Meridian 1
Succession 1000
Succession 1000M
Succession 3.0 Software

Transmission Parameters

Document Number: 553-3001-182
Document Release: Standard 1.00
Date: October 2003

Produced in Canada

Revision history

October 2003

Standard 1.00. This document is a new NTP for Succession 3.0. It was created to support a restructuring of the Documentation Library, which resulted in the merging of multiple legacy NTPs. This new document consolidates information previously contained in the following legacy documents, now retired:

- *International Loss and Level* (553-2201-181)
- *Summary of Transmission Parameters* (553-2201-182)

This document also contains a chapter "Succession Transmission Parameters" that was previously found in *Succession Communication Server for Enterprise 1000 Planning and Engineering* (553-3023-120).

Contents

About this document

This document is a global document. Contact your system supplier or your Nortel Networks representative to verify that the hardware and software described are supported in your area.

Subject

This document is a guideline to assist in the installation of systems in North American and non-North American locations. It also contains information about transmission parameters for all systems.

Note on legacy products and releases

This NTP contains information about systems, components, and features that are compatible with Succession 3.0 Software. For more information on legacy products and releases, click the **Technical Documentation** link under **Support** on the Nortel Networks home page:

http://www.nortelnetworks.com/

Applicable systems

This document applies to the following systems:

- Meridian 1 Option 11C Chassis
- Meridian 1 Option 11C Cabinet
- Meridian 1 Option 51C
- Meridian 1 Option 61
- Meridian 1 Option 61C

- Meridian 1 Option 61C CP PII
- Meridian 1 Option 81
- Meridian 1 Option 81C
- Meridian 1 Option 81C CP PII
- Succession 1000
- Succession 1000M Cabinet
- Succession 1000M Chassis
- Succession 1000M Half Group
- Succession 1000M Single Group
- Succession 1000M Multi Group

Note that memory upgrades may be required to run Succession 3.0 Software on CP3 or CP4 systems (Options 51C, 61, 61C, 81, 81C).

System migration

When particular Meridian 1 systems are upgraded to run Succession 3.0 Software and configured to include a Succession Signaling Server, they become Succession 1000M systems. Table 1 lists each Meridian 1 system that supports an upgrade path to a Succession 1000M system.

Table 1
Meridian 1 systems to Succession 1000M systems (Part 1 of 2)

This Meridian 1 system...	Maps to this Succession 1000M system
Meridian 1 Option 11C Chassis	Succession 1000M Chassis
Meridian 1 Option 11C Cabinet	Succession 1000M Cabinet
Meridian 1 Option 51C	Succession 1000M Half Group
Meridian 1 Option 61	Succession 1000M Single Group
Meridian 1 Option 61C	Succession 1000M Single Group
Meridian 1 Option 61C CP PII	Succession 1000M Single Group

Table 1
Meridian 1 systems to Succession 1000M systems (Part 2 of 2)

This Meridian 1 system...	Maps to this Succession 1000M system
Meridian 1 Option 81	Succession 1000M Multi Group
Meridian 1 Option 81C	Succession 1000M Multi Group
Meridian 1 Option 81C CP PII	Succession 1000M Multi Group

Note the following:

- When an Option 11C system is upgraded to run Succession 3.0 Software, that system becomes a Meridian 1 Option 11C Cabinet.
- When an Option 11C Mini system is upgraded to run Succession 3.0 Software, that system becomes a Meridian 1 Option 11C Chassis.

For more information, see one or more of the following NTPs:

- *Small System: Upgrade Procedures* (553-3011-258)
- *Large System: Upgrade Procedures* (553-3021-258)

Intended audience

This document is intended for individuals responsible for the installation of Meridian 1, Meridian SL-1, and Succession 1000 systems in North American and non-North American locations.

Conventions

Terminology

In this document, the following systems are referred to generically as "system":

- Meridian 1
- Succession 1000
- Succession 1000M

The following systems are referred to generically as “Small System”:

- Succession 1000M Chassis
- Succession 1000M Cabinet
- Meridian 1 Option 11C Chassis
- Meridian 1 Option 11C Cabinet

The following systems are referred to generically as “Large System”:

- Meridian 1 Option 51C
- Meridian 1 Option 61
- Meridian 1 Option 61C
- Meridian 1 Option 61C CP PII
- Meridian 1 Option 81
- Meridian 1 Option 81C
- Meridian 1 Option 81C CP PII
- Succession 1000M Half Group
- Succession 1000M Single Group
- Succession 1000M Multi Group

The call processor in Succession 1000 and Succession 1000M systems is referred to as the “Succession Call Server”.

Related information

This section lists information sources that relate to this document.

NTPs

The following NTPs are referenced in this document:

- *Features and Services* (553-3001-306)
- *Software Input/Output: Administration* (553-3001-311)

- *IP Line: Description, Installation, and Operation* (553-3001-365)
- *Software Input/Output: Maintenance* (553-3001-511)

Online

To access Nortel Networks documentation online, click the **Technical Documentation** link under **Support** on the Nortel Networks home page:

http://www.nortelnetworks.com/

CD-ROM

To obtain Nortel Networks documentation on CD-ROM, contact your Nortel Networks customer representative.

Introduction to Loss and Level

The system is capable of meeting transmission requirements worldwide.

Government agencies define the transmission requirements that all equipment installed in that country must meet.

Configuring the system to meet country-specific requirements occurs during installation. If changes to the transmission settings must occur after installation, contact a Nortel Networks transmission specialist to help with the changes.

In the system, an algorithm called the Loss and Level Plan controls the port-to-port loss between two ports or the signal level at any given port, based on the port types involved in the connection. This plan is country-specific; therefore, within a given country, the plan controls the insertion and value of pads necessary to comply with the loss and level requirements of that country.

Transmission level adjustment

Contents

This section contains information on the following topics:

Introduction

Peripheral Equipment (PE) cards meet a predetermined transmission level standard. The insertion of a pad in the transmission path on the Intelligent Peripheral Equipment (IPE) cards or the alteration of the card loss on Flexible IPE cards changes the level.

Pads alter the power level of signals applied to them. Pads can either attenuate or amplify the applied signal. The term "*loss*" means the pad attenuates the signal. The term "*gain*" means the pad amplifies the signal. The use of pads ensures the power level is within acceptable limits at the far end. Far end, in this case, refers to the port to which the connection is established within the

PBX. Pads can be applied in both the transmit and receive directions of a transmission path and the two pads are likely to be of different values.

With Flexible IPE cards using B34 codecs, level adjustments are achieved by altering the card loss. The card loss acts in the same manner as a pad, that is, it can provide gain or loss. This is achieved by scaling the digitized signal.

The following components have transmission adjustment capabilities:

- conference cards
- analog trunk cards
- digital trunk cards
- B34 codec-equipped International Intelligent Peripheral Equipment (IPE) Extended Flexible Analog Line Cards (XFALC); Extended Central Office Trunk Cards (XCOT), Extended Direct Inward Dial Cards (XDID), and Extended Flexible E&M Cards (XFEM) in Australia, New Zealand and Italy; Extended Universal Trunk cards for China (XUTC) and XEMC in China
- Basic Rate Interface Line and Trunk application cards
- Meridian Modular Telephone sets
- Extended Off-premises Station (XOPS) line card

There are two approaches to loss settings. For non-flexible IPE cards, pad values are hardcoded on the card and the required pad state is indicated by a message sent to the card. The pads that are in or out for a particular connection type are part of a predefined table. For flexible IPE cards, card losses are definable through software (LD 97).

Pad values are predefined on the following:

- North American and North American-based Intelligent Peripheral Equipment (IPE)
- 1.5 Mbit Digital Trunk Interface (DTI)/Primary Rate Interface (PRI) if the GPRI package (167) is *not* equipped
- International IPE that is *not* equipped with both the B34 codec and "flexible" firmware
- Basic Rate Interface Line (BRIL) applications

Pads and card losses are definable on the following:

- International Flexible IPE equipped with both the B34 codec and "flexible" firmware
- 1.5 Mbit DTI/PRI if the GPRI package (167) is equipped
- 2.0 Mbit DTI/PRI
- Basic Rate Interface Trunk (BRIT) application
- Meridian Modular Telephone sets
- Extended Off-Premises Station (XOPS) line cards, although the current implementation uses fixed software settings (not for China)

There are two basic approaches to loss planning. For the static loss approach, the pad is either in or out and is of fixed value for all connection types. For the dynamic approach, the loss is different depending on the port type involved in the connection. An algorithm called the Loss and Level Plan controls the port-to-port loss for the dynamic loss plan. For both static and dynamic plans, the plans are country-specific; therefore, within a given country, the plan controls the insertion and value of pads necessary to comply with the loss and level requirements of that country.

Line cards pads

Line cards can be categorized in a number of ways: as IPE, as flexible or non-flexible (B34 codec-equipped or not), and as ONS or OPS class of service and the categorizations overlap in some cases. IPE cards can be configured to function in ONS class of service.

Non-B34-equipped XFALCs are not flexible and are static with respect to loss level settings. B34-equipped XFALCs are flexible (loss is defined in software) but static. Analog line cards in general are static.

The XOPS is B34-equipped and is flexible. In OPS class of service, it sets loss dynamically. In ONS class of service, loss is set statically.

For ONS class of service, flexible IPE cards have software definable downloaded static loss. For OPS class of service, flexible cards have dynamic loss capability with country-specific loss plans hard coded in software.

With B34 codec-equipped Flexible Intelligent Peripheral Equipment (IPE) cards and Static Loss Plan Download (SLPD) features, card losses are defined in software by overlay input.

The XOPS can be used for both off- and on-premises applications. The XOPS is equipped with the B34 codec, and therefore can have its card loss defined in software by overlay input for ONS class of service. For OPS class of service, loss is hardcoded in software. The XOPS uses a combination of hardware jumper settings and software configuration to determine its mode of operation. When the XOPS is used in an off-premises mode, the difference between the Base level loss value and the Alternate level loss value is 2 dBr. The Extended Off-Premises Station (XOPS) line cards continue to have dynamic transmission level adjustment capabilities in OPS class of service.

The XOPSC (specifically for China) was also introduced. For OPS class of service, loss is dynamically applied and for ONS class of service it is statically applied. The XOPSC is based on the XOPS described above but has a different loss plan implementation.

The China Toll package changes the Loss Plan as it applies to toll calls on a DTI2 trunk connection to an analog 500/2500 type set. When a toll call is detected, the loss plan is changed on both the trunk and line cards, and following the completion of the call, the change is reversed.

The following tables cross-reference the various line cards to the various Loss and Level Plan features and highlights their interactions. Table 2 cross-references the Off-premises line cards, while Table 3 cross-references all other line cards to Loss and Level Plan features.

Table 2
Off-premises line cards and Loss and Level Plan feature interactions (Part 1 of 2)

	Dynamic Pad Switching (DPS)	**Static Loss Plan Download (SLPD)**	**Dynamic Loss Switching**
XOPS with OPS class of service	Loss dynamically applied. Alternate loss level applied for OPS to trunk and OPS to OPS connections. Base loss level applied to all other connections.	Not recommended. If XOPS installed, each unit would be treated as an ALC unit. Class of Service SHL and LOL determine which loss value, either ALUS or ALUL, to download from the SLPD table.	Not recommended. If XOPS installed, each unit would be treated as an ALC unit. ALU levels would be applied dynamically.
XOPS with ONS class of service	Loss value downloaded. Loss value equivalent to XALC or XMLC in North America.	Not recommended. If XOPS installed, each unit would be treated as an ALC unit. Class of Service SHL and LOL determine which loss value, either ALUS or ALUL, to download from the SLPD table.	Not recommended. If XOPS installed, each unit would be treated as an ALC unit. ALU levels would be applied dynamically.
XOPSC with OPS class of service (China)	Not Applicable.	Not Applicable.	Loss dynamically applied. Alternate loss level applied for OPS to trunk and OPS to OPS connections. Base loss level applied to all other connections. Loss is software definable.

Table 2
Off-premises line cards and Loss and Level Plan feature interactions (Part 2 of 2)

	Dynamic Pad Switching (DPS)	**Static Loss Plan Download (SLPD)**	**Dynamic Loss Switching**
XOPSC with ONS class of service (China)	Not Applicable.	Not Applicable.	Loss statically applied except as follows: With China Toll package enabled, pad levels are dynamically applied only when the call is a DTI2 call terminating on an analog 500/2500 type set. The ALUS entry is downloaded from the base table. No distinction between SOL and LOL class of service.
Not recommended indicates that mixing cards could result in a loss plan that is not within specification.			

Table 3
Line cards and Loss and Level Plan feature interactions

	Dynamic Pad Switching (DPS)	**Static Loss Plan Download (SLPD)**	**Dynamic Loss Switching**
North American ALUs: XALC, XMLC	Fixed loss on card, no pads. If loss and level adjustment required, it is performed by port to which the ALU is connected. Not Applicable.	Fixed loss on card. Not Applicable.	Fixed loss on card. Not Applicable.
non-B34 XFALC	Fixed loss on card. Not Applicable.	Fixed loss on card. Not Applicable.	Fixed loss on card. Not Applicable.

Table 3
Line cards and Loss and Level Plan feature interactions

	Dynamic Pad Switching (DPS)	Static Loss Plan Download (SLPD)	Dynamic Loss Switching
B34 XFALC	Not Applicable.	Loss value downloaded. CLS SHL and LOL determine which loss value, either ALUS or ALUL, to download from the SLPD table.	Loss value downloaded. CLS SHL and LOL determine which loss value, either ALUS or ALUL, to download from the SLPD table.
Chinese ALUs: XALCC XMLCC	Not Applicable.	Not Applicable.	Loss value downloaded. Loss statically applied except as follows: With China Toll package enabled, pad levels are dynamically applied only when the call is a DTI2 call terminating on an analog 500/2500 type set. The ALUS entry is downloaded from the base table. No distinction between SHL and LOL class of service.

Conference pads

Conference bridge connections that involve three or more conferees that terminate on 2-wire ports have additional loss added. The additional loss compensates for the reflection caused by the 2-wire ports. The amount of loss is a function of the number of 2-wire ports and the type of port. See page 43 and Table 9 for details.

Trunk pads

The following four software features control transmission levels on analog trunk cards:

- Static Pad Download
- Static Loss Plan Downloading
- Dynamic Pad Switching
- Dynamic Loss Switching

The following tables cross-reference

- trunk transmission level adjustment features and markets (Table 4) and
- transmission level adjustment features and trunk cards (Table 5)

Table 4
Cross-reference of transmission level adjustment features and markets

	Static Pad Download	Static Loss Plan Downloading	Dynamic Pad Switching	Dynamic Loss Switching
Markets	International countries that use Static Loss Plans; one loss setting is valid for all connection types.	International countries that use Static Loss Plans; one loss setting is valid for all connection types.	North America and countries that use the North American style Loss and Level Plan per-connection level adjustment method. Countries include China and Australia.	International countries that require per-connection level adjustments. Countries supported are Australia, New Zealand, and China.

Table 5
Cross-reference of transmission level adjustment features and trunk cards

	Static Pad Download	Static Loss Plan Downloading	Dynamic Pad Switching	Dynamic Loss Switching
North American IPE Trunks (EXUT, XUT, and XEM)	Not applicable.	Not applicable.	Fixed card loss and pads on cards Pad switching is supported.	Not applicable.
International Generic XFCOT Trunks when NATP = YES	Not applicable.	Not applicable.	Fixed card loss and pads on cards Pad switching is supported.	Not applicable.

Table 5
Cross-reference of transmission level adjustment features and trunk cards (Continued)

	Static Pad Download	Static Loss Plan Downloading	Dynamic Pad Switching	Dynamic Loss Switching
China IPE trunks: XUTC XEMC	Not applicable.	Not applicable.	Not applicable.	Class of Service dependent programmable loss. Pad switching (level adjustment) is supported.
International IPE Trunks (XCOT, XDDI, XDID, XFCOT and XFEM)	Class of Service dependent fixed loss. Pad switching is not supported.	Class of Service dependent fixed loss. Pad switching is not supported.	Not applicable.	Not applicable.
Flexible International IPE Trunks (XCOT, XDDI, XDID, XFCOT and XFEM)	Class of Service dependent fixed loss. Pad switching is not supported.	Class of Service dependent programmable static loss. Pad switching is not supported.	Not applicable.	Class of Service dependent programmable loss. Pad switching (level adjustment) is supported.

Along with the level adjustments determined by the previously mentioned features, certain cards can use additional pads. Control of these pads is by overlay input or jumper setting for IPE cards.

Different trunk cards have different pad values; refer to the specific trunk circuit card descriptions to determine what pad values they support.

Balance Impedance

Some two-wire analog trunk cards and the Extended Off-premises Station (XOPS) card have a three component compromise (3COM) impedance network that ensures proper impedance matches when connecting to a four-wire interface. The 3COM impedance network ensures stability and eliminates echo caused by impedance mismatches.

For IPE cards, this option is controlled by software configuration.

Terminating Impedance

Some analog trunk and the Extended Off-premises Station (XOPS) cards have Terminating Impedance options that ensure proper impedance matches when connecting to an external interface. The Terminating Impedance options are 600 ¾ and 900 ¾.

For IPE cards, this option is controlled by software configuration.

Digital Trunk and Primary Rate Interface

Digital Trunk Interface (DTI) and Primary Rate Interface (PRI) trunks adjust transmission level by applying software-defined pad values based on the port type involved in the connection. The pad value can be either negative, e.g., -3.0 dB (*GAIN*) or positive, e.g., +3.0 dB (*LOSS*). The *gain* and *loss* sign conventions appear to be contrary to intuition; however, from the point of view of looking at signals traversing cables, loss is the quantity of interest and is positive, therefore an increase in signal strength is a negative loss, referred to as a gain.

Basic Rate Interface Line and Trunk

Basic Rate Interface Lines and Trunks adjust transmission level in the same manner as DTI/PRI trunks do. That is, they apply pad values based on the port type involved in the connection. Basic Rate Interface Lines (BRIL) apply fixed pad values, while Basic Rate Interface Trunks (BRIT) apply software defined pad values.

Meridian Modular Telephones

Meridian Modular Telephones download software-defined Objective Loudness Rating (OLR) settings that set the level at the Central Office or

Public Exchange trunk interface to the same level as that of an analog 500/2500 type set connected to the same trunk interface.

Off-premises stations

Contents

This section contains information on the following topics:

Introduction

The Flexible Intelligent Peripheral Equipment (IPE) Extended Off-premises Station (XOPS) line cards are high-gain cards that enable sets to use a loop of up to 2300 ¾. These cards are equipped with the B34 codec that enables the card loss to be defined by overlay input. Current current applications use only software-defined card losses. The XOPS units can be used for both Off- and On-premise applications. The unit's mode of operation is determined by both hardware jumper settings (not in the case of Chinese cards) and software configuration.

Off-premises level adjustment methods

Pads on the OPS card and card loss settings on the XOPS card dynamically adjust the transmission level. A predefined software matrix determines the transmission level required based on the port type at the far end. Table 6 shows the Off-premises level adjustment matrix.

In Table 6, the first cell element is the originator's state and the second cell element is the terminator's state. Following are the state indicators:

- 0 = no transmission level adjustment (pad out [pad not applied] or Base level loss).
- 1 = transmission level adjustment (pad in [pad applied] or Alternate level loss).
- T = other routine, e.g., Dynamic Pad Switching (DPS), determines transmission level.
- X = transmission levels not dynamically adjusted; constant transmission level.

Table 6
Off-premises level adjustment matrix

	Terminator					
Originator	Off-premises Line		On-premises Line		Trunk	
Off-premises Line	1	0	0	X	1	T
On-premises Line	X	0	X	X	X	T
Trunk	T	1	T	X	T	T

Upgrade strategies

IPE XOPS cards can coexist in the same system.

Administration

The OPS unit's transmission level adjustment is controlled by Class of Service (CLS) designation in LD 10. The CLS designations are shown in the table below.

LD 10 — Class of Service designation

Prompt	Response	Description
REQ	NEW CHG	Create or modify a data block
TYPE	500	Analog Line Unit
TN	lll s cc uu	Terminal Number where lll = loop number (1 to 159) s = shelf (0 to 3) (Large Systems) cc = card (1 to 10) uu = unit (0 to 3) (add cc uu for Small Systems and Succession 1000)
CDEN	SD	Card Density. Must be Single Density (SD) for the OPS card.
...	...	...
CLS	(ONS) OPS	ONS = On-premises: Dynamic transmission level adjustment not performed by unit (OPS pad switching disabled). OPS = Off-premises Station Dynamic transmission level adjustment performed by unit (OPS pad switching enabled)

The XOPS unit's transmission level adjustment is controlled by a combination of CLS designation in LD 10 and hardware jumper settings. The CLS options are shown in the following table.

LD 10 — Class of Service designation (Part 1 of 2)

Prompt	Response	Description
REQ	NEW CHG	Create or modify a data block.
TYPE	500	Analog Line Unit
TN	lll s cc uu	Terminal Number where lll = loop number (1 to 159) s = shelf (0 to 3) (Large Systems) cc = card (1 to 10) uu = unit (0 to 3) (add cc uu for Small Systems and Succession 1000)
CDEN		Card Density. Must be DD (Double Density) for XOPS card.
...	....	....
CLS	ONS (OPS)	Class of Service ONS = On-premises dynamic transmission level. Adjustment not performed by unit (only Base level settings applied). OPS = Off-premises Station dynamic transmission level. Adjustment performed by unit (both Base and Alternate settings applied, the setting being determined by the port type involved in the connection).

LD 10 — Class of Service designation (Part 2 of 2)

Prompt	Response	Description
TIMP	(600) 900	Terminating impedance in ohms (not prompted for in Chinese Loss Plan) Prompted for XOPS units only (XOPS cards are identified by the fact that they are configured as Double Density cards on an octal density [Super] loop.
BIMP	(3COM) 600 900 COM2	Balance impedance in ohms (not prompted for in Chinese Loss Plan) 3COM = Three component compromise 600 = 600 ohm resistance 900 = 900 ohm resistance COM2 = Three component compromise secondary setting. Note: If CLS is set to ONS, then BIMP must be set to 600.

When the XOPS is used in an on-premises (ONS) mode, the loss value downloaded to it depends on whether the system is configured to use the North American or Chinese transmission plan. The Chinese transmission plan settings are selected by activating the Dynamic Loss Switching (DLS) feature and entering the Chinese Loss Plan identifier in response to the APAD prompt in LD 15.

The China Toll package introduced an exception. When a toll call on DTI2 and a line card with ONS Class of Service terminates on an analog 500/2500 type set, new loss levels are downloaded to the line card. When the call is terminated, the loss levels are reset. The new loss levels are configured in LD 73 under the prompts TOLT and TOLL.

See *Software Input/Output: Administration* (553-3001-311) for details.

Following are the card losses downloaded:

	Downloaded values	
Transmission Plan	Rx dBr	Tx dBr
North American	9 3.5	17 - 0.5
China IPE	16 0.0	23 - 3.5

For information regarding the download parameters (Rx, Tx and dBr), refer to the section of this document titled “Static Loss Plan Downloading” on page 61. For information regarding Alternative Loss Plan administration, refer to the section of this document titled “Dynamic Pad Switching” on page 49.

NT1R20 hardware strapping options:

For CLS set to ONS in LD 10:

- JX.0 and JX.1 — OFF

For CLS set to OPS in LD 10:

- JX.0 and JX.1 — OFF if loop loss is in the range 0-2.5 dB
- JX.0 and JX.1 — ON if loop loss is in the range >2.5-15 dB

Table 7 is a cross-reference of software and hardware settings required for various installations:

Table 7
XOPS software and hardware settings cross-reference for NT1R20 XOPS

	On-premises station	Off-premises station
CLS	ONS	OPS
Loop resistance	0-460 ¾	0-2300 ¾

Table 7
XOPS software and hardware settings cross-reference for NT1R20 XOPS

Loop loss (dB)	0-1.5	>1.5-2.5	>2.5-3.0	0-1.5	>1.5-2.5	>2.5-4.5	>4.5-15
Jumper settings	JX.0 & JX.1 — OFF			JX.0 & JX.1 – OFF		JX.0 & JX.1 — ON	
TIMP	600	600	600	600	600	600	600
BIMP	600 ¾	3COM	COM2	600 ¾	3COM	COM2	COM2

In Table 7, the X in JX.0 and JX.1 refers to the unit number (0-7) that is being configured. For example, if unit 5 were being configured for OPS operation with a loop resistance of 2300 ¾, and a loop loss of 6.0 dB, then J5.0 and J5.1 would both be ON.

NTRA06 hardware strapping options:

For CLS set to ONS in LD 10:

- JX.1 and JX.2 — OFF

For CLS set to OPS in LD 10:

- JX.1 and JX.2 — OFF if loop resistance is ≤600 ¾.
- JX.0 and JX.1 — ON if loop resistance is >600 ¾.

Table 8 is a cross-reference of software and hardware settings required for various installations:

Table 8
XOPS software and hardware settings cross-reference for the Chinese NTRA06 XOPS

	On-premises station	Off-premises station	
CLS	ONS	OPS	
Loop resistance	0-600 ¾	0-600 ¾	601-2300 ¾
Jumper settings	JX.1 and JX.2 — OFF	JX.1 and JX.2 — OFF	JX.1 and JX.2 — ON

In Table 8, the X in JX.1 and JX.2 refers to the unit number (0-7) that is being configured. For example, if unit 5 were being configured for OPS operation with a loop resistance of 2300 ¾ then J5.1 and J5.2 would both be ON.

Hardware requirements

For IPE in countries other than China, the NT1R20 line card is required.

For China, the NTRA06 is required.

Conference bridge

Contents

This section contains information on the following topics:

Introduction

Conference pad switching applies to conference bridge connections with three or more conferees that terminate on 2-wire ports. All trunks involved in the conference have their pad states set to *pad out*; all other connections with pad switching capabilities involved in the conference use their non-trunk pad settings.

Pad switching methods

All conference pad switching algorithms switch hard-coded pads.

You can select an alternate software defined conference pad switching algorithm. The enhanced capability is Alternate Conference Pads (ACP) selection.

In international marketplaces, the system uses the NT8D17 Extended Conference and Tone and Digit Switch (XCT) card and its associated software. This combination enables the user to select, by overlay input, either the software controlled conference pad switching algorithm or the insertion of a fixed loss for all conference calls. The response to the CPAD prompt in LD 97 determines which method to use for all conference calls.

Depending on the country, either software or hardware is used to set the pad levels. Hardware set pads are defined by four dip switches (16 settings) on the card. When set in this manner the loss is fixed, irrespective of the number of parties in the conference. Pads implemented in software are set by default to the North American loss plan settings, but can be changed to the alternative conference pads as indicated above. The alternative conference pads insert less loss (see Table 9).

Succession 1000M Cabinets and Meridian 1 Option 11C Cabinets use a different method of setting losses. They assume the North American loss plan or sets all pad values to zero (0) dB.

Alternative Conference Pads selection

Alternative Conference Pads (ACP) selection enables a different conference pad switching algorithm to be used during a conference. The ACP feature requires the use of a QPC 446 for μ-Law applications and QPC 447 for A-Law applications.

The responses to the APAD prompt in LD 15 determine the conference pad switching algorithm used for the customer. Table 9 lists the attenuation levels for different conferences.

Table 9
Default and alternative conference pads

Number of trunks in conference	Number of stations in conference	Pads (dB)	
		Default	Alternative
1	3	0.0	0.0
1	4	1.2	0.0
1	5	4.0	0.0
1	>=6	5.4	0.0
>=2	3	5.4	1.2
>=2	4	8.2	1.2
>=2	5	10.4	1.2
>=2	>=6	12.2	1.2

Alternative Conference Pads selection administration

The responses to the APAD prompt in LD 15 determine the conference pads used for the customer. The input format for the APAD prompt is two fields that accept entries in the range 0 to 7. The first field is the Dynamic Pad Switching matrix identifier and the second field is the conference pads identifier. The following table shows the valid responses to the APAD prompt.

