debug serial interface

Use the **debug serial interface** EXEC command to display information on a serial connection failure. The **no** form of this command disables debugging output.

debug serial interface
no debug serial interface

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Usage Guidelines

If the **show interface serial** command shows that the line and protocol are down, you can use the **debug serial interface** command to isolate a timing problem as the cause of a connection failure. If the keepalive values in the mineseq, yourseen, and myseen fields are not incrementing in each subsequent line of output, there is a timing or line problem at one of end of the connection.

Note While the **debug serial interface** command typically does not generate a lot of output, nevertheless use it cautiously during production hours. When SMDS is enabled, for example, it can generate considerable output.

The output of the **debug serial interface** command can vary, depending on the type of WAN configured for an interface: Frame Relay, HDLC, HSSI, SMDS, or X.25. The output also can vary depending on the type of encapsulation configured for that interface. The hardware platform also can impact **debug serial interface** output.

The following sections show example **debug serial interface** displays for various configurations and describe the possible output the command can generate for these configurations.

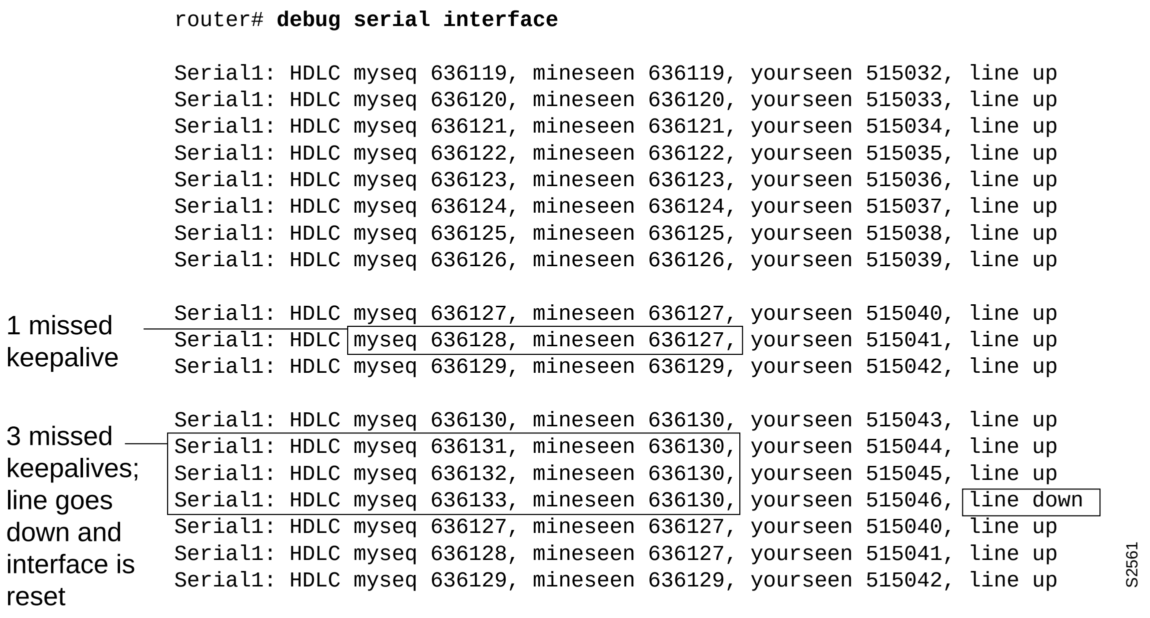
Debug Serial Interface for Frame Relay Encapsulation

The following message is displayed if the encapsulation for the interface is Frame Relay (or HDLC) and the router attempts to send a packet containing an unknown packet type:

```
Illegal serial link type code xxx
```

