PRI/Q.931 Signaling Backhaul for Call Agent Applications

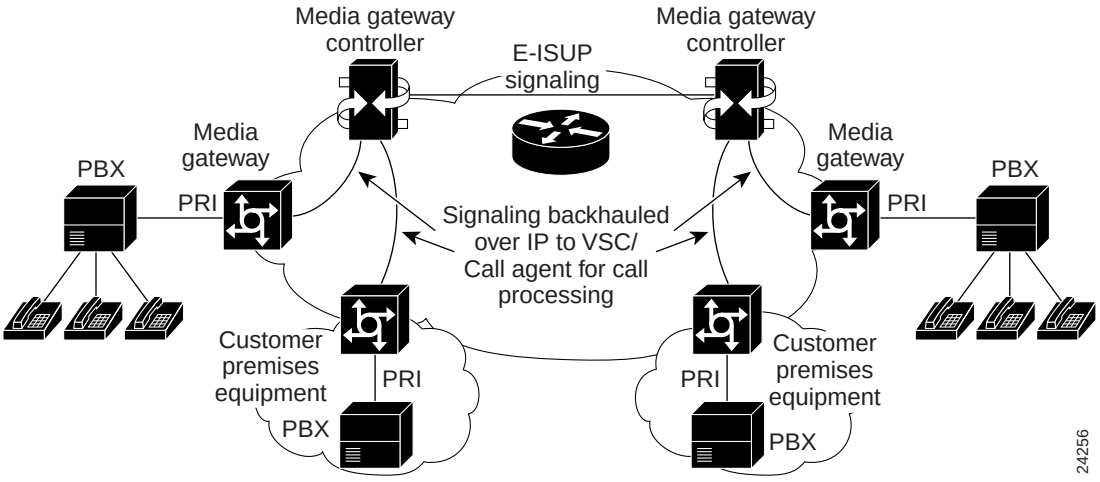
This feature module describes the PRI/Q.931 Signaling Backhaul feature. It includes information on the benefits of the new feature, supported platforms, related documents, and so forth.

This document includes the following sections:

Feature Overview

PRI/Q.931 signaling backhaul is the ability to reliably transport the signaling (Q.931 and above layers) from a PRI trunk that is physically connected to a media gateway (for example, a Cisco AS5300) to a media gateway controller (Cisco VSC3000) for processing. Additionally, the Cisco VSC3000 can respond through the same interface. For the purposes of this document, the media gateway controller will be referred to as the virtual switch controller (VSC).

Figure 1 PRI Signaling Backhaul



The backhaul takes place between a media gateway and a VSC. The gateways provide an interface between the Public Switched Telephone Network (PSTN) and the packet network world (IP or ATM). The VSC provides call processing and gateway control.

The general principle behind signaling backhaul is to reliably pass as many layers of a protocol stack as possible through a gateway directly to the VSC.

Generally, signaling backhaul would occur at a common boundary for all protocols. For ISDN, the signaling backhaul will take place at the layer 2 (Q.921) and layer 3 (Q.931) boundary. The lower layers of the protocol will be terminated and processed on the gateway, while the upper layers will be backhauled to the VSC. The upper layers of the protocol are backhauled, or transported, to the VSC using Reliable User Datagram Protocol, or RUDP over IP. RUDP provides autonomous notification of connected and failed sessions, and in-sequence, guaranteed delivery of signaling protocols across an IP network. Backhaul session manager is a software function on the VSC and gateway that manages RUDP sessions. It also groups sessions between endpoints and establishes a selection priority, and collects these groups together to form a set.

Signaling backhaul provides the additional advantage of distributed protocol processing. This permits greater expandability and scalability while offloading lower layer protocol processing from the VSC.

Signaling Backhaul and Backhaul Session Manager

The backhaul session manager enables signaling applications to backhaul signaling information to a remote or local VSC, and also provides redundancy and transparent management of transport paths. To configure the backhaul session manager, you must create a new session-set, add session-groups in that session-set, and then add sessions to the session-group.

A session is an RUDP connection between two endpoints. An endpoint is defined by the IP address and the UDP port.

A session-group is a logically ordered list of sessions based on priority of the sessions. All of the sessions in the session-group should be configured to connect the same physical machines and, for reliability, these sessions can be defined to take different paths through the network. The backhaul session manager always uses the highest priority session available in the session-group to transport all PRI signaling traffic, regardless of the number of sessions configured in the session-group (note that RUDP keepalive traffic would exist on all sessions).

If the session currently being used fails, or a higher priority session within that session group gets established, backhaul session manager and RUDP support a function in which messages waiting to be transmitted on the current session are transferred to another session automatically, while maintaining guaranteed, in-sequence delivery. This is sometimes referred to as session failover. Thus, a session-group enables network path redundancy between the gateway and the VSC. A session-group cannot be deleted unless the sessions associated with it are deleted first.

A session-set is a collection of session-groups. A session-set enables VSC redundancy and is used to implement VSC switchover. A session-set cannot be deleted unless the groups associated with it are deleted first.

In a fault-tolerant configuration, a session-set on the signaling gateway (Cisco AS5300) can have more than one session-group, each session-group connecting the Cisco AS5300 to a different VSC. In non-fault-tolerant configuration, a session-set on the signaling gateway can contain only one session-group, because there is only one VSC available.

Note that each session-set on the VSC will always have one session-group, regardless of the configuration being used.

Benefits

Call Control

Signaling backhaul integrates gateways into a virtual switch with the call control centralized in the Cisco VSC.

Signaling Protocols

This feature provides the infrastructure to support the backhaul of the ISDN signaling protocol in a non-fault tolerant manner.

Restrictions

This feature currently supports FAS and NFAS PRI D-Channel signaling only. No other signaling protocols are supported. NFAS with backup D-channel signaling is not supported.

Related Documents

- *Cisco Tandem/Transit Solution Overview*
- *Cisco Tandem/Transit Media Gateway Installation and Configuration Guide*
- *Cisco Media Gateway Controller Hardware Installation Guide*
- *Regulatory Compliance and Safety Information for Cisco Media Gateway Controller Hardware*
- *Cisco Media Gateway Controller Software Release 7 Reference Guide*
- *Cisco Media Gateway Controller Software Release 7 Provisioning Guide*
- *Cisco Media Gateway Controller Software Release 7 OMT Guide*
- *Cisco Media Gateway Controller Software Release 7 Installation and Configuration*
- *Cisco Media Gateway Controller Online Documentation Notice*
- *Release Notes for Cisco Media Gateway Controller Software Release 7*
- *Cisco Media Gateway Controller Signaling Link Terminal Documentation Notice*

Supported Platforms

- Cisco AS5300

Supported Standards, MIBs, and RFCs

There are no supported MIBs or RFCs.

Configuration Tasks

Perform the following three tasks to configure PRI signaling backhaul.

- Configuring Backhaul Session Manager
- Configuring ISDN Signaling Backhaul
- Configuring the VSC

Caution When the Fast Ethernet interface is configured for auto negotiation, it can take up to two seconds for this interface to be enabled when the interface has to initialize. Two examples of the interface initializing is when the **no shut** command is executed and if the cable is removed and then plugged back in. This auto negotiation will also affect the traffic flow on the Ethernet interface, and can therefore interrupt the traffic flow of existing RUDP connections, causing them to fail. To avoid these problems, the Fast Ethernet interface should not be configured for auto negotiation. The duplex and speed parameters should be set according to the requirements of the network, and should not be set to auto.

Configuring Backhaul Session Manager

The backhaul session manager enables signaling applications to backhaul signaling information to a remote or local virtual switch controller (VSC), and also provides redundancy and transparent management of transport paths.

To configure the backhaul session manager, complete the following steps in the following order in global configuration mode:

- Create a New Session-Set
- Add Session-Groups in the Session-Set
- Add Sessions in the Session-Group
- Change Default Values of Session-Group Parameters (optional)

Table 1 Create a New Session-Set

	Command	Purpose
Step 1	`Router(config)# backhaul-session-manager`	Enters backhaul session manager configuration mode.

Step 2	`Router(config-bsm)# ?`
	`default Set a command to its defaults`
	`exit Leave BSM config mode`
	`group Specify the Session-Group name`
	`help Description of the interactive help system`
	`no Negate a command or set its defaults`
	`session Specify the Session info`
	`set Specify the Session-Set name`
		Shows backhaul session manager choices.

Step 3	`Router(config-bsm)# set ?`
	`WORD set-name`
	
	`Router(config-bsm)# set` *`set-name`*
		Adds the new Session-Set.

Step 4	`Router(config-bsm)# set` *`set-name`* `client ?`
	`ft Specify the Session-Set Mode to Fault-Tolerant`
	`nft Specify the Session-Set Mode to Non-Fault-Tolerant`
	
	`Router(config-bsm)# set` *`set-name`* `client ft`
		Sets the Session-Set to fault-tolerant. Fault tolerance is the level of ability within a system to operate properly even if a group in the set fails.
		
		Note If the Cisco AS5300 is configured for non-fault-tolerant operation, then the VSC should also be configured for non-fault-tolerant operation. See "Configuring the VSC" section on page 9.

Table 2 Add Session-Groups in the Session-Set

	Command	Purpose

Step 1	`Router(config-bsm)# group ?`
	`WORD group-name`
	
	`Router(config-bsm)# group` *`group-name`* `?`
	`auto-reset Sets the Auto Reset Max value`
	`cumulative-ack Sets the Cumulative Ack Max value`
	`out-of-sequence Sets the Max Out-Of-Sequence value`
	`receive Sets the Max Receive value`
	`retrans Sets the Retrans Max value`
	`set Specify the Session-Set name`
	`timer Specify the Session-Group Timer values`
		Shows Session-Group options.

Step 2	`Router(config-bsm)# group` *`group-name`* `set ?`
	`WORD set-name`
	
	`Router(config-bsm)# group` *`group-name`* `set` *`set-name`*
		Adds the new Session-Group.

Table 3 Add Sessions in the Session-Group

	Command	Purpose

Step 1	`Router(config-bsm)# session ?`
	`group  Specify the Session-Group name`
	
	`Router(config-bsm)# session group ?`
	`WORD group-name`
		Adds a new Session.

Step 2	`Router(config-bsm)# session group` *group-name* `?`
	`A.B.C.D  Specify the Remote IP address`
	
	`Router(config-bsm)# session group` *group-name*
	`161.44.2.72`
		Specifies the IP address.

Step 3	`Router(config-bsm)# session group` *group-name*
	`161.44.2.72 ?`
	`<1024-9999>  Specify the Remote port`
	
	`Router(config-bsm)# session group` *group-name*
	`161.44.2.72 5555`
		Specifies the remote port. Choose a number in the range of 1024 and 9999. Make sure that this number is not already being used by another service such as MGCP on the VSC.

