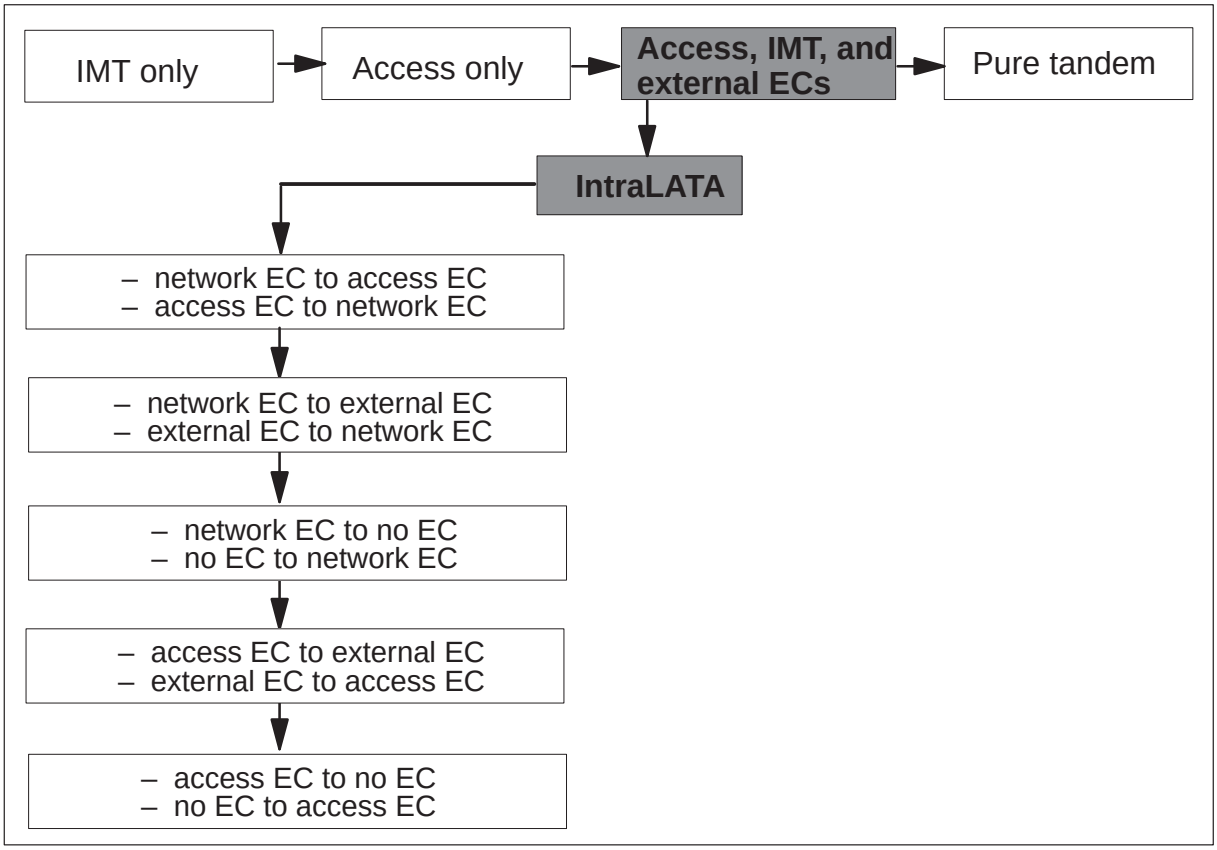
Access, IMT, and external ECs

Figure 2-3 shows the IMT provisioned with an EC in a network configuration. The long access loops are configured with an external EC and an NT6X50EC card. The remaining access loops may be provisioned with one of the following:

- an NT6X50EC card in the access mode
- an external EC
- no EC

Figure 2-3
Access, IMT, and external cancellers configuration



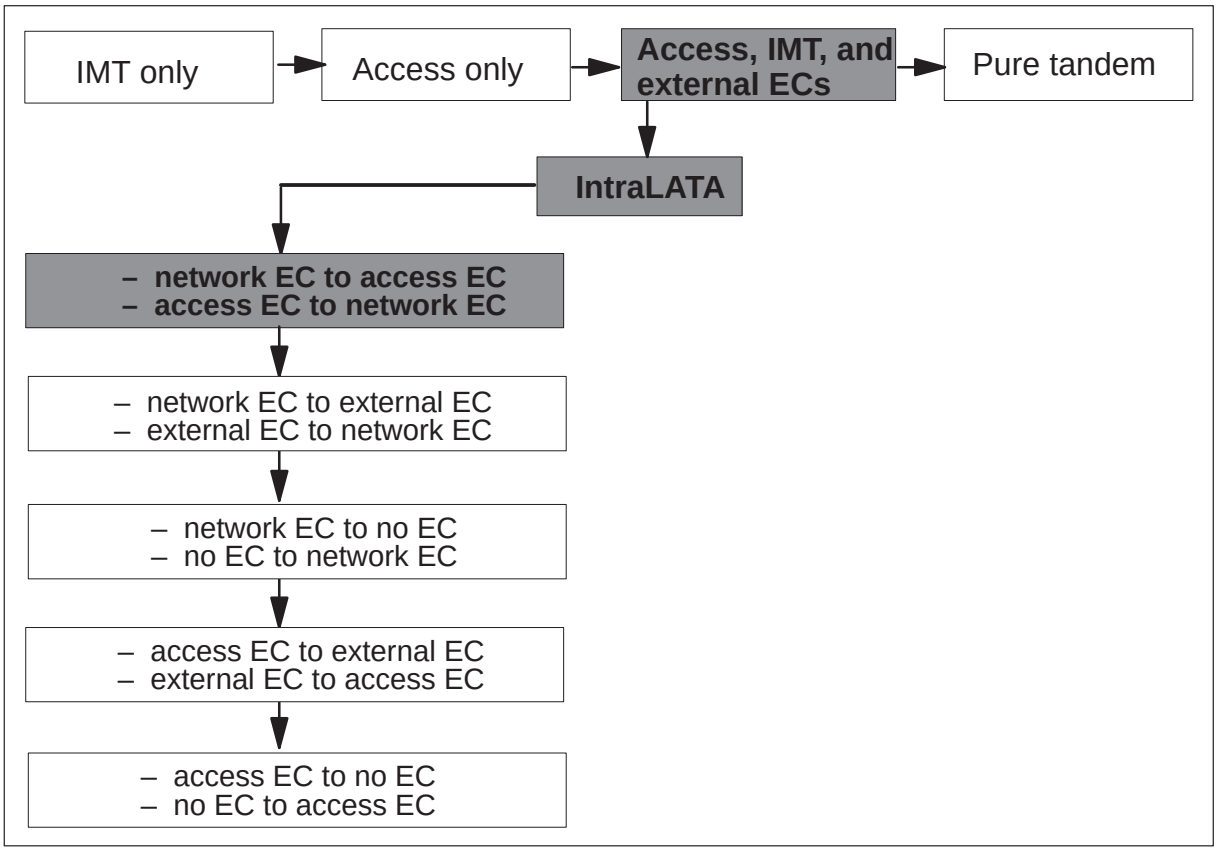


IntraLATA calls

Ten EC configurations exist for intraLATA calls. The following sections describe these configurations:

- "Network mode EC to access mode EC & access mode EC to network mode EC"
- "Network mode EC to external EC & external EC to network mode EC"
- "Network mode EC to no EC & no EC to network mode EC"
- "Access mode EC to external EC & external EC to access mode EC"
- "Access mode EC to no EC & no EC to access mode EC"

Figures 2-4 through 2-11 show echo cancellation provided in both directions. Figures 2-12 and 2-13 shows echo cancellation provided in only one direction.



Network mode EC to access mode EC & access mode EC to network mode EC

Figure 2-4 shows the “Network mode EC to access mode EC” configuration and Figure 2-5 shows the “Access mode EC to network mode EC” configuration.

Figure 2-4 shows the “Network mode EC to access mode EC” configuration. In this configuration, the following occurs:

- The network mode EC is OFF and the external EC is cancelling one side.
- The access mode EC is ON.

Note: The configuration shown in Figure 2-4 is unlikely because the short access loop does not need an EC. If ECs are deployed on all access loops, then there is no need to have the network mode EC on the long access loop.

Figure 2-4
Network mode EC to access mode EC

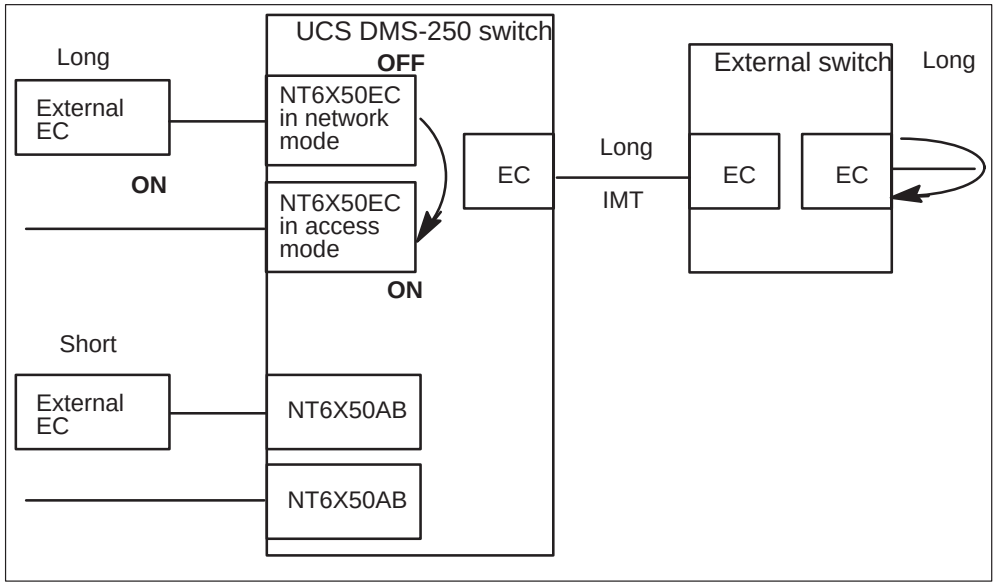
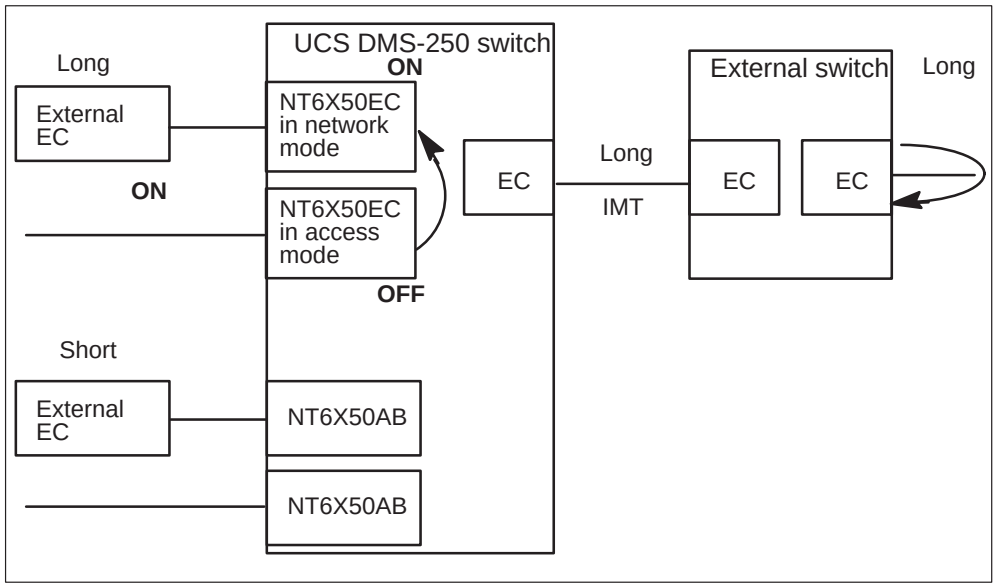


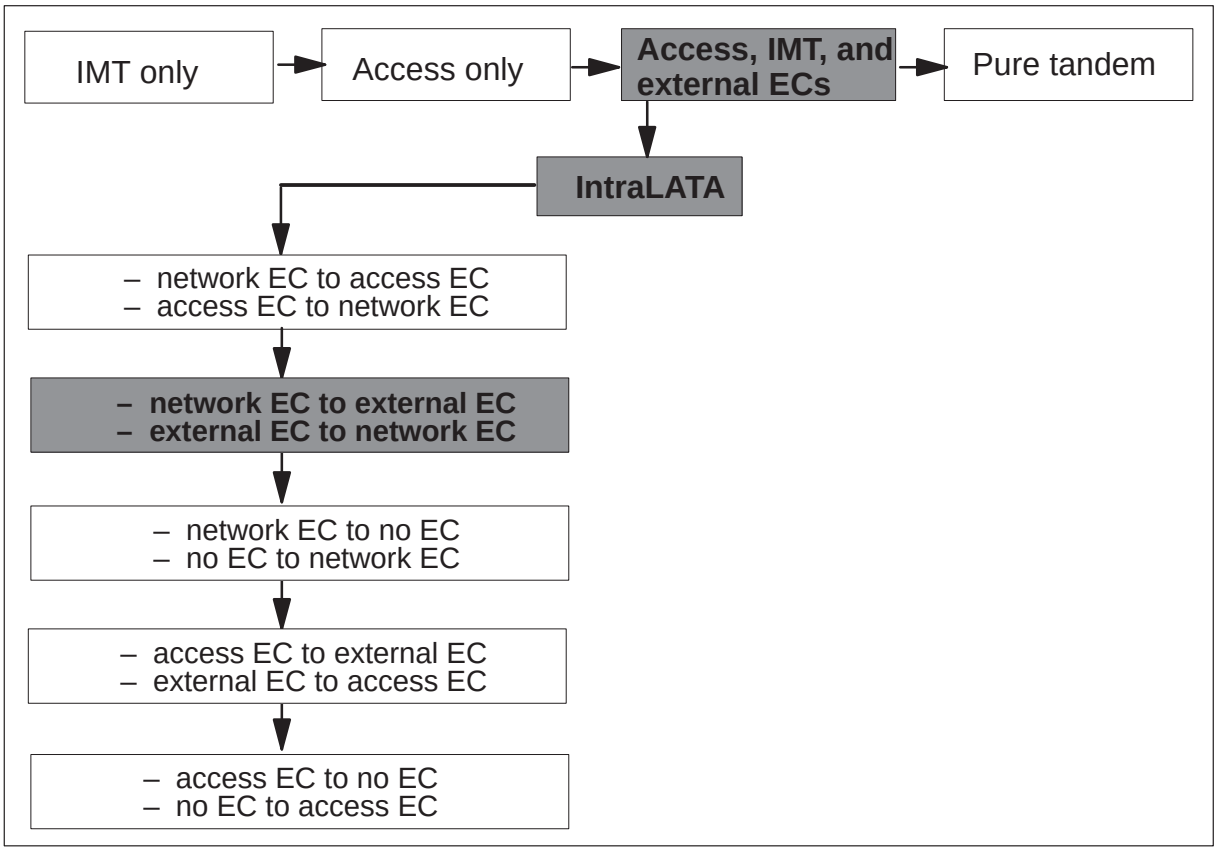
Figure 2-5 shows the “Access mode EC to network mode EC” configuration. In this configuration, the following occurs:

- The external EC is cancelling echo in one direction.
- The network mode EC is ON and is cancelling echo in the other direction.
- The access mode EC is OFF.

Note: The configuration shown in Figure 2-5 is unlikely because the short access loop does not need an EC. If ECs are deployed on all access loops, then there is no need to have the network mode EC on the long access loop.

Figure 2-5
Access mode EC to network mode EC





Network mode EC to external EC & external EC to network mode EC

Figure 2-6 shows the “Network mode EC to external EC” configuration and Figure 2-7 shows the “External EC to network mode EC” configuration.

Figure 2-6 shows “Network mode EC to external EC” configuration. In this configuration, the following occurs:

- The external EC on the long loop is cancelling one direction.
- The network mode EC is ON; both the NT6X50EC and the short loop external EC are facing the same circuit.

Note: The configuration shown in Figure 2-6 is unlikely because the short access loop does not need an EC. If ECs are deployed on all access loops, then there is no need to located the network mode canceller on the long access loop.

Figure 2-6
Network mode EC to external EC

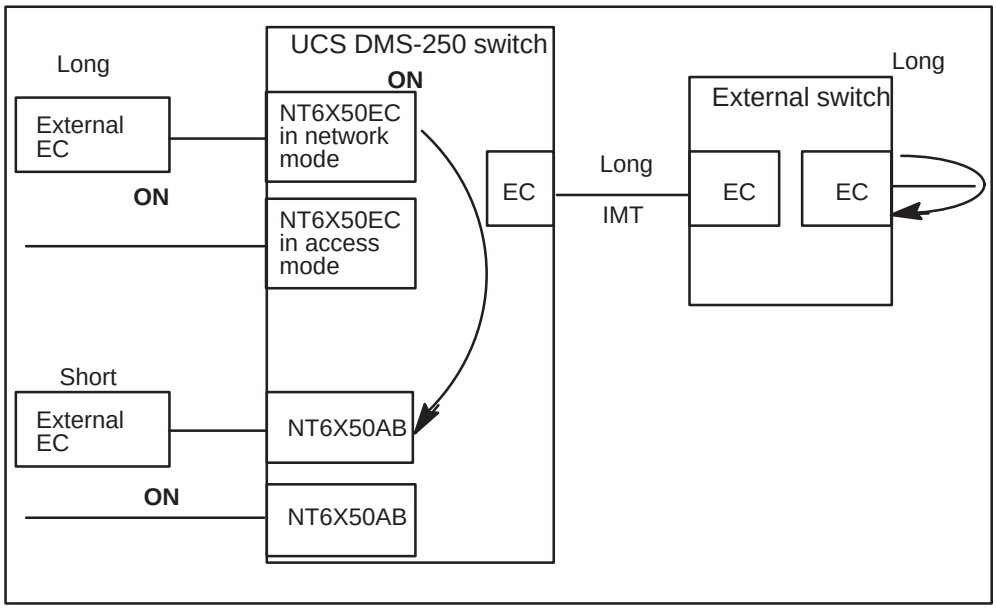
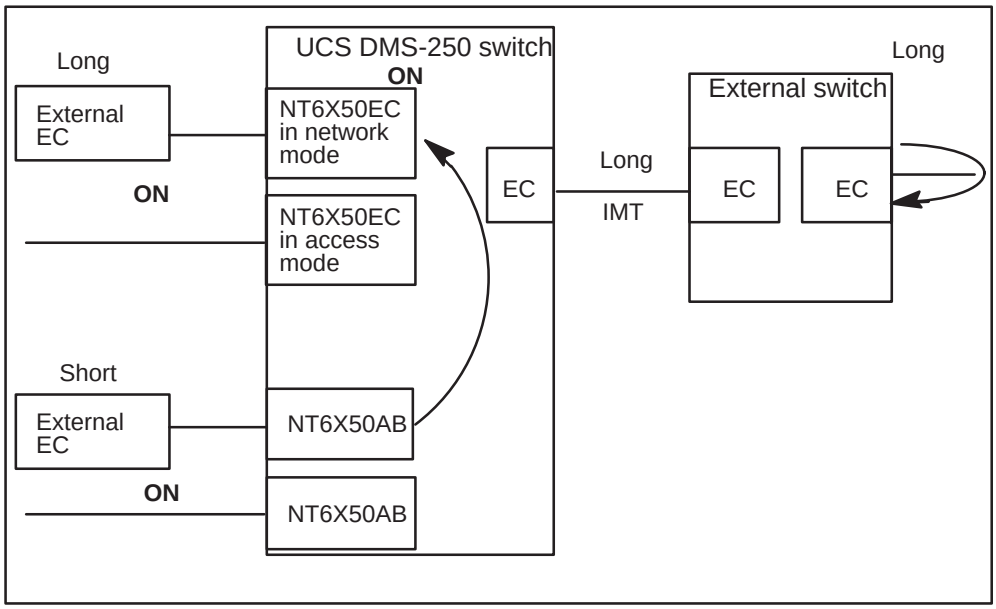


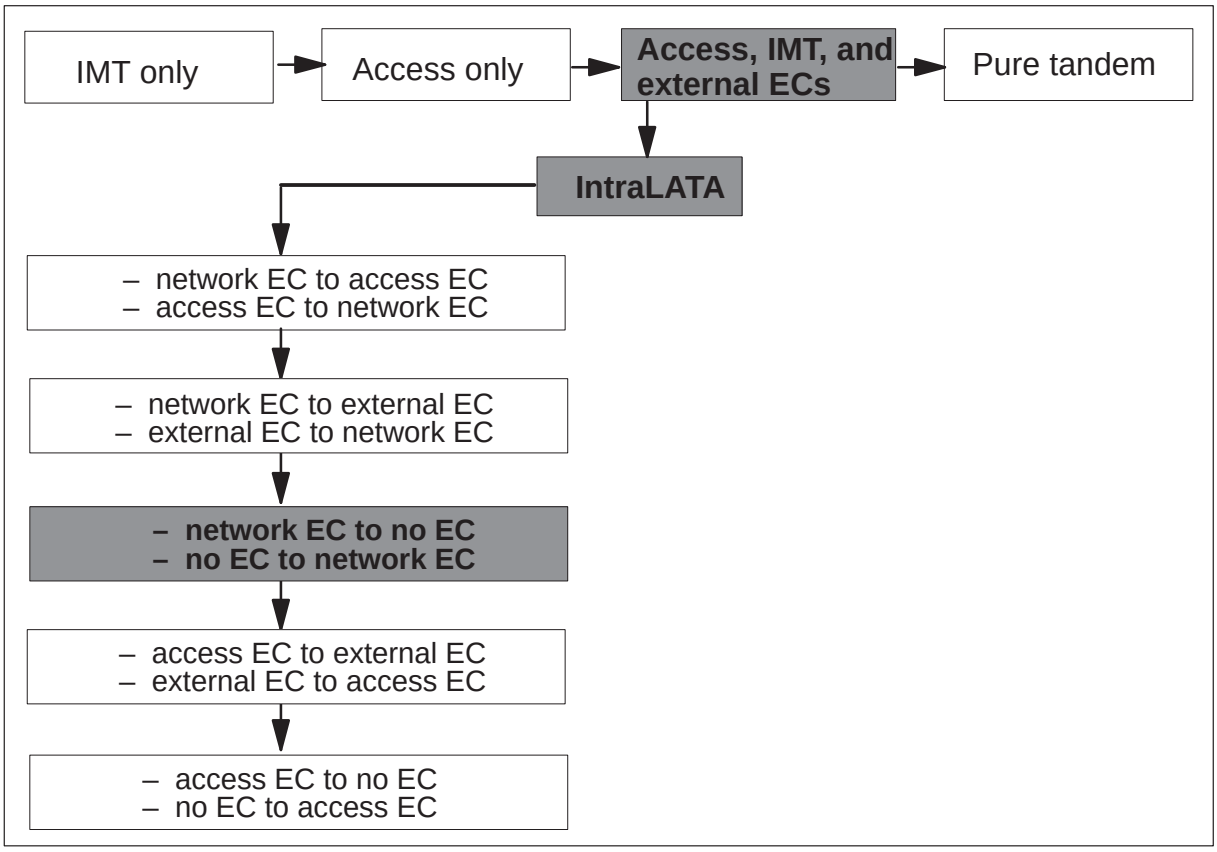
Figure 2-7 shows the “External EC to network mode EC” configuration. In this configuration, the following occurs:

- The external EC on the long loop is cancelling one direction.
- The network mode EC is ON; both the NT6X50EC and the short loop EC are facing the same circuit.

Note: The configuration shown in Figure 2-7 is unlikely because the short access loop does not need an EC. If ECs are deployed on all access loops, then there is no need to located the network mode canceller on the long access loop.

Figure 2-7
External EC to network mode EC





Network mode EC to no EC & no EC to network mode EC

Figure 2-8 shows the “Network mode EC to no EC” configuration and Figure 2-9 shows the “No EC to network mode EC” configuration.

Figure 2-8 shows the “Network mode EC to no EC” configuration. In this configuration, the following occurs:

- The network mode EC is ON and is cancelling the echo in one direction.
- The external EC is cancelling the echo in the other direction.