Debug Serial Interface for HDLC

Figure 2-99 shows sample **debug serial interface** output for an HDLC connection when keepalives are enabled.



```
router# debug serial interface

Serial1: HDLC myseq 636119, mineseen 636119, yourseen 515032, line up
Serial1: HDLC myseq 636120, mineseen 636120, yourseen 515033, line up
Serial1: HDLC myseq 636121, mineseen 636121, yourseen 515034, line up
Serial1: HDLC myseq 636122, mineseen 636122, yourseen 515035, line up
Serial1: HDLC myseq 636123, mineseen 636123, yourseen 515036, line up
Serial1: HDLC myseq 636124, mineseen 636124, yourseen 515037, line up
Serial1: HDLC myseq 636125, mineseen 636125, yourseen 515038, line up
Serial1: HDLC myseq 636126, mineseen 636126, yourseen 515039, line up

Serial1: HDLC myseq 636127, mineseen 636127, yourseen 515040, line up
Serial1: HDLC myseq 636128, mineseen 636127, yourseen 515041, line up
Serial1: HDLC myseq 636129, mineseen 636129, yourseen 515042, line up

Serial1: HDLC myseq 636130, mineseen 636130, yourseen 515043, line up
Serial1: HDLC myseq 636131, mineseen 636130, yourseen 515044, line up
Serial1: HDLC myseq 636132, mineseen 636130, yourseen 515045, line up
Serial1: HDLC myseq 636133, mineseen 636130, yourseen 515046, line down
Serial1: HDLC myseq 636127, mineseen 636127, yourseen 515040, line up
Serial1: HDLC myseq 636128, mineseen 636127, yourseen 515041, line up
Serial1: HDLC myseq 636129, mineseen 636129, yourseen 515042, line up
```

Figure 2-99 Sample Debug Serial Interface Output for HDLC

In Figure 2-99, the **debug serial interface** display shows that the remote router is not receiving all of the keepalives the router is sending. When the difference in the values in the myseq and mineseen fields exceeds three, the line goes down and the interface is reset.

Table 2-60 describes significant fields shown in Figure 2-99.

Table 2-60 Debug Serial Interface Field Descriptions for HDLC

Field	Description
Serial1	Interface through which the serial connection is taking place.
HDLC	The serial connection is an HDLC connection.
myseq 636119	The myseq counter increases by one each time the router sends a keepalive packet to the remote router.
mineseen 636119	The value of the mineseen counter reflects the last myseq sequence number the remote router has acknowledged receiving from the router. The remote router stores this value in its yourseen counter and sends that value in a keepalive packet to the router.
yourseen 515032	The yourseen counter reflects the value of the myseq sequence number the router has received in a keepalive packet from the remote router.
line up	The connection between the routers is maintained. Value changes to "line down" if the values of the myseq and myseen fields in a keepalive packet differ by more than three. Value returns to "line up" when the interface is reset. If the line is in loopback mode, ("looped") appears after this field.

Table 2-61 describes additional error messages that the **debug serial interface** command can generate for HDLC.

Table 2-61 Debug Serial Interface Error Messages for HDLC

Field	Description
Illegal serial link type code *xxx*, PC = 0x*nnnnnn*	This message is displayed if the router attempts to send a packet containing an unknown packet type.
Illegal HDLC serial type code *xxx*, PC = 0x*nnnnn*	This message is displayed if an unknown packet type is received.
Serial 0: attempting to restart	This message is displayed periodically if the interface is down. The hardware is then reset to hopefully correct the problem.
Serial 0: Received bridge packet sent to *nnnnnnnnn*	This message is displayed if a bridge packet is received over a serial interface configured for HDLC, and bridging is not configured on that interface.

Debug Serial Interface for HSSI

On an HSSI interface, the **debug serial interface** command can generate the following additional error message:

```
HSSI0: Reset from 0xnnnnnnn
```

This message indicates that the HSSI hardware has been reset. The 0x*nnnnnnn* variable is the address of the routine requesting that the hardware be reset; this value is useful only to development engineers.

Debug Serial Interface for ISDN Basic Rate

Table 2-62 describes error messages that the **debug serial interface** command can generate for ISDN Basic Rate.

Table 2-62 Debug Serial Interface Message Descriptions for ISDN Basic Rate

Message	Description
BRI: D-chan collision	A collision on the ISDN D-channel has occurred; the software will retry transmission.
Received SID Loss of Frame Alignment int.	The ISDN hardware has lost frame alignment. This usually indicates a problem with the ISDN network.
Unexpected IMP int: ipr = 0x*nn*	The ISDN hardware received an unexpected interrupt. The 0x*nn* variable indicates the value returned by the interrupt register.
BRI(d): RX Frame Length Violation. Length = *n* BRI(d): RX Nonoctet Aligned Frame BRI(d): RX Abort Sequence BRI(d): RX CRC Error BRI(d): RX Overrun Error BRI(d): RX Carrier Detect Lost	Any of these messages can be displayed when a receive error occurs on one of the ISDN channels. The (d) indicates which channel it is on. These messages can indicate a problem with the ISDN network connection.
BRI0: Reset from 0x*nnnnnnn*	The BRI hardware has been reset. The 0x*nnnnnnn* variable is the address of the routine that requested that the hardware be reset; it is useful only to development engineers.
BRI(d): Bad state in SCMs scm1 = *x* scm2 = *x* scm3 = *x* BRI(d): Bad state in SCONs scon1 = *x* scon2 = *x* scon3 = *x* BRI(d): Bad state ub SCR; SCR = *x*	Any of these messages can be displayed if the ISDN hardware is not in the proper state. The hardware is then reset. If the message is displayed constantly, it usually indicates a hardware problem.
BRI(d): Illegal packet encapsulation = *n*	This message is displayed if a packet is received, but the encapsulation used for the packet is not recognized. It can indicate that the interface is misconfigured.