LD 15

Prompt	Response	Description
REQ	NEW CHG	Create or modify a data block
TYPE	CDB	Customer Data Block
APAD	X Y	X = Alternative Dynamic Pad Switching Matrix identifier (0 to 7, with 0 as the default in North America) Y = Alternative Conference Pads identifier (0 to 7 with 0 as the default in North America) 1 = Alternative Conference Pads, where used.

Alternative Conference Pads selection hardware requirements

The Alternate Conference Pads option requires the use of QPC 446 or QPC 447 conference cards.

NT8D17 options

The NT8D17 can either use the conference pad switching algorithm or insert a predefined attenuation level depending on the response to the CPAD prompt in LD 97. Table 10 lists the software-defined conference pad switching algorithm port-to-port loss for conferences using the NT8D17 with CPAD = 0 in LD 97 with three to six ports and IPE connections between analog lines and trunks. The values given in the table are the total loss values that include both the loss inserted by the conference card and the loss inserted by the line or trunk card(s) involved in the connection.

Table 10
NT8D17 Loss insertion for conference connections

	THREE PORTS		FOUR PORTS	
Connection (A-B)	**Loss A - B (dB)**	**Loss B - A (dB)**	**Loss A - B (dB)**	**Loss B - A (dB)**
Line to line	4.0	4.0	7.0	7.0
Line to CO trunk	0.5	0.5	3.5	3.5
Line to TIE trunk	2.5	0.5	5.5	3.5
CO trunk to CO trunk	0.0	0.0	0.0	0.0
CO trunk to TIE trunk	2.0	0.0	2.0	0.0
TIE trunk to TIE trunk	2.0	2.0	2.0	2.0
	FIVE PORTS		**SIX PORTS**	
Connection (A-B)	**Loss A - B (dB)**	**Loss B - A (dB)**	**Loss A - B (dB)**	**Loss B - A (dB)**
Line to line	8.5	8.5	10.0	10.0
Line to CO trunk	5.0	5.0	6.5	6.5
Line to TIE trunk	7.0	5.0	8.5	6.5
CO trunk to CO trunk	1.5	1.5	3.0	3.0
CO trunk to TIE trunk	3.5	1.5	5.0	3.0
TIE trunk to TIE trunk	3.5	3.5	5.0	5.0

Note: Three trunks is the recommended maximum on a conference connection.

When CPAD = 1 in LD 97, the NT8D17 applies a predefined attenuation level to all conference calls. Switch settings on the circuit card determine the attenuation level. Table 11 cross-references the switch settings to attenuation levels.

Table 11
NT8D17 attenuation level switch settings

Attenuation levels (dB)	SW2 settings		
	1	2	3
12.2	on	on	on
10.4	on	on	off
8.2	off	on	on
7.2	off	on	off
5.4	on	off	on
4.0	on	off	off
1.2	off	off	on
0.0	off	off	off

The NT8D17 can operate in either A-Law or μ-Law companding mode. Jumper settings determine the companding mode to operate in. See Table 12.

Table 12
NT8D17 companding option settings

Companding Law	J3 settings
μ-Law	jumper pins 1 and 2
A-Law	jumper pins 2 and 3

NT8D17 administration

The responses to the CPAD prompt in LD 97 determine whether the NT8D17 uses the software-defined conference pad switching algorithm values or the hardware defined attenuation level for all conference calls. The following table outlines the valid responses to the CPAD prompt.

LD 97

Prompt	Response	Description
REQ	CHG	Modify data block.
TYPE	XCTP	Extended Conference and Tone and digit switch parameters
CPAD	X	X = conference pad selection method identifier (0) to 1 where 0 = software defined conference pad switching algorithm 1 = hardware attenuation levels

Dynamic Pad Switching

Contents

This section contains information on the following topics:

Introduction

On generic XFCOTs, the use of DPS is controlled by the response to the NATP (North American Transmission Plan) prompt in LD 97.

With DPS, pad switching occurs on the trunk side of the connection because all On-premises (OPS) lines have a fixed loss.

DPS determines the pad state on a per-connection basis for the following:

- North American and North American-based Intelligent Peripheral Equipment (IPE) trunks, with the exception of Chinese IPE where Dynamic Loss Switching is used for both ONS and OPS classes of service.
  XTRK = XUT or XEM in LD 14
- International Generic XFCOT (NT5K16) Central Office Trunks (COT)

The use of the term "*per-connection*" highlights that within a single call, there can be a number of different connections required. An example is an incoming trunk call. The trunk connects to the Tone and Digit Switch (TDS) to receive ring back tone; when the called party goes off hook, the trunk disconnects from the TDS and connects to the called party. This call can use two pad settings for the two different connections.

Dynamic Pad Switching overview

A predefined matrix that takes into account the port types involved in a connection is what determines the pad state. The following criteria identify the port types involved in a connection:

- unit type
- Class of Service (CLS)
- Trunk Signaling
- XTRK type

The trunk data block Class of Service (CLS) assignment characterizes the transmission properties of each trunk.

The DPS-related options for XUT and XEM trunks are

- VNL (Via Net Loss)
- Non-VNL, either:
  TRC (Transmission Compensated)
  or NTC (Non-Transmission Compensated)

Assignment of CLS VNL or non-VNL ensures stability and minimizes echo on long-haul connections, 4-wire TIE, and CCSA. Similarly, assignment of a non-VNL CLS applies to 2-wire TIE, COT, FEX, WAT, CCSA, and 4-wire non-VNL facilities. The DPS non-VNL CLS options are

- TRC — 2-wire non-VNL trunk facility with a loss of greater than 2 dB
  — 2-wire non-VNL trunk facility with impedance compensation
  — 4-wire non-VNL facility
- NTC — 2-wire non-VNL trunk facility with a loss of less than 2 dB
  — 2-wire non-VNL trunk facility when impedance compensation is not provided

The DPS-related options for the International Generic XFCOT (NT5K16) COT are

- SHL (Short line) — transmission lines of relatively short length, low loss
- LOL (Long line) — transmission lines of relatively long length, high loss

The DPS-related options in an international context for all other trunks are

- NTC (Non-Transmission Compensated) — transmission lines without compensation, high loss
  Pad out (pad not applied)
  Applies to EAM, EM4 and WR4 TIE trunks.
  UK LINK setting.
- TRC (Transmission Compensated) — transmission lines with compensation, low loss
  Pad in (pad applied)
  Applies to EAM, EM4 and WR4 TIE trunks.
  UK TIE setting.
- VNL (Via Network Loss) — no particular meaning in a European context, equivalent to TRC
  Pad in (pad applied)
  Applies to EAM and EM4 TIE trunks.
  UK TIE setting.

Alternative Loss Plan overview

The Alternative Loss Plan (ALP) feature uses five different matrices to meet country-specific Loss and Level Plan requirements. The matrices are:

0 Default (North American)

1 Australia

2 New Zealand

3 Italy

4 China

5 China

The ALP feature enables selection of a switching matrix on a per-customer basis.

There are two elements per cell. The elements are:

- originator's pad state
- terminator's pad state

With the introduction of IPE trunks, expansion of the DPS matrix to 18 x 18 was necessary to accommodate the new XTRK port types, along with updated cell information because IPE trunks can switch the transmit and receive pads independently. There are four elements:

- originator's receive pad state
- originator's transmit pad state
- terminator's receive pad state
- terminator's transmit pad state

For more information on connection matrix details, consult a Nortel Networks transmission specialist.

The following table shows how to configure an XFCOT to perform like an XUT from a loss point of view.

Table 13
XFCOT to XUT DPS matrix element mapping

XFCOT				XUT		
XTRK	**TYPE**	**SIGL**	**CLS**	**XTRK**	**TYPE**	**CLS**
XCOT	COT	LOP	SHL	XUT	COT	TRC
XCOT	COT	LOP	LOL	XUT	COT	NTC

Alternative Loss Plan capabilities

The Alternative Loss Plan (ALP) feature uses Dynamic Pad Switching with alternate switching matrices. The North American matrix is default. The ALP feature applies to analog trunks only.

The concept of Loss Switching Connection Matrices (LSCM) accommodates the 18 x18 matrix required by the Intelligent Peripheral Equipment (IPE) and the requirement to interact with the Dynamic Loss Switching (DLS) feature.

ALP 10.10C capabilities

The capabilities introduced were:

- Alternative pad (APAD) switching for analog trunks only
- Australian Dynamic Pad Switching matrix
- A Multi Frequency Compelled (MFC) pad (MFPD) used during the MFC signaling portion of a call on high gain (-7 dB) DID and CO trunks

ALP 15.58F capabilities

Enhanced capabilities include:

- Alternative Conference Pads (ACP)
- Chinese Dynamic Pad Switching matrix

You can select an alternate conference pad switching algorithm with the North American conference pad switching algorithm being the default. The responses to the APAD prompt in LD 15 control which alternative conference pad switching algorithm is in use.

When R2 Multi-Frequency Compelled Signalling on DTI 1.5 is activated, it does not support the Alternate Loss Plan.

The ACP feature requires conference cards (QPC 446/QPC 447 or later) that have alternate attenuation levels.

Administration

The following sections discuss the administration of these features.

DPS using International Generic XFCOT (NT5K16) administration

Following tables provide an overview of the administration of DPS using the Generic XFCOT (NT5K16).

LD 97

Prompt	Response	Description
REQ	CHG	Modify data block.
TYPE	LOSP	Loss plan parameters.
NATP	YES	Use the North American Transmission DPS method.

LD 14

Prompt	Response	Description
REQ	NEW CHG	Create or modify data block.
TYPE	COT	Central office trunk
XTRK	XCOT	Extended trunk type is Extended Central Office Trunk
SIGL	LOP	Signaling method on trunk is Loop Start
CLS	SHL LOL	Short Line Class of Service Long Line Class of Service

ALP feature administration

Following is an overview of the ALP feature administration

LD 15

Prompt	Response	Description
REQ	NEW CHG	Create or modify data block
TYPE	CDB	Customer data block
APAD	X Y	X = Alternative Dynamic Pad Switching matrix identifier (0) to 7 where 0 = North American 1 = Australian 2 = New Zealand 3 = Italy 5 = China IPE 6 to 7 reserved for future use. Y = Alternative Conference Pads identifier (0) to 7 where 0 = North American 1 = Alternative Conference Pads

Hardware requirements

The following sections outline the hardware requirements.

Dynamic Pad Switching

All North American-based Intelligent Peripheral Equipment (IPE) trunks use Dynamic Pad Switching algorithms to determine which pads to select.

- North American-based refers to XTRK = XUT or XEM in LD 14, except for China
- International Generic XFCOT (NT5K16)

Alternate Loss Plan for China

The Alternate Loss Plan for China (APAD prompt response number 5; see Administration above) requires the following IPE cards:

- NTRA02XUTC
- NTRA03XEMC
- NTRA04XFALCC with Message Waiting
- NTRA05XALCC without Message Waiting
- NTRA06XOPSC Off-premises Station

Static Pad Download

Contents

This section contains information on the following topics:

Introduction

Static Pad Download (SPD) sets the pad state, either pad in or pad out, for COT, DID, and TIE trunks on a unit-by-unit basis as part of the enabling process of the unit.

Static Pad Download overview

SPD is for countries where there is no need to alter the transmission level on a connection-by-connection basis for DID, COT, and TIE trunks. SPD introduced the SHL (Short Line [pad in]) and LOL (Long Line [pad out]) Classes of Service for DID and COT trunks. TIE trunks set their pad state with the TRC (Transmission Compensated [pad in]), NTC (Non-Transmission Compensated [pad out]), and VNL (Via Network Loss [pad in]) transmission characteristic Classes of Service. The enabling process for the unit sets the pad state.

Following are definitions of the various Classes of Service in an international context:

- SHL (SHort Line) — transmission lines of relatively short length,
  low loss
  Pad in (pad applied)
  Applies to DID and COT trunks.

- LOL (LOng Line) — transmission lines of relatively long length,
  high loss
  Pad out (pad not applied)
  Applies to DID and COT trunks.

- NTC (Non-Transmission Compensated) — transmission lines without
  compensation, high loss
  Pad out (pad not applied)
  Applies to EAM, EM4 and WR4 TIE trunks.
  UK LINK setting

- TRC (Transmission Compensated) — transmission lines with
  compensation, low loss
  Pad in (pad applied)
  Applies to EAM, EM4 and WR4 TIE trunks.
  UK TIE setting

- VNL (Via Network Loss) — no particular meaning in a European
  context, equivalent to TRC
  Pad in (pad applied)
  Applies to EAM and EM4 TIE trunks.
  UK TIE setting.

For the NTCK22 XDID trunk configured as TYPE TIE, XTRK XDID, and SIGL LDR

- NTC is mapped to SHL
- TRC and VNL are mapped to LOL

Administration

Administration of the pad states is in LD 14 by Class of Service designation. The following are the SPD-related Classes of Service.

- Pad out settings:

  For TYPE = DID and COT
  CLS = LOL or NTC

  For TYPE = TIE where XTRK = XFEM (LINK setting)
  CLS = NTC

- Pad in settings:

  For TYPE = DID and COT
  CLS = SHL, TRC, or VNL

  For TYPE = TIE where XTRK = XFEM (TIE setting)
  CLS = TRC or VNL

Hardware requirements

All Intelligent Peripheral Equipment (IPE) circuit cards for use *outside* Canada, U.S.A., and Japan support SPD, with the exception of those for China.

Static Loss Plan Downloading

Contents

This section contains information on the following topics:

Introduction

Static Loss Plan Downloading (SLPD) downloads software-defined pad values to all International Intelligent Peripheral Equipment (IPE) cards (China is an exception) that use both the B34 codec and "flexible" firmware.

Static Loss Plan Downloading overview

SLPD downloads software-defined Relative Input/Output Level settings to each of the B34 port types.

The following four variables determine the port types for trunks:

- unit's XTRK type defined in LD 14

- unit's TYPE defined in LD 14
- unit's signaling type defined in LD 14
- unit's transmission characteristics Class of Service (CLS) defined in LD 14

SLPD introduces the use of pads on B34 equipped Extended Flexible Analog Line Card (XFALC) units. Class of Service (CLS) designation controls the pad state. The CLS designations are LOL (Long Line) for pad out and SHL (Short Line) for pad in.

Table 14 lists the B34 port types for all Loss Plans with the exception of that for China. SLPD is not used in China.

Table 14
B34 port types for all Loss Plans with the exception of China (Part 1 of 2)

TYPE (unit type)	SIGL (signaling)	XTRK	CLS	B34 Port Type
COT, FEX, or WAT	ALL	ALL	SHL	COTS
			LOL	COTL
DID	ALL	ALL	SHL	DIDS
			LOL	DIDL
TIE	EAM	ALL	TRC	T2WT
			NTC	T2WN
			VNL	T2WV
	EM4, WR4, LDR and	ALL	TRC	T4WT
	none of the above		NTC	T4WN
			VNL	T4WV
RAN, MUS, RCD, or AWR	ALL	ALL	ALL	RANR

Table 14
B34 port types for all Loss Plans with the exception of China (Part 2 of 2)

TYPE (unit type)	SIGL (signaling)	XTRK	CLS	B34 Port Type
PAG	ALL	ALL	ALL	PAGT
none of the above	ALL	XCOT	SHL	COTS
			LOL	COTL
		XDID	SHL	DIDS
			LOL	DIDL
		XFEM	TRC	T4WT
			NTC	T4WN
			VNL	T4WV
Analog Line Unit	Not Applicable	Not	SHL	ALUS
(500/2500)		Applicable	LOL	ALUL

The usage of the downloaded Relative Input/Output Level setting is either to meet Loss Plan requirements where a single transmission level is acceptable for all connection types, or as the “Base Level” setting for the Dynamic Loss Switching feature.

If a system has both the SLPD and the Dynamic Loss Switching (DLS) features equipped, DLS takes precedence.

Relative Input/Output Level

Relative Input/Output Level refers to the power of the signal at the input or output interface with respect to 0 dBr (the digital reference point). Therefore the relative Input Level (Li) is equivalent to the card loss in the analog to digital (A/D) direction. Relative Output Level (Lo) is equivalent to the negative of the card loss in the digital to analog (D/A) direction.

The term card loss refers to the difference in signal power between the card interface point and the digital 0 dB reference point. Card loss is the sum of the loss designed into the circuitry plus the pad value selected.

Relative Input/Output Levels for a card with an A/D card loss of 2.0 dB and a D/A loss of 6.5 dB would be

- Relative Input Level (Li) = 2.0 dBr
- Relative Output Level (Lo) = - 6.5 dBr

Loss Plan selection

Loss Plan selection requires the selection of a predefined Loss Plan table in LD 97. Two predefined modes of operation are available for Europe:

- European Telecommunication Standards Institute (ETSI) mode — uses ETSI per-country input/output values as recommended in annexes to the ETSI standards
- Existing mode — uses per-country values as designed for systems that were in existence prior to the formulation of the ETSI standards.

One predefined mode of operation is also available for China.

LD 97 also enables the definition of Custom Loss Plan tables.

Table 17 shows the predefined Static Loss Plan tables applicable to the various countries and operating modes.

IPE cards transmission adjustment capabilities

There are several versions of IPE cards currently in use. Refer to Table 15 for a brief summary on the versions and their transmission adjustment capabilities.

Table 15
IPE cards transmission adjustment capabilities

	Static Pad Download (SPD)	Static Loss Plan Download (SLPD)	Default Loss Setting
non-B34 equipped trunk card	Yes	No	country specific set by hardware
“hard-coded” B34 equipped trunk card	Yes	No	country specific set by firmware
“flexible” B34 equipped trunk card	Yes (SLPD takes precedence)	Yes	universal value set by firmware
non-B34 equipped line card	N/A	N/A	country specific set by H/W
“flexible” B34 equipped line card	N/A	Yes	universal value set by F/W

Upgrade and new installation strategies

In general, existing systems do not require new flexible B34 IPE cards if their Loss Plan stays the same. Those systems use the existing Loss Plan.

Newly installed systems have the new flexible B34 cards and can operate with either the ETSI or the existing loss plan.

Systems using both B34 and non-B34 cards use the existing Loss Plan.

Relative Level setting download

Downloading of the Input/Output Relative Level settings occurs

- at system initialization for all units
- when the card or unit is enabled
- when the Extended Peripheral Equipment Controller (XPEC) is enabled
- when the IPE shelf is enabled
- when a configured card is reseated
- after a trunk or line unit has undergone a NEW, CHG, or MOV using LD 14 or LD 10

Administration

Configuration of the Loss Plan is on a system-wide basis in LD 97. The configuration of levels is by port type; refer to Table 14 for a list of B34 port types.

Entering a code in LD 97 defines the required level. Once downloaded, the B34 converts the code to a level. Table 16 provides a cross-reference between codes and Relative Input/Output Levels.

Table 16
LD 97 code to Relative Input/Output Level cross-reference

		Lines		Trunks				Lines		Trunks	
Code	**Level (dBr)**	**Rx**	**Tx**	**Rx**	**Tx**	**Code**	**Level (dBr)**	**Rx**	**Tx**	**Rx**	**Tx**
0	8.0	Ð			Ð	20	- 2.0	Ð	Ð	Ð	Ð
1	7.5	Ð			Ð	21	- 2.5	Ð	Ð	Ð	Ð
2	7.0	Ð			Ð	22	- 3.0	Ð	Ð	Ð	Ð
3	6.5	Ð			Ð	23	- 3.5	Ð	Ð	Ð	Ð
4	6.0	Ð			Ð	24	- 4.0	Ð	Ð	Ð	Ð
5	5.5	Ð			Ð	25	- 4.5	Ð	Ð	Ð	Ð
6	5.0	Ð			Ð	26	- 5.0	Ð	Ð	Ð	Ð
7	4.5	Ð			Ð	27	- 5.5	Ð	Ð	Ð	Ð
8	4.0	Ð	Ð	Ð	Ð	28	- 6.0	Ð	Ð	Ð	Ð
9	3.5	Ð	Ð	Ð	Ð	29	- 6.5	Ð	Ð	Ð	Ð
10	3.0	Ð	Ð	Ð	Ð	30	- 7.0	Ð	Ð	Ð	Ð
11	2.5	Ð	Ð	Ð	Ð	31	- 7.5	Ð	Ð	Ð	Ð
12	2.0	Ð	Ð	Ð	Ð	32	- 8.0		Ð	Ð	
13	1.5	Ð	Ð	Ð	Ð	33	- 8.5		Ð	Ð	
14	1.0	Ð	Ð	Ð	Ð	34	- 9.0		Ð	Ð	
15	0.5	Ð	Ð	Ð	Ð	35	- 9.5		Ð	Ð	
16	0.0	Ð	Ð	Ð	Ð	36	- 10.0		Ð	Ð	
17	- 0.5	Ð	Ð	Ð	Ð	37	- 10.5		Ð	Ð	
18	- 1.0	Ð	Ð	Ð	Ð	38	- 11.0		Ð	Ð	
19	- 1.5	Ð	Ð	Ð	Ð	39	- 11.5		Ð	Ð	

Note: Ð indicates a valid code for a line or a trunk in either Tx or Rx mode.

Configuration of the transmit (Tx) and receive (Rx) Relative Input/Output Levels for each port type is either automatic, i.e., the user selects a predefined SLPD table, or each port type has its level defined individually by going through the customization process in LD 97. For Relative Input/Output Levels transmit (Tx) corresponds to the D/A (decode) and receive (Rx) corresponds to the A/D (encode) direction for analog cards.

For the actual LD 97 coded input and resulting Relative Input/Output Level for each country and operating mode, refer to Table 17.

Table 17
Predefined Static Loss Plan Download tables

	Table 1 Austria and Greece ETSI				Table 2 Austria Existing				Table 3 Belgium ETSI			
B34 Port Type	**Rx**	**dBr**	**Tx**	**dBr**	**Rx**	**dBr**	**Tx**	**dBr**	**Rx**	**dBr**	**Tx**	**dBr**
COTS	28	- 6.0	18	- 1.0	24	- 4.0	22	- 3.0	24	- 4.0	22	- 3.0
COTL	28	- 6.0	18	- 1.0	28	- 6.0	18	- 1.0	28	- 6.0	18	- 1.0
DIDS	28	- 6.0	18	- 1.0	24	- 4.0	22	- 3.0	24	- 4.0	22	- 3.0
DIDL	28	- 6.0	18	- 1.0	28	- 6.0	18	- 1.0	28	- 6.0	18	- 1.0
T2WT	---	---	30	- 7.0	---	---	30	- 7.0	---	---	30	- 7.0
T2WN	---	---	30	- 7.0	---	---	30	- 7.0	---	---	30	- 7.0
T2WV	---	---	30	- 7.0	---	---	30	- 7.0	---	---	30	- 7.0
T4WT	23	- 3.5	23	- 3.5	---	---	22	- 3.0	---	---	---	---
T4WN	23	- 3.5	23	- 3.5	---	---	22	- 3.0	---	---	---	---
T4WV	23	- 3.5	23	- 3.5	---	---	22	- 3.0	---	---	---	---
PAGT	---	---	---	---	---	---	---	---	---	---	---	---
RANR	---	---	---	---	---	---	---	---	---	---	---	---
ALUS	---	---	30	- 7.0	---	---	30	- 7.0	---	---	30	- 7.0
ALUL	---	---	30	- 7.0	---	---	30	- 7.0	---	---	30	- 7.0

Note: Pad code 16 and its corresponding dB gain 0.0 are shown as "--- ---" in the table to reflect what is seen when the table is printed in LD 97

Table 17
Predefined Static Loss Plan Download tables

	Table 4 Belgium Existing				Table 5 Denmark ETSI				Table 6 Denmark Existing			
B34 Port Types	**Rx**	**dBr**	**Tx**	**dBr**	**Rx**	**dBr**	**Tx**	**dBr**	**Rx**	**dBr**	**Tx**	**dBr**
COTS	24	- 4.0	22	- 3.0	22	- 3.0	22	- 3.0	8	4.0	18	- 1.0
COTL	28	- 6.0	18	- 1.0	26	- 5.0	18	- 1.0	---	---	10	3.0
DIDS	24	- 4.0	22	- 3.0	22	- 3.0	22	- 3.0	8	4.0	18	- 1.0
DIDL	28	- 6.0	18	- 1.0	26	- 5.0	18	- 1.0	---	---	10	3.0
T2WT	8	4.0	10	3.0	---	---	28	- 6.0	8	4.0	18	- 1.0
T2WN	8	4.0	10	3.0	---	---	28	- 6.0	8	4.0	18	- 1.0
T2WV	8	4.0	10	3.0	---	---	28	- 6.0	8	4.0	18	- 1.0
T4WT	---	---	10	3.0	---	---	---	---	---	---	---	---
T4WN	---	---	10	3.0	---	---	---	---	---	---	---	---
T4WV	---	---	10	3.0	---	---	---	---	---	---	---	---
PAGT	---	---	---	---	---	---	22	- 3.0	---	---	10	3.0
RANR	---	---	---	---	---	---	---	---	8	4.0	---	---
ALUS	8	4.0	22	- 3.0	---	---	28	- 6.0	8	4.0	18	- 1.0
ALUL	8	4.0	22	- 3.0	---	---	28	- 6.0	8	4.0	18	- 1.0

Note: Pad code 16 and its corresponding dB gain 0.0 are shown as "--- ---" in the table to reflect what is seen when the table is printed in LD 97

Table 17
Predefined Static Loss Plan Download tables

	Table 7 Finland ETSI				Table 8 Germany ETSI/Existing				Table 9 Italy ETSI			
B34 Port Type	**Rx**	**dBr**	**Tx**	**dBr**	**Rx**	**dBr**	**Tx**	**dBr**	**Rx**	**dBr**	**Tx**	**dBr**
COTS	25	- 4.5	21	- 2.5	26	- 5.0	20	- 2.0	28	- 6.0	18	- 1.0
COTL	25	- 4.5	21	- 2.5	30	- 7.0	---	---	28	- 6.0	18	- 1.0
DIDS	25	- 4.5	21	- 2.5	26	- 5.0	20	- 2.0	28	- 6.0	18	- 1.0
DIDL	25	- 4.5	21	- 2.5	30	- 7.0	---	---	28	- 6.0	18	- 1.0
T2WT	---	---	30	- 7.0	10	3.0	31	- 7.5	---	---	30	- 7.0
T2WN	---	---	30	- 7.0	---	---	30	- 7.0	28	- 6.0	18	- 1.0
T2WV	---	---	30	- 7.0	10	3.0	31	- 7.5	---	---	30	- 7.0
T4WT	23	-3.5	23	-3.5	23	-3.5	23	- 3.5	23	- 3.5	23	- 3.5
T4WN	23	-3.5	23	-3.5	21	- 2.5	25	- 4.5	23	- 3.5	23	- 3.5
T4WV	23	-3.5	23	-3.5	23	-3.5	23	- 3.5	23	- 3.5	23	- 3.5
PAGT	---	---	---	---	---	---	30	- 7.0	---	---	23	- 3.5
RANR	---	---	---	---	---	---	---	---	23	- 3.5	---	---
ALUS	---	---	30	- 7.0	10	3.0	36	- 10.0	---	---	30	- 7.0
ALUL	---	---	30	- 7.0	---	---	30	- 7.0	---	---	30	- 7.0

Note: Pad code 16 and its corresponding dB gain 0.0 are shown as "--- ---" in the table to reflect what is seen when the table is printed in LD 97

