HST-3000

Frame Relay Testing

User's Guide

JDSU

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Ordering information

This guide is a product of JDSU's Technical Information Development Department, issued as part of the HST-3000. The catalog number for a printed user's guide is ML-058801. The catalog number for a CD-ROM containing all HST-3000 user documentation is CML-060301.

Federal Communications Commission (FCC) Notice

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

– Reorient or relocate the receiving antenna.
– Increase the separation between the equipment and receiver.
– Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
– Consult the dealer or an experienced radio/TV technician for help.

In order to maintain compliance with the limits of a Class B digital device JDSU requires that quality interface cables be used when connecting to this equipment. Any changes or modifications not expressly approved by JDSU could void the user's authority to operate the equipment.

Industry Canada Requirements

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

WEEE and Battery Directive Compliance

JDSU has established processes in compliance with the Waste Electrical and Electronic Equipment (WEEE) Directive, 2002/96/EC, and the Battery Directive, 2006/66/EC.

This product, and the batteries used to power the product, should not be disposed of as unsorted municipal waste and should be collected separately and disposed of according to your national regulations. In the European Union, all equipment and batteries purchased from JDSU after 2005-08-13 can be returned for disposal at the end of its useful life. JDSU will ensure that all waste equipment and batteries returned are reused, recycled, or disposed of in an environmentally friendly manner, and in compliance with all applicable national and international waste legislation.

It is the responsibility of the equipment owner to return equipment and batteries to JDSU for appropriate disposal. If the equipment or battery was imported by a reseller whose name or logo is marked on the equipment or battery, then the owner should return the equipment or battery directly to the reseller.

Instructions for returning waste equipment and batteries to JDSU can be found in the Environmental section of JDSU's web site at www.jdsu.com. If you have questions concerning disposal of your equipment or batteries, contact JDSU's WEEE Program Management team at WEEE.EMEA@jdsu.com.

Contents

About This Guide

Topics discussed in this chapter include the following:

Purpose and scope

The purpose of this guide is to help you successfully use the features and capabilities of the HST-3000 Frame Relay testing option. This guide includes task-based instructions that describe how to configure, use, and troubleshoot the HST-3000 for frame relay testing.

Assumptions

This guide is intended for novice, intermediate, and experienced users who want to use the HST-3000 Frame Relay testing option efficiently and effectively. We assume that you have basic computer experience and are familiar with basic telecommunications safety, concepts, and terminology.

Terminology

The following terms have a specific meaning when they are used in this guide:

- **HST-3000** — Handheld Services Tester 3000. In this user's guide, "HST-3000" can be used to refer to the HST-3000 family of products or the combination of a base unit and attached SIM. "HST" is sometimes used to refer to the base unit/SIM combination.
- **SIM** — Service Interface Module. Sometimes referred to generically as the module. The SIM provides test application functionality.

For definitions of other terms used in this guide, see "Glossary" on page 53.

Frame relay testing user's guide

The *HST-3000 Frame Relay Testing User's Guide* is an application-oriented guide intended to help you use the HST to commission and maintain frame relay links. This guide includes the following information:

- Step-by-step instructions for performing frame relay tests using the HST
- Troubleshooting information
- Descriptions of test results
- Technical support contact information

The *HST-3000 Frame Relay Testing User's Guide* should be used in conjunction with the *HST-3000 Base Unit User's Guide*, and the user's guide for the physical interface you are testing.

Interface user's guides

The three interface user's guides describe the results associated with physical interface testing:

- *HST-3000 T1 Testing User's Guide*
- *HST-3000 E1 Testing User's Guide*
- *HST-3000 Data Communications Testing User's Guide*
- *HST-3000 DDS Local Loop Testing User's Guide*

Base unit user's guide

The *HST-3000 Base Unit User's Guide* contains overall information about the base unit and general functions such as instructions for charging the battery, managing files, information on peripheral support, and technical specifications for the base unit. The base unit user's guide also contains a description of Acterna's warranty, services, and repair information, including terms and conditions of the licensing agreement.

Safety and compliance information

Safety and compliance information are provided in the *HST Safety and Compliance Information* booklet included with the HST-3000 user documentation CD-ROM.

Technical assistance

If you need assistance or have questions related to the use of this product, call or e-mail JDSU's Technical Assistance Center (TAC) for customer support. Before contacting TAC, you should have the serial numbers for your HST-3000 unit. See "Locating the serial number" in the *HST-3000 Base Unit User's Guide* for more information.

Table 1 lists TAC information. For the latest TAC contact information, go to www.jdsu.com, or contact your local sales office for assistance. For contact information for regional sales offices, see the back cover of this guide.

Table 1 Technical assistance centers

Region	Phone Number	
Americas	1-866-ACTERNA 301-353-1550	(1-866-228-3762) tac@jdsu.com
Europe, Africa, and Mid-East	+49 (0) 7121 86 1345 (JDSU Germany)	hotline.europe@jdsu.com
Asia and the Pacific	+852 2892 0990 (Hong Kong) +8610 6833 7477 (Beijing-China)	

During off-hours, you can request assistance by doing one of the following: leave a voice mail message at the Technical Assistance number, e-mail the North American Technical Assistance Center, tac@jdsu.com, or submit your question using our online Technical Assistance Request form at www.jdsu.com.

Conventions

When applicable, this guide uses the typographical conventions and symbols described in the following tables.

Table 2 Typographical conventions

Description	Example
User interface actions and buttons or switches you have to press appear in this **typeface**.	Press the **OK** key.
Code and output messages appear in this `typeface`.	`All results okay`

Table 2 Typographical conventions (Continued)

Description	Example
Text you must type exactly as shown appears in this **`typeface`**.	Type: **`a:\set.exe`** in the dialog box.
Variables appear in this **typeface**.	Type the new **hostname**.
Book references appear in this *typeface*.	Refer to *Newton's Telecom Dictionary*

Table 3 Keyboard and menu conventions

Description	Example
A plus sign + indicates simultaneous keystrokes.	Press **Ctrl+s**
A comma indicates consecutive key strokes.	Press **Alt+f,s**
A slanted bracket (>) indicates choosing a submenu from menu.	On the menu bar, click **Start > Program Files**.

Table 4 Symbol conventions

This symbol represents a general hazard.

This symbol represents a risk of electrical shock.

This symbol represents a risk of explosion

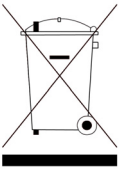
	This symbol represents a Note indicating related information or tip.
	This symbol, located on the equipment, battery, or packaging indicates that the equipment or battery must not be disposed of in a land-fill site or as municipal waste, and should be disposed of according to your national regulations.

Table 5 Safety definitions

DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

Getting Started

1

This chapter provides basic information about the HST-3000 Frame Relay testing option. Topics discussed in this chapter include the following:

Overview of features

The HST-3000 Frame Relay option provides the tools you need to commission and maintain frame relay services. The Frame Relay option offers the following features and capabilities:

– Traffic Generation. You can use the HST to generate frame relay frames and define traffic characteristics such as the frame header, frame length, and transmission rate and time. You can also configure the HST to transmit fixed or bursty traffic loads to stress the network.

– Traffic Monitoring. The HST can non-intrusively monitor frame relay traffic and gather results in both directions. Statistics, including throughput rates, lost and received frames, and congestion notification, are collected. You can also display the status of all active DCLIs.

– LMI Analysis. The HST can monitor or emulate UNI-user, UNI-network, or NNI interfaces. LMI messages can be captured and decoded into a link trace. LMI statistics such as message type, message count, errors, and timeouts are collected. The HST supports Annex D (ANSI T1.617) and LMI Rev 1 LMI types.