Step 4	`Router(config-bsm)# session group` *group-name*
	`161.44.2.72 5555 ?`
	`A.B.C.D  Specify the Local IP address`
	
	`Router(config-bsm)# session group` *group-name*
	`161.44.2.72 5555 172.18.72.198`
		Specifies the local IP address.

Step 5	`Router(config-bsm)# session group` *group-name*
	`161.44.2.72 5555 172.18.72.198 ?`
	`<1024-9999>  Specify the Local port`
	
	`Router(config-bsm)# session group` *group-name*
	`161.44.2.72 5555 172.18.72.198 5555`
		Specifies the local port. Range is 1024 through 9999.

Step 6	`Router(config-bsm)# session group` *group-name*
	`161.44.2.72 5555 172.18.72.198 5555 ?`
	`<0-9999>  Specify the Session Priority`
	
	`Router(config-bsm)# session group` *group-name*
	`161.44.2.72 5555 172.18.72.198 5555 1`
		Specifies the priority of the session within the session-group. Range is 0 through 9999, 0 being the highest priority.
		
		Note Although the Cisco IOS software allows the user to configure multiple sessions in the group with the same priority, it is recommended that the priority of the session be unique within that session-group.
		
		Note It is recommended to have at least two sessions to support session failover.
		
		Repeat steps 1 through 6 to create another session.

Repeat the steps in Table 2 and Table 3 to add a second group of sessions for fault-tolerant configuration.

Caution Do not change the following parameters unless instructed to do so by Cisco technical support. There are relationships between them that can cause sessions to fail if not set correctly.

Table 4 Change Default Values of Session-Group Parameters (optional)

	Command	Purpose

Step 1	`Router(config-bsm)# group group-name ?`
	`auto-reset  Sets the Auto Reset Max value`
	`cumulative-ack  Sets the Cumulative Ack Max Value`
	`out-of-sequence Sets the Max Out-Of-Sequence value`
	`receive  Sets the Max Receive value`
	`retrans  Sets the Retrans Max value`
	`set  Specify the Session-Set name`
	`timer  Specify the Session-Group Timer values`
	
	`Router(config-bsm)# group group-name auto-reset ?`
	`<0-255>  RUDP Auto Reset Max: 0-255`
	
	`Router(config-bsm)# group group-name auto-reset 6`
		Sets the auto reset maximum to 6.

Step 2	`Router(config-bsm)#`
	`Router(config-bsm)# group group-name cumulative-ack ?`
	`<0-255>  RUDP Cumulative Ack Max: 0-255`
	
	`Router(config-bsm)# group group-name cumulative-ack 4`
		Configures RUDP cumulative ack maximum to 4.

Step 3	`Router(config-bsm)#`
	`Router(config-bsm)# group group-name out-of-sequence ?`
	`<0-255>  RUDP Out-of-Sequence Max: 0-255`
	
	`Router(config-bsm)# group group-name out-of-sequence 4`
		Configures out-of-sequence maximum to 4.

Step 4	`Router(config-bsm)#`
	`Router(config-bsm)# group group-name receive ?`
	`<1-64>  RUDP Receive Max: 1-64`
	
	`Router(config-bsm)# group group-name receive 32`
		Configures receive maximum to 32.

Step 5	`Router(config-bsm)#`
	`Router(config-bsm)# group group-name retrans ?`
	`<0-255>  RUDP Retransmit Max: 0-255`
	
	`Router(config-bsm)# group group-name retrans 3`
		Configures retransmit maximum to 3.

Step 6	`Router(config-bsm)#`
	`Router(config-bsm)# group group-name timer ?`
	`cumulative-ack  Sets the Cumulative acknowledgment timer value`
	`keepalive  Sets the KeepAlive (Null Segment) timer value`
	`retransmit Sets the Retransmit timer value`
	`transfer-state  Sets the State Transfer timer value`
		Shows group-name timer options.

Table 4 Change Default Values of Session-Group Parameters (optional) (continued)

	Command	Purpose
Step 7	Router(config-bsm)# Router(config-bsm)# **group** *group-name* **timer cumulative-ack ?** <100-65535> RUDP Cumulative acknowledgment Timer: 100-65535 Router(config-bsm)# **group** *group-name* **timer cumulative-ack 325**	Sets the cumulative acknowledgment timer to 325 milliseconds.
Step 8	Router(config-bsm)# Router(config-bsm)# **group** *group-name* **timer keepalive ?** <0-65535> RUDP Keep Alive Timer: 0, 100-65535 Router(config-bsm)# **group** *group-name* **timer keepalive 2050**	Sets the keepalive timer to 2050 milliseconds.
Step 9	Router(config-bsm)# Router(config-bsm)# **group** *group-name* **timer retransmit ?** <100-65535> RUDP Retransmit Timer: 100-65535 Router(config-bsm)# **group** *group-name* **timer retransmit 650**	Sets the retransmit timer to 650 milliseconds.
Step 10	Router(config-bsm)# Router(config-bsm)# **group** *group-name* **timer transfer-state ?** <0-65535> RUDP State Transfer Timer: 0-65535 Router(config-bsm)# **group** *group-name* **timer transfer-state 1800** Router(config-bsm)# **exit**	Set the state transfer timer to 1800 milliseconds.

Configuring ISDN Signaling Backhaul

You must configure ISDN in order to backhaul Q.931 signaling to the VSC.

Table 5 Configure ISDN

	Command	Purpose
Step 1	Router(config)# **controller t1 0** Router(config-control)#	Enters controller configuration mode.
Step 2	Router(config-control)# **pri-group timeslots 1-24 service mgcp**	Specifies the control protocol used for backhaul (MGCP). The controller timeslots cannot be shared between backhaul and other Layer 3 protocols.
Step 3	Router(config-control)# **exit** Router(config)	Returns to configuration mode.
Step 4	Router(config)# **interface serial 0:23** Router(config-if)#	Enters serial interface configuration mode.

Table 5 Configure ISDN (continued)

	Command	Purpose
Step 5	`Router(config-if)# isdn switch-type primary-4ess`	Configures the ISDN switch type. This can be done in either global configuration mode or interface mode.
Step 6	`Router(config-if)# isdn bind-l3 backhaul` *set-name* `Router(config-if)# exit`	Configures ISDN to backhaul Q.931 to the VSC. You must use the set-name that was defined for the backhaul session manager configuration. Repeat the above steps for each T1 interface on the Cisco AS5300 that will utilize backhaul.

Configuring the VSC

The Cisco VSC3000 is the signaling controller software, which provides call control, installed on, for example, a Sun Netra 1800. Man Machine Language (MML) is the user interface into the signaling controller software. You use this interface to configure parameters of your signaling controller software and to display information about the current settings.

To configure the VSC to perform signaling backhaul, do the following steps:

- Provision MGCP Services

Note The commands shown below are not case sensitive.

Table 6 Provision MGCP Services

	Command	Purpose
Step 1	`mml> prov-add:extnode:name="va-5300-6", desc="AS-5300-6-Spans"`	Defines the media gateway, or the external node.
Step 2	`mml> prov-add:ipfaspath:name="bh6NI2", extnode="va-5300-6",mdo="BELL_1268", custgrpid="1111",side="network",desc="Backhaul service to AS-5300-6"`	Defines the PRI backhaul service (ipfaspath), the ISDN variant (NI2), customer group ID, or which dial plan to use for this connection (1111), the PRI (network and not user), and optional description (Backhaul service to AS-5300-6).

Table 6 Provision MGCP Services (continued)

	Command	Purpose
Step 3	mml> **prov-add:iplnk:name="iplink6N",if="enif1", ipaddr="IP_Addr1",port=5555,pri=1, peeraddr="172.18.72.198",peerport=5555,sigslot=0, sigport=0,svc="bh6NI2",desc="IP link-backhaul svc NAS 5300-6"**	Defines the IP network connection to the backhaul service, the ethernet interface name for the VSC ethernet card (enif1), "IP_Addr1" as defined in ../etc/XECfgParm.dat, the port number used by the VSC (7007), the IP link priority, (1) the media gateway's IP address (172.18.72.198), the media gateway's IP port (7007), the media gateway's PRI physical card slot (0), the media gateway's PRI port or the T1/E1 controller number (0), the ipfas service, which matches the name in Step 2, and an optional description (IP link-backhaul svc NAS 5300-6). **Note** The media gateway's IP port does not have to match theVSC port.
Step 4	mml>**prov-add:mgcppath:name="mgcp53006", extnode="va-5300-6",desc="MGCP service to AS-5300-6"**	Defines the MGCP signaling service. This maps to the same external node name as for IPFASPATH (Step 2).
Step 5	mml>**prov-add:iplnk:name="clink6",if="enif1", ipaddr="IP_Addr1",port=2427,peeraddr= "172.18.72.198",peerport=2427,svc="mgcp53006", pri=1,desc="MGCP link to AS-5300-6"**	Defines the IP network connection to the MGCP signaling service. Defines the ethernet interface name for the VSC ethernet card (enif1), "IP_Addr1" as defined in ../etc/XECfgParm.dat, the port used by the VSC (2427), the media gateway's IP address (172.18.72.198), the media gateway's IP port (2427), the name for MGCP signaling service (mgcp53006), the IP link priority (1), and the optional description (MGCP link to AS-5300-6).

Note If the VSC is set up for fault-tolerant operation, configure the backhaul session manager also for fault-tolerant operation. For more information, refer to the *Cisco MGC Software Release 7 Provisioning Guide*.

Verifying Configuration

Step 1 Enter the command **show isdn status** to verify successful ISDN configuration for backhaul. The following output shows that Layers 1, 2, 3 are enabled and active. Layer 3 shows the number of active ISDN calls.

In the example below, notice that the Layer 2 protocol is Q.921, and the Layer 3 protocol is BACKHAUL. This verifies that it is configured to backhaul ISDN. Also, if you are connected to a live line, you should see Layer 1 status is active, and layer 2 state is MULTIPLE_FRAME_ESTABLISHED. This means that the ISDN line is up and active.

```
Router# show isdn status
*00:03:34.423 UTC Sat Jan 1 2000
Global ISDN Switchtype = primary-net5
ISDN Serial1:23 interface
        dsl 0, interface ISDN Switchtype = primary-net5
        L2 Protocol = Q.921  L3 Protocol(s) = BACKHAUL
    Layer 1 Status:
        ACTIVE
    Layer 2 Status:
        TEI = 0, Ces = 1, SAPI = 0, State = MULTIPLE_FRAME_ESTABLISHED
    Layer 3 Status:
        NLCB:callid=0x0, callref=0x0, state=31, ces=0 event=0x0
        NLCB:callid=0x0, callref=0x0, state=0, ces=1 event=0x0
        0 Active Layer 3 Call(s)
    Activated dsl 0 CCBs = 0
    Number of active calls = 0
    Number of available B-channels = 23
    Total Allocated ISDN CCBs = 0
Router#
```

Step 2 Enter the **show backhaul-session-manager set all** command to display all session-sets. This set contains one group called grp1 and it is configured in fault-tolerant mode.

```
Router# show backhaul-session-manager set all
Session-Set
   Name   :set1
   State  :BSM_SET_OOS
   Mode   :Fault-Tolerant(FT)
   Option :Option-Client
   Groups :1
   statistics
        Successful switchovers:0
        Switchover Failures:0
        Set Down Count 0
        Group:grp1
```

Possible states are:

SESS_SET_IDLE: A session-set has been created.

