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DIGITAL
WAN Modular Interface E1

DELE1-UI
Local Management Guide

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Local Management Guide

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This manual describes how to use Local Management to control and manage the WAN Modular Interface E1 (DELE1-UI).

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Mr. Ronald Fotino	Mr. J. Solari
Full Name	Full Name
Principal Compliance Engineer	Managing Director - E.M.E.A.
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CONTENTS

Contents

PREFACE

Welcome to the *DIGITAL WAN Modular Interface E1 DELE1-UI Local Management Guide*. This manual explains how to use Local Management to control and manage the DIGITAL WAN Modular Interface E1 (DELE1-UI). Appendix A of this guide provides connector and pinout information for the DELE1-UI.

USING THIS GUIDE

Read through this guide completely to familiarize yourself with its contents and to gain an understanding of the features and capabilities of the DELE1-UI. A general working knowledge of data communications networks is helpful when setting up the DELE1-UI.

> In this document, the WAN Modular Interface E1 is referred to as either the "DELE1-UI" or "WPIM" (WAN Physical Interface Module).

STRUCTURE OF THIS GUIDE

This guide is organized as follows:

Chapter 1, **Introduction**, describes DELE1-UI features and lists specifications.

Chapter 2, **Local Management**, describes how to use Local Management to set up the DELE1-UI.

Appendix A, **WAN Interface Cable Specifications**, provides part numbers and connector information for the interface cables used with the DELE1-UI.

Appendix B, **WAN Terms and Acronyms**, is a brief glossary of the terms used in this book.

DOCUMENT CONVENTIONS

Throughout this guide, the following symbols are used to call attention to important information:

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.

RELATED DOCUMENTATION

Refer to the manual included with the host Wide Area Network module to supplement the procedures and other technical data provided in this manual. Refer to the standalone hub or module User's Guides and/or Local Management Guides for Local Management setup information. This manual references procedures in these manuals, where appropriate, but does not repeat them.

CORRESPONDENCE

Documentation Comments

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

Attn.:	Documentation Project Manager
E-MAIL:	doc_quality@lkg.mts.dec.com

World Wide Web

To locate product-specific information, refer to the DIGITAL Network products Home Page on the World Wide Web at the following locations:

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 caution that appears in this manual is defined as follows:

⚠	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 caution that must be observed for the hardware described in this manual is listed below in English, German, French, and Spanish.

⚠	CAUTION	If you are using a Local clock source, set only one end of the circuit for Local, the other end must be set for Loop.
	ACHTUNG	Wenn Sie einen lokalen Takteingang verwenden, stellen Sie nur ein Ende des Schaltkreises auf Lokal; daß andere muß auf Loop gesetzt werden.
	ATTENTION	Si vous utilisez une source d'horloge locale, ne réglez qu'une borne du circuit sur Local, l'autre devant être réglée sur Boucle.
	PRECAUCIÓN	Si está usando una fuente de reloj local, defina únicamente uno de los extremos como Local; el otro extremo deberá estar definido como Loop.

CHAPTER 1

INTRODUCTION

1.1 DELE1-UI FEATURES

The DELE1-UI extends the functionality of your Wide Area Network module to allow remote connectivity using WAN services such as E-1 or Fractional E-1.

The DELE1-UI provides an E-1 interface that includes a built-in Channel Service Unit/Digital Service Unit (CSU/DSU) for direct connection to an E-1 line. This WPIM supports both Full E-1 or Fractional E-1 using 56 or 64 Kbps timeslots.

WAN Protocols
As of this printing, the module in which the DELE1-UI is installed supports the following WAN protocols (refer to the Release Notes included with the standalone hub for a list of current protocols):

- Point to Point Protocol (LCP) as defined by RFC 1661
- Point to Point Protocol (BNCP) as defined by RFC 1638
- Point to Point Protocol LAN Extender (PPP/LEX)
- Frame Relay as defined by RFC 1490

MIB Support
Refer to the Release Notes included with the standalone hub for a list of all MIBs supported by the DELE1-UI. For information about how to extract and compile individual MIBs, contact your DIGITAL representative.

1.2 DELE1-UI SPECIFICATIONS

This section describes the environmental specifications and safety/approval requirements for the DELE1-UI. Cabletron Systems reserves the right to change these specifications at any time without notice.

Environmental Requirements

Operating Temperature: +5° to +40°C (41° to 104°F)

Non-operating Temperature: -30° to +90°C (-22° to 194°F)

Operating Humidity: 5% to 95% (non-condensing)

Safety

This unit meets the safety requirements of EN60950.

EMI

This unit meets the EMI requirements of EN55022 Class A and VCCI Class A.

EMC

This unit meets the EMC requirements of EN50082-1 including IEC 801-2 (ESD), IEC 801-3 (Radiated Susceptibility), and IEC 801-4 (EFT/B).

> It is the responsibility of the person who sells the system to which the DELE1-UI will be a part to ensure that the total system meets allowed limits of conducted and radiated emissions.

CHAPTER 2

LOCAL MANAGEMENT

This chapter explains how to configure the DELE1-UI through local management. The WAN Physical Configuration screen and the WAN Interface Configuration screen appear as local management menu selections after you install the DELE1-UI into a WAN high-speed interface module and then install the high-speed interface module into the host module. Refer to the appropriate module's User's Guide for instructions about how to set up and access local management.