Figure 2-8
Network mode EC to no EC

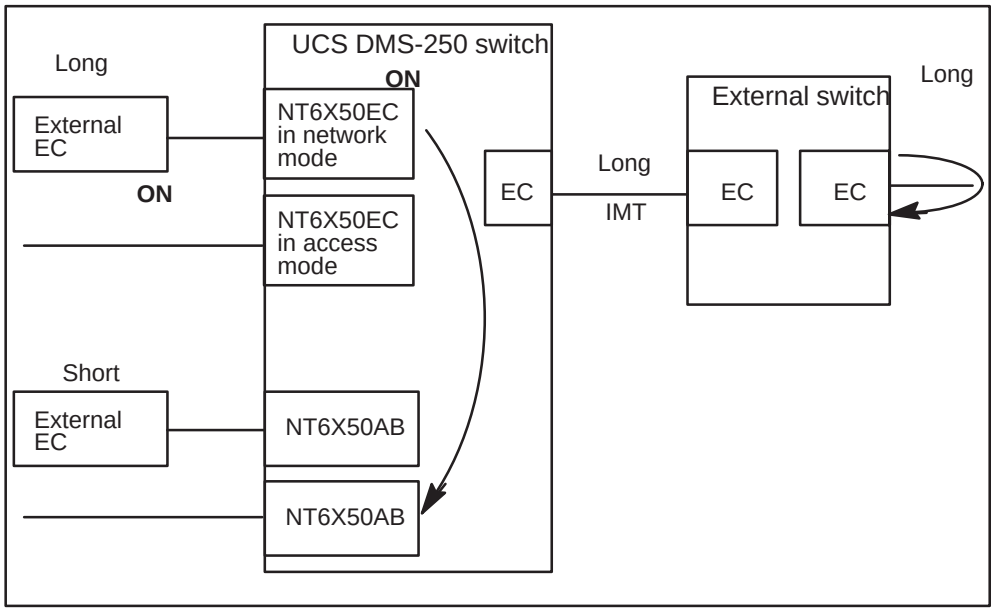
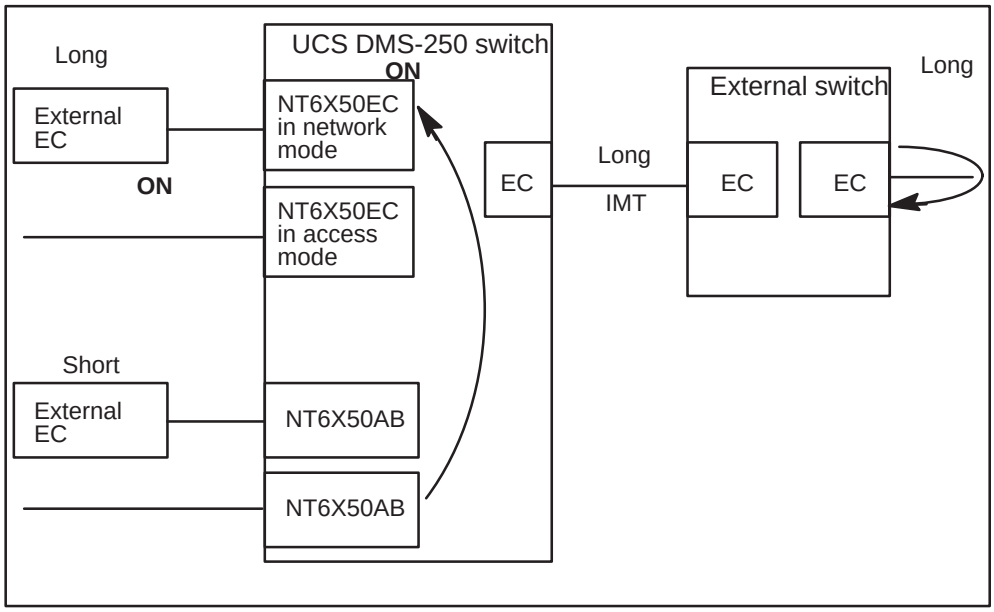
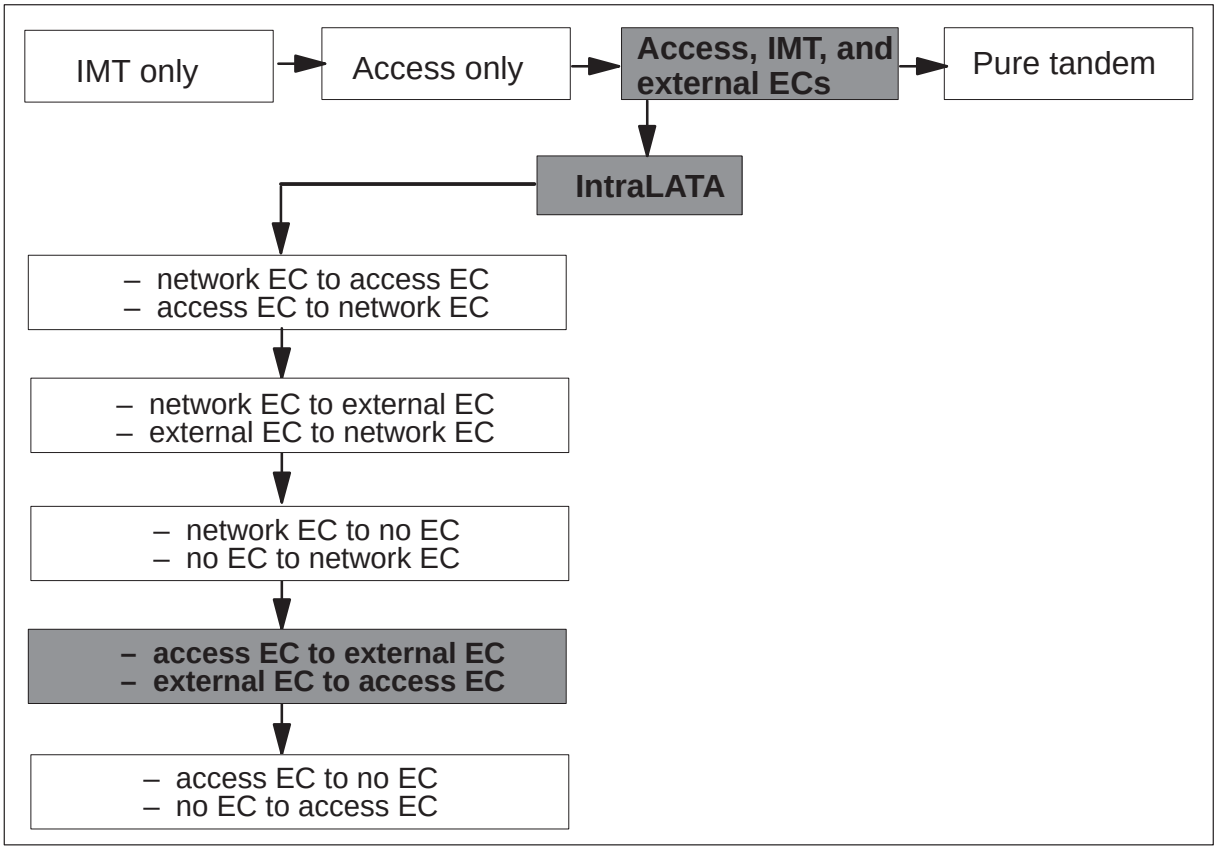


Figure 2-9 shows the “No EC to network mode EC” configuration. In this configuration, the following occurs:

- The network mode EC is ON and is cancelling the echo in one direction.
- The external EC is cancelling the echo in the other direction.

Figure 2-9
No EC to network mode EC





Access mode EC to external EC & external EC to access mode EC

Figure 2-10 shows the “Access mode EC to external EC” configuration and Figure 2-11 shows the “External EC to access mode EC” configuration.

Figure 2-10 shows the “Access mode EC to external EC” configuration. In this configuration, the following occurs:

- The external EC is cancelling the echo in one direction.
- The access mode EC is ON and is cancelling the echo in the other direction.

Figure 2-10
Access mode EC to external EC

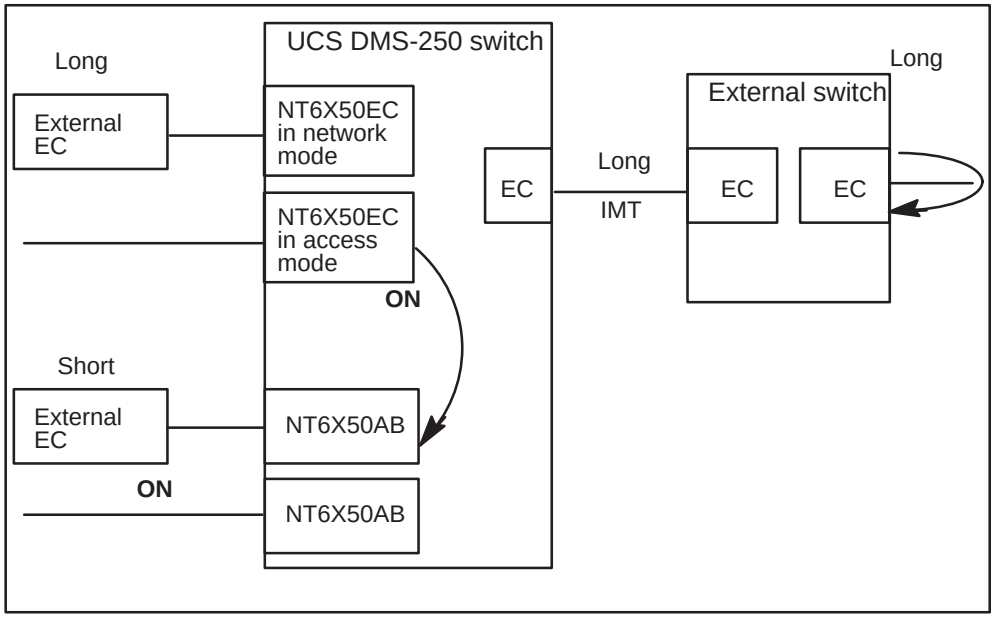
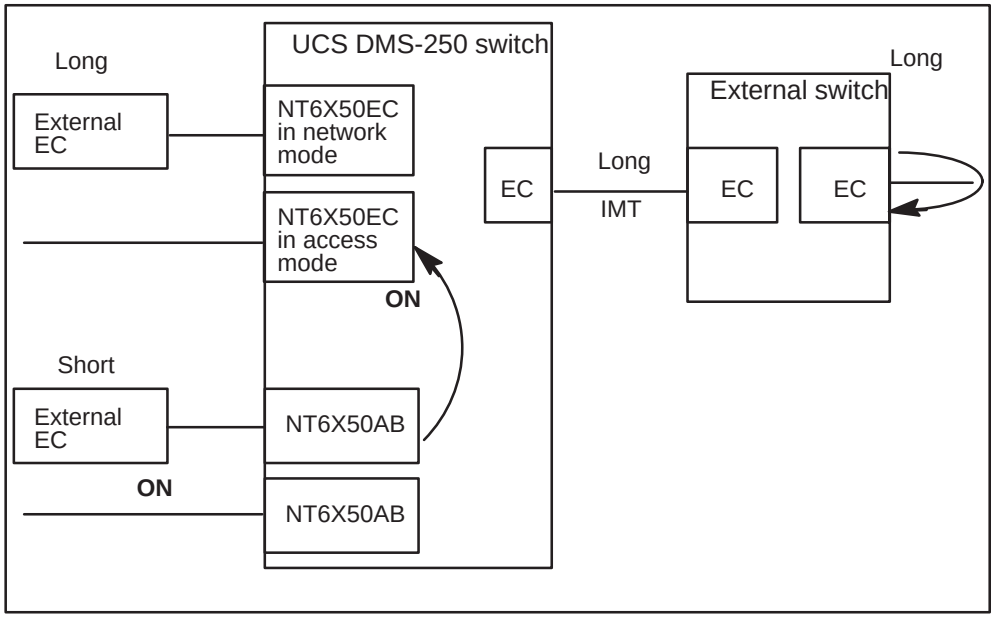
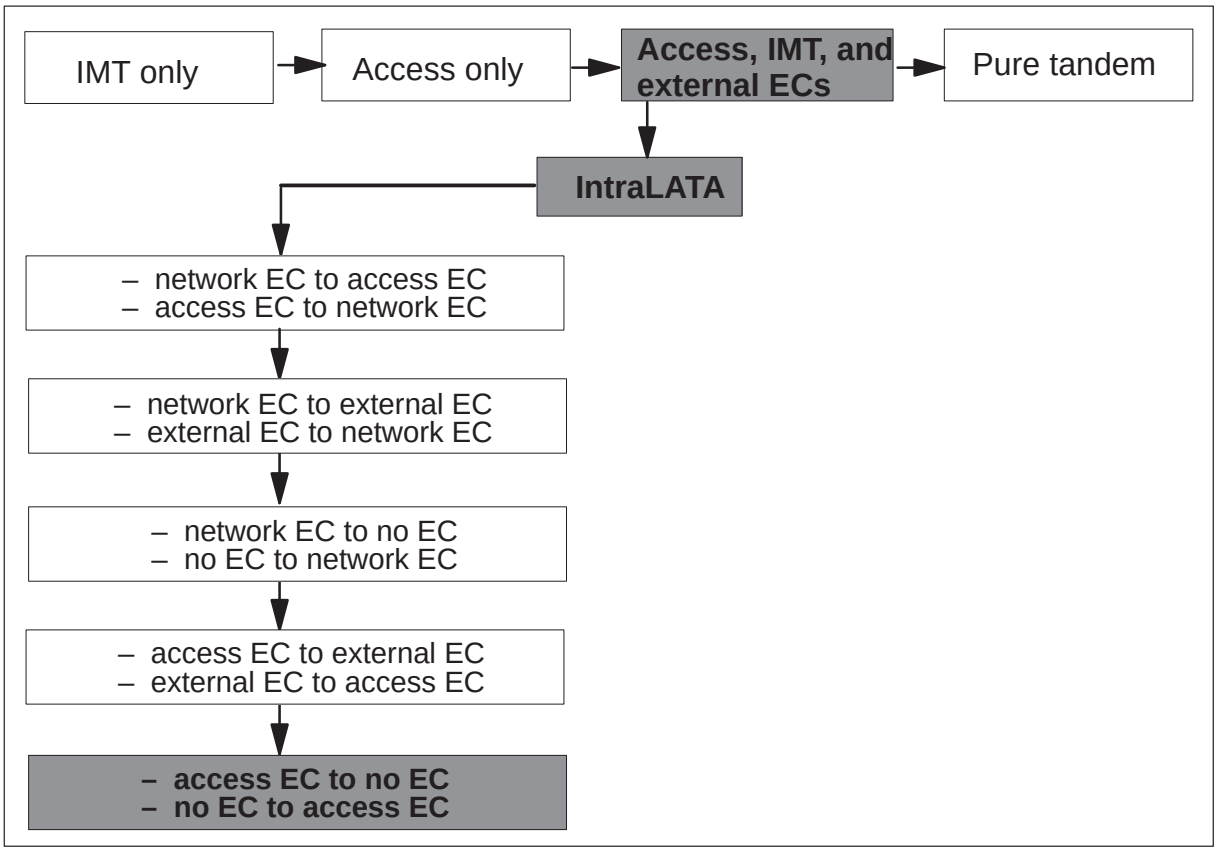


Figure 2-11 shows the “External EC to access mode EC” configuration. In this configuration, the following occurs:

- The external EC is cancelling the echo in one direction.
- The access mode EC is ON and is cancelling the echo in the other direction.

Figure 2-11
External EC to network mode EC





Access mode EC to no EC & no EC to access mode EC

Figure 2-12 shows the “Access mode EC to no EC configuration” and Figure 2-13 shows the “No EC to access mode EC” configuration.

Figure 2-12 shows the “Access mode EC to no EC” configuration. In this configuration, the following occurs:

- The access mode EC is ON and is cancelling the echo in one direction.

Note: If both access loops are short in the “Access mode EC to no canceller” configuration, the echo is not noticeable and ECs are not required.

Figure 2-12
Access mode EC to no EC

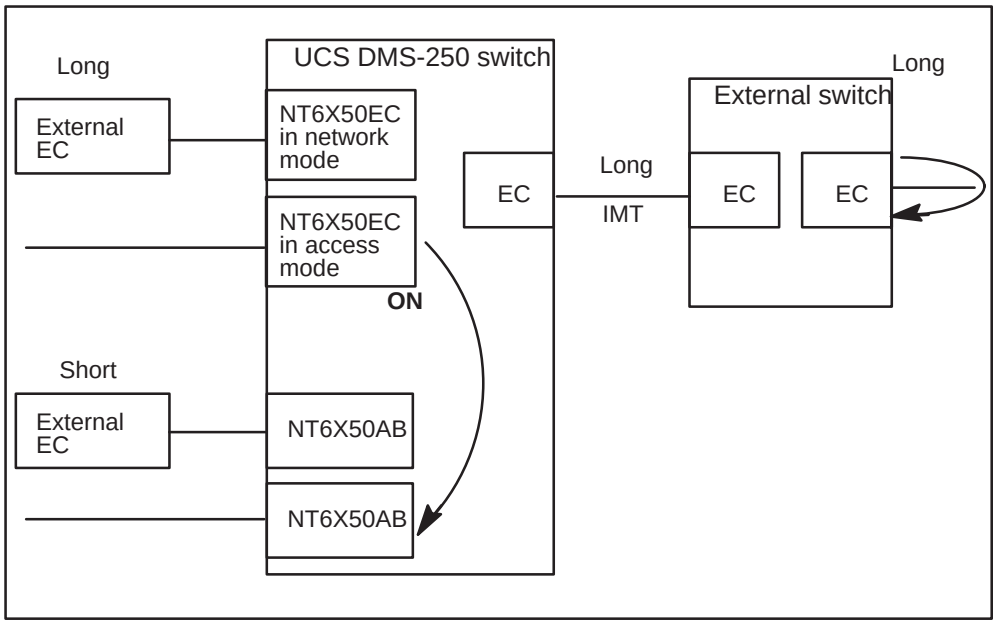
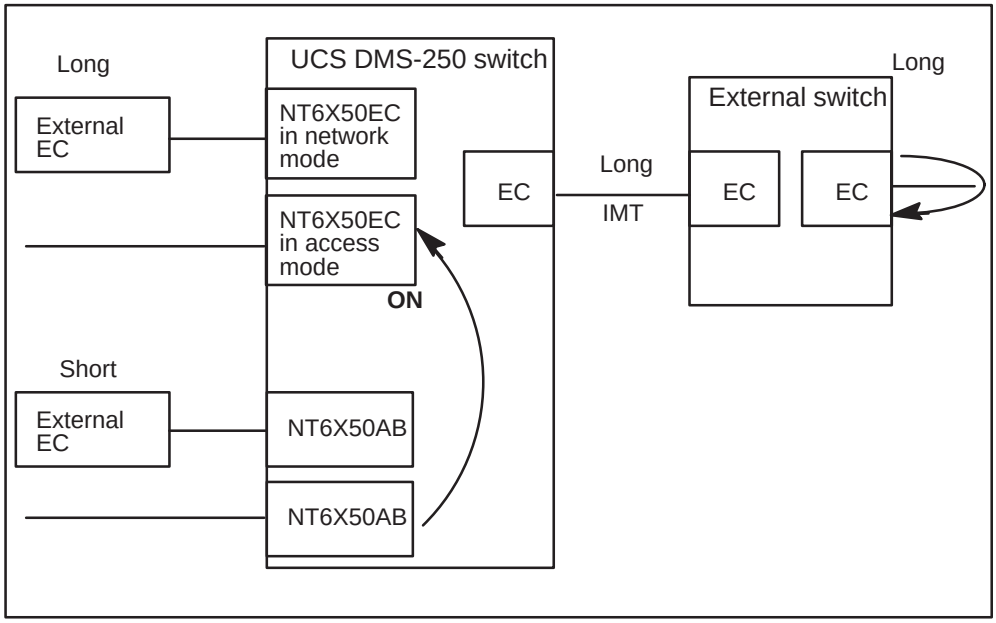
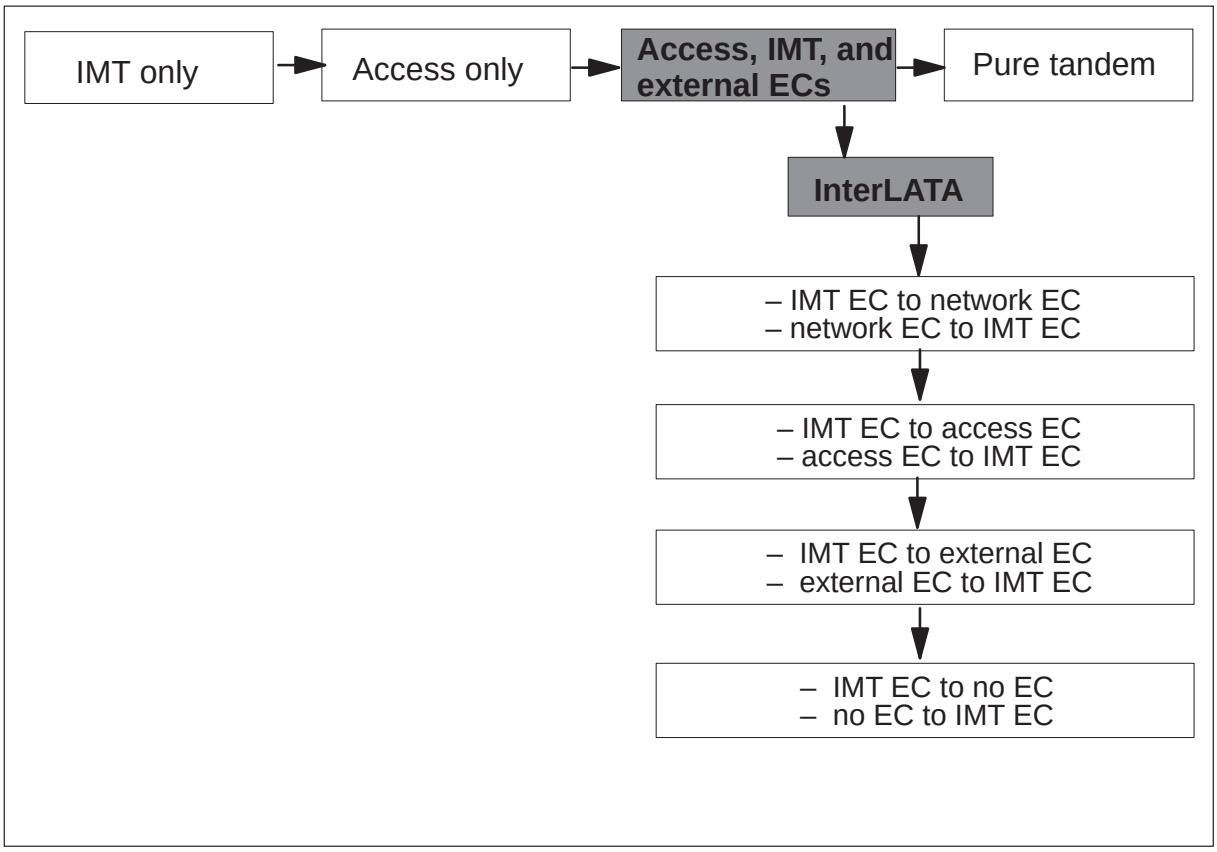


Figure 2-13 shows the “No EC to access mode EC” configuration. In this configuration, the following occurs:

- The access mode EC is ON and is cancelling the echo in one direction.

Figure 2-13
No EC to access mode EC

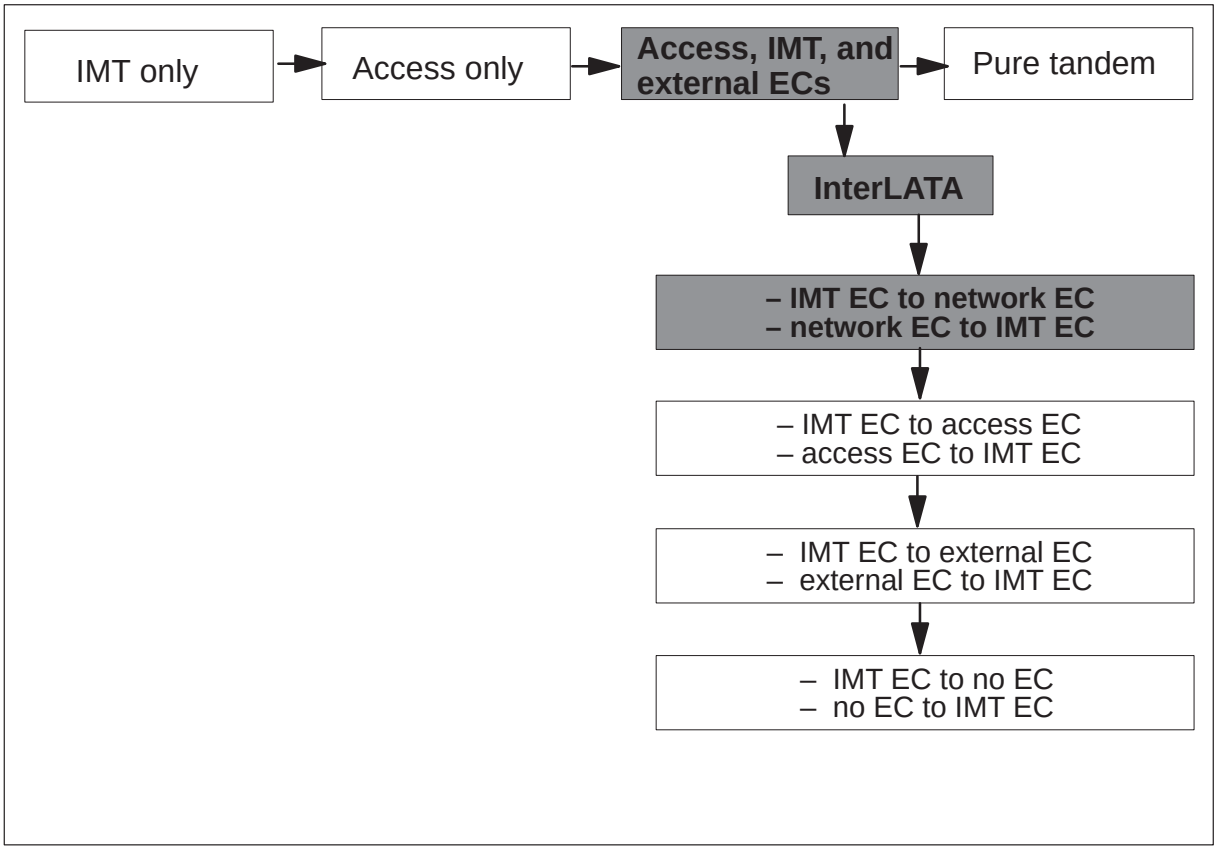




InterLATA calls

When the NT6X50EC on the IMT is in the network mode, eight configurations exist for interLATA calls. The following sections describe these configurations:

- "IMT EC to network mode EC & network mode EC to IMT EC"
- "IMT EC to access mode EC & access mode EC to IMT EC"
- "IMT EC to external EC & external EC to IMT EC"
- "IMT EC to no EC & no EC to IMT EC"



IMT EC to network mode EC & network mode EC to IMT EC

Figure 2-14 shows the “IMT EC to network mode EC” configuration and Figure 2-15 shows the “Network mode EC to IMT EC” configuration.

Figure 2-14 shows the “IMT EC to network mode EC” configuration. In this configuration, the following occurs:

- The network mode EC is ON and, in this scenario, the EC is turned on redundantly because the echo is cancelled by the external switch.
- The IMT EC is OFF and the external EC is cancelling the echo at this end.

