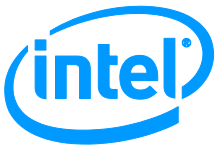
INTEL® LANConf User Manual

October 2013

Revision 1.3

Intel Confidential



Revision History

Revision Number	Description	Revision Date
1.0	Initial Release	2005
1.1	Engineering Updates	November 2006
1.2	Added OTP information	March 2012
1.3	Moved section 2.8.3 OTP to 2.8.4. Added new section 2.8.3 NVM Image.	October 2013

Table of Contents

1 Introduction

This document defines the user interface for the Intel® LANConf Software Tool. The guide is written for Intel or OEM hardware engineers, and is not intended for end users.

The Intel LANConf Software Tool is a silicon validation tool designed to validate, diagnose, and configure Intel® Ethernet Controllers. The Tool provides a method of performing IEEE conformance tests, adapter diagnostics, and transmit/receive tests. Intel LANConf also allows the user to read or write the MAC, PHY, EEPROM, and PCI Configuration spaces on Intel-based networking devices.

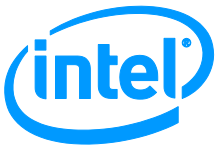
LANConf presents a GUI interface by default. A text mode interface is also supported (see Section 3).

Note: The Tool provides no error checking to prevent setting the controller to an invalid configuration.

To run LANConf, the following items are required:

- LANConf executable file (the included driver is required for operation in Windows* and Linux*).
- Intel based Ethernet Controller Network Interface Card (NIC) or LAN on Motherboard (LOM) system.
- Two Intel® Ethernet Controllers (or a dual port adapter) are required for bit error rate testing and transmit/receive testing.
- System with one available PCI or PCI-E slot (for the NIC) capable of booting to the desired operating system.

Intel LANConf behaves the same whether OS drivers are loaded or not. If drivers are loaded, LANConf will pause the drivers while in operation.



2 Graphic User Interface (GUI)

The function keys are used throughout the program. Each screen defines use of the function keys, although some generalities exist amongst most screens:

[F1] Help. Displays built-in Help.

[F2] Quick Menu. Displays the pop-up menu.

[F5] Refresh. Refreshes the screen. In the EEPROM screen, [F5] jumps to a specified offset.

[ESC] Can be used to cancel a test, move up one menu, or exit the program.

Some of these function keys are modified in some submenus. See the built-in help documentation for specifics.

2.1 Main Menu

The Arrow keys can be used to navigate up and down. Pressing the Enter key selects the highlighted entry, and the Escape key moves up one menu (to the previous menu).

2.2 F2 Quick Menu

This screen allows the user quick access to common tasks such as changing link settings, resetting the adapter, blinking LEDs, etc. For details on F2 menu options, select the menu option and refer to the F1 help screen.

Note: Link settings. When Auto-Negotiation is selected, several different values can be set. The controller first attempts to link at the highest of these values and falls back (one by one) to the lowest value until link is established. When Force is selected, only one value can be chosen. After a valid link setting is established, it should be saved and reset to enable the changes. (If Save and Reset Link is not selected, these changes will have no effect.) If an invalid link is set, link state will be undetermined.

Auto-Negotiation is preferred. Forcing link can result in a speed-duplex mismatch. This is common when one device is set to forced and its link partner is set as Auto-Negotiate. In addition, some speeds cannot be forced.

2.3 Impersonate Adapter

A device ID can be entered here to reinitialize a device as another Intel® Ethernet device. This can be useful for new hardware not yet supported by Intel LANConf, which operates similar to some other Intel Ethernet device. Impersonate adapter can also help in the recovery of a device that is lost due to NVM (EEPROM or Flash) corruption.

After entering the new device ID, the device must be selected and initialized from the main device selection menu.

2.4 Device Select

The Arrow keys can be used to navigate up and down. Pressing the Enter key selects the highlighted entry, and the Escape key moves up one menu (to the previous menu).

The following functions can be performed by pressing the specified key:

- **b** blinks the LEDs of the highlighted device.
- **X** exits the application.
- **I** allows the user to impersonate another adapter. See Section 2.3 for a description of this functionality.

After the device has been selected, the following menu appears.

2.5 Registers

The Registers (MAC and PHY) menu allows the user to read or write to the MAC and PHY registers. This menu and its submenus will vary and show different MAC and PHY registers based on the adapter capabilities. The main Registers menu contains sub-menus for a number of different register sets. These menus also allow the user to examine transmit and receive buffers and statistics, memory maps, etc.

Some register values are read/write, and others are read-only. This menu and its submenus are intended for expert users.

Note: it is possible to cause system crashes or instability by changing register values. For details on the submenus displayed under this menu, see F1 Help. For register values, see the specific device's documentation.

The "specific MAC register" screen is extremely useful for configuring registers, without browsing the individual register menus. A specific register offset can be entered and the specific MAC register option entered directly.

2.6 Transmit and Receive

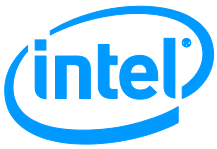
The Transmit and Receive menus allow the user to configure the device to send and receive packets. There are several transmit/receive modes, and options for transmit/receive configuration. Transmit & Receive statistics are displayed during and after data transfer. See the built-in F1 help menus for details on setup and configuration.

2.6.1 Setup

The Transmit and Receive setup menu allows the user to configure the device for various transmit/receive modes. Options include packet type, size, payload, loopback mode, link settings, memory allocation, and "Same Machine Responder" mode. The user can also find a Simple Responder on the network. See built-in Help and F1 Help menus for details on setup options.