Sections of this chapter include:

Read **Section 2.1** and **Section 2.2** to gain an understanding of the DELE1-UI Local Management screens. **Section 2.3** through **Section 2.6** provide examples for setting up the DELE1-UI for full or fractional E-1 in a PPP environment, or for configuring the DELE1-UI for LEX or Frame Relay.

Navigate through the WPIM Local Management Screens by using the following keyboard commands:

SPACEBAR to toggle between selections in a field.

ENTER (RETURN) to implement a selection.

Arrow keys to move up, down or sideways within the screen.

2.1   The WAN Physical Configuration Screen

To access the WAN Physical Configuration screen from the Feature
Selection screen, use the arrow keys to highlight the WAN Configuration
option, then press ENTER. The screen shown in **Figure 2-1** appears.

```
<host name> Local Management                    Flash Image Version: xx.xx.xx

                          WAN PHYSICAL CONFIGURATION


                           WPIM 2
   WPIM 1
Type:      E1        Type:       SY
Slot #:    1         Slot #:     1
Mode:      [Primary] Mode:       [Secondary]
Active:    Yes       Active:     No
Interfaces: 002-033  Interfaces: 034


 WPIM 1 Line Configuration                    WPIM 1 Timeslot Configuration

 E1 Timeslot View:       [Active]        01-08  N/A  000  000  000  000  000  000  000
 E1 Line Coding:         [HDB3]
 E1 Frame Type           [E1-CRC]        09-16  000  000  000  000  000  000  000  000
 E1 TX Clock Source:     [Loop-Timing]
 E1 Network Loopback:    [None]          17-24  000  000  000  000  000  000  000  000

                                         25-32  000  000  000  000  000  000  000  000

        SAVE    [WPIM 1]       WAN INT CONFIG      RETURN
```

1484_01

Figure 2-1. WAN Physical Configuration Screen

2.1.1   WAN Physical Configuration Screen Fields

The following sections describe WAN Physical Configuration screen fields and instructions for setting them. The WAN Physical Configuration screen lets you configure the WPIM or "Physical Interface."

DIGITAL offers a variety of WPIMs. The following Physical Configuration screen examples show the DELE1-UI and the DELSY-UI. Select the WPIM you wish to configure by using the arrow keys to highlight the WPIM command field at the bottom of the screen. Press the SPACEBAR to select the appropriate WPIM, then press ENTER. The WAN Configuration screen automatically displays unique configuration fields for each WPIM as shown in **Figure 2-1**.

The WAN Physical Configuration screen displays the following information for each WPIM:

WPIM *1-4*
Displays configuration information for as many as four WPIMs.

Type
Displays the WPIM type.

Slot#
Displays the slot in which the WPIM resides.

Mode
Displays the WPIM mode. Toggles between Primary and Secondary. In a device where two WPIMs are utilized but only one can be active at a given time, the second WPIM installed or recognized defaults to Secondary.

Active
Displays the status of the WPIM, Yes and No.

Interfaces
Displays the interfaces available to each WPIM.

2.1.2   DELE1-UI Configuration Fields

The configuration fields displayed on the Physical Configuration screen shown in **Figure 2-2** vary depending on the type of WPIM. The examples in this Local Management Guide cover the DELE1-UI. Each DIGITAL WPIM has a Local Management Guide that provides specific configuration guidelines and examples.

> The service provider determines the settings for the following fields. Consult the service provider for the correct settings.

E1 Timeslot View
Displays the status of the Timeslot Configuration Table. The selections for this field toggle between Active and New. The Active setting displays current Timeslot Configuration table settings. The default setting is **Active**. The New setting allows you to change Timeslot Configuration table settings. The default setting for the Timeslot Configuration table is all Timeslots not assigned (**000**).

E1 Line Coding
Displays the line coding for the physical E-1 line. The selections toggle between HDB3 and AMI. The default setting for this field is **HDB3**.

E1 Frame Type
Displays the E-1 Frame type. The selections toggle between E1 and E1-CRC. The default setting for this field is **E1-CRC**.

E1 Tx Clock Source
Displays the E-1 Transmit Clock Source. The selections for this field toggle between Loop-Timing (Extracted Line Data) and Local-Timing (Internal Clock). The default setting for this field is **Loop-Timing**.

E1 Network Loopback
Network Loopback is a testing procedure that segments the line and allows the user to isolate faults. The selections for this field toggle between None and Line-Loop. In Line-Loop all 32 channels are looped back to the E-1 line.The DELE1-UI must be in Loop-Timing mode to use this option. The default setting is **None**.

2.1.3   The WPIM Timeslot Configuration Table

The WPIM Timeslot Configuration Table allows the user to configure the way in which the DIGITAL WAN module uses the E-1 line. The configuration table consists of 32 Timeslots. Only 31 of the Timeslots are available for use because the first Timeslot is used by the device to transmit framing data. **N/A** (Not Available) always appears in Timeslot #1. You must assign each of the remaining 31 Timeslots an **Interface** number (for example, 002 for an active Interface number or 000 if the Timeslot is not used). When you lease an entire E-1 line, you can use all 31 Timeslots (the full E-1 bandwidth). If you lease only a fraction of the E-1, the service provider tells you which Timeslots to use.

