

## Chapter 40

# Test Facility

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## Introduction

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This chapter describes the main features of the Test Facility on the switch, and how to set up and use the Test Facility. The Test Facility provides a simple, efficient method of validating the operation of the switch hardware, including ports. The Test Facility does not test the switch processing core but it must be operational for the Test Facility to operate. The switch processing core is tested during every power up.

### Disabling configurations before running tests

Before using the Test Facility, we recommend that you disable interface configurations by using the command:

```
set config=none
```

Then restart or reboot the switch by using either of the commands:

```
restart reboot  
restart switch
```

### Operating mode

The Test Facility runs in the normal switch operating environment. This means that the switch processing core and an access port must be operational before you begin testing. Tests operate by using standard switch device drivers, so this software must also be fully operational. Control tests with the Command Line Interface (CLI), either from a local terminal port or remotely with Telnet. An SNMP management system can determine whether an interface is being tested, but cannot be used to initiate a test. The objects in the enterprise MIB used to set an interface to test mode may be written and read, but do not result in any action.

### Test hardware required

Tests on interfaces require external connections to be made to loopbacks or specialised test hardware.

### Displaying test status and results

When a test is initiated from a local asynchronous connection, test messages are printed for tests that are completed or halted. These messages may occur at any time during the test. If the test command has been entered from another source, such as a remote Telnet connection, these messages are not printed. In this case, use the [show test command on page 40-9](#) to display the test status and results.

### Impact of testing

Tests have the potential to degrade network operations if they are enabled on active resources, such as ports connected to a LAN or another switch. To limit this potential problem, tests stop when they detect an active resource. The resource is returned to its pre-test configuration after a test stops.

With the exception of asynchronous ports, tests should not be used to test the interface through which access was obtained to the switch. The reason for this is that the connection to the switch is broken when the Test Facility attaches to the interface. No mechanism is provided to prevent this from occurring. It is the responsibility of the user to check the operation of a resource before starting the test.

### Test methodology

Interface tests use data loopbacks and (where applicable) control line loopbacks. Frames containing a known data sequence are repeatedly transmitted via the hardware being tested. The contents of frames received via the hardware are compared against this sequence. If a packet is received with the wrong sequence it is counted as a bad frame.

The loopback error free rate is calculated as the number of good frames received divided by the number of frames sent, where a good frame is one where the received and transmitted data and lengths match. For interfaces that do not transport frames (for example, asynchronous ports), the term “frame” means the test string.

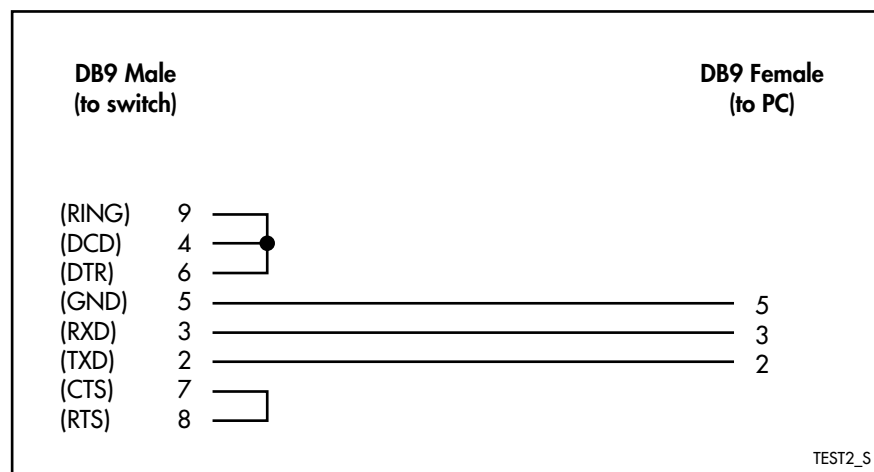
All interfaces can be tested simultaneously, including the interface used to enter the test command, by using the command:

```
enable test interface=all
```

### Special cable for testing the access port

The Test Facility automatically detects when a test is enabled on the same asynchronous port attached to the terminal from which the test command was entered, and tests only the port’s control signals. Testing of the data path is by visual inspection—if the command interpretation and the response displayed on the terminal are correct then the data path is judged to be functional. A special cable must be used in this case to provide a normal data path while looping the control signals ([Figure 40-1 on page 40-3](#)). Alternatively, use Telnet to access the CLI and initiate the test.