SESS_SET_OOS: A session(s) has been added to session-group(s). No ACTIVE notification has been received from VSC.

SESS_SET_ACTIVE_IS: An ACTIVE notification has been received over one in-service session-group. STANDBY notification has not been received on any available session-group(s).

SESS_SET_STNDBY_IS: A STANDBY notification is received, but there is no in-service active session-group available.

SESS_SET_FULL_IS: A session-group in-service that has ACTIVE notification and at least one session-group in-service that has STANDBY notification.

SESS_SET_SWITCH_OVER: An ACTIVE notification is received on session-group in-service, which had received STANDBY notification.

Step 3 Enter the **show backhaul-session-manager group status all** command to display the state of all session-groups.

The Status will be either Group-OutOfService (no session in the group has been established) or Group-Inservice (at least one session in the group has been established).

The Status(use) will be either Group-Standby (the VSC connected to the other end of this group will go into standby mode), Group-Active (the VSC connected to the other end of this group will be the active VSC), or Group-None (the VSC has not declared its intent yet).

```
Router# show backhaul-session-manager group status all
Session-Group
Group Name   :grp1
   Set Name     :set1
   Status       :Group-OutOfService
   Status (use) :Group-None
```

Step 4 Enter the **show backhaul-session-manager session all** command to display all sessions.

The State will be OPEN (the connection is established), OPEN_WAIT (the connection is awaiting establishment), OPEN_XFER (session failover is in progress for this session, which is a transient state), or CLOSE (this session is down, also a transient state). The session will move to OPEN_WAIT after waiting a fixed amount of time.

The Use-status field indicates whether PRI signaling traffic is currently being transported over this session . The field will be either OOS (this session is not being used to transport signaling traffic) or IS (this session is being used currently to transport all PRI signaling traffic). The User-status field indicates the connection status..

```
Router# show backhaul-session-manager session all

Session information --
Session-id:35
  Group:grp1
Configuration:
     Local:10.1.2.15      , port:8303
    Remote:10.5.0.3       , port:8303
  Priority:2
  RUDP Option:Client, Conn Id:0x2
State:
  Status:OPEN_WAIT, Use-status:OOS
Statistics:
  # of resets:0
  # of auto_resets 0
  # of unexpected RUDP transitions (total) 0
  # of unexpected RUDP transitions (since last reset) 0
  Receive pkts -  Total:0 , Since Last Reset:0
  Recieve failures -  Total:0 ,Since Last Reset:0
  Transmit pkts - Total:0, Since Last Reset:0


  Transmit Failures (PDU Only)
         Due to Blocking (Not an Error) - Total:0, Since Last Reset:0
         Due to causes other than Blocking - Total:0, Since Last
Reset:0
  Transmit Failures (NON-PDU Only)
         Due to Blocking(Not an Error) - Total:0, Since Last Reset:0
         Due to causes other than Blocking - Total:0, Since Last
Reset:0
  RUDP statistics
         Open failures:0
         Not ready failures:0
         Conn Not Open failures:0
         Send window full  failures:0
         Resource unavailble failures:0
         Enqueue failures:0
```

Monitoring and Maintaining Signaling Backhaul

Use the following commands to monitor and maintain this feature.

Table 7 New Clear and Show Commands

Command	Purpose
`Router# clear backhaul-session-manager group`	Resets the statistics for all available session-groups or a specified session-group.
`Router# show backhaul-session-manager set`	Displays status, statistics, or configuration of all available session-sets.

Table 7 New Clear and Show Commands

Command	Purpose
`Router# show backhaul-session-manager group`	Displays status, statistics, or configuration of all available session-groups.
`Router# show backhaul-session-manager session`	Displays status, statistics, or configuration of all available sessions.
`Router# show isdn status`	Displays status of ISDN backhaul. If the connection to the VSC is lost, the router will shut down Layer 2 so that it cannot receive more calls. When the VSC connection is back up, you may use this to verify that Layer 2 was also brought back up correctly.

Configuration Examples

This section provides the following configuration examples:

- Fast Ethernet

Fast Ethernet

In the following example, the Fast Ethernet interface is configured to not have auto negotiation configured:

```
Router# config term
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)# int f0
Router(config-if)# duplex ?
  auto  Enable AUTO duplex configuration
  full  Force full duplex operation
  half  Force half-duplex operation

Router(config-if)# duplex full
Router(config-if)#
Router(config-if)# speed ?
  10    Force 10 Mbps operation
  100   Force 100 Mbps operation
  auto  Enable AUTO speed configuration

Router(config-if)# speed 10
Router(config-if)# ^Z
Router#
```

Command Reference

This section documents new commands associated with the signaling backhaul feature. All other commands used with this feature are documented in the Cisco IOS Release 12.1(1)T command references.

- **backhaul-session-manager**

- **clear backhaul-session-manager group**
- **clear rudpv1 statistics**
- **group auto-reset**
- **group cumulative-ack**
- **group out-of-sequence**
- **group receive**
- **group retransmit**
- **group**
- **group timer keepalive**
- **group timer cumulative-ack**
- **group timer retransmit**
- **group timer transfer**
- **isdn bind-l3**
- **isdn protocol-emulate**
- **session**
- **set**
- **show backhaul-session-manager group**
- **show backhaul-session-manager session**
- **show backhaul-session-manager set**
- **show rudpv1**

backhaul-session-manager

To enter backhaul session manager configuration mode, use the **backhaul-session-manager** command.

backhaul-session-manager

Syntax Description

This command has no arguments or keywords.

Defaults

No default behavior or values.

Command Modes

Global configuration mode.

Command History

Release	Modification
12.1(1)T	This command was introduced.

Examples

Enter backhaul-session-manager configuration mode using this example:

```
Router(config)# backhaul-session-manager
Router(config-bsm)#
```

clear backhaul-session-manager group

To reset the stastistics or traffic counters for a specified session-group, use the **clear backhaul-session-manager group** command.

clear backhaul-session-manager group stats { all | name *group-name* **}**

Syntax Description

all	All available session-groups.
name *group-name*	A specified session-group.

Defaults

The statistical information accumulates.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.1(1)T	This command was introduced.

Usage Guidelines

A session is the connection between a client and a server, and a session-group is a collection of sessions in a group to implement switchover in case of a session failure. This command clears all statistics.

Examples

To clear all statistics for all available session-groups, see the following example:

```
Router# clear backhaul-session-manager group stats all
```

Related Commands

Command	Description
show backhaul-session-manager group	Displays status, statistics, or configuration of a specified or all session-groups.

clear rudpv1 statistics

To clear the counters that track RUDP statistics for a specified session-group, use the **clear rudpv1 statistics** command.

clear rudpv1 statistics

Syntax Description

This command has no arguments or keywords.

Defaults

The statistical information accumulates.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.1(1)T	This command was introduced.

Usage Guidelines

This command clears all statistics.

Examples

To clear all RUDP statistics for all available session-groups, see this example:

```
Router# clear rudpv1 statistics
```

Related Commands

Command	Description
debug rudpv1	Displays debugging information for RUDP.
show rudpv1	Displays RUDP statistics.

group auto-reset

To configure the maximum auto-reset value, use the **group auto-reset** command. To set the value to default, use the **no** form of this command.

group *grp-name* **auto-reset** *count*

no group *grp-name* **auto-reset** *count*

Caution Do not change this parameter unless instructed to do so by Cisco technical support. There are relationships between group parameters that can cause sessions to fail if not set correctly.

Syntax Description

grp-name	Session-group name.
count	Maximum number of auto-resets. Range is 0 through 255.

Defaults

5

Command Modes

Backhaul session manager configuration mode

Command History

Release	Modification
12.1(1)T	This command was introduced.

Examples

To configure the maximum auto-reset value for the group named Group5 to 6, see the following example:

```
Router(config-bsm)# group group5 auto-reset 6
```

Related Commands

Command	Description
group cumulative-ack	Configures maximum cumulative acknowledgments.
group out-of-sequence	Configures maximum out-of-sequence segments that are received before an EACK is sent.
group receive	Configures maximum receive segments.
group retransmit	Configures maximum retransmits.

group cumulative-ack

To configure maximum cumulative acknowledgments, use the **group cumulative-ack** command. Maximum cumulative acknowledgments are the maximum number of segments that are received before an acknowledgment is sent. To set the value to default, use the **no** form of this command.

group *grp-name* **cumulative ack** *count*

no group *grp-name* **cumulative ack** *count*

Caution Do not change this parameter unless instructed to do so by Cisco technical support. There are relationships between group parameters that can cause sessions to fail if not set correctly.

Syntax Description

grp-name	Session-group name.
count	Maximum number of segments received before acknowledgment. Range is 0 through 255.

Defaults

3

Command Modes

Backhaul session manager configuration mode

Command History

Release	Modification
12.1(1)T	This command was introduced.

Examples

To set the cumulative acknowledgment maximum for Group5 to 4, see the following example:

```
Router(config-bsm)# group group5 cumulative-ack 4
```

Related Commands

Command	Description
group auto-reset	Configures the maximum auto-reset value.
group out-of-sequence	Configures maximum out-of-sequence segments that are received before an EACK is sent.
group receive	Configures maximum receive segments.
group retransmit	Configures maximum retransmits.

group out-of-sequence

To configure maximum out-of-sequence segments that are received before an EACK is sent, use the **group out-of-sequence** command. To set the value to default, use the **no** form of this command.

group *grp-name* **out-of-sequence** *count*

no group *grp-name* **out-of-sequence** *count*

Caution Do not change this parameter unless instructed to do so by Cisco technical support. There are relationships between group parameters that can cause sessions to fail if not set correctly.

Syntax Description

grp-name	Session-group name.
count	Maximum number of out-of-sequence segments. Range is 0 through 255.