– Ping Testing. You can ping remote network equipment to ensure there is connectivity through the network. Ping statistics are collected to give you an indication of network performance.

Status LEDs

Six status LEDs located on the front of the HST-3000, above the LCD screen. Table 1 describes the LEDs.

Table 1 Status LEDs

LED	Description
Sync	A two-color LED that reports the presence of a signal on the selected application. – Solid green indicates a signal is present and there is frame synchronization on all active receivers. – Flashing green indicates auto-framing is running on at least one active receiver. – Solid red indicates at least one of the active receivers does not have signal or frame synchronization. – If the Sync LED is not illuminated, no signal has been detected on any active receiver.
Data	A two-color LED that reports valid frame relay frames. – Solid green indicates valid frame relay frames are being received on all active receivers. – Solid red indicates at least one of the active receivers is not receiving valid frame relay frames. The LED will illuminate red after 30 seconds of inactivity.
Error	An LED that reports error conditions. – Solid red indicates an error. – If the Error LED is not illuminated it means all results are OK.
Alarm	An LED that reports alarm status. – Solid red indicates an alarm was detected. – If the Alarm LED is not illuminated, then no alarm was detected.

Table 1 Status LEDs (Continued)

LED	Description
LpBk	This LED indicates the local loopback state of the HST unit. – Solid green indicates the HST has been placed in loopback by the remote end. – If the LpBk LED is not illuminated, there is no local loopback.
Batt	A three-color LED that indicates the battery status. – The LED is off when the battery has a useful charge. – Solid green indicates the AC adapter is plugged in. – Solid red indicates the battery is at 20 percent or below of full charge. – Flashing red indicates about five minutes of use remain. When this happens, the battery should be charged or replaced immediately. – Solid amber or flashing amber indicates the battery capacity indicator (“gas gauge”) needs to be reset. **NOTE:** For information about charging the battery, changing batteries, and resetting the battery capacity indicator, see the *HST-3000 Base Unit User’s Guide*.

Operating modes

Table 1 lists the interfaces and the operating modes on which you can perform frame relay test operations.

Table 2 Interfaces and test modes

Interface	Available Test Mode
T1 (full rate, fractional rate, or a DS1 drop from a DS3)	– **Terminate**: Allows you to transmit and receive frame relay frames using a single receiver/transmitter pair. Terminate mode tests are intrusive and require the circuit to be out of service. – **Monitor**: Allows you to monitor a live frame relay circuit. Results are gathered for both directions. The HST-3000 can monitor the local management interface (LMI) and decode and display LMI messages. Also, an overview of all the active DLCIs and their status is displayed. Any errors or anomalies on the link are also detected and reported. Monitoring is a non-intrusive test operation that does not interrupt service.
E1 (bulk or n x 64 K)	– **Terminate**: Allows you to transmit and receive frame relay frames using a single receiver/transmitter pair. Terminate mode tests are intrusive and require the circuit to be out of service. – **Monitor**: Allows you to monitor a live frame relay circuit. Results are gathered for both directions. The HST-3000 can monitor the local management interface (LMI) and decode and display LMI messages. Also, an overview of all the active DLCIs and their status is displayed. Any errors or anomalies on the link are also detected and reported. Monitoring is a non-intrusive test operation that does not interrupt service.

Table 2 Interfaces and test modes (Continued)

Interface	Available Test Mode
Datacom	– **DTE Emulation**: Allows the HST to emulate a data communications equipment (DCE) device while transmitting and receiving frame relay frames. – **DCE Emulation**: Allows the HST to emulate a data terminal equipment (DTE) device while transmitting and receiving frame relay frames. – **Monitor**: Allows you to monitor a live frame relay circuit. *See* Monitor mode for the T1 interface.
DDS Four-Wire Local Loop	– **Terminate**: Allows you to transmit and receive frame relay frames. Terminate mode separates the transmit and receive sides of a DDS path. The input signal is terminated at the receive side, and a totally independent signal is generated for the output.

Instrument settings and user preferences

For information about changing instrument and preference settings, such as date and time format, port settings, sound, and screen settings, see the *HST-3000 Base Unit User's Guide*.

Frame Relay Testing

2

This chapter provides information about using the HST for Frame Relay testing. Topics discussed in this chapter include the following:

About frame relay testing

After the physical interface has been verified, you can use the HST-3000 Frame Relay option to monitor frame relay traffic, and to transmit and receive frame relay frames to commission and maintain frame relay services.

When you purchase the Frame Relay testing feature, results such as LMI message stats, error results, DCLI status, and link trace results are available. Additionally, all the results related to the physical interface are available. For details on the interface results, see the following guides:

– *HST-3000 T1 Testing User's Guide*
– *HST-3000 E1 Testing User's Guide*
– *HST-3000 Data Communications Testing User's Guide*
– *HST-3000 DDS Local Loop Testing User's Guide*

The following sections describe how to configure an HST-3000 with the Frame Relay option to perform test operations.

NOTE:

Before you can perform a test operation, you must connect a SIM to the base unit and power on the HST-3000. For information on connecting a SIM and powering the unit, see the *HST-3000 Base Unit User's Guide*.

For information about purchasing the Frame Relay option or other HST products, contact an JDSU sales representative.

Accessing the test configuration menus

The following procedure describes how to view the menus you will use to configure the test settings.

To access the test configuration menus

1 Press the green power button to turn on the HST.

It may take several seconds for the unit to power on. When a menu appears, you can continue using the unit.

2 Select the interface on which you want to test:

Interface	Action
T1/FT1	Press the **T1** soft key.
E1	Press the **E1** soft key.
DDS four-wire local loop	Press the **DDS-LL** soft key.
Datacom	Press the **DATACOM** soft key.

3 Select **Frame Relay**.

4 Press the **Configure** navigation key.

The Summary Settings screen appears. This screen provides the most important settings for the test.

5 Review the Summary Settings.

If the settings are appropriate for your test, press the **Home** key.

To change the settings, do one of the following:

– Navigate to the desired item by selecting the item number using the keypad

– Use the arrow keys to highlight the item and then press OK.

If you want to configure additional settings, use the test configuration soft keys. The soft keys associated with frame relay parameters are as follows: FR LOAD, FR HEADER, FR LMI, and Trace. Other soft keys are available and will vary depending on the interface you selected.

Configuring the test mode

The following procedure describes how to set the test mode. For more information about these modes, see "Operating modes" on page 5.

To specify the test mode

1 Access the test configuration menus. See "Accessing the test configuration menus" on page 8.

2 Press one of the following soft keys:

- **DS1**
- **INTERFACE (E1)**
- **DATACOM**
- **DDS**

A test configuration menu appears.

3 Select **Test Mode**, and then select a mode for the test operation. The following table lists the available test modes.

Interface	Available Test Mode
T1/FT1	Terminate, Monitor
E1	Terminate, Monitor
Datacom	DTE Emulation, DCE Emulation, Monitor
DDS Four-Wire Local Loop	You do not have to specify a test mode for DDS four-wire local loop test operations.

4 To configure other test settings, select a setting and then specify the parameters. You can also configure settings using the other soft keys.

5 To return to the test result display area, press the **Home** navigation key.

You have specified the test mode for the HST.

Configuring the frame load settings

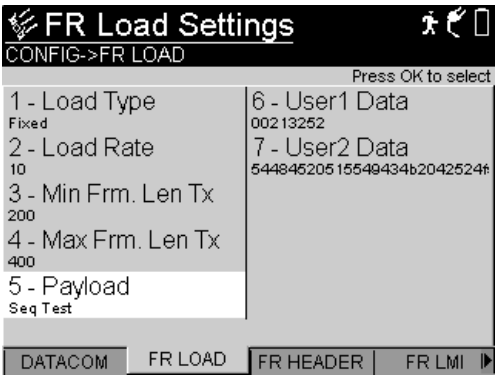
You can configure frame characteristics such as the traffic load type and rate, frame length, and payload data. The following procedure describes how to specify these characteristics.