Figure 2-14
IMT EC to network mode EC

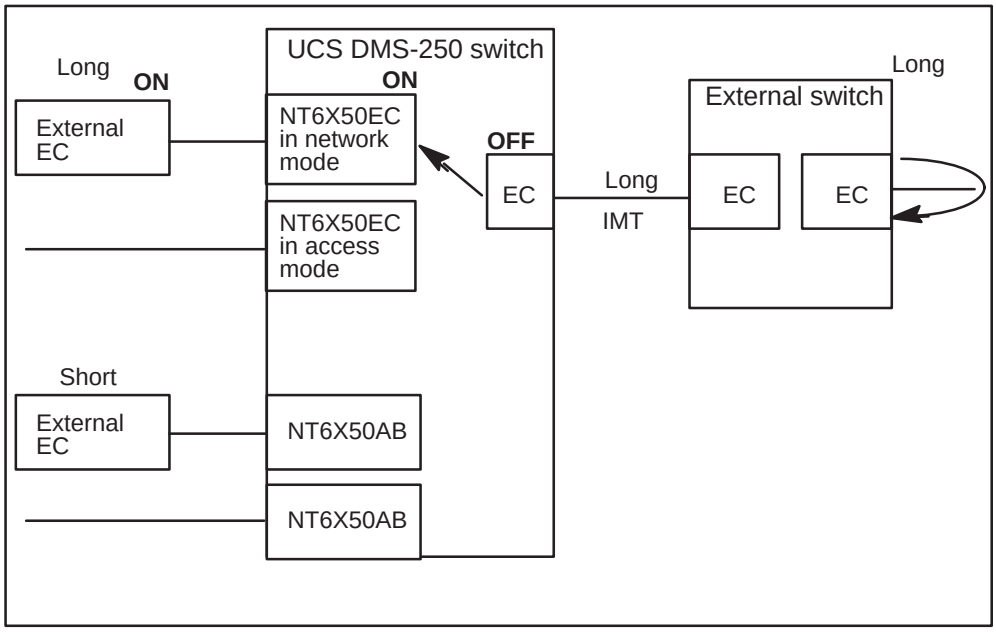
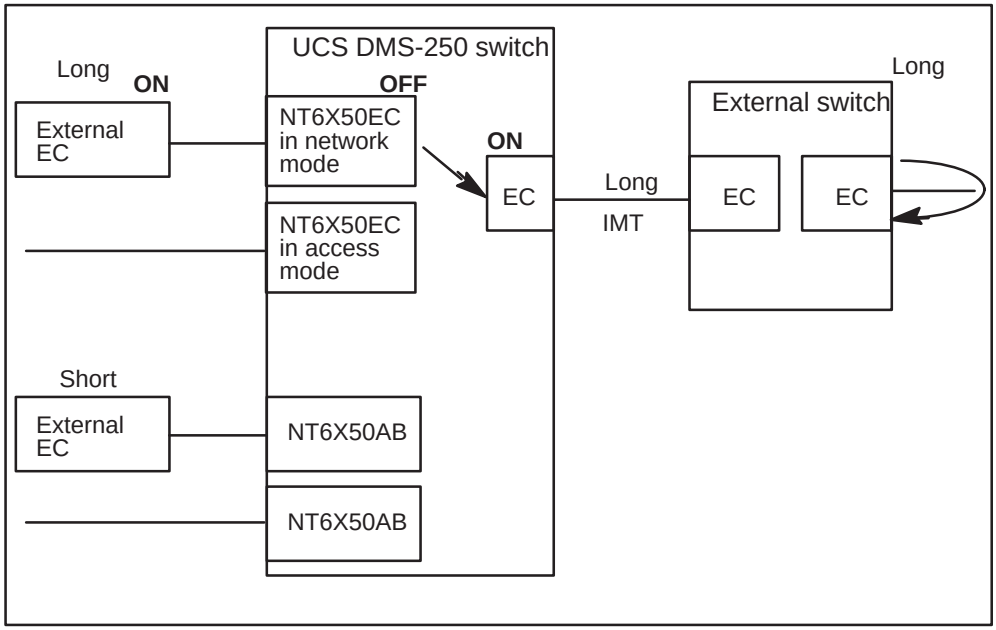
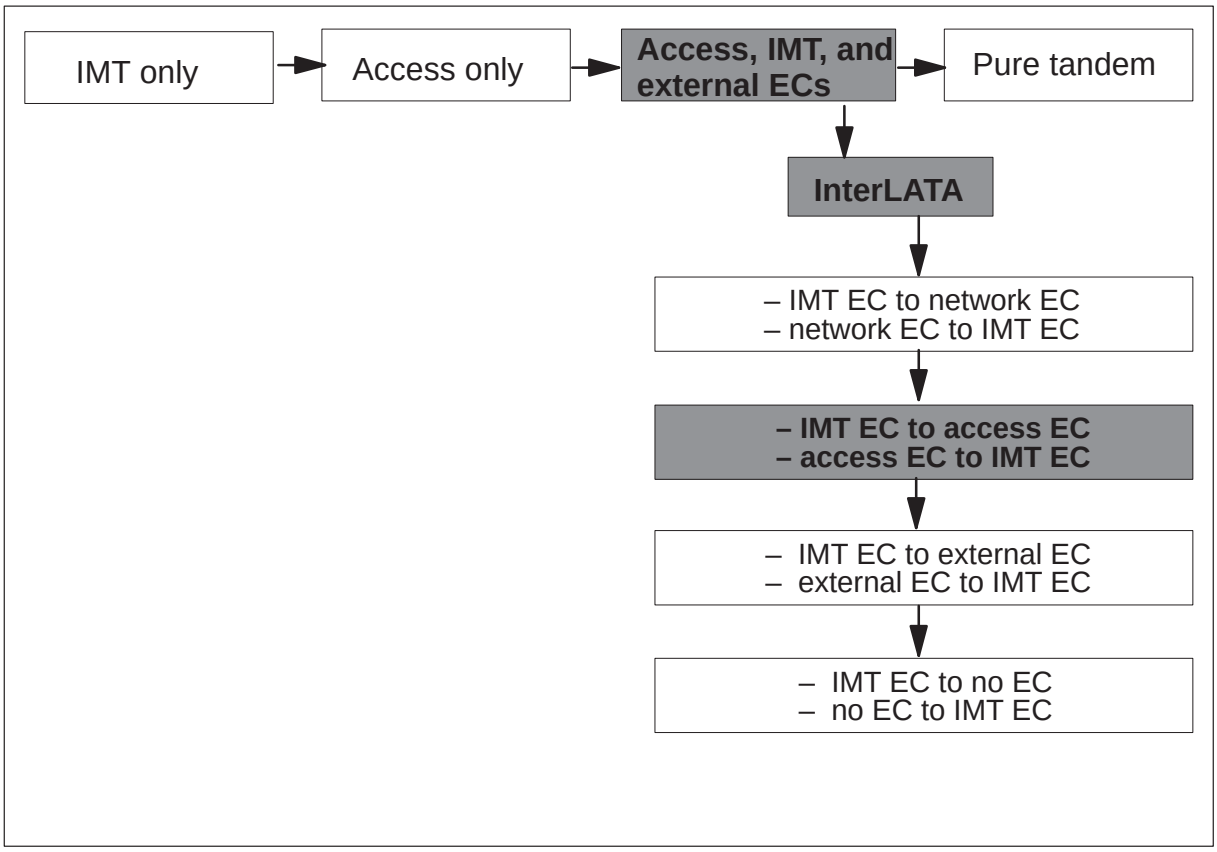


Figure 2-15 shows the “Network mode EC to IMT EC” configuration. In this configuration, the following occurs:

- The network mode EC is OFF.
- The IMT EC is ON and, in this scenario, the EC is turned on redundantly because the echo is cancelled by the external EC.

Figure 2-15
Network mode EC to IMT EC





IMT EC to access mode EC & access mode EC to IMT EC

Figure 2-16 shows the “IMT EC to access mode EC” configuration and Figure 2-17 shows the “Access mode EC to IMT EC” configuration.

Figure 2-16 shows the “IMT EC to access mode EC” configuration. In this configuration, the following occurs:

- The access mode EC is ON.
- The IMT EC is OFF.

Figure 2-16
IMT EC to access mode EC

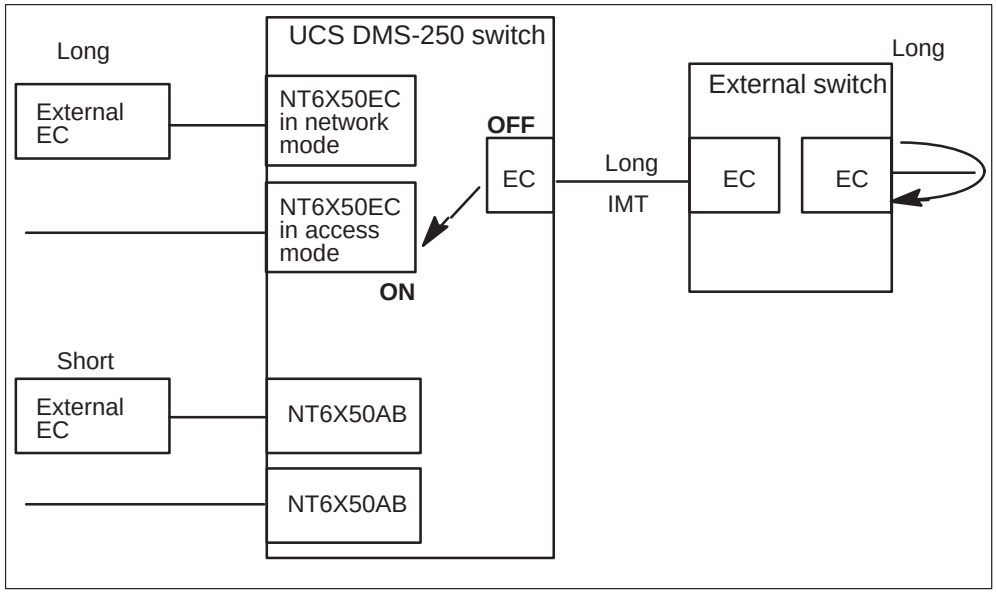
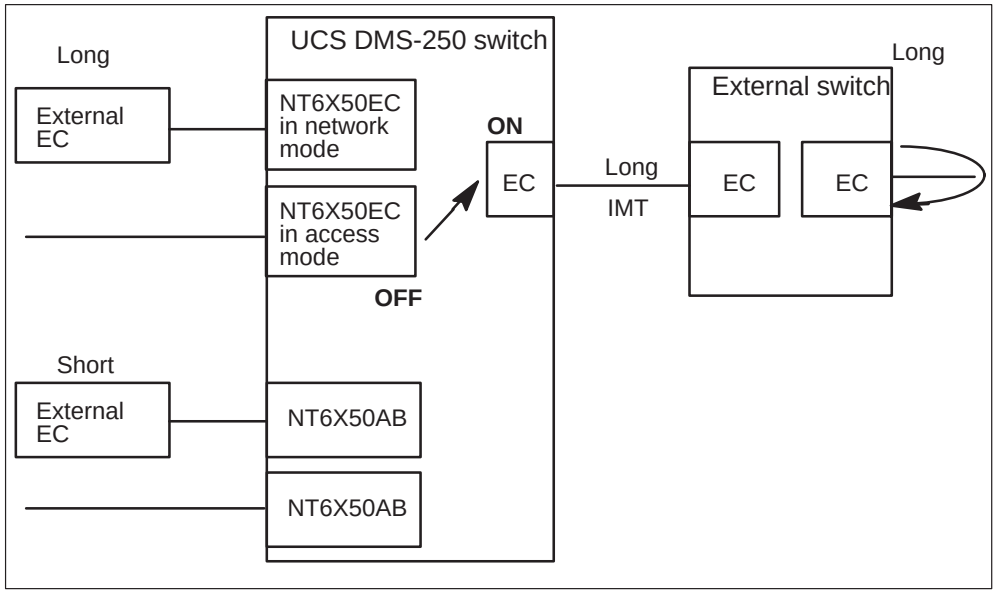
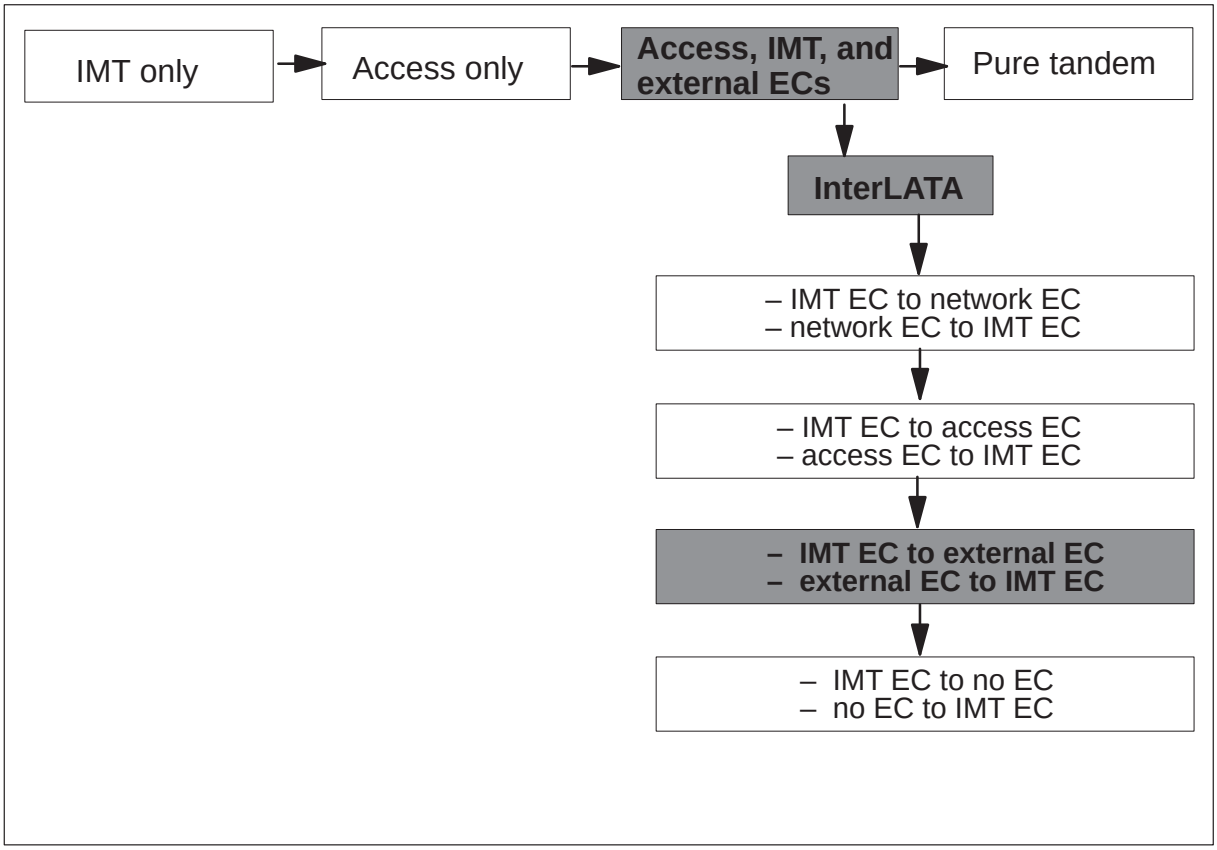


Figure 2-17 shows the “Access mode EC to IMT EC” configuration. In this configuration, the following occurs:

- The access mode EC is OFF.
- The IMT EC is ON.

Figure 2-17
Access mode EC to IMT EC





IMT EC to external EC & external EC to IMT EC

Figure 2-18 shows the “IMT EC to external EC” configuration and Figure 2-19 shows the “External EC to IMT EC” configuration.

Figure 2-18 shows the “IMT EC to external EC” configuration. In this configuration, the following occurs:

- The IMT EC is ON.
- Both the IMT EC and the external EC are cancelling the echo in the same direction.

Note: The configuration shown in Figure 2-18 is unlikely because the short access loop does not need an EC. If ECs are deployed on all access loops, then there is no need to located the network mode canceller on the long access loop.

Figure 2-18
IMT EC to external EC

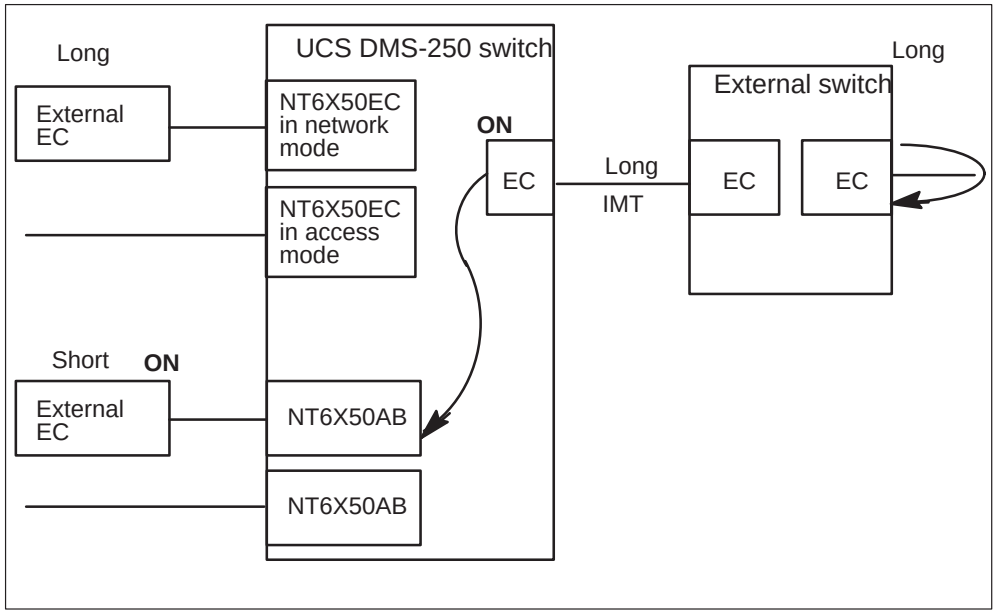
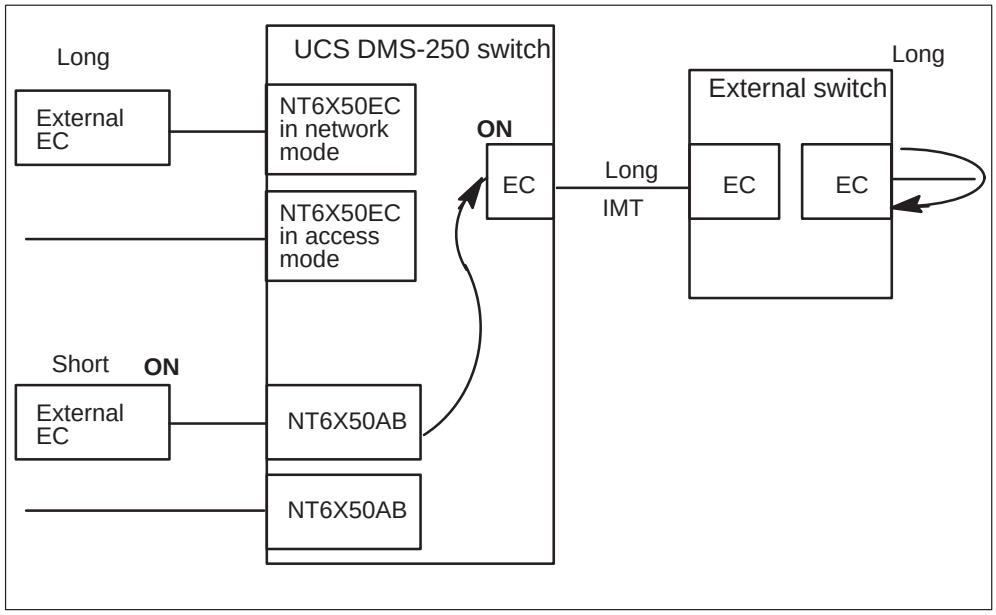


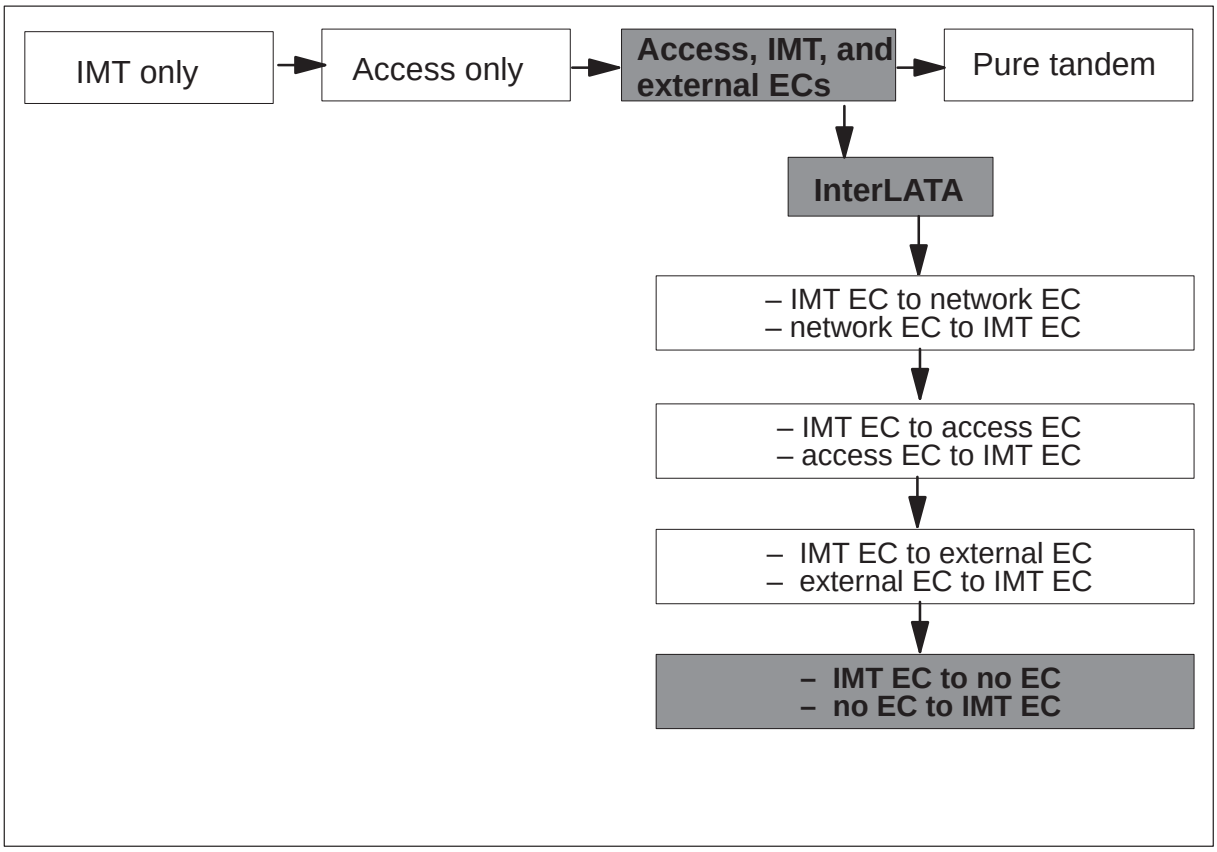
Figure 2-19 shows the “External EC to IMT EC” configuration. In this configuration, the following occurs:

- The IMT EC is ON.
- Both the IMT EC and the external EC are cancelling the echo in the same direction.

Note: The configuration shown in Figure 2-19 is unlikely because the short access loop does not need an EC. If ECs are deployed on all access loops, then there is no need to located the network mode canceller on the long access loop.

Figure 2-19
External EC to IMT EC





IMT EC to no EC & no EC to IMT EC

Figure 2-20 shows the “IMT EC to no EC” configuration and Figure 2-21 shows the “No EC to IMT EC” configuration.

Figure 2-20 shows the “IMT EC to no canceller” configuration. In this configuration, the following occurs:

- The IMT EC is ON.

Figure 2-20
IMT EC to no EC

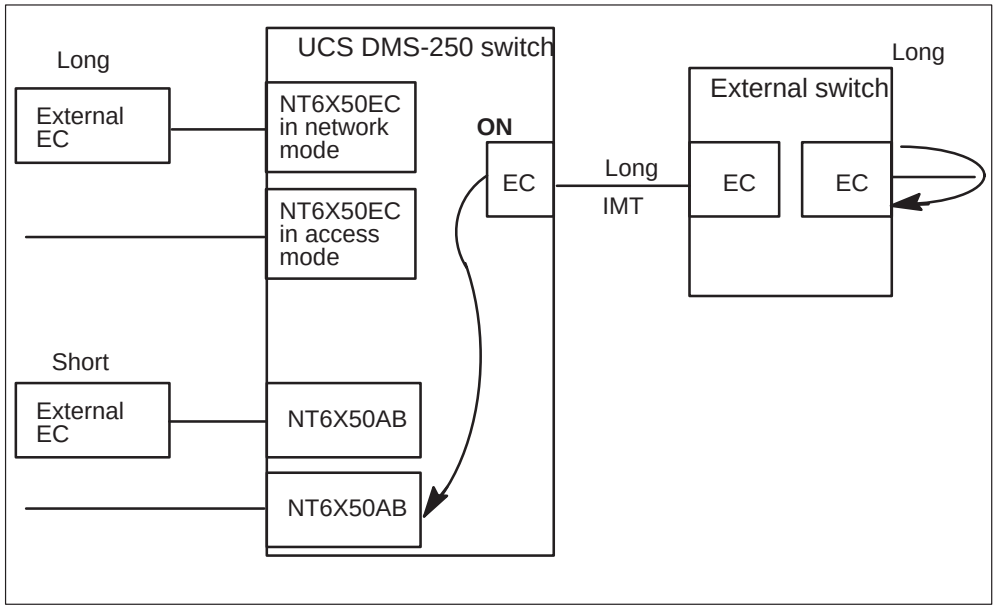
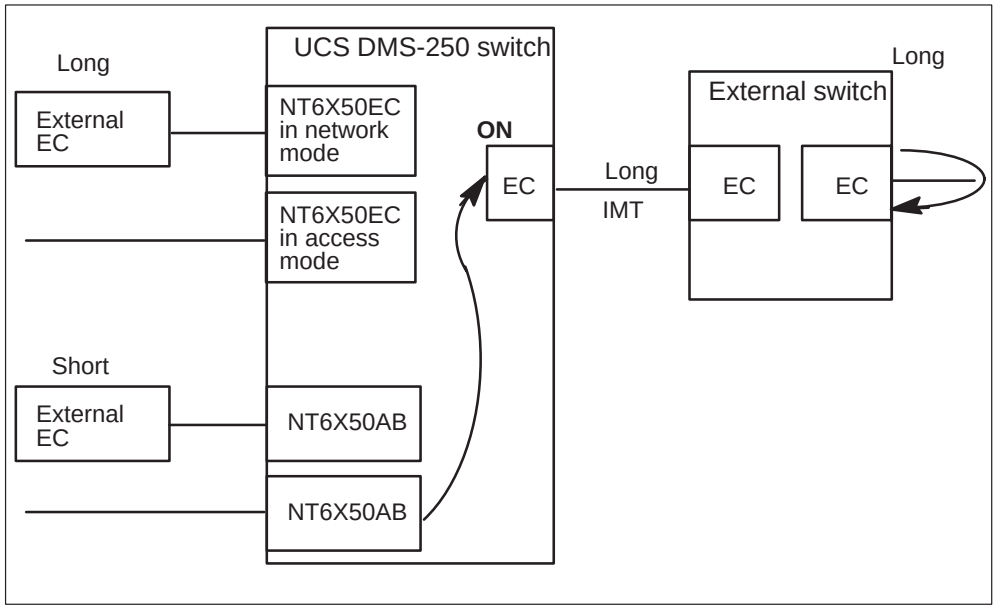
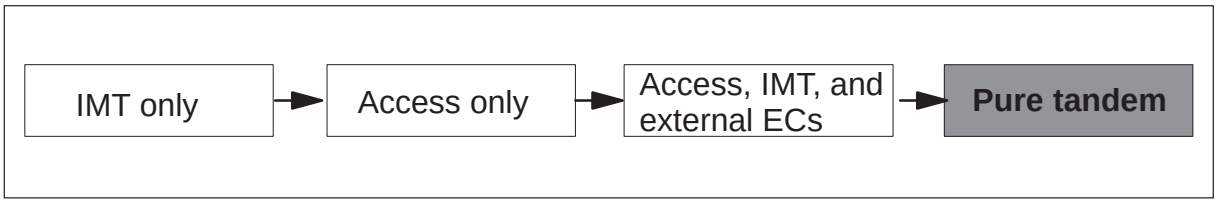


Figure 2-21 shows the “No EC to IMT EC” configuration. In this configuration, the following occurs:

- The IMT EC is ON.

Figure 2-21
No EC to IMT EC

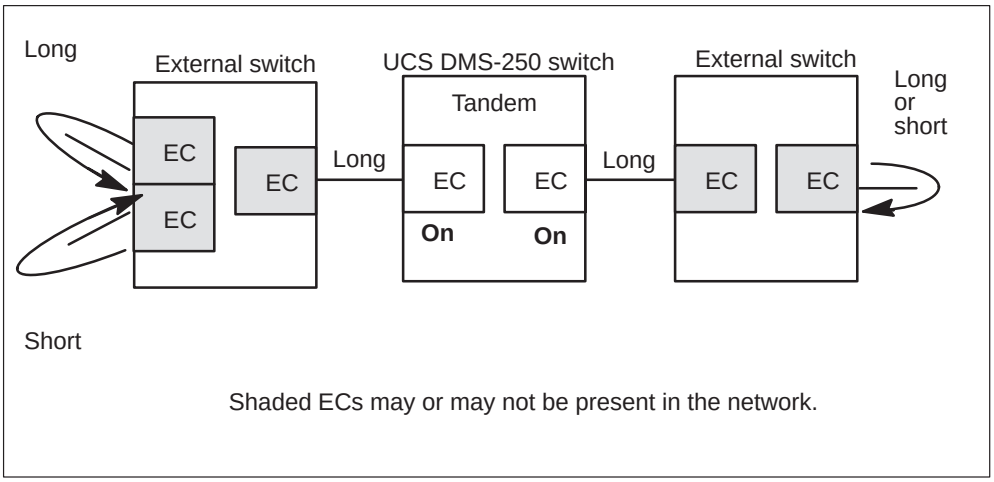




Pure Tandem

A pure tandem switch is located in the middle of a large network. How it configures the ECs depends on the EC configuration in the rest of the network. Figure 2-22 shows the ECs in the tandem switch set to ON because there is uncertainty about how the ECs in the rest of the network are deployed.

Figure 2-22
Pure tandem switch configuration



Tandem IMT calls are those where both the originator and terminator are SS7 IMTs. The table OFCVAR IMT_TANDEM_EC_ENABLE parameter controls whether tandem IMT calls enable the ECs. On a tandem IMT call, if the value in the parameter is N, the ECs are not activated. If the value is Y, the ECs are activated.

Note: The default value of the office parameter is N.