Defaults

3

Command Modes

Backhaul session manager configuration mode

Command History

Release	Modification
12.1(1)T	This command was introduced.

Examples

To set the out-of-sequence maximum for Group5 to 4, see the following example:

```
Router(config-bsm)# group group5 out-of-sequence 4
```

Related Commands

Command	Description
group auto-reset	Configures the maximum auto-reset value.
group cumulative-ack	Configures maximum cumulative acknowledgments.
group receive	Configures maximum receive segments.
group retransmit	Configures maximum retransmits.

group receive

To configure maximum receive segments, use the **group receive** command. To set the value to default, use the **no** form of this command.

group *grp-name* **receive** *count*

no group *grp-name* **receive** *count*

Caution Do not change this parameter unless instructed to do so by Cisco technical support. There are relationships between group parameters that can cause sessions to fail if not set correctly.

Syntax Description

grp-name	Session-group name.
count	Maximum number of segments in our receive window. The other side should send no more than this number of segments before receiving an acknowledgment for the oldest outstanding segment. Range is 1 through 64.

Defaults

32

Command Modes

Backhaul session manager configuration mode

Command History

Release	Modification
12.1(1)T	This command was introduced.

Examples

To set the receive maximum to 10 for Group5, see the following example:

```
Router(config-bsm)# group group5 receive 10
```

Related Commands

Command	Description
group auto-reset	Configures the maximum auto-reset value.
group cumulative-ack	Configures maximum cumulative acknowledgments.
group out-of-sequence	Configures maximum out-of-sequence segments that are received before an EACK is sent.
group retransmit	Configures maximum retransmits.

group retransmit

To configure maximum retransmits, use the **group retransmit** command. To set the value to default, use the **no** form of this command.

group *grp-name* **retransmit** *count*

no group *grp-name* **retransmit** *count*

Caution Do not change this parameter unless instructed to do so by Cisco technical support. There are relationships between group parameters that can cause sessions to fail if not set correctly.

Syntax Description

grp-name	Session-group name.
count	Maximum number of retransmits. Range is 0 through 255.

Defaults

2

Command Modes

Backhaul session manager configuration mode

Command History

Release	Modification
12.1(1)T	This command was introduced.

Examples

To set the retransmit maximum for Group5 to 3, see the following example:

```
Router(config-bsm)# group group5 retrans 3
```

Related Commands

Command	Description
group auto-reset	Configures the maximum auto-reset value.
group cumulative-ack	Configures maximum cumulative acknowledgments.
group out-of-sequence	Configures maximum out-of-sequence segments that are received before an EACK is sent.
group receive	Configures maximum receive segments.

group

To create a session-group and associate it to a specified session-set, use the **group** command. To delete the group, use the **no** form of this command.

group *grp-name* **set** *set-name*

no group *grp-name* **set** *set-name*

Syntax Description

grp-name	Session-group name.
set-name	Session-set name.

Defaults

No default behavior or values.

Command Modes

Backhaul session manager configuration mode

Command History

Release	Modification
12.1(1)T	This command was introduced.

Examples

To associate the group named Group5 with the set named Set1, see the following example:

```
Router(config-bsm)# group group5 set set1
```

Related Commands

Command	Description
group auto-reset	Configures the maximum auto-reset value.
group cumulative-ack	Configures maximum cumulative acknowledgments.
group out-of-sequence	Configures maximum out-of-sequence segments that are received before an EACK is sent.
group receive	Configures maximum receive segments.
group retransmit	Configures maximum retransmits.
group timer keepalive	Configures keepalive (or null segment) timeout.
group timer cumulative-ack	Configures cumulative acknowledgment timeout.
group timer retransmit	Configures retransmission timeout.
group timer transfer	Configures state transfer timeout.

group timer cumulative-ack

To configure cumulative acknowledgment timeout, use the **group timer cumulative ack** command. Cumulative acknowledgment timeout is the maximum number of milliseconds RUDP will delay before sending an acknowledgment for a received segment. To set the value to default, use the **no** form of this command.

group *group-name* **timer cumulative ack** *time*

no group *group-name* **timer cumulative ack** *time*

Caution Do not change this parameter unless instructed to do so by Cisco technical support. There are relationships between group parameters that can cause sessions to fail if not set correctly.

Syntax Description

group-name	Session-group name.
time	Number of milliseconds RUDP will delay. Range is 100 through 65535.

Defaults

100

Command Modes

Backhaul session manager configuration mode

Command History

Release	Modification
12.1(1)T	This command was introduced.

Examples

To set the cumulative acknowledgment timer for Group5 to 325, see the following example:

```
Router(config-bsm)# group group5 timer cumulative-ack 325
```

Related Commands

Command	Description
group timer keepalive	Configures keepalive (or null segment) timeout.
group timer retransmit	Configures retransmission timeout.
group timer transfer	Configures state transfer timeout.

group timer keepalive

To configure keepalive (or null segment) timeout, use the **group timer keepalive** command. Keepalive timeout is the number of milliseconds RUDP will wait before sending a keepalive segment. To set the value to default, use the **no** form of this command.

group *grp-name* **timer keepalive** *time*

no group *grp-name* **timer keepalive** *time*

Caution Do not change this parameter unless instructed to do so by Cisco technical support. There are relationships between group parameters that can cause sessions to fail if not set correctly.

Syntax Description

grp-name	Session-group name.
time	Number of milliseconds before RUDP sends a keepalive segment. Range is 100 through 65535.

Defaults

1000

Command Modes

Backhaul session manager configuration mode

Command History

Release	Modification
12.1(1)T	This command was introduced.

Examples

To configure the keepalive timer for Group5 to 2050 milliseconds, see the following example:

```
Router(config-bsm)# group group5 timer keepalive 2050
```

Related Commands

Command	Description
group timer cumulative-ack	Configures cumulative acknowledgment timeout.
group timer retransmit	Configures retransmission timeout.
group timer transfer	Configures state transfer timeout.

group timer retransmit

To configure retransmission timeout, use the **group timer retransmit** command. Retransmission timeout is the number of milliseconds RUDP will wait to receive an acknowledgment for a segment. To set the value to default, use the **no** form of this command.

group *grp-name* **timer retransmit** *time*

no group *grp-name* **timer retransmit** *time*

Caution Do not change this parameter unless instructed to do so by Cisco technical support. There are relationships between group parameters that can cause sessions to fail if not set correctly.

Syntax Description

grp-name	Session-group name.
time	Number of milliseconds RUDP will delay. Range is 100 through 65535.

Defaults

300

Command Modes

Backhaul session manager configuration mode

Command History

Release	Modification
12.1(1)T	This command was introduced.

Usage Guidelines

The retransmit timer must be greater than the cumulative-ack timer.

Examples

To set the retransmit timer for Group5 to 650, see the following example:

```
Router(config-bsm)# group group5 timer retransmit 650
```

Related Commands

Command	Description
group timer cumulative-ack	Configures cumulative acknowledgment timeout.
group timer keepalive	Configures keepalive (or null segment) timeout.
group timer transfer	Configures state transfer timeout.

group timer transfer

To configure state transfer timeout, use the **group timer transfer** command. To set the value to default, use the **no** form of this command.

group *grp-name* **timer transfer** *time*

no group *grp-name* **timer transfer** *time*

Caution Do not change this parameter unless instructed to do so by Cisco technical support. There are relationships between group parameters that can cause sessions to fail if not set correctly.

Syntax Description

grp-name	Session-group name.
time	Maximum number of milliseconds RUDP will wait for a transfer request. The range is 0 to 65535 milliseconds.

Defaults

2000

Command Modes

Backhaul session manager configuration mode

Command History

Release	Modification
12.1(1)T	This command was introduced.

Examples

To set the state transfer timer for Group5 to 1800, see the following example:

```
Router(config-bsm)# group group5 timer transfer-state 1800
```

Related Commands

Command	Description
group timer cumulative-ack	Configures cumulative acknowledgment timeout.
group timer keepalive	Configures keepalive (or null segment) timeout.
group timer retransmit	Configures retransmission timeout.

isdn bind-l3

To configure the ISDN serial interface for backhaul, use the **isdn bind-l3** command. To disable, use the **no** form of this command.

isdn bind-l3 *set-name*

no isdn bind-l3 *set-name*

Syntax Description

set-name	Session-set name.

Defaults

No default behavior or values.

Command Modes

Interface configuration mode

Command History

Release	Modification
12.1(1)T	This command was introduced.

Examples

To configure the ISDN serial interface for backhaul for the set named Set1, see the following example:

```
Router(config-if)# isdn bind-l3 set1
```

isdn protocol-emulate

To emulate the network side of an ISDN configuration for a Net5 switch type, use the **isdn protocol-emulate** interface configuration command. To disable, use the **no** form of this command.

isdn protocol-emulate { network | user }

no isdn protocol-emulate { network | user }

Syntax Description

network	The network side of an ISDN configuration.
user	The user side of an ISDN configuration

Defaults

No default behavior or values.

Command Modes

Interface configuration mode

Command History

Release	Modification
12.0(3)XG	This command was introduced.

Usage Guidelines

The current ISDN signalling stack can emulate the ISDN network side, but it does not conform to the specifications of the various switch types in emulating the network side. This command enables the Cisco IOS to replicate the public switched network interface to a PBX. This feature is only supported for the PRI Net5 switch type.

Examples

To configure the interface (configured for Net5), to emulate the network side ISDN, see the following example:

```
Router(config)# int s0:15
Router(config-if)# isdn protocol-emulate network
```

session

Use the **session** command to associate a transport session with a specified session-group. It is assumed that the server is located on a remote machine. To delete the session, use the **no** form of this command.

session group *group-name remote_ip remote_port local_ip local_port priority*

no session group *group-name remote_ip remote_port local_ip local_port priority*

Syntax Description

group-name	Session-group name.
remote_ip	Remote IP address.
remote_port	Remote port number. Range is 1024 through 9999.
local_ip	Local IP address.
local_port	Local port number. Range is 1024 through 9999.
priority	Priority of the session-group. Range is 0 through 9999 and 0 is the highest priority.

Command Types

No default behavior or values.

Command Modes

Backhaul session manager configuration mode

Command History

Release	Modification
12.1(1)T	This command was introduced.

Examples

To associate a transport session with the session-group Group5 and specify the parameters described above, see the following example:

```
Router(config-bsm)# session group group5 161.44.2.72 5555 172.18.72.198 5555 1
```

set

To create a fault-tolerant or non-fault-tolerant session-set with the client or server option, use the **set** command. To delete the set, use the **no** form of this command.

set *set-name* **{ client | server } { ft | nft }**

no set *set-name* **{ client | server } { ft | nft }**

Syntax Description

set-name	Session-set name.
client	Client option. The session-set should only be configured as client for backhaul.
server	Server option.
ft	Fault-tolerant. Fault-tolerance is the level of ability within a system to operate properly even if a group in the set fails.
nft	Non-fault-tolerant. Only one group is allowed in a non-fault-tolerant set.