To configure frame load settings

1 Access the test configuration menus. See "Accessing the test configuration menus" on page 8.

2 Press the **FR LOAD** soft key.

The FR Load Settings menu appears.



3 Select a setting, and then specify the parameters for that setting. The following table describes the frame relay load settings and parameters.

Setting	Parameters
Load Type	Select a traffic load type: – **Off**: No traffic load is generated. – **Fixed**: Causes the HST to transmit frames constantly at a specified rate. – **Burst**: Causes the HST to transmit a burst of traffic followed by a specified period of no frame transmissions (burst idle time). – **Ping**: Causes the HST to transmit ICMP echo request packets to a specified IP address. For information about ping testing and descriptions of the ping settings, see "Connectivity testing (ping)" on page 36.
Load Rate (Fixed loads only)	Enter a value, from **10** to **10000** Kbps, for the data load rate. **Note:** It is possible to enter a load rate that exceeds the data rate for the interface.
Burst Tx Time (Burst loads only)	Time, ranging from 0.1 to 99.9 seconds, during which the HST transmits a burst of traffic between idle time. **Note:** To type a decimal point, use the asterisk (*) key on the HST keypad.
Burst Idle Time (Burst loads only)	Time, ranging from 0.1 to 99.9 seconds, during which the HST is idle and does not transmit traffic between bursts.

Setting	Parameters
Min Frame Len Tx	Enter a value, from **5** to **9999** bytes, for the minimum frame length to be transmitted. **Note**: Assigning the same value to the Min Frame Len Tx and Max Frame Len Tx will cause a fixed-length frame to be transmitted.
Max Frame Len Tx	Enter a value, from **5** to **9999** bytes, for the maximum frame length to be transmitted.
Payload	Select the type of payload: – **Seq Test**: Transmits a sequential count from 0 to 65,535. The remainder of the data is a fixed pattern. Generated frames that are not of a length sufficient to conform to RFC 2427 will not have a TTC Test Frame Header. The HST analyzes received TTC test frames sequence numbers to check for lost frames. – **User 1 Data**: Transmits a user-defined hexidecimal payload from 1 to 64 bytes long. – **User 2 Data**: Transmits a user-defined hexidecimal payload from 1 to 64 bytes long. – **Seq + User 1**: Transmits the sequential count (0 to 65,535), and then the user-defined hexidecimal payload. **Note:** If you select the User 1 Data, User 2 Data, or Seq + User 1 payload, be certain to define the data.
User 1 Data (User 1 Data or Seq + User 1 payloads only)	Enter a hexidecimal value from **1** to **64** bytes long.

Setting	Parameters
User 2 Data (User 2 Data payload only)	Enter a hexidecimal value from **1** to **64** bytes long.

4 Do one of the following:

- To configure other test settings, press a different soft key.
- To return to the test result display area, press the **Home** navigation key.

The frame load settings are configured.

Configuring the frame header settings

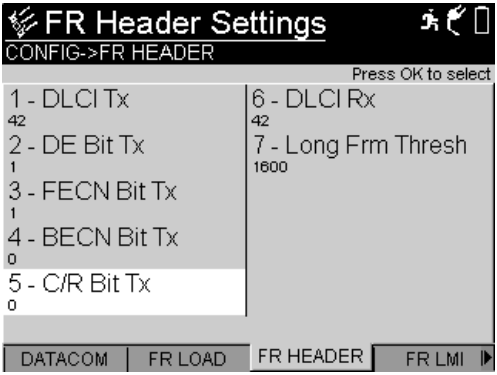
You can specify characteristics for the frame header such as transmit (Terminate mode only) and receive DLCIs, and whether the transmit control bits (DE, FECN, BECN, and C/R) are active.

To specify frame header settings

1 Access the test configuration menus. See "Accessing the test configuration menus" on page 8.

2 Press the **FR HEADER** soft key.

The FR Header Settings menu appears.



3 Select a setting, and then specify the parameters for that setting. The following table describes the available frame relay header settings.

Setting	Parameters
DLCI Tx	Enter a value, from **0** to **1023**, for the transmitted data link connection identifier (DLCI).
DE Bit Tx	Enter one of the following values for the discard eligibility indicator: – **1**: Indicates the field is checked. – **0**: Indicates the field is blank.
FECN Bit Tx	Enter one of the following values for the forward explicit congestion notification bit: – **1**: Indicates the field is checked. – **0**: Indicates the field is blank.
BECN Bit Tx	Enter one of the following values for the backward explicit congestion notification: – **1**: Indicates the field is checked. – **0**: Indicates the field is blank.

Setting	Parameters
C/R Bit Tx	Enter one of the following values for the command/response field bit: – **1**: Indicates the field is checked. – **0**: Indicates the field is blank.
DLCI Rx	Enter a value, from **0** to **1023**, for the received data link connection identifier (DLCI). The HST will display test results for the traffic on this DLCI in the DLCI result category; results for the entire link appear in the Link result category.
Lng Frm Rx Thresh	Enter a value, from **5** to **9999** bytes, to indicate the long frame receive threshold. The HST will maintain a count of received frames that exceed the specified threshold.

4 Do one of the following:

– To configure other test settings, press a different soft key.

– To return to the test result display area, press the **Home** navigation key.

The frame header settings are configured.

Configuring the LMI Settings

Local Management Interface (LMI) is a signaling mechanism often used on frame relay networks to communicate information about the status of a network connection. With the Frame

Relay testing option, the HST can monitor and emulate LMI signals on UNI-user, UNI-network, and NNI interfaces for the following LMI types:

– Annex D (ANSI T1.617)
– Annex A (ITU-T Q.933)
– LMI Rev 1

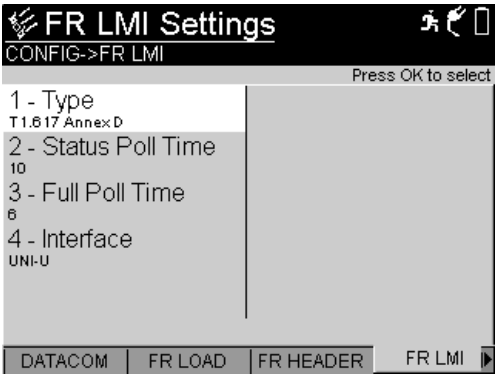
The HST can capture LMI messages, decode them, and then display them in the Trace result category. Other LMI link results include the LMI type, message count, errors, and time-outs. For more information about LMI results, see "LMI results" on page 48.

To specify LMI settings

1 Access the test configuration menus. See "Accessing the test configuration menus" on page 8.

2 Press the **FR LMI** soft key.

The FR LMI Settings menu appears.



3 Select a setting, and then specify the parameters for that setting. The following table describes the available frame relay LMI settings:

Setting	Parameters
Type	Select the type of local management interface (LMI): – **Off** – **T1.617 Annex D** – **Q.933 Annex A** – **LMI Rev 1** – **Auto**
Status Poll Time	Enter a value, from **5** to **30**, to indicate the status poll time in seconds.
Full Poll Interval	Enter a value (*n*), from **1** to **255**, to indicate that the HST should perform a full status poll time every *nth* poll cycle. For example, if you enter 4, the HST will perform a full status poll every 4th time.
Interface	Select one of the following interfaces: – **UNI-U** (user) – **UNI-N** (network) – **NNI**

4 Do one of the following:

– To configure other test settings, press a different soft key.

