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DIGITAL
WAN Modular Interface ST

DELST-UI
Local Management Guide

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DELST-UI
Local Management Guide

Part Number: 9032645

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Manufacturer's Name:	**Cabletron Systems, Inc.**
Manufacturer's Address:	**35 Industrial Way** **PO Box 5005** **Rochester, NH 03867**
European Representative Name:	**Mr. J. Solari**
European Representative Address:	**Cabletron Systems Limited** **Nexus House, Newbury Business Park** **London Road, Newbury** **Berkshire RG13 2PZ, England**
Conformance to Directive(s)/Product Standards:	**EC Directive 89/336/EEC** **EC Directive 73/23/EEC** **EN 55022** **EN 50082-1** **EN 60950**
Equipment Type/Environment:	**Networking Equipment, for use in a Commercial or Light Industrial Environment.**

We the undersigned, hereby declare, under our sole responsibility, that the equipment packaged with this notice conforms to the above directives.

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PREFACE

Welcome to the **DELST-UI Local Management Guide**. This manual explains how to manage and set up the DELST-UI.

The DELST-UI resides in and provides connectivity and functionality to Wide Area Network (WAN) devices such as the DELHW-UA. The DELST-UI supports ISDN BRI in a back-up, or fail-over capacity. See Chapter 1 for more detailed information on the DELST-UI capabilities.

In this document, the DELST-UI is also referred to as a WPIM (WAN Physical Interface Module).

The device or module in which the DELST-UI is to be installed may be referred to as the host platform in this document.

USING THIS MANUAL

Reading through this manual completely will familiarize you with its content and allow you to gain an understanding of the features and capabilities of the DELST-UI. You should have a general working knowledge of the following data communications networks and their physical layer components before using the DELST-UI:

- WAN
- Ethernet and IEEE 802.3

STRUCTURE OF THIS GUIDE

The following list briefly explains each chapter of the DELST-UI manual:

Chapter 1, **Introduction**, describes DELST-UI features, performance, and the protocols that the DELST-UI supports.

Chapter 2, **Setup and Installation**, directs the user to appropriate documentation in order to install the DELST-UI, and describes the jumper settings and cable setup.

Chapter 3, **Local Management**, describes how to manage the DELST-UI.

Appendix A, **Specifications**, provides information on physical properties, environmental requirements, regulatory compliance, pinouts and LED definitions.

Appendix B, **FCC Part 68 - User's Information**, explains the FCC Rules for the DELST-UI.

Appendix C, **WAN Terms and Acronyms**, provides a brief glossary of some of the terms used in this book, and others used in Wide Area Networking.

RELATED MANUALS

The following manuals may help the user to set up and manage the DELST-UI:

DIGITAL WAN Modular Interface DELHW-UA QuickSET Configuration Guide

DIGITAL WAN Modular Interface DLEHW-UA Local Management Guide

DIGITAL WAN Modular Interface DELHW-UA User's Guide

The manuals referenced above can be obtained on the World Wide Web in Adobe Acrobat Portable Document Format (PDF) at the following site:

http://www.networks.digital.com

The above WAN manuals may be found on the QuickSET CD included with the devices.

DOCUMENT CONVENTIONS

The following conventions are used throughout this document:

Note symbol. Calls the reader's attention to any item of information that may be of special importance.

Caution symbol. Contains information essential to avoid damage to the equipment.

Electrical Hazard Warning symbol. Warns against an action that could result in personal injury or death due to an electrical hazard.

bold type	Denotes either a user input or a highlighted screen selection.
RETURN	Indicates the RETURN or ENTER key, depends on the keyboard.
ESC	Indicates the keyboard Escape key.
SPACE bar	Indicates the keyboard space bar key.
BACKSPACE	Indicates the keyboard backspace key.
arrow keys	Refers to the four keyboard arrow keys.
[-]	Indicates the keyboard – key.
DEL	Indicates the keyboard delete key.
italic type	Emphasizes important information, indicates variables, indicates complete document titles, and indicates the first use of a term described in the glossary.
n.nn	Signals the decimal point indicator. (e.g., 1.75 equals one and three fourths, or Decimal Dotted Notation (DDN) for an IP address.
x	Indicates the generic use of a letter. (e.g., *xxx* indicates any combination of three alphabetic characters.)
n	Indicates the generic use of a number. (e.g., 19*nn* indicates a four-digit number in which the last two digits are unknown.)
[]	Indicates (in the Local Management screens) that a value may be entered or selected. In the format descriptions in the Network Tools section, required arguments are enclosed in [].
<>	In the format descriptions in the Network Tools section, denotes that optional arguments are enclosed in <>.

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If you have comments or suggestions about this manual, send them to DIGITAL Network Products:

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North America:	http://www.networks.digital.com
Europe:	http://www.networks.europe.digital.com
Asia Pacific:	http://www.networks.digital.com.au

GETTING HELP

Contact your DIGITAL representative for technical support. Before calling, have the following information ready:

- A description of the failure
- A description of any action(s) already taken to resolve the problem (e.g., changing mode switches, rebooting the unit, etc.)
- A description of your network environment (layout, cable type, etc.)
- Network load and frame size at the time of trouble (if known)
- The device history (i.e., have you returned the device before, is this a recurring problem, etc.)

SAFETY

OVERVIEW

Any warning or caution that appears in this manual is defined as follows:

	WARNING	Warns against an action that could result in equipment damage, personal injury, or death.
	VORSICHT	Warnt den Benutzer vor Aktionen, die das Gerät beschädigen, Personen verletzen oder sogar zum Tot führen könnten.
	DANGER	Déconseille à l'utilisateur d'exécuter une action pouvant entraîner des dommages matériels, corporels voire même la mort.
	AVISO	Previene contra una acción que podría dañar el equipo, provocar daños personales o la muerte.
	CAUTION	Contains information essential to avoid damage to the equipment.
	ACHTUNG	Liefert wichtige Informationen, um einen Geräteschaden zu vermeiden.
	ATTENTION	Informations indispensables permettant d'éviter les dommages matériels.
	PRECAUCIÓN	Contiene información esencial para evitar daños al equipo.

SAFETY REQUIREMENTS

The warnings or cautions that must be observed for the hardware described in this manual are listed below in English, German, French, and Spanish.

WARNING	Only qualified personnel should install or service this unit.
VORSICHT	Diese Einheit darf nur von qualifizierten Fachleuten installiert oder gewartet werden.
DANGER	L'installation et la maintenance de cet appareil sont réservées à un personnel qualifié.
AVISO	Sólo el personal cualificado debe instalar o dar mantenimiento a esta unidad.

CAUTION	These products are sensitive to static discharges. Use an antistatic wrist strap and observe all static precautions during this procedure. Failure to do so could result in damage to this equipment.
ACHTUNG	Diese Produkte sind für statische Entladungen empfindlich. Benutzen Sie deshalb ein Antistatikarmband, und beachten Sie während dieses Verfahrens alle Vorsichtsmaßnahmen. Bei Nichtbeachtung könnte das Gerät beschädigt werden.
ATTENTION	Ces produits sont sensibles à l'électricité statique. Portez un bracelet anti-statique et observez les règles de sécurité pendant cette procédure, sinon vous risqueriez d'endommager l'appareil.
PRECAUCIÓN	Estos productos son sensibles a las descargas de electricidad estática. Utilice una muñequera antiestática y observe las normas de seguridad de manipulación de dispositivos con electricidad estática durante este procedimiento. No hacerlo podría resultar en daños para el módulo.

CAUTION	If you have not configured the DELST-UI using software, do not connect any cables. Refer to the section titled Software Setup before proceeding.
ACHTUNG	Wenn Sie die DELST-UI-Einheit nicht unter Verwendung von Software konfiguriert haben, dürfen Sie keine Kabel anschließen. Lesen Sie die Informationen im Abschnitt zum Einrichten der Software (Software Setup), bevor Sie mit diesem Schritt fortfahren.
ATTENTION	Si vous n'avez pas configuré le DELST-UI à l'aide d'un logiciel, ne connectez aucun câble. Reportez-vous à la section intitulée Software Setup (Configuration du logiciel) avant toute opération.
PRECAUCIÓN	Si no ha configurado el DELST-UI a través del software, no conecte ningún cable. Consulte la sección referente a la instalación y configuración del software antes de continuar.