Defaults

No default behavior or values.

Command Modes

Backhaul session manager configuration mode

Command History

Release	Modification
12.1(1)T	This command was introduced.

Usage Guidelines

There can be multiple groups associated with a session-set.

The session-set should only be configured for the client for backhaul (not the server).

A set cannot be deleted unless the groups associated with the set are deleted first.

Examples

To specify the client set named Set1 to fault-tolerant, see the following example:

```
Router(config-bsm)# set set1 client ft
```

show backhaul-session-manager group

To display status, statistics, or configuration for all available session-groups, use the **show backhaul-session-manager group** command.

show backhaul-session-manager group { status | stats | cfg } { all | name *group-name* **}**

Syntax Description

status	Status.
stats	Statistics.
cfg	Configuration.
group-name	Name of a session-group.

Defaults

No default behavior or values.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.1(1)T	This command was introduced.

Examples

The following displays statistics for all session-groups:

```
Router# show backhaul-session-manager group stats all
Session-Group grp1 statistics
   Successful Fail-Overs      :0
   Un-Successful Fail-Over attempts:0
   Active Pkts receive count  :0
   Standby Pkts receive count :0
   Total PDUs dispatch err    :0
```

The following displays the current configuration for all session-groups:

```
Router# show backhaul-session-manager group cfg all
Session-Group
   Group Name :grp1
   Set Name   :set1
   Sessions   :3
    Dest:10.5.0.3 8304  Local:10.1.2.15 8304  Priority:0
    Dest:10.5.0.3 8300  Local:10.1.2.15 8300  Priority:2
    Dest:10.5.0.3 8303  Local:10.1.2.15 8303  Priority:2
    RUDP Options
      timer cumulative ack :100
      timer keepalive      :1000
      timer retransmit     :300
      timer transfer state :2000
      receive max          :32
      cumulative ack max   :3
      retrans max          :2
      out-of-sequence max  :3
      auto-reset max       :5
```

The following displays the current state of all session-groups. This group named grp1 belongs to the set named set1.

The Status will be either Group-OutOfService (no session in the group has been established) or Group-Inservice (at least one session in the group has been established).

The Status(use) will be either Group-Standby (the VSC connected to the other end of this group will go into standby mode), Group-Active (the VSC connected to the other end of this group will be the active VSC), or Group-None (the VSC has not declared its intent yet).

```
Router# show backhaul-session-manager group status all
Session-Group
Group Name   :grp1
   Set Name     :set1
   Status       :Group-OutOfService
   Status (use) :Group-None
```

Related Commands

Command	Description
show backhaul-session-manager set	Displays session-groups associated with a specific or all session-sets.
show backhaul-session-manager session	Displays status, statistics, or configuration of sessions.

show backhaul-session-manager session

To display various information for about a session or sessions, use the **show backhaul-session-manager session** command.

show backhaul-session-manager session { all | ip *ip_address* **}**

Syntax Description

all	All available sessions.
ip_address	The IP address of the local or remote session.

Defaults

No default behavior or values.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.1(1)T	This command was introduced.

Examples

To display information for all available sessions, see the following example.

The State will be OPEN (the connection is established), OPEN_WAIT (the connection is awaiting establishment), OPEN_XFER (session failover is in progress for this session, which is a transient state), or CLOSE (this session is down, also a transient state). The session will move to OPEN_WAIT after waiting a fixed amount of time.

The Use-status field indicates whether PRI signaling traffic is currently being transported over this session . The field will be either OOS (this session is not being used to transport signaling traffic) or IS (this session is being used currently to transport all PRI signaling traffic). OOS does not indicate if the connection is established and IS indicates that the connection is established.

```
Router# show backhaul-session-manager session all

Session information --
Session-id:35
  Group:grp1  /*this session belongs to the group named 'grp1' */
Configuration:
     Local:10.1.2.15      , port:8303
    Remote:10.5.0.3       , port:8303
  Priority:2
  RUDP Option:Client, Conn Id:0x2
State:
  Status:OPEN_WAIT, Use-status:OOS,  /*see explanation below */
Statistics:
  # of resets:0
  # of auto_resets 0
  # of unexpected RUDP transitions (total) 0
  # of unexpected RUDP transitions (since last reset) 0
  Receive pkts -  Total:0 , Since Last Reset:0
  Recieve failures -  Total:0 ,Since Last Reset:0
  Transmit pkts - Total:0, Since Last Reset:0
  Transmit Failures (PDU Only)
         Due to Blocking (Not an Error) - Total:0, Since Last Reset:0
         Due to causes other than Blocking - Total:0, Since Last
Reset:0
  Transmit Failures (NON-PDU Only)
         Due to Blocking(Not an Error) - Total:0, Since Last Reset:0
         Due to causes other than Blocking - Total:0, Since Last
Reset:0
  RUDP statistics
         Open failures:0
         Not ready failures:0
         Conn Not Open failures:0
         Send window full  failures:0
         Resource unavailble failures:0
         Enqueue failures:0
```

Related Commands

Command	Description
show backhaul-session-manager set	Displays session-groups associated with a specified or all session-sets.
show backhaul-session-manager group	Displays status, statistics, or configuration of a specified or all session-groups.

show backhaul-session-manager set

To display session-groups associated with a specified session-set or all session-sets, use the **show backhaul-session-manager set** command.

show backhaul-session-manager set { all | name *session-set-name* **}**

Syntax Description

all	All available session-sets.
name *session-set-name*	A specified session-set.

Defaults

No default behavior or values.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.1(1)T	This command was introduced.

Examples

To show session groups associated with all session-sets, see the following example:

```
Router# show backhaul-session-manager set all
```

Related Commands

Command	Description
show backhaul-session-manager group	Displays status, statistics, or configuration of a specified or all session-groups.
show backhaul-session-manager session	Displays status, statistics, or configuration of a session or all sessions.

show rudpv1

To display RUDP information, use the **show rudpv1** command.

show rudpv1 { failures | parameters | statistics }

Syntax Description

failures	RUDP failure statistics.
parameters	RUDP connection parameters.
statistics	RUDP internal statistics.

Defaults

No default behavior or values.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.1(1)T	This command was introduced.

Examples

The following example shows output for **show rudpv1 failures**:

```
Router# show rudpv1 failures
**** RUDPV1 Failure Stats ****

CreateBufHdrsFailure       0
CreateConnRecsFailure      0
CreateEventQueueFailure    0
OsSpecificInitFailure      0

NotReadyFailures           0
OptionNotSupportedFailures 0
InvalidOptionFailures      0
OptionRequiredFailures     0
GetConnRecFailures         0
InvalidConnFailures        0
EventUnavailFailures       0

GetConnRecFailures         0
FindConnRecFailures        0
EmptyBufferSendFailures    0
BufferTooLargeFailures     0
ConnNotOpenFailures        0
SendWindowFullFailures     0
GetBufHdrSendFailures      0

SendInProgressFailures     0

GetDataBufFailures         0
GetBufHdrFailures          0

SendFailures               0
SendEackFailures           0
SendAckFailures            0
SendSynFailures            0
SendRstFailures            0
SendTcsFailures            0
SendNullFailures           0

TimerFailures              0
ApplQueueFailures          0
FailedRetransmits          0
IncomingPktsDropped        0
CksumErrors                0
UnknownRudpv1Events        0
InvalidVersion             0
InvalidNegotiation         0
```

The following example shows output for **show rudpv1 parameters**:

```
Router# show rudpv1 parameters
*** RUDPV1 Connection Parameters ***


Next Connection Id:61F72B6C,  Remote conn id 126000

  Conn State             OPEN
  Conn Type              ACTIVE
  Accept Negot params?   Yes
  Receive Window         32
  Send Window            32
  Receive Seg Size       384
  Send Seg Size          384

                     Requested     Negotiated
  Max Auto Reset         5             5
  Max Cum Ack            3             3
  Max Retrans            2             2
  Max OutOfSeq           3             3
  Cum Ack Timeout       100           100
  Retrans Timeout       300           300
  Null Seg Timeout      1000          1000
  Trans State Timeout   2000          2000
  Cksum type             Hdr           Hdr


Next Connection Id:61F72DAC,  Remote conn id 126218

  Conn State             OPEN
  Conn Type              ACTIVE
  Accept Negot params?   Yes
  Receive Window         32
  Send Window            32
  Receive Seg Size       384
  Send Seg Size          384

                     Requested     Negotiated
  Max Auto Reset         5             5
  Max Cum Ack            3             3
  Max Retrans            2             2
  Max OutOfSeq           3             3
  Cum Ack Timeout       100           100
  Retrans Timeout       300           300
  Null Seg Timeout      1000          1000
  Trans State Timeout   2000          2000
  Cksum type             Hdr           Hdr
```

The following example shows output for **show rudpv1 statistics**:

```
Router# show rudpv1 statistics
*** RUDPV1 Internal Stats ****

Connection ID:61F72B6C,   Current State:OPEN

RcvdInSeq                 647
RcvdOutOfSeq              95

AutoResets                0
AutoResetsRcvd            0

TotalPacketsSent          1011
TotalPacketsReceived      958
TotalDataBytesSent        17808
TotalDataBytesReceived    17808
TotalDataPacketsSent      742
TotalDataPacketsReceived  742
TotalPacketsRetrans       117
TotalPacketsDiscarded     38

Connection ID:61F72DAC,   Current State:OPEN

RcvdInSeq                 0
RcvdOutOfSeq              0

AutoResets                0
AutoResetsRcvd            0

TotalPacketsSent          75
TotalPacketsReceived      75
TotalDataBytesSent        0
TotalDataBytesReceived    0
TotalDataPacketsSent      0
TotalDataPacketsReceived  0
TotalPacketsRetrans       0
TotalPacketsDiscarded     0

Cumulative RudpV1 Statistics

NumCurConnections         2

RcvdInSeq                 652
RcvdOutOfSeq              95

AutoResets                0
AutoResetsRcvd            0

TotalPacketsSent          1102
TotalPacketsReceived      1047
TotalDataBytesSent        18048
TotalDataBytesReceived    18048
TotalDataPacketsSent      752
TotalDataPacketsReceived  752
TotalPacketsRetrans       122
TotalPacketsDiscarded     38
```

Related Commands

Command	Description
clear rudpv1	Clears the statistics and failure counters.
show rudpv1	Shows RUDP statistics.

Debug Commands

This section documents new debug commands for PRI signaling backhaul. All other commands used with this feature are documented in the Cisco IOS Release 12.0 command references.