> The DELE1-UI always uses the first Timeslot (Timeslot #1) to transmit framing data. A full E-1 line with 32 Timeslots has 31 customer-usable Timeslots.

You can utilize Timeslots any way you choose. The DELE1-UI supports Time Division Multiplexing (TDM) allowing channelization of circuits (Timeslots) within the public network. For example, if your WPIM has access to a full E-1 (31 customer-usable Timeslots), and you want to communicate with two other sites, your configuration might look like **Figure 2-2**.
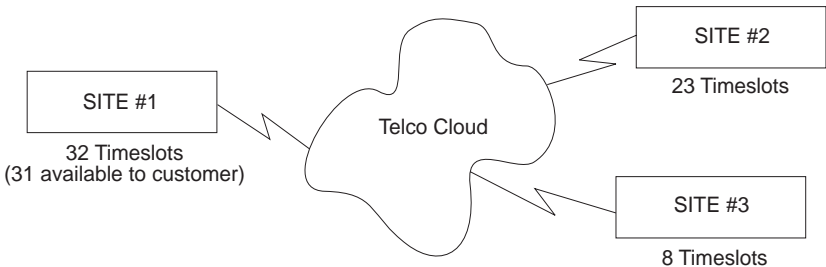
1484_02

Figure 2-2. Sample Timeslot Configuration

Figure 2-3 shows a sample configuration for three sites. Of the 32 Timeslots, Site #1 uses the first Timeslot for transmitting framing data, 23 Timeslots to communicate with Site #2 and the remaining 8 Timeslots to communicate with Site #3. This configuration varies tremendously depending on how the service provider maps out the E-1 Timeslots. Your service provider will tell you which Timeslots are active and where they go in the cloud.

1484_03

Figure 2-3. Sample Configuration

Site #1 is using the full E-1, so all the Timeslots must have an Interface assignment. Site #2 and Site #3 only use a fraction of the E-1, but the total quantity of Timeslots must match those of Site #1. Unused Timeslots receive an Interface number of 000.

> The Interface numbers of Site #1, Site #2 and Site #3 do not have to match. Only the **quantity** of Timeslots must match (the service provider assigns the Timeslots).

2.2   The WAN Interface Configuration Screen

This section describes the features of the WAN Interface Configuration screen. Access the screen by using the arrow keys to highlight the **WAN Int Config** option at the bottom of the Physical Configuration screen, then press ENTER. The WAN Interface Configuration screen shown in **Figure 2-4** appears.

```
<host name> Local Management                          Flash Image Version: xx.xx.xx

                         WAN INTERFACE CONFIGURATION




                              PT#  IF#  LID  STATE  PT#  IF#  LID  STATE
Interface Number:   [002]     001  001  Enet   UP   017
Data Compression: [NO]        002                   018
Max Xmit Unit:      0         003                   019
Line Coding:       [NONE]     004                   020
Active Protocol:   [NONE]     005                   021
                              006                   022
                              007                   023
                              008                   024
                              009                   025
                              010                   026
                              011                   027
                              012                   028
                              013                   029
                              014                   030
                              015                   031
                              016                   032




  SAVE      RETURN
```
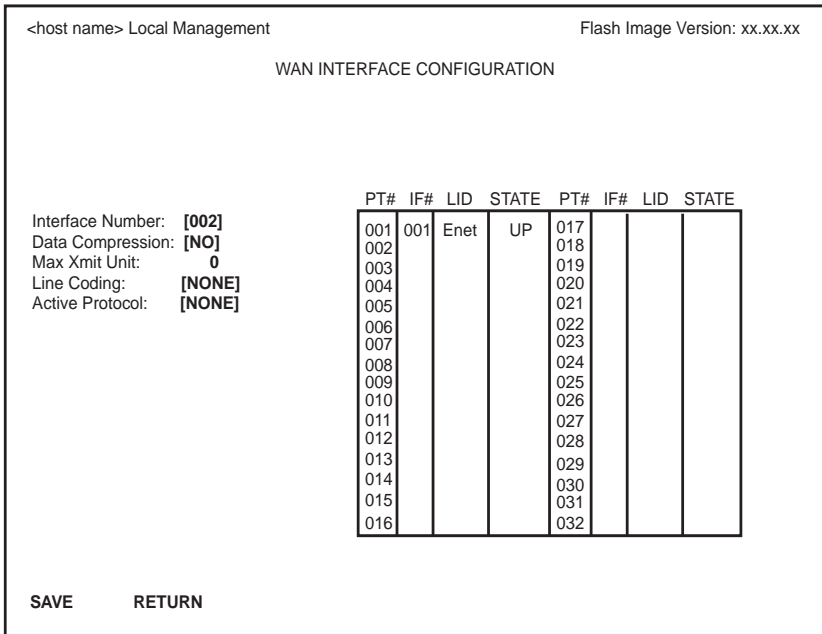
1484_04

Figure 2-4. WAN Interface Configuration Screen

2.2.1 WAN Interface Configuration Screen Fields

This section describe the WAN Interface Configuration screen fields.

