Transmission Parameters Reference
Avaya Communication Server 1000

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Contents

Chapter 1: New in this release

The following sections detail what's new in *Avaya Transmission Parameters Reference* (NN43001-282) for Avaya Communication Server 1000 (Avaya CS 1000) Release 7.6.

Features

There are no updates to the feature descriptions in this document.

Other changes

See the following sections for information about changes that are not feature-related:

Revision History

March 2013	Standard 06.01. This document is up-issued to support Communication Server 1000 Release 7.6.
August 2011	Standard 05.03. This document is up-issued to support the removal of content for outdated features, hardware, and system types.
November 2010	Standard 05.02. This document is up-issued to support Avaya Communication Server 1000 Release 7.5.
June 2010	Standard 04.01. This document is up-issued to support Avaya Communication Server 1000 Release 7.0.
May 2009	Standard 03.01. This document is up-issued to support Communication Server 1000 Release 6.0.
December 2007	Standard 02.01. Up-issued to support Communication Server 1000 Release 5.5.
November 2007	Standard 01.03. Up-issued to reflect changes in technical content. Countries of Croatia and Serbia are added to the table identifying CS 1000S Loss Values for Global Countries.
June 2007	Standard 01.02. Up-issued to remove the Avaya Networks Confidential statement.

May 2007	Standard 01.01. Up-issued to support Communication Server 1000 Release 5.0. This document contains information previously contained in the following legacy document, now retired: *Transmission Parameters , 553-3001-182*. No new content has been added for Communication Server Release 5.0. All references to Communication Server Release 4.5 are applicable to Communication Server 1000 Release 5.0.
July 2006	Standard 5.0. Up-issued to reflect changes addition of a Voice Gateway Media Card "loss values" table for Spain to the “Communication Server 1000S transmission parameters” chapter.
January 2006	Standard 4.00. Up-issued to reflect changes in the ACO loss values for New Zealand (Table 108) in the “Communication Server 1000S transmission parameters” chapter. A footnote was added to Table 108 regarding these ACO values.
August 2005	Standard 3.00. Up-issued to support Communication Server 1000 Release 4.5.
September 2004	Standard 2.00. Up-issued to support Communication Server 1000 Release 4.0.
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 "Communication Server 1000S Transmission Parameters" that was previously found in *Succession Communication Server for Enterprise 1000 Planning and Engineering , 553-3023-120* .

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Chapter 3: Introduction

This document is a global document. Contact your system supplier or your Avaya 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 document contains information about systems, components, and features that are compatible with Communication Server 1000. For more information on legacy products and releases, click the **Technical Documentation** link under **Support & Training** on the Avaya home page:

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Applicable systems

This document applies to the following systems:

- Communication Server 1000M Single Group (CS 1000M SG)
- Communication Server 1000M Multi Group (CS 1000M MG)
- Communication Server 1000E (CS 1000E)

System migration

When particular Meridian 1 systems are upgraded to run Avaya Communication Server 1000 (Avaya CS 1000) software and configured to include a Signaling Server, they become Avaya

CS 1000 systems. Table 1: Meridian 1 systems to CS 1000 systems on page 16 lists each Meridian 1 system that supports an upgrade path to a CS 1000 system.

Table 1: Meridian 1 systems to CS 1000 systems

This Meridian 1 system...	Maps to this CS 1000M system
Meridian 1 PBX 11C Chassis	CS 1000E
Meridian 1 PBX 11C Cabinet	CS 1000E
Meridian 1 PBX 61C	CS 1000M Single Group
Meridian 1 PBX 81C	CS 1000M Multi Group

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

- *Avaya CS 1000M and Meridian 1 Large System Upgrades Overview , NN43021-458*
- *Avaya Communication Server 1000E Upgrades, NN43041-458*

Intended audience

This document is intended for individuals responsible for the installation of systems in North American and non-North American locations.

Conventions

Terminology

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

- CS 1000E
- CS 1000M
- Meridian 1

The following systems are referred to generically as "Small System":

- Meridian 1 PBX 11C Chassis
- Meridian 1 PBX 11C Cabinet

The following systems are referred to generically as "Large System":

- CS 1000M SG
- CS 1000M MG
- Meridian 1 PBX 61C
- Meridian 1 PBX 81C

Related information

This section lists information sources that relate to this document.

Publications

The following publications are referenced in this document:

- *Avaya Features and Services Fundamentals, NN43001-106*
- *Avaya Software Input Output Administration , NN43001-611*
- *Avaya Signaling Server IP Line Applications Fundamentals, NN43001-125*
- *Avaya Software Input Output Reference - Maintenance, NN43001-711*

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Chapter 4: 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 Avaya 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.

Chapter 5: Transmission level adjustment

Contents

This section contains information on the following topics:

Introduction

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 Telephones
- 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 Telephones
- 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 On-premises Pad Switching (ONS) or Off-premises Pad Switching (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 configured 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 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) telephone. 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. Table 2: Off-premises line cards to Loss and Level Plan features on page 24 and Table 3: Line cards and Loss and Level Plan feature interactions on page 25 cross-reference line cards to Loss and Level Plan features and highlight their interactions. Table 2: Off-premises line cards to Loss and Level Plan features on page 24 cross-references the Off-premises line cards. Table 3: Line cards and Loss and Level Plan feature interactions on page 25 cross-references all other line cards to Loss and Level Plan features.

Table 2: Off-premises line cards to Loss and Level Plan features

	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.
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) telephone. 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 leve l 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.
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) telephone. 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 Table 11: Default and alternative conference pads on page 36 on Table 11: Default and alternative conference pads on page 36 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

Table 4: Cross-reference of transmission level adjustment features and markets on page 26 presents trunk transmission level adjustment features and markets. Table 5: Cross-reference of transmission level adjustment features and trunk cards on page 26 presents transmission level adjustment features and trunk cards.

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	Not applicable.	Not applicable.	Fixed card loss and pads on cards	Not applicable.

	Static Pad Download	Static Loss Plan Downloading	Dynamic Pad Switching	Dynamic Loss Switching
Trunks when NATP = YES			Pad switching is supported.	
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, 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, 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 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 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, for example., -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 (CO) or Public Exchange trunk interface to the same level as that of an analog (500/2500-type) telephone connected to the same trunk interface.

Chapter 6: 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 telephones 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. Present 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: Off-premises level adjustment matrix on page 30 shows the Off-premises level adjustment matrix.