- **debug backhaul-session-manager set**
- **debug backhaul-session-manager session**
- **debug rudpv1**

debug backhaul-session-manager set

To trace state changes and receive messages and events for all the available session-sets or a specified session-set, use the **debug backhaul-session-manager set** command. To turn off debugging, use the **no** form of this command.

debug backhaul-session-manager set { all | name *set-name* **}**

no debug backhaul-session-manager set { all | name *set-name* **}**

Syntax Description

all	All available session-sets.
name *set-name*	A specified session-set.

Defaults

Debugging for backhaul session-sets is not enabled.

Command History

Release	Modification
12.1(1)T	This command was introduced.

Examples

The following is output for the **debug backhaul-session-manager set all** command:

```
Router# debug backhaul-session-manager set all
Router# debug_bsm_command:DEBUG_BSM_SET_ALL

 Function set_proc_event() is called
Session-Set :test-set
Old State   :BSM_SET_OOS
New State   :BSM_SET_OOS
   Active-Grp  :NONE
   Session-Grp :g-11
   Old State   :Group-None
   New State   :Group-None
   Event rcvd  :EVT_GRP_INS

BSM:Event BSM_SET_UP is sent to user
Session-Set :test-set
Old State   :BSM_SET_OOS
New State   :BSM_SET_ACTIVE_IS
   Active-Grp  :g-11
   Session-Grp :g-11
   Old State   :Group-None
   New State   :Group-Active
   Event rcvd  :BSM_ACTIVE_TYPE
```

The following is output for the **debug backhaul-session-manager set all name** *test-set* command:

```
Router# debug backhaul-session-manager set name set1
Router# debug_bsm_command:DEBUG_BSM_SET_NAME

Router# Function set_proc_event() is called
Session-Set :test-set
Old State   :BSM_SET_OOS
New State   :BSM_SET_OOS
   Active-Grp  :NONE
   Session-Grp :g-11
   Old State   :Group-None
   New State   :Group-None
   Event rcvd  :EVT_GRP_INS

Router#BSM:Event BSM_SET_UP is sent to user
Session-Set :test-set
Old State   :BSM_SET_OOS
New State   :BSM_SET_ACTIVE_IS
   Active-Grp  :g-11
   Session-Grp :g-11
   Old State   :Group-None
   New State   :Group-Active
   Event rcvd  :BSM_ACTIVE_TYPE
```

Related Commands

Command	Description
debug backhaul-session-manager session	Debugs all available sessions or a specified session.

debug backhaul-session-manager session

To debug all the available sessions or a specified session, use the **debug backhaul-session-manager session** command. To turn off debugging, use the **no** form of this command.

debug backhaul-session-manager session { state | xport } { all | *session-id* **}**

no debug backhaul-session-manager session { state | xport } { all | *session-id* **}**

Caution Use caution when enabling this debug in a live system. It produces significant amounts of output which could lead to a disruption of service.

Syntax Description

state	Shows information about state transitions. Possible states are: SESS_SET_IDLE: A session-set has been created. SESS_SET_OOS: A session(s) has been added to session-group(s). No ACTIVE notification has been received from VSC. SESS_SET_ACTIVE_IS: An ACTIVE notification has been received over one in-service session-group. STANDBY notification has not been received on any available session-group(s). SESS_SET_STNDBY_IS: A STANDBY notification is received, but there is no in-service active session-group available. SESS_SET_FULL_IS: A session-group in-service that has ACTIVE notification and at least one session-group in-service that has STANDBY notification. SESS_SET_SWITCH_OVER: An ACTIVE notification is received on session-group in-service, which had received STANDBY notification.
xport	Provides traces for all PDUs (packets), application PDUs, and also session-manager messages. Use caution while enabling this debug command in a live system.
all	All available sessions.
session-id	A specified session.

Defaults

Debugging for backhaul-session-manager session is not enabled.

Command History

Release	Modification
12.1(1)T	This command was introduced.

Examples

The following is output for the **debug backhaul-session-manager session all** command.

```
Router# debug backhaul-session-manager session all
Router# debug_bsm_command:DEBUG_BSM_SESSION_ALL

23:49:14:SESSION:XPORT:sig rcvd. session = 34, connid = 0x80BA12FC, sig = 5 (CONN-RESET)

23:49:14:SESSION:STATE:(34) old-state:OPEN_WAIT, new-state:CLOSE
23:49:14:SESSION:STATE:(34) state:OPEN_WAIT, use-state:OOS

23:49:14:SESSION:STATE:(34) old-state:OPEN_WAIT, new-state:OPEN_WAIT
23:49:14:SESSION:STATE:(34) state:OPEN_WAIT, use-state:OOS

23:49:19:SESSION:XPORT:sig rcvd. session = 34, connid = 0x80BA12FC, sig = 5 (CONN-RESET)

23:49:19:SESSION:STATE:(34) old-state:OPEN_WAIT, new-state:CLOSE
23:49:19:SESSION:STATE:(34) state:OPEN_WAIT, use-state:OOS

23:49:19:SESSION:STATE:(34) old-state:OPEN_WAIT, new-state:OPEN_WAIT
23:49:19:SESSION:STATE:(34) state:OPEN_WAIT, use-state:OOS

23:49:24:SESSION:XPORT:sig rcvd. session = 34, connid = 0x80BA12FC, sig = 5 (CONN-RESET)

23:49:24:SESSION:STATE:(34) old-state:OPEN_WAIT, new-state:CLOSE
23:49:24:SESSION:STATE:(34) state:OPEN_WAIT, use-state:OOS

23:49:24:SESSION:STATE:(34) old-state:OPEN_WAIT, new-state:OPEN_WAIT
23:49:24:SESSION:STATE:(34) state:OPEN_WAIT, use-state:OOS

23:49:29:SESSION:XPORT:sig rcvd. session = 34, connid = 0x80BA12FC, sig = 5 (CONN-RESET)

23:49:29:SESSION:STATE:(34) old-state:OPEN_WAIT, new-state:CLOSE
23:49:29:SESSION:STATE:(34) state:OPEN_WAIT, use-state:OOS

23:49:29:SESSION:STATE:(34) old-state:OPEN_WAIT, new-state:OPEN_WAIT
23:49:29:SESSION:STATE:(34) state:OPEN_WAIT, use-state:OOS

23:49:34:SESSION:XPORT:sig rcvd. session = 34, connid = 0x80BA12FC, sig = 5 (CONN-RESET)

23:49:34:SESSION:STATE:(34) old-state:OPEN_WAIT, new-state:CLOSE
23:49:34:SESSION:STATE:(34) state:OPEN_WAIT, use-state:OOS

23:49:34:SESSION:STATE:(34) old-state:OPEN_WAIT, new-state:OPEN_WAIT
23:49:34:SESSION:STATE:(34) state:OPEN_WAIT, use-state:OOS

23:49:34:SESSION:XPORT:sig rcvd. session = 33, connid = 0x80BA14EC, sig = 1 (CONN-FAILED)

23:49:34:SESSION:STATE:(33) old-state:OPEN, new-state:CLOSE_WAIT


Router# debug backhaul-session-manager session state all
Router# debug_bsm_command:DEBUG_BSM_SESSION_STATE_ALL

23:50:54:SESSION:STATE:(34) old-state:OPEN_WAIT, new-state:CLOSE
23:50:54:SESSION:STATE:(34) state:OPEN_WAIT, use-state:OOS

23:50:54:SESSION:STATE:(34) old-state:OPEN_WAIT, new-state:OPEN_WAIT
23:50:54:SESSION:STATE:(34) state:OPEN_WAIT, use-state:OOS


Router# debug backhaul-session-manager session xport all
Router# debug_bsm_command:DEBUG_BSM_SESSION_XPORT
23:51:39:SESSION:XPORT:sig rcvd. session = 34, connid = 0x80BA12FC, sig = 5 (CONN-RESET)
```

```
23:51:42:SESSION:XPORT:sig rcvd. session = 33, connid = 0x80BA14EC, sig = 5 (CONN-RESET)

23:51:44:SESSION:XPORT:sig rcvd. session = 34, connid = 0x80BA12FC, sig = 5 (CONN-RESET)
```

Related Commands

Command	Description
debug backhaul-session-manager set	Traces state changes and receives messages and events for all available session-sets or a specified session-set.

debug rudpv1

For debug information for RUDP, use the **debug rudpv1** command. To turn off debugging, use the **no** form of this command.

debug rudpv1 { application | performance | retransmit | segment | signal | state | timer | transfer }

no debug rudpv1 { application | performance | retransmit | segment | signal | state | timer | transfer }

Caution Use this command only during times of low traffic.

Syntax Description

application	Application debugging.
performance	Performance debugging.
retransmit	Retransmit/softreset debugging
segment	Segment debugging.
signal	Signals sent to applications.
state	State transitions.
timer	Timer debugging.
transfer	Transfer state information.

Defaults

Debugging for rudpv1 is not enabled.

Command History

Release	Modification
12.1(1)T	This command was introduced.

Examples

The following is output for the **debug rudpv1 application** command:

```
Router# debug rudpv1 application
Rudpv1:Turning application debugging on
*Jan  1 00:20:38.271:Send to appl (61F72B6C), seq 12
*Jan  1 00:20:48.271:Send to appl (61F72B6C), seq 13
*Jan  1 00:20:58.271:Send to appl (61F72B6C), seq 14
*Jan  1 00:21:08.271:Send to appl (61F72B6C), seq 15
*Jan  1 00:21:18.271:Send to appl (61F72B6C), seq 16
*Jan  1 00:21:28.271:Send to appl (61F72B6C), seq 17
*Jan  1 00:21:38.271:Send to appl (61F72B6C), seq 18
*Jan  1 00:21:48.275:Send to appl (61F72B6C), seq 19
*Jan  1 00:21:58.275:Send to appl (61F72B6C), seq 20
*Jan  1 00:22:08.275:Send to appl (61F72B6C), seq 21
*Jan  1 00:22:18.275:Send to appl (61F72B6C), seq 22
*Jan  1 00:22:28.275:Send to appl (61F72B6C), seq 23
*Jan  1 00:22:38.275:Send to appl (61F72B6C), seq 24
*Jan  1 00:22:48.279:Send to appl (61F72B6C), seq 25
*Jan  1 00:22:58.279:Send to appl (61F72B6C), seq 26
*Jan  1 00:23:08.279:Send to appl (61F72B6C), seq 27
*Jan  1 00:23:18.279:Send to appl (61F72B6C), seq 28
*Jan  1 00:23:28.279:Send to appl (61F72B6C), seq 29
```

