



Bit Error Rate Testing

This feature module describes how to configure a Bit Error Rate Test (BERT) and display the test results for channelized line cards in the Cisco ASR 901 Series Aggregation Services Routers.

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Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the [Feature Information for Bit Error Rate Testing, on page 5](#).

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to <http://www.cisco.com/go/cfn>. An account on Cisco.com is not required.

Prerequisites for BERT

- To run BERT in unframed mode on a controller, you should set the “framing” configuration of the controller to “unframed”.
- When running BERT, your system expects to receive the same pattern that it is transmitting. If traffic is not being transmitted or received, create a back-to-back loopback BERT on the link or in the network, and send out a predictable stream to ensure that you receive the same data that was transmitted.
- To determine if the remote serial port returns the BERT pattern unchanged, you must manually enable network loopback at the remote serial port while you configure a BERT pattern to use in the test at specified time intervals on the local serial port.

Restrictions

- BERT affects the functionality of any configured protocol on a controller on which it is initiated. The configured protocol functionality is resumed after the BERT process is completed or successfully canceled.
- BERT is not supported for channelized E1/T1 (per time slot).

Feature Overview

The BERT feature is used to test the integrity of the physical layer. Using this feature, you can test cables and diagnose signal problems in the field.

BERT generates a specific pattern on to the egress data stream of a E1/T1 controller and then analyzes the ingress data stream for the same pattern. The bits that do not match the expected pattern are counted as bit errors.

The bit error rate (BER) is determined by comparing the erroneous bits received with the total number of bits received. You can display and analyze the total number of error bits transmitted and the total number of bits received on the link. You can retrieve error statistics anytime during the BERT.

The ASR 901 router uses Pseudo-Random Binary Sequences (PRBSs) for the BERT. The following table lists the PRBSs supported on the ASR 901 routers.

Table 1: BERT Pattern Supported in Cisco ASR 901 Routers

BERT Pattern	Description
0's	Test pattern consisting of all 0's that is used to test line coding
1's	Test pattern consisting of all 1's that is used to test alternating line volt and repeaters
2 ¹¹	Pseudo-random repeating test pattern that consists of 2,048 bits
2 ¹⁵	Pseudo-random repeating test pattern that consists of 32,767 bits
2 ²⁰ QRSS	Pseudo-random repeating test pattern that consists of 1,048,575 bits
Alt 0's and 1's	Test pattern consisting of alternating 0's and 1's that is used to test the preamp and equalizer

How to Configure BERT

The ASR 901 router supports BERT on all 16 E1/T1 controllers simultaneously. Additionally, you can cancel an already initiated BERT.

This section describes how to configure and perform a BERT on E1/T1 controllers, and how to stop or verify the test:

Performing BERT on a T1/E1 Line

To enable BERT pattern on a T1 or E1 controller, perform the following steps.

Procedure

	Command or Action	Purpose
Step 1	enable Example: <pre>Router> enable</pre>	Enables the privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: <pre>Router# configure terminal</pre>	Enters the global configuration mode.
Step 3	controller {t1 e1} slot/port Example: <pre>Router(config)# controller T1 0/5</pre>	Selects a T1 or E1 controller and enters controller configuration mode.
Step 4	bert pattern pattern interval time Example: <pre>Router(config-controller)# bert pattern 0s interval 30</pre>	Sends a BERT pattern through the T1 or E1 line for the specified time interval. <ul style="list-style-type: none"> • <i>pattern</i>—Length of the repeating BERT. • interval—Specifies the duration of the BERT test, in minutes. The interval can be a value from 1 to 14400.

Terminating BERT on a T1/E1 Controller

Procedure

	Command or Action	Purpose
Step 1	enable Example: <pre>Router> enable</pre>	Enables the privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: <pre>Router# configure terminal</pre>	Enters the global configuration mode.
Step 3	controller {t1 e1} slot/port Example:	Selects a T1 or E1 controller and enters controller configuration mode.

	Command or Action	Purpose
	Router(config)# controller T1 0/5	
Step 4	no bert pattern <i>pattern interval time</i> Example: Router(config-controller)# no bert pattern	Terminates the BER test running on the specified T1 or E1 line.

Verifying BERT on a T1/E1 Controller

To verify that BERT is running on a T1/E1 controller, enter the **show controllers** command at any time during the test.

```
Router# show controllers e1 0/9
E1 0/9 is up.
Applique type is Channelized E1 - balanced
DSX1 BERT pattern : 2^15
DSX1 BERT sync : sync
DSX1 BERT sync count : 1
DSX1 BERT interval : 1
DSX1 BERT time remain : 49
DSX1 BERT total errs : 0
DSX1 BERT total k bits: 21068
DSX1 BERT errors (last): 0
DSX1 BERT k bits (last): 21068
Last clearing of BERT counters never
No alarms detected.
alarm-trigger is not set
Framing is crc4, Line Code is HDB3, Clock Source is Internal.
Data in current interval (68 seconds elapsed):
1 Line Code Violations, 0 Path Code Violations
0 Slip Secs, 0 Fr Loss Secs, 1 Line Err Secs, 1 Degraded Mins
0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
```

Configuration Examples

The following is a sample configuration of the BERT feature.

```
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#controller e1 0/9
Router(config-controller)#bert pattern 2^15 interval 1
```

Additional References

The following sections provide references related to bit error rate testing.

Related Documents

Related Topic	Document Title
Cisco IOS Commands	Cisco IOS Master Commands List, All Releases
ASR 901 Command Reference	Cisco ASR 901 Series Aggregation Services Router Command Reference
Cisco IOS Interface and Hardware Component Commands	Cisco IOS Interface and Hardware Component Command Reference

Standards

Standard	Title
None	—

MIBs

MIB	MIBs Link
None	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	Title
None	—

Technical Assistance

Description	Link
The Cisco Technical Support website contains thousands of pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	http://www.cisco.com/techsupport

Feature Information for Bit Error Rate Testing

The following table lists the features in this module and provides links to specific configuration information.

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to <http://www.cisco.com/go/cfn>. An account on Cisco.com is not required.



Note The following table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Table 2: Feature Information for Bit Error Rate Testing

Feature Name	Releases	Feature Information
Bit Error Rate Testing	15.2(2)SNG	This feature was introduced.