The remainder of this section describes some of the less-obvious Intel LANConf setup options:

Packet Type: This is a drop down list of packet types (headers) that will be used with the packets. The legacy header will contain a regular Ethernet packet with source, destination, and length. Normal



Header is a special diagnostic packet format used internally in LANConf and other tools. No Header means just that – there will be no packet header. This packet type is useful when using the file option in the data section. This allows the user to configure an entire packet and have LANConf transmit it. Several new types of packets may be added to this section in the future.

Packet Payload Data: This option defines the type of data that will be in the packet after the header determined by packet type. To use this feature, select a payload data of "file". Then arrow down and enter a file name. The file should exist in the same directory as LANConf. Once selected, LANConf will load the file into memory. Transmit operations will use this file as input for data to build packets. If the file is a binary file, it will be read as such. It will use the amount of the file needed to build the packet of the requested size. If the file is smaller than the packet size, it will repeat the data until the packet size is achieved. In addition to binary files, a pattern file may be used. When the file extension of the file is ".pat", LANConf will assume the file is a pattern file. In a pattern file, each hexadecimal byte is expected to be entered on its own line.

When packet data or packet size is set to random, packets will be built prior to each send (as each packet is different). This results in a packet being built before every send and is much slower than when packet data is of a single type that can be built and sent repeatedly.

When any random parameters are selected, packets are sent one at a time. Otherwise, packets are sent in a burst mode (a ring at a time).

Packet Size: This is the size of the packet including any headers.

Verify Data / Stop On Verify Error: These options configure data verification. When "Verify Data" is set to enabled, packet contents will be validated against what is expected. Because, the sender needs to know what types of packets to expect, this option should be used mainly with loopback modes or with a simple responder. Data verification may not work on all forms of transmit and receive packets — especially, files with random packet formats.

Reset Before Start: Intel LANConf offers the ability to configure the adapter in a flexible manner. If the adapter is configured to test something specific via the register set and transmit/receive is started, the adapter will be reset and all the configuration changes will be lost. The "Reset Before Start" setting allows this behavior to be toggled off/on. When this option is used, use F2 to reset the adapter prior to setting up the specific adapter configuration. Otherwise the adapter's state may be unknown and the transmit/receive may not function correctly.

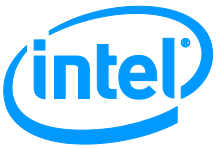
Ignore Link State: By default, LANConf will not transmit and receive until link is achieved. This option allows LANConf to attempt to transmit and receive regardless of the current link state.

TX Microsecond Delay: This option allows for a delay to be added after each transmit. A transmit is either a burst or a packet, dependent upon packet data type, contents and size. See packet payload data comments above.

Advanced – Descriptor Reclaim Policy: This option permits enforcement of a particular method of claiming descriptors which drives transmit and receive. Transmit and receive operations poll for free descriptor resources in order to know when a packet arrives and/or when to transmit the next packet. This option may be useful in diagnosing an inoperable device. There are various methods of doing this. For more information, please refer to the device's Design Guide or contact your Intel sales representative.

2.6.2 Show Corrupted Packet

This screen appears when a packet fails packet validation. If this occurs, the received packet is shown on the left and the packet that it was compared against is shown on the right. The data that did not validate correctly is highlighted.



The Up and Down arrow keys can be used to page through the buffer, and the Escape key exits this screen. Once this screen is closed, it cannot reopened until another packet validation error occurs. The F6 key can be used to save the data to disk for reviewing in a text editor or troubleshooting.

2.6.3 Loopback

Non-copper adapters perform PHY or transceiver loopback where appropriate if PHY loopback is set. Packet sizes are adjusted to fit the current device limitations with this software.

2.6.4 Memory Resource Allocation

This mode allows for memory resources to be reconfigured on the adapter.

Note: memory resources are dependent upon the OS environment. For example, in Windows*, upwards of 10,000 descriptors can be allocated. Linux* generally allows for about 1/3 of this while DOS may not even allow for 256 descriptors to be allocated. For more information, refer to the specific device's Design Guide or contact your Intel sales representative.

2.6.5 Find Responder

This mode locates a "simple responder" that is on the network and programs its MAC address into the destination address field in the transmit and receive setup screen. Packets will be transmitted to this MAC address only after using this option until it is changed in the setup menu or another adapter is selected.

2.6.6 Same Machine Responder

This mode allows the user to setup a system for Transmit/Receive to be performed between ports on the same system with only one instance of Intel LANConf. This is useful for debugging transmit and receive operations, while using an OS such as DOS, and where no responder is available except another adapter in the same system. The other adapter will work as if in "simple responder" mode.

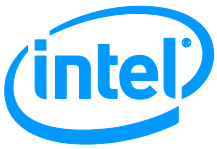
In this mode, one port will be marked as "currently in use" on the device selection menu; the user can then select a second device and perform transmit/receive testing on the same system. See built-in Help for details.

Note: it is recommended that multiple LANConf instances be used for same machine transmit/receive when possible (i.e., when running Linux* or Windows*). The Same Machine Responder feature is most useful in an OS such as DOS.

2.6.7 Transmit And Receive Statistics

Various statistics are shown while transmitting and receiving. Some devices have multiple pages of statistics. Transmit and Receive statistics are defined in the hardware manuals and taken from those locations.

Note: Many statistics are shown, and errors are not necessarily a serious concern. A single CRC error may simply be an artifact of wire noise.



2.7 IEEE Tests

These menus allow the user to perform IEEE Compliance testing. Please consult the IEEE testing User's Guide for details.