CAUTION	DO NOT plug the ISDN cable into the ISDN wall jack until after the software setup has been completed by using either QuickSET or the management procedure. If the ISDN cable is plugged in prematurely, before the host unit is configured, the telephone company may disable the ISDN line for a period of time. Plug in the cable as a final step, after you have configured the DELST-UI.
ACHTUNG	Stecken Sie das ISDN-Kabel erst dann in die Steckdose für den ISDN-Anschluß, NACHDEM die Software vollständig entweder mit QuickSET oder dem Verwaltungsverfahren eingerichtet wurde. Wenn das ISDN-Kabel vor der Konfiguration der Host-Einheit angeschlossen wird, könnte es vorkommen, daß die Telefongesellschaft die ISDN-Leitung für einige Zeit sperrt. Das Kabel sollte deshalb erst im letzten Schritt angeschlossen werden, nachdem Sie die DELST-UI-Einheit konfiguriert haben.
ATTENTION	NE PAS connecter le câble RNIS (ISDN) à la prise RNIS murale avant d'avoir terminé la configuration du logiciel soit à l'aide de QuickSET, soit par la procédure de gestion. Si le câble ISDB est connecté trop tôt, avant d'avoir configuré le système hôte, la compagnie de téléphone risque de désactiver la ligne RNIS pendant quelque temps. Ne connectez le câble qu'après avoir configuré le DELST-UI.
PRECAUCIÓN	NO conecte el cable RDSI a la toma RDSI mural hasta que se haya completado totalmente la instalación del software mediante el uso de QuickSET o el procedimiento de gestión. Si se conecta prematuramente el cable RDSI, antes de que se configure la unidad central, la compañía telefónica puede desactivar la línea RDSI durante cierto período de tiempo. Conecte el cable durante el último paso, tras haber configurado el DELST-UI.

CHAPTER 1

INTRODUCTION

This chapter provides information about the features and performance of the DELST-UI. It also briefly explains Integrated Services Digital Network (*ISDN*), call back-up, and the *WAN* protocols supported by the DELST-UI.

Note the following requirements for successful operation of this device:

- Install the DELST-UI in a Wide Area Network host platform. Refer to Chapter 2 for directions on installation procedures. Refer to the appropriate host platform manual for other installation and troubleshooting procedures.
- Use the Graphical User Interface QuickSET to fully configure the DELST-UI. Due to the automation of setup features, QuickSET use is strongly recommended. However, Chapter 3 contains additional information on configuring the DELST-UI, which can be done independently of QuickSET.

The device or module in which the DELST-UI is to be installed may be referred to in this document as the host platform.

1.1 DELST-UI FEATURES

The DELST-UI provides ISDN 128 Kbps Basic Rate Interface *(BRI)* in a backup or fail-over capacity for other devices in which the DELST-UI can be installed. The DELST-UI provides an ISDN back-up link for a remote site or branch office when the primary connection for a *frame relay* or leased line is lost or becomes disabled.

1.1.1 Performance

The capability of the DELST-UI is 128 Kbps when both B Channels are active.

There are several user-configurable timers that control the connect and disconnect time-outs to provide optimum performance. These are detailed in Chapter 3.

1.2 ISDN

ISDN provides inexpensive switched digital access to remote sites. The ISDN BRI standard provides for two high-speed 64-Kbps *bearer (B) channel*s used for voice or data connections and one 16-Kbps signaling data (D) channel used for call setup, signaling, and other information. ISDN allows all types of information to be transmitted including voice, data, fax, and video. Multiple devices can be linked to a single ISDN connection, each having their own telephone number. Two or more channels can be combined into a single larger transmission pipe offering variable transmission speeds.

1.3 ISDN CALL BACK-UP

The ISDN call back-up feature provides a back-up link for a remote site or branch office when one or more primary WAN interfaces for a frame relay circuit or a *nailed-up PPP* connection fails. The DELST-UI serves as the backup medium for this primary connection, using the ISDN interfaces to back-up any primary interfaces that have been configured for ISDN back-up.

The following are two reasons to use ISDN call back-up:

- Hardware failure of a nailed-up PPP connection
- *PPP* fails to connect (software problem)

Use call back-up if either of the following conditions exist when using Frame Relay:

- *DLCI* circuit fails to connect in 12 minutes
- DLCI goes inactive

The following is one circumstance in which it might not be advisable to use call back-up:

- When going point-to-multipoint, setting back-up on the head-end side is not recommended. If any DLCI fails, the back-up would be activated. This may be cost prohibitive.

1.3.1 Call Back-up Topology

In call back-up topology, two channels are connected, but one of them is a Switched Virtual Circuit *(SVC)* that is only activated upon failure of the primary channel. The primary channel is a Permanent Virtual Circuit *(PVC)* running Frame Relay or PPP. The Back-up channel is either ISDN BRI or PPP.

Table 1-1 shows the supported configurations at the initial release of the call back-up feature.

Table 1-1 Call Back-up Configurations

Primary Interface	Back-up Interface	Support
PPP (DELT1-UI, DELE1-UI, DELDS-UI, and DELSY-UI)	ISDN BRI (DELST-UI)	**YES**
PPP (DELT1-UI, DELE1-UI, DELDS-UI, and DELSY-UI)	PPP (DELSY-UI to Sync Modem)	**YES**
Frame Relay (DELT1-UI, DELE1-UI, DELDS-UI, and DELSY-UI)	ISDN BRI (DELST-UI)	**YES**
Frame Relay (DELT1-UI, DELE1-UI, DELDS-UI, and DELSY-UI)	PPP (DELSY-UI to Sync Modem)	**YES**

1.4 WAN PROTOCOLS

The DELST-UI interface supports ISDN BRI, which encapsulates PPP. For more information, refer to the host platform manual and the release notes included with the host platform for a list of current supported protocols.

ISDN BRI is a switched Data Link layer control protocol that uses digital signaling to place a call into an ISDN network. Once the call is made, PPP is then used to transfer data.

PPP is a Data Link layer, industry-standard WAN protocol, used to transfer multi-protocol data traffic over point-to-point connections. With this protocol, options such as security, data compression, and network protocols can be negotiated over the connection.

Frame Relay is a packet-switching data communications protocol that statistically multiplexes many data conversations over a single transmission link. Data compression allows Frame Relay to negotiate compression over Frame Relay PVCs.

1.5 MIB SUPPORT

Refer to the release notes included with the host platform for a list of all MIBs supported by the DELST-UI. For information about how to extract and compile individual MIBs, contact your DIGITAL representative.

CHAPTER 2

SETUP AND INSTALLATION

2.1 INSTALLING THE DELST-UI INTO A HOST

To physically install the DELST-UI into the host platform, please refer to the *DIGITAL WAN Modular Interface DELHW-UA User's Guide*.

2.2 JUMPER SETTINGS

The DELST-UI has two jumpers (P1 and P2) for the 100 ohm ISDN bus termination. See Figure 2-1. The jumpers must be set before using the device and must be set the same way to take care of both the transmit and receive pair of the twisted pair cable. The DELST-UI is shipped with the jumpers at a default setting of terminated.

This product is sensitive to static discharges. Use an antistatic wrist strap and observe all static precautions during this procedure. Failure to do so could result in damage to this equipment.

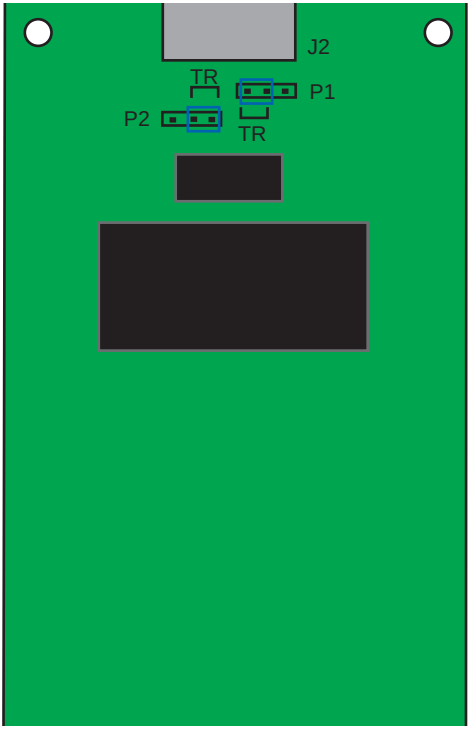


Figure 2-1 Termination Jumpers

Both jumpers must be set to the same setting, either terminated or not terminated.