Table 17
Predefined Static Loss Plan Download tables

	Table 10 Italy Existing				Table 11 Netherlands ETSI				Table 12 Netherlands Existing			
B34 Port Type	**Rx**	**dBr**	**Tx**	**dBr**	**Rx**	**dBr**	**Tx**	**dBr**	**Rx**	**dBr**	**Tx**	**dBr**
COTS	---	---	10	3.0	24	- 4.0	22	- 3.0	29	- 6.5	17	- 0.5
COTL	---	---	10	3.0	28	- 6.0	18	- 1.0	29	- 6.5	17	- 0.5
DIDS	---	---	10	3.0	24	- 4.0	22	- 3.0	29	- 6.5	17	- 0.5
DIDL	---	---	10	3.0	28	- 6.0	18	- 1.0	29	- 6.5	17	- 0.5
T2WT	---	---	10	3.0	---	---	30	- 7.0	---	---	30	- 7.0
T2WN	---	---	10	3.0	---	---	30	- 7.0	---	---	30	- 7.0
T2WV	---	---	10	3.0	---	---	30	- 7.0	---	---	30	- 7.0
T4WT	---	---	10	3.0	---	---	---	---	---	---	10	3.0
T4WN	---	---	10	3.0	---	---	---	---	---	---	10	3.0
T4WV	---	---	10	3.0	---	---	---	---	---	---	10	3.0
PAGT	---	---	10	3.0	---	---	---	---	---	---	10	3.0
RANR	---	---	---	---	---	---	---	---	---	---	---	---
ALUS	8	4.0	18	- 1.0	---	---	30	- 7.0	---	---	30	- 7.0
ALUL	8	4.0	18	- 1.0	---	---	30	- 7.0	---	---	30	- 7.0

Note: Pad code 16 and its corresponding dB gain 0.0 are shown as "--- ---" in the table to reflect what is seen when the table is printed in LD 97

Table 17
Predefined Static Loss Plan Download tables

	Table 13 Norway ETSI				Table 14 Norway Existing				Table 15 Portugal ETSI			
B34 Port Type	**Rx**	**dBr**	**Tx**	**dBr**	**Rx**	**dBr**	**Tx**	**dBr**	**Rx**	**dBr**	**Tx**	**dBr**
COTS	20	- 2.0	18	- 1.0	---	---	14	1.0	12	2.0	14	1.0
COTL	24	- 4.0	14	1.0	20	- 2.0	10	3.0	---	---	10	3.0
DIDS	20	- 2.0	18	- 1.0	---	---	14	1.0	12	2.0	14	1.0
DIDL	24	- 4.0	14	1.0	20	- 2.0	10	3.0	---	---	10	3.0
T2WT	14	1.0	24	- 4.0	8	4.0	22	- 3.0	8	4.0	18	- 1.0
T2WN	14	1.0	24	- 4.0	8	4.0	22	- 3.0	8	4.0	18	- 1.0
T2WV	14	1.0	24	- 4.0	8	4.0	22	- 3.0	8	4.0	18	- 1.0
T4WT	---	---	---	---	10	3.0	20	- 2.0	---	---	22	- 3.0
T4WN	---	---	---	---	10	3.0	20	- 2.0	---	---	22	- 3.0
T4WV	---	---	---	---	10	3.0	20	- 2.0	---	---	22	- 3.0
PAGT	---	---	18	- 1.0	---	---	14	1.0	---	---	---	---
RANR	20	- 2.0	---	---	---	---	---	---	---	---	---	---
ALUS	2	7.0	38	- 11.0	8	4.0	22	- 3.0	8	4.0	18	- 1.0
ALUL	12	2.0	26	- 5.0	8	4.0	22	- 3.0	8	4.0	18	- 1.0

Note: Pad code 16 and its corresponding dB gain 0.0 are shown as “--- ---” in the table to reflect what is seen when the table is printed in LD 97

Table 17
Predefined Static Loss Plan Download tables

	Table 16 Greece and Portugal Existing				Table 17 Spain ETSI/Existing				Table 18 Sweden ETSI/Existing			
B34 Port Type	**Rx**	**dBr**	**Tx**	**dBr**	**Rx**	**dBr**	**Tx**	**dBr**	**Rx**	**dBr**	**Tx**	**dBr**
COTS	12	2.0	14	1.0	24	- 4.0	22	- 3.0	20	- 2.0	10	3.0
COTL	---	---	10	3.0	28	- 6.0	18	- 1.0	20	- 2.0	22	- 3.0
DIDS	12	2.0	14	1.0	24	- 4.0	22	- 3.0	20	- 2.0	10	3.0
DIDL	---	---	10	3.0	28	- 6.0	18	- 1.0	20	- 2.0	22	- 3.0
T2WT	8	4.0	18	- 1.0	---	---	30	- 7.0	---	---	26	- 5.0
T2WN	8	4.0	18	- 1.0	---	---	30	- 7.0	20	- 2.0	22	- 3.0
T2WV	8	4.0	18	- 1.0	---	---	30	- 7.0	---	---	26	- 5.0
T4WT	---	---	22	- 3.0	18	- 1.0	24	- 4.0	11	2.5	23	- 3.5
T4WN	---	---	22	- 3.0	22	- 3.0	23	- 3.5	23	- 3.5	23	- 3.5
T4WV	---	---	22	- 3.0	18	- 1.0	27	- 5.5	11	2.5	23	- 3.5
PAGT	---	---	---	---	---	---	27	- 5.5	---	---	---	---
RANR	---	---	---	---	19	- 1.5	---	---	---	---	---	---
ALUS	8	4.0	18	- 1.0	---	---	30	- 7.0	4	6.0	26	- 5.0
ALUL	8	4.0	18	- 1.0	---	---	30	- 7.0	---	---	26	- 5.0

Note: Pad code 16 and its corresponding dB gain 0.0 are shown as “--- ---” in the table to reflect what is seen when the table is printed in LD 97

—continued—

Table 17
Predefined Static Loss Plan Download tables

	Table 19 Switzerland ETSI				Table 20 Switzerland Existing				Table 21 UK ETSI/Existing			
B34 Port Type	**Rx**	**dBr**	**Tx**	**dBr**	**Rx**	**dBr**	**Tx**	**dBr**	**Rx**	**dBr**	**Tx**	**dBr**
COTS	21	- 2.5	24	- 4.0	12	2.0	14	1.0	20	- 2.0	14	1.0
COTL	25	- 4.5	20	- 2.0	---	---	10	3.0	24	- 4.0	10	3.0
DIDS	21	- 2.5	24	- 4.0	12	2.0	14	1.0	20	- 2.0	14	1.0
DIDL	25	- 4.5	20	- 2.0	---	---	10	3.0	24	- 4.0	10	3.0
T2WT	---	---	29	- 6.5	8	4.0	18	- 1.0	22	- 3.0	---	---
T2WN	---	---	29	- 6.5	8	4.0	18	- 1.0	22	- 3.0	---	---
T2WV	---	---	29	- 6.5	8	4.0	18	- 1.0	22	- 3.0	---	---
T4WT	18	- 1.0	27	- 5.5	12	2.0	14	1.0	---	---	24	- 4.0
T4WN	22	- 3.0	23	- 3.5	---	---	10	3.0	---	---	---	---
T4WV	18	- 1.0	27	- 5.5	12	2.0	14	1.0	---	---	24	- 4.0
PAGT	---	---	27	- 5.5	---	---	14	1.0	---	---	24	- 4.0
RANR	19	- 1.5	---	---	10	3.0	---	---	10	3.0	---	---
ALUS	---	---	29	- 6.5	8	4.0	18	- 1.0	10	3.0	24	- 4.0
ALUL	---	---	29	- 6.5	8	4.0	18	- 1.0	10	3.0	24	- 4.0

Note: Pad code 16 and its corresponding dB gain 0.0 are shown as "--- ---" in the table to reflect what is seen when the table is printed in LD 97

—continued—

Table 17
Predefined Static Loss Plan Download tables

	Table 22 France ETSI				Table 23 France Existing				Table 24 New Zealand Existing			
B34 Port Type	**Rx**	**dBr**	**Tx**	**dBr**	**Rx**	**dBr**	**Tx**	**dBr**	**Rx**	**dBr**	**Tx**	**dBr**
COTS	26	- 5.0	28	- 6.0	22	- 3.0	24	- 4.0	28	- 6.0	---	---
COTL	32	- 8.0	22	- 3.0	28	- 6.0	18	- 1.0	32	- 8.0	10	3.0
DIDS	26	- 5.0	28	- 6.0	22	- 3.0	24	- 4.0	28	- 6.0	---	---
DIDL	32	- 8.0	22	- 3.0	28	- 6.0	18	- 1.0	32	- 8.0	10	3.0
T2WT	26	- 5.0	28	- 6.0	---	---	30	- 7.0	22	- 3.0	---	---
T2WN	20	- 2.0	34	- 9.0	28	- 6.0	18	- 1.0	26	- 5.0	12	2.0
T2WV	32	- 8.0	22	- 3.0	---	---	30	- 7.0	22	- 3.0	---	---
T4WT	23	- 3.5	23	- 3.5	23	- 3.5	23	- 3.5	22	- 3.0	---	---
T4WN	23	- 3.5	23	- 3.5	23	- 3.5	23	- 3.5	26	- 5.0	12	2.0
T4WV	23	- 3.5	23	- 3.5	23	- 3.5	23	- 3.5	22	- 3.0	---	---
PAGT	---	---	30	- 7.0	---	---	30	- 7.0	---	---	23	- 3.5
RANR	---	---	---	---	---	---	---	---	9	3.5	---	---
ALUS	20	- 2.0	34	- 9.0	---	---	30	- 7.0	9	3.5	33	- 8.5
ALUL	20	- 2.0	34	- 9.0	---	---	30	- 7.0	15	0.5	27	- 5.5

Note: Pad code 16 and its corresponding dB gain 0.0 are shown as "--- ---" in the table to reflect what is seen when the table is printed in LD 97

—continued—

Table 17
Predefined Static Loss Plan Download tables (continued)

	Table 25 Australia Existing				**Table 27 China**				**Table 28 CIS IPE only**			
B34 Port Type	**Rx**	**dBr**	**Tx**	**dBr**	**Rx**	**dBr**	**Tx**	**dBr**	**Rx**	**dBr**	**Tx**	**dBr**
COTS	30	- 7.0	14	1.0	19	- 1.5	20	- 2.0	24	- 4.0	22	- 3.0
COTL	30	- 7.0	14	1.0	19	- 1.5	20	- 2.0	28	- 6.0	18	- 1.0
DIDS	30	- 7.0	14	1.0	19	- 1.5	20	- 2.0	23	- 3.5	23	- 3.5
DIDL	30	- 7.0	14	1.0	19	- 1.5	20	- 2.0	28	- 6.0	18	- 1.0
T2WT	19	- 1.5	25	- 4.5	21	- 2.5	18	- 1.0	---	---	30	- 7.0
T2WN	30	- 7.0	14	1.0	21	- 2.5	18	- 1.0	---	---	30	- 7.0
T2WV	19	- 1.5	25	- 4.5	21	- 2.5	18	- 1.0	---	---	30	- 7.0
T4WT	22	- 3.0	22	- 3.0	22	- 3.0	17	- 0.5	---	---	22	- 3.0
T4WN	22	- 3.0	22	- 3.0	22	- 3.0	17	- 0.5	---	---	22	- 3.0
T4WV	22	- 3.0	22	- 3.0	22	- 3.0	17	- 0.5	---	---	22	- 3.0
PAGT	---	---	23	- 3.5	---	---	18	- 1.0	---	---	---	---
RANR	9	3.5	---	---	21	- 2.5	---	---	---	---	---	---
ALUS	13	1.5	31	- 7.5	---	---	23	- 3.5	---	---	30	- 7.0
ALUL	---	---	28	- 6.0	---	---	23	- 3.5				

Note: Pad code 16 and its corresponding dB gain 0.0 are shown as “--- ---” in the table to reflect what is seen when the table is printed in LD 97

When configuring or changing a table, the valid input ranges for Tx and Rx differ for lines and trunks. The valid ranges are

- Rx for lines 0-31
- Tx for lines 8-39
- Rx for trunks 8-39
- Tx for trunks 0-31

You can also disable the SLPD feature in LD 97.

Table lists the LD 10 prompts and responses, while Table lists the LD 97 prompts and responses that apply to the SLPD feature.

LD 10 — SLPD prompts and responses

Prompt	Response	Description
REQ	NEW CHG	Create or modify new data block.
TYPE	500	Analog Line Unit
CLS	(SHL) LOL	Short line, Long line Loss Plan classification

LD 97 — SLPD prompts and responses (Part 1 of 4)

Prompt	Response	Description
REQ	CHG	Modify data block.
TYPE	LOSP	Loss Plan table creation or modification
NATP	(NO) YES	North American Transmission Plan Dynamic Pad Switching method Note: Dynamic Pad Switching is supported only on Generic XFCOT [NT5K16] packs.
TTYP		Table Type to be installed or modified

LD 97 — SLPD prompts and responses (Part 2 of 4)

Prompt	Response	Description
	(STAT)	Static Loss Plan table
	DYNM	Dynamic Loss Switching table
STYP		Static Loss Plan Table to be used
	(PRED)	Predefined table
	CSTM	Customize Modify a table
	DISL	Disable Static Loss Plan Downloading
....	....	....
The following is prompted when TTYP = STAT and STYP = DISL		
PWD2		Level 2 Administrator password as defined in LD 17
....	...	...
The following is prompted when TTYP = STAT and STYP = PRED		
TNUM	1–28	Table number of one of the predefined Loss Plan tables
....	...	...
The following is prompted when TTYP = STAT and STYP = CSTM		
PWD2		Level 2 Administrator password as defined in LD 17
COTS	Rx Tx	COT short line
	8-39 0-31	Where: Rx = Relative Input/Output Level code for the Receive (A/D) direction Tx = Relative Input/Output Level code for the Transmit (D/A) direction

LD 97 — SLPD prompts and responses (Part 3 of 4)

Prompt	Response		Description
COTL	Rx	Tx	COT long line
	8-39	0-31	
DIDS	Rx	Tx	DID short line
	8-39	0-31	
DIDL	Rx	Tx	DID long line
	8-39	0-31	
T2WT	Rx	Tx	TIE 2-wire, CLS = TRC
	8-39	0-31	
T2WN	Rx	Tx	TIE 2-wire, CLS = NTC
	8-39	0-31	
T2WV	Rx	Tx	TIE 2-wire, CLS = VNL
	8-39	0-31	
T4WT	Rx	Tx	TIE 4-wire, CLS = TRC
	8-39	0-31	
T4WN	Rx	Tx	TIE 4-wire, CLS = NTC
	8-39	0-31	
T4WV	Rx	Tx	TIE 4-wire, CLS = VNL
	8-39	0-31	
PAGT	Tx		Paging trunk
	0-31		

LD 97 — SLPD prompts and responses (Part 4 of 4)

Prompt	Response		Description
RANR	Rx		RAN trunk
	8-39		
ALUS	Rx	Tx	Analog Line Card unit CLS = SHL
	0-31	8-39	
ALUL	Rx	Tx	Analog Line Card unit CLS = LOL
	0-31	8-39	

Hardware requirements

All Intelligent Peripheral Equipment (IPE) cards equipped with the B34 codec and "flexible" firmware support Static Loss Plan Downloading with the exception of Chinese IPE cards.

Following is a list of cards, and their associated countries, that can use SLPD:

NT5K02	XFALC with Message Waiting	Australia Denmark Netherlands Italy New Zealand Norway Sweden Switzerland
NT5K17	XDDI	New Zealand
NT5K18	XCOT	New Zealand
NT5K19	XFEM	New Zealand
NT5K60	XDID	Commonwealth of Independent States
NT5K61	XDID	Commonwealth of Independent States
NT5K82	XCOT	Australia Belgium Switzerland
NT5K83	XFEM	Australia Belgium Denmark Netherlands Italy Norway Sweden Switzerland
NT5K84	XDDI/XDID	Australia Belgium Switzerland

NT5K90	XFCOT	Denmark
NT5K93	XFCOT	Norway
NT5K96	XFALC without Message Waiting	Belgium Denmark Netherlands Italy Norway Sweden Switzerland
NTCK18	XFCOT	Italy
NTCK22	XDID/TIE	Italy

Dynamic Loss Switching

Contents

This section contains information on the following topics:

Introduction

Dynamic Loss Switching (DLS) enables per-connection level adjustment for International Intelligent Peripheral Equipment (IPE) trunk cards equipped with the B34 codec and flexible firmware.

The IPE Loss Plan for China incorporates Loss Switching Connection Matrices (LSCM). LSCM uses Dynamic Pad Switching (DPS) matrices to determine which level is required. IPE Loss Plan for China requires the "CHINA" package (285).

The China Toll package (292) enables special loss settings on DTI2 toll calls that terminate on an analog 500/2500 type set.

DLS is not supported on Three Wire Analog Trunks for the Commonwealth of Independent States. For B34-codec equipped IPE Analog Three Wire Trunk cards (X3W), the Static Loss Plan Downloading feature is used.

Dynamic Loss Switching overview

DLS enables per-connection level adjustments based on the port types involved. Level adjustments are the result of switching up to four pads per connection. The pads are:

- originator's receive pad
- originator's transmit pad
- terminator's receive pad
- terminator's transmit pad

DLS has Base and Alternate level switching; this is similar to the pad in and pad out switching of Dynamic Pad Switching (DPS). Base and Alternate level switching differentiates DLS from DPS because DLS has more flexibility. DPS switches hardware-defined pad values based on the port types involved in a connection. DLS switches software-defined card losses based on the port types involved in a connection.

The Relative Input/Output Levels in LD 97 define the card losses. A predefined country-specific software matrix, similar to the matrix used by DPS, chooses the level to apply to a given connection. DLS has three predefined matrices:

- New Zealand
- Italy
- Australia

The LSCM uses 18 X 18 DPS matrixes to determine which level is required.

DLS uses the Static Loss Plan Download (SLPD) table as its base level Relative Input/Output Level settings and introduces alternate level tables.

As with the SLPD feature, there is a minimum vintage of International B34 equipped IPE card required. Refer to Table 19 for a list of IPE trunk cards and their transmission adjustment capabilities.

Static Loss Plan Download and Dynamic Loss Switching inter working

If a system has both the Static Loss Plan Download (SLPD) and the DLS features equipped, then:

- for IPE trunks, DLS takes precedence over SLPD; level adjustments are performed
- for IPE lines, SLPD still applies (toll calls in China are an exception under some circumstances)

Relative Input/Output Level

For an explanation, see the section of the same heading immediately after Table 14 in the chapter "Static Loss Plan Downloading."

Loss Plan selection

LD 97 also enables the definition of Custom Loss Plan tables.

To see the tables showing the predefined "BASE" (SLPD) Relative Input/Output Level codes in LD 97 cross-referenced to the actual Relative Input/Output Levels, consult Table . Tables 24 through 27 within that larger table show Base Level SLPD values for New Zealand, Australia, and China respectively. Table 10 (Existing) shows Base Level SLPD values for Italy.

Table 18 cross-references the predefined "ALTERNATE" (DLS) Relative Input/Output Level codes in LD 97 to the actual Relative Input/Output Levels by country and table number. The Alternative Level (DLS) tables in Table 18 are not the same as the SLPD tables in Table 17.

The China Toll package (292) enables special treatment of toll calls that involve a DTI2 MFC trunk and which terminate on analog 500/2500 type sets. The China Toll package provides specific losses on the DTI2 trunk and line cards if the call is recognized to be a toll call and the line card has either OPS or ONS COS. The loss levels can be configured in LD 73 under the prompts TOLT and TOLL. When the call is terminated, the original loss levels from the pre-defined base table are sent to the ONS line card. For all call types other than toll, the loss plan on the ONS card is static. For the OPS line card, the loss levels are downloaded on a per-call basis.

The Toll Loss plan is supported only when an IPE Loss Plan for China is used, as defined by one of the following options:

- The APAD prompt in LD 15 is set to 5.
- The Static Loss Plan table defined under the STYP prompt in LD 97 is the pre-defined Table 27.
- The Dynamic Loss Plan table defined under the TTYP prompt in LD 97 is the pre-defined Table 5.

The Toll Loss Plan is not supported for conference calls.

Table 18
Alternative Level (DLS) tables (Part 1 of 2)

	New Zealand				Australia			
B34	**TABLE 1**				**TABLE 2**			
Port Type	**Rx**	**dBr**	**Tx**	**dBr**	**Rx**	**dBr**	**Tx**	**dBr**
COTS	20	- 2.0	24	4.0	22	- 3.0	22	- 3.0
COTL	20	- 2.0	22	3.0	22	- 3.0	22	- 3.0
DIDS	20	- 2.0	24	4.0	22	- 3.0	22	- 3.0
DIDL	20	- 2.0	22	3.0	22	- 3.0	22	- 3.0
T2WT	18	- 1.0	20	2.0	21	- 2.5	23	- 3.5
T2WN	18	- 1.0	20	2.0	22	- 3.0	22	- 3.0
T2WV	18	- 1.0	20	2.0	21	- 2.5	23	- 3.5
T4WT	18	- 1.0	20	2.0	14	1.0	30	- 7.0
T4WN	18	- 1.0	20	2.0	14	1.0	30	- 7.0
T4WV	18	- 1.0	20	2.0	14	1.0	30	- 7.0
PAGT	16	0.0	23	3.5	16	0.0	23	- 3.5

Table 18
Alternative Level (DLS) tables (Part 2 of 2)

	New Zealand				Australia			
RANR	9	3.5	16	0.0	9	3.5	16	0.0

Table 18
Alternative Level (DLS) tables (continued)

	Italy			
B34	**TABLE 3**			
Port Type	**Rx**	**dBr**	**Tx**	**dBr**
COTS	8	4.0	18	-1.0
COTL	8	4.0	18	-1.0
DIDS	12	2.0	14	1.0
DIDL	12	2.0	14	1.0
T2WT	12	2.0	14	1.0
T2WN	12	2.0	14	1.0
T2WV	12	2.0	14	1.0
T4WT	12	2.0	14	1.0
T4WN	12	2.0	14	1.0
T4WV	12	2.0	14	1.0
PAGT	---	---	10	3.0
RANR	16	0.0	---	---

Table 18
Alternative Level (DLS) tables (continued)

	China (systems with IPE only)			
B34	**TABLE 5**			
Port Type	**Rx**	**dBr**	**Tx**	**dBr**
COTS	16	0.0	23	- 3.5
COTL	16	0.0	23	- 3.5
DIDS	16	0.0	23	- 3.5
DIDL	16	0.0	23	- 3.5
T2WT	16	0.0	23	- 3.5
T2WN	16	0.0	23	- 3.5
T2WV	16	0.0	23	- 3.5
T4WT	16	0.0	23	- 3.5
T4WN	16	0.0	23	- 3.5
T4WV	16	0.0	23	- 3.5
PAGT	16	0.0	23	- 3.5
RANR	16	0.0	16	0.0

IPE trunk card transmission adjustment capabilities

There are several versions of IPE trunk cards currently in use. Refer to Table 19 for a brief summary on the trunk card versions and their transmission adjustment capabilities.

Table 19
IPE trunk card transmission adjustment capabilities

	Static Pad Download (SPD)	Static Loss Plan Download (SLPD)	Dynamic Loss Switching (DLS)	Default Loss Setting
“flexible 7C” B34 equipped trunk card	Yes (SLPD and DLS take precedence)	Yes (DLS takes precedence)	Yes	country specific set by firmware
“flexible 8B” B34 equipped trunk card	Yes (SLPD and DLS take precedence)	Yes (DLS takes precedence)	Yes	universal set by firmware
“flexible” B34 China	No	No	Yes	set by soft-ware

Upgrade and new installation strategies

In general, existing systems do not require new flexible B34 IPE trunk cards unless their Loss Plan changes. Such systems shall use the existing mode of operation, if applicable.

Newly installed systems have the new flexible B34 trunk cards and can operate with either the ETSI or the existing mode loss plan.

Systems using both B34 and non-B34 cards use the existing Loss Plan.

Administration

Configuration of the Loss Plan is on a system-wide basis in LD 97.

The configuration of levels is by port type; refer to Table 20 for the Chinese Loss Plan B34 port types and Table 20 for all other Loss Plan B34 port types.

Table 20
B34 port types for Chinese Loss Plan

TYPE (unit type)	SIGL (signaling)	XTRK	CLS	B34 Port Type
COT, FEX, or WAT	ALL	ALL	SHL	COTS
			LOL	COTL
DID	ALL	ALL	SHL	DIDS
			LOL	DIDL

Table 20
B34 port types for Chinese Loss Plan (Continued)

TYPE (unit type)	SIGL (signaling)	XTRK	CLS	B34 Port Type
TIE	EAM	ALL	TRC	T2WT
			NTC	T2WN
			VNL	T2WV
	LDR	XDID	TRC	T2WT
		EXUT, and	NTC	T2WN
		XUT	VNL	T2WV
		none of the above	TRC	T4WT
		none of the above	NTC	T4WN
			VNL	T4WV
	EM4, WR4, and	ALL	TRC	T4WT
	none of the above		NTC	T4WN
			VNL	T4WV
RAN, MUS, RCD, or AWR	ALL	ALL	ALL	RANR
PAG	ALL	ALL	ALL	PAGT

Table 20
B34 port types for Chinese Loss Plan (Continued)

TYPE (unit type)	SIGL (signaling)	XTRK	CLS	B34 Port Type
none of the above	ALL	XCOT	SHL	COTS
			LOL	COTL
		XDID	SHL	DIDS
			LOL	DIDL
		XFEM, and	TRC	T4WT
		XEM	NTC	T4WN
			VNL	T4WV
		EXUT, and	TRC	T4WT
		XUT	NTC	T4WN
			VNL	T4WV
Analog Line Unit	Not Applicable	Not	Not	Not
(500/2500)		Applicable	Applicable	Applicable

Table 21
B34 port types for all other Loss Plans (Part 1 of 2)

TYPE (unit type)	SIGL (signaling)	XTRK	CLS	B34 Port Type
COT, FEX, or WAT	ALL	ALL	SHL	COTS
			LOL	COTL
DID			SHL	DIDS
			LOL	DIDL

Table 21
B34 port types for all other Loss Plans (Part 2 of 2)

TYPE (unit type)	SIGL (signaling)	XTRK	CLS	B34 Port Type
TIE	EAM and LDR	ALL	TRC	T2WT
			NTC	T2WN
			VNL	T2WV
	EM4, WR4, and none of the above	ALL	TRC	T4WT
			NTC	T4WN
			VNL	T4WV
RAN, MUS, RCD, or AWR	ALL	ALL	ALL	RANR
PAG	ALL	ALL	ALL	PAGT
none of the above	ALL	XCOT	SHL	COTS
			LOL	COTL
		XDID	SHL	DIDS
			LOL	DIDL
		XFEM	TRC	T4WT
			NTC	T4WN
			VNL	T4WV
Analog Line Unit (500/2500)	Not Applicable	Not Applicable	SHL	ALUS
			LOL	ALUL

Entering a code in LD 97 defines the required level. Once downloaded, the B34 converts the code to a level. Table 22 provides a cross-reference between codes and Relative Input/Output Levels.

Table 22
LD 97 code to Relative Input/Output Level cross-reference

Code	Level (dBr)	Rx	Tx	Code	Level (dBr)	Rx	Tx
0	8.0		Ð	20	- 2.0	Ð	Ð
1	7.5		Ð	21	- 2.5	Ð	Ð
2	7.0		Ð	22	- 3.0	Ð	Ð
3	6.5		Ð	23	- 3.5	Ð	Ð
4	6.0		Ð	24	- 4.0	Ð	Ð
5	5.5		Ð	25	- 4.5	Ð	Ð
6	5.0		Ð	26	- 5.0	Ð	Ð
7	4.5		Ð	27	- 5.5	Ð	Ð
8	4.0	Ð	Ð	28	- 6.0	Ð	Ð
9	3.5	Ð	Ð	29	- 6.5	Ð	Ð
10	3.0	Ð	Ð	30	- 7.0	Ð	Ð
11	2.5	Ð	Ð	31	- 7.5	Ð	Ð
12	2.0	Ð	Ð	32	- 8.0	Ð	
13	1.5	Ð	Ð	33	- 8.5	Ð	
14	1.0	Ð	Ð	34	- 9.0	Ð	
15	0.5	Ð	Ð	35	- 9.5	Ð	
16	0.0	Ð	Ð	36	- 10.0	Ð	
17	- 0.5	Ð	Ð	37	- 10.5	Ð	
18	- 1.0	Ð	Ð	38	- 11.0	Ð	
19	- 1.5	Ð	Ð	39	- 11.5	Ð	

Note: Ð indicates a valid code in either Tx or Rx mode.