2.8 EEPROM/Flash

2.8.1 EEPROM Screens

These screens allow the user to view, change, dump, program, or erase the EEPROM contents. See built-in command help for details. Changes made to the EEPROM are saved on exit. The checksum is automatically updated whenever EEPROM contents are changed, except when Smart Write is disabled. See the built-in help for details on Smart Write mode.

Note: Changing the contents of the EEPROM can cause the adapter to be incorrectly configured, and in some cases could require that the EEPROM be removed and reprogrammed.

2.8.2 Flash

This screen allows the NVM SPI Flash contents to be viewed, modified, and erased. The Flash files are binary and its contents are not decoded by the screen. (In other words, only binary data can be programmed onto the Flash.)

The override size option allows the Flash programming to ignore the BAR mapping for the Flash from the system BIOS producing undesirable results. If the Flash is SPI compatible and SPI protocol is used, Flash access may work. If not, system stability may be compromised.

2.8.3 NVM Image

This screen is dedicated to programming and verifying the binary NVM image on devices where an EEPROM part is emulated in the flash memory and the adapter is operating in normal mode (not blank mode). If multiple NVM modules are supported by the adapter, you can update them separately using the "Update Module" submenu.

2.8.4 OTP

This screen allows the user to view, change, dump, and write-protect INVM content. See the built-in help for details.

2.9 Adapter Diagnostics

This menu runs several diagnostic tests to determine whether the adapter is functioning correctly. The loopback test is the most useful. It tests the entire DMA engine of the adapter. Tests can be run in loop mode for stress.

Diagnostics tests also include: FIFOS, IRQ, REGS, EEPROM, MACLB, PHYLB, LINK and EXTLB.

2.9.1 Change Test Options

The tests displayed here are the diagnostic tests that will be performed. Unsupported tests will not be performed by the selected device. The number of test passes represents how many test passes will be run in a loop. To enable or disable tests, navigate the highlighter using the up and down arrow keys and press [Enter] to toggle the test state from enabled to disabled.

Peer Sender Responder allows the user to perform a transmit/receive test between two ports in the system. One port is placed in Peer Sender Responder mode and then a second port can be selected for send/receive testing. A connection is required between the two ports. See built-in Help for more details.

2.9.2 Time to Link

The Time to Link tests reset the link and measure the length of time it takes to establish link with the specified link partner. The Link menu can be used to set different link speeds, both forcing and auto-negotiating, to test at various speeds and settings. However, it should be noted that not all speeds can be forced and that forcing speed on one end only can cause a speed-duplex mismatch, which can cause link results to be unpredictable.

2.9.3 Cable Diagnostics

The cable diagnostics test attempts to diagnose cable quality by sending and receiving pulses and analyzing the results. This test may be better suited to some adapters than others, and results may be inconsistent.

2.9.4 Other Diagnostics

Diagnostic tests exist for other features that may not be present in all devices. When present, these diagnostics will run and report a pass or fail result. When not present these diagnostics will report that the feature is not supported on the selected adapter.

2.9.5 Reset Adapter Loop

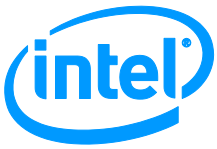
This menu sends continuous adapter resets until cancelled by the user. A reset loop is useful for dual port adapters to see how one of the ports behaves while the other is being reset.

2.9.6 Register Test Script

This feature is reserved for Intel use.

2.10 PCI/Bus Configuration Menu

These menus are for advanced users. The menus display various system and device resources. Changing values may cause the device or system to become unstable. Refer to device specifications and Operating System documentation for details on these screens and their contents.



2.10.1 OS Memory Resources

This screen displays the OS allocated resources for the device. These resources are read-only, and the data is OS dependent. This is the data that the OS is using to operate the device. It may be derived from PCI or from some other OS specific source. On some operating systems, direct PCI access is not allowed. In some cases, the memory resources are translated from the PCI configuration provided. This is displayed here.

Note: Some of the fields are derived and may contain 0, since they may not be stored by the OS (for example, latency, BIST, etc.).

2.10.2 PCI/PCI-X Configuration

This screen shows the device PCI configuration. For some operating systems, PCI is not available (in which case, the screen will read all "FFFF"). With other operating systems, the OS reconfigures memory resources. While some of these values can be read or written, these changes may not directly affect the device, depending on the operating system in use. The OS resource screen will show the OS assigned memory resources the device is currently using.

2.10.3 PCI Raw Register Screen

This screen shows PCI raw configuration space read via OS PCI mechanisms.

2.10.4 PCI Express* Raw Display

This screen displays the RAW PCI Express* configuration for the device. This data is read via OS provided PCI Express mechanism.

2.10.5 Impersonate Adapter

See Impersonate Adapter for details on this feature.

2.10.6 Hotswap Adapter

This menu enables Hotswap on PCI Express systems which support Hotswap.

2.11 SV Menu

This menu is for advanced users doing silicon or board development. Refer to the built-in F1 help and/or adapter or silicon documentation for details.

3 Text Mode User Interface

The purpose of the text mode interface is to provide a small subset of the functionality in the GUI. This is for systems that are connected through a slow terminal or serial port. This is only a subset of the main LANConf functionality and offers nothing that the main GUI does not.

```
COMMAND requiredfield [optionalfield]
```

When LANConf is launched in command line mode, a screen with a list of available adapters or networking devices is displayed.

```
        01) Intel(R) PRO/1000 MF Dual Port Server Adapter 8086-1012
6:02.0
        02) Intel(R) PRO/1000 MF Dual Port Server Adapter 8086-1012
6:02.1

        Enter Device Number or 'exit' to quit:
```

The selected device is used for all subsequent commands until a different device is selected with the select command (SELECT). For help on specific commands, please refer to the Help or '?' command.