- If the DELST-UI is the single device on the line, or if it is the end unit, set both P1 and P2 jumpers to the terminated positions.
- If the DELST-UI is on a multidrop line, or the termination is in the wall jack, set the jumpers to the not terminated positions.

Figure 2-2 shows a close-up of the jumper settings for the terminated and not terminated positions.

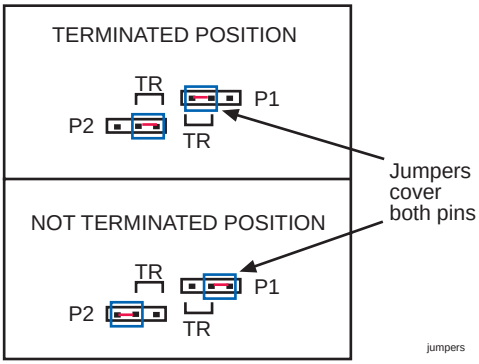


Figure 2-2 Jumper Settings

2.3 SOFTWARE SETUP

The QuickSET CD, included in the DELHW-UA shipping package, provides a quick and efficient setup for the DELST-UI into the host device. It is recommended that QuickSET be used for the setup. If a setup using Local Management and Network Tools is desired, refer to Chapter 3.

Use the QuickSET procedure or the procedure in Chapter 3, before continuing on to the ISDN setup in Section 2.4.

2.4 ISDN CONNECTION TO THE DELST-UI

DO NOT plug the ISDN cable into the ISDN wall jack until the software setup is complete, either by using QuickSET or the management procedure in Chapter 3. If this cable is plugged in prematurely, before the host unit is configured, the telephone company may disable the ISDN line for a period of time. Plug the cable in as a final step once you have configured the DELST-UI.

For the ISDN setup of the primary connections, see the host platform and primary WPIM manuals for information on setting up the connections **before** connecting any cabling to the DELST-UI. Return to this section

after completing the primary ISDN setup and the QuickSET software setup done with the DELST-UI.

If you have not configured the DELST-UI using software, do not connect any cables and refer to Section 2.3 before proceeding.

The RJ45 cable from the DELST-UI must be plugged into an NT-1. From the NT-1, an RJ45 cable must be plugged into the ISDN wall jack (see Figure 2-3, below).

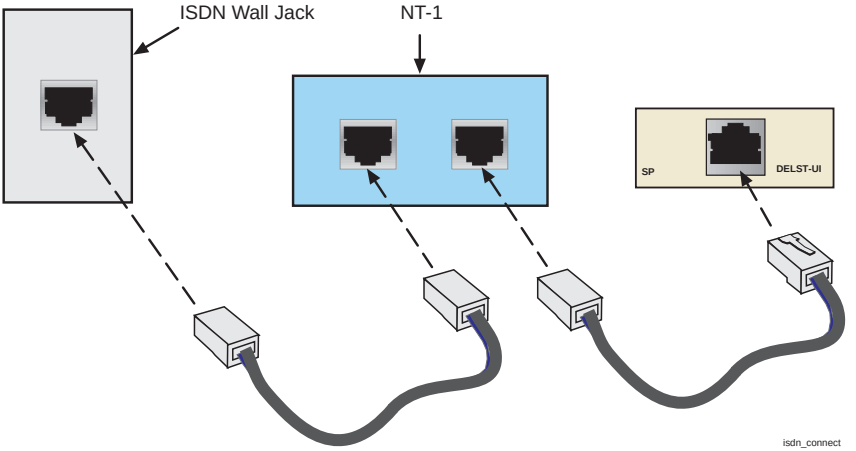


Figure 2-3 ISDN Connection to the DELST-UI

CHAPTER 3
LOCAL MANAGEMENT

Important Notice

QuickSET is highly recommended for the configuration of the DELST-UI. However, Local Management and Network Tools may be used to configure the DELST-UI. There are also some commands that are not available in QuickSET and can only be used in Network Tools. These commands are detailed in this chapter.

This chapter explains how to configure the DELST-UI for call back-up using Local Management and Network Tools, should the user need to manage at this level, or decide not to use QuickSET.

Sections of this chapter include descriptions of the screens that appear as Local Management menu selections when the DELST-UI is installed into a host platform, and instructions on setting up a configuration using Local Management and Network Tools.

Section 3.1 describes the four screens used in Local Management to configure the DELST-UI after it has been installed in a host platform. The screens are as follows:

- WAN Physical Configuration screen, Section 3.1.1
- Remote Profiles Setup screen, Section 3.1.2
- Bandwidth on Demand *(MLP)* Configuration screen, Section 3.1.3
- WAN Interface Configuration screen, Section 3.1.4

Section 3.2 gives an example of how to configure call back-up using the Local Management screens explained in Section 3.1, and adds Network Tools.

Access to Local Management screens and Network Tools is obtained by using Local Management on the host platform. Refer to the host platform's Local Management guide to establish a Local Management connection, for information on the screens, and the use of Network Tools.

Make sure that the following requirements have been met before accessing the DELST-UI through Local Management:

- The DELST-UI is properly installed in the host platform.
- A management terminal is properly configured and connected, either locally or using Telnet, to the host platform in which the DELST-UI resides. Refer to the host platform documentation for further information.

3.1 LOCAL MANAGEMENT SCREEN OVERVIEWS

The following subsections describe the screens used to configure the DELST-UI in Local Management.

3.1.1 The WAN Physical Configuration Screen

The WAN Physical Configuration screen is used to access the WPIM or "Physical Interface" for configuration. To access the WAN Physical Configuration screen from the Feature Selection screen, use the arrow keys to highlight the **WAN Setup** menu item, then press ENTER. The screen shown in Figure 3-1 displays.

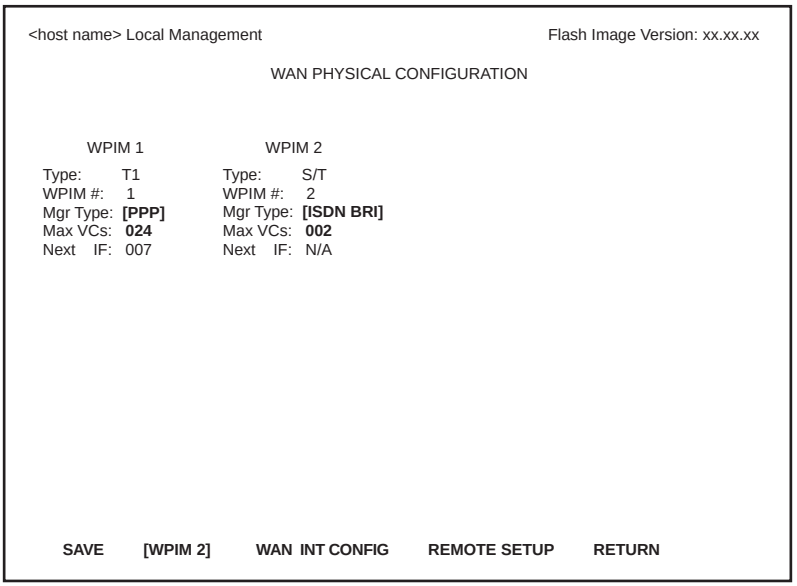


Figure 3-1 WAN Physical Configuration Screen

To select the DELST-UI for configuration, proceed as follows:

1. Use the arrow keys to highlight the WPIM command field at the bottom of the screen.
2. Use the SPACE bar to select the WPIM number that the DELST-UI is displayed under, either 1 or 2, then press ENTER. This allows editing of the DELST-UI fields. Typically the DELST-UI will have been installed in slot 2 as the secondary WPIM.

The WAN Physical Configuration screen automatically displays the configuration fields of a WPIM when available. The user-configurable fields for the DELST-UI can be seen in the WAN Physical Configuration screen in Figure 3-1.

The following describes the fields of the WAN Physical Configuration screen:

WPIM *1-2* (Read-Only)
Displays the specific configuration information for two different WPIMs.