Mode setting

The EC mode setting in table OFCVAR and table TRKSGRP datafill determine the EC mode setting based on the following conditions:

- other ECs in the path—set the ECs in the tandem switch to OFF
- no other ECs in the path—set the ECs in the tandem switch to access mode and ON.
- EC provisioning in the rest of the network unknown—set the ECs in the tandem switch to the access mode and ON.

Installation

This chapter describes how to install the NT6X50EC Integrated Echo Canceller (EC) card. This chapter also provides the following information that relates to installation:

- precautions, preparations, and special application warnings
- preliminary steps to begin the upgrade procedure
- procedure for installing an NT6X50EC card within a digital trunk controller (DTC) that supports either per-trunk signaling (PTS) or common channel signaling #7 (CCS7).

Note: The NT6X50EC is also supported on a DTCI.

Refer to Chapter 1, “Introduction,” for the following information relating to installation:

- network considerations
- tool requirements
- hardware requirements
- software requirements
- limitations and restrictions
- technical support

Before you begin

This section lists precautions, preparations, and special applications warnings that apply to the procedure described in this chapter.

Precautions

This section lists the precautions to take before you begin installing the NT6X50EC card.

1 All activities detailed in the “Before you begin” section of this chapter must be understood and completed before installing the NT6X50EC card. Adhere to all precautions and preparations during installation.

2 Both the customer and the appropriate technical assistance group must authorize any deviation from the preparations, precautions, or procedure.

3 References to “field technician” include any qualified personnel authorized to perform the procedure. Personnel performing the procedure must know login procedures, general I/O protocol, how to use documentation, general system architecture, and how to manually output messages.

4 Apply the safe stop points in this procedure as needed.

5 The datafill shown in this chapter for table CARRMTC is intended only as an example. Exact datafill requirements are the customer’s responsibility. If the module type to be worked on does not have an entry in table CARRMTC for the NT6X50EC, then the field technician must get the datafill parameters from site personnel.

6 If, before or during the procedure, the customer or field technician finds an existing problem that may be detrimental to service, the field technician must stop all activity until the problem is resolved. The field technician must notify the appropriate technical assistance group and report the problem. Follow customer trouble reporting/escalation procedures. After the problem is resolved, the field technician must receive authorization from the customer and the appropriate technical assistance group before continuing.

7 Continuation of the procedure is to be controlled by the customer representative assigned the authority and responsibility to abort or back out of the procedure.

Preparations

This section lists preparation steps to take before installing the NT6X50EC card.

1 Verify that the material associated with the Change Management (88K) order is available by comparing the material received with the material required in the 88K order. The material received must be compared with the site requirements by performing a site audit of the affected equipment. The site audit includes verification of quantities and release levels, including applicable spares.

2 Verify that the equipment is not currently at the status, vintage, or condition that this procedure is intended to accomplish before starting the procedure. If the change has been implemented already, contact the Change Application Coordinator.

3 Ensure that all scheduled routine exercise tests (REXTST) are disabled or rescheduled for the duration of any work activity. Ensure the AUTOPATCH, AUTOIMAGE, ATT, ALT, LCDREX, and NETFAB/ICTS are cancelled for the duration of any work activity. The customer is responsible for rescheduling and cancelling these applications.

Procedures

Overview

Use this procedure to install an NT6X50EC card in DTC equipment that supports PTS and/or CCS7 signaling.

Preliminary preparations

Perform Procedure 3-1, ”Completing preliminary preparations” before performing Procedure 4-3, “Upgrading to NT6X50EC in DTC equipment”.

Procedure 3-1
Completing preliminary preparations

Step	Action and response
1	Record all work associated with the upgrade on a printer to provide a detailed account of the steps you take in case the Technical Assistance Service (TAS) group becomes involved. Obtain the printer device name from the customer. **>QUIT ALL** **>RECORD START ONTO <device name>** **>(CR)** **>(CR)** *After two carriage returns, a log message prints out on the specified device.*

ATTENTION
Make certain that any LOGUTIL-related changes you make are recorded. All log- and class-related routing is returned to its original configuration when these procedures are complete.

2	Ensure that LOGUTIL is currently running to a printer device. All log classes and log reports should be routing to this device. Verify with the customer that these requirements have been met. **>LOGUTIL** `Logutil:` **>LISTREPS SPECIAL CCS** **>LISTREPS SPECIAL PM** **>LISTREPS SPECIAL TRK**

—continued—

Procedure 3-1
Completing preliminary preparations (continued)

Step	Action and response
3	Check these logs to see if any are marked “SUPP.” Logs marked SUPP have been suppressed and must be resumed prior to beginning the procedure. **>RESUME CCS** **>RESUME PM** **>RESUME TRK**
4	Ensure that classes 0 through 31 are updated to the printer device to be used. **>LISTROUTE DEVICE <printer name>** If any log classes have been deleted, use the ADDCLASS logutil command to restore them. **>ADDCLASS <printer name> <class number>** If there are any logs specific to the MC6M equipment, use the ADDREP logutil command to restore them. **>ADDREP <printer name> CCS** **>ADDREP <printer name> PM** **>ADDREP <printer name> TRK**
5	Start the printer device. **>STARTDEV <printer name>**
6	Review all logs for the past 24 hours to ensure that the equipment to be worked on does not have any pre-existing faults. **>OPEN CCS;BACK ALL** **>OPEN PM;BACK ALL** **>OPEN TRK;BACK ALL**

ATTENTION
Do not proceed until all related logs have been understood or explained.

—end—

Installing NT6X50EC in DTC that supports PTS and/or CCS7 signaling

Perform Procedure 3-2, ”Installing an NT6X50EC”, to install an NT6X50EC in DTC equipment that supports PTS and/or CCS7 signaling.

Procedure 3-2
Installing NT6X50EC in DTC equipment - PTS and/or CCS7 signaling

Step Action and response

1 Remove the filler pack (NT0X50AA).

WARNING
ANTI-STATIC PRECAUTIONS
Users must adhere to all grounding instructions and anti-static precautions to avoid damaging the NT6X50EC card.

2 Set DIP switch settings on NT6X50EC. (Refer to Appendix A, “Switch settings,” for assistance.)

3 Connect the wrist grounding strap to a frame ground location on the frame where the pack is to be inserted.

4 Busy or take offline the spans associated with the NT6X50EC. The carriers must be out of service to be able to modify table LTCPSINV (Line Trunk Controller P-Side Link Inventory).

5 After a 5-second delay, seat the circuit pack into the required slot. Be sure the circuit pack is properly seated before disconnecting the wrist grounding strap.

6 Ensure that the required extended peripheral module (XPM) patches have been applied and that the required computing module (CM) patches have been applied and activated.

7 Datafill table CARRMTC with the appropriate tuples to accommodate the NT6X50EC.

Be sure to add tuples for each peripheral module (PM) type with the datafill required for that PM’s trunk operation. Use the TMPLTNM (Template Name) field when modifying table LTCPSINV for proper operation of the newly installed NT6X50EC circuit packs. The CARD field reflects the NT6X50EC circuit pack. When that is done, a prompt called ECHO is added.

The two options for the ECHO field are NETWORK or ACCESS. NETWORK supplies echo cancellation from the distant end back to the NT6X50EC. ACCESS supplies echo cancellation from the NT6X50EC back to the origination end.

—continued—

Procedure 3-2
Installing an NT6X50EC in DTC equipment - PTS and/or CCS7 signaling (continued)

Step Action and response

Table 3-1 shows an example of datafill for table CARRMTC.

Table 3-1
Table CARRMTC datafill example

CSPMTYPE	TMPLTNM	RTSML	RTSOL	ATTR
LTC	DEFAULT	255	255	DS1 NT6X50AA MU_LAW SF ZCS BPV NILDL N 250 1000 50 50 150 1000 3 6 864 100 17 511 4 255
DTC	DEFAULT	255	255	DS1 NT6X50AA MU_LAW SF ZCS BPV NILDL N 250 1000 50 50 150 1000 3 6 864 100 17 511 4 255
DTC	ECHONET	255	255	DS1 NT6X50EC MU_LAW SF ZCS BPV NILDL N 250 1000 50 50 150 1000 3 6 864 100 17 511 4 255 NETWORK

8 Datafill table LTCPSINV to reflect the changes made to PTS spans as follows:

>TABLE LTCPSINV
>POS <cpce type> <cpce #>
for example, **>POST DTC 0**

>CHA 2
to change the field PSLNKTAB of the positioned tuple

>0 DS1EC <tmpltnm> N <leq>
for example, **>0 DS1EC ECHONET N 220**

>1 DS1EC <tmpltnm> N <leq>
for example, **>1 DS1EC ECHONET N 220**

The value of <tmpltnm> is the value datafilled for the TMPLTNM field in table CARRMTC. See the sample datafill shown in Table 3-1.

The value of <leq> depends on the distance from the carrier to the repeater. This value should correspond to the DIP switch settings on the circuit pack. The possible values are 110, 220, 330, 440, 550, or 660.

Note: Change only the links associated with NT6X50 that was replaced. Tab through the remaining links until you are asked to confirm the change.

>Y

—continued—

Procedure 3-2
Installing an NT6X50EC in DTC equipment - PTS and/or CCS7 signaling (continued)

Step Action and response

Figure 3-1 shows an example of how table LTCPSINV can be datafilled. This example shows that PTS spans 0 and 1 have been changed to reflect the new NT6X50EC circuit pack from the entry in table CARRMTC.

Figure 3-1
Table LTCPSINV datafill example

```
LTCNAME                                                    PSLINKTAB

DTC 0 N
(0 DS1EC ECHONET N 220)      (1 DS1EC ECHONET N 220)
(2 DS1 DS1CARR N)  (3 DS1 DS1CARR N) (4 DS1 DEFAULT N)
(5 DS1 DEFAULT N)  (6 DS1 DEFAULT N) (7 DS1 DEFAULT N)
(8 DS1 DEFAULT N)  (9 DS1 DEFAULT N) (10 DS1 DEFAULT N)
(11 DS1 DEFAULT N) (12 DS1 DEFAULT N)(13 DS1 DEFAULT N)
(14 DS1 DEFAULT N) (15 DS1 DEFAULT N)(16 DS1 DEFAULT N)
(17 DS1 DEFAULT N) (18 NILTYPE)      (19 NILTYPE)      $
```

9 Table TRKSGRP must be modified to reflect the new NT6X50EC circuit pack. Therefore, each trunk group appearing on the span that was modified must have its corresponding tuple changed as follows:

>TABLE TRKSGRP

```
TABLE: TRKSGRP
```

>POS <clli name> <#>

Figure 3-2
Table TRKSGRP datafill example (CLLI = ONL435TWDTSZ)

```
ONL435TWDTSZ 0                                        DS1SIG
STD
2W DT SZ N 7 6 DT SZ 6 0 N NO NO N N N N M 70 UNEQ
```

>CHA

Tab down through the fields until you reach the ECSTAT prompt. This is the ECHO_EQUIP_STATUS information that must be changed to match the NT6X50EC. Because the echo cancellation capability is on the new card, the “Internal” option is used. This option prompts you for NSMATCH (Noise Matching) and AUTOON (Auto Re-enable Control).

```
ECSTAT: UNEQ
```

>INTERNAL

—continued—

Procedure 3-2
Installing an NT6X50EC in DTC equipment - PTS and/or CCS7 signaling (continued)

Step Action and response

Note: You can enter either INTERNAL or INNOTONE. Choose INTERNAL if you want the ECs to disable when a 2100 Hz tone precedes the call. Choose INNOTONE if you do not want the ECs to disable for 2100 Hz tone.

NSMATCH:
>N
Enter Y for NSMATCH if the noise is to be maintained when the internal EC is actively cancelling noise. The default is N.

AUTOON
>Y
Enter Y for AUTOON so the NT6X50EC automatically restarts the echo cancellation after a data call is over. (The CCITT recommendation determines the criteria for the re–enabling of echo cancellation.) The default value is Y.

Note: This prompt does not appear if ECSTAT equals INNOTONE.

Confirm the tuple change. You may see a warning indicating that the NT6X50EC circuit pack must be used. This warning is expected.

>Y

Figure 3-3
Table TRKSGRP datafill example (CLLI = ONL435TWDTSZ; Internal option)

```
ONL435TWDTSZ 0                                        DS1SIG
STD
2W DT SZ N 7 6 DT SZ 6 0 N NO NO N N N N M 70 INTERNAL N Y
```

—continued—

Procedure 3-2
Installing an NT6X50EC in DTC equipment - PTS and/or CCS7 signaling (continued)

Step	Action and response
10	Type **TRKS;CARRIER** to enter that level. From there, busy and RTS spans associated with the NT6X50EC. (In our example, links 0 and 1 of DTC 0.) **>CARRIER** **>POST <cpce type> <cpce #> <link #>** for example, **>POST DTC 0 0 DTC 0 1** **>BSY <item #>;BSY <item #>** for example, **>BSY 0;BSY 1** **>TST <item #>;TST <item #>** for example, **>TST 0;TST 1** **>RTS <item #>;RTS <item #>** for example, **>RTS 0;RTS 1** ***Note:*** You will be able to return to service only spans that were previously in service. If a span is not actively carrying traffic, then it will pass testing only if a loopback is done at the DSX. **ATTENTION** Active spans must successfully pass out-of-service testing as this test validates the speech path of the NT6X50EC circuit pack.

—continued—

Procedure 3-2
Installing an NT6X50EC in DTC equipment- PTS and/or CCS7 signaling (continued)

Step	Action and response
11	Enter the TRKS;TTP level by typing: **TRKS;TTP**. From this level, post and RTS the trunks assigned to the NT6X50EC. (In our examples, links 0 and 1 of DTC 0.) **>TRKS;TTP** **>POST D <cpce type> <cpce #> <span #>** for example **>POST D DTC 0 0** **>BSY ALL** WAIT FOR BUSY QUEUE TO CLEAR **>RTS ALL** ***Note:*** TRKGRP alarms should clear. WAIT FOR BUSY QUEUE TO CLEAR Post and RTS the trunks assigned to link 1 of DTC 0. **>TRKS;TTP** **>POST D <cpce type> <cpce #> <span #>** for example, **>POST D DTC 0 1** **>BSY ALL** WAIT FOR BUSY QUEUE TO CLEAR **>RTS ALL** ***Note:*** TRKGRP alarms should clear. WAIT FOR BUSY QUEUE TO CLEAR
12	Have the customer access one trunk per span line and perform a test call. If any discrepancies are noted, go back to step 4 and replace the NT6X50EC circuit pack.
13	Repeat steps 4 through 12 for each NT6X50EC to be added. If the spans are not currently being used (that is, table LTCPSINV contains NILTYPE datafill for them), you can replace them without changing any tables.
14	Repeat steps 1 through 13 for all DTCs that are to have the new NT6X50EC circuit packs installed.
15	Update the necessary documents and/or database information as required to reflect the change.
16	Restore any log and class routing that was changed during preparation.

—continued—

Procedure 3-2
Installing an NT6X50EC in DTC equipment- PTS and/or CCS7 signaling (continued)

Step	Action and response
17	Stop any devices that were started during preparation. **>LOGUTIL** LOGUTIL: **>STOPDEV <device name>** **>QUIT**
18	Stop recording onto any devices that were initiated during preparation. **>RECORD STOP ONTO <device name>**
19	NT6X50EC is installed.

—end—

Upgrading to NT6X50EC

This chapter describes how to replace an NT6X50AA or NT6X50AB card with the NT6X50EC Integrated Echo Canceller (EC) card. This chapter also provides the following information:

- precautions, preparations, and special application warnings
- preliminary steps to perform before beginning the upgrade procedure
- procedure for upgrading to the NT6X50EC card within a digital trunk controller (DTC) that supports either per-trunk signaling (PTS) or common channel signaling #7 (CCS7).

Note: The NT6X50EC is also supported on the DTCI.

Refer to Chapter 1, “Introduction,” for the following information related to upgrading an EC card:

- network considerations
- tool requirements
- hardware requirements
- software requirements
- limitations and restrictions
- technical support

Before you begin

This section lists precautions, preparations, and special application warnings that apply to the procedure described in this chapter.

Precautions

This section lists the precautions to take before beginning to upgrade from NT6X50AA or NT6X50AB to NT6X50EC.

1 Only qualified Nortel personnel or customer personnel following Nortel or customer instructions will perform the procedure. Qualified personnel are familiar with MAPCI functions, CI functions, and Nortel documentation.

2 Perform the procedure during off-peak hours only. The customer determines off-peak hours.

3 Review all Emergency Technical Assistance Service (ETAS) Broadcast warnings and Installation Dynamic-Documentation to determine what steps are to be taken for the equipment being worked on.

4 Read the entire procedure before you begin.

5 Remove all jewelry, watches, and rings before you perform any changes on the product. Refer to NTI Installation Administrative Practice (IAP) 701 (NTI) or 1701 (NTC), and installation safety manual (ISM/IMO) for standard safety precautions.

6 If the customer determines at any time before or during the change application procedure that a problem detrimental to service exists, the customer must notify the installer. The installer will inspect the work location for shorts, broken leads, software discrepancies, defective packs, and so on. When the trouble is cleared, the customer will notify the installer.

7 The customer representative or person designated by the customer controls whether the procedure continues. This person has the authority and responsibility to determine at any time that the procedure should be stopped.

8 Verify that the equipment has not already been upgraded. If the change has already been implemented, contact the customer representative to arrange to return material and handle possible billing documentation. Complete and return the Change Action Report (CAR sheet).

9 Verify material associated with 88,000 (88K) order is available.

10 Verify general hand tools or special tools needed for the change are available.

11 When updating packs, shelves, and so on, be sure to update the pack designation, shelf designation strip, or applicable equipment designation strip as indicated in the procedure.

12 Customer personnel are responsible for busying and returning to service all circuit packs, modules, lines, trunks, or both.

13 Ensure that you have access to each Northern Telecom Publication (NTP) in this manual's "About this document" section.

14 If safe stop points are noted in the procedure, they should be applied if necessary.

15 Record on a printer all work associated with this document. If Technical Assistance Service (TAS) assistance is required, the recording provides a printed record of the steps taken.

Ensure that LOGUTIL is running to a printer device. Route all log classes and log reports to a device.

Either log TRK108 or log TRK109 is generated each time a diagnostic test is run on the NT6X50EC.

16 Ensure that the latest office image is available on disk or tape. If the current office image does not exist, take an image using standard customer procedures before starting the upgrade procedure.

17 In case of difficulty, follow local trouble reporting or escalation procedures provided by the customer. Have ETAS numbers available.

18 The field technician or the person who performs the change is responsible for contacting TAS or Emergency Recovery before applying this procedure to verify the existence of any central control complex (CCC) or peripheral module (PM) software patches that are required to complete this modification. If required patches are not present in the DMS system, the field technician is responsible for ensuring that the patches are downloaded and accessible prior to application of this procedure.

Preparations

Procedure 4-1 lists preparation steps to take before beginning to upgrade from NT6X50AA or NT6X50AB to NT6X50EC.

Procedure 4-1
Completing upgrade preparations

Step	Action and response
1	Arrange all materials, tools, and test equipment at the work location.
2	Wear a wrist strap connected to the wrist strap grounding point of the frame supervisory panel (FSP) while handling the circuit packs. This protects the cards from damage caused by static electricity.
3	Examine the logs for the previous 24 hours and ensure that there are no existing faults on the equipment to be modified.
4	All Nortel personnel working on customer equipment in the field will use Service Assurance for Functioning Equipment (SAFE, IAP 0404) operation policy.
5	Read all warnings listed in the subsection “Special application warnings.”.

Special application warnings

Read the following warnings before beginning the upgrade procedure:

1 Determine the frame type in which the NT6X50EC will be installed.

> **ATTENTION**
> Install the NT6X50EC card in either an NT6X01AB or an NT6X01AD frame. Do not install the NT6X50EC card in a type NT6X01AA frame.

2 Verify that the site being retrofitted has an entry in table CARRMTC (Carrier Maintenance Control) for the module type before you attempt either of the upgrade procedures in this chapter.

3 The datafill shown in this chapter for table CARRMTC is intended only as an example. Exact datafill requirements are the customer's responsibility. If the module type to be worked on does not have an entry in table CARRMTC for the NT6X50EC, the field technician must get the datafill parameters from site personnel.

Note: Do not use the datafill examples shown in this chapter for table CARRMTC as default values.

4 Replace the existing NT6X50AA or NT6X50AB circuit packs one at a time.

> **ATTENTION**
> Do not remove or insert more than one NT6X50 at a time.

5 Perform these procedures only during a low call processing period as determined by the customer.

6 Ensure that the required XPM patches have been applied and that the required computing module (CM) patches have been applied and activated.

7 Datafill table CARRMTC with the appropriate tuples to accommodate the NT6X50EC before you start either of the procedures in this chapter.

Be sure to add tuples for each PM type with the required datafill for that PM's trunk operation. The TMPLTNM (Template Name) field is used when modifying table LTCPSINV (Line Trunk Controller P-Side Link Inventory) for proper operation of the newly installed NT6X50EC circuit packs. The CARD field should also reflect the NT6X50EC circuit pack. When that is done, a prompt called ECHO is added.

There are two options for the ECHO field: NETWORK or ACCESS. NETWORK supplies echo suppression from the distant end back to the NT6X50EC. ACCESS supplies echo cancellation from the NT6X50EC back to the origination end.

Table 4-1 shows an example of datafill for table CARRMTC.

Table 4-1
Table CARRMTC datafill example

CSPMTYPE	TMPLTNM	RTSML	RTSOL	ATTR
LTC	DEFAULT	255	255	DS1 NT6X50AA MU_LAW SF ZCS BPV NILDL N 250 1000 50 50 150 1000 3 6 864 100 17 511 4 255
DTC	DEFAULT	255	255	DS1 NT6X50AA MU_LAW SF ZCS BPV NILDL N 250 1000 50 50 150 1000 3 6 864 100 17 511 4 255
DTC	ECHONET	255	255	DS1 NT6X50EC MU_LAW SF ZCS BPV NILDL N 250 1000 50 50 150 1000 3 6 864 100 17 511 4 255 NETWORK

Note: The NT6X50EC is also supported on the DTCI.

Procedures

This upgrade procedure is made up of the following separate procedures:

- Procedure 4-2—preliminary steps required before beginning the upgrade procedure.

  ATTENTION
  You must complete Procedure 4-2 before starting Procedure 4-3.

- Procedure 4-3—applies only to DTC equipment that uses PTS or CCS7.

Preliminary preparations

Procedure 4-2
Completing upgrade preparations

Step	Action and response
1	Record all work associated with the upgrade onto a printer to provide a detailed account of the steps taken in case TAS becomes involved.

—continued—

Procedure 4-2
Completing upgrade preparations (continued)

Step **Action and response**

Obtain the printer device name from the customer.

>QUIT ALL
>RECORD START ONTO <device name>
>(CR)
>(CR)
After two carriage returns, a log message prints out on the specified device.

> **ATTENTION**
> Make certain that any LOGUTIL-related changes you make are recorded. All log- and class-related routing is returned to its original configuration when these procedures are complete.

2 Ensure that LOGUTIL is currently running to a printer device. All log classes and log reports should be routing to this device. Verify with the customer that these requirements have been met.

>LOGUTIL
Logutil:
>LISTREPS SPECIAL CCS
>LISTREPS SPECIAL PM
>LISTREPS SPECIAL TRK

3 Check these logs to see if any are marked “SUPP.” SUPP logs have been suppressed and must be resumed prior to beginning the procedure.

>RESUME CCS
>RESUME PM
>RESUME TRK

4 Ensure that classes 0 through 31 are updated to the printer device to be used.

>LISTROUTE DEVICE <printer name>
If any log classes have been deleted, use the ADDCLASS logutil command to restore them.

>ADDCLASS <printer name> <class number>
If there are any logs specific to the MC6M equipment, use the ADDREP logutil command to restore them.

—continued—

Procedure 4-2
Completing upgrade preparations (continued)

Step	Action and response
5	**>ADDREP <printer name> CCS** **>ADDREP <printer name> PM** **>ADDREP <printer name> TRK**
6	Start the printer device. **>STARTDEV <printer name>**
7	Review all logs for the past 24 hours to ensure that the equipment to be worked on does not have any existing faults. **>OPEN CCS;BACK ALL** **>OPEN PM;BACK ALL** **>OPEN TRK;BACK ALL**

ATTENTION
Do not proceed until all related logs have been understood or explained.

—end—

Upgrading to NT6X50EC (PTS and/or CCS7)

Complete Procedure 4-3 when upgrading to an NT6X50EC card in DTC equipment that supports PTS signaling, CCS7 signalling, or both PTS and CCS7.

Procedure 4-3
Upgrading to NT6X50EC - PTS and/or CCS7

Step	Action and response
1	Ensure that you have completed the preliminary precautions located in Procedure 4-2.

ATTENTION
Do not proceed until you confirm that the preliminary precautions located in Procedure 4-2.

—continued—

Procedure 4-3
Upgrading to NT6X50EC - PTS and/or CCS7 (continued)

Step **Action and response**

2 Obtain hard copies of table LTCINV, table LTCPSINV, and table CARRMTC.

>TABLE LTCINV;LIS ALL;QUIT
>TABLE LTCPSINV;LIS ALL;QUIT
>TABLE CARRMTC;LIS ALL;QUIT

3 Determine which DTC that houses NT6X50AA/AB circuit packs will be modified first. Use Table 4-2 to determine the physical location of each NT6X50AA/AB used for P-side links.

Table 4-2
Physical location of each NT6X50AA/AB (P-side links)

DTC unit	Slot	P-side links
0	05	0, 1
0	04	4, 5
0	03	8, 9
0	02	12, 13
0	01	16, 17
1	05	2, 3
1	04	6, 7
1	03	10, 11
1	02	14, 15
1	01	18, 19

—continued—

Procedure 4-3
Upgrading to NT6X50EC - PTS and/or CCS7 (continued)

Step	Action and response

4 Make sure that the peripheral module (PM) to be modified does not have the active timing source linked to it. Otherwise, you risk bringing down the whole PM.

CAUTION
Possible loss of service
This is a critical step that can cause outages if not performed correctly.

or

From the MAP or MS;CLOCK level (SUPERNODE), ensure that the active carrier is not linked to the PM to be modified. If it is, switch the carrier as follows:

>CMC;SYNCLK
>SWCARR
Only if active timing source is linked to the PM to be modified.

or

>MS;CLOCK
>SWCARR
Only if active timing source is linked to the PM to be modified.

5 From the MAP PM level, post and test the DTC to be modified, then translate the P-side links to verify that the links are assigned as either "Carrier of Class – Trunk," or not assigned at all (NILTYPE).

>MAPCI;MTC;PM
>POST <cpce type> <cpce #>
for example, **>POST DTC 0**

ATTENTION
The DTC must be fully in service and fault free before continuing. It is the customer's responsibility to explain and correct any existing conditions.

—continued—

Procedure 4-3
Upgrading to NT6X50EC - PTS and/or CCS7 (continued)

Step **Action and response**

>TRNSL P

Figure 4-1 shows an example of P-side link assignments (DTC).

Figure 4-1
Example of P-side link assignments (DTC)

```
LINK  0:Carrier of Class – Trunk   ;Status OK
LINK  1:Carrier of Class – Trunk   ;Status OK
LINK  2:Carrier of Class – Trunk   'Status OK
LINK  3:Carrier of Class – Trunk   ;Status OK
LINK  4:Carrier of Class – Trunk   ;Status OK
LINK  5:Carrier of Class – Trunk   ;Status OK
LINK  6:Carrier of Class – Trunk   ;Status OK
LINK  7:Carrier of Class – Trunk   ;Status OK
LINK  8:Carrier of Class – Trunk   ;Status OK
LINK  9:Carrier of Class – Trunk   ;Status OK
LINK 10:Carrier of Class – Trunk   ;Status OK
LINK 11:Carrier of Class – Trunk   ;Status OK
LINK 12:Carrier of Class – Trunk   ;Status OK
LINK 13:Carrier of Class – Trunk   ;Status OK
LINK 14:Carrier of Class – Trunk   ;Status OK
LINK 15:Carrier of Class – Trunk   ;Status OK
LINK 16:Carrier of Class – Trunk   ;Status OK
LINK 17:Carrier of Class – Trunk   ;Status OK
```

>TST PM

ATTENTION

This test **must** pass! If the test fails, **do not** continue with this procedure.