Debug Serial Interface for an MK5025 Device

Table 2-63 describes the additional error messages that the **debug serial interface** command can generate for an MK5025 device.

Table 2-63 Debug Serial Interface Message Descriptions for an MK5025 Device

Message	Description
MK5(d): Reset from 0x*nnnnnnnn*	This message indicates that the hardware has been reset. The 0x*nnnnnnn* variable is the address of the routine that requested that the hardware be reset; it is useful only to development engineers.
MK5(d): Illegal packet encapsulation = *n*	This message is displayed if a packet is received, but the encapsulation used for the packet is not recognized. Possibly an indication that the interface is misconfigured.
MK5(d): No packet available for packet realignment	This message is displayed in cases where the serial driver attempted to get a buffer (memory) and was unable to do so.
MK5(d): Bad state in CSR0 = (*x*)	This message is displayed if the hardware is not in the proper state. The hardware is then reset. If this message is displayed constantly, it usually indicates a hardware problem.
MK5(d): New serial state = *n*	This message is displayed to indicate that the hardware has interrupted the software. It displays the state that the hardware is reporting.
MK5(d): DCD is down. MK5(d): DCD is up.	If the interrupt indicates that the state of carrier has changed, one of these messages is displayed to indicate the current state of DCD.

Debug Serial Interface for SMDS Encapsulation

When encapsulation is set to SMDS, **debug serial interface** displays SMDS packets that are sent and received, as well as any error messages resulting from SMDS packet transmission.

The error messages that the **debug serial interface** command can generate for SMDS follow.

The following message indicates that a new protocol requested SMDS to encapsulate the data for transmission. SMDS is not yet able to encapsulate the protocol.

```
SMDS: Error on Serial 0, encapsulation bad protocol = x
```

The following message indicates that SMDS was asked to encapsulate a packet, but no corresponding destination E.164 SMDS address was found in any of the static SMDS tables or in the ARP tables:

```
SMDS send: Error in encapsulation, no hardware address, type = x
```

The following message indicates that a protocol such as CLNS or IP has been enabled on an SMDS interface, but the corresponding multicast addresses have not been configured. The *n* variable displays the link type for which encapsulation was requested. This value is only significant to Cisco as an internal protocol type value.

```
SMDS: Send, Error in encapsulation, type=n
```

The following messages can occur when a corrupted packet is received on an SMDS interface. The router expected *x*, but received *y*.

```
SMDS: Invalid packet, Reserved NOT ZERO, x y
SMDS: Invalid packet, TAG mismatch x y
SMDS: Invalid packet, Bad TRAILER length x y
```

The following messages can indicate an invalid length for an SMDS packet:

```
SMDS: Invalid packet, Bad BA length x
SMDS: Invalid packet, Bad header extension length x
SMDS: Invalid packet, Bad header extension type x
SMDS: Invalid packet, Bad header extension value x
```

The following messages are displayed when the **debug serial interface** command is enabled:

```
Interface Serial 0 Sending SMDS L3 packet:
SMDS: dgsize:x type:0xn src:y dst:z
```

If the **debug serial interface** command is enabled, the following message can be displayed when a packet is received on an SMDS interface, but the destination SMDS address does not match any on that interface:

```
SMDS: Packet n, not addressed to us
```

debug serial packet

Use the **debug serial packet** EXEC command to display more detailed serial interface debugging information than you can obtain using **debug serial interface** command. The **no** form of this command disables debugging output.

debug serial packet
no debug serial packet

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Usage Guidelines

The **debug serial packet** command generates output that is dependent on the type of serial interface and the encapsulation that is running on that interface. The hardware platform also can impact **debug serial packet** output.

Sample Display

The **debug serial packet** command displays output for only SMDS encapsulations.