Figure 40-1: Cable pinouts for connecting a terminal to an asynchronous port under test



## Ethernet Port Tests

Ethernet port tests can be used to verify the operation of all switched Ethernet ports. Examples of switched Ethernet ports are 10BASE-T, 100BASE-TX, 1000BASE-T, 100BASE-FX, 1000BASE-SX, 1000BASE-LX, and 10GBASE-R ports.

Tests on switched Ethernet ports use external loopbacks. The tests cycle through each loopback in turn.

When tests are enabled on an Ethernet port the configurations of all the attached modules are stored and their configuration is replaced by the Test Facility.

To quickly detect if the test is being run on an active LAN, the transceiver or twisted pair loopback test is run first. If data is detected on the LAN, it is assumed to be active and the test is immediately aborted.

For 10/100Mbps Ethernet ports, the TP external loopback can be provided using a transceiver loopback plug (Figure 40-2 on page 40-4). Alternatively, connect pairs of ports by using standard crossover cables, and enable tests with the command:

```
enable test interface=all
```

For fibre ports, connect pairs of ports by using standard fibre cables, and enable tests by using the command:

```
enable test interface=all
```

Switched gigabit copper ports can be tested at 10/100Mbps by using a standard 10/100Mbps Ethernet TP loopback plug (Figure 40-2 on page 40-4). To test gigabit copper ports at gigabit rates, connect pairs of ports by using a loopback cable (Figure 40-3 on page 40-4), and enable tests with the command:

```
enable test interface=all
```

Figure 40-2: 10/100 Ethernet twisted pair (TP) loopback plug pinouts (RJ45)

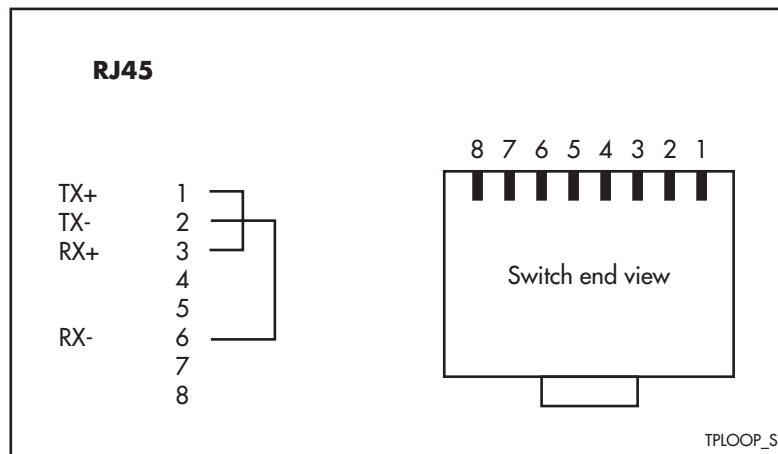
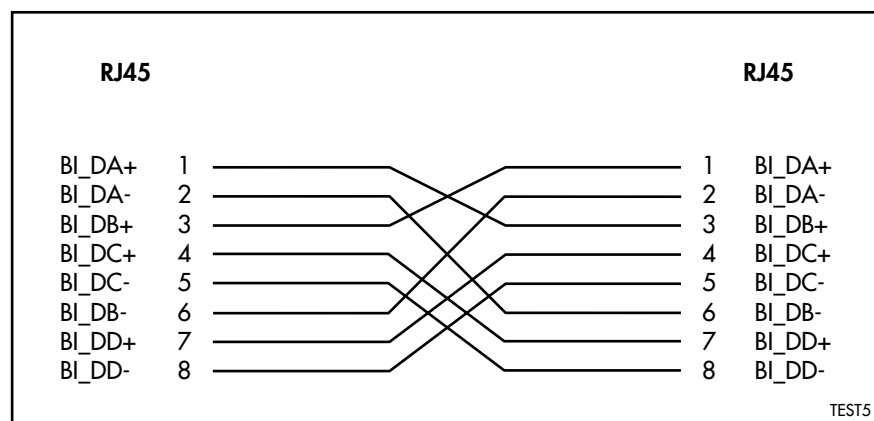


Figure 40-3: Gigabit Ethernet twisted pair (TP) loopback cable pinouts



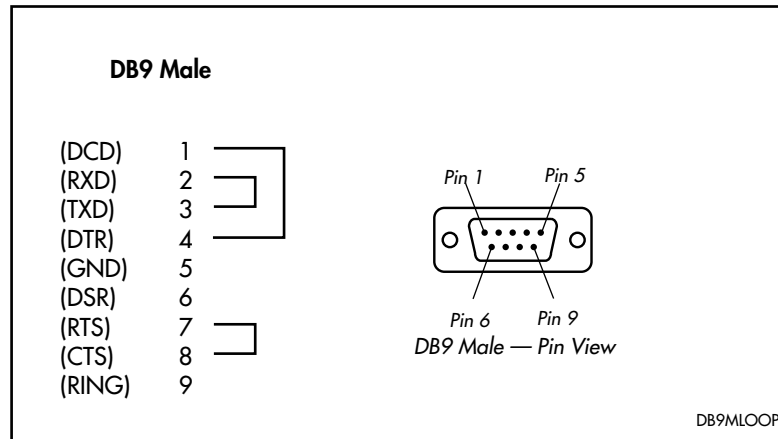
Possible test outcomes are described in the following table.