Interface Number
Displays the active Interface Numbers. Use this field to configure the
Interface Numbers you assigned to the Timeslots on the WAN Physical
Configuration screen.

Data Compression
Displays the status of Data Compression. This field displays YES or NO.
The default setting is **NO**.

Max Xmit Unit

User-configured field that displays the maximum packet size that can be transmitted on the selected Interface. The default values are **8191** for PPP and **4095** for Frame Relay.

Line Coding

Displays the Line Coding for Timeslots associated with this interface. This field displays JBZS, INV-HDLC, or None. The default setting is **None**.

Active Protocol

Displays the active OSI Layer protocol. This field displays None, FR (Frame Relay), or PPP (Point-to-Point). The default setting is **None**.

If you select **PPP**, the following field appears:

> **PPP Type:** This field displays BNCP or LEX.

If you select **FR**, the following field appears:

> **FR LMP:** This field displays NO LMI, Q.933-A or T1.617-D. This field is normally set to **Q.933-A** (the European standard). The NO LMI setting is for specialized applications in which no Frame Relay Link Management is available or required.

If **NO LMI** is selected, the following fields are displayed:

> **DLCI Address:** This field can be set to values from 0-1023. The values 0-15 and 1008-1022 are reserved DLCI addresses.

> **Circuit State:** Toggles between Active, Inactive and Invalid.

PT#

Displays the application ports (bridge ports) available from the host platform to the WAN. If the active protocol is PPP, Local Management assigns only one application port per interface number (IF#). If the active protocol is Frame Relay, Local Management assigns the available WAN bridge ports from the host platform, one per DLCI.

You can assign WAN application ports to the 31 interfaces for the PPP configuration that suits your needs. In a Frame Relay configuration, you can assign all WAN application ports to one interface. In this example, the remaining 30 interfaces would not have WAN application ports available.

The quantity of application ports for a Frame Relay network is determined by the quantity of DLCIs (Data Link Connection Identifiers) assigned to that Interface. This is determined either manually or by the LMP (Link Management Protocol).

IF#

Displays the Interface that is associated with the application port.

LID

Displays the Link Identifier. If the active protocol is Frame Relay, the Data Link Connection Identifier is displayed. If the active protocol for this interface is PPP, then PPP appears in this field.

STATE

Displays the status of the application port. If the active protocol is Frame Relay, this field displays the status as Active, Inactive, or Disabled (for No LMI). If the active protocol is PPP, this field displays UP (for active) or DOWN (for inactive).

2.3   Full E-1 Configuration Using PPP

This section provides step-by-step instructions for configuring the DELE1-UI to use a full E-1 circuit in a PPP environment. This simplified example assumes the setup shown in **Figure 2-5** using a hub with a bridge router interface module containing a DELE1-UI at Site #1. Configurations may vary depending on the hub.
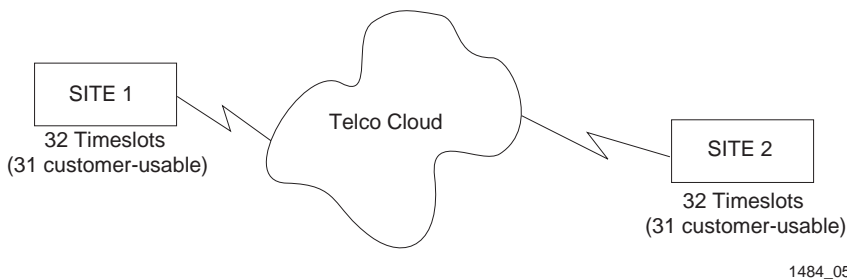
**Figure 2-5. Full E-1 Configuration**

The line configuration information shown in **Table 2-1** must be supplied by the service provider.

Table 2-1. Telco Configuration Information

Configuration Information Required By User	Configuration Information Supplied By Service Provider
Line Coding	HDB3 or AMI
Frame Type	E1 or E1-CRC
Clock Source	Loop Timing or Local Timing

2.3.1 DELE1-UI Physical Configuration

Begin the DELE1-UI configuration by accessing the WAN Physical
Configuration screen through Local Management (**Figure 2-1**). Access
the WAN Physical Configuration screen from the Feature Selection
screen that first appears when you enter Local Management. Use the
arrow keys to highlight the **WAN Configuration** option, then press
ENTER. The screen shown in **Figure 2-1** appears. Proceed with the
following steps:

1. Use the arrow keys to highlight the **[WPIM]** field at the bottom of the
    screen. Press the SPACEBAR to select the WPIM being configured,
    then press ENTER.

2. Use the arrow keys to highlight **Timeslot View**. Press the SPACEBAR
    to select **New**, then press ENTER. The cursor moves to Timeslot #2 of
    the Timeslot Configuration Table.

3. Insert an interface number (see note below) into every Timeslot. Type
    the number, press ENTER, then use the arrow keys to highlight the
    next Timeslot field. Exit this field by using the arrow keys. The cursor
    automatically moves to the **E1 Line Coding** field.

> The value assigned to the Timeslots is the interface being
> used for WAN communication. The available interface range
> is displayed on the WAN Physical Configuration screen (see
> **Figure 2-1**). You may insert any of the available interface
> numbers into the Timeslots.
>
> In the example shown in **Figure 2-1**, the interface range for a
> hub with a DELE1-UI in slot one of the HSIM is 2-33. Although
> any of these values may be used, DIGITAL recommends
> using the first available interface number (in this example
> interface #2).
>
> The following three steps are based on information supplied
> by the service provider. Consult the service provider for the
> correct settings.