Usage

```
HELP [command]
```

where [command] displays information for a specific command.

or

```
HELP [group]
```

where [group] is one of the following:

- *10 = 10 Mbps IEEE test mode commands*
- *100 = 100 Mbps IEEE test mode commands*
- *1gb = 1 Gbps IEEE test mode commands*
- *ber = BER commands*
- *txrx = Transmit/Receive commands*
- *diags = Adapter diagnostic tests*
- *reg = MAC, PHY, and PCI commands*
- *ee = EEPROM commands*

If neither a command nor a group is specified, then a list of all available commands is displayed.

Output

One of the following occurs:

- *Display a multicolumn list of available commands.*
- *Display a help description for a particular group of commands.*
- *Display a help description for a specific command.*

3.1 IEEE Test Mode Commands

Refer to the *100BASE-TX/10BASE-T Physical Layer Conformance Testing* or the *1000BASE-T/100BASE-TX/10BASE-T Physical Layer Compliance Tests Manual for Gigabit Ethernet Products* for information on IEEE test modes and configuration.

Appendix A: *LANConf Text Mode Commands*

Table 1. Basic Commands

Command	Output	Function/Description
VER	LANConf Version xx.xx.xx.xx	Provides LANConf version number.
SCAN	*Provides an indexed list of devices on the system.*	Displays all Intel® PRO networking devices found on the system.
SELECT n	Initializing device X = bus location x:y:z.	Allows the user to select a device where *n* equals the device number.
DISPLAY	Adapter.....*Name* MAC Address.....*MAC* Media Type.....*Media* Bus Location.....*Bus* Link Type.....*Link*	Displays information about the currently selected adapter or networking device.
RESET	Successful adapter reset. ***or*** ERROR: The adapter did not reset.	Resets the currently selected adapter or network device.
HELP *command* ***OR*** HELP *group*	*One of the following occurs:* • *Display a multicolumn list of available commands.* • *Display a help description for a particular group of commands.* *Display a help description for a specific command.*	Lists all available commands or provide information regarding a particular command. The commands may be listed by group. The variable *command* displays information for a specific command. The variable *group* is one of the following: • 10 = 10 Mbps IEEE test mode commands • 100 = 100 Mbps IEEE test mode commands • 1gbe = 1 Gbps IEEE test mode commands • ber = BER commands • txrx = Transmit/Receive commands • diags = Adapter diagnostic tests • regs = MAC, PHY, and PCI commands • eeprom = EEPROM commands If neither a *command* nor a *group* is specified, then a list of all available commands is displayed.
?	*A multicolumn list of available commands.*	Lists all available commands. The output of this command is the same as the help command without a command or group specified.
EXIT	Freeing adapter resources.	Stops all running tests and releases all initialized adapters and network devices before exiting the application.

Appendix B:

Table 2. IEEE Test Mode Commands

Command	Output	Function/Description
G1	Configuring. Please wait. This may take a minute. Test started. Press **Esc** or **X** to stop current test... *or* ERROR: Test failed to start.	Configures the adapter or networking device for the following IEEE tests: • 40.6.1.2.1 (Gigabit Ethernet) - Peak Differential Output Voltage and Level Accuracy • . • 40.6.1.2.2 (Gigabit Ethernet) - Maximum Output Droop.
G4	Configuring. Please wait. This may take a minute. Test started. Press ESC or 'x' to stop current test... ***or*** ERROR: Test failed to start.	Configures the adapter or networking device for the following IEEE tests: • 40.8.3.1 (Gigabit Ethernet) - MDI Return Loss • . • 40.8.3.3 (Gigabit Ethernet) - MDI Common-Mode Output Voltage • .
S1	Configuring. Please wait. This may take a minute. Test started. Press ESC or 'x' to stop current test... ***or*** ERROR: Test failed to start.	Configures the adapter for the following IEEE tests: • 9.1.2.2 (Fast Ethernet and Gigabit Ethernet) - UTP Differential Output Voltage • . • 9.1.4 (Fast Ethernet and Gigabit Ethernet) - Signal Amplitude Symmetry • . • 9.1.6 (Fast Ethernet and Gigabit Ethernet) - Rise/Fall Times • .
S2	Configuring. Please wait. This may take a minute. Test started. Press ESC or 'x' to stop current test... ***or*** ERROR: Test failed to start.	Configures the adapter or networking device for the following IEEE tests: • 9.1.5 (Fast Ethernet and Gigabit Ethernet) - Transmit Return Loss • .

S3	Configuring. Please wait. This may take a minute. Test started. Press ESC or 'x' to stop current test... ***or*** ERROR: Test failed to start.	Configures the adapter or networking device for the following IEEE tests: • 9.1.8 (Fast Ethernet and Gigabit Ethernet) - Duty Cycle Distortion (DCD) • .
S4	Configuring. Please wait. This may take a minute. Test started. Press ESC or 'x' to stop current test... ***or*** ERROR: Test failed to start.	Configures the adapter or networking device for the following IEEE tests: • 9.1.9 (Fast Ethernet and Gigabit Ethernet) - Transmit Jitter • .
S5	Configuring. Please wait. This may take a minute. Test started. Press ESC or 'x' to stop current test... ***or*** ERROR: Test failed to start.	Configures the adapter or networking device for the following IEEE tests: • 9.2.2 (Fast Ethernet and Gigabit Ethernet) - Receiver Return Loss
SA	Configuring. Please wait. This may take a minute. Test started. Press ESC or 'x' to stop current test... ***or*** ERROR: Test failed to start.	Configures the adapter or network device for the following IEEE tests: • 14.3.1.2.1 (Fast Ethernet) and 1411.10.02.05 (Gigabit Ethernet) - Peak differential output voltage on TD circuit (Amplitude 5MHz)
SB	Configuring. Please wait. This may take a minute. Test started. Press ESC or 'x' to stop current test... ***or*** ERROR: Test failed to start.	Configures the adapter or networking device for the following IEEE tests: • 14.3.1.2.5 (Fast Ethernet) and 1411.10.09 (Gigabit Ethernet) - TD Circuit Common Mode Output Voltage
SC	Configuring. Please wait. This may take a minute. Test started. Press ESC or 'x' to stop current test... ***or*** ERROR: Test failed to start.	Configures the adapter or networking device for the following IEEE tests: • 14.3.1.2.1 (Fast Ethernet) and 1411.10.02.10 (Gigabit Ethernet) - Peak Differential Output Voltage on TD Circuit (Amplitude 10 MHz) • 14.3.1.2.1 (Fast Ethernet) and 1411.10.03 (Gigabit Ethernet) - Harmonic Content (all ones signal)