Type (Read-Only)
Displays the type of WPIM installed.

WPIM # (Read-Only)
Displays the number of the slot in which the WPIM resides.

Mgr Type (Selectable)
Displays the type of protocol manager selected. For the DELST-UI the only available option is ISDN BRI. The field defaults to NONE.

Max VCs (Modifiable)
Displays the maximum number of virtual circuits (interfaces) available to be configured. The default is 2.

Next IF (Read-Only)
Displays the next available interface.

SAVE (Command)
Saves the settings.

[WPIM X] (Command)
Allows the user to select the WPIM that is to be configured. Once it is selected, the user can enter the screens to modify the data.

WAN INT CONFIG (Command)
When this selection is highlighted and the ENTER key is pressed, the WAN Interface Configuration screen displays.

REMOTE SETUP (Command)
When this selection is highlighted and the ENTER key is pressed, the Remote Setup screen displays. The Mgr Type (ISDN BRI) must have already been configured and saved, otherwise this screen is not accessible.

RETURN (Command)
Allows the user to return to the previous screen.

3.1.2 Remote Profiles Setup

The Remote Profiles Setup screen allows the user to set up the phone numbers and names for each of the interfaces.

To access the Remote Profiles Setup screen from the WAN Physical Configuration screen, use the arrow keys to highlight the **Remote Setup** menu item, then press ENTER. The screen shown in Figure 3-2 displays.

The ISDN Protocol Manager must already be set up in order for this screen to be accessible. See Section 3.1.1 for details.

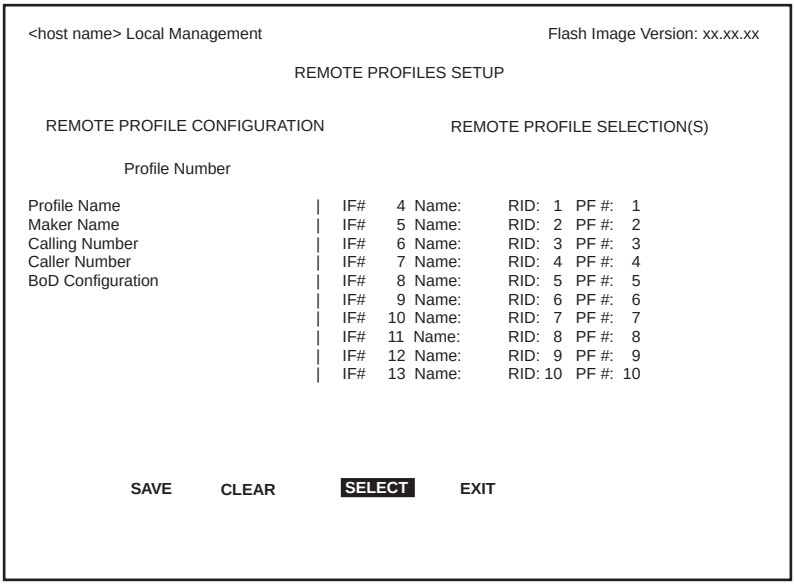


Figure 3-2 Remote Profiles Setup Screen

Caller ID is not necessary, but it functions as a first level of security.

If you set the configuration for “no caller id”, and the Telco has the caller ID phone number identified, you will never receive a call.

Remote Profiles: There must be 2 profiles set up for BoD, the first is primary, the second is multilink.

1. Once in the Remote Profiles Setup screen, use the arrow keys to navigate to and highlight the **SELECT** command. Press ENTER to allow navigation in the Remote Profiles Selection(s) area of the screen.
2. Using the arrow keys, choose the profile that is to be modified and press ENTER once it is highlighted.

Once the desired profile is selected, the following fields of the selected profile can be set or modified as desired: Profile Name, Maker Name, Calling Number, and Caller Number.

The BoD Configuration field leads to a screen that allows setting and configuring MLP (Multilink Protocol) support. This screen is described in Section 3.1.3.

The following defines the fields in the Remote Profile Selection(s):

IF# (Read-Only)
Interface number of the profile.

Name (Read-Only)
Name of the profile as defined by the user in the Remote Profiles Setup screen.

RID (Read-Only)
Remote Identifier. This is the index number of the Profile.

PF # (Read-Only)
Profile number, the information used to describe a possible connection.

SAVE (Command)
Used to save the configuration in memory once changes have been made.

CLEAR (Command)
Used to clear an entire selected profile.

SELECT (Command)
Used to enter the Remote Profile Selection(s) area in order to choose the profile to configure or modify.

EXIT (Command)
Used to exit the current screen.

PREV/NEXT (Command)
The Remote Profile Selection(s) screen will not display more than 10 profiles at a time. When there are more than 10 profiles to be displayed, the choices PREV and NEXT will display at the bottom of the screen. Highlight NEXT to go to the screen after the currently displayed screen, and PREV to go to the screen before the currently displayed screen. There is a maximum of 20 profiles.

3.1.3 Bandwidth on Demand (MLP) Configuration

The Bandwidth on Demand Configuration screen enables the user to easily program and display Bandwidth on Demand (BoD) parameters.

To access the Bandwidth on Demand Configuration screen from the Remote Profiles Setup screen, use the arrow keys to highlight the **BoD Configuration** field, then press ENTER. The screen shown in Figure 3-3 displays. The parameter name is in the first column, the minimum and maximum settings are in the second column, and the modifiable display field is in the third column.

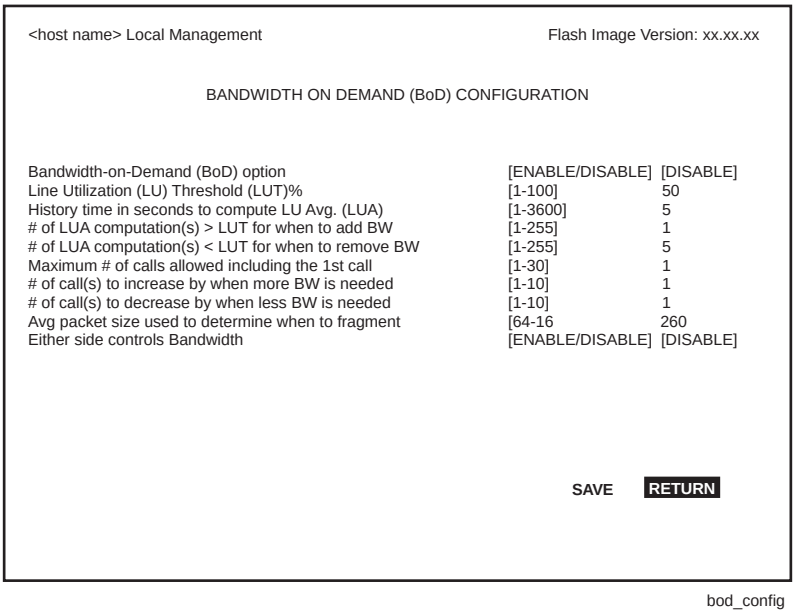


Figure 3-3 Bandwidth on Demand Configuration Screen

Use the arrow keys to select and highlight the desired parameter to modify. The first and last parameters, “BoD option” and “Either side controls Bandwidth” option, are toggle fields selected by pressing the SPACE bar once the field is highlighted. Press RETURN to choose the desired parameter. The default for these fields is DISABLE.

Use the numerical input keys to enter the desired number for all the other numerical input fields when selected.

The user must determine the settings that will work for their particular network for the following parameters. Therefore, no settings are indicated, other than default.

The fields for the BoD feature are described as follows:

Bandwidth-on-Demand (BoD) option
Specifies whether or not MLP support is desired. To successfully negotiate MLP, both devices must support MLP. The default setting is DISABLE.

Line Utilization (LU) Threshold (LUT)%
Specifies a line utilization threshold (%) value to compare against the linear weighted percentage by which to determine when more or less bandwidth is to be added or removed. The default setting is 50.

History time in seconds to compute LU Avg. (LUA)
Specifies a time value in seconds over which the line utilization percentage is averaged by the linear weighted percentage algorithm. The default setting is 5.

# of LUA computation(s) > LUT for when to add BW
Specifies the number of samples for which the condition for adding more bandwidth must persist before additional bandwidth is added. This parameter is used to filter out traffic bursts. The value should be chosen such that the time it takes to add more bandwidth is less than the time the traffic will exceed the “line threshold”. This will avoid the additional cost of adding unnecessary bandwidth. The default setting is 1.

