



T3 Bit Error Rate Testing on the Cisco 7304 Router

Feature History

Release	Modification
12.1(12c)EX1	This feature was introduced on the Cisco 7304 router.
12.2(18)S	This feature was introduced on Cisco 7304 routers running Cisco IOS Release 12.2 S.

This feature module describes the T3 Bit Error Rate Testing feature on the Cisco 7304 Router and includes information on the benefits of the new feature, supported platforms, configuration tasks, and a command reference.

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Feature Overview

The ratio of received bits on an interface that contain errors is called the bit error rate (BER). A bit error rate test is used to check the BER. This feature introduces bit error rate testing (BERT) for T3 line cards on the Cisco 7304 router.

T3 BERT is used on the Cisco 7304 to check communication between local and remote DS3 ports. If traffic is not being transmitted or received on a DS3 port, or if the quality of the line simply needs to be tested, T3 bit error rate testing can be used to test the port.

Benefits

Testing of DS3 Ports

The T3 BERT feature allows users to test DS3 ports when a port is unable to transmit or receive traffic or when packets are being dropped to verify the quality of the link between ports.

Related Features and Technologies

6-port T3 (DS3) line card

Related Documents

- T3 Line Card document for the Cisco 7304 router
- “Configuring Serial Interfaces” chapter of *Cisco IOS Interface Configuration Guide, Release 12.1*
- *Cisco IOS Interface Command Reference, Release 12.1*
- *Multichannel T1/E1 Port Adapter Support* feature module for BERT on Cisco 7200 and 7500 series routers, and RSP-enabled Cisco 7000 series routers.

Supported Platforms

- Cisco 7304 Router

This documentation only covers the T3 BERT on the Cisco 7304 router. See the “Related Documents” section of this feature module for information on BERT on non-Cisco 7304 platforms.

Supported Standards, MIBs, and RFCs

Standards

No new or modified standards are supported by this feature.

MIBs

No new or modified MIBs are supported by this feature.

To obtain lists of supported MIBs by platform and Cisco IOS release, and to download MIB modules, go to the Cisco MIB website on Cisco.com at the following URL:

<http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>

RFCs

No new or modified RFCs are supported by this feature.

Prerequisites

Before beginning a BERT test, ensure the following:

- Ensure the remote interface has **loopback network line** set when the BERT test is begun on the local interface.
- Ensure that keepalives are disabled on both ends of the link being tested.

This feature should work on all Cisco 7304 interfaces using a T3 line card.

Configuration Tasks

See the following sections for configuration tasks for the T3 Bit Error Rate Testing feature on the Cisco 7304 Router:

- Starting a DS3 Port BERT Test, page 3
- Verifying BERT Configuration, page 4

Starting a DS3 Port BERT Test

In order to perform a BERT test on a DS3 port, the remote port must have keepalives disabled and must be set in loopback mode to return the BERT signal to the local port.

The following sections explain how to configure both the local port that initiates the BERT test and the remote port that receives and returns BERT data during the test.

Configuring the Remote Port for the BERT Test

In order to perform a BERT test on a DS3 port, the remote port needs to disable keepalives and be configured in loopback mode. The following commands show how to perform these tasks:

	Command	Purpose
Step 1	<code>Router(config)# interface <i>interface-type</i> <i>slot/interface-number</i></code>	Selects the remote DS3 interface that needs to be tested using BERT.
Step 2	<code>Router(config-if)# no keepalive</code>	Disables keepalive signals.
Step 3	<code>Router(config-if)# loopback network line</code>	Enables loopback mode.

Configuring the Local Port and Starting the BERT Test

The following procedure shows how to initiate a BERT test on a local DS3 serial port:

	Command	Purpose
Step 1	<code>Router(config)# interface serial <i>slot/interface-number</i></code>	Selects the DS3 interface that needs to be tested using BERT.
Step 2	<code>Router(config)# no keepalive</code>	Disables keepalive signals.

Command	Purpose
Step 3 Router(config-if)# bert pattern {2^15 2^20 qrss 2^23} interval <i>minutes</i>	<p>Begins a BERT test.</p> <p>The following explanations explain the keywords and variables:</p> <ul style="list-style-type: none"> • 2^15—Specifies a pseudo-random repeating pattern that is 32767 bits long. • 2^20—Specifies a pseudo-random repeating pattern that is 1048575 bits long. • qrss—Specifies a quasi-random signal source. • 2^23—Specifies a pseudo-random repeating pattern that is 8388607 bits long. • interval <i>minutes</i>—Specifies the length of the test in minutes. <p>The link will stop sending traffic once the bert pattern command has been entered (interfaces will be set to down), and start sending traffic when the test is complete (interfaces automatically set back to up).</p>
Step 4 Router(config-if)# bert errors <i>number-of-errors</i>	<p>(Optional) Inserts intentional errors into the BERT test stream. The <i>number-of-errors</i> variable specifies the number of errors to insert into the current BERT test stream.</p>

Verifying BERT Configuration

The following commands can be used to verify BERT configuration:

Command	Purpose
Router# show controllers serial <i>slot/interface-number</i>	Shows the status of the controller.
Router# show controllers serial <i>slot/interface-number</i> bert	Shows the results of a BERT test or the fields of a BERT test that are still in progress, depending on whether the BERT test is active or complete.