In Table 6: Off-premises level adjustment matrix on page 30, 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 Class of Service designations are shown in the table below.

Table 7: LD 10 : Class of Service designation

Prompt	Response	Description
REQ	NEW CHG	Create or modify a data block
TYPE	500	Analog Line Unit
TN		Terminal Number
	l s c u	Format for Large System and Avaya Communication Server 1000E (Avaya CS 1000E) system, where l = loop, s = shelf, c = card, u = unit
CDEN	SD	Card Density. Must be Single Density (SD) for the OPS card.
...	...	...

Prompt	Response	Description
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.

Table 8: LD 10 : Class of Service designation

Prompt	Response	Description
REQ	NEW CHG	Create or modify a data block.
TYPE	500	Analog Line Unit
TN		Terminal Number
	l s c u	Format for Large System and CS 1000E system, where l = loop, s = shelf, c = card, u = unit
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).
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.

Prompt	Response	Description
		Note: If CLS is set to ONS, then BIMP must be set to 600.

When the XOPS is used in an 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 terminate on an analog (500/2500-type) telephone, 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 *Avaya Software Input Output Administration , NN43001-611* 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 51. For information regarding Alternative Loss Plan administration, refer to the section of this document titled Dynamic Pad Switching on page 41.

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 9: XOPS software and hardware settings cross-reference for NT1R20 XOPS on page 32 shows software and hardware settings required for various installations.

Table 9: 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

	On-premises station			Off-premises station			
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 9: XOPS software and hardware settings cross-reference for NT1R20 XOPS on page 32, 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 10: XOPS software and hardware settings cross-reference for the Chinese NTRA06 XOPS on page 33 shows software and hardware settings required for various installations.

Table 10: 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 10: XOPS software and hardware settings cross-reference for the Chinese NTRA06 XOPS on page 33, 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.

Chapter 7: 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. The alternative conference pads insert less loss (see Table 11: Default and alternative conference pads on page 36).

Avaya Communication Server 1000M (Avaya CS 1000M) Cabinets and Meridian 1 PBX 11C Cabinets use a different method of setting losses. They assume the North American Loss Plan or set 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 11: Default and alternative conference pads on page 36 lists the attenuation levels for different conferences.

Table 11: 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.

Table 12: LD 15 Customer Data Block

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 13: NT8D17 Loss insertion for conference connections on page 37 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 13: 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

Connection (A-B)	THREE PORTS		FOUR PORTS	
	Loss A - B (dB)	Loss B - A (dB)	Loss A - B (dB)	Loss B - A (dB)
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 14: NT8D17 attenuation level switch settings on page 38 cross-references switch settings to attenuation levels.

Table 14: 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 for operation. See Table 15: NT8D17 companding option settings on page 39.

Table 15: 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.

Table 16: LD 97 Configuration Record 2

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

Chapter 8: Dynamic Pad Switching

Contents

This section contains information on the following topics:

Introduction

On generic XFCOTs, the use of Dynamic Pad Switching (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, a number of different connections can be required within a single call. An example is an incoming trunk call. The trunk connects to the Tone and Digit Switch (TDS) to receive ringback 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
- Trunk Signaling
- XTRK type

The trunk data block Class of Service 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:

1. originator's pad state
2. 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 Avaya transmission specialist.

Table 17: XFCOT to XUT DPS matrix element mapping on page 44 shows how to configure an XFCOT to perform like an XUT from a loss point of view.

Table 17: 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 DPS 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 are:

- 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).

Table 18: LD 97 Configuration Record 2

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

Table 19: LD 14 Trunk Data Block

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

Prompt	Response	Description
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

Table 20: LD 15 Customer Data Block

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 DPS 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:

- NTRA02 XUTC
- NTRA03 XEMC
- NTRA04 XFALCC with Message Waiting
- NTRA05 XALCC without Message Waiting
- NTRA06 XOPSC Off-premises Station

Chapter 9: 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.

Chapter 10: 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 defined in LD 14

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

Table 21: B34 port types for all Loss Plans with the exception of China on page 52 lists the B34 port types for all Loss Plans with the exception of that for China. SLPD is not used in China.

Table 21: B34 port types for all Loss Plans with the exception of China

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 none of the above	ALL	TRC	T4WT
		ALL	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

TYPE (unit type)	SIGL (signaling)	XTRK	CLS	B34 Port Type
Analog Line Unit	Not Applicable	Not Applicable	SHL	ALUS
(500/2500)	Not Applicable	Not 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 24: Predefined Static Loss Plan Download tables on page 56 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 22: IPE cards transmission adjustment capabilities on page 54 for a brief summary on the versions and their transmission adjustment capabilities.

Table 22: 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 21: B34 port types for all Loss Plans with the exception of China on page 52 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 23: LD 97 code to Relative Input/Output Level on page 55 cross-references codes and Relative Input/Output Levels.

Table 23: LD 97 code to Relative Input/Output Level

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

		Lines		Trunks				Lines		Trunks	
Code	**Level (dBr)**	**Rx**	**Tx**	**Rx**	**Tx**	**Code**	**Level (dBr)**	**Rx**	**Tx**	**Rx**	**Tx**
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, that is, 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 24: Predefined Static Loss Plan Download tables on page 56.

Table 24: Predefined Static Loss Plan Download tables

	Table 1 Austria & 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

	Table 1 Austria & 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**

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 25: Predefined Static Loss Plan Download tables (continued)

	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 26: Predefined Static Loss Plan Download tables (continued)

	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 27: Predefined Static Loss Plan Download tables (continued)

	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

	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**
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 28: Predefined Static Loss Plan Download tables (continued)

	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	---	---	---	---	---	---	---	---	---	---

	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**
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 29: Predefined Static Loss Plan Download tables (continued)

	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

Table 30: Predefined Static Loss Plan Download tables (continued)

	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

Table 31: Predefined Static Loss Plan Download tables (continued)

	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

	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**
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

Table 32: 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

	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**
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.

The table below lists LD 10 prompts and responses.

Table 33: 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

The table below lists LD 97 prompts and responses that apply to the SLPD feature.