# of LUA computation(s) < LUT for when to remove BW
Specifies the number of seconds that the output has fallen below the line threshold before previously added additional bandwidth is removed. The default value is 5.

Maximum # of calls allowed including the 1st call
Specifies the maximum number of channels an MLP call is allowed. The value accounts for the channel used to establish the original/first link. The default setting is 1.

When modifying the “Maximum # of calls allowed” parameter, which accounts for the first call, a check is made against the maximum profiles setting for that interface. Although the maximum possible value allowed is shown to be 20, the true maximum is the current maximum profiles setting for that interface which cannot exceed 20.

# of calls to increase by when more BW is needed
Specifies the incremental number of channels by which to increase additional bandwidth. Specifically, channels can be added in multiples. The default setting is 1.

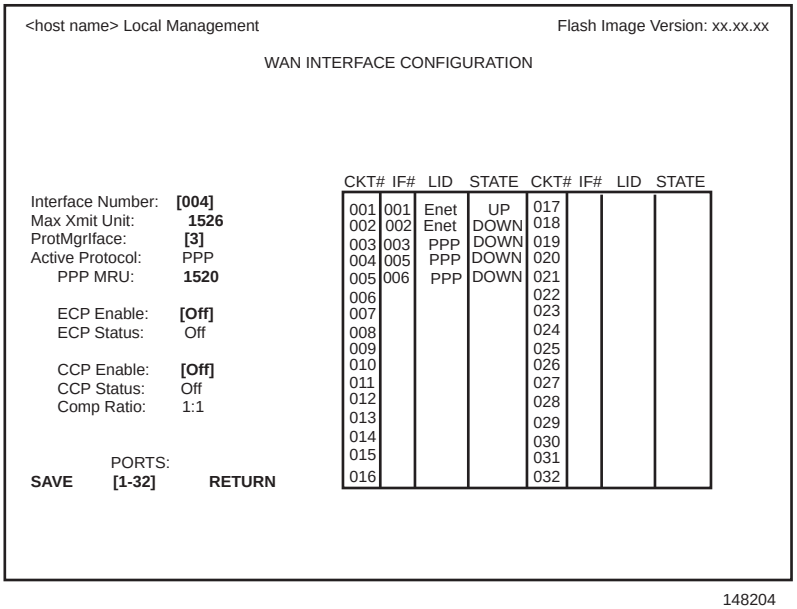
# of calls to decrease by when less BW is needed
Specifies the number of channels by which to remove bandwidth. Specifically, channels can be removed in multiples. The default setting is 1.

Avg packet size used to determine when to fragment
Specifies the average packet size by which to determine when it is best to split a packet. This is an attempt to minimize the amount of buffering necessary at the remote device to maintain packet sequence. The default setting is 260.

Either side controls Bandwidth
Specifies whether or not bandwidth changes are permitted by either side, i.e., both parties. Normally only the caller controls the bandwidth. The default setting is DISABLE.

3.1.4 The WAN Interface Configuration Screen

The WAN Interface Configuration screen is used to configure a specific interface and save the configuration. Access the screen by using the arrow keys to highlight the **WAN INT CONFIG** command at the bottom of the WAN Physical Configuration screen, then press ENTER. The WAN Interface Configuration screen, shown in Figure 3-4, displays.



148204

Figure 3-4 WAN Interface Configuration Screen

3.1.4.1 WAN Interface Configuration Screen Fields

The following sections describe WAN Interface Configuration screen fields.

Interface Number (Modifiable)
Used to configure the ISDN-PPP Interface Numbers that were automatically created according to the MaxVCs entered on the WAN Physical Configuration screen.

Max Xmit Unit (Modifiable)
Displays the maximum packet size that can be transmitted on the selected interface. The default setting for this field is **1526** for PPP. The maximum setting is 8191.

ProtMgr Iface (Modifiable)
The Protocol Manager Interface is the interface number assigned to the D channel.

Active Protocol (Read-Only)
Displays the active OSI layer protocol for the DELST-UI, PPP (Point-to-Point).

PPP MRU (Modifiable)
Displays the maximum size packet that can be received by the DELST-UI. The default is recommended. This parameter is only changed if the PPP connection does not come up, then it can be changed to try the MTU from the other side. This is an LCP parameter.

ECP Enable (Toggle)
Encryption Control Protocol Enable. Use the space bar to toggle ECP on and off. Encryption algorithms are used for a higher level of security.

ECP Enable is not currently supported. Please check the Release Notes for availability of this feature.

CCP Enable (Toggle)
Compression Control Protocol Enable. Use the space bar to toggle CCP on and off. The command enables the Data Compression mechanism available on the host platform. Data compression offers up to a four-to-one traffic compression ratio, increasing performance.

Comp Ratio (Read-Only)
Displays the Compression Ratio, the uncompressed to compressed data ratio.

CKT# (Read-Only)
Displays the circuit number.

IF# (Read-Only)
Displays the Interface that is associated with the application.

LID (Read-Only)
Displays the Link Identifier. If the active protocol for this interface is PPP, then PPP displays in this field. For the CSX400 as a host platform, in Circuit 001 and 002, the LID displays Enet, for the two Ethernet ports that are in the CSX400.

STATE (Read-Only)
Displays the status of the application port. For PPP as the active protocol, this field displays UP (active) or DOWN (inactive).

SAVE (Command)
Used to save the configuration changes. Automatically reboots the host device.

PORTS: [1-32], [33-64], [65-96], [97-128] (Command)
Displays the range shown in the table on this screen. Use the SPACE bar and either BACKSPACE or DELETE key to toggle through the displays.

RETURN (Command)
Used to return to the previous screen.

3.2 CALL BACK-UP CONFIGURATION

This section provides instructions for configuring the DELST-UI to automatically back-up a PPP dedicated/permanent connection or a Frame Relay PVC using a dial-up ISDN. These are the two primary uses. All connections configured as call back-up are continuously monitored for a failed condition. Whenever a primary connection with call back-up fails, the back-up call is automatically made using Dial-on-Demand (DoD). Once the failed connection is restored the back-up call may be automatically closed. DoD automatically brings up the back-up SVC connection whenever the primary connection has failed and there is traffic to be forwarded across the back-up SVC.

This example assumes the setup shown in Figure 3-5, has primary connections using DELT1-UIs (DELE1-UI, DELDS-UI, or DELSY-UI could also be used) and with DELST-UI back-up modules installed. The NT-1 is needed if the connection to the Telco cloud has a U interface.

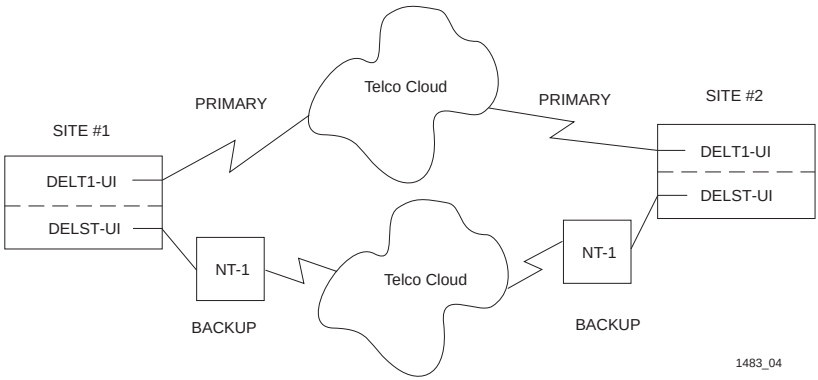


Figure 3-5 Configuration for PPP backup

The procedures listed below and detailed in the following sections must be performed in the order given to properly configure the DELST-UI for call back-up:

- Select the protocol
- Enable CCP
- Configure backup
- Set idle timeouts

- Configure the D channel
- Set phone numbers and Service Profile IDentifiers (SPID)s
- Set max number of neighbor/remote profiles
- Configure the profiles
- Reset the device
- Verify status
- Configure primary lines and routing

Network Tools can be found in the MIB NAVIGATOR selection in the main menu of Local Management for the host platform.