—continued—

Procedure 4-3
Upgrading to NT6X50EC - PTS and/or CCS7 (continued)

Step **Action and response**

6 Correlate the information obtained from translating the P-side links of the PM to be modified with the information obtained from table LTCPSINV. Figure 4-2 shows an example of assignments in table LTCPSINV.

Figure 4-2
Table LTCPSINV datafill example

```
LTCNAME                                                    PSLINKTAB
DTC 0
 (0 DS1 DS1CARR N)  (1 DS1 DS1CARR N) (2 DS1 DS1CARR N)
 (3 DS1 DS1CARR N)  (4 DS1 DEFAULT N) (5 DS1 DEFAULT N)
 (6 DS1 DEFAULT N)  (7 DS1 DEFAULT N) (8 DS1 DEFAULT N)
 (9 DS1 DEFAULT N)  (10 DS1 DEFAULT N)(11 DS1 DEFAULT N)
 (12 DS1 DEFAULT N) (13 DS1 DEFAULT N)(14 DS1 DEFAULT N)
 (15 DS1 DEFAULT N) (16 DS1 DEFAULT N)(17 DS1 DEFAULT N)
 (18 NILTYPE)       (19 NILTYPE)  $
```

Note: Links 18 and 19 are assigned as **NILTYPE** in table LTCPSINV and are not displayed when you translate the P-side links of the PM to be modified. Links datafilled as NILTYPE are not assigned, and therefore cannot be busied.

If an NT6X50AA/AB exists in a card slot in which the links are not assigned, the card can simply be removed and a new one inserted. In this case, if an NT6X50AA/AB were in slot 01 of unit 1 (spans 18 and 19), the card could be removed and replaced with a new NT6X50EC with proper equalization switch settings. See Appendix A, “Switch settings,” for assistance.

7 Determine which NT6X50 circuit pack is to be removed first. For both simplicity and consistency, Nortel recommends starting with span 0 and 1, which is the NT6X50 circuit pack in unit 0, slot 5 of the selected DTC.

Links that are assigned as “Carrier of Class – Trunk” must be busied at the TRKS;CARRIER MAP level. These links are commonly referred to as “carriers” or “spans.” Before busying a link in the carrier level, all assigned channels (trunks) should be busied at the TRKS;TTP MAP level as follows.

Note: DTC 0, links 0 and 1 are used throughout this procedure as examples.

—continued—

Procedure 4-3
Upgrading to NT6X50EC - PTS and/or CCS7 (continued)

Step **Action and response**

Post and busy the trunks assigned to link 0 of DTC 0. Enter the following commands at the MAP position:

>MAPCI;MTC;TRKS;TTP
>POST D <cpce type> <cpce #> <link #>
for example, **>POST D DTC 0 0**

>BSY ALL

Note: Trunk group alarms should be generated.

WAIT FOR BUSY QUEUE TO CLEAR

>BSY INB ALL
Post and busy the trunks assigned to link 1 of DTC 0. Enter the following commands at the MAP position:

>TRKS;TTP
>POST D <cpce type> <cpce #> <link #>
for example, **>POST D DTC 0 1**

>BSY ALL

Note: Trunk group alarms should be generated.

WAIT FOR BUSY QUEUE TO CLEAR

>BSY INB ALL
From the TRKS;CARRIER level, post and busy both links assigned to the NT6X50 to be replaced. Enter the following commands at the MAP position:

>CARRIER >POST <cpce type> <cpce #> <link #>
for example, **>POST DTC 0 0 DTC 0 1**

>BSY <item #>;BSY <item #>
for example, **>BSY 0;BSY 1**

>OFFL <item #>;OFFL <item #>
for example, **>OFFL 0;OFFL 1**

Note: The *item #* refers to the *N* column number you see when the spans are posted on the MAP display.

—continued—

Procedure 4-3
Upgrading to NT6X50EC - PTS and/or CCS7 (continued)

Step **Action and response**

> **ATTENTION**
> If table LTCPSINV is datafilled before the NT6X50EC card is installed, the switch generates PM189 logs. To clear these logs, install the NT6X50EC card.

8 While using the (T9908) wrist grounding strap, carefully remove the NT6X50AA/AB that is to be replaced. (For the example discussed throughout this procedure, that would be the NT6X50 in unit 0, slot 5 for spans 0 and 1.) The DIP switch setting on the new NT6X50EC must correlate with the settings of the NT6X50 that was removed. Set the DIP switches on the new card as described in Appendix A, “Switch settings.” Insert the new NT6X50EC into the newly vacant card slot.

9 Change table LTCPSINV to reflect the changes made to DS1 spans as follows:

>TABLE LTCPSINV
>POS <cpce type> <cpce #>
for example, **>POST DTC 0**

>CHA 2
to change the field PSLNKTAB of the positioned tuple

>0 DS1EC <tmpltnm> N <leq>
for example, **>0 DS1EC ECHONET N 220**

>1 DS1EC <tmpltnm> N <leq>
for example, **>1 DS1EC ECHONET N 220**

The value of <tmpltnm> is the value datafilled for the TMPLTNM field in table CARRMTC. See the sample datafill shown in Table 4-1.

The value of <leq> depends on the distance from the carrier to the repeater. This value should correspond to the DIP switch settings on the circuit pack. The possible values are 110, 220, 330, 440, 550, or 660.

Note: Change only the links associated with NT6X50 that was replaced. Tab through the remaining links until you are asked to confirm the change.

>Y

Figure 4-3 shows an example of how table LTCPSINV can be datafilled. This example shows that DS1 spans 0 and 1 have been changed to reflect the new NT6X50EC circuit pack from the entry in table CARRMTC.

—continued—

Procedure 4-3
Upgrading to NT6X50EC - PTS and/or CCS7 (continued)

Step Action and response

Figure 4-3
Table LTCPSINV datafill example

```
LTCNAME                                                    PSLINKTAB

DTC 0 N
 (0 DS1EC ECHONET N 220)      (1 DS1EC ECHONET N 220)
 (2 DS1 DS1CARR N)  (3 DS1 DS1CARR N) (4 DS1 DEFAULT N)
 (5 DS1 DEFAULT N)  (6 DS1 DEFAULT N) (7 DS1 DEFAULT N)
 (8 DS1 DEFAULT N)  (9 DS1 DEFAULT N) (10 DS1 DEFAULT N)
 (11 DS1 DEFAULT N) (12 DS1 DEFAULT N)(13 DS1 DEFAULT N)
 (14 DS1 DEFAULT N) (15 DS1 DEFAULT N)(16 DS1 DEFAULT N)
 (17 DS1 DEFAULT N) (18 NILTYPE)      (19 NILTYPE)      $
```

10 Determine the CLLI names of the trunk groups assigned to the DTC spans that were modified. To do this, use table TRKMEM as shown:

>TABLE TRKMEM
TABLE: TRKMEM
>LIS ALL (4 EQ 'DTC 0 0 *')

Note: This command lists all the trunks assigned to DTC 0 span 0. The command means to list all table entries where range 4 (which is the MEMVAR field) is equal to DTC 0 0 *. The asterisk indicates any character found and is referencing the 24 channels of the span that can be assigned.

Table 4-3 shows an example of datafill for table TRKMEM for DTC 0, span 0.

—continued—

Procedure 4-3
Upgrading to NT6X50EC - PTS and/or CCS7 (continued)

Step Action and response

Table 4-3
Table TRKMEM datafill example for DTC 0, span 0

CLLI	EXTRKNM	SGRP	MEMVAR
TIE349TWMFDD	1	0	DTC 0 0 1
EDL297TWDTLS	1	0	DTC 0 0 2
EDL385TWDTGS	1	0	DTC 0 0 3
ONL435TWDTSZ	1	0	DTC 0 0 4
ONL445TWDTSZ	1	0	DTC 0 0 5
ONT565TWMFWK	1	0	DTC 0 0 11
ONT575TWMFWK	1	0	DTC 0 0 12
ONT584TWDTWK	1	0	DTC 0 0 13
EAN641TWMFWK	1	0	DTC 0 0 14
EAN650TWMFWK	1	0	DTC 0 0 15
EAN651TWMFWK	1	0	DTC 0 0 16

Note: More than one trunk group can appear on each 24-channel span. The LIS ALL command can be repeated to find the trunks assigned to the second span of the NT6X50 that was replaced:

>LIS ALL (4 EQ 'DTC 0 1 *')

11 Table TRKSGRP must be modified to reflect the new NT6X50EC circuit pack. Therefore, each trunk group appearing on the span that was modified must have its corresponding tuple changed as follows:

>TABLE TRKSGRP
TABLE: TRKSGRP
>POS <clli name> <#>

—continued—

Procedure 4-3
Upgrading to NT6X50EC - PTS and/or CCS7 (continued)

Step Action and response

Figure 4-4
Example of table TRKSGRP for CLLI ONL435TWDTSZ

```
ONL435TWDTSZ 0                                    DS1SIG
STD
2W DT SZ N 7 6 DT SZ 6 0 N NO NO N N N N M 70 UNEQ
```

>CHA

Tab down through the fields until you reach the ECSTAT prompt. This is the ECHO_EQUIP_STATUS information that must be changed to match the NT6X50EC. Because the echo cancellation capability is on the new card, the "Internal" option is used. This option prompts you for NSMATCH (Noise Matching) and AUTOON (Auto Re-enable Control).

ECSTAT: UNEQ
>INTERNAL

Note: You can enter either INTERNAL or INNOTONE. Choose INTERNAL if you want the ECs to disable when a 2100 Hz tone precedes the call. INNOTONE indicates ECs will not be disabled upon receipt of a 2100 Hz tone.

NSMATCH:
>N

Enter Y for NSMATCH if the noise is to be maintained when the internal EC is actively cancelling noise. The default is N.

AUTOON
>Y

Enter Y for AUTOON if the EC is automatically turned on after silence. The default value is Y.

Note: This prompt does not appear if ECSTAT equals INNOTONE.

Confirm the tuple change. You may see a warning indicating that the NT6X50EC circuit pack must be used. This warning is expected.

>Y

—continued—

Procedure 4-3
Upgrading to NT6X50EC - PTS and/or CCS7 (continued)

Step **Action and response**

Figure 4-5
Example of table TRKSGRP for CLLI ONL435TWDTSZ—Internal option

```
ONL435TWDTSZ 0                                    DS1SIG
STD
2W DT SZ N 7 6 DT SZ 6 0 N NO NO N N N N M 70 INTERNAL N Y
```

Note: If the modified table TRKSGRP has additional trunk members on spans that have not yet had the NT6X50EC circuit pack inserted, keep those circuits out of service until the associated cards are updated. If these circuits are in service, the switch will generate a PM189 SWERR indicating an unexpected command (because of the datafill error) every time a call is made on this circuit.

12 Enter the TRKS;CARRIER level by typing: **TRKS;CARRIER**. From this level, busy and return to service the spans associated with the NT6X50 that was replaced (in the example throughout this procedure, links 0 and 1 of DTC 0).

>CARRIER

>POST <cpce type> <cpce #> <link #>
for example, **>POST DTC 0 0 DTC 0 1**

>BSY <item #>;BSY <item #>
for example, **>BSY 0;BSY 1**

>TST <item #>;TST <item #>
for example, **>TST 0;TST 1**

>RTS <item #>;RTS <item #>
for example, **>RTS 0;RTS 1**

ATTENTION
Active spans must successfully pass out-of-service testing as this test validates the speech path of the NT6X50EC circuit pack.

—continued—

Procedure 4-3
Upgrading to NT6X50EC - PTS and/or CCS7 (continued)

Step	Action and response
13	Enter the TRKS;TTP level by typing: **TRKS;TTP**. From this level, post and RTS the trunks assigned to the NT6X50 that was replaced (in the example throughout this procedure, links 0 and 1 of DTC 0). **>TRKS;TTP** **>POST D <cpce type> <cpce #> <span #>** for example **>POST D DTC 0 0** **>BSY ALL** WAIT FOR BUSY QUEUE TO CLEAR **>RTS ALL** ***Note:*** TRKGRP alarms should clear. WAIT FOR BUSY QUEUE TO CLEAR Post and RTS the trunks assigned to link 1 of DTC 0. **>TRKS;TTP** **>POST D <cpce type> <cpce #> <span #>** for example, **>POST D DTC 0 1** **>BSY ALL** WAIT FOR BUSY QUEUE TO CLEAR **>RTS ALL** ***Note:*** TRKGRP alarms should clear. WAIT FOR BUSY QUEUE TO CLEAR

ATTENTION
TTP headsets cannot be used to test ECs by placing calls between the headset and an EC-equipped trunk due to the lack of call control. Headsets can be used for this purpose if at least one intermediate looparound is used.

14	Have the customer access one trunk per span line and perform a test call. If any discrepancies are noted, go back to step 8 and replace the NT6X50EC circuit pack.
15	Repeat steps 4 through 14 for each NT6X50 to be replaced. If the spans are not currently being used (that is, table LTCPSINV contains NILTYPE datafill for them), you can replace them without changing any tables.

—continued—

Procedure 4-3
Upgrading to NT6X50EC - PTS and/or CCS7 (continued)

Step	Action and response
16	Repeat steps 1 through 15 for all DTCs that are to have the new NT6X50EC circuit packs installed.
17	Update the necessary documents and/or database information as required to reflect the change.
18	Restore any log and class routing that was changed during preparation.
19	Stop any devices that were started during preparation. **>LOGUTIL** LOGUTIL: **>STOPDEV <device name>** **>QUIT**
20	Stop recording onto any devices that were initiated during preparation. **>RECORD STOP ONTO <device name>**
21	Procedure 4-3 is complete.

—end—

Echo canceller testing

This chapter describes how to test the NT6X50EC Integrated Echo Canceller (EC) card in either a lab or field environment. The information includes both testing setup and troubleshooting steps.

Note: This chapter assumes a delay box is used to simulate network delay.

Setup

Connections are made from one T1 port to another with delay boxes located in between. Depending upon the configuration, these delay boxes provide both network delay and physical tail delay. Each delay setup has an application depending upon whether the EC is on the network side or the access side.

The following constraints should be noted when dealing with testing procedures in this chapter:

- Echo cancellation is done on the network side with the NT6X50 set to network mode, or done on access side with the NT6X50 set to access mode.
- The ”network” side refers to an EC on a T1 trunk that serves as a link to the rest of an interexchange carrier’s (IEC) network. Echo generated at the near end of the EC is cancelled before it is transmitted through the network.
- The ”access” side refers to an EC that serves as a link between the IEC and the local exchange carrier (LEC). Echo generated at the near end of the EC is cancelled as it is transmitted from the LEC to the IEC’s network at the far end.
- Although a majority of IECs place their ECs on the network side, several place ECs on the access side.

Network delay-only setup

In a ”network delay-only” setup, the delay boxes delay the intermachine trunks (IMT). This setup is similar to IEC network setups in large metropolitan areas where the distance to the LEC switch is negligible and tail delay is minimal. Delay values are typically set at greater than 32 ms for

perceptibility of echo cancellation problems. Configurations for network and access modes are shown in Figures 5-1 and 5-2.

Figure 5-1
Network delay setup - NT6X50EC on network side

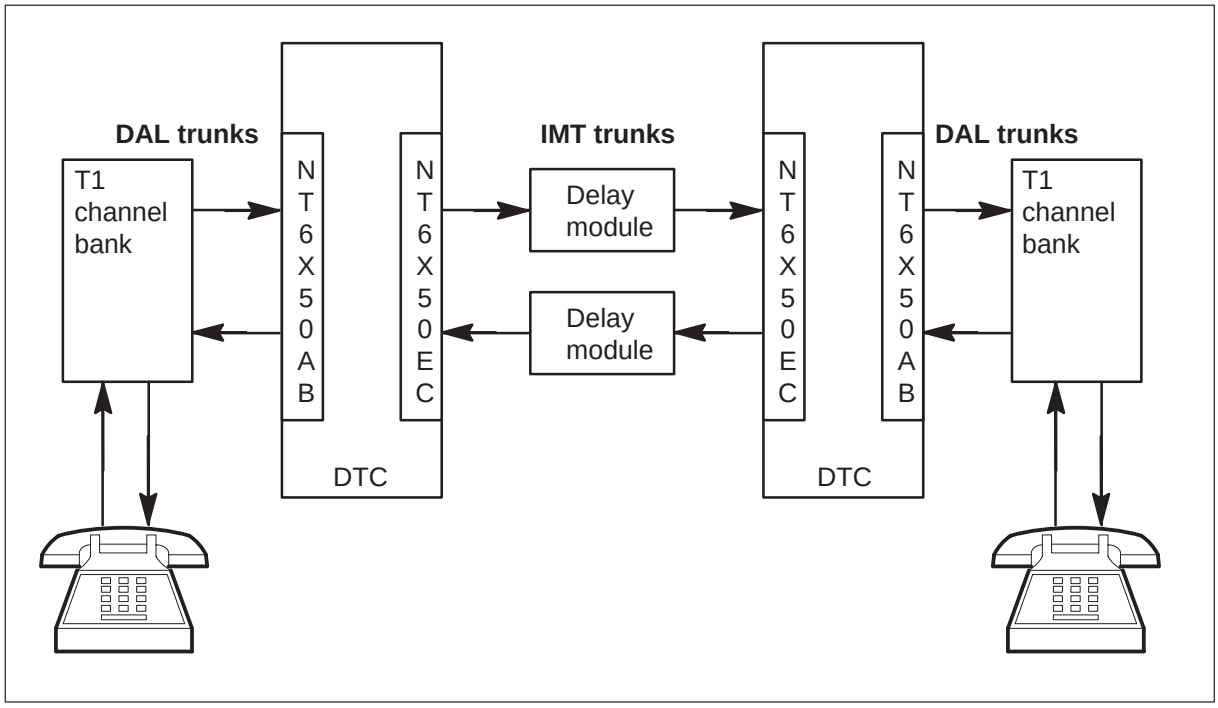
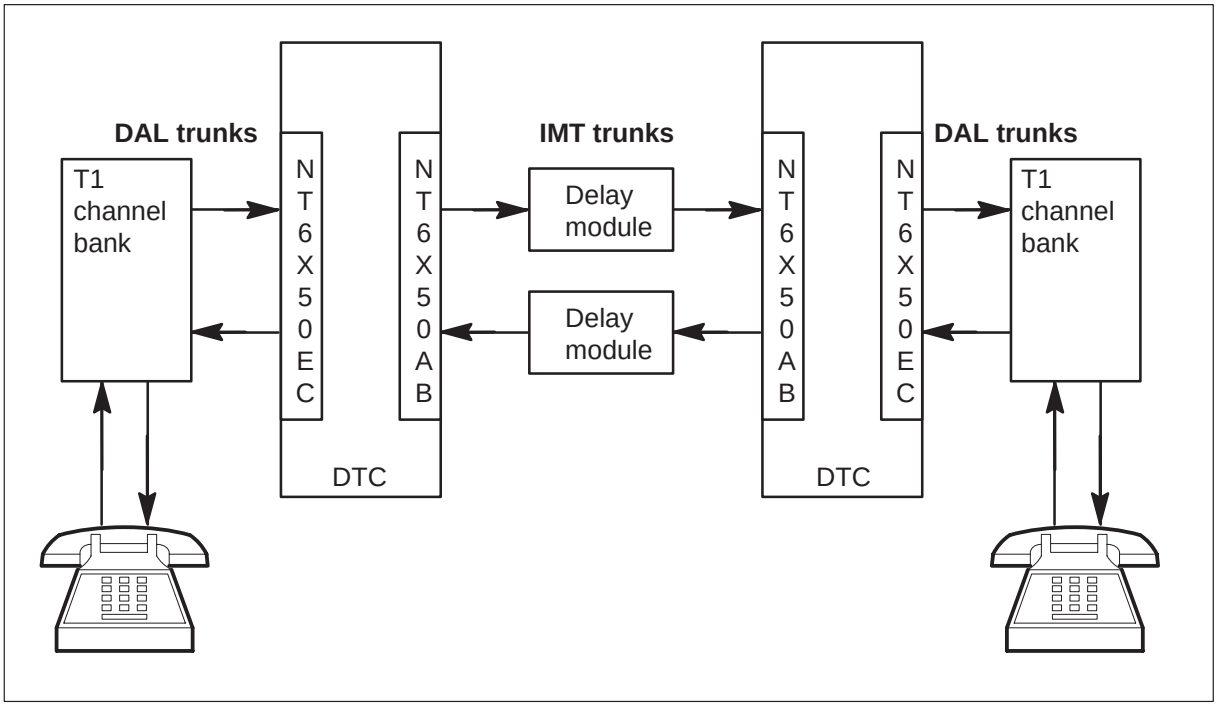


Figure 5-2
Network delay setup – NT6X50EC on access side



Tail delay-only setup

In a tail delay-only setup, the delay boxes are on the direct access line (DAL) side of the circuit between a digital trunk controller (DTC) and a channel bank (Figures 5-3 and 5-4). Channel banks divide DS1 streams into individual DS0s for use by handsets. The delay setting must be less than the maximum tail delay.

Figure 5-3
Tail delay setup - NT6X50EC on network side

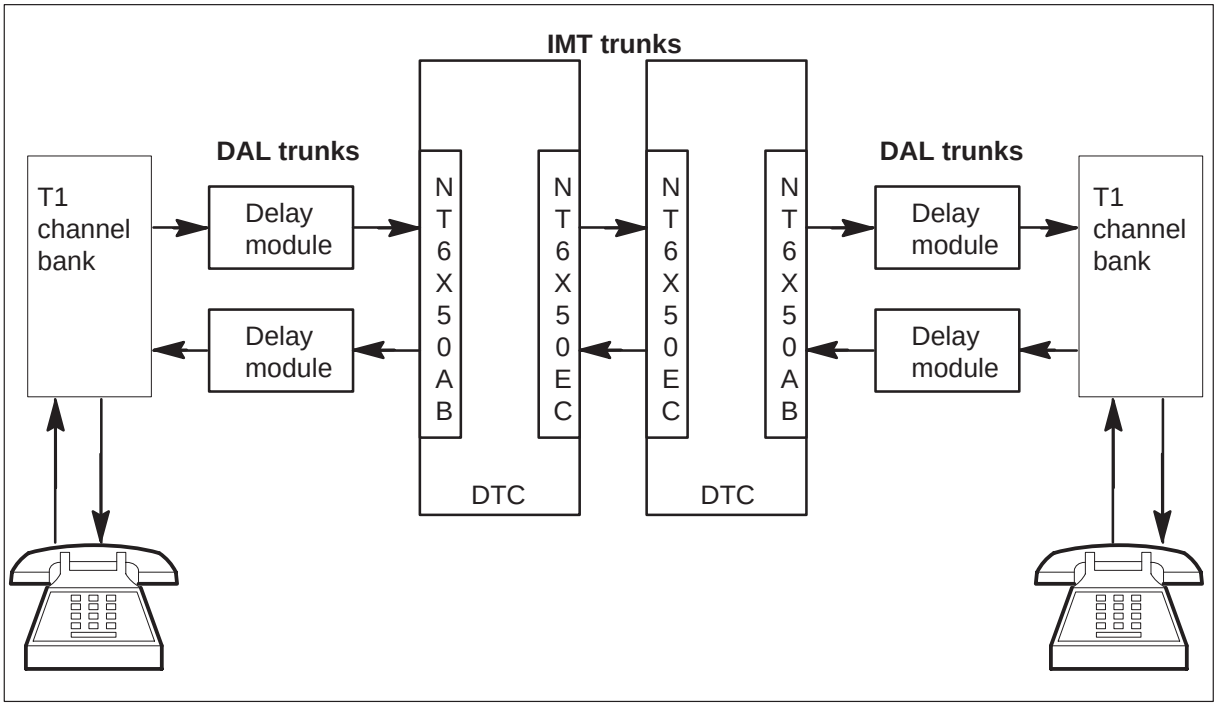
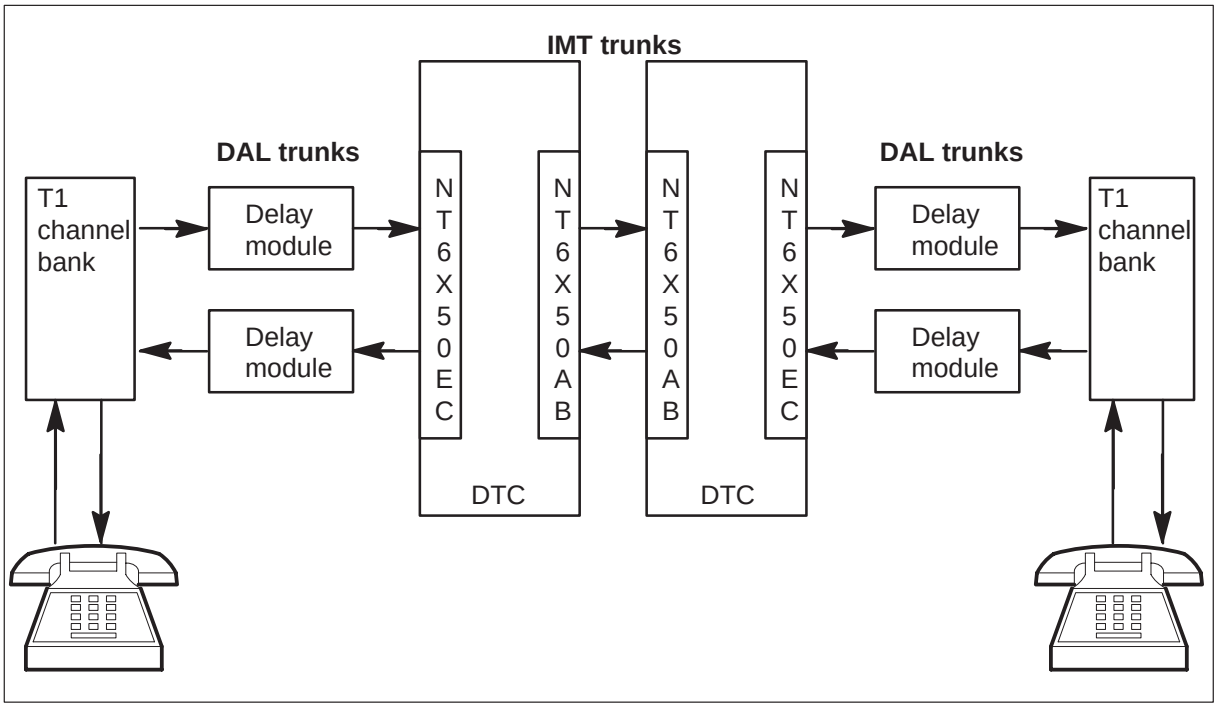


Figure 5-4
Tail delay setup – NT6X50EC on access side



Combined delay setup

In a combined delay setup (Figure 5-5), T1 delay modules are set up on both the network side and the tail (access) side. This configuration creates a worst-case network scenario. Network delay may be set to any value. Tail delay must be set to less than the maximum tail delay value.