– To return to the test result display area, press the **Home** navigation key.

The frame relay LMI settings are configured.

Configuring the trace settings

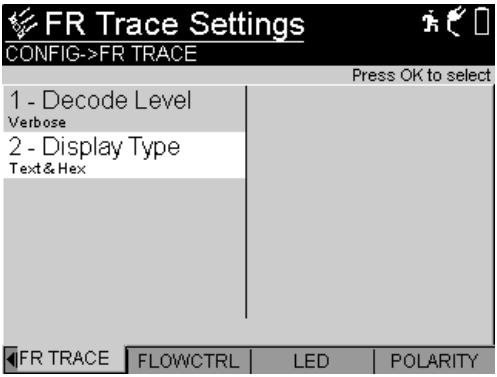
You can use the HST-3000 to capture and decode LMI messages. Captured messages can be displayed as link trace results in text, hexidecimal, or text and hexidecimal format. The following procedure describes how to set the trace settings.

To specify trace settings

1 Access the test configuration menus. See "Accessing the test configuration menus" on page 8.

2 Press the **FR Trace** soft key.

The FR Trace Settings menu appears.



3 Select a setting, and then specify the parameters for that setting. The following table describes the available frame relay trace settings:

Setting	Parameters
Decode Level	Select one of the following decode levels: – **Simple**: Displays basic decode information for each trace message. – **Verbose**: Displays detailed decode information for each trace message.

Setting	Parameters
Display Type	Select how trace messages will be displayed: – **Text**: Displays the trace messages as text. – **Hex**: Displays the trace messages in a hexidecimal format. – **Text & Hex**: Displays the trace messages in both text and hexidecimal formats.

4 Do one of the following:

– To configure other test settings, press a different soft key.

– To return to the test result display area, press the **Home** navigation key.

The trace settings are configured.

Managing test configurations

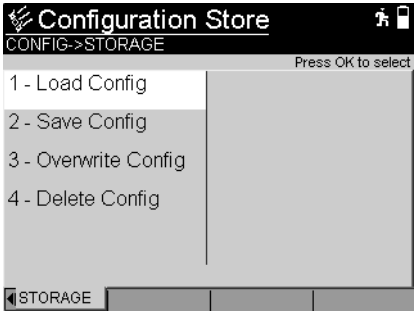
The configuration storage feature allows you to save particular test configurations, load a previously saved configuration, and delete saved configurations.

To view the configuration storage feature

1 Press the **Configure** navigation key.

2 Press the **Storage** soft key.

The Config Store menu appears.



Storing a new configuration

After you have finished configuring the HST-3000 for a particular test, you can store the test configuration for future use. The configurations are stored on power down.

To store a test configuration

1. Set up the HST-3000 for the test you are performing.
2. Press the **Configure** navigation key.
3. Press the **Storage** soft key.
4. Press the **2** key.
5. Enter the file name.
6. Press the **OK** key.

The test configuration is stored.

Loading a configuration

After a configuration is saved, you can load it. This could save you some time in cases where the majority of settings are the same.

To load a test configuration

1. Press the **Configure** navigation key.
2. Press the **Storage** soft key.

3 Press the **1** key.

4 Select the file name to load.

5 Press the **OK** key.

The test configuration is loaded.

Overwriting a configuration

You can change a saved configuration then overwrite the old version.

To overwrite a configuration

1 Press the **Configure** navigation key.

2 Press the **Storage** soft key.

3 Press the **3** key.

4 Select the file name to overwrite.

5 Press the **OK** key.

The test configuration is overwritten.

Deleting a configuration

If a configuration is no longer needed, you can delete it.

To delete a test configuration

1 Press the **Configure** navigation key.

2 Press the **Storage** soft key.

3 Press the **4** key.

4 Select the file name to delete.

5 Press the **OK** key.

The test configuration is deleted.

Monitoring frame relay traffic

In monitor mode, you can use the HST-3000 Frame Relay option to non-intrusively monitor live traffic on a T1 or E1 circuit or a Datacom interface. If you are testing using a T1 or E1 SIM, you can monitor traffic on both receivers simultaneously, which allows you to monitor traffic heading towards the network and towards the CPE. The following sections describe how to monitor frame relay traffic for a T1 or E1 circuit or Datacom interface.

Monitoring traffic on T1 and FT1 circuits

Using a T1 SIM with the Frame Relay option, the HST-3000 can monitor traffic on both DS1 receivers simultaneously. You can monitor traffic on a full rate T1 or fractional T1 (FT1) circuit. Separate results are provided for each receiver.

To monitor traffic on a T1 or FT1 circuit

1. Connect a SIM with T1 testing capability to the base unit, and then power on the HST-3000.

   For information about connecting a SIM and powering on the unit, see the *Base Unit User's Guide*.

2. Access the test configuration menus for T1 testing. See "Accessing the test configuration menus" on page 8.

   The Summary Settings screen appears. This screen provides the most important settings for the test.

3. Review the Summary Settings.

   If the settings are appropriate for your test, press the **Home** key and proceed to step 10.

   To change the settings, do one of the following:

   – Navigate to the desired item by selecting the item number using the keypad

   – Use the arrow keys to highlight the item and then press OK.

If you want to configure additional settings, proceed to step 4.

4 Press the **DS1** soft key.

The DS1 Settings menu appears.

5 Select a setting, and then specify the parameters. For details on the DS1 settings, see the *HST-3000 T1 Testing User's Guide.*

6 Specify the frame header settings:

a Press the **FR HEADER** soft key.

The FR Header Settings menu appears.

b Select **DLCI Rx**, and then enter a value, from **0** to **1023**.

The HST will display test results for the traffic on this DLCI in the DLCI result category; results for the entire link appear in the Link result category.

c Select **Lng Frm Rx Thresh**, and then enter a value, from **5** to **9999** bytes, to indicate the threshold for long frames on the receiver.

The HST will provide a count of received frames that exceed the threshold you specified.

7 Specify the local management interface settings. See "Configuring the LMI Settings" on page 16.

8 Specify how link trace results should be displayed. See "Configuring the trace settings" on page 19

9 After you finish configuring the test settings, press the **Home** navigation key.

10 Connect the HST-3000 to the circuit. For more information, see the *HST-3000 T1 Testing User's Guide*.

11 Press the **Restart** soft key to start the test.

You are monitoring frame relay traffic on a T1 or FT1 circuit.

Monitoring traffic on E1 circuits

Using an E1 SIM with the Frame Relay option, the HST-3000 can monitor traffic on both E1 receivers simultaneously. You can monitor traffic on a bulk rate or nx64 circuit. Separate results are provided for each receiver.

To monitor traffic on a T1 or FT1 circuit

1 Connect a SIM with E1 testing capability to the base unit, and then power on the HST-3000.

For information about connecting a SIM and powering on the unit, see the *Base Unit User's Guide*.

2 Access the test configuration menus for E1 testing. See "Accessing the test configuration menus" on page 8.

The Summary Settings screen appears. This screen provides the most important settings for the test.

3 Review the Summary Settings.

If the settings are appropriate for your test, press the **Home** key and proceed to step 10.

To change the settings, do one of the following:

– Navigate to the desired item by selecting the item number using the keypad

– Use the arrow keys to highlight the item and then press OK.

If you want to configure additional settings, proceed to step 4.

4 Press the **INTERFACE** soft key.

The Interface Settings menu appears.

5 Select a setting, and then specify the parameters. For details on the E1 settings, see the *HST-3000 E1 Testing User's Guide.*

6 Specify the frame header settings:

a Press the **FR HEADER** soft key.

The FR Header Settings menu appears.

b Select **DLCI Rx**, and then enter a value, from **0** to **1023**.