3.2.1 Select the Protocol

Select the ISDN Protocol Manager for the DELST-UI in Local Management, using the WAN Physical screen.

Begin the DELST-UI configuration by accessing the WAN Physical Configuration screen through Local Management. Access the WAN Physical Configuration screen from the WAN Setup menu item that displays in the Setup Menu in Local Management. Use the arrow keys to highlight the **WAN Setup** menu item, then press ENTER. The screen shown in Figure 3-6 displays.

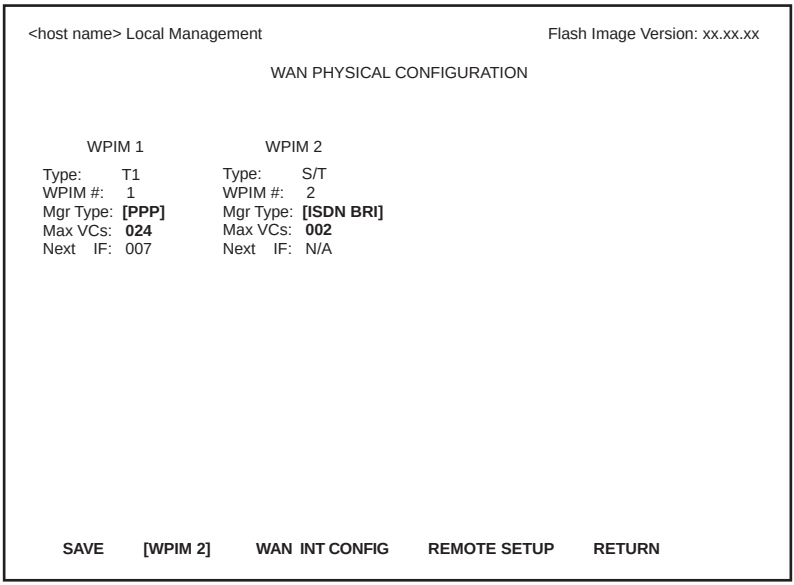


Figure 3-6 WAN Physical Configuration Screen

Proceed with the following steps:

1. Use the arrow keys to highlight the **[WPIM X]** field at the bottom of the screen. Press the SPACE bar to select the WPIM number of the DELST-UI being configured, then press ENTER. Typically the back-up DELST-UI will be installed in slot 2 of the host platform.
2. Use the arrow keys to highlight the **MgrType**. Press the SPACE bar to select ISDN BRI, then press ENTER.
3. Use the arrow keys to highlight the **SAVE** command, then press ENTER. The message “Save Done” displays and Local Management saves the changes to memory. The message “REBOOT IN PROGRESS.....” will also display, and the host platform will automatically reboot.

3.2.2 Enable Compression Control Protocol (CCP)

The WAN Interface Configuration screen, Figure 3-7, need only be accessed if the Compression Control Protocol (CCP) feature is to be turned on (normally it is desirable to have this function on). Otherwise, the functions of this screen are not normally needed for call back-up. Access the WAN Interface Configuration screen by using the arrow keys to highlight the WAN Int Config command in the WAN Physical Configuration screen, then press ENTER.

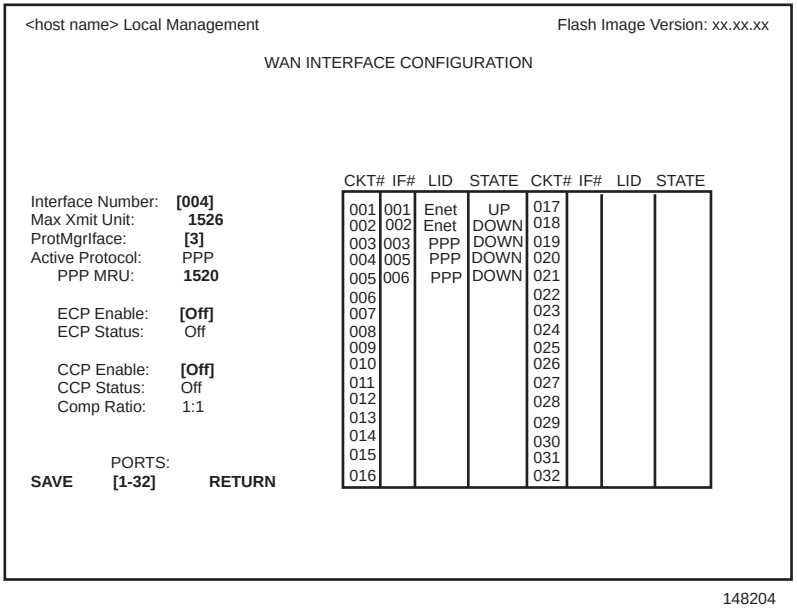


Figure 3-7 WAN Interface Configuration Screen

Proceed with the following steps:

1. Use the arrow keys to highlight **Interface Number**. Set the WAN connection Interface Number by typing the number of the interface to configure (from the IF# column), then press ENTER.
2. Use the arrow keys to highlight **CCP Enable**. Press the SPACE bar to select **On** to enable CCP, then press ENTER.

3. Use the arrow keys to highlight the **SAVE** command. Press ENTER. The message "Save Done!" displays and Local Management saves the changes to memory. Upon saving this screen, the interface just configured is assigned to an application port (CKT#) in the table once the device starts communicating with the service provider's switch.

The commands in the rest of the procedure are Network Tools commands. Refer to the host platform manual for detailed information on accessing Network Tools.

3.2.3 Configure Backup

Use the following Network Tools command to configure backup:

setbackup [PRIMARYIFACENUM] [BACKUPIFACENUM] [TIMETOCONNECT] [TIMETODISCONNECT] [CONNECTRETRIESNUM] [TIMEBETWEENCONNETRETRIES][BACKUPOVERRIDE]

PRIMARYIFACENUM
The number of the primary interface that is going to be backed up.

BACKUPIFACENUM
The number of the interface assigned as the backup interface to the primary interface.

TIMETOCONNECT
How long the system will wait (in seconds) before attempting to switch over to the backup interface. Default is zero. Allowed values are in increments of five seconds.

TIMETODISCONNECT
How long the system will wait (in seconds) before attempting to switch over to the primary interface once the primary interface has been restored. Default is 90 seconds. Allowed values are in increments of five seconds.

CONNECTRETRIESNUM
Specifies the number of tries to bring up the backup interface before giving up. The default is three. Allowed values are in increments of one.

TIMEBETWEENCONNETRETRIES
Specifies the time interval between tries to bring up the backup interface. The default is 30 seconds. Allowed values are in increments of five seconds. Zero is allowed but not advisable.

BACKUPOVERRIDE

Specifies if the backup interface will disconnect whenever the primary interface is restored (reconnected). Choosing ENABLED for this command will not disconnect the backup interface even though the primary interface is restored. Used specifically when the primary interface has an intermittent problem, as it is desirable for the backup interface to stay connected until the primary interface problem is corrected. Once the primary connection is fully operational, BACKUPOVERRIDE should be set to DISABLED, the default value.

For any switched medium like ISDN there are two types of interfaces, primary and secondary (backup). Primary interfaces automatically attempt to connect using DoD. Because of this, it is recommended not to create any unnecessary interfaces because they will consume unnecessary time in trying to connect. However, if additional interfaces have been created for which their need is unknown, then DoD should be disabled. To do this, set the backup interface to itself. e.g., setbackup 12 12. Do this for each interface that should have DoD disabled. This recommendation also applies to Dial-in only interfaces (i.e., answer mode interfaces.

Example 1:

There is a nailed-up PPP interface #3, and to back it up, ISDN interface #4 is used with the default values. Use this Network Tools command:

setbackup 3 4

Example 2:

For answer mode only:

setbackup 3 to 3

Answer mode only is set. This will set the backup interface to itself if the ISDN interface is to be used only as a dial-in circuit (i.e., answer mode only).

If the interface is active, you cannot configure backup. De-activate the interface before proceeding.

3.2.4 Set Idle Timeouts

Set the receive and transmit idle timeouts for backup interfaces using Network Tools. This command automatically disconnects an idle switched interface within the parameters:

setidletimeout [IFACENUM] [TRANSMITIDLETIMEOUT] [RECEIVEIDLETIMEOUT]

IFACENUM
The number of the interface to be configured.

