FLUKE networks™

# 660 Series

## Internetwork Throughput Option

Users Guide

PN 1606548
December 2000

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## Using This Guide

This guide shows you how to conduct an Internetwork Throughput test using the Fluke Networks 660 Series Frame Relay Installation Assistant. It serves as a companion to two other documents in the 660 Series manual set: the *660 Series Frame Relay Installation Assistant Users Guide* and the *660 Series Frame Relay Installation Assistant Reference Manual*. (The Reference manual is available on the Fluke Web site at http://www.fluke.com/manuals/660.) We encourage you to refer to these other documents for detailed descriptions of the 660 tester's features and functions and help with operating the tester.

This guide has three chapters. Chapter 1 shows you how to activate the Internetwork Throughput test software, how to set up and connect your testers to a network, and how to run a Throughput test. A basic description of the Internetwork Throughput test and illustrations of setup and result screens are provided to help you run the test and interpret results. Chapters 2 and 3 contain important reference information. The tables in Chapter 2 list and describe the test setup parameters so that you can tailor the Throughput test to fit your specific test requirements. Chapter 3 provides detailed descriptions of the results displayed upon completion of the test.

# Introduction

The Internetwork Throughput Option (ITO) is separately purchased software for the Fluke Networks 660 Series Frame Relay Installation Assistant. This option adds IP performance test capability to your 660 tester, enabling you to test enterprise-wide throughput and evaluate line capacity during installation and maintenance of Enterprise backbones, WANs, and VPNs.

With ITO software, the network test capabilities of your 660 tester are expanded so that you can now do the following:

- Test end-to-end PVC performance over designated DLCIs using IP packets within the payload of the generated test traffic
- Test data patterns, frame size, or rate sensitivity for network devices, such as modems, FRADS, hubs, switches or routers
- Verify IP performance across a WAN and compare it to a Service Level Agreement (SLA)
- Determine baseline congestion when installing a network.

To customize operation, you can configure a single transmission rate or ramp up the transmission speed through a series of stepped rates. In addition, you can configure frame length, data patterns, and the duration of the test.

When the test is completed, the controlling tester displays results, which include IP throughput rate (measured in Kbps), the number of successfully delivered packets/bytes and lost packets/bytes, and ratios of sent packets to lost packets.

# Technical Support

If you require technical support, please have the following information available before you contact Fluke Networks:

- Your name and company
- Model number and serial number of the tester
- A description of the problem and any error messages that appear on the LCD.

To locate an authorized service center, visit Fluke Networks on the World Wide Web at www.flukenetworks.com or call us at one of the following numbers:

USA and Canada: 1-888-993-5853
Europe: +31 402-678-200
Japan: +81-3-3434-0181
Singapore: +65-738-5655
Anywhere in the world: +1-425-446-5500

# Before You Begin

There are a couple of important steps you must take (in the order listed) before you can run an Internetwork Throughput test:

1. Obtain the latest version of ITO software for your testers
2. Enable the ITO software.

## Obtaining Current Software for Your Testers

The Internetwork Throughput test is a double-ended test that requires two Fluke Networks testers. You can use either two 660 testers or a 660 tester and a Fluke Networks OneTouch Series II tester.

Periodically, Fluke Networks releases updates to the 660 and OneTouch software. To run the test, both testers must have the current version of software installed.

### *Updating the 660 Tester*

If you are using a 660 tester, make sure that you are running software version 2.0 or later. To find out what version of software is installed on your tester, turn it on, then check the version number in the lower right corner of the tester's display.

If you need to update the software in the tester, call Fluke Networks to order an update or go to the Fluke Networks Website at http://www.fluke.com/nettools/software/660, click **660 Frame Relay Installation Assistant**, then download the latest software version to your PC. Use the 660 Link (f660link.exe) program to transfer the files to your tester.

*Note*

*660 Link is a Windows-based download utility program that is on the 3.5-inch diskette that was shipped with your 660 tester or with the software update. You can also obtain 660 Link (f660link.exe) from Fluke Networks at this Website address: http://www.fluke.com/nettools/software/660.*

*For information on running 660 Link and installing new software, see the* 660 Frame Relay Installation Assistant Reference Manual, *which is located on the Web at http://www.fluke.com/manuals/660.*

### *Updating the OneTouch Tester*

If you plan to interoperate with a OneTouch Network Assistant, make sure that the tester has ITO or xDSL software version 4.50 or later installed.

To determine the version of software installed in your OneTouch, turn on the tester, then press HELP. The software version is displayed on the **Help** screen.

If you need to update the software in the OneTouch, either call Fluke Networks to order the CD-ROM version or go to the Fluke Networks Website at http://www.fluke.com/nettools, then do the following:

1. Click the **Support** button.

   The **Network Tools Support** page is displayed.

2. Click **Software Download**.

   The **Software Downloads** page is displayed.

3. Click **OneTouch Series II** and check to see if a new version of Series II Network Assistant software is released.
4. To download the update files, click **OneTouch Series II Network Assistant Software**.
5. After the files are downloaded to your PC, run OneTouch Link to transfer the files to the OneTouch.

*Note*

*OneTouch Link is a Windows-based download utility program. This program is on the CD-ROM that was shipped with the tester or with the software update. If you download the update files from the Fluke Networks Website, OneTouch Link is included.*

*For instructions on installing and running OneTouch Link, see the* OneTouch Series II Getting Started Manual.

## Enabling ITO Software

To run an Internetwork Throughput test, the local initiating tester, which controls the test, must have the ITO software enabled. If you ordered the ITO software when you purchased your tester, this option was enabled for you at the factory. If you ordered the software after purchasing the tester, you received a key code from Fluke Networks. You need that key code to activate the software on the tester.

*Note*

*If you need help obtaining your tester's key code, contact Fluke Networks Technical Support for assistance.*

This section shows you how to enable the ITO software on a 660 and OneTouch tester.

### *Enabling ITO Software on the 660 Tester*

To enable the ITO software, have your tester's key code handy then do the following:

1. Turn the rotary dial to **SETUP**.

   The **Setup** menu is displayed. The **System** option is highlighted.

2. Press ENTER to display the **Setup System** menu. Then, press 4 (**Page Down**) until you display Page 4.

3. Press ⊜ to highlight **Enable Software Options**. Then, press ENTER.

   The **Enable Software Options** screen is displayed. The **STATUS** column indicates that the Internetwork Throughput software option is **Disabled**.

4. Make sure that **Disabled** is highlighted. Then, press ENTER.

   The **Enter Key Code** screen is displayed.

5. Press ENTER.

   The tester displays a text entry screen.

6. To enter the tester's key code, move the cursor to the first character in the code, then press ENTER to select it.

   The character you selected now appears in the **Entry Key Code** box.

   *Note*

   *When entering the key code, do not include dashes.*

   Continue in this manner until all of the characters in the key code are displayed in the **Entry Key Code** box.

7. Press SAVE.

   The **Enter Key Code** screen is redisplayed. The key code that you entered appears in the **Enter Key Code** box.

8. Do *one* of the following:

   - Press SAVE if the key code is correct.
   - Press ENTER if the key code is not correct. The **Enter Key Code** screen is redisplayed. You can now re-enter the key code.
   - Press EXIT to cancel.

9. Verify that the ITO software is activated. To do this, complete Steps 1-3 of this procedure.

   When the **Enable Software Options** screen is displayed, check that the status for the **Internetwork Throughput** option is changed to **Enabled**.

### *Enabling ITO Software on the OneTouch Tester*

To enable the ITO software, complete the following:

1. Connect the OneTouch to your PC.
2. Start the OneTouch Link program.
3. From the **Tools** menu, select **Enable OneTouch** options.

   The **OneTouch Options** screen is displayed.

4. Click the **ITO** tab.
5. In the **Option Key** box, type the key code for the tester. Then, click **Enable**.

   The ITO software is now activated.

## Setting Up the Testers

The Internetwork Throughput test is a double-ended test of bandwidth that requires you to use two Fluke Networks testers—one as the local initiating tester and one as the remote unattended tester— at either end of the link under test. You can use either two 660 testers or a 660 tester and a OneTouch tester.

Figure 1-1 shows the relationship between a local 660 tester and a remote unattended OneTouch tester. Figure 1-2 shows an equivalent relationship between a OneTouch serving as the local tester and a 660 as the unattended tester. Another possible configuration (not shown) is a 660 as the local tester interoperating with another 660 as the remote tester.