To configure the Loss Plan manually, the user must define the Relative Input/Output Levels for transmit (Tx) and receive (Rx) on a port type-by port-type basis. To configure the Loss Plan automatically, the user must select a predefined table number.

For Relative Input/Output Levels transmit (Tx) corresponds to the D/A (decode) and receive (Rx) corresponds to the A/D (encode) direction for analog cards.

You can also disable the DLS feature in LD 97.

Table lists the LD 97 prompts and responses that apply to the DLS feature.

LD 97 — DLS prompts and responses (Part 1 of 6)

Prompt	Response	Description
REQ	CHG	Modify a data block.
TYPE	LOSP	Loss Plan table creation or modification
NATP	(NO) YES	North American Transmission Plan Dynamic Pad Switching method Note: Dynamic Pad Switching is supported only on Generic XFCOT [NT5K16] packs.
TTYP		Table Type to be installed or modified
	(STAT)	Static Loss Plan table
	DYNM	Dynamic Loss Switching table
STYP		Static Loss Plan Table to be used
	(PRED)	Predefined table
	CSTM	Customize Modify a table
	DISL	Disable Static Loss Plan Downloading
DTYP		Dynamic Loss Switching table type

LD 97 — DLS prompts and responses (Part 2 of 6)

Prompt	Response	Description
	(PRED)	Predefined table
	CSTM	Customize Modify a table
	DISL	Disable Dynamic Loss Switching
...	....	...
The following is prompted when the response to TTYP is STAT and the response to STYP is DISL		
PWD2		Level 2 Administrator password as defined in LD 17
...	...	...
The following is prompted when the response to TTYP is DYNM and the response to DTYP is DISL		
PWD2		Level 2 Administrator password as defined in LD 17
....	....	...
The following is prompted when the response to TTYP is STAT and the response to STYP is PRED		
TNUM	1–28	Table number of one of the predefined Base Level tables
...	...	...
The following is prompted when the response to TTYP is DYNM and the response to DTYP is PRED		
TNUM	1–5	Table number of one of the predefined Alternative Level tables
....	.....	....

LD 97 — DLS prompts and responses (Part 3 of 6)

Prompt	Response	Description
The following are the prompts output if the response to STYP is CSTM or the response to DTYP is CSTM		
PWD2		Level 2 Administrator password as defined in LD 17
COTS	RxTx	COT short line
	8-390-31	
COTL	RxTx	COT long line
	8-390-31	
DIDS	RxTx	DID short line
	8-390-31	
DIDL	RxTx	DID long line
	8-390-31	
T2WT	RxTx	TIE 2-wire, CLS = TRC
	8-390-31	
T2WN	RxTx	TIE 2-wire, CLS = NTC
	8-390-31	
T2WV	RxTx	TIE 2-wire, CLS = VNL
	8-390-31	
T4WT	RxTx	TIE 4-wire, CLS = TRC
	8-390-31	
T4WN	RxTx	TIE 4-wire, CLS = NTC
	8-390-31	

LD 97 — DLS prompts and responses (Part 4 of 6)

Prompt	Response	Description
T4WV	RxTx 8-390-31	TIE 4-wire, CLS = VNL
PAGT	Tx 0-31	Paging trunk
...	...	...
Following are the prompts output if the response to STYP is DISL or the response to DTYP is DISL		
PWD2		Level 2 Administrator password as defined in LD 17
COTS	RxTx 8-390-31	COT short line
COTL	RxTx 8-390-31	COT long line
DIDS	RxTx 8-390-31	DID short line
DIDL	RxTx 8-390-31	DID long line
T2WT	RxTx 8-390-31	TIE 2-wire, CLS = TRC
T2WN	RxTx 8-390-31	TIE 2-wire, CLS = NTC

LD 97 — DLS prompts and responses (Part 5 of 6)

Prompt	Response	Description
T2WV	RxTx	TIE 2-wire, CLS = VNL
	8-390-31	
T4WT	RxTx	TIE 4-wire, CLS = TRC
	8-390-31	
T4WN	RxTx	TIE 4-wire, CLS = NTC
	8-390-31	
T4WV	RxTx	TIE 4-wire, CLS = VNL
	8-390-31	
PAGT	Tx	Paging trunk
	0-31	
RANR	Rx	RAN trunk
	8-39	
...	....	....
Following are the prompts output if the response to STYP is PRED or the response to DTYP is PRED		
PWD2		Level 2 Administrator password as defined in LD 17
COTS	RxTx	COT short line
	8-390-31	
COTL	RxTx	COT long line
	8-390-31	

LD 97 — DLS prompts and responses (Part 6 of 6)

Prompt	Response	Description
DIDS	RxTx 8-390-31	DID short line
DIDL	RxTx 8-390-31	DID long line
T2WT	RxTx 8-390-31	TIE 2-wire, CLS = TRC
T2WN	RxTx 8-390-31	TIE 2-wire, CLS = NTC
T2WV	RxTx 8-390-31	TIE 2-wire, CLS = VNL
T4WT	RxTx 8-390-31	TIE 4-wire, CLS = TRC
T4WN	RxTx 8-390-31	TIE 4-wire, CLS = NTC
T4WV	RxTx 8-390-31	TIE 4-wire, CLS = VNL
PAGT	Tx 0-31	Paging trunk
RANR	Rx 8-39	RAN trunk

Table lists the LD 15 prompts and responses that are required to configure the LSCM for China:

LD 15 — Chinese LSCM prompts and responses

Prompt	Response	Description
REQ	CHG	Modify data block.
TYPE	CDB	...
CUST	...	
...	...	...
APAD	X Y	Alternate PAD Where: X = Alternative Dynamic Pad Switching matrix identifier (0)-7 5 = China IPE matrix Y = Alternative Conference Pads identifier (0)-7 0 = default (North American) 1 = Alternative Conference Pads
...	...	....

LD 73 — Define TOLT and TOLL pad levels prompts and responses (Part 1 of 2)

Prompt	Response	Description
REQ	NEW CHG PRT	Create, modify, or print data record.
TYPE	DTI2	
FEAT	PAD	Pad category
PDCA	1 – 16	Pad category table
TNLS	(NO) YES	TN list
DFLT	(1) – 16	Default table

LD 73 — Define TOLT and TOLL pad levels prompts and responses (Part 2 of 2)

Prompt	Response	Description
...	...	...
TOLT	Rx Tx (0)(0)	Toll Call Pad data on DTI2 card. Default values 0 dB Receive, 0 dB Transmit (Valid range 0 – 26, see Table 24)
TOLL	Rx Tx (16)(30)	Toll Call Pad data on DTI2 card. Default values 0 dB Receive, 7 dB Transmit (Valid range Rx: 0 – 31, Tx: 8 – 39, see Table 16 or Table 22)

Hardware requirements

Dynamic Loss Switching requires the following cards:

- NT5K02XFALC with Message Waiting — Australia, New Zealand
- NT5K17XDDI — New Zealand
- NT5K18XCOT — New Zealand
- NT5K19XFEM — New Zealand
- NT5K82XCOT — Australia
- NT5K83XFEM — Australia
- NT5K84XDDI — Australia
- NTRA02XUTC — China
- NTRA03XEMC — China
- NTRA04XFALCC with Message Waiting — China
- NTRA05XALCC without Message Waiting — China
- NTRA06XOPSC Off-premises Station — China

Balance Impedance adjustment

Contents

This section contains information on the following topics:

Introduction

Balance impedance adjustment applies to a small number of International Intelligent Peripheral Equipment trunk packs.

Administration

Implementation of the compromise impedance network varies among Peripheral Equipment (PE) packs. On certain Intelligent Peripheral Equipment (IPE), selection of the compromise impedance network is by response to the BIMP prompt in LD 14.

Valid responses to the BIMP prompt in LD 14 are:

- 600 selects the primary setting
- 3COM selects the alternate setting

Hardware requirements

Balance impedance adjustment is available on the following circuit cards:

- NT5K90XFCOT Denmark
- NTCK18XFCOT Italy
- NTCK22XDID/TIE Italy

Digital Trunk and Primary Rate Interface

Contents

This section contains information on the following topics:

Introduction

This section provides an overview of the 1.5 Mbit Digital Trunk Interface (DTI)/Primary Rate Interface (PRI), and 2.0 Mbit DTI/PRI, transmission concepts and controls.

To satisfy transmission loss plans, trunk and line cards use pads to adjust signal level. For 2.0 Mbit DTI/PRI trunks, and 1.5 Mbit DTI/PRI trunks if GPRI package (167) is equipped, pad values are selected by overlay input.

Each digital trunk and primary rate trunk has a pad category assigned in LD 14. The pad category determines which table of pad values to use. LD 73 is where definition of the tables occurs. The use of tables enables the assignment of different pad values to different trunk types and customers. With the exception of the UK and Germany, most of Europe uses 0 dB pads on all digital trunks and connections.

Pad switching

For 2.0 Mbit DTI/PRI, switching of the loss value is on the receive and transmit side, depending on the port type involved in the connection.

A trunk connected to a 2.0 Mbit DTI/PRI trunk has its pad state set by the pad switching algorithm for that trunk type. If the connection is a 1.5 Mbit DTI/PRI trunk to a 2.0 Mbit DTI/PRI trunk, then the 1.5 Mbit DTI pad switching algorithm sets the 1.5 Mbit DTI/PRI trunk pad states. If the connection is an analog trunk to a 2.0 Mbit DTI/PRI trunk, then the pad switching method for that trunk type sets the analog trunk pad states.

XDID, XFCOT, and XFEM trunks have their pad state set to pad out (Base level).

XUT and XEM trunks set their pad states to pad out. Chinese packs use the values in the base table.

Port type definition

The following criteria identify the port types involved in a connection:

- unit type
- Class of Service (CLS)
- Port type (PTYP) designation in LD 16
- Trunk Signaling
- XTRK type

R2 Multi-Frequency Compelled signaling capability is available on switches with DTI 1.5 TIE or DID trunks, and is configured as MFC Class of Service in LD 14. This capability does not support the Alternate Loss Plan.

The trunk data block Class of Service (CLS) assignment characterizes the transmission properties of each trunk. The options in a North American context are:

- Via Net Loss (VNL)
- Non-VNL, either
  Transmission Compensated (TRC)
  or Non-Transmission Compensated (NTC)

Assignment of CLS VNL or non-VNL ensures stability and minimizes echo on long-haul connections, 4-wire TIE, and CCSA. Similarly, assignment of a non-VNL CLS applies to 2-wire TIE, COT, FEX, WAT, CCSA, and 4-wire non-VNL facilities. The non-VNL CLS options in a North American context are:

- TRC — 2-wire non-VNL trunk facility with a loss of greater than 2 dB
  — 2-wire non-VNL trunk facility with impedance compensation
  — 4-wire non-VNL facility
- NTC — 2-wire non-VNL trunk facility with a loss of less than 2 dB
  — 2-wire non-VNL trunk facility when impedance compensation is not provided

The options in an international context are

- NTC (Non-Transmission Compensated) — transmission lines without compensation, high loss
  Pad out (pad not applied)
  Applies to EAM, EM4 and WR4 TIE trunks.
  UK LINK setting

- TRC (Transmission Compensated) — transmission lines with compensation, low loss
  Pad in (pad applied)
  Applies to EAM, EM4 and WR4 TIE trunks.
  UK TIE setting
- VNL (Via Network Loss) — no particular meaning in a European context,
  equivalent to TRC
  Pad in (pad applied)
  Applies to EAM and EM4 TIE trunks.
  UK TIE setting

The responses to the PTYP prompt in LD 16 define the port types for connections involving 2.0 Mbit DTI/PRI. The port type connected to the 2.0 Mbit DTI/PRI trunk determines which loss to apply. The response to the PTYP prompt in LD 16 defines the port type for all trunks except ISA trunks. ISA trunks use the service route's port type.

Following are the valid responses to the LD 16 PTYP prompt:

For analog TIE trunk routes:

- ATTanalog TIE trunk
- AOTsatellite PBX analog TIE trunks when PBX includes OPS set
- ASTsatellite PBX TIE or ESN trunk

For digital TIE trunk routes excluding 1.5 Mbit PRI routes:

- DCTcombination satellite PBX TIE trunk
- DSTdigital satellite PBX TIE trunk

For analog COT, FEX, DID WAT trunk routes:

- ACOanalog CO trunk
- ATOanalog toll office trunk

For digital Central Office trunk routes:

- DCOdigital or combination CO trunk
- DTOdigital or combination toll office trunk

For 1.5 Mbit PRI TIE trunk routes:

- PRI B-channel port classification
- DTTdigital or combination TIE trunk
- DCTcombination satellite PBX TIE trunk
- DSTdigital satellite PBX TIE trunk

For 1.5 Mbit PRI COT, FEX, DID WAT trunk routes:

- PRI B-channel port classification
- DCOdigital or combination CO trunk
- DTOdigital or combination toll office trunk

Administration

PCM companding law

The Pulse Code Modulation (PCM) companding law is the method used to convert analog signals to digital signals and vice versa. Succession 1000M, Succession 1000, and Meridian 1 can accommodate a number of different PCM companding laws:

- µ-Law
- A-Law inverted (Sweden only)
- A-Law even bit interleaved

The response to the PCML prompt in LD 14 defines the PCM companding law used by the Digital Trunk Interface (DTI) or Primary Rate Interface (PRI) channel.

The valid responses to the PCML prompt in LD 14 are shown in the table below.

Prompt	Response	Description
REQ	NEW CHG	Create or modify a data block.
...	....	...
PCML	A MU	A = DTI trunk using A-Law companding MU = DTI trunk using µ-Law companding

If the response to PCML in LD 14 differs from the PCML setting in LD 17, a companding law conversion occurs for each call on that channel; for example, conversion to the system law, i.e., response to PCML prompt in LD 17, occurs for all incoming calls, while conversion to the far-end law, i.e., response to PCML prompt in LD 14, occurs for all outgoing calls.

DTI/PRI pad selection

Assignment of the pad category table occurs during the creation (NEW) or modification (CHG) of a trunk in LD 14

Pad category Table 1 in LD 73 is the system default. Table 1 always exists and cannot be changed or removed. Table 23 shows the default pad code to pad value cross-reference for Table 1.

Table 23
Default 2.0 Mbit DTI/PRI pad category table

	TABLE			
	with GPRI package (167)			
Port Type	Rx Code	Rx Pad (dB)	Tx Code	Tx Pad (dB)
ONS	17	- 3.0	0	0.0

OPS	17	- 3.0	0	0.0
DTT	0	0.0	0	0.0
DCO	0	0.0	0	0.0
NTC	4	4.0	1	1.0
TRC	4	4.0	1	1.0
DTR	17	- 3.0		
VNL	4	4.0	1	1.0
ACO	4	4.0	1	1.0
AFX	4	4.0	1	1.0
ADD	4	4.0	1	1.0
PRI	0	0.0	0	0.0

LD 73 enables changes to the receive (Rx) and transmit (Tx) pad codes for the different port types for all tables except Table 1. Pad code values are in the range 0-26.

Table 24 cross-references pad codes and pad values.

Table 24
Pad code to pad value cross-reference (Part 1 of 2)

CODE	VALUE (dB)	CODE	VALUE (dB)	CODE	VALUE (dB)
0	0.0	9	9.0	18	- 4.0
1	1.0	10	10.0	19	- 5.0
2	2.0	11	11.0	20	- 6.0
3	3.0	12	12.0	21	- 7.0
4	4.0	13	13.0	22	- 8.0
5	5.0	14	14.0	23	- 9.0
6	6.0	15	- 1.0	24	- 10.0

Table 24
Pad code to pad value cross-reference (Part 2 of 2)

CODE	VALUE (dB)	CODE	VALUE (dB)	CODE	VALUE (dB)
7	7.0	16	- 2.0	25	Idle
8	8.0	17	- 3.0	26	0.6

DTI for the Commonwealth of Independent States (CDTI2) supports the same 16 different pad values as DTI2: 0, 1, 2, 3, 4, 5, 6, 8, 10, 15, 16, 17, 18, 20, 25, and 26.

LD 73 pad value definition

Definition of pad values is in response to the following LD 73 prompts. Output of these prompts occurs when FEAT = PAD:

LD 73 — Pad value definition prompts and responses (Part 1 of 2)

Prompt	Response		Description
REQ	NEW CHG		Create or modify a data block.
TYPE	DTI2 PRI2		2 Mbit Digital Trunk Interface 2 Mbit Primary Rate Interface
FEAT	PAD		
ONS	Rx	Tx	On-premises Station
DSET	Rx	Tx	Digital Set
OPS	Rx	Tx	Off-premises Station
DTT	Rx	Tx	Digital TIE trunks
SDTT	Rx	Tx	Digital Satellite TIE trunks
DCO	Rx	Tx	Digital COT, FEX, WAT, and DID trunks
DTO	Rx	Tx	Digital TOLL office trunks

LD 73 — Pad value definition prompts and responses (Part 2 of 2)

Prompt	Response		Description
NTC	Rx	Tx	Non-Transmission Compensated (Analog TIE)
TRC	Rx	Tx	Transmission Compensated (Analog TIE)
DTR	Rx		Pad value while DTR is connected (receive only).
VNL	Rx	Tx	Via Net Loss (Analog TIE)
SATT	Rx	Tx	Analog Satellite TIE trunks
ACO	Rx	Tx	Analog COT and WAT trunks
ATO	Rx	Tx	Analog TOLL office trunks
PRI	Rx	Tx	1.5 Mbit Primary Rate Interface trunk
PRI2	Rx	Tx	2.0 Mbit Primary Rate Interface trunk

UK 2.0 Mbit DTI/PRI settings

For digital trunks in the UK the following conditions apply:

- DPNSS and DASS trunks have their loss pad values hard coded in software. For DPNSS trunks, the values for both Tx and Rx are 0 dB. For DASS trunks, the Tx value is 0 dB and the Rx value is 4 dB.
- For any other digital trunk or BRIT, you must create (key in at the TTY) the pad table. For digital CO trunks and digital TIE trunks, the pad table is created in LD 73 using the above-stated DPNSS loss values for all TIE trunks and DASS loss values for CO trunks. In this case, you must point to the pad table by responding to the PDCA prompt in LD 14. See *Software Input/Output: Administration* (553-3001-311) for more information.

German 2.0 Mbit DTI/PRI settings

Table 25 shows the settings required for 2.0 Mbit DTI/PRI operation in Germany. Germany always uses the gateway (GPRI package 167 equipped) settings. The pad settings for all trunk types, in both the transmit and receive direction, are set at 3 dB.

Table 25
German 2.0 Mbit DTI/PRI settings with GPRI package (167)

Port Type	Rx Code	Rx Pad (dB)	Tx Code	Tx Pad (dB)
ONS	3	3.0	3	3.0
OPS	3	3.0	3	3.0
DTT	3	3.0	3	3.0
DCO	3	3.0	3	3.0
NTC	3	3.0	3	3.0
TRC	3	3.0	3	3.0
VNL	3	3.0	3	3.0
ACO	3	3.0	3	3.0
AFX	3	3.0	3	3.0
ADD	3	3.0	3	3.0
PRI	3	3.0	3	3.0

1.5/2.0 Mbit Gateway

Contents

This section contains information on the following topics:

Introduction

The 1.5/2.0 Mbit Gateway feature introduced enhanced transmission modification capabilities required when interconnecting 1.5 and 2.0 Mbit networks.

Overview

This feature introduced a number of capabilities. The first is pad values for both the 1.5 and 2.0 Mbit Digital Trunk Interfaces (DTI) and Primary Rate Interfaces (PRI) to support the required losses to enable interconnection of 1.5 and 2.0 Mbit networks. The second is the ability to configure pad values in LD 73 for the 1.5 Mbit DTI/PRI. In addition, the 1.5 Mbit DTI/PRI pad switching algorithm now requires the pads on analog trunks be switched in when the connection involves a 1.5 Mbit DTI/PRI.

The default pad table (Table 1) in LD 73 meets current North American loss and level requirements when the 1.5/2.0 Mbit Gateway (GPRI) package (167) is equipped.

Supported hardware includes the following:

- QPC 720 (Version C or later) — 1.5 Mbit PRI card
- QPC 536 — 2.0 Mbit DTI card
- NT8D72 — 2.0 Mbit PRI card
- NT5D97 2.0 Mbit Dual Port DTI/PRI
- Meridian MS-1 Audio Teleconferencing bridge

Pad switching

1.5 Mbit DTI/PRI and 2.0 Mbit DTI/PRI all use dynamic pad switching (DPS). 1.5 Mbit DTI/PRI and 2.0 Mbit DTI/PRI use the loss value input for the port type in LD 73.

Descriptions of the pad switching algorithm and port type definitions for the 1.5 and 2.0 DTI/PRI from a Gateway point of view follow.

1.5 Mbit DTI/PRI

For the 1.5 Mbit DTI/PRI, switching of loss values occurs in the receive and transmit directions. The applied losses depend on the port type involved in the connection with the 1.5 Mbit DTI/PRI.

If the port type involved in the connection to the 1.5 Mbit DTI/PRI is an analog trunk port, then the analog trunk sets its pad state to pad in and the DTI/PRI applies the LD 73 defined loss values for that port type. If the port type involved in the connection to the 1.5 Mbit DTI/PRI is digital trunk port, then the originating side applies zero loss and the terminating side applies the LD 73 defined loss values for that port type.

2.0 Mbit DTI/PRI

For 2.0 Mbit DTI/PRI, switching of loss values occurs in the receive and transmit directions. The applied losses depend on the port type involved in the connection with the 2.0 Mbit DTI/PRI.

A trunk port involved in a connection with a 2.0 Mbit DTI/PRI trunk has its pad state set by the pad switching algorithm for that port type. If the port involved in the connection to a 2.0 Mbit DTI/PRI trunk is a 1.5 Mbit DTI/PRI trunk, then the 1.5 Mbit DTI/PRI pad switching algorithm sets the losses for the 1.5 Mbit DTI/PRI trunk. If the port involved in a connection to a 2.0 Mbit DTI/PRI trunk is an analog trunk, then the pad switching method for that trunk type sets the pad states for the analog trunk.

XDID, XFCOT, and XFEM trunks have their pad state set to pad out (Base level).

XUT and XEM trunks have their pad state set to pad out.

Port type definition

The following criteria identify the port types involved in a connection:

- unit type
- Class of Service (CLS)
- Port type (PTYP) designation in LD 16
- Trunk Signaling
- XTRK type

The trunk data block Class of Service (CLS) assignment characterizes the transmission properties of each trunk. The options in a North American context are:

- Via Net Loss (VNL)
- Non-VNL, either:
  Transmission Compensated (TRC) or
  Non-Transmission Compensated (NTC)

Assignment of CLS VNL or non-VNL ensures stability and minimizes echo on long-haul connections, 4-wire TIE, and CCSA. Similarly, assignment of a non-VNL CLS applies to 2-wire TIE, COT, FEX, WAT, CCSA, and 4-wire non-VNL facilities. The non-VNL CLS options in a North American context are:

- TRC — 2-wire non-VNL trunk facility with a loss of greater than 2 dB
  — 2-wire non-VNL trunk facility with impedance compensation
  — 4-wire non-VNL facility
- NTC — 2-wire non-VNL trunk facility with a loss of less than 2 dB
  — 2-wire non-VNL trunk facility when impedance compensation is not provided

The options in an international context are:

- NTC (Non-Transmission Compensated) — transmission lines without compensation, high loss
  Pad out (pad not applied)
  Applies to EAM, EM4, and WR4 TIE trunks
  UK LINK setting
- TRC (Transmission Compensated) — transmission lines with compensation, low loss
  Pad in (pad applied)
  Applies to EAM, EM4 and WR4 TIE trunks
  UK TIE setting
- VNL (Via Network Loss) — no particular meaning in a European context, equivalent to TRC
  Pad in (pad applied)
  Applies to EAM and EM4 TIE trunks
  UK TIE setting

The responses to the PTYP prompt in LD 16 define the port types for connections involving DTI/PRI. The port type connected to the DTI/PRI trunk determines which loss to apply. The response to the PTYP prompt in LD 16 defines the port type for all trunks except ISA trunks. ISA trunks use the service route’s port type.

Following are the valid responses to the LD 16 PTYP prompt:

For analog TIE trunk routes:

- ATT analog TIE trunk
- AOT satellite PBX analog TIE trunks when PBX includes OPS set
- AST satellite PBX TIE or ESN trunk

For digital TIE trunk routes excluding 1.5 Mbit PRI routes:

- DTT digital or combination TIE trunk
- DCT combination satellite PBX TIE trunk
- DST digital satellite PBX TIE trunk

For analog COT, FEX, DID WAT trunk routes:

- ACO analog CO trunk
- ATO analog toll office trunk

For digital Central Office trunk routes:

- DCO digital or combination CO trunk
- DTO digital or combination toll office trunk

For 1.5 Mbit PRI TIE trunk routes:

- PRI B-channel port classification
- DTT digital or combination TIE trunk
- DCT combination satellite PBX TIE trunk
- DST digital satellite PBX TIE trunk

For 1.5 Mbit PRI COT, FEX, DID WAT trunk routes:

- PRI B-channel port classification
- DCO digital or combination CO trunk
- DTO digital or combination toll office trunk

Loss value definition

Following are the supported port types and input format for the pad values in LD 73 when the system disks include the 1.5/2.0 Mbit Gateway (GPRI) package (167) and TYPE = DTI/PRI/DTI2/PRI2. The default is the North American requirement.

When TYPE = DTI or PRI:

ONS	Rx	Tx	On-premises Station
DSET	Rx	Tx	Digital telephone
OPS	Rx	Tx	Off-premises Station
DTT	Rx	Tx	1.5 Mbit DTI/PRI Digital TIE trunk
SDTT	Rx	Tx	Digital Satellite TIE trunk
DCO	Rx	Tx	1.5 Mbit DTI/PRI Digital COT, FEX, WAT, and DID trunk
DTO	Rx	Tx	1.5 Mbit DTI/PRI Digital Toll Office trunk
VNL	Rx	Tx	Via Network Loss Analog TIE trunk
SATT	Rx	Tx	Analog Satellite TIE trunk
ACO	Rx	Tx	Analog COT, FEX, WAT, and DID trunk
ATO	Rx	Tx	Analog Toll Office trunk
PRI	Rx	Tx	1.5 Mbit PRI trunk, PTYP = PRI for route
PRI2	Rx	Tx	2.0 Mbit DTI/PRI trunk
XUT	Rx	Tx	Extended Universal Trunk Analog COT, FEX, WAT, and DID trunk
XEM	Rx	Tx	Extended E&M Trunk Analog TIE trunk
BRIL	Rx	Tx	Basic Rate Interface Line application
BRIT	Rx	Tx	Basic Rate Trunk application

When TYPE = DTI2 or PRI2:

ONS	Rx	Tx	On-premises Station
OPS	Rx	Tx	Off-premises Station
DTT	Rx	Tx	2.0 Mbit DTI/PRI Digital TIE trunk
DCO	Rx	Tx	2.0 Mbit DTI/PRI Digital COT, FEX, WAT, and DID trunk
NTC	Rx	Tx	Non-transmission compensated Analog TIE
TRC	Rx	Tx	Transmission compensated Analog TIE
DTR	Rx		Pad value while DTR is connected (receive only).
VNL	Rx	Tx	Via Network Loss Analog TIE trunk
ACO	Rx	Tx	Analog COT trunk
AFX	Rx	Tx	Analog FEX trunk

ADD	Rx	Tx	Analog DID trunk
PRI	Rx	Tx	1.5 Mbit DTI/PRI trunk
DSET	Rx	Tx	Digital telephone
BRIL	Rx	Tx	Basic Rate Interface Line application
BRIT	Rx	Tx	Basic Rate Trunk application

Administration

Assignment of the pad category table occurs during the creation (NEW) or modification (CHG) of a trunk in LD 14.