TRANSMITIDLETIMEOUT
The idle time out parameter for the transmit time out.

RECEIVEIDLETIMEOUT
The idle time out parameter for the receive time out.

Example: To set the receive time out to 180 seconds and the transmit side to 600 seconds for ISDN interface #4, use this command:

setidletimeout 4 180 600

3.2.5 Configure the D Channel

Use the following command in Network Tools to set the switch type:

setswitchtype [WANPORTNUM] [SWITCHTYPE]

WANPORTNUM
If the DELST-UI occupies WAN port number one, use 1, if it occupies port number two, use 2 as the WANPORTNUM.

SWITCHTYPE
Choose between the types of ISDN BRI switches. The choices are NI1, DMS100, and ATT5 (default is NI1).

3.2.6 Set Phone Numbers and SPIDs for the Port

The following Network Tools command is used to set the phone numbers and the SPIDs:

setisdnbri [WANPORTNUM] [LDN1][SPID1] [LDN2] [SPID2]

LDN1
The first Local Directory Number. Likewise, LDN2 is the second Local Directory Number.

SPID1
The first Service Profile Identifier. Likewise, SPID2 is the second Service Profile Identifier.

SPID format: [XXXYYYZZZZ] [01] [01]

Where XXX represents the area code, YYY represents the prefix, and ZZZZ represents the local number. [01] [01] is the fixed suffix.

Example 1: For the first WAN port to be configured for ISDN, issue the command:

```
setisdnbri 1 555 1000 0555100001 5553000 0555300001
```

For the second WAN port to be configured, issue the command:

```
setisdnbri 2 5551000 0555100001 5553000 0555300001
```

The command also allows for skipping or clearing any entry by using the key letters S (or s) to skip the field, and C (or c) to clear the field.

Example 2: To skip LDN1 and SPID1, change LDN2, and clear SPID 2, issue the following command:

```
setisdnbri 2 s s 0555600001 c
```

3.2.7 Set Maximum Number of Neighbor/Remote Profiles

A neighbor/remote profile describes a possible connection. The maximum should be set to account for support of PPP Multilink. If PPP Multilink is used, then the number of profiles must accommodate the maximum possible number of additional “more BW” connections/calls desired. Consequently, each neighbor profile would then describe a possible connection to the same remote end point (user). Two profiles will be set up for the first ISDN interface. This means that the first ISDN interface can be used to connect (call) two different end users or the same end user twice (e.g., Multilink). The default is one profile per ISDN interface.

Use the Network Tools command:

setmaxprofiles [IFACENUM] [MAXPROFILESNUM]

Example: To set two profiles for ISDN interface #4 issue the command:

setmaxprofiles 4 2

3.2.8 Reset

The host platform must be reset at this time. Reset the host platform or disconnect the ISDN line (this forces the Telco to re-initialize). Refer to the host platform user’s guide in order to reset the platform.

3.2.9 Configure the Profiles

Configure the profiles and specify phone numbers for backup interfaces. Use Local Management to configure BoD (submenu of the profiles menu) and enable using MLP if desired. Refer to Section 3.1.2 for details.

Set max profiles, total profiles to allow multilink (QuickSET does this automatically).

Multilink is dynamic and needs an interface to support the link.

3.2.10 Verify Status

Use the Network Tools command idsnstat to verify the D channel status; it should read active. The isdnstat command is used to display the ISDN settings, including the switch type, LDNs, SPIDs, and the operational status of the D channel. This command is normally used to verify that the switch and the DELST-UI are working properly. If the settings are not correct, or the D channel is not operational, the situation must be corrected before continuing the configuration. The connection must be operational or the backup configuration will not work.

isdnstat [WANPORTNUM]

Use the Network Tools commands ct and dt to test the line by doing a manual connect or disconnect:

ct [IFACENUM] connects (places) a call for the interface designated.
dt [IFACENUM] disconnects (hangs up) the call.

These three Network Tools commands allow the user to check whether or not the ISDN line and profile(s) have been configured properly and that a connection is possible.

3.2.11 Configure Primary Lines and Routing

Configure the primary lines. Refer to the appropriate WPIM user's manual. Configure routing if used. Refer to the appropriate host platform user's manual.

When reconfiguring an interface, the host platform does not have to be reset.

Configuration is complete.

APPENDIX A
SPECIFICATIONS

This appendix provides operating specifications for the DELST-UI. These specifications may be changed at any time without notice.

A.1 PHYSICAL PROPERTIES

Dimensions	1.94 H x 6.2 W x 15.06 D (cm) .762 H x 2.44 W x 5.93 D (in)
Weight	113.6 g (4 ounces)
MTBF (Predicted)	200,000 hours

A.2 ENVIRONMENTAL REQUIREMENTS

Operating Temperature	5°C to 40°C (41°F to 104°F)
Storage Temperature	-30°C to 90°C (-22°F to °F)
Relative Humidity	5% to 95% (non-condensing)

A.3 REGULATORY COMPLIANCE

This equipment meets the following safety and electromagnetic compatibility (EMC) requirements:

Safety	UL 1950, CSA C22.2 No.950, EN 60950, IEC 950, and 73/23/EEC
Electromagnetic Compatibility (EMC)	FCC Part 15, EN 55022, VCCI V-3, CSA C108.8 EN 50082-1, AS/NZS 3548, and 89/336/EEC
Telcommunications	FCC CFR47 Part 68, CS-03

A.4 DELST-UI INTERFACE CABLE PINOUTS

The following are the cable pinouts for the DELST-UI RJ-45 network interface connector.

Table A-1 DELST-UI Network Interface Cable Pin Assignments

Pin	Signal
1	Not Used
2	Not Used
3	Transmit +
4	Receive +
5	Receive -
6	Transmit -
7	Not Used
8	Not Used

A.5 DELST-UI WAN LEDS

The information in the following table is not currently supported, but is supplied for future reference. Check the Release Notes for the application of this information.

Table A-2 DELHW-UA WAN LED States for the DELST-UI

LED	Color	State
LINK	RED (solid)	Nothing connected.
	GREEN (solid)	Link.
	YELLOW (flashing)	Traffic.
STS	OFF	No channels connected.
	GREEN (solid)	Either “B” channel connected.
	YELLOW (blinking)	Test Mode.

APPENDIX B

FCC PART 68 - USER'S INFORMATION

The following instructions are provided to ensure compliance with the Federal Communications Commission (FCC) Rules, Part 68.

1. This device must only be connected to the ISDN Basic Rate network behind an FCC Part 68 registered channel service unit. Direct connection is not allowed.

2. Before connecting your unit, you must inform the telephone company of the following information:

Port ID	REN/SOC	FIC	USOC
DELST-UI	6.0P	N/A (XD)	N/A (XD)

3. If the unit appears to be malfunctioning, it should be disconnected from the telephone lines until you learn if your equipment or the telephone line is the source of the trouble. If your equipment needs repair, it should not be reconnected until it is repaired.

4. If the telephone company finds that the equipment is exceeding tolerable parameters, the telephone company can temporarily disconnect service, although they will attempt to give you advance notice if possible.

5. Under the FCC Rules, no customer is authorized to repair this equipment. This restriction applies regardless of whether the equipment is in or out of warranty.

6. If the telephone company alters their equipment in a manner that will affect use of this device, they must give you advance warning so as to give you the opportunity for uninterrupted service. You will be advised of your right to file a complaint with the FCC.

7. The attached affidavit must be completed by the installer.

8. In the event of equipment malfunction, all repairs should be performed by a DIGITAL representative or an authorized agent. It is the responsibility of the users requiring service to report the need for service to a DIGITAL representative or to one of our authorized agents.

Service can be obtained from your DIGITAL representative.

AFFIDAVIT FOR THE CONNECTION OF CUSTOMER EQUIPMENT TO 1.544 MBPS AND/OR SUBRATE DIGITAL SERVICES

For the work to be performed in the certified territory of

Telco's name:_____

State of:_____

Country of:_____

I, _____ , of _____
(Name of Authorized Representative) (Customer Name)

_____ , _____
(Customer's Address) (Telephone Number)

being duly sworn, state:

I have responsibility for the operation and maintenance of the terminal equipment to be connected to _____Subrate digital services. The terminal equipment to be connected complies with Part 68 of the Commission's rules except for the encoded analog content and billing protection specifications. With respect to encoded analog content and billing protection:

- I attest that all operations associated with the establishment, maintenance and adjustment of the digital CPE with respect to encoded analog content and encoded billing information continuously complies with Part 68 of the FCC's Rules and Regulations.