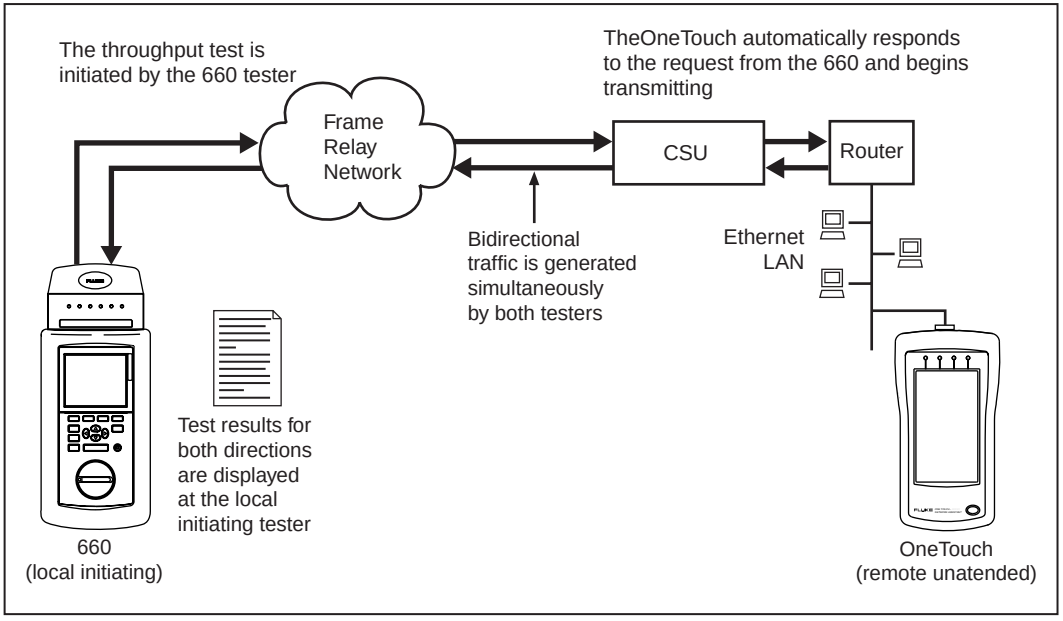



**Figure 1-1. 660 Operating as the Local Tester**

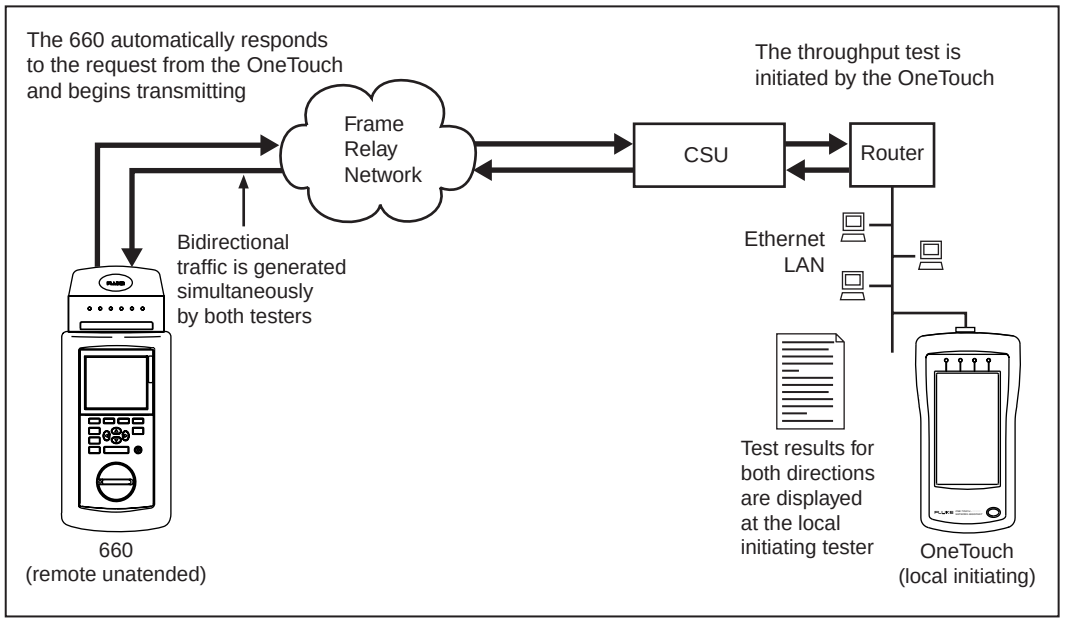



**Figure 1-2. OneTouch Operating as the Local Tester**

## Setting Up the Local Initiating Tester

This section shows you how to set up the local tester. Follow the instructions for your particular test scenario.

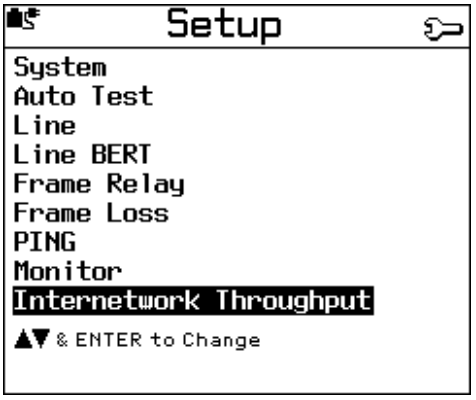
### 660 Tester Setup

To set up a 660 tester, complete the following:

1. Turn the rotary dial to **SETUP**.

   The **Setup** menu is displayed.

2. Press ⊛ to select **Internetwork Throughput**, as in the following:

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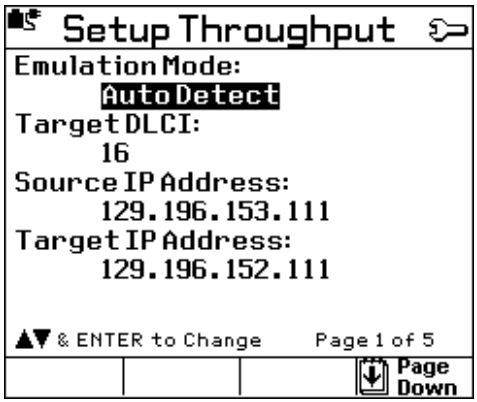
3. Press ENTER.

   The **Setup Throughput** menu is displayed:

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   This menu has five pages of setup parameters. At a minimum, you must specify a value for **Target DLCI**, **Source IP Address**, **Target IP Address**, **Speed**, and **Test Duration**.

   See Table 2-1 for descriptions of the parameters on this menu and their settings.

4. Press ENTER. Then, select the desired setting for **Emulation Mode**.
5. Press ⊛ then ENTER. Select the desired setting for **Target DLCI**.
6. Press ⊛ then ENTER to display the **Source IP Address List**.

7. Supply the IP address of the local tester. Do *one* of the following:

   - If the tester's IP address is in the list, press ⊛ to highlight the address, then press [ENTER] to select it.

     The **Setup Throughput** menu is redisplayed, and the address you selected now appears as the **Source IP Address**.

     OR

   - If the tester's address is not in the list, you need to add it. Do the following:

     a. Press [3] (**Add Item**).

        A numeric entry screen is displayed.

     b. Type the tester's IP address, then press [SAVE].

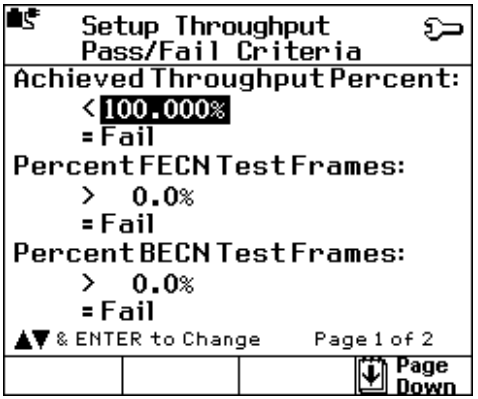
        The **Setup Throughput** menu is redisplayed, and the address you selected appears as the **Source IP Address**.

8. Press ⊛ to highlight **Target IP Address**. Press [ENTER] to display the **Target IP Address List**.

   Supply the IP address of remote tester by following the instructions given in Step 7.