LD 73 enables changes to the receive (Rx) and transmit (Tx) pad codes for the different port types for all tables except TABLE 1. Pad code values are in the range 0-26.

Table 26 shows the 0-26 code to pad value cross-reference.

Table 26
Pad code to pad value cross-reference

CODE	VALUE (dB)	CODE	VALUE (dB)	CODE	VALUE (dB)
0	0.0	9	9.0	18	- 4.0
1	1.0	10	10.0	19	- 5.0
2	2.0	11	11.0	20	- 6.0
3	3.0	12	12.0	21	- 7.0
4	4.0	13	13.0	22	- 8.0
5	5.0	14	14.0	23	- 9.0
6	6.0	15	- 1.0	24	- 10.0
7	7.0	16	- 2.0	25	Idle
8	8.0	17	- 3.0	26	0.6

LD 73 pad value definition

Definition of pad values is in response to the following LD 73 prompts. Output of these prompts occurs when FEAT = PAD:

LD 73 — Pad value definition prompts and responses for 1.5 Mbit DTI and PRI (Part 1 of 2)

Prompt	Response		Description
REQ	NEW CHG		Create or modify a data block.
TYPE	DTI PRI		1.5 Mbit Digital Trunk Interface 1.5 Mbit Primary Rate Interface
FEAT	PAD		
ONS	Rx	Tx	On-premises Station
DSET	Rx	Tx	Digital telephone
OPS	Rx	Tx	Off-premises Station
DTT	Rx	Tx	Digital TIE trunks
SDTT	Rx	Tx	Digital Satellite TIE trunks
DCO	Rx	Tx	Digital COT, FEX, WAT, and DID trunks
DTO	Rx	Tx	Digital TOLL office trunks
VNL	Rx	Tx	Via Net Loss (Analog TIE)
SATT	Rx	Tx	Analog Satellite TIE trunks
ACO	Rx	Tx	Analog COT and WAT trunks
ATO	Rx	Tx	Analog TOLL office trunks
PRI	Rx	Tx	1.5 Mbit Primary Rate Interface trunk
PRI2	Rx	Tx	2.0 Mbit Primary Rate Interface trunk

LD 73 — Pad value definition prompts and responses for 1.5 Mbit DTI and PRI (Part 2 of 2)

Prompt	Response		Description
XUT	Rx	Tx	IPE Analog CO trunk ***Note:*** Prompted when GPRI is equipped
XEM	Rx	Tx	IPE Analog TIE trunk ***Note:*** Prompted when GPRI is equipped
BRIL	Rx	Tx	Basic Rate Interface Line application
BRIT	Rx	Tx	Basic Rate Interface Trunk application

LD 73 — Pad value definition prompts and responses for 2 Mbit DTI and PRI (Part 1 of 2)

Prompt	Response		Description
REQ	NEW CHG		Create or modify a data block.
TYPE	DTI PRI		1.5 Mbit Digital Trunk Interface 1.5 Mbit Primary Rate Interface
FEAT	PAD		
ONS	Rx	Tx	On-premises Station
OPS	Rx	Tx	Off-premises Station
DTT	Rx	Tx	Digital TIE trunks
DCO	Rx	Tx	Digital COT, FEX, WAT, and DID trunks
NTC	Rx	Tx	Non-Transmission Compensated (Analog TIE)
TRC	Rx	Tx	Transmission Compensated (Analog TIE)
DTR	Rx		Pad value while DTR is connected (receive only).

LD 73 — Pad value definition prompts and responses for 2 Mbit DTI and PRI (Part 2 of 2)

Prompt	Response		Description
VNL	Rx	Tx	Via Net Loss (Analog TIE)
ACO	Rx	Tx	Analog COT and WAT trunks
AFX	Rx	Tx	Analog FEX trunk
ADD	Rx	Tx	Analog DID trunks
PRI	Rx	Tx	1.5 Mbit Primary Rate Interface trunk
DSET	Rx	Tx	Digital Telephone
BRIL	Rx	Tx	Basic Rate Interface Line application
BRIT	Rx	Tx	Basic Rate Interface Trunk application

Tables 27 and 28 show the Table 1 default pad settings for 2.0 Mbit DTI/PRI and 1.5 Mbit DTI/PRI.

Table 27
2.0 Mbit DTI/PRI pad category table defaults (Part 1 of 2)

	Table 1			
Port Type	Rx Code	Rx Pad (dB)	Tx Code	Tx Pad (dB)
ONS	17	- 3.0	0	0.0
OPS	17	- 3.0	0	0.0
DTT	0	0.0	0	0.0
DCO	0	0.0	0	0.0
NTC	4	4.0	1	1.0
TRC	4	4.0	1	1.0

Table 27
2.0 Mbit DTI/PRI pad category table defaults (Part 2 of 2)

DTR	17	- 3.0		
VNL	4	4.0	1	1.0
ACO	4	4.0	1	1.0
AFX	4	4.0	1	1.0
ADD	4	4.0	1	1.0
PRI	0	0.0	0	0.0
DSET	6	6.0	0	0.0
BRIL	0	0.0	0	0.0
BRIT	0	0.0	0	0.0

Table 28
1.5 Mbit DTI/PRI pad category table defaults

	Table 1			
Port Type	**Rx code**	**Rx PAD (dB)**	**Tx code**	**Rx PAD (dB)**
ONS	6	6.0	0	0.0
DSET	6	6.0	0	0.0
OPS	6	6.0	0	0.0
DTT	0	0.0	0	0.0
SDTT	3	3.0	0	0.0
DCO	3	3.0	0	0.0
DTO	0	0.0	0	0.0
VNL	6	6.0	0	0.0

SATT	6	6.0	0	0.0
ACO	6	6.0	0	0.0
ATO	6	6.0	0	0.0
PRI	0	0.0	0	0.0
PRI2	0	0.0	0	0.0
XUT	6	6.0	0	0.0
XEM	3	3.0	0	0.0
BRIL	0	0.0	0	0.0
BRIT	0	0.0	0	0.0

German 2.0 Mbit DTI/PRI settings

See the same heading on page 130.

Basic Rate Interface Lines and Trunks

Contents

This section contains information on the following topics:

Introduction

This section provides an overview of the Basic Rate Interface Line (BRIL) and Basic Rate Interface Trunk (BRIT) transmission concepts and controls.

Pad switching

Pad switching algorithms differ for BRIL and BRIT. Both switch pads on a per-connection basis. BRIL switches predefined pad values based on the port type involved in the connection. BRIT uses the loss value input for the port type in LD 73.

For BRIL switching of loss values occurs in the receive and transmit directions. The applied losses depend on the port type involved in the connection with the BRIL. Table 29 shows port type determination and Table 30 shows the switched losses for BRIL connections.

Table 29
Port type determination for BRIL connections

<table>
<tr><th>2.0 Mbit DTI/ PRI</th><th>Trunk Type</th><th>LD 16 PTYP</th><th>XTRK</th><th>DATA CALL</th><th>Port Type</th></tr>
<tr><td>YES</td><td></td><td></td><td></td><td></td><td>2.0 Mbit DTI/ PRI</td></tr>
<tr><td rowspan="8">NO</td><td rowspan="5">COT, DID, FEX, WAT</td><td>ACO</td><td></td><td></td><td>ACO</td></tr>
<tr><td>ATO</td><td rowspan="2">YES</td><td rowspan="2"></td><td>ATO</td></tr>
<tr><td rowspan="3">none of the above</td><td>IPE</td></tr>
<tr><td rowspan="2">NO</td><td>YES</td><td>DATA</td></tr>
<tr><td>NO</td><td>OTHER</td></tr>
<tr><td rowspan="3">none of the above</td><td rowspan="3"></td><td>YES</td><td></td><td>IPE</td></tr>
<tr><td rowspan="2">NO</td><td>YES</td><td>DATA</td></tr>
<tr><td>NO</td><td>OTHER</td></tr>
</table>

Table 30
Switched losses for BRIL connections

Port Type	Rx (dB)	Tx (dB)
2.0 Mbit DTI/PRI	0.0	0.0
ACO	0.0	- 6.0
ATO	6.0	0.0
IPE	0.0	- 6.0
DATA	0.0	0.0
OTHER	3.0	- 3.0

For BRIT, switching of loss values occurs in the receive and transmit directions. The applied losses depend on the port type involved in the connection with the BRIL.

Port type definition

The following criteria identify the port types involved in a connection:

- unit type
- Class of Service (CLS)
- Port type (PTYP) designation in LD 16
- Trunk Signaling
- XTRK type

The trunk data block Class of Service (CLS) assignment characterizes the transmission properties of each trunk. The options in a North American context are

- Via Net Loss (VNL)
- Non-VNL, either
  Transmission Compensated (TRC)
  or Non-Transmission Compensated (NTC)

Assignment of CLS VNL or non-VNL ensures stability and minimizes echo on long-haul connections, 4-wire TIE, and CCSA. Similarly, assignment of a non-VNL CLS applies to 2-wire TIE, COT, FEX, WAT, CCSA, and 4-wire non-VNL facilities. The non-VNL CLS options in a North American context are

- TRC — 2-wire non-VNL trunk facility with a loss of greater than 2 dB
  — 2-wire non-VNL trunk facility with impedance compensation
  — 4-wire non-VNL facility
- NTC — 2-wire non-VNL trunk facility with a loss of less than 2 dB
  — 2-wire non-VNL trunk facility when impedance compensation is not provided

The options in an international context are

- NTC (Non-Transmission Compensated) — transmission lines without
  compensation, high loss
  Pad out (pad not applied)
  Applies to EAM, EM4 and WR4 TIE trunks
  UK LINK setting
- TRC (Transmission Compensated) — transmission lines with
  compensation, low loss
  Pad in (pad applied)
  Applies to EAM, EM4 and WR4 TIE trunks
  UK TIE setting
- VNL (Via Network Loss) — no particular meaning in a European context
  equivalent to TRC
  Pad in (pad applied)
  Applies to EAM and EM4 TIE trunks.
  UK TIE setting

The responses to the PTYP prompt in LD 16 define the port types for connections involving BRI Trunks. The port type connected to the BRI Trunk determines which loss to apply. The response to the PTYP prompt in LD 16 defines the port type for all trunks except ISA trunks. ISA trunks use the service route's port type.

Following are the valid responses to the LD 16 PTYP prompt:

For analog TIE trunk routes:

- ATT analog TIE trunk
- AOT satellite PBX analog TIE trunks when PBX includes OPS set
- ASTs satellite PBX TIE or ESN trunk

For digital TIE trunk routes excluding 1.5 Mbit PRI routes:

- DTT digital or combination TIE trunk
- DCT combination satellite PBX TIE trunk
- DST digital satellite PBX TIE trunk

For analog COT, FEX, DID WAT trunk routes:

- ACO analog CO trunk
- ATO analog toll office trunk

For digital Central Office trunk routes:

- DCO digital or combination CO trunk
- DTO digital or combination toll office trunk

For 1.5 Mbit PRI TIE trunk routes:

- PRI B-channel port classification
- DTT digital or combination TIE trunk
- DCT combination satellite PBX TIE trunk
- DST as digital satellite PBX TIE trunk

For 1.5 Mbit PRI COT, FEX, DID WAT trunk routes:

- PRI B-channel port classification
- DCO digital or combination CO trunk
- DTO digital or combination toll office trunk

Administration

BRIT pad selection

Assignment of the pad category table occurs during creation (NEW) or modification (CHG) of the trunk in LD 27.

LD 73 enables changes to the receive (Rx) and transmit (Tx) pad codes for the different port types for all tables except Table 1. Pad code values are in the range 0-26.

Table 31 cross-references pad codes to their respective loss values.

Table 31
Pad code to pad value cross-reference

CODE	VALUE (dB)	CODE	VALUE (dB)	CODE	VALUE (dB)
0	0.0	9	9.0	18	- 4.0
1	1.0	10	10.0	19	- 5.0
2	2.0	11	11.0	20	- 6.0
3	3.0	12	12.0	21	- 7.0
4	4.0	13	13.0	22	- 8.0
5	5.0	14	14.0	23	- 9.0
6	6.0	15	- 1.0	24	- 10.0
7	7.0	16	- 2.0	25	Idle
8	8.0	17	- 3.0	26	0.6

LD 73 pad value definition

Definition of pad values is in response to the following LD 73 prompts. Output of these prompts occurs when FEAT = PAD:

LD 73 — Pad value definition prompts and responses (Part 1 of 2)

Prompt	Response		Description
REQ	NEW CHG		Create or modify a new data block.
...			
FEAT	PAD		
ONS	Rx	Tx	On-premises Station
OPS	Rx	Tx	Off-premises Station
DTT	Rx	Tx	Digital TIE trunks
DCO	Rx	Tx	Digital COT, FEX, WAT, and DID trunks

LD 73 — Pad value definition prompts and responses (Part 2 of 2)

Prompt	Response		Description
NTC	Rx	Tx	Non-Transmission Compensated (Analog TIE)
TRC	Rx	Tx	Transmission Compensated (Analog TIE)
DTR	Rx		Pad value while DTR is connected (receive only)
VNL	Rx	Tx	Via Net Loss (Analog TIE)
ACO	Rx	Tx	Analog COT and WAT trunks
AFX	Rx	Tx	Analog FEX trunk
ADD	Rx	Tx	Analog DID trunks
PRI	Rx	Tx	1.5 Mbit Primary Rate Interface trunk
DSET	Rx	Tx	Digital Telephone
BRIL	Rx	Tx	Basic Rate Interface Line application
BRIT	Rx	Tx	Basic Rate Interface Trunk application

Table 32 shows the default pad code settings for BRIT.

Table 32
Default BRIT pad category table

	Table 1			
Port Type	**Rx Code**	**Rx Pad (dB)**	**Tx Code**	**Tx Pad (dB)**
ONS	17	- 3.0	0	0.0
OPS	17	- 3.0	0	0.0
DTT	0	0.0	0	0.0
DCO	0	0.0	0	0.0
NTC	4	4.0	1	1.0
TRC	4	4.0	1	1.0
DTR	17	- 3.0		
VNL	4	4.0	1	1.0
ACO	4	4.0	1	1.0
AFX	4	4.0	1	1.0
ADD	4	4.0	1	1.0
PRI	0	0.0	0	0.0
DSET	6	6.0	0	0.0
BRIL	0	0.0	0	0.0
BRIT	0	0.0	0	0.0

Meridian Modular Telephones

Contents

This section contains information on the following topics:

Introduction

Meridian Modular Telephones have the following system-defined transmission parameters:

— codec coding law (CODE)

— transmit objective loudness rating (TOLR)

— receive objective loudness rating (ROLR)

— sidetone objective loudness rating (SOLR)

— handsfree transmit objective loudness rating (HTLR)

— handsfree receive objective loudness rating (HRLR)

— automatic gain control (AGCD)

— handset volume reset (VOLR)

Transmission parameters definition occurs in the Configuration Record (LD 17) and downloading to all Meridian Modular Telephones occurs after a system reload (SYSLOAD). This accommodates the needs of international installations where different loss and level plans are in place.

> ***Note:*** Download of transmission parameters does not occur during parallel reload procedures.

The default transmission settings for Meridian Modular Telephones ensure that the levels at the Central Office trunk interface are equivalent to those of an analog 500/2500 type set connected to the same interface under the North American Loss and Level Plan.

Codec PCM companding law

The codecs in the Meridian Modular telephones are able to accommodate a number of different PCM companding laws. The laws are

— µ-Law

— A-Law inverted (Sweden only)

— A-Law even bit interleaved

Administration

Selection of the companding law is by response to the CODE prompt in LD 17. Valid inputs to the CODE prompt are

— 0 — µ-Law

— 1 — A-Law inverted (Sweden only)

— 2 — A-Law even bit interleaved

The companding law selected must agree with the companding laws defined by the following:

For Intelligent Peripheral Equipment (IPE): LD 97

LD 97

Prompt	Response	Description
REQ	CHG	Modify data block.
TYPE	SYSP	System Parameters
INTN	YES NO	YES = IPE is using A-law companding NO = IPE is using μ-Law companding

For the system: LD 17

LD 17

Prompt	Response	Description
REQ	NEW CHG	Create or modify data block.
TYPE	CFN	Configuration
PCML	A MU	A = System default is A-law companding. MU = System default is μ-Law companding.

Receive and transmit objective loudness rating

When using the North American Loss and Level Plan, the following transmission parameters meet the requirements of most situations:

- transmit offset of - 45 dB (LD 17 prompt TOLR = 0)
- receive offset of + 45 dB (LD 17 prompt ROLR = 0)

Table 33 on page 142 shows the values entered for LD 17 prompts ROLR and TOLR and the associated loudness rating for North America.

Table 33
Receive and transmit transmission parameters (North America)

Value for prompt ROLR or TOLR in LD17	ROLR	TOLR
00	+45.00	–45.00
01	+45.85	–44.50
02	+46.70	–44.50
03	+47.55	–44.00
04	+48.40	–43.50
05	+49.25	–43.00
06	+50.10	–43.00
07	+50.95	–42.50
08	+51.80	–42.00
09	+52.65	–41.50
10	+53.50	–41.50
11	+54.35	—
12	+55.20	—
13	+56.05	—
14	+56.90	—
15	+57.75	—
16–31	—	—
32	+45.00	–45.00
33	+44.15	–45.50
34	+43.30	–46.00
35	+42.45	–46.00
36	+41.60	–46.50
37	+40.75	–47.00
38	+39.90	–47.50
39	+39.05	–47.50
40	—	–48.00
41	—	–48.50
42	—	–49.00
43	—	–49.00
44	—	–49.50
45	—	–50.00
46	—	–50.50
47	—	–50.50
48	—	–51.00
49	—	–51.50
50–52	—	–52.00
53	—	–53.00
54–63	—	—

Definition of ROLR and TOLR are in terms of loss. For example

- ROLR

— If the ROLR of a telephone changes from + 45 dB to + 50 dB, there is 5 dB *more loss* and, consequently, the receive path is *quieter*.

— If the ROLR changes from + 45 dB to + 39 dB, there is 6 dB *less loss* and, consequently, the receive path is *louder*.

- TOLR

— If the TOLR changes from - 45 dB to - 50 dB, there is 5 dB *less loss* and, consequently, the transmit path is *louder*.

— If the TOLR changes from - 45 dB to - 40 dB, there is 5 dB *more loss* and, consequently, the transmit path is *quieter*.

Another way of looking at both TOLR and ROLR is that if the number *increases* in value (becomes more positive or less negative) the path is *quieter*, and as the number *decreases* in value (becomes less positive or more negative), the path is *louder*.

Administration

Table 34 lists international software ROLR and TOLR values. In addition, separate definitions for Handsfree receive (HRLR) and transmit (HTLR) objective ratings are possible. Refer to Table 36 for the HRLR and HTLR settings.

Table 34
Handset receive and transmit international transmission parameters

Quieter				
LD 17 value	**Change from nominal**		**LD 22 output**	
#	**ROLR (dB)**	**TOLR (dB)**	**ROLR (dB)**	**TOLR (dB)**
00	0.00	0.0	45.00	- 45.00
01	0.85	0.5	45.85	- 44.50
02	1.70	0.5	46.70	- 44.50
03	2.55	1.0	47.55	- 44.00
04	3.40	1.5	48.40	- 43.50
05	4.25	2.0	49.25	- 43.00
06	5.10	2.0	50.10	- 43.00
07	5.95	2.5	50.95	- 42.50
08	6.80	3.0	51.80	- 42.00
09	7.65	3.5	52.65	- 41.50
10	8.50	3.5	53.50	- 41.50
11	9.35	4.0	54.35	- 41.00
12	10.20	4.5	55.20	- 40.50
13	—	5.0	—	- 40.00
14	—	5.0	—	- 40.00
15	—	5.5	—	- 39.50
16	—	6.0	—	- 39.00
17	—	6.5	—	- 38.50
18	—	6.5	—	- 38.50
19	—	7.0	—	- 38.00
20	—	7.5	—	- 37.50
21	—	8.0	—	- 37.00
22	—	8.0	—	- 37.00
23	—	8.5	—	- 36.50
24	—	9.0	—	- 36.00
25	—	9.5	—	- 35.50
26	—	9.5	—	- 35.50
27	—	10.0	—	- 35.00

Table 35
Handset receive and transmit international transmission parameters

Louder				
LD 17 value	**Change from nominal**		**LD 22 output**	
#	**ROLR (dB)**	**TOLR (dB)**	**ROLR (dB)**	**TOLR (dB)**
32	0.00	0.0	45.00	- 45.00
33	0.85	0.5	44.15	- 45.50
34	1.70	1.0	43.30	- 46.00
35	2.55	1.0	42.45	- 46.00
36	3.40	1.5	41.60	- 46.50
37	4.25	2.0	40.75	- 47.00
38	5.10	2.5	39.90	- 47.50
39	5.95	2.5	39.05	- 47.50
40	6.80	3.0	38.20	- 48.00
41	7.65	3.5	37.35	- 48.50
42	8.50	4.0	36.50	- 49.00
43	9.35	4.0	35.65	- 49.00
44	10.20	4.5	34.80	- 49.50
45	11.05	5.0	33.95	- 50.00
46	11.90	5.5	33.10	- 50.50
47	12.75	5.5	32.25	- 50.50
48	13.60	6.0	31.40	- 51.00
49	14.45	6.5	30.55	- 51.50
50	15.30	7.0	29.70	- 52.00
51	—	7.0	—	- 52.00
52	—	7.5	—	- 52.50
53	—	8.0	—	- 53.00
54	—	8.5	—	- 53.50
55	—	8.5	—	- 53.50
56	—	9.0	—	- 54.00
57	—	9.5	—	- 54.50
58	—	10.0	—	- 55.00
59	—	10.0	—	- 55.00
60	—	10.5	—	- 55.50
61	—	11.0	—	- 56.00
62	—	11.5	—	- 56.50
63	—	11.5	—	- 56.50

Table 36
Handsfree receive and transmit international transmission parameters

Quieter				
LD 17 value	**Change from nominal**		**LD 22 output**	
#	**HRLR (dB)**	**HTLR (dB)**	**HRLR (dB)**	**HTLR (dB)**
00	0.00	0.0	42.00	- 44.00
01	0.85	0.5	42.85	- 43.50
02	1.70	0.5	43.70	- 43.50
03	2.55	1.0	44.56	- 43.00
04	3.40	1.5	45.40	- 42.50
05	4.25	2.0	46.25	- 42.00
06	5.10	2.0	47.10	- 42.00
07	5.95	2.5	47.95	- 41.50
08	6.80	3.0	48.80	- 41.00
09	—	3.5	—	- 40.50
10	—	3.5	—	- 40.50
11	—	4.0	—	- 40.00
12	—	—	—	—
13	—	—	—	—
14	—	—	—	—
15	—	—	—	—
16	—	—	—	—
17	—	—	—	—
18	—	—	—	—
19	—	—	—	—
20	—	—	—	—
21	—	—	—	—
22	—	—	—	—
23	—	—	—	—
24	—	—	—	—
25	—	—	—	—
26	—	—	—	—
27	—	—	—	—
28	—	—	—	—
29	—	—	—	—
30	—	—	—	—
31	—	—	—	—

Table 37
Handsfree receive and transmit international transmission parameters

Louder				
LD 17 value	**Change from nominal**		**LD 22 output**	
#	**HRLR (dB)**	**HTLR (dB)**	**HRLR (dB)**	**HTLR (dB)**
32	0.00	0.0	42.00	- 44.00
33	0.85	0.5	41.15	- 44.50
34	1.70	1.0	40.30	- 45.00
35	2.55	1.0	39.45	- 45.00
36	3.40	1.5	38.60	- 45.50
37	4.25	2.0	37.75	- 46.00
38	5.10	2.5	36.90	- 46.50
39	5.95	2.5	36.05	- 46.50
40	6.80	3.0	35.20	- 47.00
41	—	3.5	—	- 47.50
42	—	4.0	—	- 48.00
43	—	4.0	—	- 48.00
44	—	4.5	—	- 48.50
45	—	5.0	—	- 49.00
46	—	5.5	—	- 49.50
47	—	5.5	—	- 49.50
48	—	6.0	—	- 50.00
49	—	6.5	—	- 50.50
50	—	7.0	—	- 51.00
51	—	7.0	—	- 51.00
52	—	7.5	—	- 51.50
53	—	8.0	—	- 52.00
54	—	8.5	—	- 52.50
55	—	—	—	—
56	—	—	—	—
57	—	—	—	—
58	—	—	—	—
59	—	—	—	—
60	—	—	—	—
61	—	—	—	—
62	—	—	—	—
63	—	—	—	—

Sidetone objective loudness rating

Sidetone is the coupling of a portion of the transmitted voice signal back to the telephone receiver. This enables you to hear your own voice, which provides a natural quality to the conversation. The value of the SOLR is a measure of the loss of sidetone.

Administration

The recommended North American SOLR value is 12 dB. Table 38 lists the values accepted for LD 17 prompt SOLR.

Table 38
Acceptable SOLR values

SOLR	North American Loudness rating	International Loudness rating
0	7 dB	9 dB (default)
1	12 dB (default)	15 dB
2	17 dB	21 dB
3	22 dB	27 dB
4	sidetone disabled	sidetone disabled

Note: The default value is 1 (12 dB). The recommended value is 1 (12 dB).

As the SOLR value increases, the receiver has *less* of the transmitted signal coupled back to it. As the SOLR value decreases, the receiver has *more* of the transmitted signal (near end person's voice, room noise) coupled back to it.

Factoring in the return loss of the trunk interface, the default SOLR value of 12 dB produces an effective SOLR of 9 dB with nominal return loss on external calls.

Note that changing the SOLR value (transmission setting) affects only the integral sidetone control circuits in the telephone. Other sources that contribute sidetone (such as return loss at trunk interfaces at the switch, CO, and through the entire network to the far end) are independent of the SOLR transmission setting. This rules applies to all Meridian Modular Telephones except the M2216ACD-1 and M2216ACD-2, which have their sidetone values fixed at the North American default level of 12 dB, except the SOLR download.

Automatic Gain Control

To keep the sound heard in the handset within a specified range, the Meridian Modular Telephones use an Automatic Gain Control (AGC) circuit. The AGC lowers the levels of sounds above and below the range. Lowering of loud sounds ensures they fit into the range, while lowering of soft sounds reduces background noise.

Administration

Automatic Gain Control settings: LD 17

LD 17

Prompt	Response	Description
REQ	NEW CHG	Create or modify a data block.
TYPE	CFN	Configuration
...	...	...
ATRN	YES	Aries Transmission
AGCD	YES NO	Yes = Automatic Gain Control disabled for all sets No = Automatic Gain Control enabled for all sets

Handset volume reset

The handset volume reset feature resets the handset volume to a nominal level every time a user hangs up or changes to handsfree.

Administration

Handset volume reset settings: LD 17

LD 17

Prompt	Response	Description
REQ	NEW CHG	Create or modify a data block.
TYPE	CFN	Configuration
ATRN	YES	Aries Transmission
VOLR	YES NO	Yes = Handset volume reset enabled for all sets. No = Handset volume reset disabled for all sets.