Debug Serial Packet for SMDS Encapsulation

Figure 2-100 shows sample output when SMDS is enabled on the interface.

```
router# debug serial packet

Interface Serial2 Sending SMDS L3 packet:
SMDS Header  : Id: 00 RSVD: 00 BEtag: EC Basize: 0044
Dest:E18009999999FFFF Src:C12015804721FFFF Xh:04030000030001000000000000000000
SMDS LLC   : AA AA 03 00 00 00 80 38
SMDS Data  : E1 19 01 00 00 80 00 00 0C 00 38 1F 00 0A 00 80 00 00 0C 01 2B 71
SMDS Data  : 06 01 01 0F 1E 24 00 EC 00 44 00 02 00 00 83 6C 7D 00 00 00 00 00
SMDS Trailer  : RSVD: 00 BEtag: EC Length: 0044
```

Figure 2-100 Sample Debug Serial Packet Output for SMDS

As Figure 2-100 shows, when encapsulation is set to SMDS, **debug serial packet** displays the entire SMDS header (in hex), as well as some payload data on transmit or receive. This information is useful only when you have an understanding of the SMDS protocol. The first line of the output indicates either Sending or Receiving.

debug source-bridge

Use the **debug source-bridge** EXEC command to display information about packets and frames transferred across a source-route bridge. The **no** form of this command disables debugging output.

debug source-bridge
no debug source-bridge

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Sample Display

Figure 2-101 shows sample **debug source-bridge** output for peer bridges using TCP as a transport mechanism. The RSRB network configuration has ring 2 and ring 1 bridged together through remote peer bridges. The remote peer bridges are connected via a serial line and use TCP as the transport mechanism.

```
router# debug source-bridge


RSRB: remote explorer to 5/131.108.250.1/1996 srn 2 [C840.0021.0050.0000]
RSRB: Version/Ring XReq sent to peer 5/131.108.250.1/1996
RSRB: Received version reply from 5/131.108.250.1/1996 (version 2)
RSRB: DATA: 5/131.108.250.1/1996 Ring Xchg Rep, trn 2, vrn 5, off 18, len 10
RSRB: added bridge 1, ring 1 for 5/131.108.240.1/1996
RSRB: DATA: 5/131.108.250.1/1996 Explorer trn 2, vrn 5, off 18, len 69
RSRB: DATA: 5/131.108.250.1/1996 Forward trn 2, vrn 5, off 0, len 92
RSRB: DATA: forward Forward srn 2, br 1, vrn 5 to peer 5/131.108.250.1/1996
```

Figure 2-101 Sample Debug Source-Bridge Output in TCP Environment

Explanations for individual lines of ouptut in Figure 2-101 follow.

The following line indicates that a remote explorer frame has been sent to IP address 131.108.250.1 and like all RSRB TCP connections, has been assigned port 1996. The bridge belongs to ring group 5. The explorer frame originated from ring number 2. The routing information field (RIF) descriptor has been generated by the local station and indicates that the frame was sent out via bridge 1 onto virtual ring 5.

```
RSRB: remote explorer to 5/131.108.250.1/1996 srn 2 [C840.0021.0050.0000]
```

The following line indicates that a request for remote peer information has been sent to IP address 131.108.250.1, TCP port 1996. The bridge belongs to ring group 5.

```
RSRB: Version/Ring XReq sent to peer 5/131.108.250.1/1996
```

The following line is the response to the version request previously sent. The response is sent from IP address 131.108.250.1, TCP port 1996. The bridge belongs to ring group 5.

```
RSRB: Received version reply from 5/131.108.250.1/1996 (version 2)
```

The following line is the response to the ring request previously sent. The response is sent from IP address 131.108.250.1, TCP port 1996. The target ring number is 2, virtual ring number is 5, the offset is 18, and the length of the frame is 10 bytes.

```
RSRB: DATA: 5/131.108.250.1/1996 Ring Xchg Rep, trn 2, vrn 5, off 0, len 10
```

The following line indicates that bridge 1 and ring 1 were added to the source-bridge table for IP address 131.108.250.1, TCP port 1996.

```
RSRB: added bridge 1, ring 1 for 5/131.108.250.1/1996
```

The following line indicates that a packet containing an explorer frame came across virtual ring 5 from IP address 131.108.250.1, TCP port 1996. The packet is 69 bytes in length. This packet is received after the Ring Exchange information was received and updated on both sides.

```
RSRB: DATA: 5/131.108.250.1/1996 Explorer trn 2, vrn 5, off 18, len 69
```

The following line indicates that a packet containing data came across virtual ring 5 from IP address 131.108.250.1 over TCP port 1996. The packet is being placed on the local target ring 2.The packet is 92 bytes in length.

```
RSRB: DATA: 5/131.108.250.1/1996 Forward trn 2, vrn 5, off 0, len 92
```