   When the **Setup Throughput** menu is redisplayed, the address you selected appears as the **Target IP Address**.

9. Press [4] (**Page Down**) and finish selecting settings for the parameters found on Pages 2, 3, and 4.
10. Press [4] (**Page Down**), then press [ENTER] to display the following:

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On this page and the one that follows, you can configure pass/fail criteria for the Internetwork Throughput test. You can also select the message that the tester displays when the particular threshold is exceeded (Ignore=Pass, Fail or Warning).

The cursor is positioned on the current setting for the **Achieved Throughput Percent** subtest.

11. To change the pass/fail criteria and/or message for a subtest, position the cursor on the setting you want to change, then press [ENTER]. Follow the on-screen instructions to make the desired change, then press [SAVE] to save it.

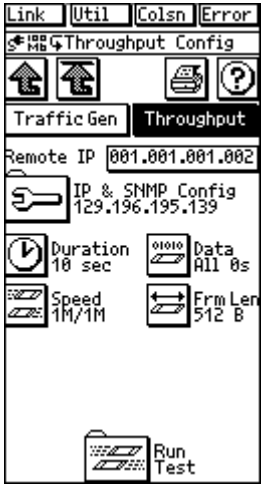
You have completed the setup of the 660 as the local tester.

### *OneTouch Tester Setup*

To set up a OneTouch tester, complete the following:

1. From the top-level display, press (**Connectivity Tests**).
2. Press (**Internetwork Throughput Option**).

   The **Throughput Config** screen is displayed:

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This screen displays the setup parameters for the test. See Table 2-2 for descriptions of these parameters and their settings.

3. Use the Address Entry Keypad to type the IP address of the remote unattended tester in the **Remote IP** field. When you are finished, press **OK** to exit.

4. Press  (**IP & SNMP Config**). Then, use the Address Entry Keypad to type the IP address of this (local) tester.

   *Note*

   *You can configure the IP address manually or with the Dynamic Host Configuration Protocol (DHCP). Chapter 6 in the OneTouch Series II Users Manual provides instructions for both methods.*

5. Press  (**Duration**). Then, select a test duration period.

6. Press  (**Data PRBS**). Then, select a data pattern to transmit.

7. Press  (**Speed**). Then, select an upstream (to the remote tester) rate and a downstream (from the remote tester) rate or define your own upstream and downstream rates.

8. Press  (**Frm Len**). Then select a frame size.

You have completed the setup of the local OneTouch tester.

## Setting Up the Remote Unattended Tester

This section shows you how to set up the remote unattended tester. Follow the instructions for your particular test scenario.

### 660 Tester Setup

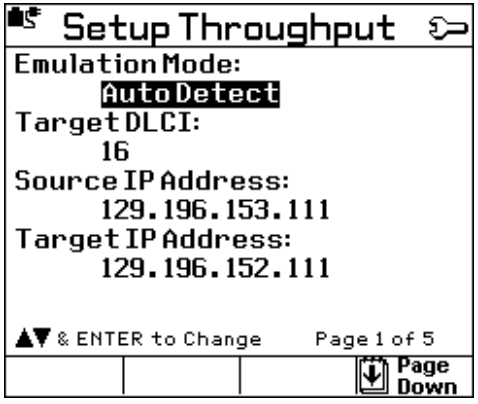
To set up a 660 as the remote tester, you need only supply the local tester's IP address. To do this, complete the following:

1. Turn the rotary dial to **SETUP**.

   The **Setup** menu is displayed.

2. Press ⊜ to select **Internetwork Throughput**. Then, press [ENTER].

   The **Setup Throughput** menu is displayed:




acx10s.bmp

3. Press ⊜ to highlight **Source IP Address**. Then, press [ENTER] to display the **Source IP Address List**.

4. Supply the local tester's IP address. Do *one* of the following:
   - If the tester's IP address is in the list, press ⊛ to highlight the address, then press [ENTER] to select it.

     The **Setup Throughput** menu is redisplayed. The address you selected appears as the **Source IP Address**.
   - If the tester's IP address is not in the list, you need to add it. To do this:

     a. Press [3] **(Add Item)**.

     A numeric entry screen is displayed.

     b. Type the tester's IP address, then press [SAVE].

     The **Setup Throughput** menu is redisplayed. The address you selected now appears as the **Source IP Address**.

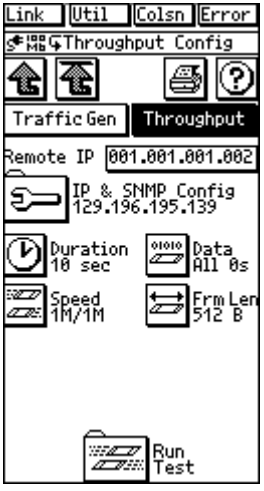
   You have completed the setup of the 660 as the remote tester.

### *OneTouch Tester Setup*

To set up a OneTouch tester, complete the following:

1. From the top-level display, press (**Connectivity Tests**).
2. Press (**Internetwork Throughput Option**).

   The **Throughput Config** screen is displayed:

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3. Press (**IP & SNMP Config**). Then, type the IP address of this tester.

   For a description of the **IP & SNMP Config** parameter, consult Table 2-2.

*Note*

*You can configure the IP address either manually or by using the Dynamic Host Configuration Protocol (DHCP). See Chapter 6 in the OneTouch Series II Users Manual for details.*

You have completed the setup of the OneTouch as the remote tester.

## Connecting the Testers to the Network

There are two possible connection schemes:

- A 660 tester connected to another 660 tester
- A 660 tester connected to a OneTouch Series II tester.

*Note*

*You can also interoperate between two OneTouch SeriesII testers. See the OneTouch Series II Users Manual for instructions.*

Follow the instructions that fit your particular application.

### Connecting Two 660 Testers

To connect two 660 testers, refer to Figure 1-3 and complete the following:

*Note*

*Figure 1-3 illustrates the most common connection scheme, in which the 660 testers are connected to a T1/E1/DDS line and emulating CPE. The testers can connect to any 660-supported interface (for example, Serial) and operate in any of the other 660 emulation modes (for example, UNI NET). See Chapter 3 in the* Frame Relay Installation Assistant Users Guide for *information about 660-supported interfaces and emulation modes.*

1. On both the local and far end, terminate the 660 tester to an out-of-service Frame Relay link at the customer premise (T1, E1, or DDS line).

2. Turn on both testers.

You can leave the remote tester unattended. It is ready to respond to requests from the local tester to participate in the test.

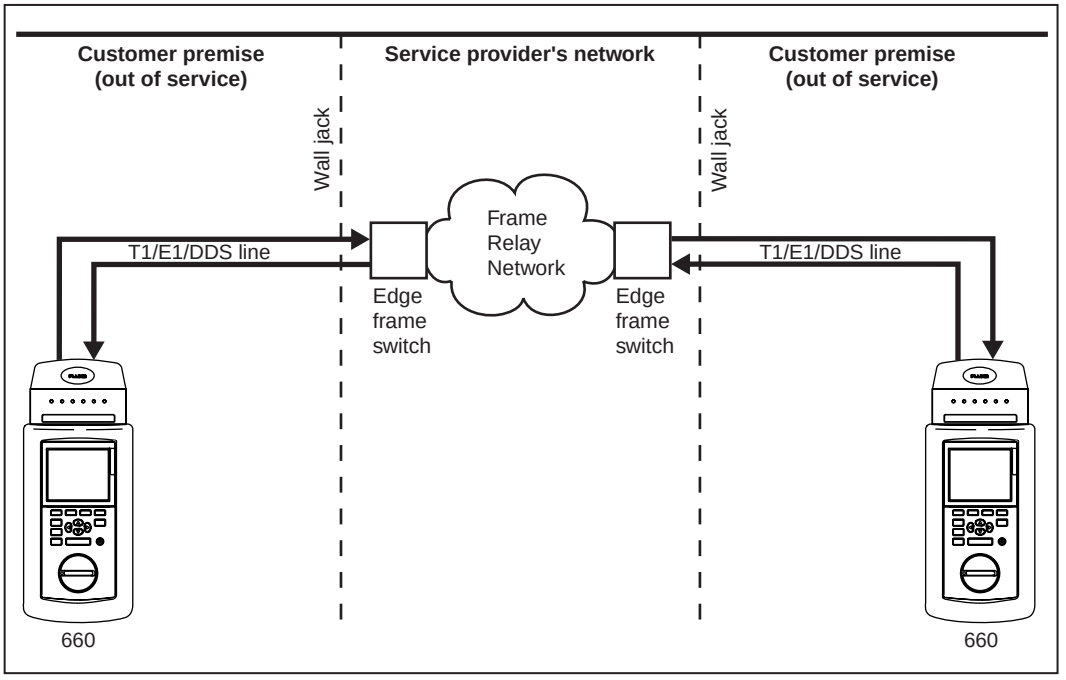



**Figure 1-3. Connecting a Local 660 to a Remote 660 Tester**

### *Connecting a 660 to a OneTouch Tester*

To connect a 660 (local or remote) to a OneTouch tester (local or remote), refer to Figure 1-4 and complete the following:

*Note*

*Figure 1-4 illustrates the most common connection scheme, in which a 660 tester is emulating CPE. The 660 can connect to any 660-supported interface (for example, Serial) and operate in any of the other 660 emulation modes (for example, UNI NET). See Chapter 3 in the* Frame Relay Installation Assistant Users Guide *for information about 660-supported interfaces and emulation modes.*

1. Terminate the 660 to an out-of-service Frame Relay link on the customer premise (T1/E1/DDS line).
2. Connect the One Touch to the desired Ethernet segment on the LAN.
3. Turn on the testers.

The remote tester can now be left unattended. It is ready to respond to requests from any local tester to participate in the test.

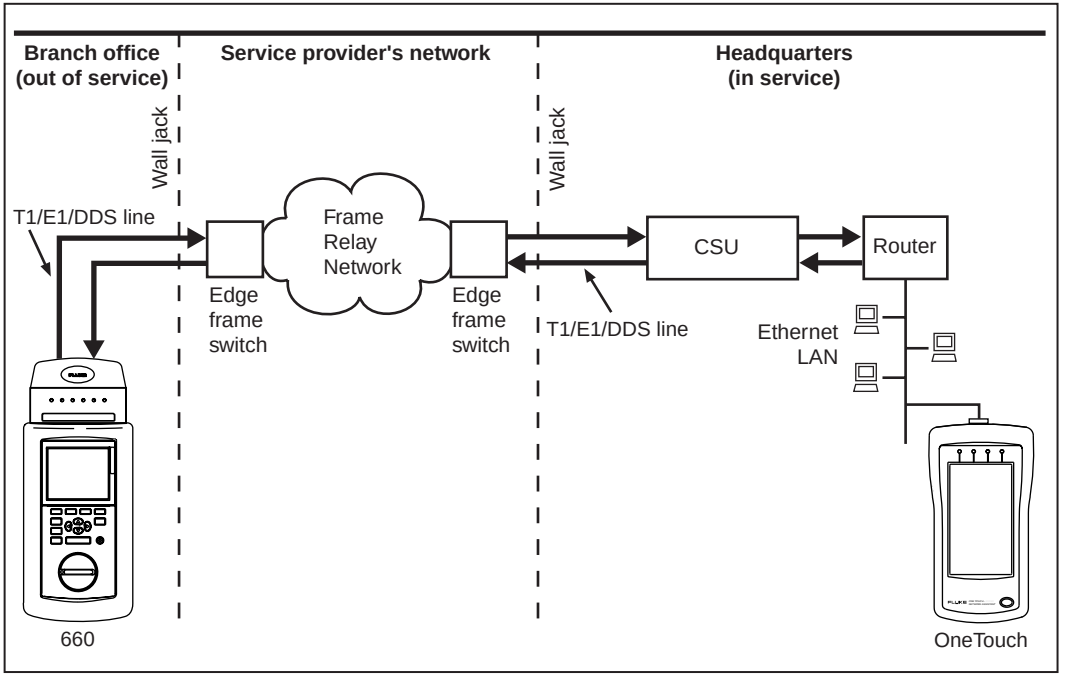



**Figure 1-4. Connecting a 660 to a OneTouch Tester**

# Starting an Internetwork Throughput Test

After you set up the testers and connect them to their respective network locations, you are ready to start the test. You must do this on the local tester.

This section first describes the exchange between the local and remote testers, then shows you how to conduct a Throughput test.

## What Happens During a Throughput Test: an Overview

The Internetwork Throughput test is bi-directional. The two testers generate traffic simultaneously in both directions (upstream and downstream). The local tester reports results for both directions.

After the test starts from the local tester, the following actions occur (refer to Figures 1-1 and 1-2, which illustrate the relationship between the local and remote testers):

1. The local tester sends a Start request to the remote tester that is specified as its target or remote IP address, then waits for a response to that request. Within the Start request are the configuration parameters for the test. The remote unattended tester uses these parameters to configure itself to match the desired rate, data pattern, frame length, etc.
2. Both testers set their counters to zero and set up for tracking the number of packets received from the other tester.

*Note*

*The number of frames per second for the upstream and downstream bit rates is also calculated and displayed. The Ethernet preamble and inter-frame gap are not used in this calculation when the 660 is the local initiating tester, and the number of frames per second is rounded up.*

3. Both testers generate the user-configured traffic for the specified duration. The traffic generated is IP-level data-grams, which allows routing. Both testers transmit traffic simultaneously.
4. After the user-specified duration, the local tester sends a request to the remote tester asking it to send back its upstream test results. After the local tester receives this information, it displays both the results it calculated (downstream) and the results calculated by the remote tester (upstream).

### *Starting the Throughput Test on a 660 Tester*

To start the test on a 660, do the following:

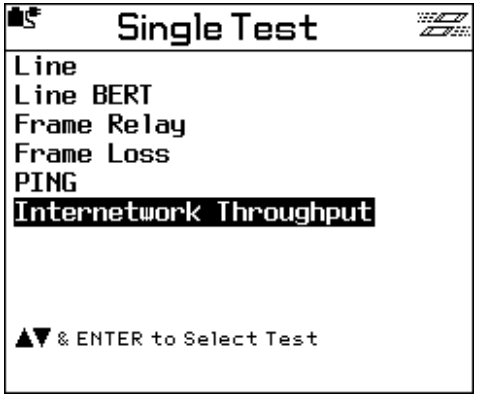
*Note*

*To run the test, the local initiating tester must have the ITO software enabled. If you have not activated the software, see "Enabling the ITO Option" for instructions. The remote unattended tester does not have to have the ITO software option enabled to respond to a start request from a local initiating tester.*

1. Turn the rotary dial to **SINGLE TEST**.

   The **Single Test** menu is displayed.

2. Press ⏎ to select **Internetwork Throughput**, as in the following:

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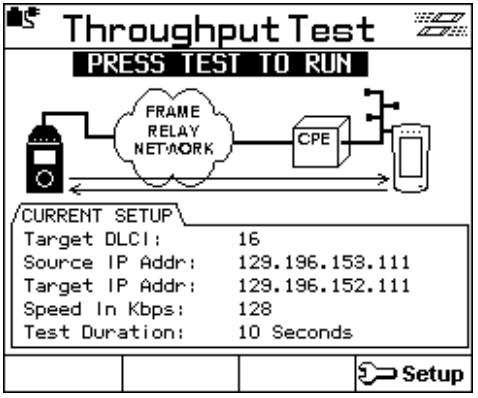
3. Press ENTER to display the **Throughput Test** launch screen:

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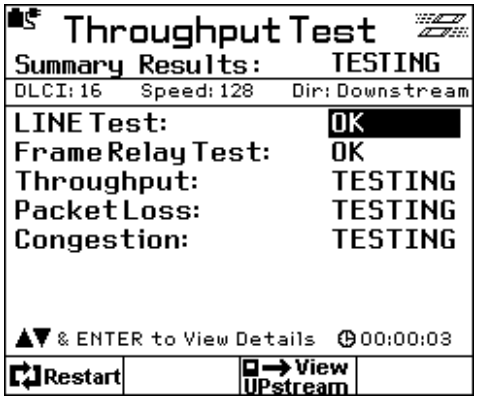
The information at the bottom of the screen shows the current setup for the test and the user-specified duration.