| Event  | Action        | Error                  | Result    |
|--|---------------|------------------------|-----------|
| 2 non-sent frames received in any second                     | Halt test     | Active LAN             | Bad       |
| 10 consecutive bad or missing frames during transceiver loop | Complete test | No Transceiver warning | See below |
| < 99.9% error free frames                                    | Complete test | -                      | Bad       |
| >= 99.9% error free frames                                   | Complete test | -                      | Good      |

## Asynchronous Port Tests

The asynchronous port test requires a loopback plug in the port being tested in order to loop data and control signals back to the switch (Figure 40-4).

Figure 40-4: Asynchronous loopback plug pinouts (DB9 male)



Tests cannot be run on an asynchronous port that is already configured for use by other modules, for example, as a service or a Telnet session.

To test the port control signals, the output signals are continuously toggled, and the corresponding (looped back) input state is examined. To pass the control signal test, the state of an input must match the state of the corresponding output.

The following table describes the error thresholds that determine the test outcome. For the error rate calculations, a test data sequence is considered to be the equivalent of a frame.

| Event                                   | Action        | Error       | Result |
|---|---------------|-------------|--------|
| 10 consecutive bad or missing sequences | Halt test     | No loopback | Bad    |
| < 99.9% error free sequences            | Complete test | -           | Bad    |
| >= 99.9% error free sequences           | Complete test | -           | Good   |

## Command Reference

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This section describes the commands available on the switch for testing the switch's hardware.

The shortest valid command is denoted by capital letters in the Syntax section. See [“Conventions” on page xxxviii of About this Software Reference](#) in the front of this manual for details of the conventions used to describe command syntax. See [Appendix A, Messages](#) for a complete list of messages and their meanings.

To alert the user of a test failure, a bell character is printed each time a negative test result is printed. In the following outputs, a bell character is printed for each \* character displayed in the outputs (the \* character is included in the actual output).

### disable test interface

---

**Syntax**    DISable TEST INTerface=*interface*

where *interface* is the interface being tested

**Description**    This command halts interface tests that are active. The interface must be specified.

**Examples**    To disable testing on asyn0, use the command:

```
dis test int=asyn0
```

**Related Commands**    [enable test interface](#)  
                          [reset test interface](#)  
                          [show test](#)

## enable test interface

**Syntax** ENable TEST INTERface=*interface* [Time=*time*|CONT] [MORE]

where:

- *interface* is the interface to be tested.
- *time* is the required test duration in minutes.

**Description** Before using the Test Facility, disable configurations (**set configuration=none**) and restart or reboot the switch. This command enables interface tests described in the following table.

| This interface option... | Tests this...                    |
|--------------------------|----------------------------------|
| ALL                      | All switch interfaces            |
| ASYNn                    | Asynchronous port n              |
| BASE                     | All interfaces on the base board |
| PORTn                    | Switch port n                    |

The **time** parameter specifies the duration of the tests in minutes. If **time** is not specified, tests run for four minutes. If **cont** is specified, tests run continuously.

The **more** parameter provides continuous updates of the status of the current test and control states of asynchronous interfaces ([Figure 40-5 on page 40-7](#)). Control signal faults are logged to the switch's logging facility. To display this information, use the [show log command on page 38-34 of Chapter 38, Logging Facility](#).

The **more** parameter should be used only on a single interface at a time. The **more** parameter is not valid when **interface** specifies a group of them; however, no mechanism is provided to prevent **more** being individually enabled on multiple interfaces. This command is provided for hardware servicing only.

Due to the nature of the output, it may be difficult to enter commands, including the [disable test interface command on page 40-6](#), while the **more** option is in effect. Therefore, tests should be enabled for short periods.