Table 34: LD 97 : SLPD prompts and responses

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

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	• Rx = Relative Input/Output Level code for the Receive (A/D) direction • Tx = Relative Input/Output Level code for the Transmit (D/A) direction
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

Prompt	Response		Description
	8-39	0-31	TIE 4-wire, CLS = TRC
T4WT	Rx	Tx	
	8-39	0-31	TIE 4-wire, CLS = NTC
T4WN	Rx	Tx	
	8-39	0-31	TIE 4-wire, CLS = VNL
T4WV	Rx	Tx	
	8-39	0-31	
PAGT	Tx		Paging trunk
	0-31		
RANR	Rx		RAN trunk
	8-39		Analog Line Card unit CLS = SHL
ALUS	Rx	Tx	
	0-31	8-39	Analog Line Card unit CLS = LOL
ALUL	Rx	Tx	
	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. Table 35: Cards and associated Countries: SLPD on page 65 lists cards and associated countries that can use SLPD.

Table 35: Cards and associated Countries: SLPD

Card Number	Card Type	Country
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

Card Number	Card Type	Country
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

Chapter 11: 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) telephone.

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. See Table 39: IPE trunk card transmission adjustment capabilities on page 72 for a list of IPE trunk cards and their transmission adjustment capabilities.

Static Loss Plan Download and Dynamic Loss Switching interworking

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 21: B34 port types for all Loss Plans with the exception of China on page 52, beginning on Table 21: B34 port types for all Loss Plans with the exception of China on page 52, in the chapter "Static Loss Plan Downloading".

Loss Plan selection

LD 97 enables the definition of Custom Loss Plan tables.

- The LD 97 table on Table 34: LD 97 : SLPD prompts and responses on page 63 cross-references predefined "BASE" (SLPD) Relative I/O Level codes to actual Relative I/O Levels.
- Table 36: Alternative Level (DLS) tables for New Zealand and Australia on page 70 cross-references the predefined "ALTERNATE" (DLS) Relative I/O Level codes in LD 97 to the actual Relative I/O Levels by country (New Zealand or Australia) and table number.
- Table 37: Alternative Level (DLS) tables for Italy on page 70 shows Base Level SLPD values for Italy.
- Table 42: LD 97 code to Relative Input/Output Level cross-reference on page 74 to 27, starting on Table 42: LD 97 code to Relative Input/Output Level cross-reference on page 74, show Base Level SLPD values for New Zealand, Australia, and China.

Note:

The Alternative Level (DLS) tables in Table 36: Alternative Level (DLS) tables for New Zealand and Australia on page 70 are not the same as the SLPD tables in Table 24: Predefined Static Loss Plan Download tables on page 56.

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) telephones. 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 36: Alternative Level (DLS) tables for New Zealand and Australia

	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
RANR	9	3.5	16	0.0	9	3.5	16	0.0

Table 37: Alternative Level (DLS) tables for Italy

	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

	Italy			
B34	TABLE 3			
Port Type	Rx	dBr	Tx	dBr
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 38: Alternative Level (DLS) table for China (systems with IPE only)

	TABLE 5			
B34 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. See Table 39: IPE trunk card transmission adjustment capabilities on page 72 for a brief summary of trunk card versions and transmission adjustment capabilities.

Table 39: 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 software

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 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 40: B34 port types for Chinese Loss Plan on page 72 for the Chinese Loss Plan B34 port types and Table 41: B34 port types for all other Loss Plans on page 73 for all other Loss Plan B34 port types.

Table 40: 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
TIE	EAM	ALL	TRC	T2WT
			NTC	T2WN

TYPE (unit type)	SIGL (signaling)	XTRK	CLS	B34 Port Type
			VNL	T2WV
	LDR	XDID, EXUT, XUT	TRC	T2WT
			NTC	T2WN
			VNL	T2WV
		none of the above	TRC	T4WT
			NTC	T4WN
			VNL	T4WV
	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, XEM	TRC	T4WT
			NTC	T4WN
			VNL	T4WV
		EXUT, XUT	TRC	T4WT
			NTC	T4WN
			VNL	T4WV
Analog Line Unit (500/2500)	Not applicable	Not applicable	Not applicable	Not applicable

Table 41: B34 port types for all other Loss Plans

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

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 42: LD 97 code to Relative Input/Output Level cross-reference on page 74 provides a cross-reference between codes and Relative Input/Output Levels.

Table 42: 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

Code	Level (dBr)	Rx	Tx		Code	Level (dBr)	Rx	Tx
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	Ã	Ã
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:

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.

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

Table 43: LD 97 : DLS prompts and responses

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.

Prompt	Response	Description
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
	(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
....	.....	....
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

Prompt	Response	Description
	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	
T4WV	RxTx	TIE 4-wire, CLS = VNL
	8-390-31	
PAGT	Tx	Paging trunk
	0-31	
...	...	...
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	COT short line
	8-390-31	
COTL	RxTx	COT long line
	8-390-31	
DIDS	RxTx	DID short line
	8-390-31	

Prompt	Response	Description
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	
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	
DIDS	RxTx	DID short line
	8-390-31	
DIDL	RxTx	DID long line
	8-390-31	
T2WT	RxTx	TIE 2-wire, CLS = TRC

Prompt	Response	Description
	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	
T4WV	RxTx	TIE 4-wire, CLS = VNL
	8-390-31	
PAGT	Tx	Paging trunk
	0-31	
RANR	Rx	RAN trunk
	8-39	

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

Table 44: LD 15 : Chinese LSCM prompts and responses

Prompt	Response	Description
REQ	CHG	Modify data block.
TYPE	CDB	...
CUST		Customer Number
	0-99	Range for Large System and Avaya Communication Server 1000E (Avaya CS 1000E) system
	0-31	Range for Media Gateway 1000B (Avaya MG 1000B)
...	...	...
APAD	X Y	Alternate PAD • X = Alternative Dynamic Pad Switching matrix identifier (0)-7 • 5 = China IPE matrix • Y = Alternative Conference Pads identifier (0)-7

Prompt	Response	Description
		• 0 = default (North American) • 1 = Alternative Conference Pads
...	...	....