4. Use the arrow keys to highlight **E1 Line Coding**. Press the
    SPACEBAR to select **HDB3** or **AMI**, then press ENTER.

5. Use the arrow keys to highlight **E1 Frame Type**. Press the
    SPACEBAR to select **E1** or **E1-CRC**, then press ENTER.

6. Use the arrow keys to highlight **E1 Tx Clock Source**. Press the
    SPACEBAR to select **Local** (no clock source provided by telephone
    company) or **Loop** (clock source provided by telephone company),
    then press ENTER.

> ⚠ If you are using a Local clock source, set only one end of the
> circuit for Local, the other end must be set for Loop.

7. Use the arrow keys to highlight **E1 Network Loopback.** Press the
    SPACEBAR to select **None**, then press ENTER.

8. Use the arrow keys to highlight the **SAVE** command, then press
    ENTER. The message "Save Done!" appears and Local Management
    saves the changes to memory.

9. Access the WAN Interface Configuration screen by using the arrow
    keys to highlight the **WAN Int Config** option, then press ENTER.

2.3.2 DELE1-UI Interface Configuration

This screen is accessed through the WAN Physical Configuration screen.
Refer to **Figure 2-4** and proceed with the following steps to configure the
WAN Interface through Local Management.

1. Set the WAN connection Interface Number by typing the same
    number into the **Interface Number** field that was input into the
    Timeslots in the WAN Physical Configuration screen, then press
    ENTER (see note on page 2-12).

2. Unless the user sets the Max Xmit Unit, the DELE1-UI automatically
    sets the **Max Xmit Unit** to **8191** (default) after the active protocol
    (PPP) is selected.

3. If the E1 Line Coding is **HDB3** on the previous screen:

    a. Use the arrow keys to highlight **Line Coding**. Press the
        SPACEBAR to select **None**, then press ENTER.

    b. Use the arrow keys to highlight **Active Protocol**. Press the
        SPACEBAR to select **PPP**, then press ENTER.

    c. Use the arrow keys to highlight **PPP Type**. Press the SPACEBAR
        to select **BNCP**, then press ENTER.

4. If the E1 Line Coding is **AMI** on the previous screen:

a. Use the arrow keys to highlight **Line Coding**. Press the SPACEBAR to select **INV-HDLC**, then press ENTER.

b. Use the arrow keys to highlight **Active Protocol**. Press the SPACEBAR to select **PPP**, then press ENTER.

c. Use the arrow keys to highlight **PPP Type**. Press the SPACEBAR to select **BNCP**, then press ENTER.

5. Use the arrow keys to highlight the **SAVE** command, then press ENTER. The message "Save Done!" appears and Local Management saves the changes to memory.

> Upon saving this screen, the interface just configured is assigned to an application port (PT#) in the table on the right hand side of the screen.

The WAN configuration is complete. It takes up to 60 seconds for the WAN Interface to come out of standby and for communications to begin.

2.4   Fractional E-1 Configuration Using PPP

This section provides step-by-step instructions for configuring the DELE1-UI to use a fractional E-1 circuit in a PPP environment. This example assumes the setup shown in **Figure 2-6** using two hubs each with an HSIM containing a DELE1-UI. Configurations may vary depending on the hub. In a fractional E-1 setup, only a portion of the 32 Timeslots or DS-0's are used.

> The terms DS-0 (Digital Signal, level 0) and Timeslot are used synonymously in this guide to represent a standard 64,000 bit/second channel.
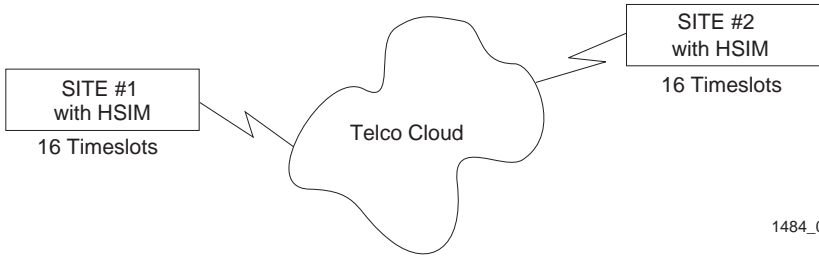
Figure 2-6. Fractional E-1 Configuration

The line configuration information shown in **Table 2-2** must be supplied
by the service provider.

Table 2-2. Telco Configuration Information

Configuration Information Required By User	Configuration Information Supplied By Service Provider
Line Coding	HDB3 or AMI
Frame Type	E1 or E1-CRC
Clock Source	Loop Timing or Local Timing
DS-0's (Timeslots)	Timeslots being used for each end of the circuit

2.4.1   DELE1-UI Physical Configuration

Begin the DELE1-UI configuration by accessing the WAN Physical
Configuration screen through Local Management (**Figure 2-1**). Proceed
with the following steps:

1.   Use the arrow keys to highlight the **[WPIM]** field at the bottom of the
     screen. Press the SPACEBAR to toggle the field to the WPIM being
     configured, then press ENTER.