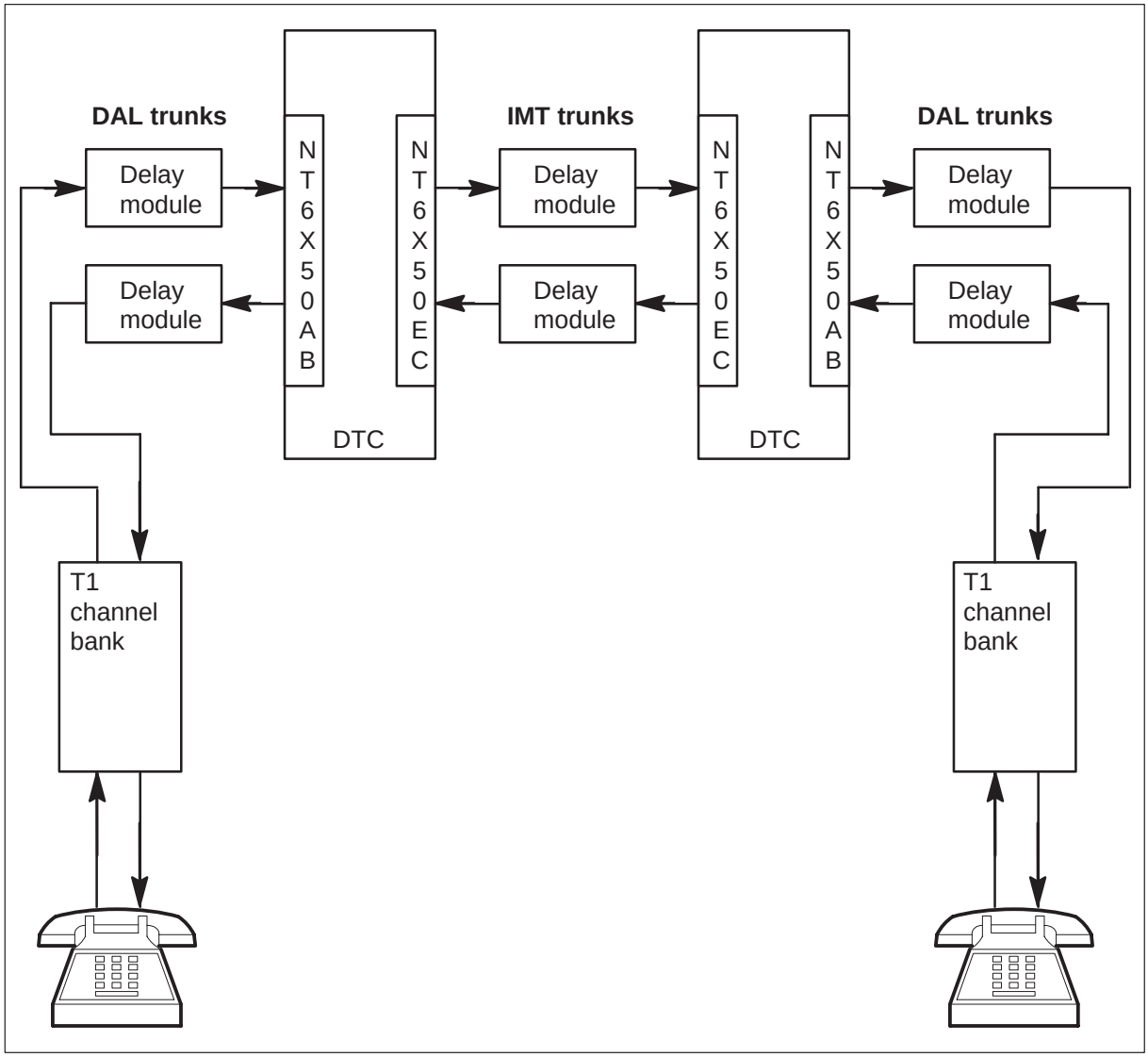
Transmission levels

To control signal levels, set the gain or attenuation in the channel bank cards. Once the T1 connections are made with the desired setup for delay, check for the desired attenuation of the signal through the network. This is often done with a transmission impairments test set (TIMS) at one end and the TTP level of the MAP terminal on the switch at the other end.

The following are typical attenuation values:

- 0 dB in the transmit direction and –6 dB in the receive direction
- –3 dB in the transmit direction and –6dB in the receive direction
- –3 dB in the transmit direction and –9 dB in the receive direction

Figure 5-5
Combined setup - NT6X50EC on network side



Testing

This section provides information for quantitative testing, subjective testing, and in-switch testing.

Quantitative testing

Quantitative testing techniques are described in CCITT Recommendation *ECs, Blue Book, Volume III, Fascicle III.1, Recommendation G.165, ITU, Geneva 1989.*

Subjective testing

For subjective testing, Nortel strongly recommends that you follow the steps in Procedure 5-1. This common test technique ensures that results from one test can be meaningfully compared to results from another.

Procedure 5-1
Performing subjective testing

Step	Action and response
1	Limit background noise, which at high levels can be interpreted as doubletalk, and which will disable the EC. Additionally, be aware of any possible “talk off.” Talk off refers to a human voice disabling the EC. Because the EC may be set to disable at 2100 Hz, a human voice that is able to create a 2100 Hz tone can disable the EC.
2	Place both telephone sets in quiet rooms to minimize false results.
3	Assign one speaker and one listener for each call. During the call, only the speaker talks. The listener simply goes off hook when the phone rings and hangs up when the speaker indicates the call is over. This technique allows the speaker to concentrate on the quality and characteristics of the speech path. This technique also avoids immediate doubletalk while the Digital Signal Processors (DSP) at both ends are attempting to converge. Initial call doubletalk is not a normal calling scenario, and can confuse the EC.
4	High voice energy, or yelling, can overdrive any analog channel bank channel unit cards that may be present causing analog clipping to occur and distorting test results. If an individual test case requires high voice energy, measure signal levels throughout the circuit at these levels, and ensure that the maximum energy falls within a safe range. Signal levels greater than –3 dBm0 are considered dangerous.
5	Record the results for each call as soon as the call is completed. Have the designated speaker record the results. Record each call in one of the following categories: • Clean call: no speech path impairments are noted. • Initial echo <2 seconds—fragmented or continuous echo detected. Total duration of this event is two seconds or less. Differentiate between fragmented and continuous echo. • Initial echo >2 seconds—fragmented or continuous echo detected. Total duration of this event was between two and five seconds. Differentiate between fragmented and continuous echo.

—continued—

Procedure 5-1
Performing subjective testing (continued)

Step Action and response

- Initial echo >5 seconds—fragmented or continuous echo detected. Total duration of this event was between five and ten seconds. Differentiate between fragmented and continuous echo.
- Initial echo >10 seconds—fragmented or continuous echo detected. Total duration of this event was greater than ten seconds. Differentiate between fragmented and continuous echo.
- Mid-call impairment: mid-call fragmented echo or a mid-call deconvergence or reconvergence is detected. Record the characteristics and duration of the impairment.

—end—

In-switch testing

To perform EC in-switch testing, do the following:

From the TRKS;CARRIER level, busy the spans associated with the NT6X50EC. (In this example, links 0 and 1 of DTC 0.)

>CARRIER
>POST <cpce type> <cpce #> <link #>
for example, **>POST DTC 0 0 DTC 0 1**

>BSY <item #>;BSY <item #>
for example, **>BSY 0;BSY 1**

>TST <item #>;TST <item #>
for example, **>TST 0;TST 1**

Troubleshooting

Echo cancellation is a complex function and its performance depends on several factors throughout the network. In test setups particularly, a problem or incorrect setting in one area of the system can cause echo cancellation to be poor. This section identifies some areas to check when beginning to troubleshoot a problem.

Configuration and datafill errors

1 Are the trunk members equipped in table TRKMEM (Trunk Member)?

2 Does the datafill in table TRKSGRP (Trunk Subgroup) match the actual configuration?

3 Is the ECSTAT field set to INTERNAL or INNOTONE (equipped) in table TRKSGRP?

4 Is the office parameter IMT_TANDEM_EC_ENABLE in table OFCVAR set correctly?

Load and patches

1 Are you using the correct load? Refer to “Software requirements” in Chapter 1, “Introduction.”

2 Does the load have all XPM and CM patches properly applied? Refer to “Software requirements” in Chapter 1, “Introduction.”

Transmission levels

1 Is the echo return loss at least 6 dB?

2 Are the signal levels greater than –3dBm0?

Other possible, less common problems

1 Does the tail circuit length exceed the maximum allowed length based on the transmission speed and provisioned tail delay? Refer to Table 1-1, “Maximum allowable round trip tail circuit length.”

2 Is there high background noise (particularly in switch rooms and labs)?

3 Are there any carrier problems such as slips, bipolar violation, or errored seconds?

4 Is there a problem with switch synchronization?

5 Are the line equalization settings correct?

6 Is this the current release of the circuit pack in use?

Performance monitoring capabilities

This chapter describes performance monitoring capabilities provided by the Echo Canceller Monitor (ECMON) command. The ECMON command and its options work with NT6X50EC Integrated Echo Canceller (EC) card to perform performance monitoring of EC-enabled trunks, XPMs, or system.

In addition to describing the functionality of the ECMON command, this chapter also includes information on the following:

- lists in-service maintenance tools that are supported on the NT6X50EC card
- describes logs related to the EC card
- describes operational measurements (OM) associated with the EC card

Software requirements

The ECMON command communicates with the performance monitoring software available only in digital trunk controller (DTC) extended peripheral modules (XPM).

ECMON commands

ECMON command options allow the user to perform the following:

- immediate query
- continuous monitoring
- continuous monitoring status (per-trunk, XPM, system)
- automatic performance monitoring

Immediate query

The ECMON READ command, entered from a MAP terminal, generates a performance report displaying real-time readings of the echo return loss (ERL) and echo return loss enhancement (ERLE) values. ERL and ERLE values are determined by the NT6X50EC card when the specified trunk is involved in an EC-enabled, answered call at the time of the request.

ERL and ERLE readings and status messages (”EC performance okay” or ”suspect indication”) display on the MAP terminal where the command was issued.

Note: Valid ERL and ERLE readings display only if EC is active on the NT6X50EC card when the command is sent. If the the feature is not active, the following message displays:

```
Echo canceller not enabled on selected trunk
```

Note: For accurate ERL and ERLE readings, use the ECMON READ command 30 seconds after the call is established. However, for determination of 2100 Hz tone detection, the ECMON READ command may be used immediately.

ECMON READ input/output

Format:

>ECMON <trunk group clli> <trunk group member number>READ

Sample response(s):

>ECMON IMT2WMFWK 63 READ

```
IMT2WMFWK 63 – DTC 2    carrier 3   channel 2
ERL: 8 dB   ERLE: 35 dB
Echo canceller performing within expected limits.
```

ECMON READ restrictions

Restrictions associated with the ECMON READ command include:

- Trunk group CLLI can be any valid trunk group CLLI equipped with internal ECs. The datafill of table TRKSGRP (Trunk Subgroup), parameter ECSTAT must be set to either INTERNAL or INNOTONE. Short CLLI names are also supported.
- Trunk group member number can be any valid member of the trunk group CLLI specified in the trunk group CLLI parameter. The trunk group member must be on a DS1 span equipped with an internal EC. Table LTCPSINV must point to an entry in table CARRMTC specifying that an NT6X50EC circuit is equipped for the specified trunk group member’s carrier port.
- Usage is restricted to one command every five seconds. This time lapse requirement ensures that no degradation of call processing performance occurs.

Logs

Each time the ECMON READ command executes successfully, a PM910 log is generated. This log displays EC performance data at the MAP terminal that issued the request.

Continuous monitoring

A series of ECMON command options allows the user to enable or disable continuous monitoring of EC performance on a per-trunk, per XPM, or system-wide basis. Request for continuous monitoring is made from the MAP terminal using the formats listed in Table 6-1. Table 6-1 formats are used to enable/disable a trunk, XPM, or system from performing continuous monitoring.

Note: Continuous monitoring saves the user from having to repeatedly enter the ECMON READ command.

Table 6-1
Continuous monitoring formats - enable/disable monitoring of trunk, XPM, system

Command format	Example	Description
ECMON <CLLI> <member #> <option>	**ECMON IMTOGMFSD 21 ON**	Enables per trunk
ECMON <CLLI> <member #><option>	**ECMON IMTOGMFSD 21 OFF**	Disables per trunk
ECMON <PM type> <PM #><option>	**ECMON DTC 10 OFF**	Disables per XPM
ECMON <option>	**ECMON OFF**	Disables for whole system

Continuous monitoring status

A series of ECMON command options allows the user to display the performance status for the trunk, XPM, or system enabled through the ECMON continuous monitoring enable/disable option. Status reports are displayed on the MAP terminal where the request was issued. Table 6-2 formats allow users to select status reporting for specific trunk(s), XPM(s), or the system.

Table 6-2
Continuous monitoring format – status reporting for enabled trunk, XPM, system

Command format	Example	Description
ECMON <CLLI> <member #><option>	**ECMON IMT2WMFWK 63 STATUS**	Status per trunk
ECMON <PM type> <PM #><option>	**ECMON DTC 2 STATUS**	Status per XPM
ECMON <option>	**ECMON STATUS**	Status for whole system

Logs

A PM910 log is generated each time a query to trunk circuit with continuous monitoring enabled is generated. This log shows whether or not the associated echo canceller is performing within acceptable limits and provides a record of the associated echo canceller performance readings.

Automatic monitoring

Automatic performance monitoring sequences through all trunks equipped with the NT6X50EC card and verifies that EC performance is operating within expected limits for each assigned in-service channel of an NT6X50EC port. A channel is monitored for ten minutes or until three performance monitor reports are received from the XPM. Once enabled, automatic performance monitoring is maintained over computing module (CM) restarts. Table 6-3 shows automatic monitoring formats.

Table 6-3
Automatic monitoring format - enable/disable monitoring

Command format	Example	Description
ECMON AUTO <option>	**ECMON AUTO ON**	Enables automatic monitoring
ECMON AUTO <option>	**ECMON AUTO OFF**	Disables automatic monitoring
ECMON AUTO <option>	**ECMON AUTO STATUS**	Displays current state of automatic monitoring

Logs

If automatic monitoring encounters a circuit with suspect echo canceller performance, the UCS DMS-250 switch attempts three immediate performance queries with 30 seconds. The data from those queries (if successful) and the initial suspect performance report are output as one PM911 log. This log helps determine if a problem exists and to isolate an existing problem. The PM911 log contains the data for each successful query performed.

Note: The query types shown in Table 6-3 may not be successful because such queries work only for trunks involved in answered echo canceller-enabled calls.

Responses

Responses to the following ECMON commands, an explanation of each command, and any user action that should be taken based on that response are included in this section:

- per-trunk READ

- per-trunk ON
- per-trunk OFF
- per-trunk STATUS
- per-trunk input errors
- XPM-based commands
- XPM-based failure conditions
- system-wide commands
- system-wide failure conditions
- AUTO
- general errors

Table 6-4 provides information on each field that may appear in response to the various commands.

Table 6-4
ECMON response fields

Field name	Description
CLLI	Trunk group to which the displayed data applies
mem #	Trunk group member number
XPM type	Type of XPM to which the specified trunk is assigned; only DTC is supported
XPM #	XPM number to which the specified trunk is assigned
carrier	T1 span/port to which the specified trunk is assigned
channel	T1 timeslot to which the specified trunk is assigned
ERL: xx dB	ERL reading returned by the XPM
ERLE: xx dB	ERLE reading returned by the XPM
text	Message that explains the results of the ECMON request

Per-trunk READ responses

Responses to per-trunk READ commands may include any of the following, depending on the type of response.

Per-trunk READ - valid response

Format:

<CLLI> <mem #> – <XPM type> <XPM #> <carrier> <channel>
ERL: xx dB ERLE: xx dB
<text>

Sample display:

```
   IMTC7ANY 63 – DTC 10  carrier 12  channel 21
   ERL: 8 dB    ERLE: 27 dB
Echo canceller performing within expected limits.
```

Sample response(s):

```
Echo Canceller Performing Within Expected Limits.
```

Meaning: The requested data is obtained from the XPM and returned to the MAP display where the request originated. This response indicates that the request was successful and that the sum of ERL and ERLE is at least 30 dB.

Action: None. This is the expected response

```
Potential network problem; ERL should be at least 6 dB.
```

Meaning: The ERL is less than 6 dB which may indicate a problem within the network. The echo canceller will not work properly unless the ERL is at least 6 dB.

Action: Determine the reason that the ERL is less than 6 dB and correct the problem. Repeat the command to verify the results.

```
Potential echo cancellation problem; ERL+ERLE < 30 dB.
```

Meaning: The ERL is at least 6 dB and the echo canceller is activated, but the total ERL plus enhancement is less than 30 dB. This may indicate a potential problem with echo cancellation on the NT6X50EC.

Action: Troubleshoot the possible source of the echo cancellation problem. Repeat the command to verify the results.

Per-trunk READ - invalid response

Format:

<CLLI> <mem #> – <XPM type> <XPM #> <carrier> <channel>
<text>

Sample response(s):

```
Invalid ERL/ERLE readings. Please try again.
```

Meaning: The response message from the XPM has flagged the data as invalid. This can occur if the input signal amplitude to the EC is too low, if the ERL is too low, or if there is an echo suppressor in the transmission path.

Action: Verify that there are no external echo suppressors in the transmission path and that multiple ECs are not active on the call. Repeat the command to verify the results.

```
2100 Hz tone detected. Echo Canceller disabled.
```

Meaning: The NT6X50EC has disabled the EC on the specified trunk because a 2100 Hz tone was detected, which indicates a data call.

Action: None.

```
Echo Canceller not enabled on selected trunk
```

Meaning: Echo cancellation is not enabled on the NT6X50EC for the selected trunk. This can occur if the specified trunk releases from the call while the readings are being retrieved, or if the specified trunk is involved in a call in which it is not the end circuit.

Action: Verify whether the NT6X50EC should be activated for the call.

Per-trunk READ - valid continuous monitoring active response

Only one channel of a DS1 carrier can have performance monitoring active. If continuous monitoring is active on a channel different from the one specified in the READ request, a response appears in the following format:

Format:

<text>
<CLLI> <mem #> – <XPM type> <XPM #> <carrier> <channel>
<text>

Sample response(s):

```
Echo canceller monitoring already active on trunk:
<CLLI><mem#>-<XPM type><XPM#><carr><chan>.
Request denied.
```

Meaning: A request for another trunk on the same carrier is already in progress in the DTC. Possible causes include the following: continuous monitoring may be active on a different trunk assigned to the same carrier as the requested trunk, or another user may have requested a reading on a different trunk assigned to the same carrier.

Action: Determine if continuous monitoring is enable for a different trunk or if another user is requesting a reading. Clear the conflict and try again.

Per-trunk READ - invalid continuous monitoring active response

Format:

<CLLI> <mem #> – <XPM type> <XPM #> <carrier> <channel> <text>

Sample response(s):

```
Processing another request for this trunk
```

Meaning: The XPM is processing another request on the specified trunk and can only do one at a time. This request came in second and was rejected.

Action: Try the request again after five or ten seconds.

```
Selected trunk is not involved in a call.
Request for immediate READ denied.
```

Meaning: The specified trunk has no call, so the echo canceller is not enabled.

Action: Wait until the specified trunk is involved in an answered echo canceller-enabled call, and enter the command again.

Per-trunk ON responses

Responses to per-trunk ON commands may take any of the following formats, depending on the type of response.

Note: The specified trunk does not have to be involved in an answered call at the time of the request. If it is involved in an answered, EC-enabled call, the ERL and ERLE data display.

Per-trunk ON - Trunk not involved in an EC-enabled call response

Format:

<text>
<CLLI> <mem #> – <XPM type> <XPM #> <carrier> <channel>

Sample response(s):

```
Continuous monitoring enabled.
   IMTC7ANY 64 – DTC 10  carrier 17  channel 23
```

Note: The text message indicates that the UCS DMS-250 switch successfully processed a request to continuously monitor the echo canceller for a specified trunk. The specified trunk was not involved in a call at the time of the request. This is the expected response and no action is required.

Per-trunk ON - Trunk involved in an EC-enabled call response

Format:

<text>
<CLLI> <mem #> – <XPM type> <XPM #> <carrier> <channel>
ERL: xx dB ERLE: xx dB
<text>

Sample response(s):

```
Continuous monitoring enabled.
   IMTC7ANY 63 – DTC 10  carrier 12  channel 21
   ERL: 8 dB    ERLE: 27 dB
Echo canceller performing within expected limits.
```

Note: The text messages indicate that the UCS DMS-250 switch successfully processed a request to continuously monitor the echo canceller for a specified trunk. The specified trunk was involved in a call at the time of the request. This is the expected response. No action is required.

Per-trunk ON - Trunk not involved in an EC-enabled call response

Sample response(s):

```
Continuous monitoring already active on trunk.
No action taken.
```

Meaning: Continuous performance monitoring is already active on the specified trunk.

Action: Verify that the request specified the correct trunk. If not, enter the correct trunk and try again. Otherwise, do nothing.

Per-trunk ON - Different trunk already being monitored response

Format:

<text>
<CLLI> <mem #> – <XPM type> <XPM #> <carrier> <channel>
<text>

Sample responses(s):

```
Already monitoring specified trunk. No action taken.
```

Meaning: Continuous performance monitoring is already active on the specified trunk.

Action: Verify that the correct trunk was entered in the request. If not, enter the correct trunk. Otherwise, do nothing.

Per-trunk OFF commands

Responses to per-trunk OFF commands may take any of the following formats, depending on the type of response.

Per-trunk OFF - valid response

Format:

<text>
<CLLI> <mem #> – <XPM type> <XPM #> <carrier> <channel>

Sample responses(s):

```
Continuous monitoring disabled.
   IMTC7ANY 64 – DTC 10  carrier 17  channel 23
```

Note: The text message indicates that the UCS DMS-250 switch successfully processed a request to disable continuous monitoring of echo canceller for the specified trunk. This is the expected response. No action is required.

Per-trunk OFF - invalid response

Format:

<text>

Sample responses(s):

```
Continuous monitoring not active on specified trunk.
No action taken.
```

Meaning: A request was made to cancel continuous monitoring on a trunk that was not being continuously monitored.

Action: Verify that the correct trunk was entered in the request. If not, enter the correct trunk. Otherwise, do nothing.

Per-trunk STATUS responses

Format:

<text>
<CLLI> <mem #> – <XPM type> <XPM #> <carrier> <channel>

Sample display:

```
Continuous monitoring active.
   IMTC7ANY 63 – DTC 10  carrier 3   channel 02
```

Sample responses(s):

```
Continuous monitoring active.
```

Meaning: A status request was entered for a trunk that is being monitored.

Action: This is the expected response. No action is required.

```
Continuous monitoring not active.
```

Meaning: A status request was entered for a trunk that is not being monitored.

Action: This is the expected response. No action is required.

Per-trunk input errors

The following responses may appear on the MAP terminal if input errors are made when entering commands.

Format:

<text>

Sample responses(s):

```
<CLLI> is not a valid trunk group CLLI.
```

Meaning: The trunk group CLLI specified is not valid. This message also displays when an incomplete valid trunk CLLI of more than six characters is entered. A valid partial CLLI of six characters is processed as a short CLLI.

Action: Determine the correct CLLI for the trunk and try the command again.

```
<trunk_num> is not a valid trunk number.
```

Meaning: The second parameter entered was a number larger than 9999. The valid range is 0 to 9999.

Action: Enter the command again with a valid CLLI group member number.

```
Missing command parameters. Correct format is:
ECMON <CLLI><number><ON|OFF|READ|STATUS>
```

Meaning: One of the three required parameters is missing.

Action: Enter the command again with the correct number of parameters.

```
Invalid trunk command, <parm 3>.
Valid options are  ON, OFF, READ, or STATUS.
```

Meaning: An invalid entry was made in the third parameter.

Action: Enter the command again with one of the four valid options in the third parameter.

```
Timed out waiting for response from <DTC><#>.
```

Meaning: The XPM sent no response or responded after the ten-second timer expired. The time-out could be caused by high processing requirement on either the CM or XPM.

Action: Try the command again. Verify that the destination XPM is functional. If the error is repeatable notify ETAS of the problem.

`Unexpected response received. Please try again`

Meaning: The response received from the XPM does not match any of the expected responses.

Action: Record pertinent call scenario information and verify that the error is repeatable. Notify ETAS of the problem.

`Specified trunk does not exist.`

Meaning: The trunk member specified in the ECMON command does not exist in table TRKMEM.

Action: Determine the correct trunk member and try the command again.

`Trunk not datafilled for internal echo cancellation.`

Meaning: The specified trunk is not set for internal echo cancellation. The ECSTAT field in table TRKSGRP is not set to INTERNAL or INNOTONE.

Action: Verify the trunk group CLLI and trunk group member number. Verify that the specified trunk is datafilled for internal ECs. Correct the datafill if necessary. Try the ECMON command again.

`Trunk circuit assigned to unsupported XPM type.`

Meaning: The specified trunk is assigned to an XPM type that is not supported by the ECMON command.

Action: Verify the trunk group CLLI and trunk group member number. Verify that the specified trunk is assigned to a DTC XPM. Correct the datafill if necessary. Try the ECMON command again.

`Trunk not assigned to NT6X50EC-equipped channel.`

Meaning: The specified trunk is not datafilled on an XPM span whose carrier maintenance datafill indicates the card code is NT6X50EC. The entry for the XPM span in table LTCPSINV must point to an entry in table CARRMTC which identifies the card type as NT6X50EC.

Action: Verify the datafill and correct it if necessary. Try the ECMON command again.

```
Check service state of target equipment.
Try again when all related equipment in service.
```

Meaning: Some of the equipment required to retrieve data for the specified trunk is out of service.

Action: Verify that all required equipment is in service. If not, restore all associated equipment before trying the command again. If all required equipment is already in service, notify ETAS of the problem.

XPM-based commands

XPM-based commands provide the following options:

- Disable continuous performance monitoring for all trunks assigned to the specified XPM. Request must be confirmed before the command is processed.
- List all trunks with continuous performance monitoring active on the specified XPM.

Sample response(s):

```
XPM-based OFF request response – confirmed.
```

Command: >ECMON <xpm type>< xpm num> OFF

Reply:
```
This will disable continuous monitoring on
<XPM type> <num>. Do you wish to continue?
(YES, Y, NO or N):
```

Input: >Yes

Reply:
```
Continuous monitoring disabled for <XPM type>
<XPM num):
```

Meaning: The request to disable continuous monitoring for all trunks on the specified XPM is successfully processed.

Action: This is the expected response. No action is required.

```
XPM-based OFF request response – not confirmed.
```

Command: >ECMON <xpm type> <xpm num> OFF

Reply:
```
This will disable continuous monitoring on
<XPM type> <num>. Do you wish to continue?
(YES, Y, NO or N):
```

Input: >No

Reply:
```
Command aborted.
```

Meaning: The request to disable continuous monitoring for all trunks on the specified XPM was aborted at the user's request. No action is taken.

Action: This is the expected response. No action is required.

`XPM-based STATUS request response`

Command: >ECMON <xpm type> <xpm num> STATUS

Reply:
```
Continuous monitoring active on the following
trunks:
 <CLLI><mem>–<XPM type><XPM num> carrier
 <#> channel <#>
 <CLLI><mem>–<XPM type><XPM num> carrier
 <#> channel <#>
 <CLLI><mem>–<XPM type><XPM num> carrier
 <#> channel <#>
 <CLLI><mem>–<XPM type><XPM num> carrier
 <#> channel <#>
```

Meaning: Successful processing of a list of all trunks that have continuous performance monitoring active on the specified XPM.

Action: This is the expected response. No action is required.

`XPM-based STATUS request response`

Command: >ECMON <xpm type> <xpm num> STATUS

Reply:
```
No trunks are being monitored on <XPM type>
<XPM num>.
```

Meaning: A request is received to list all trunks that have continuous performance monitoring active. This response is sent to the requesting MAP terminal when no trunks are being performance monitored.

Action: This is the expected response. No action is required.

XPM-based failure conditions

The following responses may appear for XPM-based commands that experience failure conditions.