Table 45: LD 73 : Define TOLT and TOLL pad levels prompts and responses

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
...	...	...
TOLT	Rx (0) Tx (0)	Toll Call Pad data on DTI2 card. Default values 0 dB Receive, 0 dB Transmit (Valid range 0 – 26, see Table 48: Pad code to pad value cross-reference on page 90)
TOLL	Rx (16) Tx (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 23: LD 97 code to Relative Input/Output Level on page 55 or Table 42: LD 97 code to Relative Input/Output Level cross-reference on page 74)

Hardware requirements

Dynamic Loss Switching requires the following cards:

Table 46: Cards and associated Countries: DLS

Card Number	Card Type	Country
NT5K02	XFALC with Message Waiting	Australia, New Zealand
NT5K17	XDDI	New Zealand
NT5K18	XCOT	New Zealand

Card Number	Card Type	Country
NT5K19	XFEM	New Zealand
NT5K82	XCOT	Australia
NT5K83	XFEM	Australia
NT5K84	XDDI	Australia
NTRA02	XUTC	China
NTRA03	XEMC	China
NTRA04	XFALCC with Message Waiting	China
NTRA05	XALCC without Message Waiting	China
NTRA06	XOPSC Off-premises Station	China

Chapter 12: 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 Intelligent Peripheral Equipment (IPE) packs. On certain 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

Chapter 13: 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
- 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 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

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 T1E 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:

- 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:

- 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
- DCT digital 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. Avaya Communication Server 1000 (Avaya CS 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 DTI or PRI channel. 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, that is, 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 47: Default 2.0 Mbit DTI/PRI pad category table on page 90 shows the default pad code to pad value cross-reference for Table 1.

Table 47: 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 48: Pad code to pad value cross-reference on page 90 cross-references pad codes and pad values.

Table 48: 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

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:

Table 49: LD 73 : Pad value definition prompts and responses

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 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
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 Avaya Software Input Output Administration for more information.

German 2.0 Mbit DTI/PRI settings

Table 50: German 2.0 Mbit DTI/PRI settings with GPRI package (167) on page 92 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 50: 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

Chapter 14: 1.5/2.0 Mbit Gateway

Contents

This section contains information on the following topics:

Introduction

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

Overview

This feature introduces 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:

- 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 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
- Port type (PTYP) designation in LD 16
- Trunk Signaling
- XTRK type

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

- Via Net Loss (VNL)
- Non-VNL: 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 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 loss of less than 2 dB — 2-wire non-VNL trunk facility without impedance compensation

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.

The following sections list 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, 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 applicatio

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, 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

In LD 14, you can assign a pad category table when you add (NEW) or modify (CHG) a trunk. In LD 73, you can change the receive (Rx) and transmit (Tx) pad codes for different port types for all tables, except TABLE 1. Pad code values are in the range 0-26. Table 51: Pad code to pad value cross-reference on page 99 cross-references pad codes (0-26) to pad values.

Table 51: 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.

Table 52: LD 73 : Pad value definition prompts and responses for 1.5 Mbit DTI and PRI

Prompt	Response	Description
REQ	NEW CHG	NEW = Add a data block. CHG = Modify a data block.
TYPE	DTI PRI	DTI = 1.5 Mbit Digital Trunk Interface PRI = 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

Prompt	Response	Description
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
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

Table 53: LD 73 : Pad value definition prompts and responses for 2 Mbit DTI and PRI

Prompt	Response	Description
REQ	NEW	NEW = Add a data block.
	CHG	CHG = Modify a data block.
TYPE	DTI	DTI = 1.5 Mbit Digital Trunk Interface
	PRI	PRI = 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).
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

Prompt	Response	Description
DSET	Rx Tx	Digital Telephone
BRIL	Rx Tx	Basic Rate Interface Line application
BRIT	Rx Tx	Basic Rate Interface Trunk application

Table 54: 2.0 Mbit DTI/PRI pad category table defaults on page 101 and Table 55: 1.5 Mbit DTI/PRI pad category table defaults on page 101 show the Table 1 default pad settings for 2.0 Mbit DTI/PRI and 1.5 Mbit DTI/PRI.

Table 54: 2.0 Mbit DTI/PRI pad category table defaults

	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

Table 55: 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

	Table 1			
Port Type	**Rx code**	**Rx PAD (dB)**	**Tx code**	**Rx PAD (dB)**
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 German 2.0 Mbit DTI/PRI settings.

Chapter 15: 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 56: Port type determination for BRIL connections on page 104 shows port type determination, and Table 57: Switched losses for BRIL connections on page 104 shows the switched losses for BRIL connections.

Table 56: Port type determination for BRIL connections

2.0 Mbit DTI/ PRI	Trunk Type	LD 16 PTYP	XTRK	DATA CALL	Port Type
YES					2.0 Mbit DTI/PRI
NO	COT, DID, FEX, WAT	ACO			ACO
		ATO	YES		ATO
		none of the above			IPE
			NO	YES	DATA
				NO	OTHER
	none of the above		YES		IPE
			NO	YES	DATA
				NO	OTHER

Table 57: 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
- Port type (PTYP) designation in LD 16
- Trunk Signaling
- XTRK type

The trunk data block Class of Service 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 T1E trunks UK LINK setting

TRC (Transmission Compensated) — transmission lines with

compensation, low loss Pad in (pad applied) Applies to EAM, EM4 and WR4 T1E trunks UK T1E 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 58: Pad code to pad value cross-reference on page 107 cross-references pad codes to their respective loss values.

Table 58: 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:

Table 59: LD 73 : Pad value definition prompts and responses

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
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)

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

Table 60: Default BRIT pad category table on page 108 shows the default pad code settings for BRIT.

Table 60: 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

Chapter 16: 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) telephone 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):

Table 61: LD 97 Relative Input/Output levels

Prompt	Response	Description
REQ	CHG	Modify data block.
TYPE	SYSP	System Parameters

Prompt	Response	Description
INTN	YES NO	YES = IPE is using A-law companding NO = IPE is using µ-Law companding

For the system: LD 17

Table 62: 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 63: Receive and transmit transmission parameters (North America) on page 111 shows the values entered for LD 17 prompts ROLR and TOLR and the associated loudness rating for North America.

Table 63: Receive and transmit transmission parameters (North America)

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

Value for prompt ROLR or TOLR in LD17	ROLR	TOLR
	— — — — — — —	

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 64: Handset receive and transmit international transmission parameters on page 112 and Table 65: Handset receive and transmit international transmission parameters on page 113 list international software Handset receive (ROLR) and transmit (TOLR) values. In addition, separate definitions for Handsfree receive (HRLR) and transmit (HTLR) objective ratings are possible. Refer to Table 66: Handsfree receive and transmit international transmission parameters on page 113 and Table 67: Handsfree receive and transmit international transmission parameters on page 114 for the HRLR and HTLR settings.