The HST will display test results for the traffic on this DLCI in the DLCI result category; results for the entire link appear in the Link result category.

c Select **Lng Frm Rx Thresh**, and then enter a value, from **5** to **9999** bytes, to indicate the threshold for long frames on the receiver.

The HST will provide a count of received frames that exceed the threshold you specified.

7 Specify the local management interface settings. See "Configuring the LMI Settings" on page 16.

8 Specify how link trace results should be displayed. See "Configuring the trace settings" on page 19

9 After you finish configuring the test settings, press the **Home** navigation key.

10 Connect the HST-3000 to the circuit. For more information, see the *HST-3000 E1 Testing User's Guide*.

11 Press the **Start** soft key to start the test.

You are monitoring frame relay traffic on an E1 circuit.

Monitoring traffic on Datacom interfaces

Using a Datacom SIM with the Frame Relay option, the HST-3000 can monitor frame relay traffic on Datacom interfaces.

To monitor traffic on a Datacom interface

1 Connect a SIM with Datacom testing capability to the base unit, and then power on the HST-3000.

For information about connecting a SIM and powering on the unit, see the *HST-3000 Base Unit User's Guide*.

2 Access the test configuration menus for Datacom testing. See "Accessing the test configuration menus" on page 8.

The Summary Settings screen appears. This screen provides the most important settings for the test.

3 Review the Summary Settings.

If the settings are appropriate for your test, press the **Home** key and proceed to step 12.

To change the settings, do one of the following:

– Navigate to the desired item by selecting the item number using the keypad

– Use the arrow keys to highlight the item and then press OK.

If you want to configure additional settings, proceed to step 4.

4 Press the **DATACOM** soft key.

The Datacom Settings menu appears.

5 Select a setting, and then specify the parameters. For details on the Datacom settings, see the *HST-3000 Data Communications Testing User's Guide.*

6 Specify the frame header settings:

a Press the **FR HEADER** soft key.

b Select **DLCI Rx**, and then enter a value, from **0** to **1023**, for the received data link connection identifier (DLCI).

The HST will display test results for the traffic on this DLCI in the DLCI result category; results for the entire link appear in the Link result category.

c Select **Lng Frm Rx Thresh**, and then enter a value, from **5** to **9999** bytes, to indicate the threshold for long frames on the receiver.

The HST will maintain a count of received frames that exceed the specified threshold.

7 Specify the local management interface settings. See "Configuring the LMI Settings" on page 16.

8 Specify how link trace results should be displayed. See "Configuring the trace settings" on page 19

9 Specify how you want the Datacom LEDs to function. For details, see the *HST-3000 Data Communications Testing User's Guide*.

10 Specify the polarity settings. For details, see the see the *HST-3000 Data Communications Testing User's Guide.*

11 After you finish configuring the test settings, press the **Home** navigation key.

12 Connect the HST-3000 to the circuit. For more information, see the *HST-3000 Data Communications Testing User's Guide*.

13 Press the **Start** soft key to start the test.

You are monitoring frame relay traffic on a datacom interface.

Generating traffic loads

Using the HST-3000 and a SIM with the Frame Relay option, you can transmit and receive test frames over the circuit to test the integrity of the data link. The Frame Relay option allows you to configure frame characteristics such as the payload, traffic load type, and frame length to simulate various kinds of traffic scenarios.

Transmitting traffic on T1 or FT1 circuits

The HST can transmit and receive frame relay frames at rates of 1.536 Mbps on the DS1 interface or 64 Kbps for DS0 channels.

To transmit frame relay traffic on a T1 or FT1 circuit

1 Access the test configuration menus for T1 testing. See "Accessing the test configuration menus" on page 8.

The Summary Settings screen appears. This screen provides the most important settings for the test.

2 Review the Summary Settings.

If the settings are appropriate for your test, press the **Home** key and proceed to step 12.

To change the settings, do one of the following:

– Navigate to the desired item by selecting the item number using the keypad

– Use the arrow keys to highlight the item and then press OK.

If you want to configure additional settings, proceed to step 3.

3 Press the **DS1** soft key.

The DS1 Settings menu appears.

4 Select a setting, and then specify the parameters. For details on the DS1 settings, see the *HST-3000 T1 Testing User's Guide.*

5 Specify the frame load settings. See "Configuring the frame load settings" on page 11.

6 Specify the frame header settings. See "Configuring the frame header settings" on page 14.

7 Specify the local management interface settings. See "Configuring the LMI Settings" on page 16.

8 Specify how link trace results should be displayed. See "Configuring the trace settings" on page 19.

9 *Optional*. If you intend to insert errors or enable alarms, do the following:

a Press the **ERROR** soft key.

The Error Settings menu appears.

b Press the number key that corresponds to the setting you want to configure. For example, to configure an alarm, press the **1** key.

The following table shows the available settings.

Setting	Parameter
Alarms	Select **Alarms**, and then specify the type of alarm to be enabled: – **LOF** – **LOS** – **AIS** – **Yellow Alarm**
Errors	Select **Errors**, and then specify the type of error to be inserted: – **Fr CRC Error** – **BPV** – **CRC Error** – **Frame Error**
Frame Errors	This setting is only available if the error type is Frame Errors. – Select **Frame Errors**. – Indicate how many errors will be inserted when you press the error insertion action key: 1 or 2.
Beep On Error	Select whether an audible beep will sound when an error is detected.

10 Press the **OTHER** soft key, and then specify the LBO level and Tx clock offset. For details on these settings, see the *HST-3000 T1 Testing User's Guide.*

11 After you finish configuring the test settings, press the **Home** navigation key.

12 Connect the HST to the circuit. For more information, see the *HST-3000 T1 Testing User's Guide*.

13 To begin transmitting traffic, press the **Restart** soft key.

14 To insert errors, do one of the following:

– Press the **1** key.

– Press the **Action** soft key and then press the **1** key.

This inserts the number and type of error that you specified on the Error Settings menu.

The error is inserted into the Primary Tx (transmit) path.

15 To enable or disable alarms, do one of the following:

– Press the **3** key.

– Press the **Action** soft key and then press the **2** key.

This enables or disables the type of alarm that you specified on the Error Settings menu.

The alarm is inserted into the Primary Tx (transmit) path.

The HST transmits frame relay traffic on the circuit.

Transmitting traffic on E1 circuits

The HST can transmit and receive frame relay frames at rates of 2 Mbps on the E1 interface or 64 Kbps for individual timeslots.

To transmit frame relay traffic on an E1 circuit

1 Access the test configuration menus for E1 testing. See "Accessing the test configuration menus" on page 8.

The Summary Settings screen appears. This screen provides the most important settings for the test.

2 Review the Summary Settings.

If the settings are appropriate for your test, press the **Home** key and proceed to step 11.

To change the settings, do one of the following:

– Navigate to the desired item by selecting the item number using the keypad

– Use the arrow keys to highlight the item and then press OK.

If you want to configure additional settings, proceed to step 3.

3 Press the INTERFACE soft key.

The Interface Settings menu appears.

4 Select a setting, and then specify the parameters. For details on the E1 settings, see the *HST-3000 E1 Testing User's Guide.*

5 Specify the frame load settings. See "Configuring the frame load settings" on page 11.

6 Specify the frame header settings. See "Configuring the frame header settings" on page 14.

7 Specify the local management interface settings. See "Configuring the LMI Settings" on page 16.

8 Specify how link trace results should be displayed. See "Configuring the trace settings" on page 19.

9 *Optional*. If you intend to insert anomalies or enable defects, do the following:

   a Press the **ERROR** soft key.

   The Error Settings menu appears.

   b Press the number key that corresponds to the setting you want to configure. For example, to configure a defect, press the **1** key.