2. Use the arrow keys to highlight **Timeslot View**. Press the SPACEBAR to select **New**, then press ENTER. The cursor moves to Timeslot #2 of the Timeslot Configuration Table.

3. Insert an interface number (see the note below) into every Timeslot being used (in the example shown in **Figure 2-6**, 16 Timeslots are being used, the rest have zeros in them). Type the number, press ENTER, then use the arrow keys to highlight the next Timeslot field. Exit this field by using the arrow keys.The cursor automatically moves to the **E1 Line Coding** field.

> The value assigned to the Timeslots is the interface being used for WAN communication. The available interface range is displayed on the WAN Physical Configuration screen (see **Figure 2-1**). You may insert any of the available interface numbers into the Timeslots.
>
> In the example shown in **Figure 2-1**, the interface range for a hub with a DELE1-UI in slot one of the HSIM is 2-33. Although any of these values may be used, DIGITAL recommends using the first available interface number (in this example interface #2).
>
> The following three steps are based on information supplied by the service provider. Consult the service provider for the correct settings.

4. Use the arrow keys to highlight **E1 Line Coding**. Press the SPACEBAR to select **HDB3** or **AMI**, then press ENTER.

5. Use the arrow keys to highlight **E1 Frame Type**. Press the SPACEBAR to select **E1** or **E1-CRC**, then press ENTER.

6. Use the arrow keys to highlight **E1 Tx Clock Source**. Press the SPACEBAR to select **Local** (no clock source provided by telephone company) or **Loop** (clock source provided by telephone company), then press ENTER.

!\ If you are using a Local clock source, set only one end of the circuit for Local, the other end must be set for Loop.

7. Use the arrow keys to highlight the **SAVE** command, then press ENTER. The message "Save Done!" appears and Local Management saves the changes to memory.

8. Access the WAN Interface Configuration screen by using the arrow keys to highlight the **WAN Int Config** option and then press ENTER.

2.4.2   DELE1-UI Interface Configuration

This screen is accessed through the WAN Physical Configuration screen. Proceed with the following steps to configure the WAN Interface through Local Management.

1. Set the WAN connection Interface Number by typing the same number into the **Interface Number** field that was input into the Timeslots in the WAN Physical Configuration screen, then press ENTER (see note on page 2-17).

2. Unless the user sets the Max Xmit Unit, the DELE1-UI automatically sets the **Max Xmit Unit** to **8191** (default) after the active protocol (PPP) is selected.

3. If the E1 Line Coding is **HDB3** on the previous screen:

    a. Use the arrow keys to highlight **Line Coding**. Press the SPACEBAR to select **None**, then press ENTER.

b.   Use the arrow keys to highlight **Active Protocol**. Press the
     SPACEBAR to select **PPP**, then press ENTER.

c.   Use the arrow keys to highlight **PPP Type**. Press the SPACEBAR
     to select **BNCP**, then press ENTER.

4.   If the E1 Line Coding is **AMI** on the previous screen:

a.   Use the arrow keys to highlight **Line Coding**. Press the
     SPACEBAR to select **INV-HDLC**, then press ENTER.

b.   Use the arrow keys to highlight **Active Protocol**. Press the
     SPACEBAR to select **PPP**, then press ENTER.

c.   Use the arrow keys to highlight **PPP Type**. Press the SPACEBAR
     to select **BNCP**, then press ENTER.

5.   Use the arrow keys to highlight the **SAVE** command, then press
     ENTER. The message "Save Done!" appears and Local Management
     saves the changes to memory.

> Upon saving this screen, the interface just configured is
> assigned to an application port (PT#) in the table on the right
> hand side of the screen.

The WAN configuration is complete. It takes up to 60 seconds for the
WAN Interface to come out of standby and for communications to begin.

2.5   Frame Relay Configuration

This section provides step-by-step instructions for configuring the DELE1-UI to use an E-1 circuit in a Frame Relay environment. This example assumes the setup shown in **Figure 2-7** using two hubs each with a WPIM containing a DELE1-UI. Configurations may vary depending on the hub.
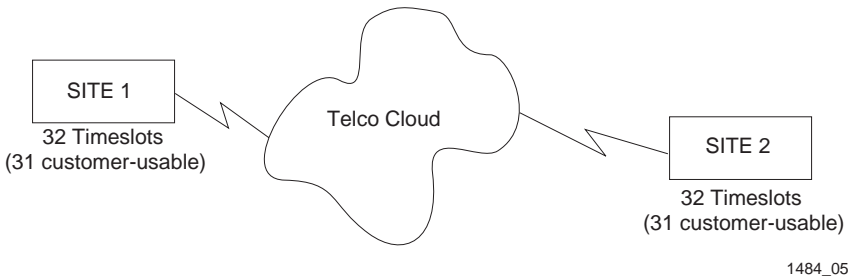
Figure 2-7. Frame Relay Configuration

The following information must be supplied to the service provider.

• LMP type: **Q.933-A**

The line configuration information shown in **Table 2-3** must be supplied by the service provider.