Configuration Example

Initiating a BERT Test

In the following example, the link between serial interface 5/0 on Router A to serial interface 6/0 on Router B is being tested using BERT. The BERT test is initiated on Router B and is using pattern 2^23. The BERT test will last for 10 minutes. For the sake of this example, Router B is a Cisco 7304 router.

Remote End Configuration (Router A):

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# interface serial 5/0
Router(config-if)# no keepalive
Router(config-if)# loopback network line
```

Local End Configuration (Router B, a Cisco 7304 router)

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# interface serial 6/0
Router(config-if)# bert pattern 2^23 interval 10
```

In the following example, a BERT test using pattern 2^23 is begun on serial interface 6/0. The BERT test will last for 10 minutes and 5 errors will be intentionally inserted into the test stream.

In this example, assume the remote end has been configured using the configuration from Router A.

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# interface serial 6/0
Router(config-if)# bert pattern 2^23 interval 10
Router(config-if)# bert errors 5
```

Verifying BERT Results

In the following example, the **show controllers serial slot/interface-number bert** command is used to view a BERT test that is still in progress. This command has to be entered on the router that initiated the BERT test:

```
Router# show controller serial 6/0 bert

Interface Serial6/0 (DS3 port 1)
BERT information:
  State           :enabled (sync'd)
  Pattern         :2^23
  Interval        :10 minutes
  Time remaining  :00:01:44
  Total errors    :0
  Time this sync  :00:08:10
  Errors this sync :0
  Sync count      :1
```

In the following example, the **show controllers serial *slot/interface-number* bert** command is used to view a BERT test that is complete. This command has to be entered on the router that initiated the BERT test.

```
Router# show controller serial 6/0 bert
```

```
Interface Serial6/0 (DS3 port 1)
BERT information:
  State           :enabled (sync'd)
  Pattern         :2^23
  Interval        :10 minutes
  Time remaining  :00:09:44
  Total errors    :0
  Time this sync  :00:00:10
  Errors this sync :0
  Sync count     :1
```

Command Reference

This section documents modified commands. All other commands used with this feature are documented in the Cisco IOS Release 12.1 Configuration Guide and Command Reference publications.

- **bert errors**
- **bert pattern**
- **show controllers serial bert**

bert errors

To insert intentional errors into a BERT test pattern, use the **bert errors** command.

bert errors {*number-of-errors*}

Syntax Description	<i>number-of-errors</i>	Specifies the number of errors to insert into the current BERT test stream. If no number is specified, the <i>number-of-errors</i> is set to 1.
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Defaults	<p>This command is disabled by default. If a BERT test is performed, no errors are intentionally inserted into the BERT test stream unless the bert errors command is entered.</p> <p>The default <i>number-of-errors</i>, when the bert errors command is specified without the <i>number-of-errors</i> option, is 1.</p>
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Command Modes	Serial interface configuration mode
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Command History	Release	Modification
	12.1(12c)EX1	This command was introduced for Cisco 7304 routers.
	12.2(18)S	This command was introduced on Cisco 7304 routers running Cisco IOS Release 12.2 S.

Usage Guidelines	<p>The bert errors command is generally used to verify that the BERT test is functioning properly.</p> <p>The bert errors command is used to intentionally insert errors in a BERT test stream. A BERT test stream is equal to the number of bits for a particular test (a 2¹⁵ test is 32767 bits long, a 2²⁰ is 1048575 bits long, and a 2²³ is 8388607 bits long). For instance, if bert errors 5 is entered when a 2¹⁵ test is underway, 5 errors will be inserted for each 32767 bits in the test stream.</p>
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Examples	<p>In the following example, a BERT test using pattern 2²³ is begun on serial interface 6/0 on Router B to test the link to serial interface 5/0 on Router A. The BERT test will last for 10 minutes and 5 errors will be intentionally inserted into the test stream. For the sake of this example, assume Router B is a Cisco 7304 router.</p>
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Remote End Configuration (Router A):

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# interface serial 5/0
Router(config-if)# no keepalive
Router(config-if)# loopback network line
```

Local End Configuration (Router B, a Cisco 7304 Router)

```

Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# interface serial 6/0
Router(config-if)# no keepalive
Router(config-if)# bert pattern 2^23 interval 10
Router(config-if)# bert errors 5