10 After you finish configuring the test settings, press the **Home** navigation key.

11 Connect the HST to the circuit. For more information, see the *HST-3000 E1 Testing User's Guide*.

12 To begin transmitting traffic, press the **Start** soft key.

The HST transmits frame relay traffic on the circuit.

Transmitting traffic over a Datacom interface

The HST can also transmit frame relay traffic over a Datacom interface.

To transmit frame relay traffic over a Datacom interface

1. Access the test configuration menus for Datacom testing. See "Accessing the test configuration menus" on page 8.

   The Summary Settings screen appears. This screen provides the most important settings for the test.

2. Review the Summary Settings.

   If the settings are appropriate for your test, press the **Home** key and proceed to step 11.

   To change the settings, do one of the following:

   – Navigate to the desired item by selecting the item number using the keypad

   – Use the arrow keys to highlight the item and then press OK.

   If you want to configure additional settings, proceed to step 3.

3. Press the **DATACOM** soft key.

   The Datacom Settings menu appears.

4. Select a setting, and then specify the parameters. For details on the Datacom settings, see the *HST-3000 Data Communications Testing User's Guide.*

5. Specify the frame load settings. See "Configuring the frame load settings" on page 11.

6. Specify the frame header settings. See "Configuring the frame header settings" on page 14.

7. Specify the local management interface settings. See "Configuring the LMI Settings" on page 16.

8. Specify how link trace results should be displayed. See "Configuring the trace settings" on page 19.

9 For details on configuring flow control, the User LEDs, or polarity settings, refer to the *HST-3000 Data Communications Testing User's Guide.*

10 After you finish configuring the test settings, press the **Home** navigation key.

11 Connect the HST to the circuit. For more information, see the *HST-3000 Data Communications Testing User's Guide*.

12 To begin transmitting traffic, press the **Start** soft key.

The HST transmits frame relay traffic over the Datacom interface.

Transmitting traffic over the DDS four-wire local loop interface

Using an HST with a DDS four-wire local loop (DDS-4WLL) SIM and the Frame Relay option, you can generate and receive frame relay traffic.

To transmit traffic over the DDS-4WLL interface

1 Connect a SIM with DDS four-wire local loop testing capability to the base unit, and then power on the HST-3000.

For information about connecting a SIM and powering on the unit, see the *HST-3000 Base Unit User's Guide*.

2 Access the test configuration menus for DDS four-wire local loop testing. See "Accessing the test configuration menus" on page 8.

The Summary Settings screen appears. This screen provides the most important settings for the test.

3 Review the Summary Settings.

If the settings are appropriate for your test, press the **Home** key and proceed to step 11.

To change the settings, do one of the following:

– Navigate to the desired item by selecting the item number using the keypad

– Use the arrow keys to highlight the item and then press OK.

If you want to configure additional settings, proceed to step 4.

4 Press the **DDS** soft key.

The DDS Settings menu appears.

5 Select a setting, and then specify the parameters. For details on the DDS settings, see the *HST-3000 DDS Local Loop Testing User's Guide*.

6 Specify the frame load settings. See "Configuring the frame load settings" on page 11.

7 Specify the frame header settings. See "Configuring the frame header settings" on page 14.

8 Specify the local management interface settings. See "Configuring the LMI Settings" on page 16.

9 Specify how link trace results should be displayed. See "Configuring the trace settings" on page 19.

10 When you have finished configuring the test settings, press the **Home** navigation key.

11 Connect the HST to the circuit. For more information, see the *HST-3000 DDS Local Loop Testing User's Guide*.

12 To begin transmitting traffic, press the **Restart** soft key.

The HST transmits frame relay traffic over the DDS-4WLL interface.

Connectivity testing (ping)

The Ping feature lets you test connectivity to a far-end device, such as a router without taking the device out of service. Ping testing involves transmitting ICMP echo request packets to a specified IP address. If the target device is active, it will return ICMP echo reply packets to a specified source IP address. If no reply packets are received, the target device is not active.

To perform a ping test

1 Access the test configuration menus. See "Accessing the test configuration menus" on page 8.

The Summary Settings screen appears. This screen provides the most important settings for the test.

2 Review the Summary Settings.

If the settings are appropriate for your test, press the **Home** key and proceed to step 6.

To change the settings, do one of the following:

– Navigate to the desired item by selecting the item number using the keypad

– Use the arrow keys to highlight the item and then press OK.

If you want to configure additional settings, proceed to step 3.

3 Set the Test Mode to **Terminate**. See "Configuring the test mode" on page 10.

You can only perform a ping test in Terminate mode.

4 Set the Load Type to **Ping**. See "Configuring the frame load settings" on page 11.

The available options on the FR Load Settings menu change to those for ping testing.

5 Select a setting, and then specify the parameters for the setting. The following table describes the available options.

Settings	Parameters
Source IP Address	Enter the IP address of the device the echo reply packets will be transmitted to. **NOTE:** The HST only receives echo messages if the source address of the incoming echo message matches the destination address configured on the HST.
Dest IP Address	Enter the IP address of the device the echo request packets will be transmitted to.
Ping Length	Enter a value, from **34** to **2000** octets, to indicate the length of the packets.
Encapsulation	Select the type of encapsulation for the packets: – **NLPID** – **ETHER**
Inverse Arp	Select one of the following: – **On**. If you want the HST to use Inverse ARP to determine the IP address of the equipment at the other end of the Frame Relay link, select On. – **Off**. If you specified a destination address for the device you are pinging, select Off. Off is the default.
Lng Frm Rx Thresh	Enter a value, from **5** to **9999** bytes, to indicate the long frame receive threshold. The HST will maintain a count of received frames that exceed the specified threshold.

6 Connect the HST to the circuit.

7 Press the **Home** navigation key.

8 To start the test, press the **Restart** soft key.

9 To view ping results, do the following:

   a Press the **Display** soft key,

   b Select **Frame Relay**, and then select **Ping**.

Connectivity testing is complete.

Viewing test results

After you start a test, Summary test results automatically appear. To view additional results, select a different test result category.

To view test results

1 Configure and run a test.
   – See “Generating traffic loads” on page 28
   – See “Monitoring frame relay traffic” on page 23

2 Press the **Display** soft key, and then select **Frame Relay**.

   A list of subcategories appear.

3 Select a subcategory.

   The results for the category appear.

4 For other results, press the Display soft key, and then select a different category.

   For descriptions of test results, see “Test Results” on page 41.

Saving and printing results

For information about saving and printing test results, see the *HST-3000 Base Unit User's Guide*.

Test Results

A

This appendix describes the test result categories and the results within each category that are available when performing frame relay tests. Topics in this appendix include the following:

Frame relay results

The Frame Relay result category is divided into the following subcategories: DLCI, Link, Ping, LMI, DLCI List, and Trace. The results available in each subcategory are listed in the following sections.

DLCI results

Table 3 lists results in the DLCI (Data Link Connection Identifier) category. These results apply to the DLCI you specified as a frame header setting when you configured your test.

Table 3 DLCI results

Result	Definition
% BECN Frm Rx	Percentage of total frame relay frames with the BECN bit set.
% CR Frm Rx	Percentage of total frame relay frames received with the C/R bit.
% DE Frm Rx	Percentage of total frame relay frames with the DE bit set.
% FECN Frm Rx	Percentage of total frame relay frames with the FECN bit set.
% Lost Frm	Percentage of total frame relay frames lost by the network based on gaps in sequence numbers.
% Util	Current link utilization during the last second.
Avg % Util	The average percentage of link utilization on the received channel since the start of the test. Calculated as total frame relay octets in frames (excluding flags, including overhead) ÷ total octets (idle and frame data) received.