SD	Configuring. Please wait. This may take a minute. Test started. Press ESC or 'x' to stop current test... ***or*** ERROR: Test failed to start.	Configures the adapter or networking device for the following IEEE tests: • 14.3.1.2.2 (Fast Ethernet) and 1411.10.07 (Gigabit Ethernet) - TD Circuit Differential Output Impedance (Transmit Return Loss)
SE	Configuring. Please wait. This may take a minute. Test started. Press ESC or 'x' to stop current test... ***or*** ERROR: Test failed to start.	Configures the adapter or networking device for the following IEEE tests: • 14.3.1.2.3 (Fast Ethernet) and 1411.10.12 (Gigabit Ethernet) - Transmitter Output Timing Jitter with Cable Model • 14.3.1.2.3 (Fast Ethernet) and 1411.10.13 (Gigabit Ethernet) - Transmitter Output Timing Jitter without Cable Model
SF	Configuring. Please wait. This may take a minute. Test started. Press ESC or 'x' to stop current test... ***or*** ERROR: Test failed to start.	Configures the adapter or networking device for the following IEEE tests: • 14.2.1.4 (Fast Ethernet) and 1411.10.05 (Gigabit Ethernet) - RD Circuit Differential Input Impedance (Receive Return Loss)

Table 3. Bit Error Rate (BER) Commands

Command	Output	Function/Description
BER10RX	Configuring. Please wait. This may take a minute. Test started. Press ESC or 'x' to stop. Press 's' to query stats... ***or*** ERROR: Test failed to start.	Configures the adapter or networking device for the following IEEE tests: • 10BASE-T RD Receiver Circuit Signal Acceptance Test
BER10TX	Configuring. Please wait. This may take a minute. Test started. Press ESC or 'x' to stop. Press 's' to query stats... ***or*** ERROR: Test failed to start.	Configures the adapter for the following IEEE tests: • 10BASE-T RD Receiver Circuit Signal Acceptance Test

BER100RX	Configuring. Please wait. This may take a minute. Test started. Press ESC or 'x' to stop. Press 's' to query stats... ***or*** ERROR: Test failed to start.	Configures the adapter or networking device for the following IEEE tests: • 9.2.1 (Fast Ethernet and Gigabit Ethernet) - 100BASE-TX Differential Input Signals
BER100TX	Configuring. Please wait. This may take a minute. Test started. Press ESC or 'x' to stop. Press 's' to query stats... ***or*** ERROR: Test failed to start.	Configures the adapter or networking device for the following IEEE tests: • 9.2.1 (Fast Ethernet and Gigabit Ethernet) - 100BASE-TX Differential Input Signals
BER1000RX	Configuring. Please wait. This may take a minute. Test started. Press ESC or 'x' to stop. Press 's' to query stats... ***or*** ERROR: Test failed to start.	Configures the adapter or networking device for the following IEEE tests: • 40.6.1.3.1 (Gigabit Ethernet) - 1000BASE-T Receiver Differential Input Signals • 40.6.1.3.4 (Gigabit Ethernet) - 1000BASE-T Alien Crosstalk Noise Rejection
BER1000TX	Configuring. Please wait. This may take a minute. Test started. Press ESC or 'x' to stop. Press 's' to query stats... ***or*** ERROR: Test failed to start.	Configures the adapter or networking device for the following IEEE tests: • 40.6.1.3.1 (Gigabit Ethernet) - 1000BASE-T Receiver Differential Input Signals • 40.6.1.3.4 (Gigabit Ethernet) - 1000BASE-T Alien Crosstalk Noise Rejection

Table 4. MAC Register Commands

Command	Output	Function/Description
READMAC *offset*	Read *offset* = *value*. ***or*** ERROR: Read at *offset* failed.	Reads the value of a MAC register offset. The *offset* is the MAC register offset in hexadecimal value.

WRITEMAC *offset value*	Wrote *offset* -> *value*. ***or*** ERROR: Write at *offset* failed.	Writes a value to a MAC register offset. *Offset* is the MAC register offset in hexadecimal value and *value* equals the register value in hexadecimal.

Table 5. PHY Register Commands

Command	Output	Function/Description
READPHY *offset*	Read *offset* = *value*. ***or*** ERROR: Read at *offset* failed.	Reads a value of a PHY register offset. *Offset* is the PHY register offset value in hexadecimal.
WRITEPHY *offset value*	Wrote *offset* -> *value*. ***or*** ERROR: Write at *offset* failed.	Writes a value to a PHY register offset. *Offset* is the PHY register offset value in hexadecimal and *value* equals the register value in hexadecimal.