4. Do one of the following:
   - If the current setup is correct, press TEST to begin testing.
   - If you want to change the current setup, follow these steps:
     a. Press 4 (**Setup**) to display the **Setup Throughput** menu.
     b. Follow the instructions on the screen to change the setup parameters. When you are finished, press EXIT to return to the **Throughput Test** launch screen.
     c. Press TEST to start the test.

While the Internetwork Throughput test is running, the tester updates you on the progress of the subtests for the downstream direction:

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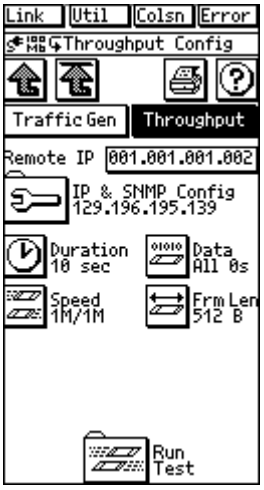
After the test ends, the **THROUGHPUT TEST COMPLETE** screen is displayed. This screen provides an overall test result for the upstream direction and an overall test result for the downstream direction. See “Final Results Displayed by the 660 Tester” for details.

### Starting the Throughput Test on a OneTouch Tester

To start the test on a OneTouch, complete the following:

1. From the top-level display, press (**Connectivity Tests**).
2. Press (**Internetwork Throughput Option**).

   The **Throughput Config** screen is displayed:

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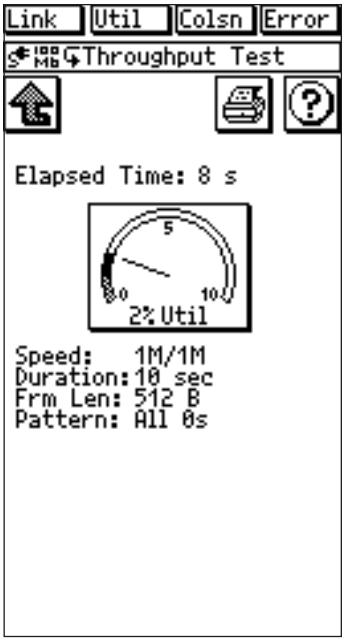
   This screen shows you the current setup and user-specified duration of the test.

3. Do one of the following:
   - If the current setup is correct, press (**Run Test**) to begin testing.
   - If the current setup is not correct, press the desired keys and make the necessary changes. Then, return to the **Throughput Config** screen and press (**Run Test**) to begin testing.

While the test is in progress, the **Throughput Test** screen is displayed:




acx08f.eps

This screen displays the elapsed test time (in seconds) and setup for the test. The Utilization meter indicates total network utilization, which includes the traffic generated by both testers as well as any other traffic detected on the network.

After the test ends, the tester displays final results. See “Final Results Displayed by the OneTouch” for details.

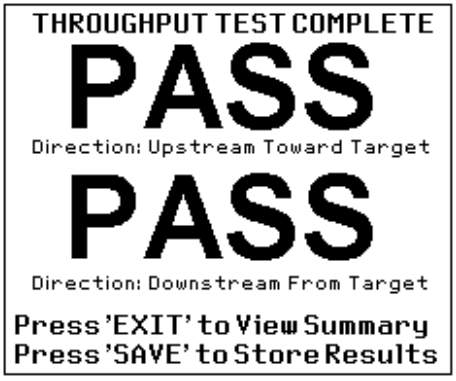
# *Final Test Results*

Final test results are reported for the upstream and downstream directions. These results are displayed on the local tester only. Tables 3-1 and 3-2 provide detailed information about the Throughput test results referred to in this section.

## *Final Results Displayed by the 660*

After the Throughput test ends (or is manually interrupted), the **THROUGHPUT TEST COMPLETE** is displayed. On this screen, the tester reports an overall PASS, WARNING, or FAIL result for the upstream (toward target) direction and the downstream (from target) direction.

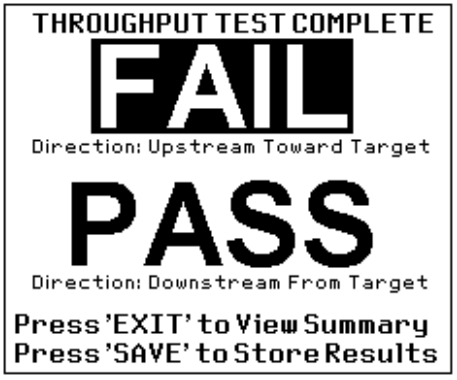
Figure 1-5 shows a situation in which an overall PASS result was obtained for each direction:




acx14s.bmp

**Figure 1-5. Overall PASS Results for Upstream and Downstream**

Figure 1-6, on the other hand, shows a situation in which an overall FAIL result was obtained in the upstream direction and an overall PASS result was obtained in the downstream direction.




acx15s.bmp

**Figure 1-6. Overall FAIL (Upstream) and Overall PASS (Downstream) Results**

From the **THROUGHPUT TEST COMPLETE** screen, you can exit and immediately view results or save the results for later viewing. See "Viewing 660 Test Results Without Saving Them" and "Saving 660 Test Results", which follow, for details.

## *Viewing 660 Test Results without Saving Them*

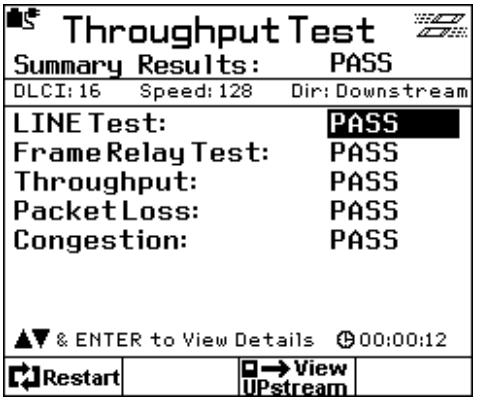
To view test results without saving them, follow these steps:

*Note*

*This procedure shows you how to exit the* ***THROUGHPUT TEST COMPLETE*** *screen to immediately look at final test results. Be aware that if you exit, you cannot return to this screen to save the results you saw. In addition, any associated fault log records are lost. If you think that you may want to keep the test results, you should save them first. See "Saving 660 Results" for instructions.*

1. On the **THROUGHPUT TEST COMPLETE** screen, press EXIT.

   Summary results for the downstream direction are displayed, as in the following:



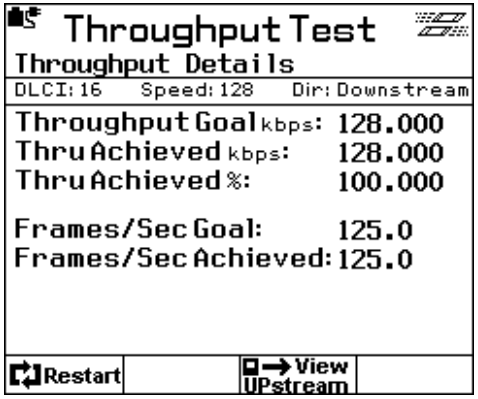

acx17s.bmp

   An overall PASS, FAIL, or WARN result for each subtest is given in the right column.

2. To look at summary results for the upstream direction, press 3 (**View UPstream**).

3. To look at the detailed results for the Throughput subtest, move the cursor to **Throughput**, then press ENTER.

The **Throughput Details** screen is displayed, as in the following:

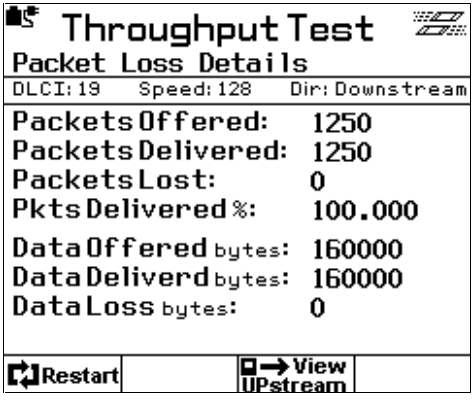



acx18s.bmp

Throughput detailed results enable you to compare the actual measured throughput (**Thru Achieved**) to the attempted throughput goal. This screen shows you results for the downstream direction.