Country-specific settings

Following are the mandatory settings for different countries:

Table 39
Country-specific Meridian Modular Telephone settings (Part 1 of 2)

Country	CODE	SOLR	ROLR	TOLR	AGCD	VOLR	HRLR	HTLR
North America µ-Law	0	0	0	0	N	N	0	0
North America A-Law	2	0	0	0	N	N	0	0
Australia	2	1	6	58	N	N	7	0
Austria	2	1	33	55	Y	Y	0	54
Belgium	2	1	0	49	Y	Y	0	54
China								
Denmark	2	0	9	47	Y	Y	8	48

Table 39
Country-specific Meridian Modular Telephone settings (Part 2 of 2)

Country	CODE	SOLR	ROLR	TOLR	AGCD	VOLR	HRLR	HTLR
France	2	0	37	49	Y	Y	8	40
Germany	2	1	0	63	Y	N	0	51
Holland	2	0	3	41	Y	Y	0	0
Hong Kong	0	1	0	43	N	N	4	54
New Zealand	2	1	9	48	N	N	4	54
Norway	2	0	2	60	Y	Y	4	54
Sweden	2	0	1	63	Y	N	4	11
Switzer-land	2	1	36	41	Y	Y	4	54
UK	2	0	6	63	Y	Y	0	0

Transmission characteristics—A-Law

Contents

This section contains information on the following topics:

Overview

There are two methods of converting signals from analog to digital or digital to analog:

- μ-Law, used in North America and Japan
- A-Law, used in most other areas of the world, including Europe

Since systems are backwards compatible, various configurations are possible. The ports within a system can be configured in the following:

- intelligent peripheral equipment (IPE) modules
- peripheral equipment (PE) modules or PE shelves in an SL-1 cabinet
- various common equipment modules or shelves

IPE modules support intelligent peripherals, such as NT8D14 Universal Trunk Cards and NT8D09 Message Waiting Line Cards. PE modules or shelves support PE cards that are identified by "QPC" codes. Various common equipment modules or shelves support digital trunk interface (DTI) and primary rate interface (PRI) cards.

IPE, PE, and common equipment ports can be interconnected to support transmission requirements. The loss tables in this document provide the transmission requirements for these interconnections.

Transmission characteristics for IPE

Tables 40 through 54 provide the transmission characteristics for IPE.

Frequency response

Frequency response (attenuation distortion) at a given frequency is the difference between the loss at that frequency and the loss at 2820 Hz.

Table 40 shows the minimum and maximum loss differences at significant frequency breakpoints for 2-wire and 4-wire interfaces.

Table 40
Frequency response—A-Law

Frequency (Hz)	2-wire interface (dB)		4-wire interface (dB)	
	Minimum	Maximum	Minimum	Maximum
200	0.0	+5.0	0.0	+3.0
300	–0.5	+1.0	–0.3	+0.3
400	–0.6	+2.0	–0.5	+0.5
600	–0.6	+0.7	–0.5	+0.5
REF	–0.6	+0.7	–0.5	+0.5
2400	–0.6	+0.7	–0.5	–0.5
3000	–0.6	+1.0	–0.5	+0.9
3400	–0.6	+3.0	–0.5	+1.0
3600	0.0	—	0.0	—

Note: Positive values denote loss; negative values denote gain (measured at 2820 Hz with 0 dBm0 input level.

Overload level

Overload levels are measured with respect to the zero-level point in the PBX, which is defined as having an overload point of +3 dBm in an analog-to-digital conversion.

Therefore, the overload level in the receive direction is defined as the analog signal level (at the port interface) with an average power that is 3 dB greater than that of the signal, which after encoding produces the equivalent of the digital milliwatt (PBX zero-level point). The overload level in the transmit direction is defined as the analog signal level (at the port interface) with an average power that is 3 dB greater than that of the signal, which after decoding results from the equivalent of the digital milliwatt. Table 41 shows the overload levels in both the receive and the transmit directions.

Table 41
Overload level—A-Law

Type of circuit	Overload level (dBm)	
	Receive (analog to digital)	**Transmit (digital to analog)**
Line	+6.5	+2.5
CO trunk	+3.0	+6.0
Tie trunk	+3.5	+3.5
Tie (4-wire)	+3.0	+4.0

Note: For trunks, overload is specified for pads-out mode.

Tracking error (gain variation with level)

Level tracking measures how closely changes in the level of the input signal cause corresponding changes in output level. Tracking error, as shown in Table 42, is the deviation, in decibels, in gain or loss through specified ranges of input level relative to the deviation of a nominal 820-Hz input signal at the 0 dBm0 level.

Table 42
Tracking error (gain variation with level)—A-Law

820-Hz signal input (dBm0)	Variation in insertion loss (dB)
–55 to –10	+0.5
–10 to +3	+0.5

Return loss

Return loss at an impedance discontinuity in a transmission path is the ratio, in decibels, of the power level of an incident signal to the power level of the resulting reflected signal. Echo return loss (ERL) is a weighted average of the return loss values over the frequency range of 500 to 2500 Hz. Single-frequency return loss (SFRL) is the lowest value of nonweighted return loss occurring in the frequency range of 200 to 3200 Hz.

Table 43 shows return losses guidelines to satisfy the in-service requirements shown in Table 44. For each interface type (line and 2-wire trunk), a connection is made through the PBX to a 4-wire trunk interface, and the return loss is measured at both interfaces. All terminating impedances are 600 ohms.

Table 43
Return loss—in-service parameter values—A-Law (Part 1 of 2)

Connection	Echo return loss (dB)	Single-frequency return loss (dB) (300–3200 Hz)	Notes
Line interfaces:			
Line side	>18	> 12	1
4-wire trunk side	> 21	> 19	2

Note 1: Terminating impedances are 600 ¾ for a regular line and 600 ¾ and 2.16 µF for a PBX line.

Note 2: Terminating impedances are 600 ¾ for a regular line and 900 ¾ and 2.16 µF for a PBX line.

Note 3: Terminating impedances are 600 ¾/900 ¾ and 2.16 µF for a 2-wire trunk.

Note 4: Terminating impedances are 600 ¾ for a regular line and a 4-wire trunk.

Note 5: The design requirements in this table are intended to ensure the satisfaction of the in-service requirements in Table 44.

Table 43
Return loss—in-service parameter values—A-Law (Part 2 of 2)

Connection	Echo return loss (dB)	Single-frequency return loss (dB) (300–3200 Hz)	Notes
2-wire trunk interfaces:			
2-wire trunk side	> 22	> 17	2
4-wire trunk side	> 28	> 22	2

Note 1: Terminating impedances are 600 ¾ for a regular line and 600 ¾ and 2.16 µF for a PBX line.

Note 2: Terminating impedances are 600 ¾ for a regular line and 900 ¾ and 2.16 µF for a PBX line.

Note 3: Terminating impedances are 600 ¾/900 ¾ and 2.16 µF for a 2-wire trunk.

Note 4: Terminating impedances are 600 ¾ for a regular line and a 4-wire trunk.

Note 5: The design requirements in this table are intended to ensure the satisfaction of the in-service requirements in Table 44.

Table 44
Return loss—in-service attenuation—A-Law (Part 1 of 2)

Connection from 4-wire VNL tie trunk to:	Circuit termination	Echo return loss	Single-frequency return loss	Notes
4-wire VNL tie trunk (through balance)	4-wire legs of hybrid terminated in 600 ¾	> 27	> 20	1, 3

Note 1: Reference impedance is 600/900 ¾ + 2.16 µF.

Note 2: Reference impedance is 900 ¾ + 2.16 µF.

Note 3: Switchable pads set for nominal loss of 1 dB.

Note 4: Switchable pads set for nominal loss of 3 dB.

Note 5: If facility loss is less than 2 dB or adequate impedance correction is not provided, nominal loss has to be increased to 3 dB by switching in the 2 dB pad.

Table 44
Return loss—in-service attenuation—A-Law (Part 2 of 2)

Connection from 4-wire VNL tie trunk to:	Circuit termination	Echo return loss	Single-frequency return loss	Notes
4-wire non-VNL tie trunk (terminal balance)	600 ¾ + 2.16 μF at distant PBX	> 22	> 15	1, 3
2-wire non-VNL tie trunk (terminal balance)	600 ¾ + 2.16þμF at distant PBX	> 18	> 10	1, 5
CO or FX trunk (terminal balance)	900 ¾ + 2.16 μF at CO	> 18	> 10	2, 5
PBX line (terminal balance)	600 ¾ + 2.16 μF	> 24	> 18	1, 4
Regular line (terminal balance)	600 ¾	> 24	> 18	1, 4
PBX line (terminal balance)	Set off-hook	> 12	> 8	1, 4

Note 1: Reference impedance is 600/900 ¾ + 2.16 μF.

Note 2: Reference impedance is 900 ¾ + 2.16 μF.

Note 3: Switchable pads set for nominal loss of 1 dB.

Note 4: Switchable pads set for nominal loss of 3 dB.

Note 5: If facility loss is less than 2 dB or adequate impedance correction is not provided, nominal loss has to be increased to 3 dB by switching in the 2 dB pad.

Idle channel noise

Idle channel noise (noise in the absence of a signal) is the short-term, average, absolute noise power, measured with either psophometric weighting or 3000-Hz flat weighting, as shown in Table 45:

- Psophometric weighting measures noise with a frequency weighting that reflects the characteristic of the human ear.
- 3000-Hz flat weighting measures noise with equal weighting for all frequencies in the 200–3000 Hz frequency range, measured at the PBX tip and ring.

Table 45
Idle channel noise—A-Law

Connection type	Psophometric dBm0p	3000-Hz flat noise (dBrn)
Line to line	< –65	< 29
Line to trunk:		
Trunk side	< –65	< 29
Line side	< –65	< 29
Trunk to trunk	< –65	< 29

Longitudinal balance

Longitudinal balance (longitudinal to metallic), as shown in Table 46, defines the amount of metallic noise voltage (conductor to conductor) resulting from longitudinal voltage (conductor to ground) at the circuit input. The equation for calculating longitudinal-to-metallic balance is as follows:

longitudinal balance (dB) = 20 log [Vs/Vm]

Note: Vs is the disturbing longitudinal voltage, and Vm is the resulting metallic voltage of the same frequency. Ideally, the metallic noise voltage is negligible and the longitudinal balance approaches infinity. All measurements are at the PBX tip and ring.

Table 46
Longitudinal balance—A-Law

Frequency (Hz)	Minimum balance (dB)	Average balance (dB)
200	58	63
500	58	63
1000	58	63
3000	53	58

Crosstalk

Crosstalk is the presence of unwanted voice signals coupled from one voice channel to another. Crosstalk is not only an annoyance to the listener but also is perceived as a violation of privacy. The crosstalk coupling attenuation for every combination of through connections in all interface categories, measured with input signals from 200 to 3200þHz at 0 dBm0, are listed in Table 47.

Table 47
Crosstalk—A-Law

Connection	Crosstalk attenuation (dB)
Line to line	> 75
Line to trunk	> 75
Trunk to trunk	> 75

Quantization distortion

Quantization distortion, shown in Table 48, is the distortion introduced when an analog signal is encoded to digital format, and then decoded to analog format. The quantization noise is the difference between the original analog speech signal and the analog signal (speech plus noise) resulting from the decoding process.

Table 48
Quantization distortion—A-Law

Input level (dBm0)	Minimum signal/distortion ratio (dB)
0 to –30	33
–31 to –40	27
–41 to –45	22
Note: Input signal is 820 Hz sine-wave; output is measured with psophometric weighting.	

Intermodulation distortion

With the input driven with a composite signal consisting of two sine-wave signals (denoted as f1 and f2), each in the range of 450–2050 Hz (but not harmonically related) and of equal level in the range of –21 to –4 dBm0, the system does not produce any 2f2-f1 intermodulation product at the output having a level greater than 35 dB below the power level of the composite input signal.

Envelope delay

Envelope delay in a system is the propagation time through the system of a low-frequency sinusoidal envelope of an amplitude-modulated sinusoidal carrier. The carrier frequency is varied throughout the frequency range of interest to obtain the envelope delay as a function of frequency.

Relative envelope delay is the difference between the envelope delay at a given frequency and the global minimum envelope delay within the frequency range.

The values in Table 49 indicate the relative envelope delay for the frequency ranges shown.

Table 49
Relative envelope delay—A-Law

	Relative envelope delay (μs)	
Bandwidth (Hz)	**Line-line**	**Line to trunk/ trunk to line/ trunk to trunk**
800 to 2700	750	375
1000 to 2600	380	190
1150 to 2300	300	150

Note: The above limits apply to 95 percent of all connections.

Impulse noise

Impulse noise is noise bursts or spikes that exceed normal peaks of idle-channel noise. Impulse noise is measured by counting the number of spikes exceeding a preset threshold, as shown in Table 50. Impulse noise level is measured as the number of counts above 55 dBrnC during a five-minute interval, under fully loaded busy-hour PBX traffic conditions.

Table 50
Impulse noise—A-Law

Noise level (dBrnC)	Counts
55	0 counts for 5 minutes

Echo path delay

Echo path delay, as shown in Table 51, is the maximum round-trip port-to-port delay for all frequencies in the 200–3400 Hz range.

Table 51
Echo path delay—A-Law

Path	μs
Analog to analog	3000
Analog to digital	2400
Digital to digital	2000

Spurious in-band

Table 52 specifies the image signal level required for in-band frequencies as measured selectively at the output port.

Table 52
Spurious in-band image signals—A-Law

Input signal	Image signal level (300–3400 Hz)
0 dBm0 (700–1100 Hz)	< –40 dBm0

Spurious out-of-band

Table 53 specifies the image signal level required for out-of-band frequencies as measured selectively at the output port.

Table 53
Spurious out-of-band image signals—A-Law

Input signal	Image signal level (above 3–4 kHz)
0 dBm0 (300 Hz–3.4 kHz)	< –25 dBm0

Discrimination against out-of-band signals

Table 54 specifies the image signal level required for the designated input signals as measured at the output port.

Table 54
Discrimination against out-of-band signals—A-Law

Input signal	Image signal level (at any frequency)
–25 dBm0 (above 4.6 kHz)	25 dB below level of test signal

Transmission characteristics for PE

The transmission characteristics for PE are the same as for A-law IPE (see Tables 41 through 54). The PE overload levels are the same as for the μ-Law overload levels in Table 56.

Transmission characteristics—µ-Law

Contents

This section contains information on the following topics:

Transmission characteristics for IPE

Tables 55 through 68 provide the transmission characteristics for IPE.

Frequency response

Frequency response (attenuation distortion) at a given frequency is the difference between the loss at that frequency and the loss at 1000 Hz. Table 55 shows the minimum and maximum loss differences at significant frequency breakpoints for

- station-to-station interfaces and station-to-2-wire trunk interfaces
- 4-wire analog trunk to 4-wire analog trunk interfaces

Table 55
Frequency response—μ-Law

Frequency (Hz)	Frequency response (dB)			
	Station to station/ station to 2-wire		4-wire to 4-wire	
	Minimum	Maximum	Minimum	Maximum
60	+20.0	—	+16.0	—
200	0.0	+5.0	0.0	+3.0
300	–0.5	+1.0	–0.3	+0.3
3000	–0.5	+1.0	–0.3	+0.3
3200	–0.5	+1.5	–0.3	+1.5
3400	0.0	+3.0	0.0	+3.0

Note: Positive values denote loss; negative values denote gain (measured at 1000 Hz with 0 dBm0 input level).

Overload level

Overload levels are measured with respect to the zero-level point in the PBX, which is defined as having an overload point of +3 dBm in an analog to digital conversion.

Therefore, the overload level in the receive direction is defined as the analog signal level (at the port interface) with an average power that is 3 dB greater than that of the signal, which after encoding produces the equivalent of the digital milliwatt (PBX zero-level point).

The overload level in the transmit direction is defined as the analog signal level (at the port interface) with an average power that is 3 dB greater than that of the signal, which after decoding results from the equivalent of the digital milliwatt. Table 56 shows the overload levels in both the receive and the transmit directions.

> ***Note:*** The digital milliwatt is the digital representation of a 1 kHz signal at 0 dBm.

Table 56
Overload level—μ-Law

Type of circuit	Overload level (dBm)	
	Receive (analog to digital)	**Transmit (digital to analog)**
Line	+6.5	+2.5
CO trunk	+3.0	+6.0
Tie trunk	+3.5	+3.5
Tie (4-wire)	+3.0	+4.0
Note: For trunks, overload is specified for pads-out mode.		

Tracking error (gain variation with level)

Level tracking measures how closely changes in the level of the input signal cause corresponding changes in output level. Tracking error, as shown in Table 57, is the deviation, in decibels, in gain or loss through specified ranges of input level relative to the deviation of a nominal 1000-Hz input signal at the 0 dBm0 level.

Table 57
Tracking error (gain variation with level)—μ-Law

Input signal (dBm0)	Maximum tracking error (dB)	Average tracking error (dB)
0 to –37	± 0.5	± 0.25
–37 to –50	± 1.0	± 0.5
Note: The input signal level is referenced to the zero relative power level (dBm0).		

Return loss

Return loss at an impedance discontinuity in a transmission path is the ratio, in decibels, of the power level of an incident signal to the power level of the resulting reflected signal. Echo return loss (ERL) is a weighted average of the return loss values over the frequency range of 500 to 2500 Hz. Single-frequency return loss (SFRL) is the lowest value of nonweighted return loss occurring in the frequency range of 200 to 3200 Hz.

Table 58 shows the return loss needed to satisfy the in-service parameter values shown in Table 59. For each interface type (line and 2-wire trunk), a connection is made through the PBX to a 4-wire trunk interface, and the return loss is measured at both interfaces. Terminating impedance is 600 ohms for all IPE cards.

Table 58
Return loss—design parameter values—μ-Law

Connection	Echo return loss (dB)	Single-frequency return loss (dB)
Line interfaces:		
line side	>18	>12
4-wire trunk side	>25	>19
2-wire trunk interfaces:		
2-wire trunk side	>22	>17
4-wire trunk side	>28	.22

Table 59
Return loss—in-service parameter values—μ-Law

Connection from 4-wire VNL tie trunk to:	Circuit termination	Echo return loss (dB)	Single-frequency return loss (dB)	Notes
4-wire VNL tie trunk	4-wire legs of hybrid terminated in 600 ¾	>27	>20	1, 3
4-wire non-VNL tie trunk	600 ¾ at tip/ring of channel in distant PBX	>22	>15	1, 3
2-wire non-VNL tie trunk	600/900 ¾ at tip/ring of channel in distant PBX	>18	>10	1, 4
CO or FX trunk (TRC)	900 ¾ at CO	>18	>10	2, 3
PBX station line	600 ¾	>24	>18	1, 5
PBX station line	Station off-hook	>12	>8	1, 5

Note 1: Reference impedance is 600 ¾.

Note 2: Reference impedance is 900 ¾.

Note 3: Nominal trunk to trunk loss is 0 dB.

Note 4: Nominal trunk to trunk loss is 0.5 dB.

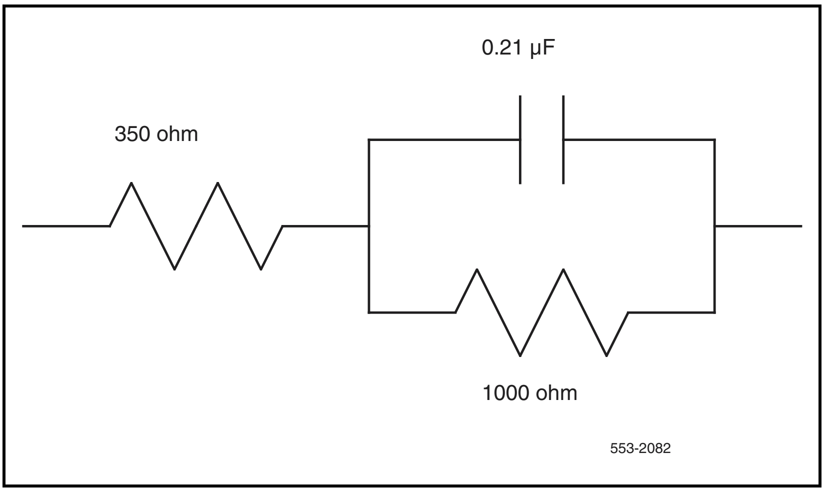
Note 5: Nominal loss is 3.5 dB, trunk to station; 2.5 dB, station to trunk.

Transhybrid loss

Impedance mismatches between hybrid compromise networks and 2-wire terminations (line or trunk) can result in instability and listener echo degradations in the 4-wire switching path of a digital PBX. The echo return loss requirements presented in Tables 58 and 59 do not adequately address this problem. Thus, for digital PBXs, requirements are placed on the return loss at the hybrid between the 2-wire interface and the 4-wire switching path. This requirement is called transhybrid loss.

Two-wire ports with external facilities present a distribution of impedances to the PBX interface. To effect a good match with this distribution and to achieve the transhybrid loss specifications shown in Table 60, a three-element compromise impedance network is used in 2-wire analog trunk ports to balance the impedance of the trunk (see Figure 1).

Figure 1
Compromise impedance network



Trans-hybrid loss is measured from a balanced 4-wire port (with transmit and receive legs at equal level) to the 2-wire port. The 2-wire port is terminated in a compromise impedance network that consists of 600 ohms (for stations) or the network in Figure 1 (for 2-wire trunks). Table 60 gives the minimum trans-hybrid loss over the indicated frequency ranges for input signals at the

4-wire port.

Table 60
Trans-hybrid loss—μ-Law

	Trans-hybrid loss (dB)	
Two-wire port	**200 to 3400 Hz**	**500 to 2500 Hz**
Line	>17	>19
Trunk	>18	>21

Input impedance

Input impedance (see Table 59) for a 2-wire port of a digital PBX is the impedance seen looking into the port from an external source. The requirements shown in Table 61 pertain to the minimum return loss of the port when

- the return loss is measured with a return-loss test set terminated with a specified reference impedance at the PBX
- the port is connected through the PBX to a 4-wire port with 600 ohms termination

The return loss is a function of frequency and increases without limit as the port input impedance approaches the reference impedance.

Table 61
Input impedance—μ-Law

Path through PBX to 4-wire trunk from 2-wire port	Reference impedance	Frequency range (Hz)	Minimum return loss (dB)
Line	600 ¾	200–500	20
		500–3400	26
Trunk	600 ¾	200–500	20
		500–1000	26
		1000–3400	30
Note: For trunks, the minimum return loss specifications are supported for the 600-ohm termination option of the trunk. The specifications are not supported for the 900-ohm termination option.			

Idle channel noise

Idle channel noise (noise in the absence of a signal) is the short-term, average, absolute noise power, measured with either C-message weighting or 3000 Hz flat weighting, as shown in Table 62.

- C-message weighting measures noise with a frequency weighting that reflects the characteristic of the human ear.
- 3000-Hz flat weighting measures noise with equal weighting for all frequencies in the 200–3000 Hz frequency range, measured at the PBX tip and ring.

Table 62
Idle channel noise—µ-Law

Connection type	C-message weighted noise (dBrnC)			3000-Hz flat noise (dBrn)
	Analog to analog	Analog to digital	Digital to analog	
Line to line	< 20	< 15	< 13	< 29
Line to trunk *	< 20	< 15	< 13	< 29
Line to CO trunk at trunk port	< 23	< 16	< 16	< 29
Trunk to trunk	< 20	< 15	< 13	< 29
*At the line port or at the tie trunk port				

Longitudinal balance

Longitudinal balance (longitudinal to metallic), as shown in Table 63, defines the amount of metallic noise voltage (conductor to conductor) resulting from longitudinal voltage (conductor to ground) at the circuit input. The equation for calculating longitudinal-to-metallic balance is as follows:

longitudinal balance (dB) = 20 log [Vs/Vm]

Note: Vs is the disturbing longitudinal voltage, and Vm is the resulting metallic voltage of the same frequency. Ideally, the metallic noise voltage is negligible and the longitudinal balance approaches infinity. All measurements are at the PBX tip and ring.

Table 63
Longitudinal balance—μ-Law

Frequency (Hz)	Minimum balance (dB)	Average balance (dB)
200	58	63
500	58	63
1000	58	63
3000	53	58

Crosstalk

Crosstalk is the presence of unwanted voice signals coupled from one voice channel to another. Crosstalk is not only an annoyance to the listener but also is perceived as a violation of privacy. The crosstalk coupling attenuation for every combination of through connections in all interface categories, measured with input signals from 200 to 3200þHz at 0 dBm0, are listed in Table 64.

Table 64
Crosstalk—µ-Law

Connection	Minimum crosstalk attenuation (dB)
Line to line	> 75
Line to trunk	> 75
Trunk to trunk	> 75

Quantization distortion

Quantization distortion is the distortion introduced when an analog signal is encoded to digital format, then decoded to analog format. The quantization noise is the difference between the original analog speech signal and the analog signal (speech plus noise) resulting from the decoding process.

Table 65 shows the minimum signal-level to distortion-level ratio values for 1000-Hz sine-wave input signal levels and C-message weighted output (distortion) levels.

Table 65
Quantization distortion—µ-Law

	Minimum signal-distortion ratio (dB)	
Input signal level (dBm0)	Analog to analog	Digital to analog or analog to digital
+0 to –30	33	35
–30 to –40	27	29
–40 to –45	22	25

Intermodulation distortion

Intermodulation distortion is caused by nonlinearities present in the electric-to-electric transfer function of the PBX. This form of distortion primarily affects data transmission.

Intermodulation distortion is measured by using the four-tone method that employs two pairs of equal-level tones transmitted at a total, composite power level of –13 dBm. One pair of tones uses 857 Hz and 863 Hz frequencies, while the second pair uses 1372 Hz and 1388 Hz frequencies. The second- and third-order products of distortion are denoted as R2 and R3, respectively.

The power levels for R2 and R3 (see Table 66) are expressed in decibels below the received power level and are calculated as follows:

- R2 is the average power level measured in two different ranges of the voiceband between 503 Hz and 537 Hz, and between 2223 Hz and 2257 Hz.
- R3 is the total power level in the frequency range between 1877 Hz and 1923 Hz.

Table 66
Intermodulation distortion—µ-Law

Connection type	Distortion limits (dB) below received level		Test-signal input level (dBm)
	R2	R3	
Line to line	39	51	–9
Line to trunk	39	51	–9 at line –13 at trunk
Trunk to trunk	39	51	–13

Envelope delay

Envelope delay in a system is the propagation time through the system of a low-frequency sinusoidal envelope of an amplitude-modulated sinusoidal carrier. The carrier frequency is varied throughout the frequency range of interest to obtain the envelope delay as a function of frequency.

Relative envelope delay is the difference between the envelope delay at a given frequency and the global minimum envelope delay within the frequency range. The values in Table 67 indicate the relative envelope delay for the frequency ranges shown.

Table 67
Relative envelope delay—μ-Law

	Relative envelope delay (μs)	
Bandwidth (Hz)	**Line to line**	**Line to trunk and trunk to trunk**
800 to 2700	750	375
1000 to 2600	380	190
1150 to 2300	300	150

Impulse noise

Impulse noise is noise bursts or spikes that exceed normal peaks of idle-channel noise. Impulse noise is measured by counting the number of spikes exceeding a preset threshold over a defined time duration. Over a five-minute interval, the number of counts above 55 dBrnC is zero under fully loaded busy-hour PBX traffic conditions.

Echo path delay

Echo path delay is the maximum round-trip port to port delay for all frequencies in the 200–3400 Hz range (see Table 68).

Table 68
Echo path delay—μ-Law

Path	ms
Analog to analog	3.0
Analog to digital	2.4
Digital to digital	2.0

Transmission characteristics for PE

The transmission characteristics for PE are the same as for IPE (see Tables 55 through 68) except for the following characteristics.

Overload level

The overload levels for PE with trunks in pads-out mode are listed in Table 69.

Table 69
Overload level—μ-Law

Port	Receive (analog to digital)	Transmit (digital to analog)
Line	+7.0	+2.0
CO trunk	+3.0	+6.0
2-wire and 4-wire tie trunk	+3.0	+6.0
Tie (4-wire)	+2.5	+6.5

Return loss

The requirements for return loss of PE are the same as those for IPE (see Tables 58 and 59); however, the conditions for the requirements listed in Table 59 are modified as follows:

- The nominal loss for a tie trunk (2-wire or 4-wire, VNL or non-VNL) to or from a 4-wire tie trunk is 0 dB.
- The nominal loss for a CO/FX trunk to or from a 4-wire tie trunk is 0.5 dB.
- The nominal loss for a station line (including an SL-1 telephone line) to or from a 4-wire tie trunk is 2.5 dB.

Note: The preceding conditions are based on 4-wire tie trunk ports utilizing trunk card vintage QPC237C or later for North America and QPC296C or later internationally.