Table 6. PCI and PCIe Commands

Command	Output	Function/Description
READPCI *offset*	Read *offset* = *value*. ***or*** ERROR: Read at *offset* failed.	Reads a PCI DWORD at a specified offset. This command supports reading the first 64 DWORDs of the device PCI Configuration Space. *Offset* is the PCI DWORD offset in hexadecimal.
WRITEPCI *offset value*	Wrote *offset* -> *value*. ***or*** ERROR: Write at *offset* failed.	Writes a PCI DWORD at a specified offset. This command supports writing of the first 64 DWORDs of the device PCI Configuration Space. *Offset* is the PCI DWORD in hexadecimal and *value* equals the PCI DWORD value in hexadecimal.
READPCIE *offset*	Read *offset* = *value*. ***or*** ERROR: Write at *offset* failed.	Reads a PCIe DWORD at a specified offset. This command supports reading 1024 DWORDs of PCI and extended PCI space on PCIe adapters and networking devices. *Offset* is the PCIe offset in hexadecimal.
WRITEPCIE *offset value*	Wrote *offset* -> *value*. ***or*** ERROR: Write at *offset* failed.	Writes a PCIe DWORD at a specified offset. This command supports writing1024 DWORDs of PCI and extended PCI space on PCIe adapters and networking devices. Offset is the PCIe offset in hexadecimal and value equals the PCIe DWORD value in hexadecimal.

Table 7. Networking Adapter and Hardware Diagnostics

Command	Output	Function/Description
FIFOS	PASSED. ***or*** FAILED.	Performs a test on the FIFO of the network adapter or hardware.
IRQ	PASSED. ***or*** FAILED.	Performs a test of the network adapter or hardware interrupt.
REGS	PASSED. ***or*** FAILED.	Performs a test the read and write functions of the register.
EEPROM	PASSED. ***or*** FAILED.	Tests the EEPROM checksum.
MACLB	PASSED. ***or*** FAILED.	Tests the MAC loopback.
PHYLB	PASSED. ***or*** FAILED.	Tests the PHY loopback.
LINK	PASSED. ***or*** FAILED.	Tests the adapter or networking device link.
EXTLB	PASSED. ***or*** FAILED.	Tests the external loopback with an external dongle.

Table 8. EEPROM Commands

Command	Output	Function/Description
READEE *offset*	Read: *offset* = *value*. ***or*** ERROR: Read *offset* failed.	Reads the EEPROM word at a specified offset. *Offset* is the EEPROM word offset in hexadecimal.
WRITEEE *offset value*	Wrote *offset* -> *value*. Updated EEPROM checksum. ***or*** ERROR: Write at *offset* failed.	Writes an EEPROM word at a specified offset and updates the EEPROM checksum. *Offset* is the EEPROM word offset in hexadecimal and *value* equals the EEPROM word value.

SETEEBITS *offset bitmask*	Wrote *offset* -> *value*. Updated EEPROM checksum. ***or*** ERROR: Write at *offset* failed.	Sets bits in the EEPROM word based on a specified bit mask and updates the EEPROM checksum. *Offset* is the EEPROM word offset in hexadecimal and *bitmask* equals the EEPROM word bitmask.
CLEAREEBITS *offset bitmask*	Wrote *offset* -> *value*. Updated EEPROM checksum. ***or*** ERROR: Write at *offset* failed.	Clears bits in the EEPROM word based on a specified bit mask and updates the EEPROM checksum. *Offset* is the EEPROM word offset in hexadecimal and *bitmask* equals the EEPROM word bitmask.
DUMPEEIMG *filename*	Wrote EEPROM image to file *filename*. ***or*** ERROR: Unable to create file *filename*.	Writes the EEPROM image to a file with a specified file name. *Filename* is the name of the file to save the EEPROM image.
WRITEEEIMG *imagefile*	Wrote *imagefile* to EEPROM. Updated EEPROM checksum. ***or*** ERROR: EEPROM write error.	Programs the EEPROM with contents of a specified image file without changing the MAC address and updates the EEPROM checksum. *Imagefile* is the EEPROM image file to write to the EEPROM.
MACADDR *address*	Wrote MAC Address *XXXXXXXXXXXX*. Updated EEPROM checksum. ***or*** ERROR: EEPROM write error.	Programs the EEPROM with the specified MAC address and updates the EEPROM checksum. *Address* is the MAC address to write to the EEPROM.

Table 9. Transmit and Receive Commands

Command	Output	Function/Description
TX *packets*	Checking Link... this may take a minute. Done. Test started. Press ESC or 'x' to stop. Press 's' to query stats... ***or*** Checking Link... this may take a minute. Done. ERROR: Transmit failed to start.	Starts transmit on the current adapter or networking device selected. The default is an infinite number of packets to transmit. *Packets* is the number of packets to transmit. This is an optional parameter.
RX	This may take a minute. Done. Test started. Press ESC or 'x' to stop. Press 's' to query stats... ***or***	Starts receive on the current adapter or networking device selected.