Sample response(s):

```
<XPM type> <num> not equipped.
```

Meaning: The specified XPM is not equipped.

Action: Equip the specified XPM or determine the proper XPM type and number before entering the command again.

```
No NT6X50EC equipped on <XPM type> <num>.
```

Meaning: The specified XPM is not equipped with any NT6X50EC circuit packs.

Action: Verify that at least one NT6X50EC circuit pack is equipped in the specified XPM. If the hardware is present, verify the datafill for tables LTCPSINV and CARRMTC.

```
<XPM type> <num> not in service.
```

Meaning: The specified XPM is not in service.

Action: Restore the specified XPM and try the command again.

```
Only DTC peripherals supported by this command.
```

Meaning: This command is only supported by DTC XPMs equipped with NT6X50EC circuit packs.

Action: Specify the supported XPM type and try the command again.

```
Missing command parameters. Correct format is:
ECMON <DTC> <XPM number> <OFF|STATUS>.
```

Meaning: The second parameter was not entered. Both the XPM number and command options parameters are needed for XPM-based commands.

Action: Enter the command again with all the required parameters.

```
<parm2> is not a valid XPM number.
```

Meaning: The value entered for the second parameter was not a valid XPM number.

Action: Enter the command again using a valid XPM number for the second parameter.

```
<parm3> is not a valid XPM option.
```

Meaning: The value entered for the third parameter was not one of the allowed values (either OFF or STATUS).

Action: Enter the command again using the value of OFF or STATUS for the third parameter.

System-wide commands

System-wide commands allow the user to list all trunks with continuous performance monitoring enabled, or to disable continuous performance monitoring system wide. Request must be confirmed before the command is processed.

Sample response(s):

```
System-based OFF request response – confirmed.
```

Command: >ECMON OFF

Reply:
```
This will disable all echo canceller
performance monitoring. Do you wish to
continue? (YES, Y, NO or N):
```

Input: >Yes

Reply:
```
ECMON OFF command started.
  Continuous monitoring disabled – <XPM type>
   <num>
  Continuous monitoring disabled – <XPM type>
   <num>
  Continuous monitoring disabled – <XPM type>
   <num>
ECMON OFF command completed.
```

```
System-based OFF request response – not confirmed.
```

Command: >ECMON OFF

Reply:
```
This will disable all echo canceller
performance monitoring. Do you wish to
continue? (YES, Y, NO or N):
```

Input: >No

Reply:
```
Command aborted.
```

Meaning: A successful response to the request to disable all continuous performance monitoring on the system.

Action: This is the expected response. No action is required.

```
STATUS request response.
```

Command: >ECMON STATUS

Reply:
```
Continuous monitoring active on the following
trunks:
 <CLLI><mem>–<XPM type><XPM num> carrier
 <#> channel <#>
 <CLLI><mem>–<XPM type><XPM num> carrier
 <#> channel <#>
 <CLLI><mem>–<XPM type><XPM num> carrier
 <#> channel <#>
 <CLLI><mem>–<XPM type><XPM num> carrier
 <#> channel <#>
ECMON STATUS command complete.
```

Meaning: Successful processing of a list of all trunks that have continuous performance monitoring active. The display is ordered on an XPM and then channel basis.

Action: This is the expected response. No action is required.

```
STATUS request response – no trunks being monitored.
```

Command: >ECMON STATUS

Reply:
```
Continuous monitoring not active on any
trunks.
```

Meaning: A successful response to a request to list all trunks with continuous performance monitoring active when no trunks are being monitored.

Action: This is the expected response. No action is required.

```
STATUS request response – no NT6X50EC-equipped XPMs.
```

Command: >ECMON STATUS

Reply: `No NT6X50EC-equipped XPMs found.`

Meaning: A successful response to a request to list all trunks with continuous performance monitoring active when no XPMs are equipped with NT6X50EC circuit packs.

Action: This is the expected response. No action is required.

System-wide failure conditions

System-wide failure condition responses may appear for system-wide commands that experience failure conditions.

Sample responses(s):

```
Internal resources unavailable; request aborted.
```

Meaning: The ECMON CI process encountered an error while trying to send a request to the program that processes the request to disable all continuous monitoring.

Action: Try the command again. Notify ETAS if the problem persists.

```
Not in service, not processed – <DTC> <num>
```

Meaning: The ECMON CI encountered an out-of-service XPM while trying to process a request to disable all continuous monitoring.

Action: Put the XPM back in service and try the command again.

```
Internal resource error; request aborted for – <DTC> <num>
```

Meaning: The ECMON CI encountered an error while trying to send a request to an XPM.

Action: Try the command again. Notify ETAS if the problem persists.

```
System resource error detected. Command failed for –  <DTC>
<num>
```

Meaning: The ECMON CI detected a system-related error while waiting for a response to an XPM request while trying to process a request to disable all continuous monitoring.

Action: Try the command again. Notify ETAS if the problem persists.

```
Command acknowledgment time-out. Command failed for –  <DTC>
<num>
```

Meaning: The ECMON CI did not receive a response to an XPM request within the expected time while trying to process a request to disable all continuous monitoring.

Action: Try the command again. Notify ETAS if the problem persists.

```
Internal processing error; request failed for –  <DTC> <num>
```

Meaning: An internal communication error occurred between ECMON CI and ECMONP.

Action: Try the command again. Notify ETAS if the problem persists.

```
Unexpected reply received; request failed for –  <DTC> <num>
```

Meaning: The ECMON CI received an unexpected message while trying to process a request to disable all continuous monitoring.

Action: Try the command again. Notify ETAS if the problem persists.

AUTO commands

The ECMON AUTO command offers ON, OFF, and STATUS options to enable or disable the automatic performance monitoring process, or to query the current site of the automatic echo canceller performance monitoring process.

Sample responses(s):

```
Automatic echo canceller performance monitoring enabled.
```

Meaning: A successful request to enable the automatic echo canceller performance monitoring process.

Action: This is the expected response. No action is required.

```
Automatic echo canceller performance monitoring already
enabled.
```

Meaning: A request was received to enable the automatic echo canceller performance monitoring process when it was already enabled.

Action: None.

```
Automatic echo canceller performance monitoring disabled
```

Meaning: A successful request to disable the automatic echo canceller performance monitoring process

Action: This is the expected response. No action is required.

```
Automatic echo canceller performance monitoring already
disabled.
```

Meaning: A request was received to disable the automatic echo canceller performance monitoring process when it was not enabled.

Action: None.

```
Cannot change AUTO status during a dump.
```

Meaning: The system backup process was active when a request was entered to change the active state of the automatic echo canceller performance monitoring process.

Action: Wait for the backup to finish and enter the command again.

```
<parm2> is not valid. Valid options are ON, OFF, or STATUS.
```

Meaning: The second parameter entered was not one of the acceptable values.

Action: Enter the command again using a valid value for the second parameter.

```
Missing command option. Valid options are ON, OFF or STATUS.
```

Meaning: No value was entered for the second parameter.

Action: Enter the command again using the value of ON, OFF or STATUS for the second parameter.

General errors

Several general error responses can be received, regardless of the command formats entered.

Sample response(s):

```
Unknown ECMON command.
Enter HELP ECMON for correct command options.
```

Meaning: The input command does not conform to any of the allowed command formats. This message appears if the first parameter is not recognized as a valid trunk group CLLI, as a supported XPM type, or as the key word AUTO, OFF, or STATUS.

Action: Enter the command again using a valid command format.

```
ECMON cannot be used on this system.
```

Meaning: The ECMON command is not allowed on systems equipped with external echo cancellers assigned to PDTC XPMs. This message appears when the system supports that hardware configuration.

Action: None. The command is not supported in this configuration.

```
Internal data error detected. Please try again later.
```

Meaning: An internal table data inconsistency has been detected. An audit of the internal tables has been scheduled.

Action: Wait about ten minutes for the internal audit to finish and try the command again. If the problem persists, contact ETAS.

```
Invalid request, <num>, received.
```

Meaning: An invalid input parameter was received by the program that processes ECMON CI command requests.

Action: Try the command again. Notify ETAS of all details of this error if it is repeatable.

```
Invalid carrier number, <carrier>, received.
```

Meaning: An invalid input parameter was received by the program that processes ECMON CI command requests.

Action: Try the command again. Notify ETAS of all details of this error if it is repeatable.

```
Invalid carrier channel, <chan num>, received.
```

Meaning: An invalid input parameter was received by the program that processes ECMON CI command requests.

Action: Try the command again. Notify ETAS of all details of this error if it is repeatable.

```
Internal resource unavailable. Request aborted.
```

Meaning: This response displays at the MAP terminal if any of the required internal resources are not available when the command is issued.

Action: Try the command again. If the problem persists, notify ETAS.

```
Not assigned – <XPM type> <num> <carr> <chan>
```

Meaning: A translation error occurred when converting the XPM number, carrier number, and carrier channel number data contained in an XPM response message to its CLLI and CLLI member number.

Action: Verify that the data contained in tables CLLI and TRKMEM contain valid data for the displayed XPM carrier and channel. Correct table entries as needed. If the table data is already correct, notify ETAS.

In-service maintenance tools

The NT6X50EC card supports all in-service maintenance tools supported on the NT6X50AB card.

The following tools are accessible through the MAP terminal:

- bit error rate monitoring
- errored second monitoring
- severely errored second monitoring
- unavailable errored second monitoring
- PM logs

In addition to tools supported on the NT6X50AB, the NT6X50EC also supports ECF (EC failure) alarm monitoring.

Logs

The following logs are associated with the EC card:

- PM 110
- TRK108
- TRK109
- PM 910
- PM 911
- PM 912

Note: PM logs 910, 911, and 912 relate to the ECMON command.

PM110

The PM110 log generates when the DTC detects a fault and reports it to the UCS DMS-250 switch's central control complex (CCC). A PM110 log is used when the carrier remains in service for the EC faults.

The in-service EC diagnostic test uses the following PM log reasons:

- EC FAIL: SET generates if the EC portion of the DS1 card failed.
- EC FAIL: CLR generates if the ECF alarm clears.

Format

```
PM110 date time seqnbr INFO CARRIER pmid
   CARRIER NO:nnnn, REASON:readon_txt
```

Example

```
PM110 JAN02 00:03:14 9200 INFO CARRIER DTC 0
   CARRIER NO: 5, REASON: EC FAIL: SET

PM110 JAN02 00:06:20 9203 INFO CARRIER DTC 0
   CARRIER NO: 5, REASON: EC FAIL: CLR
```

Field descriptions

Table 6-5 describes the fields in the PM110 log.

Table 6-5
PM110 field descriptions

Field	Value	Description
pmid	DTC nnn where nnn is 0 to 255	Indicates the PM type and PM number of the affected PM.
nnnn	0 to 9999	Indicates the T1 carrier.
reason_txt	EC FAIL:SET	Indicates failure of the EC portion of the DS1 card.
	EC FAIL:CLR	Indicates the ECF alarm is cleared.

Action

If the switch encounters an echo canceller failure (ECF), the EC portion of the card becomes nonfunctional. The card remains in operation as a normal DS1 AB card as long as the AB portion is functional.

Deload the trunks using the TTP MAP level and BSY the link at the CARRIER MAP level. Perform an out-of-service test to verify functionality. If the test fails, replace the card. If the test passes, the initial fault condition could be the result of an intermittent problem. Notify ETAS of a potential problem.

TRK108

The TRK subsystem generates a TRK108 log when a diagnostic test on a DS1 facility passes.

Note: The trunk maintenance (TRK) subsystem generates either a TRK108 or TRK109 log when a diagnostic test is run on a DS1 facility. This test may result from a manual request from the MAP terminal or from a system request if trouble with the DS1 and/or its connected facilities is encountered. A system-initiated diagnostic test is preceded by a log with an event type of either trouble (TBL), fault (FLT), or information (INFO).

Each diagnostic test reported by these logs consists of several test procedures. For example, the system initiates diagnostic testing for some of the system troubles reported in TRK116. If the diagnostic test passes, TRK108 generates.

Format

```
TRK108 mmmdd hh:mm:ss ssdd PASS
   PM: pmnm NO no CCT cct
```

Example

```
TRK108 FEB23 22:52:25 3560 PASS
   PM: DTC NO 10 CCT 8
```

Field descriptions

Table 6-6 describes the fields in the TRK108 log.

Table 6-6
TRK108 field descriptions

Field	Value	Description
pmnm	alphanumeric	Indicates the type of PM to which the suspect DS1 is connected.
no	0–99	Indicates the PM.
cct	0–99	Indicates the DS1 carrier.

TRK109

The TRK subsystem generates a TRK109 log when a diagnostic test on a DS1 facility fails.

Note: The trunk maintenance (TRK) subsystem generates either a TRK108 or TRK109 log when a diagnostic test is run on a DS1 facility. This test may result from a manual request from the MAP terminal or from a system request if trouble with the DS1 and/or its connected facilities is encountered. A system-initiated diagnostic test is preceded by a log with an event type of either trouble (TBL), fault (FLT), or information (INFO).

Each diagnostic test reported by these logs consists of several test procedures. For example, the system initiates diagnostic testing for some of the system troubles reported in TRK116. If the diagnostic test fails, TRK109 generates. For each TRK109 log, check the NT6X50EC card to determine the fault.

Format

```
TRK109 date time seqnbr FAIL
   PM: pmnm NO no CCT cct
   ERROR: diagtxt
   ACTION: acttxt
   CARD: PEC
```

Example

```
TRK109 FEB23 22:52:25 3560 FAIL
   PM:     DTC NO 10 CCT 8
   ERROR:  EC FAIL
   ACTION: REPLACE CARD
   CARD:   NT6X50
```

Field descriptions

Table 6-7 describes the fields in the TRK109 log.

Table 6-7
TRK109 field descriptions

Field	Value	Description
pmnm	alphanumeric	Indicates the type of PM to which the suspect DS1 is connected.
no	0–99	Indicates the PM.
cct	0–99	Indicates the DS1 carrier.
diagtxt	EC FAIL	Indicates failure of the EC functions on the card. **Action:** Replace the card. For instructions, refer to Chapter 4, “Upgrading to NT6X50EC”.
acttxt	alphanumeric	Indicates the action to take. For details, see description column for diagtxt (diagnostic text) field.
PEC	alphanumeric	This code identifies the product.
	—end—	

Action

Contact the next level of maintenance if replacing the card does not correct the problem.

PM910

A PM910 log generates whenever the XPM sends an echo canceller performance report to the computing module (CM). The performance report could be generated autonomously or in response to an ECMON READ command. An autonomous report is generated each time a continuous-performance-monitored trunk is involved in an answered echo canceller-

enabled call. A PM910 log is not generated for performance reports initiated by the automatic performance monitoring process.

Format

```
PM910   <date> <time> <seqnum> INFO ECHO CANCELLER REPORT
<monitor mode>
   MON TRK:     <clli> <mem> - <type> <num> <carr> <chan>
   ASSOC TRK:   <clli> <mem> - <type> <num> <carr> <chan>
   ERL: <value> dB  ERLE: <value>: dB
<performance text>
```

Note: The six fields related to MON TRK and ASSOC TRK display an asterisk (*) if data for any of those fields is invalid.

Example

```
250G PM910 JUN5 09:17:45 1596 INFO ECHO CANCELLER REPORT
MONITOR
   MON TRK:     imtc7iany 10 – DTC 10 10 12
   ASSOC TRK:   imtc7oany 10 – DTC  5  7 21
   ERL: 06 dB   ERLE: 28dB
Echo Canceller Performing Within Expected Limits.
```

Field descriptions

Table 6-8 describes the fields in the PM910 log.

Table 6-8
PM910 field descriptions

Field	Subfield	Value	Description
monitor mode		MONITOR	Continuous monitoring mode generates this report.
		READ	Immediate query of echo canceller performance generates this report.
MON TRK	clli	string	Reporting trunk CLLI group name.
	mem	0000–9999	Reporting trunk CLLI group member number.
	type	DTC	Reporting trunk is assigned to this XPM type. Only DTC is supported by the ECMON command.
	num	000–255	Reporting trunk is assigned to this XPM number.

—continued—

Table 6-8
PM910 field descriptions (continued)

Field	Subfield	Value	Description
	carr	00–19	Reporting trunk is assigned to this XPM carrier port.
	chan	01–24	Reporting trunk is assigned to this XPM carrier channel.
ASSOC TRK	clli	string	CLLI group name of trunk connected to reporting trunk.
	mem	0000–9999	CLLI group member number of trunk connected to reporting trunk.
	type	PM type	Trunk connected to reporting trunk is assigned to this PM type.
	num	0–255	Trunk connected to reporting trunk is assigned to this PM number.
	carr	00–19	Trunk connected to reporting trunk is assigned to this PM carrier port.
	chan	01–24	Trunk connected to reporting trunk is assigned to this PM carrier channel.
ERL	value	00–70	The echo return loss reading in decibels. Not displayed unless the reading is flagged as valid.
ERLE	value	00–70	The echo return loss enhancement reading in decibels. Not displayed unless the reading is flagged as valid.
performance text		text string	Evaluation of echo canceller performance or the reason ERL and ERLE data are not displayed.
		—end—	

Performance text and action

Refer to information in the *Responses* section of this document for information on performance text messages that appear in the PM910 log and the appropriate user action (if any) for each.

PM911

A PM911 log generates whenever the CM-based automatic echo canceller performance monitoring process receives a performance report from an XPM when either ERL or ERLE readings are suspect.

Format

```
PM911   <date> <time> <seqnum> INFO ECHO CANCELLER REPORT
<monitor mode>
   MON TRK:     <clli> <mem> - <type> <num> <carr> <chan>
   ASSOC TRK:   <clli> <mem> - <type> <num> <carr> <chan>
   Error reading: ERL: <value> dB  ERLE: <value> dB
   Follow-up 1: ERL:   <value> dB  ERLE: <value> dB
   Follow-up 2: ERL:   <value> dB  ERLE: <value> dB
   Follow-up 3: ERL:   <value> dB  ERLE: <value> dB
<Reason text>
```

Note: The six fields related to MON TRK and ASSOC TRK display an asterisk (*) if data for any of those fields is invalid.

Example

```
250G PM911 JUN5 09:17:45 1596 INFO ECHO CANCELLER REPORT
Automatic performance monitor   9128
   MON TRK:   imtc7iany 10  DTC 10 10 12
   ASSOC TRK  imtc7oany 10  DTC  5  7 21
   Error reading: ERL: 06 dB    ERLE: 20 dB
   Follow-up 1:   ERL: 06 dB    ERLE: 24 dB
   Follow-up 2:   ERL: 07 dB    ERLE: 24 dB
   Follow-up 3:   ERL: 07 dB    ERLE: 22 dB
Potential Echo Canceller Problem: ERL + ERLE <30 dB.
```

Field descriptions

Table 6-9 describes the fields in the PM911 log.

Table 6-9
PM911 field descriptions

Field	Subfield	Value	Description
monitor mode		Automatic performance monitoring	The automatic echo canceller performance monitoring process generates this report.
MON TRK	clli	string	Reporting trunk CLLI group name.
	mem	0000–9999	Reporting trunk CLLI group member number.
	type	DTC	Reporting trunk is assigned to this XPM type.
	num	000–255	Reporting trunk is assigned to this XPM number.

—continued—

Table 6-9
PM911 field descriptions (continued)

Field	Subfield	Value	Description
	carr	00–19	Reporting trunk is assigned to this XPM carrier port.
	chan	01–24	Reporting trunk is assigned to this XPM carrier channel.
ASSOC TRK	clli	string	CLLI group name of trunk connected to reporting trunk.
	mem	0000–9999	CLLI group member number of trunk connected to reporting trunk.
	type	PM type	Trunk connected to reporting trunk is assigned to this PM type.
	num	0–255	Trunk connected to reporting trunk is assigned to this PM number.
	carr	00–19	Trunk connected to reporting trunk is assigned to this PM carrier port.
	chan	01–24	Trunk connected to reporting trunk is assigned to this PM carrier channel.
Error reading: ERL	value	00–70	The echo return loss reading in decibels that may have caused this report to be generated.
Error reading: ERLE	value	00–70	The echo return loss enhancement reading in decibels that may have caused this report to be generated.
Follow-up 1: ERL (optional)	value	00–70	First follow-up echo return loss reading in decibels, taken approximately five seconds after the previous error readings.
Follow-up 1: ERLE (optional)	value	00–70	First follow-up echo return loss enhancement reading in decibels, taken approximately five second after the previous error readings.
Follow-up 2: ERL (optional)	value	00–70	Second follow-up echo return loss reading in decibels, taken approximately five seconds after after the first follow-up.
Follow-up 2: ERLE (optional)	value	00–70	Second follow-up echo return loss enhancement reading in decibels, taken approximately five seconds after the first follow-up.

—continued—

Table 6-9
PM911 field descriptions (continued)

Field	Subfield	Value	Description
Follow-up 3: ERL (optional)	value	00–70	Third follow-up echo return loss reading in decibels, taken approximately five seconds after the second follow-up.
Follow-up 3: ERLE (optional)	value	00–70	Third follow-up echo return loss enhancement reading in decibels, taken approximately five seconds after the second follow-up.
Performance text		text string	Text explaining why the log is generated.
		—end—	

Note: If the call disconnects before or while the readings are being obtained from the XPM, follow-up ERL and ERLE readings of 0 display.

Performance text and action

Refer to information in the *Responses* section of this document for information on performance text messages that appear in the PM911 log and the appropriate user action (if any) for each.

PM912

A PM912 log generates whenever an ECMON command modifying the current performance-monitoring state completes successfully. Failure responses display on the MAP terminal where the command originated.

Format

```
PM912   <date> <time> <seqnum> INFO ECHO CANCELLER REPORT
<reply text>
   Trunk: <clli> <mem> - <type> <num> <carr> <chan>
                    or
   XPM: <spm type> <xpm num>
```

Note: The fields related to Trunk and XPM are filled with an asterisk (*) if data for any of those fields is invalid.

Example

EC enabled:

```
250G PM912 JUN5 09:17:45 1596 INFO ECHO CANCELLER REPORT
Monitoring enabled for
   Trunk: imtc7iany 10 – DTC 10 10 12
```

EC disabled:

```
250G PM912 JUN5 09:17:45 1596 INFO ECHO CANCELLER REPORT
Monitoring disabled for
   XPM: DTC 10
```

Field descriptions

Table 6-10 describes the fields in the PM912 log.

Table 6-10
PM912 field descriptions

Field	Subfield	Value	Description
reply text		text string	The function was successfully processed by the ECMON command.
Trunk (optional)	clli	string	Reporting trunk CLLI group name.
	mem	0000–9999	Reporting trunk CLLI group member number.
	type	DTC	Reporting trunk is assigned to this XPM type.
	num	000–255	Reporting trunk is assigned to this XPM number.
	carr	00–19	Reporting trunk is assigned to this XPM carrier port.
	chan	01–24	Reporting trunk is assigned to this XPM carrier channel.
XPM (optional)	XPM type	DTC	XPM specified in ECMON command.
	XPM num	000–255	XPM number specified in ECMON command.

Reply text

```
Monitoring enabled.
```

Meaning: A CLLI-based ECMON ON command is successfully processed.

```
Monitoring disabled.
```

Meaning: A CLLI-based ECMON OFF command is successfully processed.

```
All monitoring disabled on XPM.
```

Meaning: An XPM-based ECMON OFF command is successfully processed.

```
All monitoring disabled for system.
```

Meaning: An system-based ECMON OFF command is successfully processed.

```
Automatic monitor process enabled.
```

Meaning: An ECMON AUTO ON command is successfully processed.

```
Automatic monitor process disabled.
```

Meaning: An ECMON AUTO OFF command is successfully processed.

Note: No action is required for any of these text replies. The PM 912 log provides a history of successful ECMON ON and ECMON OFF command execution.

Operational measurements (OMs)

OMs provide statistical information about the performance of a UCS DMS-250 switch by counting the occurrence of various events. For the integrated EC card, OM register DS1ECF provides the number of EC failures in the OM audit cycle.

One set of registers is reported for each carrier port of each digital PM.

Note: Log reports and CI displays from the echo monitoring process do not increment OM counters.

Registers

OM group DS1CARR registers display on the MAP terminal as follows:

```
DS1LCGA     DS1RCGA     DS1LOF      DS1SLP
DS1SBU      DS1MBU      DS1PBU      DS1CBU
DS1BER      DS1ES       DS1SES      DS1UAS
DS1AIS      DS1ECF      DS1BPV
```

Group structure

OM group DS1CARR provides one tuple for each DS1 carrier.

Key field: None

Info field: The DS1OMINF information field identifies a terminal on a specific digital PM. It consists of the site where the PM is located, the PM type, the external PM sequence number, the DS1 carrier number (0 to 19) within the PM, and the carrier direction (C or P) to indicate if the PM port is on the central side (C-side) or peripheral side (P-side) of the carrier.

Register DS1ECF

DS1ECF counts the number of EC failures in the DS1 carrier during a 10-minute audit cycle.

Associated registers

None

Associated logs

TRK109 is generated by the trunk maintenance subsystem when a test on a DS1 fails.

Appendix A
NT6X50EC switch settings

Appendix A provides information on switch settings for the NT6X50EC card.

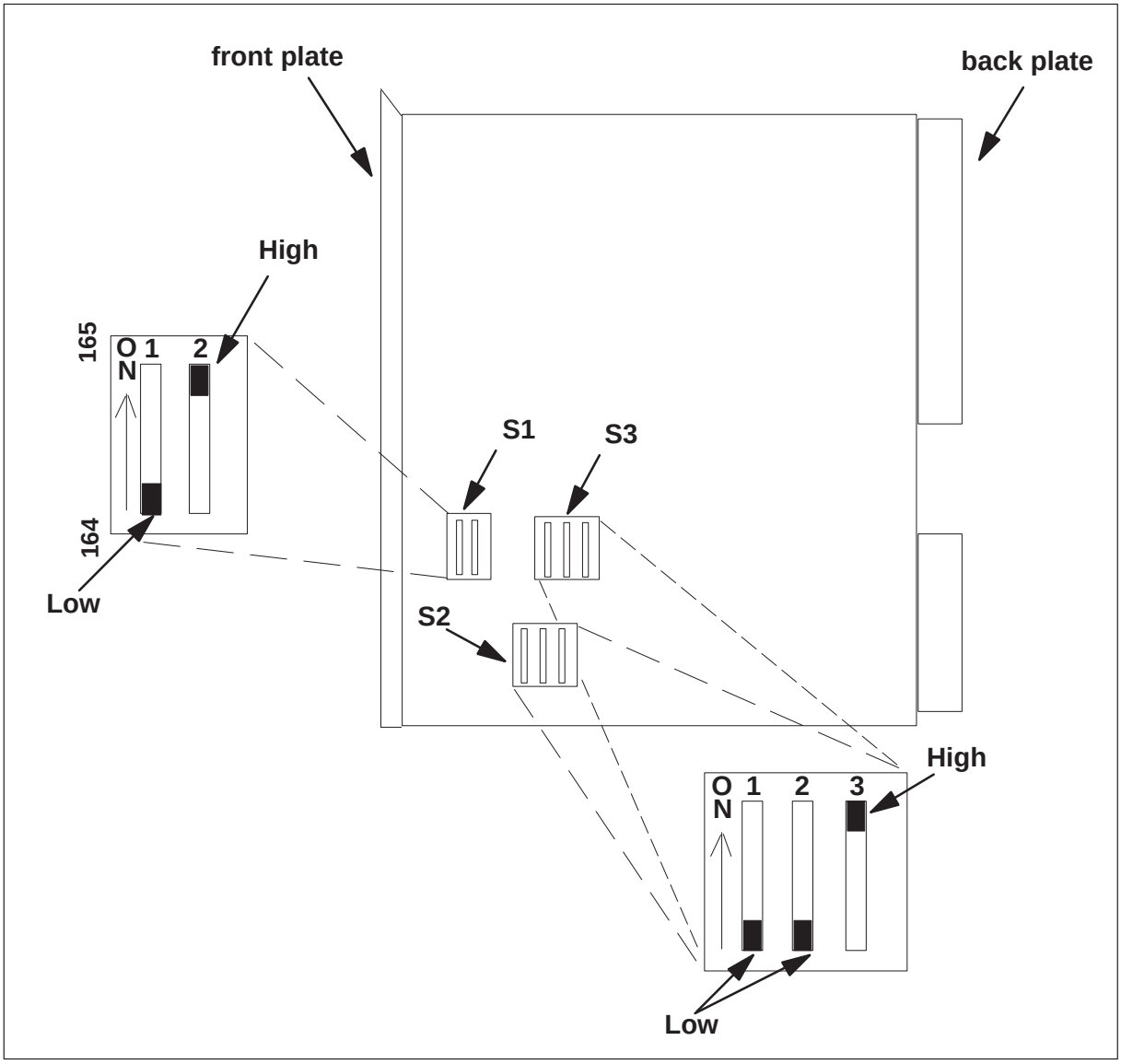
DIP switch settings

NT6X50EC DIP switches are labeled S1, S2, and S3. The following positions apply to all three switches:

- Low (off or switch open)
- High (on or switch closed)

Figure 7-1, NT6X50EC card DIP switch settings, shows the positions of the DIP switches on the NT6X50EC card and the Low/High settings. The settings shown in Figure 7-1 are for example purposes only. See sections “S1,” “S2 and S3” later in this appendix for recommended DIP switch settings.