Figure 40-5: Example output from the **enable test interface more** command for an asynchronous port

```

asyn1 control signals; cycle 2

output          input
-----
rts    OFF      cts    OFF
dtr    ON       cd     ON
              ring    -
-----

```

**Examples** To enable testing on asynchronous port 0, use the command:

```
ena test int=asyn0
```

To enable testing on switch port 3, use the command:

```
ena test int=port3
```

**Related Commands** [disable test interface](#)  
[reset test interface](#)  
[show test](#)

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## reset test interface

---

**Syntax** RESET TEST INTERface

**Description** This command clears all the results from interface tests; that is, it sets the state column to “no test” and clears previous results.

**Examples** To clear all previous test results ready to start a new test, use the command:

```
reset test int
```

**Related Commands** [disable test interface](#)  
[enable test interface](#)  
[show test](#)



## show test

**Syntax** `SHoW TEST [INteRface[={ALL|BASe|EXpansion}]] [COUnter]`

**Description** This command displays the unit test status and results. Results are stored until one of the following takes place:

- a test is rerun
- the **reset test interface** command is entered
- the switch is powered off or reset

| Parameter | Description   |
|-----------|---|
| INteRface | Type of interface.<br>Default: <b>all</b>   |
| ALL       | All switch interfaces.  |
| BASe      | All interfaces on the base board.   |
| EXpansion | All interfaces on expansion options/modules.  |
| COUnter   | Total number of frames transmitted and received, and the number of good and bad frames received.<br>Default: no default |

Figure 40-6: Example output from the **show test** command

| Board  | ID  | Bay | Board Name | Host | Id | Rev  | Serial number |
|--------|-----|-----|------------|------|----|------|---------------|
| Base   | 252 |     | AT-8624PoE |      | 0  | M1-1 | 125201050007  |
| Uplink | 246 | 0   | AT-A47     |      | 0  | M1-0 | 0             |
| Uplink | 246 | 1   | AT-A47     |      | 0  | M1-0 | 0             |

| Interface | State    | Result | Type | Duration (minutes) | Details Data( %OK ) | Control |
|-----------|----------|--------|------|--------------------|---------------------|---------|
| port1     | complete | good   | ALL  | 4                  | good(100.0)         | -       |
| port2     | complete | good   | ALL  | 4                  | good(100.0)         | -       |
| port3     | complete | good   | ALL  | 4                  | good(100.0)         | -       |
| port4     | complete | good   | ALL  | 4                  | good(100.0)         | -       |
| port5     | complete | good   | ALL  | 4                  | good(100.0)         | -       |
| port6     | complete | good   | ALL  | 4                  | good(100.0)         | -       |
| port7     | no test  | -      | -    | -                  | -                   | -       |
| .         |          |        |      |                    |                     |         |
| .         |          |        |      |                    |                     |         |
| .         |          |        |      |                    |                     |         |
| port22    | complete | good   | ALL  | 4                  | good(100.0)         | -       |
| port23    | complete | good   | ALL  | 4                  | good(100.0)         | -       |
| port24    | complete | good   | ALL  | 4                  | good(100.0)         | -       |
| port25    | no test  | -      | -    | -                  | -                   | -       |
| port26    | no test  | -      | -    | -                  | -                   | -       |
| asyn0     | complete | good   | -    | 4                  | good(100.0)         | good    |

Table 40-1: Parameters in output of the **show test** command

| Parameter     | Meaning  |
|---------------|--|
| Board         | Type of board; one of:<br>Accel<br>Base<br>Blade<br>Chassis<br>Engine<br>Expansion<br>GenericIO<br>IO Module<br>MAC<br>NSM<br>NSM 4PIC<br>PAC<br>PIC<br>PSU<br>Switch<br>Uplink  |
| ID            | Identification number for the board model.   |
| Bay           | Bay number where the expansion card or module is installed.  |
| Board Name    | Short name for the board.  |
| Host ID       | Used when the stacking feature is enabled to uniquely identify each stack member in a stack.   |
| Rev           | Version number of the board.   |
| Serial Number | Unique serial number for the board.  |
| Interface     | Name of the interface to which the test results apply.   |
| State         | Status of the test module for this interface:<br>no test<br>testing<br>changing<br>complete<br>halted  |
| Result        | Test result.<br><br>If the test has been completed, either "good" or "BAD".<br><br>If testing is in progress, either "wait continuous" or "wait <mins> minutes".<br><br>If testing has been halted, one of "Active LAN", "BAD or no SynTstr", or "BAD or no loop".   |
| Type          | Test sub-mode, which varies depending on the interface type being tested. Not all tests have sub-modes.<br><br>For Ethernet interfaces, one of "trans", "TP", "ENDEC", "MAC", "FX data", or "FX link".<br><br>For synchronous interfaces, one of "RS-232dte", "X.21 dte", "V.35 dte", or "dce".<br><br>For ENCO compression and encryption cards, one of "-", "STAC", "DES", or "ALL".<br><br>For switch ports, one of "default", "ENDAC", "MAC", "FX data", or "FX link".<br><br>For ADSL and SHDSL interfaces, one of "SAR", "CELL", "DIGITAL", or "ANALOG". |