4. To view Throughput detailed results for the upstream direction, press 3 (**View UPstream**).

5. To look at detailed results for the Packet Loss subtest, press EXIT to return to the **Throughput Test Summary Results** screen. Press ⊙ then ENTER to display the following:

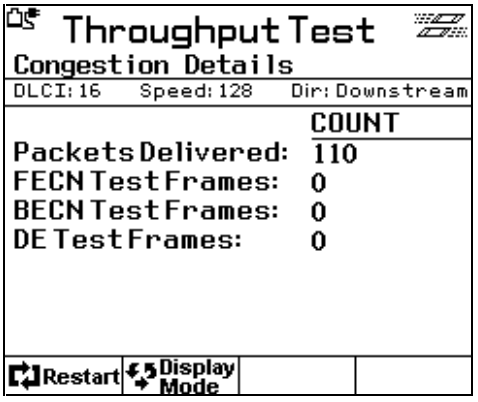



acx22s.bmp

Packet Loss detailed results show you the number of packets and the number of bytes transmitted. The number of transmitted packets and bytes is compared to the respective number of successfully delivered packets and bytes.

6. To view Packet Loss details for the upstream direction, press [3] (**View UPstream**).

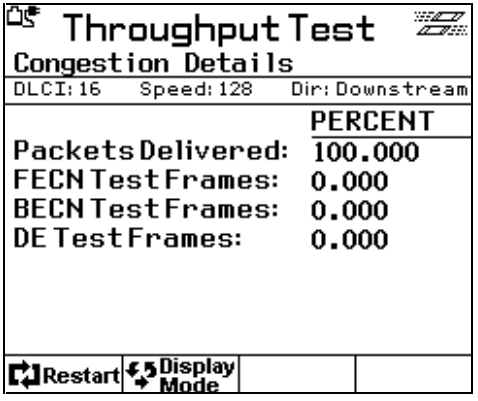
7. To look at Congestion subtest results, press [EXIT] to return to the **Throughput Test Summary Results** screen. Press ⊛ then [ENTER] to display the **Congestion Details** screen, as in the following:




acx20s.bmp

Congestion detailed results show the number (**COUNT**) of packets transmitted and indicate whether any of the packets contained frames marked by the Frame Relay network as congested (**FECN** and **BECN**) or eligible for discarding (**DE**).

8. Press [2] (**Display Mode**). The results are now displayed in percent format, as in the following:



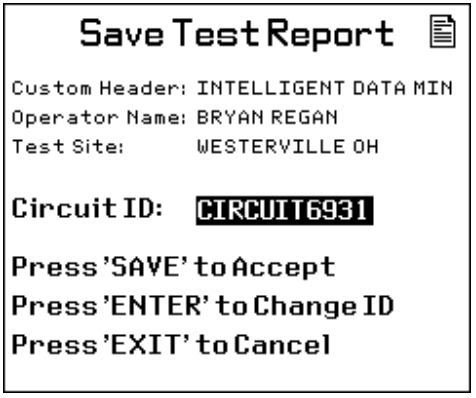

acx21s.bmp

### *Saving 660 Test Results*

To save test results for later viewing, complete the following:

1. On the **THROUGHPUT TEST COMPLETE** screen, press SAVE.

   The **Save Test Report** screen is displayed, as in the following:




acb16f.bmp

   The tester prompts you to provide a name for the file in the **Circuit ID** field. You can accept the default file name that is provided or you can type a different name for the file in this field.

2. Do one of the following:

   - To use the default file name, press SAVE.

     The results are saved in a report file. This file contains both summary and detailed results from the test. If any errors or failures were detected, corresponding fault log records are appended to the report (see "The Fault Log" in the *Frame Relay Installation Assistant Users Guide* for details).

   - To change the name of the file, press ENTER. Then, follow the instructions on the screen to supply a new name. The name you choose can be from 1 to 15 characters long.

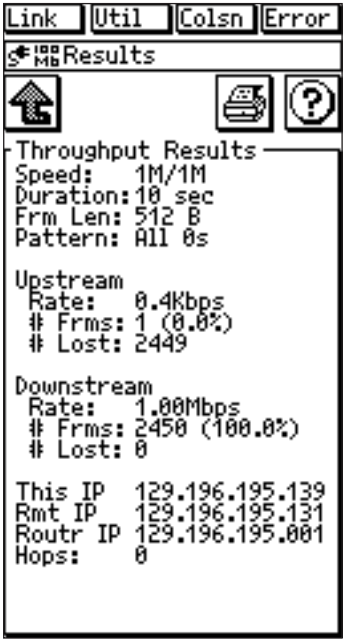
     After you type a name for the file, press SAVE.

     The results are saved in the named file. This file contains both summary and detailed results from the test. If any errors or failures were detected, corresponding fault log records are appended to the report (see "The Fault Log" in the *Frame Relay Installation Assistant Users Guide* for details).

   - Press EXIT to cancel.

### *Final Results Displayed by the One Touch*

When the Throughput test ends, the OneTouch displays its findings on the **Results** screen (Figure 1-7):




acx07f.eps

**Figure 1-7. OneTouch Final Results Screen**

The top portion of this screen shows the upstream/downstream test speeds (**Speed**), the duration of the test (**Duration**), the frame length (**Frm Len**), and the data pattern (**Pattern**) as specified in the setup for the test. In the middle of the screen, separate results are given for the upstream and downstream test directions (see Table 3-2 for explanations). The information at the bottom provides the IP addresses of the local tester (**This IP**), the tester at the remote end (**Rmt IP**), and the router (**Routr IP**), if any. **Hops** shows the number of routers between the local tester and the remote tester.

# Chapter 2
# Internetwork Throughput Test Setup Parameters

## Introduction

The tables in this chapter list the Internetwork Throughput test setup parameters for the Fluke Networks 660 and OneTouch Series II testers.

**Table 2-1. Setup Parameters for the Fluke Networks 660 Tester**

| Parameter | Function | Setting (default bold) | Explanation of Setting |
|---|---|---|---|
| Emulation Mode | Sets the tester to automatically detect the appropriate emulation mode based on LMI or sets the tester to emulate CPE-to-Network, Network-to-CPE, or Network-to-Network. | **AutoDetect** | Automatically sets the tester to the LMI (Local Management Interface) emulation mode as discovered by the tester. |
| | | UNI CPE | Emulates CPE (Customer Premise Equipment) on a UNI (User-to-Network interface). The tester transmits LMI status enquiries to the edge switch. |
| | | UNI Network | Emulates a NET (network connection) on a UNI (User-to-Network interface). The tester transmits LMI status messages in response to CPE status enquiries. |
| | | Net to Net (NNI) | Emulates a NNI (Network-to-Network interface). The tester transmits both LMI status enquiries and status messages. |
| Target DLCI | Selects the active DLCI through which you want to test. | **16**<br>Press **ENTER** for menu. | Pressing the **Auto Detect** softkey instructs the tester to always set the target DLCI (Data Link Connection Identifier) to the first (lowest numbered) active DLCI discovered.<br>You can also use the arrow keys to select an active DLCI from the list then press **ENTER**, or press the **User Entered** softkey to manually enter the desired DLCI. |
| Source IP Address | Selects the IP address for the local initiating device (your tester). | Press **ENTER** for menu. | Press the arrow keys to select an IP address from the list shown, or press the **Add Item** softkey and follow the instructions on the screen to enter the desired source IP address. |
| Target IP Address | Selects the IP address for the remote unattended device (far-end tester). | Press **ENTER** for menu. | Press the arrow keys to select an IP address from the list shown, or press the **Add Item** softkey and follow the instructions on the screen to enter the desired target IP address. |

**Table 2-1. Setup Parameters for the Fluke Networks 660 Tester (cont.)**

| Parameter | Function | Setting (default bold) | Explanation of Setting |
|---|---|---|---|
| Speed | Sets the throughput transmission rate for the test. | 8 to 2048 Kbps (**128 Kbps**) | The desired speed is used to calculate the throughput goal. The throughput goal is the actual transmission rate (in Kbps) based on the duration of the test and the configured frame size. A frames-per-second rate is calculated that is as close as possible to the desired speed as the values of these parameters allow. |
| Payload Contents | Specifies the data pattern to be sent within the ITO test frames. | All Ones, All Zeros, Alternating 1s and 0s, PRBS | Select to send all ones, all zeros, alternating ones and zeros, a Pseudo-Random Bit Sequence (PRSB). The PRBS pattern simulates normal data traffic. |
| Frame Length | Sets the length of the transmitted ITO frame in bytes. | 64 to 1518 bytes (**128 bytes**) | When the remote unattended device is another 660 tester, Frame Length specifies the length of each Frame Relay frame (including header and FCS) transmitted by the 660.<br>When the remote unattended device is a OneTouch tester, Frame Length specifies the length of each Ethernet Frame (including header and CRC) arriving on the LAN segment to which the OneTouch is connected. The selected Payload Data is repeated inside the user payload area in the frame until the value specified by Frame Length is met. |
| Test Duration | Specifies the duration of the Internetwork Throughput test. | 2 seconds,<br>**10 seconds**,<br>30 seconds,<br>60 seconds,<br>120 seconds,<br>300 seconds | Both the local initiating tester and the remote unattended tester transmit at the desired speed for the period of time specified by Test Duration. Then, the local initiating tester queries the remote unattended tester for its results. This can take an additional few seconds. The test then ends, and the results for both directions are displayed on the local initiating tester. |