Table 3 DLCI results (Continued)

Result	Definition
Avg Frm Rate Rx	The average number of frame relay frames received per second, since the start of the test (frame count ÷ total seconds).
Avg Frm Size Rx	Calculates the average size of received frames (frame octets ÷ frame count).
Avg Thrput(bps)Rx	The average received throughput since the start of the test, calculated as frame octets ÷ total seconds.
BECN Frm Rx	Count of the frame relay frames received with the BECN bit set.
CR Frm Rx	Count of the frame relay frames received with the C/R bit set.
DE Frm Rx	Count of frame relay frames with the DE bit set.
Long Frm DLCI	Count of frame relay frames exceeding the length specified as the long frame threshold.
FECN Frms Rx	Count of the frame relay frames with the FECN bit set.
Frame Count Rx	Count of the total number of frame relay frames detected.
Frame Octets Rx	Count of the total number of frame octets detected. The frame octets include all octets between the flags of the frame relay frame (for example, the address field, the information field, and the FCS field).
Max % Util	The maximum percentage of link utilization on the received channel in any one second since the start of the test.

Table 3 DLCI results (Continued)

Result	Definition
Max Frame Rate Rx	The maximum rate of received frames over a one second period, expressed in frames per second.
Max Thrput(bps)Rx	The maximum received throughput, in bits per second, during any one second since the start of the test.
Test Frm Lost	Count of frame relay frames lost by the network based on gaps in sequence numbers.
Test Frm Rx DLCI	Count of the total number of frame relay frames detected for the DLCI.
Thrput(bps) Rx	The current received throughput, in bits per second, measured over the last second.

Link results

Table 4 lists results in the Link category. These results apply to the entire link.

Table 4 Link results

Result	Definition
% BECN Frm Rx	Percentage of total frame relay frames with the BECN bit set.
% CR Frm Rx	Percentage of total frame relay frames received with the C/R bit.
% DE Frm Rx	Percentage of total frame relay frames with the DE bit set.
% FECN Frm Rx	Percentage of total frame relay frames with the FECN bit set.

Table 4 Link results (Continued)

Result	Definition
% Lost Frm	Percentage of total TTC test frames lost by the network based on gaps in sequence numbers.
% Util	Current link utilization during the last second.
Avg % Util	The average percentage of link utilization on the received channel since the start of the test. Calculated as total frame relay octets in frames (excluding flags, including overhead) ÷ total octets (idle and frame data) received.
Avg Frm Rate Rx	The average number of frame relay frames received per second, since the start of the test (frame count ÷ total seconds).
Avg Frm Size Rx	Calculates the average size of received frames (frame octets ÷ frame count).
Avg Thrput(bps)Rx	The average received throughput since the start of the test, calculated as frame octets ÷ total seconds.
BECN Frm Rx	Count of the frame relay frames received with the BECN bit set.
CR Frm Rx	Count of the frame relay frames received with the C/R bit set.
DE Frm Rx	Count of frame relay frames with the DE bit set.
FCS Err Frm	Count of frame relay frames with FCS errors.
Long Frm DLCI	Count of frame relay frames exceeding the length specified as the long frame threshold.
FECN Frms Rx	Count of the frame relay frames with the FECN bit set.

Table 4 Link results (Continued)

Result	Definition
Frm Count Rx	Count of the total number of frame relay frames detected.
Frm Octets Rx	Count of the total number of frame octets detected. The frame octets include all octets between the flags of the frame relay frame (for example, the address field, the information field, and the FCS field).
Max % Util	The maximum percentage of link utilization in any one second since the start of the test.
Max Frame Rate Rx	The maximum rate of received frames over a one second period, expressed in frames per second.
Max Thrput(bps)Rx	The maximum received throughput, in bits per second, during any one second since the start of the test.
Short Frm	Count of frame relay frames containing less than four octets between frame flags.
Test Frm Lost	Count of frame relay frames lost by the network based on gaps in sequence numbers.
Test Frm Rx	Count of the total number of frame relay frames detected for the link.
Thrput(bps) Rx	The current received throughput, in bits per second, measured over the last second.

Ping results

Table 5 lists results in the Ping category. These results only appear if you configure the HST to transmit a Ping load.

Table 5 Ping results

Result	Definition
Avg Delay (ms)	Average round trip delay, measured in milliseconds, since the start of the test.
Echoed Pings	Count of echo frames transmitted since the start of the test.
Lost Pings	Count of Echo messages that were not replied to. This result also includes out of order Echo Reply messages and corrupted order Echo Reply messages.
Max Delay (ms)	Maximum round trip delay, measured in milliseconds, since the start of the test.
Min Delay (ms)	Minimum round trip delay, measured in milliseconds, since the start of the test.
Tx Pings	Count of transmitted ping packets since the last test restart.

Table 5 Ping results (Continued)

Result	Definition
Ping State	Displays the ping status: – Idle – Inverse ARP Active – OK – Host Unreachable – Network Unreachable – Protocol Unreachable – Port Unreachable – Fragmentation Needed but DF Bit Set – Unknown Network – Unknown Host – TTL Failed During Transit – TTL Failed During Reassembly – Network Prohibited – Host Prohibited – Network TOS – Host TOS – Unknown Error

LMI results

Table 6 lists results in the LMI category.

Table 6 LMI results

Result	Definition
Message Count Rx	Count of LMI messages received since the start of the test (an incrementing count indicates a “heartbeat”).

Table 6 LMI results (Continued)

Result	Definition
Message Errors	Indicates the wrong message type was received, for example: – A status enquiry was received in UNI-N mode, – A small status message was received when expecting a full status message, – A status response was received, but no request was sent, – A message with incorrect information elements was received
Message Type	Indicates the type of LMI available on the frame relay circuit: None, LMI Rev 1, T1.617 Annex D, or ITU-T Q.933 Annex A.
Seq Err	Count of all the LMI frames received which have an incorrect or unexpected sequence number since the last test restart.
Status Enq Message Rx	Count of LMI Status Enquiry messages received since the last test restart.
Status Message	Indicates whether the LMI is Up or Down.
Time Outs	Count of LMI Status Enquiry messages sent that yielded no response from the network before the next poll cycle.

DLCI list results

The DLCI list result shows the status of up to 150 data link connection identifiers in the test.

The status (active, new, inactive, or deleted), provided by a LMI full status poll, is displayed for each DLCI. If a DLCI is inactive, a count of the number of times that the specified DLCI was inactive, and the duration during which it was inactive is provided.

NOTE:

Deleted DLCIs only apply to LMI Rev 1.

Trace results

The Trace Results category displays decoded LMI text for STATUS, STATUS ENQUIRY, and STATUS UPDATE (LMI revision 1 only) messages. When you configure the HST for testing, you can specify whether you want to display detailed (Verbose) or summarized (Simple) decode text in this category (see "Configuring the trace settings" on page 19).

Figure 1 shows detailed decoded LMI text.

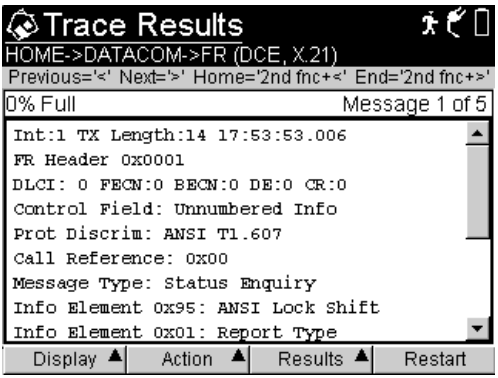


Figure 1 Detailed LMI decode text

Figure 2 shows summarized decoded LMI text.