Table 2-3. Telco Configuration Information

Configuration Information Required By Customer	Information Supplied By Service Provider
Line Coding	HDB3 or AMI
Frame Type	E1 or E1-CRC
Clock Source	Loop Timing or Local Timing
DSO's (Timeslots)	Timeslots being used for each end of the circuit

2.5.1   DELE1-UI Physical Configuration

Begin the DELE1-UI configuration by accessing the WAN Physical Configuration screen through Local Management (**Figure 2-1**). Proceed with the following steps:

1. Use the arrow keys to highlight the **[WPIM]** field at the bottom of the screen. Press the SPACEBAR to select the WPIM being configured, then press ENTER.

2. Use the arrow keys to highlight **Timeslot View**. Press the SPACEBAR to select **New**, then press ENTER. The cursor moves to Timeslot #2 of the Timeslot Configuration Table.

3. Insert an interface number (see note below) into every Timeslot being used. Type the number, press ENTER, then use the arrow keys to highlight the next Timeslot field. Exit this field by using the arrow keys. The cursor automatically moves to the **E1 Line Coding** field.

> The value assigned to the Timeslots is the interface being used for WAN communication. The available interface range is displayed on the WAN Physical Configuration screen (see **Figure 2-1**). You may insert any of the available interface numbers into the Timeslots.
>
> In the example shown in **Figure 2-1**, the interface range for a hub with a DELE1-UI in slot one of the HSIM is 2-33. Although any of these values may be used, DIGITAL recommends using the first available interface number (in this example interface #2).
>
> The following three steps are based on information supplied by the service provider. Consult the service provider for the correct settings.

4. Use the arrow keys to highlight **E1 Line Coding**. Press the SPACEBAR to select **HDB3** or **AMI**, then press ENTER.

5.   Use the arrow keys to highlight **E1 Frame Type**. Press the
     SPACEBAR to select **E1** or **E1-CRC**, then press ENTER.

6.   Use the arrow keys to highlight **E1 Tx Clock Source**. Press the
     SPACEBAR to select **Local** (no clock source provided by telephone
     company) or **Loop** (clock source provided by telephone company),
     then press ENTER.

> If you are using a Local clock source, set only one end of the
> circuit for Local, the other end must be set for Loop.

7.   Use the arrow keys to highlight the **SAVE** command, then press
     ENTER. The message "Save Done!" appears and Local Management
     saves the changes to memory.

8.   Access the WAN Interface Configuration screen by using the arrow
     keys to highlight the **WAN Int Config** option and then press ENTER.

2.5.2   DELE1-UI Interface Configuration

This screen is accessed through the WAN Physical Configuration screen.
Proceed with the following steps to configure the WAN Interface through
Local Management.

1.   Set the WAN connection Interface Number by typing the same
     number into the **Interface Number** field that was input into the
     Timeslots in the WAN Physical Configuration screen, then press
     ENTER (see note on page 2-21).

2.   Use the arrow keys to highlight **Line Coding**. Press the SPACEBAR
     to select **None**, then press ENTER.

3.   Use the arrow keys to highlight **Active Protocol**. Press the
     SPACEBAR to select **FR**, then press ENTER.

4.   Use the arrow keys to highlight **FR LMP**. Press the SPACEBAR to
     select **Q.933-A**, then press ENTER.

5. Use the arrow keys to highlight the **SAVE** command, then press ENTER. The message "Save Done!" appears and Local Management saves the changes to memory.

> Upon saving this screen, the interface just configured is assigned to an application port (PT#) in the table on the right hand side of the screen once the device starts communicating with the service provider's switch.

The WAN configuration is complete. Communications between the DELE1-UI and the service provider's switch takes approximately 1-2 minutes to begin. A status of **Inactive** appears until both ends of the PVC (Permanent Virtual Circuit) are configured. Once both end devices have negotiated link management with the switches, the status field reads **Active**.

2.6   LEX Configuration

This section provides step-by-step instructions for configuring the DELE1-UI to operate in a LEX environment. LEX (LAN Extender) is a Cisco Systems protocol that allows a core router to communicate to a remote site using PPP.

The line configuration information shown in **Table 2-4** must be supplied by the service provider.

Table 2-4. Telco Configuration Information

Configuration Information Required by User	Configuration Information Supplied by Service Provider
Line Coding	HDB3 or AMI
Frame Type	E1 or E1-CRC
Clock Source	Loop Timing or Local Timing

2.6.1   DELE1-UI Physical Configuration

Begin the DELE1-UI configuration by accessing the WAN Configuration
screen through Local Management (**Figure 2-1**). Access the WAN
Physical Configuration screen from the Feature Selection screen that first
appears when you enter Local Management. Use the arrow keys to
highlight the WAN Configuration option, then press ENTER. The screen
shown in **Figure 2-1** appears. Proceed with the following steps:

1. Use the arrow keys to highlight the **[WPIM]** field at the bottom of the
    screen. Press the SPACEBAR to select the WPIM being configured,
    then press ENTER.

2. Use the arrow keys to highlight **Timeslot View**. Press the SPACEBAR
    to select **New**, then press ENTER. The cursor moves to Timeslot #2 of
    the Timeslot Configuration Table.

3. Insert an interface number (see note below) into every Timeslot being
    used. Type the number, press ENTER, then use the arrow keys to
    highlight the next Timeslot field. Exit this field by using the arrow
    keys.The cursor automatically moves to the **E1 Line Coding** field.