- The digital CPE does not transmit digital signals containing encoded analog or billing information which is intended to be decoded within the telecommunications network.

- The encoded analog and billing protection is factory set and is not under the control of the customer.

I attest that the operator(s) maintainer(s) of the digital CPE responsible for the establishment, maintenance and adjustment of the encoded analog content and billing information has (have) been trained to perform these functions by successfully completing one of the following: Check appropriate one(s).

a. A training course provided by the manufacturer/grantee of the equipment used to encode analog signals; or

b. A training course provided by the customer or authorized representative, using training materials and instructions provided by the manufacturer/grantee of the equipment used to encode analog signals; or

c. An independent training course (e.g. trade school or technical institution) recognized by the manufacturer/grantee of the equipment used to encode analog signals; or

d. In lieu of the proceeding training requirements, the operator(s) maintainer(s) is (are) under the control of a supervisor trained in accordance with _____above.

I agree to provide_____with proper documentation
(Telco's Name)

to demonstrate compliance with the information as provided in the proceeding paragraph, if so requested.

_____ (Signature)

_____ (Title)

_____ (Date)

Subscribed and sworn to me this _____ day of _____ , 19____ .

_____
(Notary Public)

My commission expires: _____

APPENDIX C
WAN TERMS AND ACRONYMS

This appendix provides definitions for WAN terms and acronyms.

AMI	Alternate Mark Inversion, line coding used with both E-1 and T-1. A digital 1 is encoded as a “mark” (pulse) and a 0 is encoded as a “space.” The marks alternate polarity.
ANSI	American National Standards Institute, the US member of the ISO.
bearer (B) channel	A 64-Kbps channel used with BRI and PRI ISDN services.
bipolar violation	The occurrence of two successive pulses of the same polarity in a bipolar signal.
B8ZS	Binary 8-Zero Substitution, line coding utilized with ESF (Expanded Super Frame). Insures the ones density requirement for digital T-carrier facilities in the public network, while allowing 64 Kbps clear data per channel.This encoding method is not supported by some Telcos.
BRI	Basic Rate Interface, minimum rate ISDN subscriber interface, provides 2 B + 1 D channels (two 64 Kbps “B” (Bearer) channels and one 16 Kbps “D” (Data) signaling channel for a total of 144 Kbps).
CHAP	Challenge Handshake Authentication Protocol, a security protocol supported under point-to-point protocol (PPP) used to prevent unauthorized access to devices and remote networks.
CRC	Cyclic Redundancy Check, an algorithm or process used to identify corrupted packets in the transmission link.

CSU	Channel Service Unit, a device that terminates the local loop/digital channel on a customer's (DSU) premises. The CSU connects to a DSX-1 interface on the CPE.
DCE	Data Communications Equipment, a device such as a modem that connects the communications circuit with the end device (see DTE).
data (D) channel	A full-duplex 16 Kbps channel used with BRI and PRI services for signaling and control.
D4	D4 Framing, a popular framing format in T-1. Uses 12 T-1 Frames to identify both the channel and the signaling bit.
DN	Directory Number, the telephone number for an ISDN line assigned by the telephone company.
DLCI	Data Link Connection Identifier, a unique virtual circuit identifier used in Frame Relay. Identifies a given frame as being from a particular logical link. The DLCI has only local significance.
DN	Directory Number, addresses assigned by the service provider for each device operating on the line.
DoD	Dial on Demand.
DSU	Digital Service Unit, converts RS-232 or other terminal interfaces to DSX-1 (T-1) interface.
DS-0	Digital Signal, level 0, a standard 64,000 bit/second channel. Synonymous with "Timeslot."
DTE	Data Terminal Equipment, equipment that originates and terminates data transmission such as a computer or printer (see DCE).
E-1	European digital signal level 1. Similar to T-1 but provides 32 channels (2.048 Mbps) instead of 24 channels (1.544 Mbps).

ESF	Extended Super Frame. A new T-1 framing standard (see D4 framing) that uses 24 T-1 frames, thus allowing individual identification of the channel and signaling bits.
Fractional T-1	Use of a portion (less than the full 24 channels) of a T-1 line.
frame relay	A network protocol that allows for many point-to-point virtual connections over a single access channel.
HDB3	High Density Bipolar 3, used with E-1, a bipolar coding method that does not allow more than 3 consecutive zeros.
HDLC	High-Level Data Link Control, layer 2 (link layer) full-duplex protocol derived from SDLC.
INV. HDLC	A form of zero suppression in which all zeros in the HDLC packet are changed to ones and all ones are changed to zeros.
ISDN	Integrated Services Digital Network. Allows point-to-point connections at 64 Kbps or 128 Kbps when necessary and disconnects the line when not in use. With this service the user only pays for the time connected.
JBZS	Jam Bit-Zero Suppression, a form of zero suppression that places a one in the seventh bit of a timeslot. Reduces the effective throughput to 56 Kbps.
Leased Line	A telecommunications line between two service points leased from a communications carrier for private use, usually incurring a monthly service rate.
LEX	LAN Extender, a Cisco Systems protocol used to internetwork a host-based router with a remote switch.
LMP	Link Management Protocol, used in Frame Relay. Allows the device to gather information about the DLCIs (Data Link Connection Identifiers) See T1.617-D, Q.933-A.

local timing	Timing for digital transmission circuit is internally generated by a source within the equipment. Usually used for short haul private lines. In this case one CSU must be set for Local (internal) timing and the CSU at the other end of the line must be set for Loop (recovered) timing to create a master-slave situation.
loop timing	Timing for digital transmission circuit is recovered from the received data, not generated internally by a source within the equipment. This is the typical situation when using public lines.
Multi-Link Protocol (MLP)	Defined in RFC 1717, a protocol that defines performing inverse multiplexing on the TCP/IP point-to-point protocol (PPP), ie., the ability to use multiple serial WAN channels for transferring one data stream. With MLP, a user can send and receive data over both B channels in an ISDN BRI connection.
MUX	Multiplexer, an electronic device that allows two or more signals to pass over one communications circuit.
nailed-up PPP	A permanent, leased line that has a flat fee. The line is always connected, as it is not a switched connection.
PPP	Point-to-Point Protocol, provides a method for transmitting datagrams over serial point-to-point links.
PRI	Primary Rate Interface, an ISDN service providing 23 “B” (Bearer) channels of 64 Kbps and one 64 Kbps “D” (Data) channel for signaling and control.
PVC	Permanent Virtual Circuit, a virtual circuit that provides the equivalent of a dedicated private line service.
Q.933-A	Q.933 Annex A, an ITU link management protocol specification used in Frame Relay.
SDLC	Synchronous Data Link Control, layer 2 (link layer) protocol developed by IBM for SNA connectivity. Basis for HDLC.

SNA	Systems Network Architecture, data communication network architecture developed by IBM in the 1970s.
SPID	Service Profile ID is a unique number that identifies the characteristics of the ISDN line. One SPID number may be assigned for each B channel of the ISDN BRI line, or one SPID for both B channels, or no SPIDs depending on the switch at the CO (Central Office).
spoofing	Technique used to remove poll and update service frames from WAN links while ensuring that the network continues to operate normally, used to minimize dial-up connection time.
SVC	Switched Virtual Circuit. A connection across a network established on an as-needed basis. The connection lasts only for the duration of the transfer, and is the datacom equivalent of a dialed phone call.
T1	A Bell System term that refers to the physical carrier used to transmit a digital signal at 1.544 Mbps.
T1.617-D	T1.617 Annex D, an ANSI link management protocol specification used in Frame Relay.
TDM	Time Division Multiplexing, a technique in which separate data or voice signals are transmitted simultaneously over a single communications medium based on time interleaving.
timeslot	A standard 64,000 bit/second channel. Synonymous with DS0 (Digital Signal, level 0).
WAN	Wide Area Network, a network spanning a large geographic area.
WPIM	WAN Physical Interface Module, that provide connectivity/functionality for WAN modules.

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