Transhybrid loss

The trunk specifications for transhybrid loss (see Table 60) apply to PE trunks that are compatible with Electronic Industries Association (EIA) specifications.

Input impedance

The trunk specifications for input impedance (see Table 61) apply to PE trunks that are compatible with EIA specifications.

Loss plan

Contents

This section contains information on the following topics:

Introduction

End-to-end connection loss is one of the most important aspects to consider when planning private networks. That is because end-to-end connection loss is a major element in controlling transmission performance parameters, such as received volume, echo, noise, and crosstalk. In digital networks, loss provisioning is a function of network switching. Therefore, in private networks the loss plan of the PBX is fundamental to the overall network loss design.

The insertion loss of a PBX connection is defined as the level difference between the power delivered from a reference signal source connected across an input port to a measuring instrument connected across an output port, with

- the path through the PBX connected
- the path through the PBX replaced by a direct connection

For insertion loss tests, both the signal source and the measurement instrument are terminated in 600 ohm. The reference signal source frequency is between 1000 Hz and 1020þHz for North America, and between 800 Hz and 820 Hz for most other locations. The insertion loss values are expressed as absolute loss between interface ports and, within the limits of overload and tracking error, are independent of the signal level.

Loss plan for μ-Law applications

The insertion losses between intelligent peripheral equipment (IPE) ports, IPE and peripheral equipment (PE) ports, and analog and digital ports are connection-specific to be compatible with end-to-end network connection loss requirements. The Succession 1000M, Succession 1000, and Meridian 1 loss specifications are in agreement with North American standards, that are formulated to provide satisfactory end-to-end performance for connections within private networks and connections between private and public networks. These specifications include evolving standards for connections involving ISDN-compatible stations (ICS) and Integrated Services (IS) trunks.

The loss plan strategy for IPE combines electrical inserted loss with terminal acoustic parameters for optimum transmission performance. This strategy enables IPE to accommodate a variety of voice terminals while maintaining acoustic equivalence with traditional telephones.

Some connections between digital and analog ports have asymmetrical loss to conform to network loss plans or to provide compatibility with the transmission characteristics of various voice terminals. This asymmetry is resolved at a remote point, for example another switch, in the overall connection.

A satellite tie trunk connects a satellite or tributary PBX (defined as a PBX that does not have its own directory number for incoming calls) to the main PBX. Satellite tie trunks, in some connections, require different loss treatment than nonsatellite tie trunks.

> ***Note:*** In this context, the term *satellite* has no relationship to, and should not be confused with, an earth-orbiting transponder or circuits associated with an earth-orbiting transponder.

Trunk options

To accommodate specific network and facility characteristics, you can select various options for analog trunk ports. These options lead to variations in the loss plan as follows:

- Transmission class of service (COS):

  Note: *COS* is the acronym used for transmission class of service in Electronic Industry Association (EIA) and Telecommunications Industry Association (TIA) standards.

  Analog trunks are assigned one of the following class of service options:

  — via net loss (VNL) for facilities with loss proportional to length

  — non-VNL, as follows:

    – transmission compensated (TRC) for 2-wire non-VNL facilities with a loss of 2 dB or greater, or for which impedance compensation is provided, or for a 4-wire non-VNL facility

    – non-transmission compensated (NTC) for 2-wire non-VNL facilities with a loss of less than 2 dB or when impedance compensation is not provided

- Signaling arrangements:

  Depending on signaling arrangements, analog tie trunks can interface with a switch through equipment compatible with E&M trunks or with loop dial repeater (LDR) trunks.

  — IPE LDR tie trunks utilize a loss plan compatible with industry standards for tie trunks.

  — PE LDR tie trunk loss insertion is the same as for PE central office (CO) trunks.

  — LDR trunks for public switched telephone network (PSTN) access—for example, direct inward dial (DID) service—follow the loss plan for CO trunks.

- Facility termination:

  IPE E&M tie trunks can be configured to interface 4-wire or 2-wire facility terminations.

Note: Facilities associated with the Nortel Networks Electronic Switched Network (ESN) offering for dialing features are recommended to be 4-wire for optimum transmission; thus, the 4-wire option is often referred to as the ESN option and the 2-wire as the non-ESN option. The presence or absence of the ESN package does not constrain the selection of the facility termination option.

— With the 4-wire (ESN) option invoked, the loss insertion in each direction is 0.5 dB less than for the 2-wire (non-ESN) option.

— PE E&M tie trunks (including satellite tie trunks) with QPC237C or later vintage are compatible with the loss requirements of 4-wire facility terminations (as recommended for ESN applications) and are reflected thus in the loss plan; for earlier vintages and 2-wire PE E&M tie trunks, the loss is 0.5þdB more in each direction.

Loss plan specifications

The loss plan tables are in a matrix format. The transmission direction of the loss values is shown by arrows. The values are independent of the originating or terminating function of the ports connected. Positive values denote loss, negative values denote gain, as shown below:

- In Table 70 (IPE ports to IPE ports), the electrical loss from an E&M tie trunk to an analog telephone is 3.5 dB; in the reverse direction, the electrical loss is 2.5 dB. (If the trunk is optioned for 2-wire facility termination, the losses are 4 and 3 dB, respectively.)
- In Table 71 (digital ports to IPE ports), the electrical loss from a digital tie trunk port to an analog E&M tie trunk is 3 dB; in the reverse direction, the electrical loss has a negative value of –3 dB, indicating a 3 dB gain.

For simplicity, Tables 70 through 75 present the loss plan for system default settings as follows:

IPE E&M tie trunk:	VNL, 4-wire
IPE LDR tie trunk:	TRC
IPE satellite E&M tie trunk:	TRC, 2-wire
IPE CO (local) trunk:	TRC
IPE TO (tandem or IC access) trunk:	VNL
PE E&M tie trunk:	VNL
PE satellite tie trunk:	TRC
PE CO (local) trunk:	TRC
PE TO (tandem, IC access) trunk:	VNL

Tables 70 through 75 provide loss values measured in decibels (dB), for connections between IPE ports (line and analog trunk ports), digital ports (PRI or DTI ports), and PE ports (line and analog trunk ports), as noted here:

	IPE ports	**Digital ports**	**PE ports**
IPE ports	Table 70		
Digital ports	Table 71	Table 72	
PE ports	Table 73	Table 74	Table 75

The complete loss values for the class-of-service options (VNL, TRC, NTC) are presented in Tables 70 through 6. The loss values given for IPE tie trunks are based on the selection of the 4-wire facility termination option; those for IPE satellite trunks are based on the selection of the 2-wire facility termination option. Digital ports are not shown because the loss between analog trunks and digital ports is the same for all classes of service and is also covered in Tables 70 through 75.

Note 1: The losses presented in Tables 70 through 6 for connections to, from, and between IPE analog line ports reflect a 2 dB reduction in the electrical loss in the transmission direction to the line card. This reduction is implemented in cards shipped after October 1991 to accommodate the longer station loops being installed in distributed customer environments.

Note 2: The toll office values in Tables 70 through 6 reflect a trunk that is connected to an office in the public switched network with a higher rank than the local serving office. In general, this trunk connects to a local access and transport area (LATA) tandem or to an interexchange carrier point of presence (IC POP).

Tables 1 through 6 show the loss plan for line and trunk IPE port connections.

Table 70
Electrical loss—IPE ports to IPE ports (Part 1 of 2)

		IPE port (COS)	Analog station	Analog off-prem station	Digital set	ISDN terminal	2W E&M tie* (NTC)	2W E&M tie* (TRC)	4W E&M tie* (VNL)
	Class**		ONS	OPS	D/ONS	ICS	A/TT	A/TT	S/ATT
IPE port			↑ ↓	↑ ↓	↑ ↓	↑ ↓	↑ ↓	↑ ↓	↑ ↓
Analog station		→	4						
	ONS	←	4	—	—	—	—	—	—
Analog off-prem		→	1.5	1					
station	ONS	←	1.5	1	—	—	—	—	—
Digital set		→	0.5	0	0				
	D/ONS	←	3.5	3	0	—	—	—	—
ISDN terminal		→	6.5	0	6	0			
	ICS	←	3.5	–3	0	0	—	—	—
2W E&M tie*		→	1	0.5	0.5	–2.5	1		
(NTC)	A/TT	←	3	2.5	–0.5	–0.5	1	—	—
2W E&M tie*		→	1	0.5	0.5	–2.5	1	1	
(TRC)	A/TT	←	3	2.5	–0.5	–0.5	1	1	—
4W E&M tie*		→	3.5	3	3	–3	0.5	0.5	0
(VNL)	A/TT	←	2.5	2	–1	–1	0.5	0.5	0
LDR tie		→	0.5	0	0	–6	0.5	0.5	0
(NTC)	A/TT	←	0.5	0	–3	–3	1.5	0.5	0
LDR tie		→	0.5	0	0	–6	0.5	0.5	0
(TRC)	A/TT	←	0.5	0	–3	–3	0.5	0.5	0
LDR tie		→	0.5	0	0	–6	0.5	0.5	0
(VNL)	A/TT	←	0.5	0	–3	–3	0.5	0.5	0
CO/FX/WATS		→	0.5	0	0	–6	0.5	0.5	3
(NTC)	A/CO	←	0.5	0	–3	–3	1.5	0.5	1
CO/FX/WATS		→	0.5	0	0	–6	0.5	0.5	0
(TRC)	A/CO	←	0.5	0	–3	–3	0.5	0.5	0
Toll office		→	4.5	4	4	1	3.5	3.5	0
(VNL)	A/TO	←	4.5	4	1	4	4.5	1.5	0

*E&M tie trunk transmission category is 4-wire; satellite tie trunk is 2-wire.

**Class (for example, ONS and ICS) denotes Telecommunications Industry Association (TIA) port designation for cross-reference purposes.

Table 70
Electrical loss—IPE ports to IPE ports (Part 2 of 2)

	Class**	IPE port (COS)	LDR tie (NTC) ONS	LDR tie (TRC) OPS	LDR tie (VNL) D/ONS	CO/FX/ WATS (NTC) ICS	CO/FX/ WATS (TRC) A/TT	Toll office (VNL) A/TT	
IPE port			↑ ↓	↑ ↓	↑ ↓	↑ ↓	↑ ↓	↑ ↓	
Analog station		→							
	ONS	←	—	—	—	—	—	—	
Analog off-prem		→							
station	**ONS**	←	—	—	—	—	—	—	
Digital set		→							
	D/ONS	←	—	—	—	—	—	—	
ISDN terminal		→							
	ICS	←	—	—	—	—	—	—	
2W E&M tie*		→							
(NTC)	**A/TT**	←	—	—	—	—	—	—	
2W E&M tie*		→							
(TRC)	**A/TT**	←	—	—	—	—	—	—	
4W E&M tie*		→							
(VNL)	**A/TT**	←	—	—	—	—	—	—	
LDR tie		→	1						
(NTC)	**A/TT**	←	1	—	—	—	—	—	
LDR tie		→	1	1					
(TRC)	**A/TT**	←	1	1	—	—	—	—	
LDR tie		→	1	1	1				
(VNL)	**A/TT**	←	1	1	1	—	—	—	
CO/FX/WATS		→	1	1	1	1			
(NTC)	**A/CO**	←	1	1	1	1	—	—	
CO/FX/WATS		→	1	1	1	1	1		
(TRC)	**A/CO**	←	1	1	1	1	1	—	
Toll office		→	1	1	1	1	1	1	
(VNL)	**A/TO**	←	1	1	1	1	1	1	

*E&M tie trunk transmission category is 4-wire; satellite tie trunk is 2-wire.

**Class (for example, ONS and ICS) denotes Telecommunications Industry Association (TIA) port designation for cross-reference purposes.

Table 71
Electrical loss—digital ports to IPE ports

Digital port	Class**	IPE port (COS)	Analog set ONS ↑ ↓	Analog OPS OPS	Digital set D/ONS ↑ ↓	ISDN terminal ICS ↑ ↓	E&M tie* A/TT ↑ ↓	Satellite tie* S/ATT ↑ ↓	CO/FX/WATS A/CO ↑ ↓	Toll office A/TO ↑ ↓
Tie		→	8.5	6	8	0	3	6.5	3	3
	D/TT	←	2.5	0	–1	0	–3	0.5	–3	–3
Satellite tie*		→	2.5	2	2	–3	0	0.5	0	3
	S/DTT	←	2.5	2	-1	0	0	0.5	0	3
CO/FX/WATS/DID		→	2.5	0	2	–3	2	0.5	0	3
	D/CO	←	2.5	0	–1	0	2	0.5	0	3
Toll office		→	8.5	0	8	3	3	6.5	6	6
FX/WATS/DID	**D/TO**	←	2.5	0	–1	0	–3	0.5	0	0
Primary rate interface		→	6.5	0	6	0	3	6.5	3	3
	IST	←	3.5	0	0	0	0	0.5	–3	–3

*E&M tie trunk transmission category is 4-wire; satellite tie trunk is 2-wire.

**Class (for example, ONS and ICS) denotes TIA port designation for cross-reference purposes.

Table 72
Electrical loss—digital port to digital ports

Digital port	Class*	Digital port (COS)	Tie D/TT ↑ ↓	Satellite tie S/DTT ↑ ↓	CO/FX/WATS D/CO ↑ ↓	Toll office D/TO ↑ ↓	Primary rate interface IST ↑ ↓
Tie		→	0				
	D/TT	←	0	—	—	—	—
Satellite tie		→	0	0			
	S/DTT	←	6	0	—	—	—
CO/FX/WATS /DID		→	0	0	3		
	D/CO	←	6	0	3	—	—
Toll office		→	0	6	6	0	
FX/WATS/DID	**D/TO**	←	0	0	0	0	—
Primary rate interface		→	0	6	3	0	0
	IST	←	0	0	0	0	0

*Class (for example, D/TT and D/CO) denotes TIA port designation for cross-reference purposes.

Table 73
Electrical loss—IPE ports to PE ports

IPE port (COS)	Class**	PE port (COS)	Analog set ONS ↑ ↓	Analog off-prem set OPS ↑ ↓	E&M tie* (NTC) A/TT ↑ ↓	E&M tie* (TRC) A/TT ↑ ↓	E&M tie* (VNL) A/TT ↑ ↓	CO/FX/ WATS (NTC) A/CO ↑ ↓	CO/FX/ WATS (TRC) A/CO ↑ ↓	CO/FX/ WATS (VNL) A/CO ↑ ↓
Analog station	**ONS**	→	4.5	0.5	0	0	2	0.5	0.5	4.5
		←	4.5	0.5	0	0	2	0.5	0.5	4.5
Analog Off-Premise Station	**OPS**	→	2	0	–0.5	–0.5	2	0.5	0.5	0.5
		←	2	0	–0.5	–0.5	2	0.5	0.5	0.5
Digital set	**D/ONS**	→	1	1	–3.5	–3.5	–1.5	–3	–3	1
		←	4	4	–0.5	–0.5	1.5	0	0	4
ISDN terminal	**ICS**	→	7	0	–0.5	-3.5	1.5	–3	–3	4
		←	4	–3	–3.5	–6.5	–1.5	–6	–6	1
2-W E&M tie* (NTC)	**A/TT**	→	1.5	1.5	0	0	0	1.5	0.5	4.5
		←	3.5	3.5	0	0	0	3.5	0.5	3.5
2-W E&M tie* (TRC)	**A/TT**	→	1.5	1.5	0	0	0	0.5	0.5	0.5
		←	3.5	3.5	0	0	0	0.5	0.5	0.5
4-W E&M tie* (VNL)	**A/TT**	→	4	4	–0.5	–0.5	–0.5	1	0	0
		←	3	3	–0.5	–0.5	–0.5	3	0	0
LDR tie (NTC)	**A/TT**	→	1	1	0.5	0.5	0.5	1	1	1
		←	1	1	0.5	0.5	0.5	1	1	1
LDR tie (TRC)	**A/TT**	→	1	1	0.5	0.5	0.5	1	1	1
		←	1	1	0.5	0.5	0.5	1	1	1
LDR tie (VNL)	**A/TT**	→	1	1	0.5	0.5	0.5	1	1	1
		←	1	1	0.5	0.5	0.5	1	1	1
CO/FX/WATS (NTC)	**A/CO**	→	1	1	0.5	0.5	2.5	1	1	1
		←	1	1	0.5	0.5	2.5	1	1	1
CO/FX/WATS (TRC)	**A/CO**	→	1	1	0.5	0.5	0.5	1	1	1
		←	1	1	0.5	0.5	0.5	1	1	1
Toll office (VNL)	**A/TO**	→	5	5	2.5	2.5	0.5	1	1	1
		←	5	5	2.5	2.5	0.5	1	1	1

*IPE E&M tie trunk transmission category is 4-wire; satellite tie trunk is 2-wire.

**Class (for example, ONS and OPS) denotes TIA port designation for cross-reference purposes.

Table 74
Electrical loss—digital ports to PE ports

Digital port (COS) / Class* / PE port (COS)		Analog set ONS ↑	Analog set ONS ↓	Analog OPSt OPS ↑	Analog OPSt OPS ↓	E&M tie A/TT ↑	E&M tie A/TT ↓	Satellite tie S/ATT ↑	Satellite tie S/ATT ↓	CO/FX/WATS A/CO ↑	CO/FX/WATS A/CO ↓	Toll office A/TO ↑	Toll office A/TO ↓
Tie **D/TT**	→	9		6		6.5		4.5		6		3	
	←		3		0		0.5		–1.5		0		–3
Satellite tie **S/DTT**	→	3		2		0.5		–1.5		0		3	
	←		3		2		0.5		–1.5		0		3
CO/FX/WATS/DID **D/CO**	→	3		0		2.5		0.5		0		3	
	←		3		0		2.5		0.5		0		3
Toll office FX/WATS/DID **D/TO**	→	9		6		6.5		4.5		6		6	
	←		3		0		0.5		–1.5		0		0
Primary rate interface **IST**	→	7		7		6.5		4.5		3		3	
	←		4		4		0.5		–1.5		–3		–3

*Class (for example, ONS and OPS) denotes TIA port designation for cross-reference purposes.

Table 75
Electrical loss—PE ports to PE ports

PE port (COS)	Class*		Analog set ONS ↑ ↓	Analog off-prem set OPS ↑ ↓	E&M tie (NTC) A/TT ↑ ↓	E&M tie (TRC) A/TT ↑ ↓	E&M tie (VNL) A/TT ↑ ↓	CO/FX/ WATS (NTC) A/CO ↑ ↓	CO/FX/ WATS (TRC) A/CO ↑ ↓	Toll office (VNL) A/TO ↑ ↓
Analog set		→	5							
	ONS	←	5	—	—	—	—	—	—	—
Analog		→	5	1						
Off-Prem Sta'n	**ONS**	←	5	1						
E&M tie		→	0.5	0.5	0					
(NTC)	**A/TT**	←	0.5	0.5	0	—	—	—	—	—
E&M tie		→	0.5	0.5	0	0				
(RTC)	**A/TT**	←	0.5	0.5	0	0	—	—	—	—
E&M tie		→	2.5	2.5	0	0	0			
(VNL)	**A/TT**	←	2.5	2.5	0	0	0	—	—	—
CO/FX/WATS		→	1	1	0.5	0.5	2.5	1		
(NTC)	**A/CO**	←	1	1	0.5	0.5	2.5	1	—	—
CO/FX/WATS		→	1	1	0.5	0.5	0.5	1	1	
(TRC)	**A/CO**	←	1	1	0.5	0.5	0.5	1	1	—
Toll office		→	5	5	2.5	0.5	0.5	1	1	1
(VNL)	**A/TO**	←	5	5	2.5	0.5	0.5	1	1	1

*Class (for example, ONS and OPS) denotes TIA port designation for cross-reference purposes.

Table 76 shows the loss tolerance for all of the connections in Tables 70 through 6.

Table 76
Insert loss tolerance

Type of connection	Insertion loss tolerance (dB)
Line to line	± 1.0
Line to analog trunk	± 0.7
Line to digital trunk	± 0.7
Analog trunk to analog trunk	± 0.7
Analog trunk to digital trunk	± 0.7
Digital trunk to digital trunk	± 0.2

Loss plan for conference connections

When three or more conferees that terminate on 2-wire ports are connected through a conference bridge, the 2-wire terminations cause reflections that are compensated by added loss in the conference bridge. The added loss is a function of the number of 2-wire ports and the type of port. Table 77 lists the port-to-port loss for conferences with three to six ports and IPE connections between analog lines and trunks.

> ***Note:*** A maximum of three trunks are recommended on a conference connection.

Table 77
Loss insertion for conference connections

Connection (A-B)	Three ports		Four ports	
	Loss A-B (dB)	Loss B-A (dB)	Loss A-B (dB)	Loss B-A (dB)
Line to line	4.0	4.0	7.0	7.0
Line to CO trunk	0.5	0.5	3.5	3.5
Line to tie trunk	2.5	0.5	5.5	3.5
CO trunk to CO trunk	0.0	0.0	0.0	0.0
CO trunk to tie trunk	2.0	0.0	2.0	0.0
Tie trunk to tie trunk	2.0	2.0	2.0	2.0
Connection (A-B)	**Five ports**		**Six ports**	
	Loss A-B (dB)	**Loss B-A (dB)**	**Loss A-B (dB)**	**Loss B-A (dB)**
Line to line	8.5	8.5	10.0	10.0
Line to CO trunk	5.0	5.0	6.5	6.5
Line to tie trunk	7.0	5.0	8.5	6.5
CO trunk to CO trunk	1.5	1.5	3.0	3.0
CO trunk to tie trunk	3.5	1.5	5.0	3.0
Tie trunk to tie trunk	3.5	3.5	5.0	5.0

Loss plan for A-Law applications

The insertion loss values for connections between ports are location specific. If not modified for specific locations—for example, to meet approval requirements of a particular administration—the μ-Law loss plan applies. The insertion loss limits are listed in Table 76.

Transmission parameters for Meridian Modular Telephones

Contents

This section contains information on the following topics:

Introduction

Meridian Modular Telephones have the following system-defined transmission parameters:

- transmit objective loudness rating (TOLR)
- receive objective loudness rating (ROLR)
- sidetone objective loudness rating (SOLR)

These transmission parameters are defined in the Configuration Record (LD17) and are downloaded to all Meridian Modular Telephones after a system reload (sysload). This accommodates the needs of international installations where different loss and level plans are in place.

> ***Note:*** The transmission parameters are not downloaded during parallel reload procedures.

The default transmission settings for Meridian Modular Telephones are designed, under the North American loss and level plan, to appear identical at the CO to the settings of analog 500/2500 type sets. Note that the North American loss and level plan assumes trunk losses of 3 to 4 dB to the CO.

Contact your Nortel Networks representative for the recommended transmission parameters for countries not using the North American loss and level plan.

Receive and transmit objective loudness rating

To obtain optimal transmit and receive performance in North America, it is important that the following transmission parameters be used:

- a transmit offset of –45 dB (LD 17 prompt TOLR = 0)
- a receive offset of +45 dB (LD 17 prompt ROLR = 0)

Table 78 shows the values entered for LD 17 prompts ROLR and TOLR and the associated loudness rating for North America.

The ROLR and the TOLR are considered as quantities of loss. Here are some examples:

- If the ROLR of a telephone changes from +45 dB to +50þdB, there is 5 dB *more loss* and, consequently, the receive path is *quieter*.
- If the ROLR changes from +45 dB to +39 dB, there is 6þdB *less loss* and, consequently, the receive path is *louder*.
- If the TOLR changes from –45 dB to –50 dB, there is 5þdB *less loss* and, consequently, the transmit path is *louder*.
- If the TOLR changes from –45 dB to –40 dB, there is 5þdB *more loss* and, consequently, the transmit path is *quieter*.

Another way of looking at both TOLR and ROLR is that if the number *increases* in value (becomes more positive or less negative) the path is *quieter*, and as the number *decreases* in value (becomes less positive or more negative) the path is *louder*.

International software ROLR and TOLR values are listed in Table 79. In addition, separate Handsfree receive (HRLR) and Handsfree transmit (HTLR) objective ratings can be defined. See Table 80.

Table 78
Receive and transmit transmission parameters (North America)

Value for prompt ROLR or TOLR in LD17	ROLR	TOLR
00	+45.00	–45.00
01	+45.85	–44.50
02	+46.70	–44.50
03	+47.55	–44.00
04	+48.40	–43.50
05	+49.25	–43.00
06	+50.10	–43.00
07	+50.95	–42.50
08	+51.80	–42.00
09	+52.65	–41.50
10	+53.50	–41.50
11	+54.35	—
12	+55.20	—
13	+56.05	—
14	+56.90	—
15	+57.75	—
16–31	—	—
32	+45.00	–45.00
33	+44.15	–45.50
34	+43.30	–46.00
35	+42.45	–46.00
36	+41.60	–46.50
37	+40.75	–47.00
38	+39.90	–47.50
39	+39.05	–47.50
40	—	–48.00
41	—	–48.50
42	—	–49.00
43	—	–49.00
44	—	–49.50
45	—	–50.00
46	—	–50.50
47	—	–50.50
48	—	–51.00
49	—	–51.50
50–52	—	–52.00
53	—	–53.00
54–63	—	—

Table 79
Handset receive and transmit transmission parameters (international)

Quieter					Louder				
LD17 value	Change from nominal		LD22 output		LD17 value	Change from nominal		LD22 output	
	ROLR	TOLR	ROLR	TOLR		ROLR	TOLR	ROLR	TOLR
#	dB	dB	dB	dB	#	dB	dB	dB	dB
00	0.00	0.0	+45.00	–45.00	32	0.00	0.0	+45.00	–45.00
01	0.85	0.5	+45.85	–44.50	33	0.85	0.5	+44.15	–45.50
02	1.70	0.5	+46.70	–44.50	34	1.70	1.0	+43.30	–46.00
03	2.55	1.0	+47.55	–44.00	35	2.55	1.0	+42.45	–46.00
04	3.40	1.5	+48.40	–43.50	36	3.40	1.5	+41.60	–46.50
05	4.25	2.0	+49.25	–43.00	37	4.25	2.0	+40.75	–47.00
06	5.10	2.0	+50.10	–43.00	38	5.10	2.5	+39.90	–47.50
07	5.95	2.5	+50.95	–42.50	39	5.95	2.5	+39.05	–47.50
08	6.80	3.0	+51.80	–42.00	40	6.80	3.0	+38.20	–48.00
09	7.65	3.5	+52.65	–41.50	41	7.65	3.5	+37.35	–48.50
10	8.50	3.5	+53.50	–41.50	42	8.50	4.0	+36.50	–49.00
11	9.35	4.0	+54.35	–41.00	43	9.35	4.0	+35.65	–49.00
12	10.20	4.5	+55.20	–40.50	44	10.20	4.5	+34.80	–49.50
13		5.0		–40.00	45	11.05	5.0	+33.95	–50.00
14		5.0		–40.00	46	11.90	5.5	+33.10	–50.50
15		5.5		–39.50	47	12.75	5.5	+32.25	–50.50
16		6.0		–39.00	48	13.60	6.0	+31.40	–51.00
17		6.5		–38.50	49	14.45	6.5	+30.55	–51.50
18		6.5		–38.50	50	15.30	7.0	+29.70	–52.00
19		7.0		–38.00	51		7.0		–52.00
20		7.5		–37.50	52		7.5		–52.50
21		8.0		–37.00	53		8.0		–53.00
22		8.0		–37.00	54		8.5		–53.50
23		8.5		–36.50	55		8.5		–53.50
24		9.0		–36.00	56		9.0		–54.00
25		9.5		–35.50	57		9.5		–54.50
26		9.5		–35.50	58		10.0		–55.00
27		10.0		–35.00	59		10.0		–55.00
28		10.5		–34.50	60		10.5		–55.50
29		11.0		–34.00	61		11.0		–56.00
30		11.0		–34.00	62		11.5		–56.50
31		11.5		–33.50	63		11.5		–56.50

Table 80
Handsfree receive and transmit transmission parameters (international)

Quieter					Louder				
LD17 value	Change from nominal		LD22 output		LD17 value	Change from nominal		LD22 output	
	HRLR	HTLR	HRLR	HTLR		HRLR	HTLR	HRLR	HTLR
#	dB	dB	dB	dB	#	dB	dB	dB	dB
00	0.00	0.0	+42.00	–44.00	32	0.00	0.0	+42.00	–44.00
01	0.85	0.5	+42.85	–43.50	33	0.85	0.5	+41.15	–44.50
02	1.70	0.5	+43.70	–43.50	34	1.70	1.0	+40.30	–45.00
03	2.55	1.0	+44.56	–43.00	35	2.55	1.0	+39.45	–45.00
04	3.40	1.5	+45.40	–42.50	36	3.40	1.5	+38.60	–45.50
05	4.25	2.0	+46.25	–42.00	37	4.25	2.0	+37.75	–46.00
06	5.10	2.0	+47.10	–42.00	38	5.10	2.5	+36.90	–46.50
07	5.95	2.5	+47.95	–41.50	39	5.95	2.5	+36.05	–46.50
08	6.80	3.0	+48.80	–41.00	40	6.80	3.0	+35.20	–47.00
09		3.5		–40.50	41		3.5		–47.50
10		3.5		–40.50	42		4.0		–48.00
11		4.0		–40.00	43		4.0		–48.00
12					44		4.5		–48.50
13					45		5.0		–49.00
14					46		5.5		–49.50
15					47		5.5		–49.50
16					48		6.0		–50.00
17					49		6.5		–50.50
18					50		7.0		–51.00
19					51		7.0		–51.00
20					52		7.5		–51.50
21					53		8.0		–52.00
22					54		8.5		–52.50
23					55				
24					56				
25					57				
26					58				
27					59				
28					60				
29					61				
30					62				
31					63				

Sidetone objective loudness rating

Sidetone is provided by coupling a portion of the transmitted voice signal back to the telephone receiver. This enables you to hear your own voice, which provides a natural quality to the conversation. The value of the SOLR is a measure of the loss of sidetone. The recommended SOLR value is +12 dB. Table 81 lists the values accepted for LD 17 prompt SOLR.