Figure 7-1
NT6X50EC card DIP switch settings



S1

S1 selects the Tone Disable setting. S1 must be set when using the NT6X50EC card in either echo canceller (EC) or AB mode. Table 7-1 shows the switch settings for S1.

Table 7-1
S1 settings

Selector	On (High)	Off (Low)
SW1	Port 0 is G.165	Port 0 is G.164
SW2	Port 1 is G.165	Port 1 is G.164

Note 1: Nortel recommends a setting of G.164.

Note 2: When in G.165 mode, the NT6X50EC does not support v.34 modems.

S2 and S3

S2 and S3 are used only when the NT6X50EC is datafilled as type AB in the switch data tables. When the card is datafilled as type EC, S2 and S3 are not used, and the datafill in the tables overrides the S2 and S3 settings.

S2 sets the line length for port 0 on the circuit pack. Set S2 as shown in Table 7-2.

Table 7-2
S2 settings

ELS1	ELS2	ELS3	Line length
Low	Low	Low	1–110 ft
Low	Low	High	110–220 ft
Low	High	Low	220–230 ft
Low	High	High	330–440 ft
High	Low	Low	440–550 ft
High	Low	High	550–660 ft
High	High	Low	reserved
High	High	High	reserved

S3 sets the line length for port 1 on the circuit pack. Set S3 as shown in Table 7-3.

Table 7-3
S3 settings

ELS1	ELS2	ELS3	Line length
Low	Low	Low	1–110 ft
Low	Low	High	110–220 ft
Low	High	Low	220–230 ft
Low	High	High	330–440 ft
High	Low	Low	440–550 ft
High	Low	High	550–660 ft
High	High	Low	reserved
High	High	High	reserved

Appendix B
Table descriptions

Appendix B describes the following tables that must be datafilled for the NT6X50EC Integrated Echo Canceller (EC) card:

- CARRMTC (Carrier Maintenance Control)
- LTCPSINV (Line Trunk Controller P-Side Link Inventory)
- TRKSGRP (Trunk Subgroup)
- TRKMEM (Trunk Member)
- OFCVAR (Office Variables)
- OFCENG (Office Engineering)

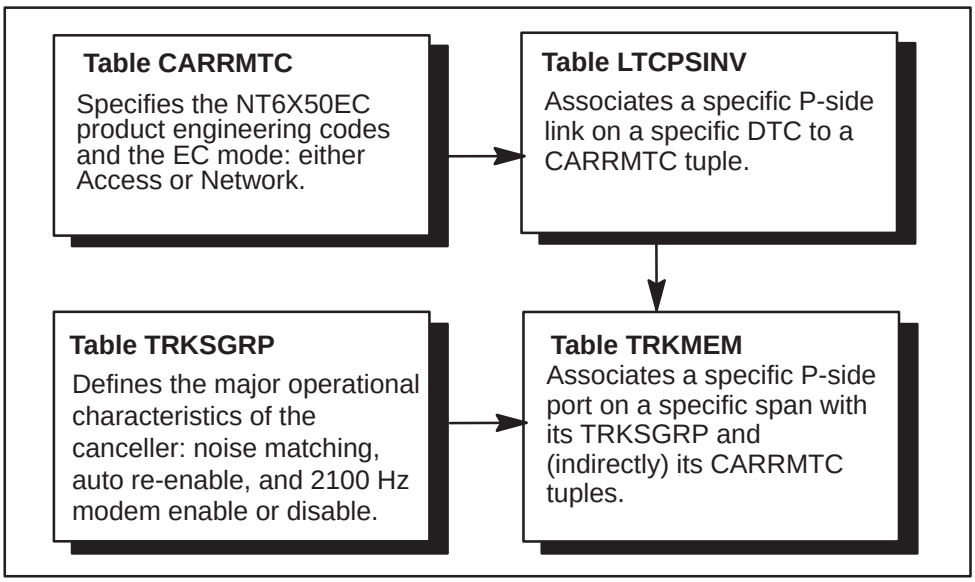
Figure 8-1 shows how the first four tables relate to each other.

Note 1: The NT6X50EC is also supported on DTCI.

Note 2: All these tables have valid entries in addition to the ones shown in this chapter. However, only entries applicable to the EC card are shown here.

Note 3: For more information on the tables within this chapter, see the *UCS DMS-250 Data Schema Reference Manual*.

Figure 8-1
Interrelationship of CARRMTC, LTCPSINV, TRKSGRP, and TRKMEM



CARRMTC

Table CARRMTC contains peripheral module (PM) maintenance data, out-of-service limits for alarms and system return-to-service information. Table CARRMTC can have up to 16 entries for each type of PM that can provide carrier links in the switch. Each PM type is allotted one entry as the default. Table 8-1 lists datafill for table CARRMTC.

Table 8-1
CARRMTC field descriptions

Field	Subfield or refinement	Entry	Explanation and action
CSPMTYPE		DTC or NIL	*C-side node peripheral module type* Enter the PM type of the node on the C-side of the carrier link. • DTC is for digital trunk controllers. • Enter NIL if there is no signaling type.
TMPLTNM		alphanumeric (1 to 16 characters)	*Template name* Enter the template name for the PM. This entry also appears in the inventory tables, field CARRIDX. The default value is DEFAULT.
CARD		NT6X50EC	*Product engineering code of card* Enter the Product Engineering Code (PEC) of the EC card.
ECHO		ACCESS or NETWORK	*Echo canceller mode* Enter ACCESS if the NT6X50EC is equipped on the access side of the UCS DMS-250 switch. Enter NETWORK if the NT6X50EC is equipped on the network side of the UCS DMS-250 switch.

LTCPSINV

Table LTCPSINV contains the following:

- the assignments for the peripheral–side (P–side) links for the peripheral modules (PM)
- the PSDATA field and its subfield, which lets you set T1–specific tail delay values for each T1 that includes an NT6X50EC

The next two sections explain each of these functions of Table LTCPSINV in more detail.

Note: The key for this table is the same as the key for table LTCINV.

P–side links for PMs

For each extended multiprocessor system (XMS)–based PM (XPM) or common peripheral module (CPM) listed in Table LTCINV's datafill, a corresponding entry appears automatically in Table LTCPSINV. Those corresponding entries in Table LTCINV let you specify the P–side links for the XPMs and CPMs.

All the P-side link types initially default to NILTYPE. P-side links that do not have hardware assigned must remain NILTYPE. Unequipped software assigned P-side links generate service-affecting problems.

Setting T1–specific tail delay values

Table LTCPSINV also lets you specify an adjustable tail delay length for each T1 that is equipped with an NT6X50EC (you must modify Table LTCPSINV for each T1 for which you want to set a default tail delay value).

Note: The ECHO_CANCELLER_TAIL_DELAY field in Table OFCENG lets you set a default tail delay value for the entire switch. Every T1 on that switch that includes an NT6X50EC uses that switch–wide default value, unless you override that default for specific T1s, here in Table LTCPSINV. For more information about setting a switch–wide default tail delay value, see the section of this chapter that describes the OFCENG table.

Although you can datafill many types of XPMs, the ability to set T1–specific tail delay values applies to the following only:

- Digital Trunk Controller (DTC)
- Digital Trunk Controller ISDN (DTCI)

Here is an example of the datafill for a DTC without T1–specific tail delay settings:

DTC 2 N (**0** DS1 DEFAULT N) (**1** DS1EC ECNET N 220) (**2** DS1EC ECNET N 220) (**3** DS1EC ECNET N 220).....(**19** DS1 DEFAULT N) $

In the example, there are a total of 20 T1s with ECs available on the DTC (the number of each T1 appears in bold). For each of the T1s, you could set a default tail delay value. Following the number of each T1 is the PSDATA (P–side data) field.

If you want to set T1–specific tail delay values, you must first datafill the PSDATA field to indicate the presence of the NT6X50EC. Your entry in the PSDATA field depends on whether you have a DTC or a DCTI:

- for a DTC, enter DS1EC
- for a DTCI, enter DS1PRA

When you datafill the PSDATA field, a subfield that lets you specify the T1–specific tail delay values becomes available. In that subfield, you can specify a tail delay that ranges from 32 ms to 96 ms for each T1. The following example shows the modified datafill for the DTC, this time including T1–specific tail delay values:

DTC 2 N (0 DS1 DEFAULT N) (1 DS1EC ECNET N 220 **48**) (2 DS1EC ECNET N 220 **80**) (3 DS1EC ECNET N 220 **$**).....(19 DS1 DEFAULT N **$**)

In this example, the subfield and its contents (the T1–specific tail delay values) are in bold. A $ means the system uses the default value of 48 ms.

The datafill for a DTCI is the same as shown in the example, except for the following details:

- the PSDATA field contains DS1PRA
- there is one, additional subfield

The following shows the example datafill, re–configured for a DTCI:

DTC 2 N (0 DS1 DEFAULT N) (1 **DS1EC** ECNET N 220 **48**) (2 **DS1EC** ECNET N 220 **80**) (3 **DS1EC** ECNET N 220 **$**).....(19 DS1 DEFAULT N **$**)

Datafill sequence and implications

Datafill the following tables before datafilling table LTCPSINV.

- LTCINV
- CARRMTC

Related table and datafill

The T1–specific tail delay values you set in Table LTCPSINV override the default tail delay values set in the following locations:

- the XPM layer

- in Table OFCENG

For more information about the relationship between tail delay values in Table LTCPSINV and Table OFCENG, see the section of this chapter that corresponds to Table OFCENG.

Datafill

Table 8-2 lists datafill for table LTCPSINV.

Table 8-2
LTCPSINV field descriptions

Field	Subfield or refinement	Entry	Description
XPMTYPE		DTC	XPM type Enter DTC for the type of extended peripheral module.
PSLINK		0 to 19	P–side link Enter the P-side port number.
CARRIDX		alphanumeric (1 to 16 characters) or DEFAULT	Carrier Index Enter a valid template name from table CARRMTC. Otherwise, enter DEFAULT for the default template name in table CARRMTC.
PSDATA		DS1EC or DS1PRA	Enter one of the following to acknowledge the presence of the EC and display the subfield that lets you set aT1–specific tail delay value: • DS1EC for a DTC • DS1PRA for a DTCI ***Note:*** Setting a T1–specific tail delay value is optional. If you do not set a T1–specific value, the switch–wide default of 48 ms applies. For details on how to fill out the PSDATA subfields to specify a T1–specific tail delay value, see the section entitled, "Setting T1–specific tail delay values."

—end—

TRKSGRP

Table TRKSGRP lists the supplementary information for each subgroup assigned to one of the trunk groups listed in table TRKGRP.

Specify input data for subgroups 0 or 1 for each trunk group listed in table TRKGRP, excluding trunk groups that are defined in table TRKGRP as maintenance group type (MAINT). No data is required in table TRKSGRP for this trunk group type.

Datafill

Table 8-3 lists datafill for table TRKSGRP.

Table 8-3
TRKSGRP field descriptions

Field	Subfield or refinement	Entry	Description
SGRPKEY		See subfields.	Subgroup key This field consists of subfields CLLI and SGRP
	CLLI	alphanumeric	Commomn language location identifier Enter the CLLI of the trunk group to which the subgroup belongs.
	SGRP	0 or 1	Subgroup number Enter the trunk subgroup number.
	ESUPR	N	Echo suppressor*Echo suppressor* If the trunk subgroup has echo suppressors, enter FULL (F) when both echo suppressors are located at the near end of the trunk group. Enter HALF (H) when an echo suppressor is located at the near and far end of the trunk group; otherwise, enter NONE (N).

—continued—

Table 8-3
TRKSGRP field descriptions (continued)

Field	Subfield or refinement	Entry	Description
	ECSTAT	UNEQ, INTERNAL, EXTERNAL, INNOTONE	*Echo cancellation-equipped status* Select entries as follows: • UNEQ indicates no echo canceller is equipped on this subgroup. • INTERNAL indicates the echo canceller on this trunk subgroup is equipped with NT6X50EC card in the DTC frame and is enabled by call processing if the call is not a data call. • EXTERNAL indicates the echo canceller is not equipped in the DTC but is external. No call processing is involved. • INNOTONE indicates internal echo cancellation without 2100 HZ tone control.

—continued—

Table 8-3
TRKSGRP field descriptions (continued)

Field	Subfield or refinement	Entry	Description
	NSMATCH	Y or N	*Noise match control* Enter Y to indicate that noise matching is on. Enter N to indicate that noise matching is off. Default is N.
	AUTOON	Y or N	*Auto re-enable control* Enter Y to indicate that the NT6X50EC automatically restarts echo cancellation after a data call is over. Enter N for no automatic re-enable after a data call. Default is Y. ***Note:*** The CCITT recommendation determines the criteria for re–enabling of echo cancellation.
		—end—	

TRKMEM

Table TRKMEM lists the data for each trunk specified in tables TRKGRP and TRKSGRP. This table associates a specific port, on a specific span and channel, with its TRKSGRP tuples and (indirectly) with its CARRMTC tuples.

TRKMEM records the following data for each trunk group member and for each analog or digital trunk, including the spare trunks:

- code assigned to the trunk group in table CLLI
- external trunk number assigned by the operating company
- number of the trunk subgroup
- equipment number

To change a trunk member from a working trunk group to a spare, delete the member from the working trunk group in table TRKMEM then add the member to the spare trunk group in table TRKMEM.

Datafill sequence and implications

Datafill table TRKSGRP before datafilling table TRKMEM.

Datafill

Table 8-4 lists datafill for table TRKMEM.

Table 8-4
TRKMEM field descriptions

Field	Subfield or refinement	Entry	Description
CLLI		alphanumeric (1 to 16 characters)	*Common language location identifier* Enter the CLLI code that is assigned to the trunk group to which the trunk is a member. This is the same name as the TRKSGRP key.
SGRP		numeric (0 to 1)	*Subgroup number* Enter the subgroup number to which the trunk is assigned.
	PMTYPE	DTC, DTCI	*Peripheral module type* Enter the peripheral module (PM) type on which the trunk is mounted and datafill the refinements associated with this entry value. Each refinement entry must be separated from the next by a blank space.
	DTCNO/ DTCINO	0 to 511	*Peripheral module number*
	DTCCKTNO/ DTCICKTNO	numeric (0 to 19)	*Digital trunk controller circuit number* Enter the number of the DTC or DTCI circuit card to which the trunk group member is assigned.
	DTCCKTTS/ DTCICKTTS	numeric (1 to 24)	*Digital trunk controller circuit time-slot* Enter the number of the circuit card DS1 time-slot to which the trunk group member is assigned.

—end—

OFCVAR

Table OFCVAR controls the propagation of AB bits in an SS7 environment. These bits are used to control external echo cancellers. Table 8-5 lists the fields that affect the propagation of AB bits in an SS7 environment.

Datafill

Table 8-5 shows the datafill for Table OFCVAR.

Table 8-5
OFCVAR field descriptions

Field	Entry	Explanation and action
ECHO_CANCELLER_CONTROL_FORWARD	ECCF	*Echo canceller control forward*
ECHO_CANCELLER_CONTROL_BACKWARD	ECCB	*Echo canceller control backward*
IMT_TANDEM_EC_ENABLE	Y or N	*Intermachine trunks tandem echo cancellers enable* Enter Y to enable tandem ECs or N to not enable tandem ECs.
—end—		

Related fields in other tables

The following additional fields in other tables also affect the propagation of AB bits in an SS7 environment:

- ECSTAT field in table TRKSGRP
- XFERRATE field in table TRKGRP

Table 8-6 shows the relationship of these two fields and their effects.

Table 8-6
ECSTAT and XFERRATE relationship

Values in ECSTAT field	Values in XFERRATE field	Effect
uneq	56Kb	AB bits sent per ECCF/ECCB
uneq	64Kb	No AB bits sent
external	56Kb	AB bits sent per ECCF/ECCB
external	64Kb	Invalid combination
internal	56Kb	AB bits sent per ECCF/ECCB
internal	64Kb	No AB bits sent

—end—

OFCENG

Table OFCENG lets you set a switch–wide, default tail delay value. This tail delay value applies to every T1 on the switch that includes an NT6X50EC. This switch-wide default value overrides the default value set in the XPM layer, but does *not* override any T1–specific tail delay values set in Table LTCPSINV

Note: For more information about the datafill in Table LTCPSINV, see the section in this chapter that corresponds to that table.

Note: [ADD: information about what must happen for the tail delay changes to take effect?]

Datafill

Table 8-7 shows the applicable datafill for Table LTCPSINV.

Table 8-7
OFCVAR field descriptions

Field	Entry	Explanation and action
ECHO_CANCELLER_TAIL_ DELAY	Numeric (32 – 64, in increments of 16)	*Echo canceller tail delay* Enter the value, in milliseconds, of the switch–wide, default tail delay.

—end—

Datafill consistency verification

Tables TRKMEM, TRKSGRP, LTCPSINV, and CARRMTC must contain consistent echo canceller information. The UCS DMS-250 switch verifies tables TRKMEM, TRKSGRP, LTCPSINV, and CARRMTC contain consistent EC information:

- If you add or update a tuple in table TRKMEM, the UCS DMS-250 switch verifies that tables TRKSGRP, LTCPSINV, and CARRMTC contain consistent EC information.
- If you add or update a tuple within table TRKSGRP, the UCS DMS-250 switch verifies that tables TRKSGRP, LTCPSINV, and CARRMTC contain consistent EC information.
- If you add or update a tuple within table LTCPSINV, the UCS DMS-250 switch verifies that tables TRKSGRP, LTCPSINV, and CARRMTC contain consistent EC information.
- If you update a tuple within table CARRMTC, the UCS DMS-250 switch verifies that tables TRKSGRP, LTCPSINV, and CARRMTC contain consistent EC information.

If the tables contain inconsistent EC information, the UCS DMS-250 switch disallows the datafill and generates an error message.

Appendix C
Cost-savings deployment strategies

The strategy to deploy NT6X50EC on your network depends upon your objective. This appendix describes two deployment strategies based on two objectives:

- minimizing initial costs
- minimizing future maintenance costs

If your objective is to minimize the initial costs, your strategy is to deploy the least number of echo cancellers on your network. If your objective is to minimize maintenance costs, your strategy is to deploy more echo cancellers on your network to simplify future maintenance.

Minimizing initial costs

To minimize initial costs, you must deploy the least possible number of echo cancellers on your network. Table 9-1 shows which networks this strategy is suitable to and the disadvantages of this strategy.

Table 9-1
Minimize initial costs matrix

Objective	Suitable to	Disadvantages
Minimize initial costs	switches with a limited number of access trunks that have long delay.	Maintenance costs increase if switch configurations change frequently.
	switches whose configuration remains relatively unchanged.	When an access trunk is re–deployed to serve a loop that has a long delay, the access trunk must have an internal EC set to network mode and an external EC.

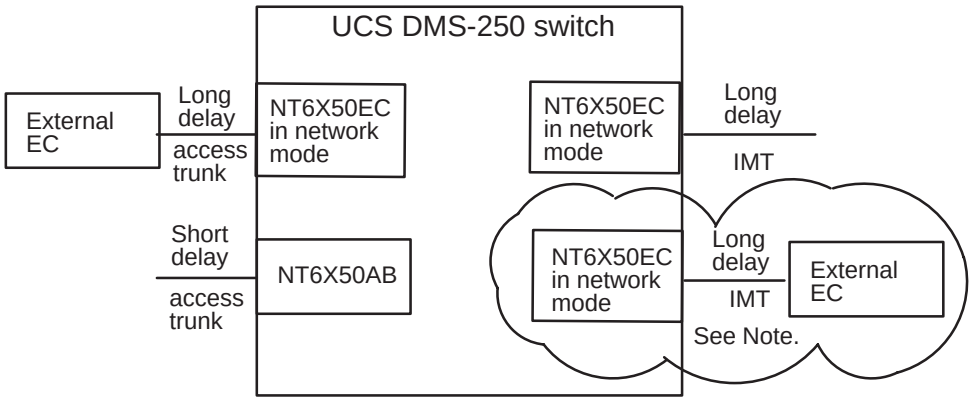
The strategy to minimize initial costs follows:

- On access trunks that have short delays, do not deploy ECs.
- On access trunks that have long delays, deploy, with an external EC, the NT6X50EC card in network mode.
- On IMT trunks, deploy the NT6X50EC card in network mode.
- Do not set IMT trunks to the access mode.

Note: If you are using an IMT trunk to connect to a local exchange carrier (LEC) that does not have an EC, you must deploy an external EC on the IMT trunk.

Figure 9-1, Strategy to minimize initial costs, shows this strategy's configuration.

Figure 9-1
Strategy to minimize initial costs



you must deploy an external EC on that IMT trunk.

Note: If you are using an IMT trunk to connect to a LEC that does not have an EC, then you must deploy an external EC on the IMT trunk.

Note that to minimize the initial costs, the access trunks with short delays contain no ECs. If you were to place ECs on these trunks, your initial costs would rise. See the section "Minimizing future maintenance costs."

Minimizing future maintenance costs

To minimize future maintenance costs, you must deploy more echo cancellers to simplify maintenance. Table 9-2 shows which networks this strategy is suitable to and the disadvantages of this strategy.

Table 9-2
Minimize future maintenance costs matrix

Objective	Suitable to	Disadvantages
Minimize future maintenance costs	switches with a large number of access trunks that have long delay and a large number of IMT trunks.	The initial cost is higher. You must deploy more than the minimum number of ECs required.

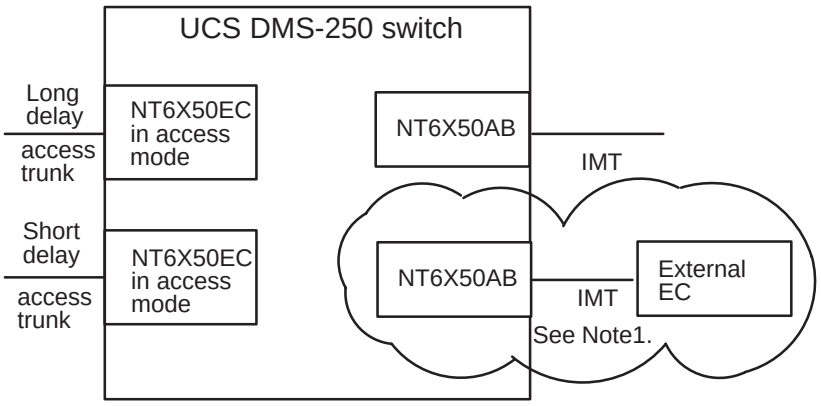
The strategy to minimize future maintenance costs follows

- On access trunks, deploy the NT6X50EC card in access mode.
- On IMT trunks, do not deploy ECs.

If	then
you deploy an EC on IMT trunks	do not set it to access mode.
you are using an IMT trunk to connect to a LEC that does not have an EC,	you must deploy an external EC on the IMT trunk.
IMT tandem trunks must provide echo cancellation	you must deploy an EC in access mode on the IMT trunks.

Figure 9-2, Strategy to minimize future maintenance costs, shows this strategy's configuration.

Figure 9-2
Strategy to minimize future maintenance costs



Note1: If you are using an IMT trunk to connect to a LEC that does not have an EC, then you must deploy an external EC on the IMT trunk.

Note2: This configuration assumes there are no tandem IMT trunks and echo cancellation is not required on tandem trunks.

Note that access trunks with short delays require ECs.

List of abbreviations

CARRMTC
Carrier Maintenance Control (table)

CCS7
Common Channel Signaling System #7; also see SS7

CLLI
common language location identifier

CM
computing module

CPM
common peripheral module

CSPMTYPE
C-side Peripheral Module Type (table CARRMTC)

DSP
digital signal processor

DTC
digital trunk controller

DTC+
digital trunk controller plus

DTCI
ISDN digital trunk controller

EC
echo canceller

ECF
echo canceller failure

ECMON
Echo Canceller Monitor (command)

ECSTAT
Echo Canceller Status (table TRKSGRP)

ERL
echo return loss

ERLE
echo return loss enhancement

ETAS
Emergency Technical Assistance Service

EXTRKNM
External Trunk Number (table TRKMEM)

IEC
interexchange carrier

IMT
intermachine trunk

INNOTONE
internal, no tone

ISDN
Integrated Services Digital Network

ISUP
ISDN User Part

LEC
local exchange carrier

LTC
line trunk controller

LTCINV
Line Trunk Controller Inventory (table)

LTCNAME
Link Trunk Controller Name (table LTCPSINV)

LTCPSINV
Line Trunk Controller P-Side Link Inventory (table)

MTC
maintenance level

NETFAB/ICTS
network fabric testing/integrity check traffic simulator

NSMATCH
Noise Matching (table TRKSGRP)

OFCVAR
Office Variables (table)

OM
operational measurement

PEC
product engineering code

PM
peripheral module

PRI
primary rate interface

PSLNK
P-side link

REXTST
routine exercise test

SS7
Signaling System 7; also see CCS7

TAS
Technical Assistance Service

TIMS
transmission impairments test set

TMPLTNM
Template Name (table CARRMTC)

TRKMEM
Trunk Member (table)

TRKSGRP
Trunk Subgroup (table)

TTP
trunk test position

UCS
Universal Carrier Software

XMS
extended multiprocessor system

XPM
extended peripheral module

Ordering information

Use the following table for ordering Nortel NTPs (Northern Telecom Publications) and Product Computing-Module Loads (PCLs):

Type of product	Source	Phone	Cost
Technical documents (paper or CD-ROM)	Nortel Product Documentation	1-877-662-5669, Option 4 + 1	Yes
Individual NTPs (paper)	Merchandising Order Service	1-800-347-4850	Yes
Marketing documents	Sales and Marketing Information Center (SMIC)	1-800-4NORTEL (1-800-466-7835) * ESN 444-5930	No
PCL software	Nortel	Consult your Nortel sales representative * Employee	Yes

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Please have the CD number and software version available, for example, **HLM-2631-001 02.02**.

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Please have the eight-digit ordering code, for example, **UCSE0009**, as well as the ordering codes for the features you wish to purchase. Contact your Nortel representative for assistance.

Digital Switching Systems

UCS DMS-250

NT6X50EC Integrated Echo Canceller Application Guide

Product Documentation—Dept 3423
Northern Telecom
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