Table 64: 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 01 02 03 04	0.00 0.85 1.70	0.0 0.5 0.5 1.0	45.00 45.85	- 45.00 - 44.50 -
05 06 07 08 09	2.55 3.40 4.25	1.5 2.0 2.0 2.5	46.70 47.55	44.50 - 44.00 -
10 11 12 13 14	5.10 5.95 6.80	3.0 3.5 3.5 4.0	48.40 49.25	43.50 - 43.00 -
15 16 17 18 19	7.65 8.50 9.35	4.5 5.0 5.0 5.5	50.10 50.95	43.00 - 42.50 -
20 21 22 23 24	10.20	6.0 6.5 6.5 7.0	51.80 52.65	42.00 - 41.50 -
25 26 27 28 29	— — — — — —	7.5 8.0 8.0 8.5	53.50 54.35	41.50 - 41.00 -
30 31	— — — — — —	9.0 9.5 9.5 10.0	55.20	40.50 - 40.00 -

Quieter				
LD 17 value	Change from nominal		LD 22 output	
#	ROLR (dB)	TOLR (dB)	ROLR (dB)	TOLR (dB)
	— — — — — — —	10.5 11.0 11.0 11.5	— — — — — — — — — — — — — — — — — — —	40.00 - 39.50 - 39.00 - 38.50 - 38.50 - 38.00 - 37.50 - 37.00 - 37.00 - 36.50 - 36.00 - 35.50 - 35.50 - 35.00 - 34.50 - 34.00 - 34.00 - 33.50

Table 65: 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 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63	0.00 0.85 1.70 2.55 3.40 4.25 5.10 5.95 6.80 7.65 8.50 9.35 10.20 11.05 11.90 12.75 13.60 14.45 15.30 — — — — — — — — — — — — —	0.0 0.5 1.0 1.0 1.5 2.0 2.5 2.5 3.0 3.5 4.0 4.0 4.5 5.0 5.5 5.5 6.0 6.5 7.0 7.0 7.5 8.0 8.5 8.5 9.0 9.5 10.0 10.0 10.5 11.0 11.5 11.5	45.00 44.15 43.30 42.45 41.60 40.75 39.90 39.05 38.20 37.35 36.50 35.65 34.80 33.95 33.10 32.25 31.40 30.55 29.70 — — — — — — — — — — — — —	- 45.00 - 45.50 - 46.00 - 46.00 - 46.50 - 47.00 - 47.50 - 47.50 - 48.00 - 48.50 - 49.00 - 49.00 - 49.50 - 50.00 - 50.50 - 50.50 - 51.00 - 51.50 - 52.00 - 52.00 - 52.50 - 53.00 - 53.50 - 53.50 - 54.00 - 54.50 - 55.00 - 55.00 - 55.50 - 56.00 - 56.50 - 56.50

Table 66: 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 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	0.00 0.85 1.70 2.55 3.40 4.25 5.10 5.95 6.80 — — — — — — — — — — — —	0.0 0.5 0.5 1.0 1.5 2.0 2.0 2.5 3.0 3.5 3.5 4.0 — — — — — — — — — — — —	42.00 42.85 43.70 44.56 45.40 46.25 47.10 47.95 48.80 — — — — — —	- 44.00 - 43.50 - 43.50 - 43.00 - 42.50 - 42.00 - 42.00 - 41.50 - 41.00 - 40.50 - 40.50 - 40.00

Quieter				
LD 17 value	Change from nominal		LD 22 output	
#	HRLR (dB)	HTLR (dB)	HRLR (dB)	HTLR (dB)
25 26 27 28 29 30 31	— — — — — — — — — — — —	— — — — — — — — —	— — — — — — — — — — — — — — — — — — —	— —

Table 67: 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 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63	0.00 0.85 1.70 2.55 3.40 4.25 5.10 5.95 6.80 —	0.0 0.5 1.0 1.0 1.5 2.0 2.5 2.5 3.0 3.5 4.0 4.0 4.5 5.0 5.5 5.5 6.0 6.5 7.0 7.0 7.5 8.0 8.5 — — — — — — — — —	42.00 41.15 40.30 39.45 38.60 37.75 36.90 36.05 35.20 —	- 44.00 - 44.50 - 45.00 - 45.00 - 45.50 - 46.00 - 46.50 - 46.50 - 47.00 - 47.50 - 48.00 - 48.00 - 48.50 - 49.00 - 49.50 - 49.50 - 50.00 - 50.50 - 51.00 - 51.00 - 51.50 - 52.00 - 52.50 — — — — — — — — — —

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 Sidetone objective loudness rating (SOLR) is a measure of the loss of sidetone.

Administration

The recommended North American SOLR value is 12 dB. Table 68: Acceptable SOLR values on page 115 lists the values accepted for LD 17 prompt SOLR.

Table 68: 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

Use LD 17 to configure Automatic Gain Control.

Table 69: LD 17 : Configure Automatic Gain Control settings.

Prompt	Response	Description
REQ	NEW CHG	Create or modify a data block.

Prompt	Response	Description
TYPE	CFN	Configuration
...	...	...
ATRN	YES	Aries Transmission
AGCD	YES NO	Yes = Automatic Gain Control disabled for all telephones No = Automatic Gain Control enabled for all telephones

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

Use LD 17 to configure Handset Volume Reset.

Table 70: LD 17 : Configure Handset Volume Reset

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 telephones. No = Handset volume reset disabled for all telephones.

Country-specific settings

Following are the mandatory settings for different countries:

Table 71: Country-specific Meridian Modular Telephone settings

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

Country	CODE	SOLR	ROLR	TOLR	AGCD	VOLR	HRLR	HTLR
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
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
Switzerland	2	1	36	41	Y	Y	4	54
UK	2	0	6	63	Y	Y	0	0

Chapter 17: 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
- various common equipment modules or shelves

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

IPE 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

Table 72: Frequency response : A-Law on page 120 through Table 86: Discrimination against out-of-band signals : A-Law on page 128 beginning on Table 72: Frequency response : A-Law on page 120 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 72: Frequency response : A-Law on page 120 shows the minimum and maximum loss differences at significant frequency breakpoints for 2-wire and 4-wire interfaces.

Table 72: Frequency response : A-Law

	2-wire interface (dB)		4-wire interface (dB)	
Frequency (Hz)	Minimum	Maximum	Minimum	Maximum
200	0.0	+5.0	0.0	+3.0
300	–0.5	+1.0	–0.3	+0.3

	2-wire interface (dB)		4-wire interface (dB)	
Frequency (Hz)	**Minimum**	**Maximum**	**Minimum**	**Maximum**
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 73: Overload level : A-Law on page 121 shows the overload levels in both the receive and the transmit directions.