The following is output for the **debug rudpv1 performance** command:

```
Router# debug rudpv1 performance
Rudpv1:Turning performance debugging on
corsair-f#
*Jan  1 00:44:27.299:
*Jan  1 00:44:27.299:Rudpv1 Sent:Pkts 11,  Data Bytes 236,  Data Pkts 9
*Jan  1 00:44:27.299:Rudpv1 Rcvd:Pkts 10,  Data Bytes 237,  Data Pkts 9
*Jan  1 00:44:27.299:Rudpv1 Discarded:0,  Retransmitted 0
*Jan  1 00:44:27.299:
*Jan  1 00:44:37.299:
*Jan  1 00:44:37.299:Rudpv1 Sent:Pkts 11,  Data Bytes 236,  Data Pkts 9
*Jan  1 00:44:37.299:Rudpv1 Rcvd:Pkts 10,  Data Bytes 237,  Data Pkts 9
*Jan  1 00:44:37.299:Rudpv1 Discarded:0,  Retransmitted 0
*Jan  1 00:44:37.299:
*Jan  1 00:44:47.299:
*Jan  1 00:44:47.299:Rudpv1 Sent:Pkts 11,  Data Bytes 236,  Data Pkts 9
*Jan  1 00:44:47.299:Rudpv1 Rcvd:Pkts 11,  Data Bytes 236,  Data Pkts 9
*Jan  1 00:44:47.299:Rudpv1 Discarded:0,  Retransmitted 0
*Jan  1 00:44:47.299:
```

The following is output for the **debug rudpv1 retransmit** command:

```
Router# debug rudpv1 retransmit
Rudpv1:Turning retransmit/softreset debugging on
*Jan  1 00:52:59.799:Retrans timer, set to ack 199
*Jan  1 00:52:59.903:Retrans timer, set to ack 200
*Jan  1 00:53:00.003:Retrans timer, set to ack 201
*Jan  1 00:53:00.103:Retrans timer, set to ack 202
*Jan  1 00:53:00.203:Retrans timer, set to ack 203
*Jan  1 00:53:00.419:Retrans timer, set to ack 97
*Jan  1 00:53:00.503:Retrans handler fired, 203
*Jan  1 00:53:00.503:Retrans:203:205:
*Jan  1 00:53:00.503:
*Jan  1 00:53:00.607:Retrans timer, set to ack 207
*Jan  1 00:53:00.907:Retrans timer, set to ack 210
*Jan  1 00:53:01.207:Retrans handler fired, 210
*Jan  1 00:53:01.207:Retrans:210:211:212:
*Jan  1 00:53:01.207:
*Jan  1 00:53:01.207:Retrans timer, set to ack 213
*Jan  1 00:53:01.311:Retrans timer, set to ack 214
*Jan  1 00:53:01.419:Retrans timer, set to ack 98
*Jan  1 00:53:01.611:Retrans timer, set to ack 215
*Jan  1 00:53:01.711:Retrans timer, set to ack 218
*Jan  1 00:53:01.811:Retrans timer, set to ack 219
*Jan  1 00:53:01.911:Retrans timer, set to ack 220
*Jan  1 00:53:02.011:Retrans timer, set to ack 221
*Jan  1 00:53:02.311:Retrans handler fired, 221
*Jan  1 00:53:02.311:Retrans:221:
*Jan  1 00:53:02.311:
*Jan  1 00:53:02.311:Retrans timer, set to ack 222
*Jan  1 00:53:02.415:Retrans timer, set to ack 225
```

The following is output for the **debug rudpv1 segment** command:

```
Router# debug rudpv1 segment
Rudpv1:Turning segment debugging on
*Jan  1 00:41:36.359:Rudpv1: (61F72DAC) Rcvd ACK 61..198 (32)
*Jan  1 00:41:36.359:Rudpv1: (61F72DAC) Send ACK 199..61 (32)
*Jan  1 00:41:36.459:Rudpv1: (61F72DAC) Rcvd ACK 62..199 (8)
*Jan  1 00:41:36.459:Rudpv1: (61F72DAC) Rcvd ACK 62..199 (32)
*Jan  1 00:41:36.459:Rudpv1: (61F72DAC) Send ACK 200..62 (32)
*Jan  1 00:41:36.559:Rudpv1: (61F72DAC) Rcvd ACK 63..200 (32)
*Jan  1 00:41:36.559:Rudpv1: (61F72DAC) Send ACK 201..63 (32)
*Jan  1 00:41:36.659:Rudpv1: (61F72DAC) Rcvd ACK 64..201 (32)
*Jan  1 00:41:36.659:Rudpv1: (61F72DAC) Send ACK 202..64 (32)
*Jan  1 00:41:36.759:Rudpv1: (61F72DAC) Rcvd ACK 65..202 (32)
*Jan  1 00:41:36.759:Rudpv1: (61F72DAC) Send ACK 203..65 (32)
*Jan  1 00:41:36.859:Rudpv1: (61F72DAC) Rcvd ACK 66..202 (32)
*Jan  1 00:41:36.859:Rudpv1: (61F72DAC) Send ACK 204..66 (32)
*Jan  1 00:41:36.959:Rudpv1: (61F72DAC) Rcvd ACK 67..202 (32)
*Jan  1 00:41:36.959:Rudpv1: (61F72DAC) Rcvd ACK EAK 68..202 (9)
*Jan  1 00:41:36.959:Rudpv1: (61F72DAC) Send ACK 203..67 (32)
*Jan  1 00:41:36.963:Rudpv1: (61F72DAC) Send ACK 205..67 (32)
*Jan  1 00:41:36.963:Rudpv1: (61F72DAC) Rcvd ACK 68..204 (8)
*Jan  1 00:41:37.051:Rudpv1: (61F72B6C) Send ACK NUL 118..96 (8)
*Jan  1 00:41:37.051:Rudpv1: (61F72B6C) Rcvd ACK 97..118 (8)
*Jan  1 00:41:37.059:Rudpv1: (61F72DAC) Rcvd ACK 68..205 (32)
*Jan  1 00:41:37.063:Rudpv1: (61F72DAC) Send ACK 206..68 (32)
*Jan  1 00:41:37.263:Rudpv1: (61F72DAC) Rcvd ACK 70..206 (32)
*Jan  1 00:41:37.363:Rudpv1: (61F72DAC) Send ACK EAK 207..68 (9)
*Jan  1 00:41:37.363:Rudpv1: (61F72DAC) Rcvd ACK 71..206 (32)
*Jan  1 00:41:37.363:Rudpv1: (61F72DAC) Rcvd ACK 69..206 (32)
*Jan  1 00:41:37.363:Rudpv1: (61F72DAC) Send ACK 207..71 (8)
*Jan  1 00:41:37.363:Rudpv1: (61F72DAC) Send ACK 207..71 (32)
*Jan  1 00:41:37.363:Rudpv1: (61F72DAC) Send ACK 208..71 (32)
*Jan  1 00:41:37.363:Rudpv1: (61F72DAC) Send ACK 209..71 (32)
*Jan  1 00:41:37.367:Rudpv1: (61F72DAC) Rcvd ACK 72..209 (8)
*Jan  1 00:41:37.463:Rudpv1: (61F72DAC) Rcvd ACK 72..209 (32)
*Jan  1 00:41:37.463:Rudpv1: (61F72DAC) Send ACK 210..72 (32)
*Jan  1 00:41:37.563:Rudpv1: (61F72DAC) Rcvd ACK 73..210 (32)
*Jan  1 00:41:37.563:Rudpv1: (61F72DAC) Send ACK 211..73 (32)
```

The following is output for the **debug rudpv1 signal** command:

```
Router# debug rudpv1 signal
Rudpv1:Turning signal debugging on
*Jan  1 00:39:59.551:Rudpv1:Sent CONN_FAILED to connID 61F72DAC, sess 33
*Jan  1 00:39:59.551:
*Jan  1 00:39:59.551:Rudpv1:Sent CONN_TRANS_STATE to connID 61F72B6C, sess 34
*Jan  1 00:39:59.551:
*Jan  1 00:39:59.551:Rudpv1:Sent CONN_TRANS_STATE to connID 61F72DAC, sess 33
*Jan  1 00:39:59.551:
*Jan  1 00:39:59.551:Rudpv1:Sent CONN_OPEN to connID 61F72B6C, sess 34

*Jan  1 00:39:59.551:Rudpv1:Sent AUTO_RESET to connID 61F72DAC, sess 33
*Jan  1 00:39:59.551:
*Jan  1 00:40:00.739:%LINK-5-CHANGED:Interface FastEthernet0, changed state
to administratively down
*Jan  1 00:40:01.739:%LINEPROTO-5-UPDOWN:Line protocol on Interface
FastEthernet0, changed state to down
*Jan  1 00:40:04.551:Rudpv1:Sent CONN_RESET to connID 61F72DAC, sess 33
*Jan  1 00:40:04.551:
*Jan  1 00:40:05.051:Rudpv1:Clearing conn rec values, index 2, connid
61F72DAC
*Jan  1 00:40:10.051:Rudpv1:Sent CONN_RESET to connID 61F72DAC, sess 33
*Jan  1 00:40:10.051:
*Jan  1 00:40:10.551:Rudpv1:Clearing conn rec values, index 2, connid
61F72DAC
*Jan  1 00:40:15.551:Rudpv1:Sent CONN_RESET to connID 61F72DAC, sess 33
*Jan  1 00:40:15.551:
*Jan  1 00:40:16.051:Rudpv1:Clearing conn rec values, index 2, connid
61F72DAC

*Jan  1 00:40:21.051:Rudpv1:Sent CONN_RESET to connID 61F72DAC, sess 33
*Jan  1 00:40:21.051:
*Jan  1 00:40:21.551:Rudpv1:Clearing conn rec values, index 2, connid
61F72DAC
*Jan  1 00:40:25.587:%LINK-3-UPDOWN:Interface FastEthernet0, changed state
to up
*Jan  1 00:40:26.551:Rudpv1:Sent CONN_RESET to connID 61F72DAC, sess 33
*Jan  1 00:40:26.551:
*Jan  1 00:40:26.587:%LINEPROTO-5-UPDOWN:Line protocol on Interface
FastEthernet0, changed state to up
*Jan  1 00:40:27.051:Rudpv1:Clearing conn rec values, index 2, connid
61F72DAC
*Jan  1 00:40:28.051:Rudpv1:Sent CONN_OPEN to connID 61F72DAC, sess 33
```