**Table 2-1. Setup Parameters for the Fluke Networks 660 Tester (cont.)**

| Parameter | Function | Setting (default bold) | Explanation of Setting |
|---|---|---|---|
| Single Speed or Ramp Up | Selects between single speed test mode or ramp up test mode (in which the tester increments through a range of transmission speeds). | **Single Speed** | When set to Single Speed, the Internetwork Throughput test transmits bi-directionally at the rate defined by the Speed setting. |
| | | Ramp Up | When set to Ramp Up, the tester runs a series of individual tests starting at the specified Ramp-Up Start at Speed setting, then increments the transmission rate by the specified Ramp Up Increment By setting. The final test speed is run at the specified Ramp Up Stop At Speed setting.<br><br>If any of the pass/fail criteria are exceeded during a Ramp Up test, the test ends when the duration expires for the current step's speed. The results are presented on the local initiating tester, and no other speeds are attempted. |
| Ramp-Up Start At Speed | Sets the initial throughput transmission rate for the ramped speeds Internetwork Throughput test. | 8 to 2048 Kbps (**64 Kbps**) | The ramped Internetwork Throughput test first runs at the specified Ramp-Up Start At Speed for the specified duration. If no pass/fail criteria are exceeded, the ramped test proceeds to the next speed increment and repeats. |
| Ramp-Up Stop At Speed | Sets the final throughput transmission rate for the ramped speeds Internetwork Throughput test. | 8 to 2048 Kbps (**128 Kbps**) | The ramped Internetwork Throughput test runs its final iteration at the specified Ramp-Up Stop At Speed. If no pass/fail criteria are exceeded, the ramped test proceeds to the next speed increment and repeats. |
| Ramp-Up Increment By | Sets the increment speed for each interval of the ramped Internetwork Throughput test. | 8 to 2048 Kbps (**16 Kbps**) | The ramped Internetwork Throughput test steps up the transmission rate for each iteration of the ramped test as specified by the Ramp-Up Increment By setting. |

**Table 2-1. Setup Parameters for the Fluke Networks 660 Tester (cont.)**

| Parameter | Function | Setting (default bold) | Explanation of Setting |
|---|---|---|---|
| Multiprotocol Encapsulation | Selects the type of encapsulation used by the CPE to transmit packets within Frame Relay frames. | **Auto Detect** | Instructs the tester to monitor received non-management frames and automatically determine the type of multiprotocol encapsulation configured at the CPE. |
| | | RFC 1490 (2427) | Sets the tester to use the standard RFC 1490 (now RFC 2427) as the multiprotocol encapsulation type. |
| | | Cisco (Ethertype) | Sets the tester to use Ethertype (the default in many Cisco products) as the multiprotocol encapsulation type. |
| | | No Encapsulation | Sets the tester to not use multiprotocol encapsulation. |
| Transmit DE Test Frames | Allows or disallows transmission of frames with the DE (Discard Eligible) bit set to 1. | Yes | All generated frames will have the DE bit set to 1in the Frame Relay header.<br>Note: If the remote unattended tester is a OneTouch, only upstream frames traveling from the 660 tester toward the OneTouch are marked DE. |
| | | **No** | The DE bit in the Frame Relay header is set to 0 (Not Discard Eligible). |
| Transmit FECN Test Frames | Allows or disallows transmission of frames with the FECN (Forward Explicit Congestion Notification) bit set to 1. | Yes | All generated frames will have the FECN bit set to 1in the Frame Relay header.<br>Note: If the remote unattended tester is a OneTouch, then only upstream frames traveling from the 660 tester toward the OneTouch will be marked FECN. |
| | | **No** | The FECN bit in the Frame Relay header is set to 0 (No Forward Explicit Congestion Notification). |

**Table 2-1. Setup Parameters for the Fluke Networks 660 Tester (cont.)**

| Parameter | Function | Setting (default bold) | Explanation of Setting |
|---|---|---|---|
| Transmit BECN Test Frames | Allows or prevents transmission of frames with the BECN (Backward Explicit Congestion Notification) bit set to 1. | Yes | All generated frames have the BECN bit set to 1in the Frame Relay header.<br>Note: If the remote unattended tester is a OneTouch, only upstream frames traveling from the 660 tester toward the OneTouch are marked BECN. |
| | | **No** | The FECN bit in the Frame Relay header is set to 0 (No Backward Explicit Congestion Notification). |
| ITO Pass/Fail Criteria | Selects the results criteria for the Frame Loss sub-tests.<br>There are 2 settings for each sub-test:<br>1. The pass/fail threshold<br>2. The message to be displayed after a sub-test fails (Warning, Fail, or exclude the sub-test result). | Achieved Throughput Percent 0.000% to 100.000% (**100.000%**, **Fail**) | The acceptable limit for the Achieved Throughput result.<br>Given the default settings, if the Achieved Throughput falls below 100.000%, the test shows a summary "FAIL" result for Packet Loss. |
| | | Percent FECN Test Frames 0.0% to 100.0% (**0.0%, Warning**) | The acceptable limit for the ratio of test frames that are received with the FECN bit set to 1 in the Frame Relay header as opposed to those test frames that are received without the FECN bit set.<br>Given the default settings, if there are more than 0.0% percent of the test frames (one or more) marked FECN, the test shows a summary "WARNING" result for Congestion. |

**Table 2-1. Setup Parameters for the Fluke Networks 660 Tester (cont.)**

| Parameter | Function | Setting (default bold) | Explanation of Setting |
|---|---|---|---|
| ITO Pass/Fail Criteria (cont.) | Selects the results criteria for the Frame Loss sub-tests.<br>There are 2 settings for each sub-test:<br>1. The pass/fail threshold<br>2. The message to be displayed after a sub-test fails (Warning, Fail, or exclude the sub-test result). | Percent BECN Test Frames 0.0% to 100.0% (**0.0%**, **Warning**) | The acceptable limit for the ratio of test frames that are received with the BECN bit set to 1 in the Frame Relay header as opposed to those test frames that are received without the FECN bit set.<br>Given the default settings, if there are more than 0.0% percent of the test frames (one or more) marked BECN, the test shows a summary "WARNING" result for Congestion. |
| | | Percent DE Test Frames 0.0% to 100.0% (**0.0%**, **Warning**) | The acceptable limit for the ratio of test frames that are received with the DE bit set to 1 in the Frame Relay header as opposed to those test frames that are received without the DE bit set.<br>Given the default settings, if there are more than 0.0% percent of the test frames (one or more) marked BECN, the test shows a summary "WARNING" result for Congestion. |

**Table 2-2. Setup Parameters for the Fluke Networks OneTouch Tester**

| Parameter | Function | Setting (default bold) | Explanation of Setting |
|---|---|---|---|
| Remote IP | Specifies the IP address of the tester at the remote end. | | |
|  IP & SNMP Config | Specifies the IP address for the local initiating tester.<br>Select the method for configuring the IP address (Manual or DHCP). See Chapter 6 in the *OneTouch Series II Users Manual* for details. | | |
|  Duration | Specifies the length of time that the test will run. | 2, 10, 30, 60, 120, or **300** | Select the number of seconds that the test will run. |
|  Data PRBS | Specifies the data pattern to be sent. | All 0s | Select to send all zeros. |
| | | All 1s | Select to send all ones. |
| | | Alt 1/0 | Select to send alternating ones and zeros. |
| | | PRBS | Select to send a Pseudo-Random Bit Sequence. This pattern simulates normal traffic. |