> The value assigned to the Timeslots is the interface being
> used for WAN communication. The available interface range
> is displayed on the WAN Physical Configuration screen (see
> **Figure 2-1**). You may insert any of the available interface
> numbers into the Timeslots.
>
> In the example shown in **Figure 2-1**, the interface range for a
> hub with a DELE1-UI in slot one of the HSIM is 2-33. Although
> any of these values may be used, DIGITAL recommends
> using the first available interface number (in this example
> interface #2).
>
> The following three steps are based on information supplied
> by the service provider. Consult the service provider for the
> correct settings.

4. Use the arrow keys to highlight **E1 Line Coding**. Press the
    SPACEBAR to select **HDB3** or **AMI**, then press ENTER.

5. Use the arrow keys to highlight **E1 Frame Type**. Press the SPACEBAR to select **E1** or **E1-CRC**, then press ENTER.

6. Use the arrow keys to highlight **E1 Tx Clock Source**. Press the SPACEBAR to select **Local** (no clock source provided by telephone company) or **Loop** (clock source provided by telephone company), then press ENTER.

> ⚠️ If you are using a Local clock source, set only one end of the circuit for Local, the other end must be set for Loop.

7. Use the arrow keys to highlight the **SAVE** command, then press ENTER. The message "Save Done!" appears and Local Management saves the changes to memory.

8. Access the WAN Interface Configuration screen by using the arrow keys to highlight the **WAN Int Config** option and then press ENTER.

2.6.2   DELE1-UI Interface Configuration

This screen is accessed through the WAN Physical Configuration screen. Refer to **Figure 2-4** and proceed with the following steps to configure the WAN Interface through Local Management.

1. Set the WAN connection Interface Number by typing the same number into the **Interface Number** field that was input into the Timeslots in the WAN Physical Configuration screen, then press ENTER (see note on page 2-24).

2. Unless the user sets the Max Xmit Unit, the DELE1-UI automatically sets the **Max Xmit Unit** to **8191** (default) after the active protocol (PPP) is selected.

3. If the E1 Line Coding is **HDB3** on the previous screen:

    a. Use the arrow keys to highlight **Line Coding**. Press the SPACEBAR to select **None**, then press ENTER.

b. Use the arrow keys to highlight **Active Protocol**. Press the SPACEBAR to select **PPP**, then press ENTER.

c. Use the arrow keys to highlight **PPP Type**. Press the SPACEBAR to select **LEX**, then press ENTER.

4. If the E1 Line Coding is **AMI** on the previous screen:

a. Use the arrow keys to highlight **Line Coding**. Press the SPACEBAR to select **INV-HDLC**, then press ENTER.

b. Use the arrow keys to highlight **Active Protocol**. Press the SPACEBAR to select **PPP**, then press ENTER.

c. Use the arrow keys to highlight **PPP Type**. Press the SPACEBAR to select **LEX**, then press ENTER.

5. Use the arrow keys to highlight the **SAVE** command, then press ENTER. The message "Save Done!" appears and Local Management saves the changes to memory.

Upon saving this screen, the interface just configured is assigned to an application port (PT#) in the table on the right hand side of the screen.

The WAN configuration is complete. It takes up to 60 seconds for the WAN Interface to come out of standby and for communications to begin.

APPENDIX A

WAN INTERFACE CABLE SPECIFICATIONS

This appendix provides the Cabletron Systems part numbers and connector information for the DELE1-UI Line Interface Cables.

Table A-1. Cabletron DELE1-UI Cable Part Numbers

Interface Cable	Cabletron Part Number
20 foot E1 Line Interface Cable	9372095-20[1]
E1 Line Interface Cable	9372095-L[2]

1. Standard 20 foot E1 Line Interface Cable.
2. (L denotes length required in feet or meters). For example: 9372095-3 denotes a 3 foot cable; 9372095-3M denotes a 3 meter cable.

Table A-2. DELE1-UI Connector Information

Cabletron interface cable part number	9372095-L
Description	E1 line interface cable
Connector 1	RJ45
Connector 2	RJ45

Table A-3. DELE1-UI RJ45 Connector Pin Assignments

Pin	Signal
1	Receive Ring
2	Receive Tip
3	Shield Ground
4	Transmit Ring
5	Transmit Tip
6	Shield Ground
7	Not Used
8	Not Used

Table A-4. RJ45 DTE Pin Assignments

Pin	Signal
1	Receive Ring
2	Receive Tip
3	Shield Ground
4	Transmit Ring
5	Transmit Tip
6	Shield Ground
7	Not Used
8	Not Used

Table A-5. RJ45 Network Pin Assignments

Pin	Signal
1	Receive Ring
2	Receive Tip
3	Not Used
4	Transmit Ring
5	Transmit Tip
6	Not Used
7	Not Used
8	Not Used

APPENDIX B

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).

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 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.
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.
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.

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.

MUX   Multiplexer, an electronic device that allows two or more signals to pass over one communications circuit.

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 1970's.

T-1   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 DS-0 (Digital Signal, level 0).

WAN   Wide Area Network, a network spanning a large geographic area.

WPIM   WAN Physical Interface Module, provides connectivity/functionality for WAN modules.

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