Table 73: Overload level : A-Law

	Overload level (dBm)	
Type of circuit	**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 74: Tracking error (gain variation with level) : A-Law on page 122, 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 74: 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.

Note:

The minimum ERL in any telephone connection, including analog trunks, digital trunks, or both, is 6 dB.

Table 75: Return loss : in-service parameter values : A-Law on page 122 shows return losses guidelines to satisfy the in-service requirements shown in Table 76: Return loss : in-service attenuation : A-Law on page 123. 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 75: Return loss : in-service parameter values : A-Law

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
2-wire trunk interfaces:			

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

Note:

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

Note:

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

Note:

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

Note:

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

Note:

The design requirements in this table are intended to ensure the satisfaction of the in-service requirements in Table 76: Return loss : in-service attenuation : A-Law on page 123.

Table 76: Return loss : in-service attenuation : A-Law

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
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 + 2.16ÊµF 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)	Telephone off-hook	> 12	> 8	1, 4

Connection from 4-wire VNL tie trunk to:	Circuit termination	Echo return loss	Single-frequency return loss	Notes
Note: Reference impedance is 600/900 ¾ + 2.16 µF. **Note:** Reference impedance is 900 ¾ + 2.16 µF. **Note:** Switchable pads set for nominal loss of 1 dB. **Note:** Switchable pads set for nominal loss of 3 dB. **Note:** 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 77: Idle channel noise : A-Law on page 124:

- 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 77: 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 78: Longitudinal balance : A-Law on page 125, 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 78: 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 3200ÊHz at 0 dBm0, are listed in Table 79: Crosstalk : A-Law on page 125.

Table 79: 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 80: Quantization distortion : A-Law on page 126, 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 80: 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 81: Relative envelope delay : A-Law on page 126 indicate the relative envelope delay for the frequency ranges shown.

Table 81: Relative envelope delay : A-Law

Bandwidth (Hz)	Relative envelope delay (µs)	
	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

Bandwidth (Hz)	Relative envelope delay (µs)	
	Line-line	Line to trunk/ trunk to line/ trunk to trunk
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 82: Impulse noise : A-Law on page 127. 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 82: Impulse noise : A-Law

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

Echo path delay

Echo path delay, as shown in Table 83: Echo path delay : A-Law on page 127, is the maximum round-trip port-to-port delay for all frequencies in the 200–3400 Hz range.

Table 83: Echo path delay : A-Law

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

Spurious in-band

Table 84: Spurious in-band image signals : A-Law on page 128 specifies the image signal level required for in-band frequencies as measured selectively at the output port.

Table 84: 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 85: Spurious out-of-band image signals : A-Law on page 128 specifies the image signal level required for out-of-band frequencies as measured selectively at the output port.

Table 85: 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 86: Discrimination against out-of-band signals : A-Law on page 128 specifies the image signal level required for the designated input signals as measured at the output port.

Table 86: 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

Chapter 18: Transmission characteristics : µ-Law

Contents

This section contains information on the following topics:

Introduction

This chapter summarizes transmission characteristics for IPE. See Table 87: Frequency response : µ-Law on page 130 to Table 100: Echo path delay : µ-Law on page 139.

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 87: Frequency response : µ-Law on page 130 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 87: Frequency response : µ-Law

Frequency (Hz)	Frequency response (dB)			
	Station to station/ station to 2-wire		4-wire to 4-wire	
	Maximum	Minimum	Maximum	Minimum
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 88: Overload level : µ-Law on page 131 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 88: 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 89: Tracking error (gain variation with level) : µ-Law on page 131, 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 89: 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 90: Return loss : design parameter values : µ-Law on page 132 shows the return loss needed to satisfy the in-service parameter values shown in Table 91: Return loss : in-service parameter values : µ-Law on page 132. 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 90: 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 91: 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

Connection from 4-wire VNL tie trunk to:	Circuit termination	Echo return loss (dB)	Single-frequency return loss (dB)	Notes
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:

Reference impedance is 600 ¾.

Note:

Reference impedance is 900 ¾.

Note:

Nominal trunk to trunk loss is 0 dB.

Note:

Nominal trunk to trunk loss is 0.5 dB.

Note:

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 Table 90: Return loss : design parameter values : µ-Law on page 132 and Table 91: Return loss : in-service parameter values : µ-Law on page 132 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 92: Trans-hybrid loss : µ-Law on page 134, a three-element compromise impedance network is used in 2-wire analog trunk ports to balance the impedance of the trunk (see Figure 1: Compromise impedance network on page 134).

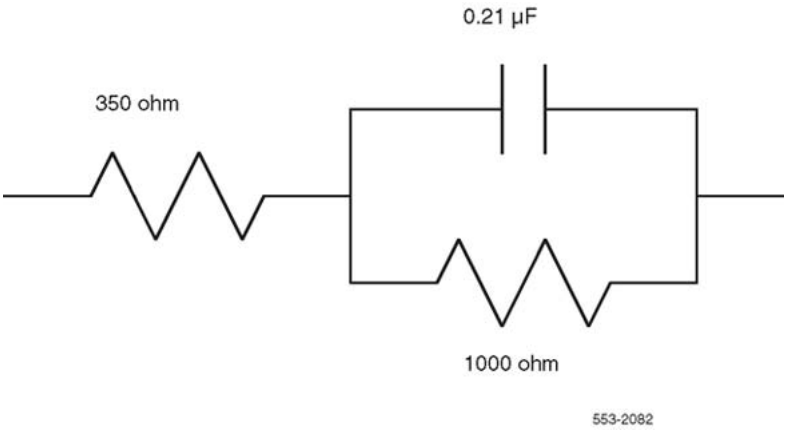

Figure 1: Compromise impedance network

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: Compromise impedance network on page 134 (for 2-wire trunks). Table 92: Trans-hybrid loss : µ-Law on page 134 gives the minimum trans-hybrid loss over the indicated frequency ranges for input signals at the 4-wire port.

Table 92: Trans-hybrid loss : µ-Law

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

Input impedance

Input impedance (see Table 91: Return loss : in-service parameter values : µ-Law on page 132) 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 93: Input impedance : µ-Law on page 135 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 93: 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 94: Idle channel noise : µ-Law on page 135.

- 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 94: 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 95: Longitudinal balance : µ-Law on page 136, 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 95: 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 3200ÊHz at 0 dBm0, are listed in Table 96: Crosstalk : µ-Law on page 136.