Table 81
Acceptable SOLR values

SOLR	Loudness rating
0	7 dB
1	12 dB (default)
2	17 dB
3	22 dB
4	sidetone disabled

Note: The default value is 1 (12 dB). The recommended value is 1 (12 dB).

As the SOLR value increases, less of the transmitted signal is coupled back to the receiver. As the SOLR value decreases, more of the transmitted signal (near-end person's voice, or room noise) is coupled back to the receiver.

Factoring in the return loss of the trunk interface, the default SOLR value of 12 dB produces an effective SOLR of 9 dB with nominal return loss on external calls.

Note that when the SOLR value (transmission setting) is changed, only the integral sidetone control circuits in the telephone are affected. Other sources that contribute sidetone (such as return loss at trunk interfaces at the PBX, at the CO, and through the entire network to the far end) are independent of the SOLR transmission setting.

Note: The SOLR download is accepted by all Meridian Modular Telephones except the M2216ACD-1 and M2216ACD-2 telephones that have sidetone values fixed at the default level of 12 dB.

Small system transmission parameters

Contents

This section contains information on the following topics:

Introduction

Small systems accommodate two companding laws to convert signals from analog to digital and from digital to analog:

- µ-Law that is used in North America and Japan.
- A-Law that is used in most other areas of the world, including Europe.

The following transmission specification applies to both standard µ-Law and A-Law cards. There are other countries that have their own transmission plans and thus use unique cards which have had adjustments made to accommodate their transmission specifications. These adjustments are generally in A/D and D/A gains.

The transmission characteristics are given in the following section. Except where indicated otherwise, the design objectives given are met when measured between 2 wire and 4 wire analog input and output interfaces terminated with their nominal impedance.

IMPORTANT

The reference frequency for µ-Law is 1024 Hz and A-Law is 820 Hz. The reference level is -10 dBmO (as an alternative a reference level of 0 dBmO may be used).

Transmission A-Law and µ-Law

Loss Plan

Insertion loss

The insertion loss of a private branch exchange (PBX) connection is defined as the difference between the power delivered from the (test) reference source into the input port and the power at the output port. For insertion loss tests both the signal source and the measurement instrument have impedances of 600 ohms. The test frequency is 820 Hz for A-Law and 1024 Hz for µ-Law.

The insertion losses between various Intelligent Peripheral Equipment (IPE) ports are connection-specific in order to be compatible with end-to-end network connection loss requirements. The small system loss specifications are in agreement with North American standards, which are formulated to provide satisfactory end-to-end performance for connections within private networks and between private and public networks.

The loss plan strategy for IPE combines electrical loss with terminal acoustic parameters for optimum transmission performance. For this reason, some connections have asymmetrical loss in order to conform with network loss plans. This asymmetry is resolved at a remote point (another switch) in the overall connection.

Tables 83, 84, and 85 provide loss values measured in decibels (dB) for connections between:

- IPE ports (lines and trunks)
- Digital ports (PRI or DTI)

IMPORTANT

Tables 83, 84, and 85 are in matrix format. Be aware of the direction of the arrows when searching for a loss value.

Table 82
Guide to loss values tables

	IPE Port	Digital Port
IPE Ports	Table 83	
Digital Ports	Table 84	Table 85

Table 83
Insertion Loss from IPE Ports to IPE Ports (measured in dB) (Part 1 of 2)

	IPE Ports				
IPE Ports	**500/2500 Line** ↑	**Digital Line** ↑ ↓	**2/4 Wire E&M Trunk** ↑ ↓	**4 Wire (ESN) E&M Trunk** ↑ ↓	**CO/FX/WATS Loop Tie Trunk** ↑ ↓
500/2500 Line →	6	‘			
←	6				
Digital Line →	2.5	0			
←	3.5	0			
2/4 Wire E&M Trunk →	6	3.5	1		
←	3	-0.5	1		
4 Wire (ESN) E&M Trunk →	5.5	3	0.5	0	
←	2.5	-1	0.5	0	

Table 83
Insertion Loss from IPE Ports to IPE Ports (measured in dB) (Part 2 of 2)

	IPE Ports				
CO/FX/WATS Loop Tie Trunk →	2.5	0	0.5	0	0.5
←	0	-3.5	0	-0.5	0.5

Table 84
Insertion Loss Digital Ports To IPE Ports (measured in dB) (Part 1 of 2)

	IPE Ports				
Digital Ports	**500/2500 Line** ↑ ↓	**Digital Line** ↑ ↓	**2/4 Wire E&M Trunk** ↑ ↓	**4 Wire (ESN) E&M Trunk** ↑ ↓	**CO/FX/WATS Loop Tie Trunk** ↑ ↓
Tie Trunk →	8.5	6	3.5	3	2.5
←	2.5	0	-2.5	-3	-2.5
Satellite Tie Trunk (See note 1) →	2.5	-3	0.5	0	-0.5
←	2.5	0	0.5	0	-0.5

Table 84
Insertion Loss Digital Ports To IPE Ports (measured in dB) (Part 2 of 2)

	IPE Ports				
CO/FX/WATS Loop Tie Trunk					
→	0.5	2	2.5	2	0.5
←	4.5	-1	2.5	2	-0.5
Toll Office (See note 2)					
→	8.5	6	3.5	3	5.5
←	2.5	0	-2.5	-3	0.5
Primary Rate Interface (PRI) (See note 3)					
→	6.5	6	3.5	3	2.5
←	3.5	0	0.5	0	-2.5`

Notes to Table 84

1 A satellite tie trunk connects a satellite or tributary PBX to a main PBX. A tributary PBX does not have its own directory number for incoming calls.

2 The toll office designation is for a trunk to an office in the public switched network with a higher rank than the local office (class 5).

3 The 1.5Mb PRI and DTI have digital pads which are controlled by software to provide the insertion loss given above. The 2Mb PRI and DTI have programmable digital pads. The default value for these pads gives the insertion loss in Table 84. The pad values can be printed and changed in overlay 73 (LD 73).

Table 85
Electrical loss Digital ports to Digital ports (measured in dB) (Part 1 of 2)

	Digital ports				
Digital Ports	**Tie Trunk** ↑	**Satellite Tie Trunk** (note 1) ↑ ↓	**CO/FX/WATS Loop Tie Trunk** ↑ ↓	**Toll Office Trunk** (note 2) ↑ ↓	**Primary Rate Interface (PRI)** (note 3) ↑ ↓
Tie Trunk					
→	0				
←	0				
Satellite Tie Trunk (See note 1)					
→	0	0			
←	0	0			
CO/FX/WATS Loop Tie Trunk					
→	0	0	3		
←	6	0	3		
Toll Office (See note 2)					
→	0	6	6	0	
←	0	0	0	0	

Table 85
Electrical loss Digital ports to Digital ports (measured in dB) (Part 2 of 2)

	Digital ports				
Primary Rate Interface (PRI) (See note 3) →	0	6	3	0	0
←	0	0	0	0	0

Notes to Table 85

1 A satellite tie trunk connects a satellite or tributary PBX to a main PBX. A tributary PBX does not have its own directory number for incoming calls.

2 The toll office designation is for a trunk to an office in the public switched network with a higher rank than the local office (class 5).

3 The 1.5Mb PRI and DTI have digital pads which are controlled by software to provide the insertion loss given above. The 2Mb PRI and DTI have programmable digital pads. The default value for these pads gives the insertion loss in Table 85. The pad values can be printed and changed in LD 73.

Insertion loss limits

Table 86 gives the analog insertion loss limits for trunk and line connections.

Table 86
Insertion loss limits for trunk and line connections (Part 1 of 2)

Connection	Insertion Loss Variation Limits (dB)
Line — Line	±1.0
Line — Analog Trunk	± 0.7
Line — Digital Trunk	±0.7
Analog Trunk — Analog Trunk	±0.7

Table 86
Insertion loss limits for trunk and line connections (Part 2 of 2)

Connection	Insertion Loss Variation Limits (dB)
Analog Trunk — Digital Trunk	±0.7
Digital Trunk — Digital Trunk	±0.2

Frequency Response

Frequency Response, or Attenuation Distortion, at a given frequency is the difference between the loss at the test frequency and the loss at the reference frequency. Table 87 gives the frequency response for 2 wire and 4 wire interfaces.

Table 87
Frequency Response for 2 wire and 4 wire interfaces

	2 Wire Interface		4 Wire Interface	
Frequency (Hz)	Minimum	Maximum	Minimum	Maximum
200	0	5	0	3
300	-0.5	1.0	-0.5	0.5
3000	-0.5	1	-0.5	0.5
3200	-0.5	1.5	-0.5	1.5
3400	0	3.0	0	3.0

Notes to Table 87

1 The symbol (+) denotes a loss and the symbol (-) denotes a gain.

2 Reference Sources:
µ-Law -1024 Hz -10 dBmO
A-Law - 820 Hz -10 dBmO

Input impedance and balance impedance

Input Impedance for a port is the impedance as seen looking into the port from the tip and ring.

The Balance Impedance is the output source impedance of the port and is designed to match the impedance of the transmission line plus the far end trunk.

Table 88
Input impedance/balance impedance

Connection	System	Input Impedance	Balance Impedance
500/2500 Line	IPE	600	600
2 Wire E&M Trunk	IPE	600	600
4 Wire E&M Trunk	IPE	600	600
DID/DOD/LOOP TIE Trunk	IPE	600/900	600/3COM (3 COM is the EIA termination of 350 + 1000//0.21 μ F)
C.O.Trunk	IPE	600/900	600/3COM (3 COM is the EIA termination of 350 + 1000//0.21 μ F)

Return Loss

The return loss measures how closely the input impedance matches the required impedance (source impedance). Return loss at an impedance discontinuity in a transmission path is the ratio (in dB) of the power level of an incident signal to the power level of the resulting reflected signal.

Echo Return Loss (ERL) is a weighted average of the return loss value over the frequency range of 500 to 2500 Hz.

Single Frequency Return Loss (SFRL) is the lowest value of return loss in the frequency range of 200 to 3200 Hz.

The line or trunk undergoing testing is connected to a 4 wire E&M trunk, which is terminated with 600 OHMS. The return loss is measured against its characteristic input impedance (see Table 89).

Reference Source for μ-Law or A-Law is 0 dBmO.

Table 89
Return Loss

Interface	Echo Return Loss (dB)	Single Frequency Return Loss (dB)
4 Wire Trunk	>28	>22
2 Wire Line	>18	>12
2 Wire Trunk	>22	>17

Transhybrid Loss

The source impedance of a two-wire interface must match the terminating impedance (line plus telephone or line plus far end trunk). If the source impedance does not match, there can be a problem with stability and listener echo.

The match of the output source impedance to the line or trunk impedance is measured by connecting the interface to a 4 wire trunk. The reflected signal from the hybrid is then measured when the 2 wire interface is terminated with the balance impedance given in Table 88.

The values for the transhybrid (return) loss of a 2 wire interface when terminated in its balance impedance is given in Table 90.

Reference Level is 0 dBmO.

Table 90
Transhybrid loss

Input Frequency (Hz)	Transhybrid Return Loss (dB)
300	16
500	20
2500	20
3400	16

Idle Channel Noise

Idle channel noise is noise in the absence of a signal. It is the short-term average absolute noise power, measured with either C-message weighting for μ–Law or Psophometric weighting for A-Law. The 3 k Hz flat measurement uses equal weighting for all frequencies in the 20-3000 Hz range. The values are shown in Table 91.

Table 91
Idle Channel Noise

Connection	μ-Law C Message Noise dBrnC0	A-Law Psophometric dBmP0	3 kHz dBm0
Line — Line	<20	>65	<29
Line — Trunk	<20	>65	<29
Trunk — Trunk	<20	>65	<29

Impulse Noise

Impulse noise is defined as noise bursts or spikes that exceed normal peaks of idle-channel noise. Impulse noise is measured by counting the number of spikes exceeding a pre-set threshold; it is the number of counts above 55 dBm0 during a five minute interval, under fully loaded busy hour PBX traffic conditions.

Table 92
Impulse Noise

Time	Level	Counts
5 Minutes	>55 dBmO	0

Variation of gain versus level

The variation of gain verses level (tracking error) measures how closely changes in input levels causes corresponding changes in output levels.

The tracking error is measured in decibels and is defined as the deviation in gain or loss through a range of input level relative to the gain or loss at the reference frequency and level of 0 dBmO.

The two methods of measuring the tracking error are listed below.

Method 1

When a noise signal as defined in CCITT, recommendation 0.131 is applied at the input of any interface, the gain versus level deviation at the output meets the limits set out in Table 93.

Table 93
Variation of gain versus level method 1

Input Level dBm0	Gain Variation dB
-55 to -10	+/-0.5

Alternatively, when a sine wave input in the frequency range 700 - 1100 Hz is applied at the input of any interface, the gain vs level deviation at the output meets the limits given in Table 94.

Reference frequency:

- 700 - 1100 Hz
- 820 Hz A-Law
- 1024 Hz μ-Law

Table 94
Variation of gain versus level method 1

Input Level dBm0	Gain Variation dB
-10 to +3	+/-0.5

Method 2

With a sine wave in the frequency range of 700-1100 Hz applied to the input port of any interface, the variation of the gain versus level at the output port meets the limits given in Table 95.

Reference frequency:

- 700-1100 Hz
- 820 Hz A-Law
- 1024 Hz μ-Law

Table 95
Variation of gain versus level method 2

Input Level dBm0	Gain Variation dB
-37 to -50	+/-1
0 to 37	+/-0.5

Total distortion including quantization distortion

The quantization distortion is the difference between the original analog signal and the analog signal (signal plus noise) resulting from the decoding process. There are two methods of measuring the quantization distortion:

Method 1

With a noise signal corresponding to CCITT recommendation 0.131 applied to the input interface, the total distortion measured at the output interface lies above the limit given in Table 96.

Table 96
Total distortion method 1

Input Signal dBmO	Analog — Analog dB	Digital — Analog dB
-55	11.1	13.1
-40	26.1	28.1
-34	30.7	32.7
-27 to -6	32.4	34.4
-3	24.0	26.8

Method 2

With a sine wave at the reference frequency is applied to the input interface, the total distortion measured at the output port interface lies above the limit given in Table 97.

Reference frequency:

- 1020 Hz μ-Law
- 820 or 420 Hz A-Law

Table 97
Total distortion method 2

Input signal dBm0	Analog — Analog dB	Digital — Analog dB
-45	22	24
-40	27	29
-30 to 0	33	35

Spurious in-band signal

When a sine wave signal in the range of 700-1100 Hz, at a level of 0 dBmO is applied to the input port, the output level (at any frequency other than that of the applied signal,) is less than -40 dBmO when measured selectively in the band 300-3400 Hz.

Spurious out-of-band signal

When a sine wave signal in the range of 300-3400 Hz, at a level of 0 dBmO is applied to the input port, the level of spurious out-of-band image signals measured selectively at the output port is lower than -25 dBmO.

Discrimination against out-of-band signals

With any sine wave signal above 4.6 kHz applied to the input port at -25 dBm0, the level of any image frequency produced at the output is at least 25 dB below the level of the test signal.

Intermodulation

When two sine wave signals, f1 and f2, in the range of 450 to 2050 Hz, not harmonically related and of equal level in the range -21 to -4 dBmO are applied to the input, they do not create any 2f2-f1 intermodulation product greater than 35 dB below the power level of the input signal.

Group Delay

Absolute group delay

The absolute group delay is the minimum group delay measured in the frequency band 500-2800 Hz. The absolute group delay meets the limits given in Table 98.

Table 98
Absolute group delay

Interface type	Absolute Group Delay Microseconds
Analog — Analog	3000
Analog — Digital	2700
Digital — Digital	2400

Group delay distortion

The group delay distortion is the difference between the absolute group delay (minimum delay) and the group delay in the range 500 to 2800 Hz.

Table 99
Group delay distortion

Frequency range	Group delay distortion Microseconds
500-600	1800
600-1000	900
1000-2600	300
2600-2800	1500

Longitudinal balance

Longitudinal balance defines the amount of impedance balance that exists between the tip and ring conductor with respect to ground. Longitudinal balance is measured by injecting a longitudinal signal on the tip and ring conductors with respect to ground and measuring the amount of signal (noise) that is introduced between the tip and ring. The equation for calculating longitudinal balance is:

Longitudinal Balance = 20 Log Vs/Vm

Vs is the disturbing longitudinal voltage and Vm is the tip to ring metallic noise voltage. Ideally the metallic noise voltage would be negligible and the longitudinal balance would approach infinity.

Table 100
Longitudinal balance for loop start interfaces

Frequency Hz	Minimum balance dB	Average balance dB
200	58	63
500	58	63
1000	58	63
3000	53	58

Crosstalk

Crosstalk is speech signal (signalling) energy transferred from one voice channel to another. The crosstalk coupling loss for every possible type of connections over the frequency range of 200 to 3200 Hz is shown in Table 101.

Test Source:

Frequency 200-3200 Hz 0 dBmO.

Table 101
Crosstalk

Connection type	Minimum Attenuation dBm0	Design Objective dBm0
Line — Line	>65	>75
Line — Trunk	>65	>75
Trunk — Trunk	>65	>75

Succession transmission parameters

Contents

This section contains information on the following topics:

Introduction

This chapter provides transmission parameters for a Succession 1000 system.

The Succession 1000 Virtual Trunk loss plan adheres to TIA912: Voice Gateway Transmission Requirements. TIA912 has an optimum overall loudness rating of 10 dB. The overall loudness rating approximates a normal conversation between a talker and listener spaced one meter apart, providing a high degree of satisfaction for the majority of users.

Voice Gateway port type

Table 102 identifies the port types involved in a connection.

Table 102
Voice Gateway Port Type Definition

Voice Gateway Port Designation	Port Definition
ONS	Analog On Premise Station (telephone)
OPS	Analog Off Premise Station (telephone)
DGS	Digital Station (telephone)
DSET	Nortel Networks Digital Station (Aries or Taurus telephone)
WAN	Wide Area Network (IP connection)
DAL	Digital Access Line – digital connection to a digital CO
FXO	Foreign Exchange Office – analog connection to an analog CO
FXD	Foreign Exchange Digital – digital connection to an analog CO
ATT	Analog Tie Trunk – private analog network connection to a gateway/PBX

Insertion loss to WAN interface for North America

Table 103 identifies the default insertion loss to WAN interface for North America.

Table 103
Default Insertion Loss to WAN interface for North America (Part 1 of 2)

		WAN interface
ONS	←	0.5
	→	8.5
OPS	←	-3
	→	6

Table 103
Default Insertion Loss to WAN interface for North America (Part 2 of 2)

	WAN interface
DGS ←	0
→	0
DSET ←	-4
→	8
DAL ←	0
→	0
FXO ←	-6
→	0
FXD ←	-3
→	3
ATT ←	-3
→	3

The pads on OPS line card are set to pads in, then OPS line card has 0 dB Tx pad and 3 dB Rx pad. For DAL port, the loss plan assumes Succession 1000 Tx pad 0 dB and 6 dB for Rx pad. The pads on XUT trunk card for the FXO port are set to pad out, which means –3 dB Tx pad and 0 dB Rx pad. The pads on XEM trunk card for ATT port are set to Tx pad out and Rx pad in, which means –1 dB Tx pad and 3 dB Rx pad.

Default loss values for Succession Media Gateway

Table 104 shows the default loss values. The default loss values are applicable for North America. If no other loss values are configured in LD 73, then the North America default loss plan applies to calls made through the LAN/WAN interface.

Table 104
Succession Media Gateway Card Default Loss Values for North America

Succession 1000 DTI/PRI Prompt	Rx Code	Tx Code	Rx Pad	Tx Pad
ONP	8	17	8	-3
DSET	8	18	8	-4
OPX	6	20	6	-6
DTT	0	20	0	-6
SDTT	0	20	0	-6
DCO	4	19	4	-5
DTO	3	19	3	-5
VNL	0	20	0	-6
SATT	3	19	3	-5
ACO	3	20	3	-6
ATO	3	19	3	-5
PRI	0	20	0	-6
PRI2	0	20	0	-6
XUT	3	20	3	-6
XEM	4	20	4	-6
BRIL	0	0	0	0
BRIT	0	20	0	-6
WRLS	3	19	3	-5

Use the *Pad code to pad value cross- reference* table in this document.

Loss values for Voice Gateway Media Card (other countries)

The loss values for the countries other than North America, require changes made to the Pad Category tables in LD 73. In LD 73 the prompt `PDCA` is the gate opener to Pad Category tables 1 to 16. The response to prompt `PDCA` must be **15** to change the loss values.

PDCA table 15 can not be created or removed by user manually, if you have a DDB defined already, then the PDCA table was added to the database automatically at upgrade time, as default table 1 does. Otherwise use the following commands in LD 73:

LD 73
`REQ` **NEW**
`TYPE` **DDB**
`TRSH` **0**
other prompts: <**cr**>

To change or view the current Pad Category table content, use the following:

LD 73
`REQ` **PRT (CHG)**
`TYPE`**DTI**
`FEAT`**PAD**
`PDCA`**15**

> ***Note:*** To modify or access PDCA table 15, GPRI package 167 must be optioned.

See *Software Input/Output: Administration* (553-3001-311) LD 73 for details.

Tables 105 through 110 show the loss values for countries other than North America.

Table 105
Succession 1000 Loss Values for Global Countries

Succession 1000 DTI/ PRI Prompt	Australia		Austria		Belgium		Denmark	
	Rx Code	Tx Code	Rx Code	Rx Code	Rx Code	Tx Code	Rx Code	Tx Code
ONP	1	0	6	4	3	5	4	6
DSET	3	6	7	2	4	6	5	6
OPX*	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
DTT	0	0	0	0	0	0	0	0
SDTT	0	0	0	0	0	0	0	0
DCO*	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
DTO	3	19	3	19	3	19	3	19
VNL	0	0	0	0	0	0	0	0
SATT	3	19	3	19	3	19	3	19
ACO	0	1	16	0	16	0	17	15
ATO	3	19	3	19	3	19	3	19
PRI	0	0	0	0	0	0	0	0
PRI2	0	0	0	0	0	0	0	0
XUT	0	1	16	0	16	0	17	15
XEM	19	1	19	1	19	1	19	1
BRIL	0	0	0	0	0	0	0	0
BRIT	0	0	0	0	0	0	0	0
WRLS	3	19	3	19	3	19	3	19

Note: * OPX and DCO do not apply for these countries. Press <cr> for these prompts.

Table 106
Succession 1000 Loss Values for Global Countries

	France		Germany		Greece		Italy	
Succession 1000 DTI/ PRI Prompt	**Rx Code**	**Tx Code**	**Rx Code**	**Rx Code**	**Rx Code**	**Tx Code**	**Rx Code**	**Tx Code**
ONP	2	5	2	4	3	5	4	6
DSET	0	4	8	7	0	7	6	7
OPX*	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
DTT	0	0	0	0	0	0	0	0
SDTT	0	0	0	0	0	0	0	0
DCO*	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
DTO	3	19	3	19	3	19	3	19
VNL	0	0	0	0	0	0	0	0
SATT	3	19	3	19	3	19	3	19
ACO	18	2	15	1	16	0	16	0
ATO	3	19	3	19	3	19	3	19
PRI	0	0	0	0	0	0	0	0
PRI2	0	0	0	0	0	0	0	0
XUT	18	2	15	1	16	0	16	0
XEM	19	1	20	0	19	1	19	1
BRIL	0	0	0	0	0	0	0	0
BRIT	0	0	0	0	0	0	0	0
WRLS	3	19	3	19	3	19	3	19

Note: * OPX and DCO do not apply for these countries. Press <cr> for these prompts.

Table 107
Succession 1000 Loss Values for Global Countries

Succession 1000 DTI/ PRI Prompt	Norway		Sweden		Switzerland		UK	
	Rx Code	Tx Code	Rx Code	Rx Code	Rx Code	Tx Code	Rx Code	Tx Code
ONP	5	6	14	3	3	3	6	5
DSET	4	7	7	7	7	4	3	4
OPX*	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
DTT	0	0	0	0	0	0	0	0
SDTT	0	0	0	0	0	0	0	0
DCO*	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
DTO	3	19	3	19	3	19	3	19
VNL	0	0	0	0	0	0	0	0
SATT	3	19	3	19	3	19	3	19
ACO	0	16	18	18	17	15	2	16
ATO	3	19	3	19	3	19	3	19
PRI	0	0	0	0	0	0	0	0
PRI2	0	0	0	0	0	0	0	0
XUT	0	16	18	18	17	15	2	16
XEM	16	16	19	1	19	1	2	16
BRIL	0	0	0	0	0	0	0	0
BRIT	0	0	0	0	0	0	0	0
WRLS	3	19	3	19	3	19	3	19

Note: * OPX and DCO do not apply for these countries. Press <cr> for these prompts.

Note: The DASS/DPNSS interface to Succession Media Gateway loss is adjusted by changing the PRI2 entry.

Table 108
Succession 1000 Loss Values for Global Countries

Succession 1000 DTI/PRI Prompt	New Zealand	
	Rx Code	**Tx Code**
ONP	16	1
DSET	4	6
OPX*	n/a	n/a
DTT	0	0
SDTT	0	0
DCO*	n/a	n/a
DTO	3	19
VNL	0	0
SATT	3	19
ACO	2	2
ATO	3	19
PRI	0	0
PRI2	0	0
XUT	2	2
XEM	0	3
BRIL	0	0
BRIT	0	0
WRLS	3	19

Note: * OPX and DCO do not apply for these countries. Press <cr> for these prompts.

Internet Telephone loss plan adjustment

Systems installed in the United Kingdom require the SLR of the Internet Telephone to be increased. For further details, refer to "Configure Loss Plan" in *IP Line: Description, Installation, and Operation* (553-3001-365).

Meridian 1, Succession 1000,
Succession 1000M

Transmission Parameters

Publication number: 553-3001-182
Document release: Standard 1.00
Date: October 2003
Produced in Canada