**Table 2-2. Setup Parameters for the Fluke Networks OneTouch Tester (cont.)**

| Parameter | Function | Setting (default bold) | Explanation of Setting |
|---|---|---|---|
|  Speed | Specifies the upstream (to the remote tester) and downstream (from the remote tester) speeds to be tested. | ISDN 128 Kbps, T1 1.544 Mbps, E1 2.048 Mbps, 1 Mbps/1Mbps | ITO speed parameters. |
| | | 64 Kbps/1.5 Mbps, 160 Kbps/3 Mbps, 384 Kbps/4.6 Mbps, 640 Kbps/6Mbps, 1 Mbps/1Mbps | ANSI Assymetrical rates (XDSL speed parameters). |
| | | Auto | Tests a range of speeds to determine the operating speed of RADSLK modems. |
| | |  Start at | Select the lowest speed for the range of downstream rates to be tested. |
| | |  Stop at | Select the highest speed for the range of downstream rates to be tested. |
| | |  Upstream | Select the speed of the upstream traffic generated during the test. |
| | |  Incr by | Select the increment size of the downstream speeds within the range you defined with your Start at and Stop at selections.<br>The test increments the downstream speed and continues testing only if the channel passes 95% of the transmitted data at the current speed. |

**Table 2-2. Setup Parameters for the Fluke Networks OneTouch Series Tester (cont.)**

<table>
<tr><th>Parameter</th><th>Function</th><th>Setting (default bold)</th><th>Explanation of Setting</th></tr>
<tr><td>  <br>Speed (cont.)</td><td>Specifies the upstream speed (to the remote tester) and downstream speed (from the remote tester) to be tested.</td><td>User 1 and User 2</td><td>Allows you to define your own upstream and downstream rates. The total upstream and downstream rates must not exceed the following:<br>For 10 Mb:<br><table><tr><th>Frame Size</th><th>Max bps</th></tr><tr><td>64</td><td>6.9 Mbps</td></tr><tr><td>128</td><td>8.2 Mbps</td></tr><tr><td>256</td><td>9.0 Mbps</td></tr><tr><td>512</td><td>9.5 Mbps</td></tr><tr><td>768</td><td>9.6 Mbps</td></tr><tr><td>1024</td><td>9.6 Mbps</td></tr><tr><td>1280</td><td>9.7 Mbps</td></tr><tr><td>1518</td><td>9.7 Mbps</td></tr></table>For 100 Mb:<br><table><tr><th>Frame Size</th><th>Max bps</th></tr><tr><td>64</td><td>32.8 Mbps</td></tr><tr><td>128</td><td>65.5 Mbps</td></tr><tr><td>256</td><td>75.8 Mbps</td></tr><tr><td>512</td><td>86.0 Mbps</td></tr><tr><td>768</td><td>86.0 Mbps</td></tr><tr><td>1024</td><td>90.1 Mbps</td></tr><tr><td>1280</td><td>92.2 Mbps</td></tr><tr><td>1518</td><td>85.0 Mbps</td></tr></table></td></tr>
<tr><td>  <br>Frm Len</td><td>Specifies a frame size.</td><td>64, 128, 256, 512, 768, 1024, 1280, 1518</td><td>Select an RFC frame size (in bytes).</td></tr>
</table>

*Chapter 3*

# Internetwork Throughput Test Results

## *Introduction*

The tables in this chapter list the Internetwork Throughput test results displayed by the Fluke Networks 660 and OneTouch Series II testers.

**Table 3-1. Throughput Test Results Reported by the 660 Tester**

| Sub-Test | Function of Test | Result | Explanation of Result |
|---|---|---|---|
| LINE Test | See Chapters 3 through 6 in the *Frame Relay Installation Assistant Reference Manual.* | | |
| Frame Relay Test | See Chapter 2 *in the Frame Relay Installation Assistant Reference Manual.* | | |
| Throughput<br>(separate results for the upstream and downstream directions are provided) | Compares the actual measured throughput to the attempted throughput goal as defined by the Speed setting for the test. | Throughput Goal (Kbps) | The Speed setting is used to calculate the exact transmission rate. Because the tester must transmit complete frames of the size specified under the Frame Length setting, a frames-per-second rate is calculated that is as close to the desired speed as possible. This becomes the Throughput goal transmission rate. |
| | | Thru Achieved (Kbps) | The actual measured rate of successfully received test frames.<br>Calculated as:<br>(Total test packets received * Frame Length * 8) / 1000<br>test duration in seconds |
| | | Thru Achieved (%) | The percent ratio of successfully delivered test packets to the number of offered test packets.<br>Calculated as:<br>Total test packets delivered * 100%<br>Total test packets offered |
| | | Frames per Second Goal | The calculated transmission rate expressed in units of frames per second based on the user specified Speed setting (rounded up). |
| | | Frames per Second Achieved | The actual measured throughput rate of successfully received test frames (expressed in units of frames per second).<br>Calculated as:<br>Total packets received<br>test duration in seconds |

**Table 3-1. Throughput Test Results Reported by the 660 Tester (cont.)**

| Sub-Test | Function of Test | Result | Explanation of Result |
|---|---|---|---|
| Packet Loss<br>(separate results for the upstream and downstream directions are provided) | Breaks out the number of transmitted packets and bytes and compares them to the number of successfully delivered packets and bytes. | Packets Offered | The number of transmitted data test packets. |
| | | Packets Delivered | The number of successfully received data test packets. |
| | | Packets Loss | The difference between the number of transmitted data test packets and the number of successfully received data test packets. |
| | | Packets Delivered % | The percentage of successfully delivered test frames to the total number of offered test frames.<br>Calculated as:<br>Total test packets delivered * 100%<br>Total test packets offered |
| | | Data Offered | The number of transmitted bytes.<br>Calculated as:<br>Total test packets offered * Frame Length |
| | | Data Delivered | The number of successfully received bytes.<br>Calculated as:<br>Total test packets delivered * Frame Length |
| | | Data Loss | The difference between the number of transmitted bytes and the number of successfully received bytes. |

**Table 3-1. Throughput Test Results Reported by the 660 Tester (cont.)**

| Sub-Test | Function of Test | Result | Explanation of Result |
|---|---|---|---|
| Congestion<br><br>(separate results are reported for the upstream and downstream directions) | Shows whether the Frame Relay network is marking frames as congested or discard eligible at specific throughput rates. | Packets Delivered | The number of successfully received data test packets. |
| | | FECN Test Frames | The number of successfully received data test packets that have the Forward Explicit Congestion Notification bit set to 1 in the Frame Relay header. |
| | | FECN Test Frames % | The ratio of successfully received data test packets to test frames that have the Forward Explicit Congestion Notification bit set to 1 in the Frame Relay header. |
| | | BECN Test Frames | The number of successfully received data test packets that have the Backward Explicit Congestion Notification bit set to 1 in the Frame Relay header. |
| | | BECN Test Frames % | The ratio of successfully received data test packets to test frames that have the Backward Explicit Congestion Notification bit set to 1 in the Frame Relay header. |
| | | DE Test Frames | The number of successfully received data test packets that have the Discard Eligible bit set to 1 in the Frame Relay header. |
| | | DE Test Frames % | The ratio of successfully received data test packets to test frames that have the Discard Eligible bit set to 1 in the Frame Relay header. |

**Table 3-2. Throughput Test Results Reported by the OneTouch Tester**

| Result | Description |
|---|---|
| Speed | User-specified (in test setup) upstream and downstream test speeds. |
| Duration | User-specified (in test setup) duration of the test. |
| Frm Len | User-specified (in test setup) frame length. |
| Pattern | User-specified (in test setup) data pattern. |
| Upstream Rate | Actual upstream data transmission rate.<br>The number of frames (# Frms) shows the number of frames that were successfully transmitted as well as the percentage of successful transmissions. |
| Downstream Rate | Actual downstream data transmission rate.<br>The number of frames (# Frms) shows the number of frames that were successfully transmitted and the percentage of successful transmissions. The number of frames lost (# Lost) shows the number of frames lost during the transmission. |
| This IP | IP address of the local initiating tester. |
| Rmt IP | IP address of the remote unattended tester. |
| Routr IP | IP address of the router (if any). |
| Hops | Number of routers (hops) between the local and remote testers. |