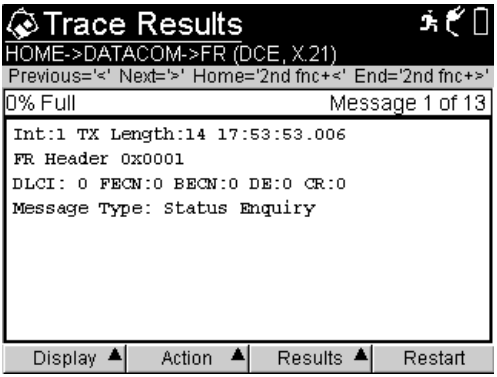


Figure 2 Summarized LMI decode text

Event Table results

The Event Table category displays the date and time that significant events, errors, or alarms occurred during the course of your test.

Event Histogram results

A histogram is a display or print output of test results in a bar graph format. Histograms enable you to quickly identify spikes and patterns of errors over a specific interval of time (seconds, minutes, or hours).

Use the up and down arrow keys to scroll through each of the events reported in the histogram.

NOTE:

When viewing a histogram, the left and right arrow keys can not be used to navigate through the other result categories. Use the Display softkey to select and then view another category.

Glossary

A

AIS — Alarm Indication Signal (Blue Alarm). A continuous stream of unframed 1's sent to indicate that the terminal equipment has failed, has lost its signal source, or has been temporarily removed from service.

ANSI — American National Standards Institute. Standards organization that approved the initial Frame Relay standard.

B

Bc — Committed Burst Size. The maximum amount of data (in bits) that the network agrees to transfer, under normal conditions, during a time interval Tc.

BECN — Backward Explicit Congestion Notification. A bit sent by a frame relay network to notify an interface device that the sending device should initiate congestion avoidance procedures.

C

CIR — Committed Information Rate. The committed rate (in bits per second) at which the ingress access interface trunk interfaces, and egress access interface of a frame relay network transfer information to the destination frame relay end system under normal conditions. The rate is averaged over a minimum time interval Tc.

C/R — Command/Response field bit.

D

DA — Destination address.

DS1 — Digital Signal 1. An interface providing a framed or unframed 1.544 Mb/s bit stream. DS1 corresponds to the North American and Japanese T1 designator.

DCE — Data Communications Equipment. Equipment that resolves issues between a Data Terminal Equipment (DTE) device and the network, such as a modem. You can configure the HST to emulate a DCE device when testing frame relay service on a data communications interface.

DE — Discard Eligibility Indicator bit.

DLCI — Data Link Connection Identifier.

DS2 — Digital Signal 2. A digital signaling rate of 6.312 Mbps, corresponding to the North American T2 designator

DS3 — Digital Signal 3. A digital signal rate of 44.736 Mbps, corresponding to the North American T3 designator.

DSX — Digital System Cross-connect frame.

DTE — Data Terminal Equipment. Equipment that serves as the data transmission source, data transmission destination, or both, for the purpose of sending for receiving data. Examples of DTEs include personal computers (PCs), data terminals, and peripheral devices such as printers. You can configure the HST to emulate a DTE device when testing frame relay service on a data communications interface.

E

ES — Errored Second. A second during which at least one error or alarm occurred.

ESF — Extended Superframe. The F bits from 24 consecutive frames are used to provide frame alignment, frame CRC and out-of-band signalling.

EA — Extension Bit. A bit that indicates whether the frame uses a 3 or 4 byte header.

Encapsulation — A process by which an interface device places an end device's protocol-specific frames inside a frame relay frame. The network accepts only frames formatted specifically for frame relay; therefore, interface devices acting as interfaces to a frame relay network must perform encapsulation.

F

FCS — The standard 16-bit cyclic redundancy check used for HDLC and frame relay frames. The FCS detects bit errors occurring in the bits of the frame between the opening flag and the FCS, and is only effective in detecting errors in frames no larger than 4096 octets.

FEAC — Far End Alarm and Control. This function allows the user to send loop up and down codes as well as performance information to a far end device.

FECN — Forward Explicit Congestion Notification. A bit set used by frame relay networks to notify an interface device that the receiving device should initiate congestion avoidance procedures. *See also* BECN.

FRAD — Frame Relay Access Device. A device that is responsible for framing data with header and trailer information (control information) prior to presentation of the frame to the frame relay switch. On the receiving end, the FRAD strips away the frame relay control information so that the target device is presented with the data in its original form. A FRAD may be a standalone device or it may be embedded in a router, switch, multiplexer or similar device.

Frame Loss — Criteria is as follows: D4D - 2 out of 5 Ft bits in error; ESF - 2 out of 5 frame bits in error.

FT1 — Fractional T1.

I

ITU-T — International Telecommunications Union-the Telecommunications Services Sector. A standards organization that devises and proposes recommendations for international communications.

L

LBO — Line Build Out. An optional attenuation which can be applied to the output signal to simulate long lengths of cable.

LOF — Loss of Frame. A condition indicating that the receiving equipment has lost frame delineation.

LOS — Loss Of Signal. A condition when no pulses of positive or negative polarity are received for more than 175 pulse counts.

LMI — Local Management Interface. Specification serving as the connection status mechanism for frame relay service.

M

Multipat — Automated test that transmits 5 consecutive test patterns: ALL ONES, 1:7, 2:8, 3 in 24, and QRSS.

N

NNI — Network-to-Network Interface. Interface that provides the ability for networks to query and respond to one another.

NIU — Network Interface Unit. Electronic device at the point of interconnection between the service provider communications facilities and terminal equipment at a subscriber's premises.

P

Pattern sync — The condition when the received test pattern matches the transmitted test pattern. In order to detect pattern sync the instrument must be transmitting a known test pattern in at least one channel (if framed) or continuously (if unframed).

Ping — Program which sends an ICMP echo request packet to an IP address and awaits a reply. Ping requests are typically used to test connectivity. You can transmit and respond to ping packets using the HST.

Private Virtual Circuit — A virtual circuit using a fixed path. Although the actual path taken through the network may vary from time to time, such as when automatic rerouting takes place, the beginning and end of the circuit will not change. In this way, the PVC is like a dedicated point-to-point circuit.

PVC — *See* Private Virtual Circuit.

Q

QRSS — Quasi-Random Signal Sequence.

R

RAI — See Yellow Alarm.

Rx — Receiver or input.

S

SF — Super Frame.

SIM — Service Interface Module. SIMs connect to the HST-3000 base unit to provide testing functionality.

Switched Virtual Circuit — A virtual circuit available on a call-by-call basis. Establishing a call by using the SVC signaling protocol (Q.933) is comparable

to normal telephone use. Users specify a destination address similar to a phone number.

SVC — *See* Switched Virtual Circuit.

T

T1 — T-carrier Level 1. Digitally multiplexed telecommunications carrier system. Carries a Level 1 digital signal (DS1) that consists of 24 multiplexed voice-frequency channels (DS0).

Tc — Committed Rate Measurement Interval. The time interval during which the user can send only Bc-committed amount of data and Be excess amount of data. In general, the duration of Tc is proportional to the "burstiness" of the traffic. *See also* CIR and Bc.

TNV — Telephone-network voltage.

TTC — Transmission test cells.

Tx — Transmitter or output.

U

UNI — User network interface. Interface providing the end device interface to the network.

V

VC — Virtual Circuit. two-way, software-defined data paths between two ports that act as private line replacements in the network.

Y

Yellow Alarm — SA terminal will transmit a yellow alarm when it loses its incoming signal.

In SF(D4) framing formats the yellow alarm is formed by setting bit 2 in every channel to zero for at least one second.

In ESF framing the yellow alarm is formed by repeatedly sending 8 ones followed by 8 zeros in the ESF data link.

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21129364-001
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