```

Related Commands^R

Command	Description
bert pattern	Begins a BERT test.
show controllers serial <i>slot/interface-number</i>	Shows the status of the controller.
show controllers serial <i>slot/interface-number</i> bert	Shows the results of a BERT test or the fields of a BERT test that are still in progress, depending on whether the BERT test is active or complete.

bert pattern

To initiate a BERT test, use the **bert pattern** command. To stop a test in progress, use the **no bert pattern** command.

bert pattern {**2^15** | **2^20** | **qrss** | **2^23**} **interval** *minutes*

no bert pattern {**2^15** | **2^20** | **qrss** | **2^23**} **interval** *minutes*

Syntax Description		
2^15		Specifies a pseudo-random repeating pattern that is 32767 bits long.
2^20		Specifies a pseudo-random repeating pattern that is 1048575 bits long.
qrss		Specifies a quasi-random signal source.
2^23		Specifies a pseudo-random repeating pattern that is 8388607 bits long.
interval <i>minutes</i>		Specifies the length of the BERT test in minutes.

Defaults No BERT tests are performed unless this command is entered.

Command Modes Serial interface configuration mode

Command History	Release	Modification
	12.1(12c)EX1	This command was introduced for Cisco 7304 routers.
	12.2(18)S	This command was introduced on Cisco 7304 routers running Cisco IOS Release 12.2 S.

Usage Guidelines The link being tested using T3 BERT cannot forward traffic during the BERT test. Therefore, the interfaces connected using the tested link will be set to down until the BERT test is complete. The interfaces will automatically be set to up once the BERT test is complete.

In order to perform a BERT test using the **bert pattern** command, the remote port has to have keepalives disabled (the **no keepalive** command) and be in loopback mode (the **loopback network line** command) Keepalives should also be disabled on the port where the BERT test is initiated.

Use the **show controllers serial slot/interface-number bert** command to view BERT testing results.

Examples

In the following example, the link between serial interface 5/0 on Router A to serial interface 6/0 on Router B is being tested using BERT. The BERT test is initiated on Router B and is using pattern 2^23. The BERT test will last for 10 minutes. For the sake of this example, Router B is a Cisco 7304 router.

Remote End Configuration (Router A):

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# interface serial 5/0
Router(config-if)# no keepalive
Router(config-if)# loopback network line
```

Local End Configuration (Router B, a Cisco 7304 router)

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# interface serial 6/0
Router(config-if)# bert pattern 2^23 interval 10
```

In the following example, a BERT test using pattern 2^23 is begun on serial interface 6/0. The BERT test will last for 10 minutes and 5 errors will be intentionally inserted into the test stream.

In this example, assume the remote end has been configured using the configuration from Router A in the prior example.

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# interface serial 6/0
Router(config-if)# bert pattern 2^23 interval 10
Router(config-if)# bert errors 5
```

Related Commands^R

Command	Description
bert errors	Intentionally inserts errors into a BERT test stream.
show controllers serial slot/interface-number	Shows the status of the controller.
show controllers serial slot/interface-number bert	Shows the results of a BERT test or the fields of a BERT test that are still in progress, depending on whether the BERT test is active or complete.

show controllers serial bert

To view the BERT statistics for a completed or BERT test in progress, enter the **show controllers serial bert** command.

show controllers serial *slot/interface-number* bert

Syntax Description	Parameter	Description
	<i>slot</i>	Specifies the slot where the serial interface is located.
	<i>interface-number</i>	Specifies the number of the serial interface.

Defaults None.

Command Modes EXEC

Command History	Release	Modification
	12.1(12c)EX1	This command was introduced for Cisco 7304 routers.
	12.2(18)S	This command was introduced on Cisco 7304 routers running Cisco IOS Release 12.2 S.

Usage Guidelines This command is used to view the results of a user-initiated BERT test.

Examples In the following example, the **show controllers serial *slot/interface-number* bert** command is used to view a BERT test that is still in progress:

```
Router# show controller serial 6/0 bert

Interface Serial6/0 (DS3 port 1)
BERT information:
  State           :enabled (sync'd)
  Pattern         :2^23
  Interval        :10 minutes
  Time remaining  :00:01:44
  Total errors    :0
  Time this sync  :00:08:10
  Errors this sync :0
  Sync count     :1
```

In the following example, the **show controllers serial *slot/interface-number* bert** command is used to view a BERT test that is complete:

```
Router# show controller serial 6/0 bert
```

```
Interface Serial6/0 (DS3 port 1)
BERT information:
  State           :enabled (sync'd)
  Pattern         :2^23
  Interval        :10 minutes
  Time remaining  :00:09:44
  Total errors    :0
  Time this sync  :00:00:10
  Errors this sync :0
  Sync count     :1
```

Related Commands^R

Command	Description
bert pattern	Begins a BERT test.
bert errors	Inserts intention errors into a BERT test.

Glossary

alarm—A notification that a rising or falling threshold has been crossed.

trigger—An alarm which, when asserted, causes the line protocol to go down.