Table 40-1: Parameters in output of the **show test** command (Continued)

| Parameter          | Meaning   |
|--------------------|---|
| Duration (minutes) | Duration of the test.   |
| Details            | Three columns of detailed results. Due to the criteria used to halt tests, they may show "good" if the event that halted the test occurred after the test had been running correctly.   |
| Data               | Whether results for data signals are good or bad.   |
| %OK                | Number of data frames successfully received as a percentage of the total number of data frames transmitted.   |
| Control            | Result for control signal tests, one of "good", "BAD", or a period (".") if testing is in progress. For asyn0 tests, it indicates the interface mode being tested. For Ethernet tests, it indicates the loopback mode being tested. |

Figure 40-7: Example output from the **show test counter** command

| Board  | ID  | Bay | Board Name | Host | Id | Rev  | Serial number |
|--------|-----|-----|------------|------|----|------|---------------|
| Base   | 252 |     | AT-8624PoE |      | 0  | M1-1 | 125201050007  |
| Uplink | 246 | 0   | AT-A47     |      | 0  | M1-0 | 0             |
| Uplink | 246 | 1   | AT-A47     |      | 0  | M1-0 | 0             |

| Interface | State    | Type | Duration (minutes) | Tx        | RxTotal   | RxGood    | RxBad     |
|-----------|----------|------|--------------------|-----------|-----------|-----------|-----------|
| port1     | complete | ALL  | 4                  | 000025224 | 000025223 | 000025223 | 000000000 |
| port2     | complete | ALL  | 4                  | 000025224 | 000025223 | 000025223 | 000000000 |
| port3     | complete | ALL  | 4                  | 000025224 | 000025223 | 000025223 | 000000000 |
| port4     | complete | ALL  | 4                  | 000025223 | 000025223 | 000025223 | 000000000 |
| port5     | complete | ALL  | 4                  | 000025224 | 000025223 | 000025223 | 000000000 |
| port6     | complete | ALL  | 4                  | 000025224 | 000025223 | 000025223 | 000000000 |
| port7     | no test  | -    | -                  | -         | -         | -         | -         |
| .         | .        | .    | .                  | .         | .         | .         | .         |
| port22    | complete | ALL  | 4                  | 000025224 | 000025223 | 000025223 | 000000000 |
| port23    | complete | ALL  | 4                  | 000025225 | 000025224 | 000025224 | 000000000 |
| port24    | complete | ALL  | 4                  | 000025225 | 000025224 | 000025224 | 000000000 |
| port25    | no test  | -    | -                  | -         | -         | -         | -         |
| port26    | no test  | -    | -                  | -         | -         | -         | -         |
| asyn0     | complete | -    | 4                  | 000002399 | 000002399 | 000002399 | 000000000 |

Table 40-2: Parameters in output of the **show test counter** command

| Parameter  | Meaning   |
|------------|---|
| Board      | Possible board types:<br>Base<br>Uplink                     |
| ID         | Identification number for the board model.                  |
| Bay        | Bay number where the expansion card or module is installed. |
| Board Name | Short name for the board.                                   |

Table 40-2: Parameters in output of the **show test counter** command (Continued)

| Parameter             | Meaning   |
|-----------------------|---|
| Host ID               | Used when the stacking feature is enabled to uniquely identify each stack member in a stack.  |
| Rev                   | Version number of the board.  |
| Serial Number         | Unique serial number for the board.   |
| Interface             | Name of the interface to which the test counters apply.   |
| State                 | Status of the test module for this interface:<br>No test<br>Testing<br>Complete<br>Halted   |
| Type                  | The test sub-mode, which varies depending on the switch model and interface type being tested. Not all tests have multiple sub-modes. Ethernet sub-modes are trans, TP, ENDEC, and MAC. |
| Duration (minutes)    | Duration of the test.   |
| <b>Frame Counters</b> | Four columns of details.  |
| Tx                    | Total number of frames transmitted on the interface.  |
| RxTotal               | Total number of frames received on the interface.   |
| RxGood                | Number of good frames received on the interface.  |
| RxBad                 | Number of bad frames received on the interface.   |

**Examples** To display results from testing all interfaces on the switch, use the command:

```
sh test int=all
```

**Related Commands**

- [disable test interface](#)
- [enable test interface](#)
- [reset test interface](#)