Table 96: 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 97: Quantization distortion : µ-Law on page 137 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 97: 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 98: Intermodulation distortion : µ-Law on page 138) 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 98: 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 99: Relative envelope delay : µ-Law on page 138 indicate the relative envelope delay for the frequency ranges shown.

Table 99: Relative envelope delay : µ-Law

Bandwidth (Hz)	Relative envelope delay (µs)	
	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 100: Echo path delay : µ-Law on page 139).

Table 100: Echo path delay : µ-Law

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

Chapter 19: 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 1020ÊHz 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 and analog and digital ports are connection-specific to be compatible with end-to-end network connection loss requirements. The Avaya Communication Server 1000 (Avaya CS 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 and M trunks or with loop dial repeater (LDR) trunks.

  - IPE LDR tie trunks utilize a Loss Plan compatible with industry standards for tie 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 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.

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 101: Electrical loss : IPE ports to IPE ports on page 145 (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 102: Electrical loss : digital ports to IPE ports on page 147 (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, Table 101: Electrical loss : IPE ports to IPE ports on page 145 through Table 103: Electrical loss : digital port to digital ports on page 148 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

Table 101: Electrical loss : IPE ports to IPE ports on page 145 through Table 103: Electrical loss : digital port to digital ports on page 148 provide loss values measured in decibels (dB), for connections between IPE ports (line and analog trunk ports) and digital ports (PRI or DTI ports)), as noted here:

	IPE ports	Digital ports
IPE ports	Table 101: Electrical loss : IPE ports to IPE ports on page 145	
Digital ports	Table 102: Electrical loss : digital ports to IPE ports on page 147	Table 103: Electrical loss : digital port to digital ports on page 148

The complete loss values for the class-of-service options (VNL, TRC, NTC) are presented in Table 101: Electrical loss : IPE ports to IPE ports on page 145 through Table 103: Electrical loss : digital port to digital ports on page 148 beginning on Table 101: Electrical loss : IPE ports to IPE ports on page 145. 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 Table 101: Electrical loss : IPE ports to IPE ports on page 145 through Table 103: Electrical loss : digital port to digital ports on page 148.

Note:

The losses presented in Table 101: Electrical loss : IPE ports to IPE ports on page 145 through Table 103: Electrical loss : digital port to digital ports on page 148 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:

The toll office values in Table 101: Electrical loss : IPE ports to IPE ports on page 145 through Table 103: Electrical loss : digital port to digital ports on page 148 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).

Table 101: Electrical loss : IPE ports to IPE ports on page 145 through Table 103: Electrical loss : digital port to digital ports on page 148 show the Loss Plan for line and trunk IPE port connections.

Table 101: Electrical loss : IPE ports to IPE ports

		IPE port (COS)	Analog station	Analog off-prem station	Digital telephone	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 station		→	1.5	1					
	ONS	←	1.5	1	—	—	—	—	—
Digital telephone		→	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* (NTC)		→	1	0.5	0.5	–2.5	1		
	A/TT	←	3	2.5	–0.5	–0.5	1	—	—
2W E&M tie* (TRC)		→	1	0.5	0.5	–2.5	1	1	
	A/TT	←	3	2.5	–0.5	–0.5	1	1	—
4W E&M tie* (VNL)		→	3.5	3	3	–3	0.5	0.5	0
	A/TT	←	2.5	2	–1	–1	0.5	0.5	0
LDR tie (NTC)		→	0.5	0	0	–6	0.5	0.5	0
	A/TT	←	0.5	0	–3	–3	1.5	0.5	0
LDR tie (TRC)		→	0.5	0	0	–6	0.5	0.5	0
	A/TT	←	0.5	0	–3	–3	0.5	0.5	0
LDR tie (VNL)		→	0.5	0	0	–6	0.5	0.5	0

		IPE port (COS)	Analog station	Analog off-prem station	Digital telephone	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**
	A/TT	←	0.5	0	–3	–3	0.5	0.5	0
CO/FX/WATS (NTC)		→	0.5	0	0	–6	0.5	0.5	3
	A/CO	←	0.5	0	–3	–3	1.5	0.5	1
CO/FX/WATS (TRC)		→	0.5	0	0	–6	0.5	0.5	0
	A/CO	←	0.5	0	–3	–3	0.5	0.5	0
Toll office (VNL)		→	4.5	4	4	1	3.5	3.5	0
	A/TO	←	4.5	4	1	4	4.5	1.5	0
IPE port			↑ ↓	↑ ↓	↑ ↓	↑ ↓	↑ ↓	↑ ↓	
Analog station		→							
	ONS	←	—	—	—	—	—	—	
Analog off-prem station		→							
	ONS	←	—	—	—	—	—	—	
Digital telephone		→							
	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 (NTC)		→	1						
	A/TT	←	1	—	—	—	—	—	
LDR tie (TRC)		→	1	1					

		IPE port (COS)	Analog station	Analog off-prem station	Digital telephone	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**
	A/TT	←	1	1	—	—	—	—	
LDR tie (VNL)		→	1	1	1				
	A/TT	←	1	1	1	—	—	—	
CO/FX/WATS (NTC)		→	1	1	1	1			
	A/CO	←	1	1	1	1	—	—	
CO/FX/WATS (TRC)		→	1	1	1	1	1		
	A/CO	←	1	1	1	1	1	—	
Toll office (VNL)		→	1	1	1	1	1	1	
	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 102: Electrical loss : digital ports to IPE ports

	IPE port (COS)		Analog (500/2500-type) telephone	Analog OPS	Digital telephone	ISDN terminal	E&M tie*	Satellite tie*	CO/FX/WATS	Toll office
	Class**		**ONS**	**OPS**	**D/ONS**	**ICS**	**A/TT**	**S/ATT**	**A/CO**	**A/TO**
Digital port			↑ ↓		↑ ↓	↑ ↓	↑ ↓	↑ ↓	↑ ↓	↑ ↓
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

	IPE port (COS)		Analog (500/2500-type) telephone	Analog OPS	Digital telephone	ISDN terminal	E&M tie*	Satellite tie*	CO/FX/WATS	Toll office
	Class**		ONS	OPS	D/ONS	ICS	A/TT	S/ATT	A/CO	A/TO
	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 103: Electrical loss : digital port to digital ports

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

	Digital port (COS)		Tie	Satellite tie	CO/FX/ WATS	Toll office	Primary rate interface
	Class*		D/TT	S/DTT	D/CO	D/TO	IST
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 104: Insert loss tolerance on page 149 shows the loss tolerance for all of the connections in Table 101: Electrical loss : IPE ports to IPE ports on page 145 through Table 103: Electrical loss : digital port to digital ports on page 148.