	This may take a minute. Done. ERROR: Receive failed to start.	
TXRX	Test started. Press ESC or 'x' to stop. Press 's' to query stats... ***or*** ERROR: Transmit and Receive failed to start.	Starts transmit and receive on the current adapter or networking device selected.
TXRXALL	Test started. Press ESC or 'x' to stop. Press 's' to query stats... *or* ERROR: Transmit and Receive failed to start.	Starts transmit and receive on all initialized adapters or networking device that are set up for transmit and receive through the *MODE* command.
TX *txrxmode*	OK ***or*** ERROR	Sets the transmit/receive mode on the currently selected adapter or networking device to be used in a multiple adapter transmit/receive (*TXRXALL*) test. In order for an adapter to be used in the *TXRXALL* command, the *MODE* must be set to transmit (*TX*), receive (*RX*), or transmit/receive (*TXRX*). The default transmit/receive mode is none. *Txrxmode* defines the mode to be used with the TXRXALL command: TX = Adapter transmits RX = Adapter receives TXRX = Adapter transmits and receives none = Adapter is not used with the *TXRXALL* command (default).
DESTADDR *addr*	OK ***or*** ERROR	Sets the destination MAC address on the currently selected adapter or networking device. The default value is FFFFFFFFFFFF. *Addr* is the destination address.
PACKETSIZE *size*	OK ***or*** ERROR	Sets the packet size. The default size is 1024. If the *TXRXALL* command is used, the packet size is used for all adapters in the multiple adapter transmit/receive. Therefore, the packet size only needs to be set up once for a multiple adapter transmit/receive test. *Size* is the packet size.

SPEEDDUPLEX *setting*	OK ***or*** ERROR	Sets the speed and duplex for transmit and receive. This command specifies whether to auto-negotiate or force the speed and duplex. The default setting is 1000 Mbps full duplex for Gigabit Ethernet adapters and 100 Mbps full duplex for Fast Ethernet adapters. If the TXRXALL command is used, the SPEEDDUPLEX setting is used for all adapters in the multiple adapter transmit/receive tests. Therefore, SPEEDDUPLEX only needs to be configured once for a multiple adapter transmit/receive test. *Setting* is: ane1000f = Auto-negotiate, 1000 Mbps full duplex. ane100f = Auto-negotiate, 100 Mbps full duplex. ane100h = Auto-negotiate, 100 Mbps half duplex. ane10f = Auto-negotiate, 10 Mbps full duplex. ane10h = Auto-negotiate, 10 Mbps half duplex. force100f = Force 100 Mbps full duplex. force100h = Force 100 Mbps half duplex. force10f = Force 100 Mbps full duplex. force10h = Force 100 Mbps half duplex.
LOOPBACK *mode*	OK ***or*** ERROR	Sets the loopback mode. Default is none. If *TXRXALL* command is run, the loopback setting will be used for all adapters in the multiple adapter transmit/receive. Therefore, loopback mode only needs to be configured once for a multiple adapter transmit/receive test. *Mode* equals one of the following: none = No loopback mode mac = MAC loopback mode phy = PHY loopback mode tcvr = Transceiver loopback mode

PACKETDATA *type*	OK ***or*** ERROR	Sets the packet data type. The default is normal. If the *TXRXALL* command is enabled, the packet data setting is used for all adapters in the multiple adapter transmit/receive. Therefore, the *PACKETDATA* type only needs to be configured once for a multiple adapter transmit/receive test. There are two types of headers: legacy and normal. The legacy header contains 14 bytes consisting of only the destination address, source address, and packet length. The normal header contains a legacy header with the addition of a signature string, a packet number, and a software CRC. The legacy packet types are used to create a packet that is backwards compatible with older Intel diagnostic software. The normal packet types are the recommended defaults. *Type* is: normal = Normal header followed by ascending numbers in hexadecimal notation random = Normal header followed by random data pattern5A = Normal header followed by repeating 5Ah file = Normal header followed by data from the file specified in the *PATTERNFILE* command. legacy = Legacy header and ascending numbers in hexadecimal notation legacyrandom = Legacy header and random data legacypattern5A = Legacy header and repeating 5Ah. legacyfile = Legacy header and data from the file specified in the *PATTERNFILE* command rawff = All FFh rawaa = All AAh rawfile = Data in the file specified in the *PATTERNFILE* command ***Note:*** If the file, legacyfile or rawfile type is chosen, the *PATTERNFILE* command must be set and the size requested in the *PACKETSIZE* command and *RANDOMPACKETSIZE* command is ignored. The packet size is the length of the file.
PATTERNFILE *filename*	OK ***or*** ERROR	Used with the *PACKETDATA* command when file, legacyfile, or rawfile is selected. It inputs a pattern file for transmit. If the *TXRXALL* command is running, the pattern file will be used for all adapters in the multiple adapter transmit/receive test that have been specified as a file, legacyfile or rawfile *PACKETDATA* type. Therefore, *PATTERNFILE* only needs to be configured once for a multiple adapter transmit/receive test. *Filename* is the name of the file.

RANDOMPACKETSIZE *onoff*	OK ***or*** ERROR	Turns random packet size on or off. If the *TXRXALL* command is enabled, the *RANDOMPACKETSIZE* setting is used for all adapters in the multiple adapter transmit/receive. Therefore, the random packet size setting only needs to be configured once for a multiple adapter transmit/receive test. *Onoff* enables or disables the random packet size specified. on = Uses the minimum and maximum of the random packet size specified in the SETRANDOMPACKETSIZE command. off = Ignores the data of the random packet size specified in the SETRANDOMPACKETSIZE command and uses the packet size specified in the PACKETSIZE command.
SETRANDOMPACKETSIZE *min, max*	OK ***or*** ERROR	Sets the minimum and the maximum random packet size. The default value for minimum equals 64 and for maximum equals 1024. This command is only used if *RANDOMPACKETSIZE* is enabled. If the *TXRXALL* command is enabled and *RANDOMPACKETSIZE* has been set to on, the random packet size range will be used for all adapters in the multiple adapter transmit/receive. Therefore, the random packet size range only needs to be configured once for a multiple adapter transmit/receive test. *Min* and *max* equal the minimum random packet size and maximum random packet size, respectively.
VERIFYDATA *onoff*	OK ***or*** ERROR	Compares the received packet contents with the expected packet contents. It can be turned on or off. The default is off. If the *TXRXALL* command is enabled, the *VERIFYDATA* setting will be used for all adapters in the multiple adapter transmit/receive. Therefore, the verify data setting only needs to be configured once for a multiple adapter transmit/receive test. *Onoff* enables or disables the VERIFYDATA command. on = VERIFYDATA on. off = VERIFYDATA off.
TRANSMITQUEUE *type*	OK ***or*** ERROR ***or*** ERROR: Not supported	Sets the transmit queue to either primary or secondary. The default is primary. If the *TXRXALL* command is enabled, the transmit queue setting will be used for all adapters in the multiple adapter transmit/receive. Therefore, the transmit queue setting only needs to be configured once for a multiple adapter transmit/receive test. *Type* defines which transmit queue to use. primary = Primary transmit queue is used. secondary = Secondary transmit queue is used.