The following is output for the **debug rudpv1 state** command:

```
Router# debug rudpv1 state
Rudpv1:Turning state debugging on

*Jan  1 00:38:37.323:Rudpv1: (61F72DAC) State Change:OPEN -> CONN_FAILURE
*Jan  1 00:38:37.323:Rudpv1: (61F72B6C) State Change:OPEN -> TRANS_STATE
*Jan  1 00:38:37.323:Rudpv1: (61F72DAC) State Change:CONN_FAILURE ->
TRANS_STATE
*Jan  1 00:38:37.323:Rudpv1: (61F72B6C) State Change:TRANS_STATE -> OPEN
*Jan  1 00:38:37.323:Rudpv1: (61F72DAC) State Change:TRANS_STATE -> SYN_SENT
*Jan  1 00:38:37.455:%LINK-5-CHANGED:Interface FastEthernet0, changed state
to administratively down
*Jan  1 00:38:38.451:%LINEPROTO-5-UPDOWN:Line protocol on Interface
FastEthernet0, changed state to down
*Jan  1 00:38:42.323:Rudpv1: (61F72DAC) State Change:SYN_SENT -> CLOSED
*Jan  1 00:38:42.823:Rudpv1: (61F72DAC) State Change:INACTIVE -> SYN_SENT
*Jan  1 00:38:47.823:Rudpv1: (61F72DAC) State Change:SYN_SENT -> CLOSED
*Jan  1 00:38:48.323:Rudpv1: (61F72DAC) State Change:INACTIVE -> SYN_SENT
*Jan  1 00:38:53.323:Rudpv1: (61F72DAC) State Change:SYN_SENT -> CLOSED
*Jan  1 00:38:53.823:Rudpv1: (61F72DAC) State Change:INACTIVE -> SYN_SENT
*Jan  1 00:38:56.411:%LINK-3-UPDOWN:Interface FastEthernet0, changed state
to up
*Jan  1 00:38:57.411:%LINEPROTO-5-UPDOWN:Line protocol on Interface
FastEthernet0, changed state to up
*Jan  1 00:38:57.823:Rudpv1: (61F72DAC) State Change:SYN_SENT -> OPEN
```

The following is output for the **debug rudpv1 timer** command:

```
Router# debug rudpv1 timer
Rudpv1:Turning timer debugging on
*Jan  1 00:53:40.647:Starting Retrans timer for connP = 61F72B6C, delay = 300
*Jan  1 00:53:40.647:Stopping SentList timer for connP = 61F72B6C
*Jan  1 00:53:40.747:Starting NullSeg timer for connP = 61F72B6C, delay = 1000
*Jan  1 00:53:40.747:Stopping Retrans timer for connP = 61F72B6C
*Jan  1 00:53:40.747:Starting Retrans timer for connP = 61F72B6C, delay = 300
*Jan  1 00:53:40.747:Stopping SentList timer for connP = 61F72B6C
*Jan  1 00:53:40.847:Starting NullSeg timer for connP = 61F72B6C, delay = 1000
*Jan  1 00:53:40.847:Stopping Retrans timer for connP = 61F72B6C
*Jan  1 00:53:40.847:Starting Retrans timer for connP = 61F72B6C, delay = 300
*Jan  1 00:53:40.847:Stopping SentList timer for connP = 61F72B6C
*Jan  1 00:53:40.947:Starting NullSeg timer for connP = 61F72B6C, delay = 1000
*Jan  1 00:53:40.947:Stopping Retrans timer for connP = 61F72B6C
*Jan  1 00:53:40.947:Starting Retrans timer for connP = 61F72B6C, delay = 300
*Jan  1 00:53:40.947:Stopping SentList timer for connP = 61F72B6C
*Jan  1 00:53:41.047:Starting NullSeg timer for connP = 61F72B6C, delay = 1000
*Jan  1 00:53:41.147:Starting NullSeg timer for connP = 61F72B6C, delay = 1000
*Jan  1 00:53:41.151:Starting NullSeg timer for connP = 61F72B6C, delay = 1000
*Jan  1 00:53:41.151:Starting NullSeg timer for connP = 61F72B6C, delay = 1000
*Jan  1 00:53:41.151:Stopping Retrans timer for connP = 61F72B6C
*Jan  1 00:53:41.151:Starting SentList timer for connP = 61F72B6C, delay = 300
*Jan  1 00:53:41.419:Timer Keepalive (NullSeg) triggered for conn = 61F72DAC
*Jan  1 00:53:41.419:Starting Retrans timer for connP = 61F72DAC, delay = 300
*Jan  1 00:53:41.419:Stopping SentList timer for connP = 61F72DAC
*Jan  1 00:53:41.419:Starting NullSeg timer for connP = 61F72DAC, delay = 1000
*Jan  1 00:53:41.419:Stopping Retrans timer for connP = 61F72DAC
*Jan  1 00:53:41.451:Timer SentList triggered for conn = 61F72B6C
*Jan  1 00:53:41.451:Starting SentList timer for connP = 61F72B6C, delay = 300
*Jan  1 00:53:41.451:Starting NullSeg timer for connP = 61F72B6C, delay = 1000
*Jan  1 00:53:41.451:Stopping SentList timer for connP = 61F72B6C
*Jan  1 00:53:41.551:Starting NullSeg timer for connP = 61F72B6C, delay = 1000
*Jan  1 00:53:41.551:Starting NullSeg timer for connP = 61F72B6C, delay = 1000
*Jan  1 00:53:41.551:Starting NullSeg timer for connP = 61F72B6C, delay = 1000
*Jan  1 00:53:41.551:Starting NullSeg timer for connP = 61F72B6C, delay = 1000
```

The following is output for the **debug rudpv1 transfer** command:

```
Router# debug rudpv1 transfer
Rudpv1:Turning transfer debugging on
*Jan  1 00:37:30.567:Rudpv1:Send TCS, connId 61F72B6C, old connId 61F72DAC
*Jan  1 00:37:30.567:Rudpv1:Initiate transfer state, old conn 61F72DAC to
new conn 61F72B6C
*Jan  1 00:37:30.567:Rudpv1:Old conn send window 51 .. 52
*Jan  1 00:37:30.567:Rudpv1:New conn send window 255 .. 2
*Jan  1 00:37:30.567:Rudpv1:Rcvd TCS 142, next seq 142
*Jan  1 00:37:30.567:Rudpv1:Rcv'ing trans state, old conn 61F72DAC to new
conn 61F72B6C
*Jan  1 00:37:30.567:Rudpv1:Seq adjust factor 148
*Jan  1 00:37:30.567:Rudpv1:New rcvCur 142
*Jan  1 00:37:30.567:Rudpv1:Send transfer state, old conn 61F72DAC to new
conn 61F72B6C
*Jan  1 00:37:30.567:Rudpv1:Send TCS, connId 61F72B6C, old connId 61F72DAC,
seq adjust 208, indication 0
*Jan  1 00:37:30.567:Rudpv1:Transfer seg 51 to seg 3 on new conn
*Jan  1 00:37:30.567:Rudpv1:Finishing transfer state, old conn 61F72DAC to
new conn 61F72B6C
*Jan  1 00:37:30.567:Rudpv1:Send window 2 .. 4
```

Related Commands

Command	Description
clear rudpv1 statistics	Clears RUDP statistics and failure counters.
show rudpv1	Displays RUDP failures, parameters, and statistics.

Glossary

Backhaul—A scheme where telephony signaling is reliably transported from a gateway to a Media Gateway Controller across a packet switched network.

Fault Tolerance—The level of ability within a system to operate properly even if errors occur.

Layer 1—This describes the Physical Layer of the OSI Reference Model defined in ITU X.200. It is responsible for the electric signal being sent and received. This can be viewed as a bit stream coming in, and going out, of the system. Scope must be considered when using this term. For example, Layer 1 on a T1 is 1.544 Mbps but Layer 1 on a DS-0 timeslot in the T1 is 64 kbps.

Layer 2—This describes the Datalink Layer of the OSI Reference Model defined in ITU X.200. It is responsible for point-to-point delivery of a PDU. Layer 2 protocols have two basic classes: reliable (meaning delivery is guaranteed or an error is reported) and unreliable (meaning delivery may not occur with no indication to the upper layers).

Layer 3—This describes the Network Layer of the OSI Reference Model defined in ITU X.200. It is responsible for the network routing and delivery of a message. Examples of Layer 3 protocols include X.25 Packet Layer Protocol and the Internet Protocol. Q.931 is not considered a Layer 3 protocol because it is not concerned with routing and delivery of a message but rather the message body itself.

MG—Media Gateway. A Media Gateway terminates facilities (trunks), packetizes the PCM stream into IP/ATM and/or forwards packets into the IP/ATM network. It performs these functions in reverse order for media streams flowing from the packet network to the PSTN.

MGC—Media Gateway Controller. A Media Gateway Controller provides call control capability to handle signaling traffic from a variety of sources. It also manages connections and resources of its Media Gateways. Can also be called a Call Agent.

MGC Switchover—The re-routing of signaling traffic by the signaling gateway as required (and requested by the MGCs) between related MGCs in the event of failure or unavailability of the currently used MGC. The traffic is re-routed from the primary MGC to the back-up MGC.

MGCP—Media Gateway Control Protocol.

NFAS—Non-Facility Associated Signaling - This is a classification of signaling protocols that provide the signaling channel in a separate physical line from the bearer channels.

PDU—Protocol Data Unit. OSI term for packet.

Q.931—Q Signaling. An inter-PBX signaling protocol for networking PBX supplementary services in a multi- or uni-vendor environment.

RUDP—Cisco Reliable UDP.

Session—A session is an RUDP connection between two endpoints. An endpoint is defined by the IPaddress and the UDP port.

Session-Group—A session-group is a logically ordered list of sessions based on priority of the sessions. All of the sessions in the session-group should be configured to connect the same physical machines.

Session-Manager—Manages all the sessions in a specific client.

Session-Set—A collection of session-groups.

SG—Signaling Gateway. A Signaling Gateway transmits and receives PSTN signaling at the edge of IP/ATM network. It backhauls the signaling to a Media Gateway Controller. The Signaling Gateway function may be co-resident with the Media Gateway function to process signaling associated with line or trunk terminations controlled by the Media Gateway.

SS7—Signaling System 7. SS7 defines the procedures for the set-up, ongoing management, and subsequent clearing of calls between telephone users. It performs these functions by exchanging telephone control messages between SS7 components that support the end-user's connection.

VoIP—Voice over IP. The ability to carry normal telephone-style voice over an IP-based internet with POTS-like functionality, reliability, and voice quality.

VSC—Virtual Switch Controller. The Cisco VSC3000 is an intelligent call agent with universal protocol support. Functioning as a "soft switch," the Cisco VSC3000 controls the packet telephony network by directing calls across broadband, multi-service packet infrastructures. As a primary component within the Cisco Open Packet Telephony architecture, it utilizes open and widely recognized industry-standard protocols and interfaces.