Table 104: 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 105: Loss insertion for conference connections on page 150 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 105: 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

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 104: Insert loss tolerance on page 149.

Chapter 20: 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) telephones. Note that the North American loss and level plan assumes trunk losses of 3 to 4 dB to the CO.

Contact your Avaya 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 108: Receive and transmit transmission parameters (North America) on page 154 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 +50ÊdB, 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 6ÊdB less loss and, consequently, the receive path is louder.
- If the TOLR changes from –45 dB to –50 dB, there is 5ÊdB less loss and, consequently, the transmit path is louder.
- If the TOLR changes from –45 dB to –40 dB, there is 5ÊdB 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 106: Handset receive and transmit transmission parameters (international) on page 152. In addition, separate Handsfree receive (HRLR) and Handsfree transmit (HTLR) objective ratings can be defined. See Table 107: Handsfree receive and transmit transmission parameters (international) on page 153.

Table 106: Handset receive and transmit transmission parameters (international)

Quieter					Louder				
LD17value	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 01	0.00	0.0 0.5	+45.00	–45.00	32 33	0.00	0.0 0.5	+45.00	–45.00
02 03	0.85	0.5 1.0	+45.85	–44.50	34 35	0.85	1.0 1.0	+44.15	–45.50
04 05	1.70	1.5 2.0	+46.70	–44.50	36 37	1.70	1.5 2.0	+43.30	–46.00
06 07	2.55	2.0 2.5	+47.55	–44.00	38 39	2.55	2.5 2.5	+42.45	–46.00
08 09	3.40	3.0 3.5	+48.40	–43.50	40 41	3.40	3.0 3.5	+41.60	–46.50

Quieter					Louder				
LD17value	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
10 11	4.25	3.5 4.0	+49.25	–43.00	42 43	4.25	4.0 4.0	+40.75	–47.00
12 13	5.10	4.5 5.0	+50.10	–43.00	44 45	5.10	4.5 5.0	+39.90	–47.50
14 15	5.95	5.0 5.5	+50.95	–42.50	46 47	5.95	5.5 5.5	+39.05	–47.50
16 17	6.80	6.0 6.5	+51.80	–42.00	48 49	6.80	6.0 6.5	+38.20	–48.00
18 19	7.65	6.5 7.0	+52.65	–41.50	50 51	7.65	7.0 7.0	+37.35	–48.50
20 21	8.50	7.5 8.0	+53.50	–41.50	52 53	8.50	7.5 8.0	+36.50	–49.00
22 23	9.35	8.0 8.5	+54.35	–41.00	54 55	9.35	8.5 8.5	+35.65	–49.00
24 25	10.20	9.0 9.5	+55.20	–40.50	56 57	10.20	9.0 9.5	+34.80	–49.50
26 27		9.5		–40.00	58 59	11.05	10.0	+33.95	–50.00
28 29		10.0		–40.00	60 61	11.90	10.0	+33.10	–50.50
30 31		10.5		–39.50	62 63	12.75	10.5	+32.25	–50.50
		11.0		–39.00		13.60	11.0	+31.40	–51.00
		11.0		–38.50		14.45	11.5	+30.55	–51.50
		11.5		–38.50		15.30	11.5	+29.70	–52.00
				–38.00					–52.00
				–37.50					–52.50
				–37.00					–53.00
				–37.00					–53.50
				–36.50					–53.50
				–36.00					–54.00
				–35.50					–54.50
				–35.50					–55.00
				–35.00					–55.00
				–34.50					–55.50
				–34.00					–56.00
				–34.00					–56.50
				–33.50					–56.50

Table 107: 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 01	0.00	0.0 0.5	+42.00	–44.00	32 33	0.00	0.0	+42.00	–44.00
02 03	0.85	0.5 1.0	+42.85	–43.50	34 35	0.85	0.5	+41.15	–44.50
04 05	1.70	1.5 2.0	+43.70	–43.50	36 37	1.70	1.0	+40.30	–45.00

06 07	2.55	2.0 2.5	+44.56	–43.00	38 39	2.55	1.0	+39.45	–45.00
08 09	3.40	3.0 3.5	+45.40	–42.50	40 41	3.40	1.5	+38.60	–45.50
10 11	4.25	3.5 4.0	+46.25	–42.00	42 43	4.25	2.0	+37.75	–46.00
12 13	5.10		+47.10	–42.00	44 45	5.10	2.5	+36.90	–46.50
14 15	5.95		+47.95	–41.50	46 47	5.95	2.5	+36.05	–46.50
16 17	6.80		+48.80	–41.00	48 49	6.80	3.0	+35.20	–47.00
18 19				–40.50	50 51		3.5		–47.50
20 21				–40.50	52 53		4.0		–48.00
22 23				–40.00	54 55		4.0		–48.00
24 25					56 57		4.5		–48.50
26 27					58 59		5.0		–49.00
28 29					60 61		5.5		–49.50
30 31					62 63		5.5		–49.50
							6.0		–50.00
							6.5		–50.50
							7.0		–51.00
							7.0		–51.00
							7.5		–51.50
							8.0		–52.00
							8.5		–52.50

Table 108: Receive and transmit transmission parameters (North America)

Value for prompt ROLR or TOLR in LD 17	ROLR	TOLR
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16–31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50–52 53 54–63	+45.00 +45.85 +46.70 +47.55 +48.40 +49.25 +50.10 +50.95 +51.80 +52.65 +53.50 +54.35 +55.20 +56.05 +56.90 +57.75 — +45.00 +44.15 +43.30 +42.45 +41.60 +40.75 +39.90 +39.05 — — — — — — — — — — — — — — —	–45.00 –44.50 –44.50 –44.00 –43.50 –43.00 –43.00 –42.50 –42.00 –41.50 –41.50 — — — — — — – 45.00 –45.50 –46.00 –46.00 –46.50 –47.00 –47.50 –47.50 –48.00 –48.50 –49.00 –49.00 –49.50 –50.00 –50.50 –50.50 –51.00 –51.50 –52.00 –53.00 —

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 109: Acceptable SOLR values on page 155 lists the values accepted for LD 17 prompt SOLR.

Table 109: 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.

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