X ***or*** [esc]		**Stop Transmit/Receive.** Pressing the [esc] or [x] key stops the *TX*, *RX*, *TXRX* or *TXRXALL* test. The current test stops and the final statistics are displayed. If the *TXRXALL* command was used, statistics will be displayed for all adapters and networking device in the multiple adapter transmit/receive test. The displayed statistics are a basic set of hardware statistics. More detailed statistics can be displayed by pressing the [m] key. The statistics can also be saved to a file named stats.txt by pressing the [d] key.
S		**Query Statistics.** Pressing the [s] key queries the statistics. This command can be used during a *TX*, *RX*, *TXRX*, or *TXRXALL* test to query the current state of the transmit/receive test. If the *TXRXALL* test is running, statistics will be displayed for all adapters in the multiple adapter transmit/receive test.
ADAPTER NUMBER *adapternumber*		**Adapter Number - Query Statistics.** In a *TXRXALL* test, if the status of a single adapter is requested, the adapter number can be entered. The adapter number is the number displayed in the *SCAN* command and the number used by the *SELECT* command to choose the current adapter.

Table 10. Supported IEEE Tests

IEEE Test	Command
9.1.2.2 (Fast Ethernet and Gigabit Ethernet) - UTP Differential Output Voltage	S1
9.1.4 (Fast Ethernet and Gigabit Ethernet) - Signal Amplitude Symmetry	S1
9.1.5 (Fast Ethernet and Gigabit Ethernet) - Transmit Return Loss	S2
9.1.6 (Fast Ethernet and Gigabit Ethernet) - Rise/Fall Times	S1
9.1.8 (Fast Ethernet and Gigabit Ethernet) - Duty Cycle Distortion (DCD)	S3
9.1.9 (Fast Ethernet and Gigabit Ethernet) - Transmit Jitter	S4
9.2.1 (Fast Ethernet and Gigabit Ethernet) - 100Base-TX Differential Input Signals	BER100RX and BER100TX
9.2.2 (Fast Ethernet and Gigabit Ethernet) - Receiver Return Loss	S5
14.2.1.4 (Fast Ethernet) - RD Circuit Differential Input Impedance (Rx Return Loss)	SF
14.3.1.2.1 (Fast Ethernet) - Peak Differential Output Voltage on TD Circuit (Amplitude 5MHz)	SA

14.3.1.2.1 (Fast Ethernet) - Peak Differential Output Voltage on TD Circuit (Amplitude 10 MHz)	SC
14.3.1.2.1 (Fast Ethernet) - Harmonic Content, All Ones Signal	SC
14.3.1.2.2 (Fast Ethernet) - TD Circuit Differential Output Impedance (Tx Return Loss)	SD
14.3.1.2.3 (Fast Ethernet) - Transmitter Output Timing Jitter with Cable Model	SE
14.3.1.2.3 (Fast Ethernet) - Transmitter Output Timing Jitter without Cable Model	SE
14.3.1.2.5 (Fast Ethernet) - TD Circuit Common-Mode Output Voltage	SB
40.6.1.2.1 (Gigabit Ethernet) - Peak Differential Output Voltage and Level Accuracy	G1
40.6.1.2.2 (Gigabit Ethernet) - Maximum Output Droop	G1
40.6.1.3.1 (Gigabit Ethernet) - 1000Base-T Receiver Differential Input Signals	BER1000RX and BER1000TX
40.6.1.3.4 (Gigabit Ethernet) - 1000Base-T Alien Crosstalk Noise Rejection	BER1000RX and BER1000TX
40.8.3.1 (Gigabit Ethernet) - MDI Return Loss	G4
40.8.3.3 (Gigabit Ethernet) - MDI Common-Mode Output Voltage	G4
1411.10.02.05 (Gigabit Ethernet) - Peak Differential Output Voltage on TD Circuit (Amplitude 5 MHz)	SA
1411.10.02.10 (Gigabit Ethernet) - Peak Differential Output Voltage on TD circuit (Amplitude 10 MHz)	SC
1411.10.03 (Gigabit Ethernet) - Harmonic Content, All Ones Signal	SC
1411.10.05 (Gigabit Ethernet) - RD Circuit Differential Input Impedance (Rx Return Loss)	SF
1411.10.07 (Gigabit Ethernet) - TD Circuit Differential Input Impedance (Tx Return Loss)	SD
1411.10.09 (Gigabit Ethernet) - TD Circuit Common-Mode Output Voltage	SB
1411.10.12 (Gigabit Ethernet) - Transmitter Output Timing Jitter with Cable Model	SE
1411.10.13 (Gigabit Ethernet) - Transmitter Output Timing Jitter without Cable Model	SE
Fast Ethernet and Gigabit Ethernet - 10 Base-T RD Receiver Circuit Signal Acceptance Test	BER10RX and BER1000TX