The following line indicates that a packet containing data is being forwarded to the peer that has IP 131.108.250.1 address belonging to local ring 2 and bridge 1. The packet is forwarded via virtual ring 5. This packet is sent after the Ring Exchange information was received and updated on both sides.

```
RSRB: DATA: forward Forward srn 2, br 1, vrn 5 to peer 5/131.108.250.1/1996
```

Figure 2-102 shows sample **debug source-bridge** output for peer bridges using direct encapsulation as a transport mechanism. The RSRB network configuration has ring 1 and ring 2 bridged together through peer bridges. The peer bridges are connected via a serial line and use TCP as the transport mechanism.

```
router# debug source-bridge

RSRB: remote explorer to 5/Serial1 srn 1 [C840.0011.0050.0000]
RSRB: Version/Ring XReq sent to peer 5/Serial1
RSRB: Received version reply from 5/Serial1 (version 2)
RSRB: IFin: 5/Serial1 Ring Xchg, Rep trn 0, vrn 5, off 0, len 10
RSRB: added bridge 1, ring 1 for 5/Serial1
```

Figure 2-102 Sample Debug Source-Bridge Output in Direct Encapsulation Environment

Explanations for individual lines of output in Figure 2-102 follow.

The following line indicates that a remote explorer frame was sent to remote peer Serial1, which belongs to ring group 5. The explorer frame originated from ring number 1. The routing information field (RIF) descriptor 0011.0050 was generated by the local station and indicates that the frame was sent out via bridge 1 onto virtual ring 5.

```
RSRB: remote explorer to 5/Serial1 srn 1 [C840.0011.0050.0000]
```

The following line indicates that a request for remote peer information was sent to Serial1. The bridge belongs to ring group 5.

```
RSRB: Version/Ring XReq sent to peer 5/Serial1
```

The following line is the response to the version request previously sent. The response is sent from Serial 1. The bridge belongs to ring group 5 and the version is 2.

```
RSRB: Received version reply from 5/Serial1 (version 2)
```

The following line is the response to the ring request previously sent. The response is sent from Serial1. The target ring number is 2, virtual ring number is 5, the offset is 0, and the length of the frame is 39 bytes.

```
RSRB: IFin: 5/Serial1 Ring Xchg Rep, trn 2, vrn 5, off 0, len 39
```

The following line indicates that bridge 1 and ring 1 were added to the source-bridge table for Serial1.

```
RSRB: added bridge 1, ring 1 for 5/Serial1
```

debug source event

Use the **debug source event** EXEC command to display information on source-route bridging activity. The **no** form of this command disables debugging output.

debug source event
no debug source event

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Usage Guidelines

Output of the **debug source bridge** command is identical to the output of this command.

Note In order to use the **debug source event** command to display traffic source-routed through an interface, you first must disable fast switching of SRB frames with the **no source-bridge route-cache** interface configuration command.

Sample Display

Figure 2-103 shows sample **debug source event** output.

```
router# debug source event

RSRB0: forward (srn 5 bn 1 trn 10), src: 8110.2222.33c1 dst: 1000.5a59.04f9
[0800.3201.00A1.0050]
RSRB0: forward (srn 5 bn 1 trn 10), src: 8110.2222.33c1 dst: 1000.5a59.04f9
[0800.3201.00A1.0050]
RSRB0: forward (srn 5 bn 1 trn 10), src: 8110.2222.33c1 dst: 1000.5a59.04f9
[0800.3201.00A1.0050]
RSRB0: forward (srn 5 bn 1 trn 10), src: 8110.2222.33c1 dst: 1000.5a59.04f9
[0800.3201.00A1.0050]
RSRB0: forward (srn 5 bn 1 trn 10), src: 8110.2222.33c1 dst: 1000.5a59.04f9
[0800.3201.00A1.0050]
```

Figure 2-103 Sample Debug Source Event Output

Table 2-64 describes significant fields shown in Figure 2-103.

Table 2-64 Debug Source Event Field Descriptions

Field	Description
RSRB0:	Indication that this RIF cache entry is for the Token Ring 0 interface, which has been configured for remote source-route bridging. (SRB1, in contrast, would indicate that this RIF cache entry is for Token Ring 1, configured for source-route bridging.)
forward	Forward (normal data) packet, in contrast to a control packet containing proprietary Cisco bridging information.
srn 5	Ring number of the packet's source ring.
bn 1	Bridge number of the bridge this packet traverses.
trn 10	Ring number of the packet's target ring.
src: 8110.2222.33c1	Source address of the route in this RIF cache entry.
dst: 1000.5a59.04f9	Destination address of the route in this RIF cache entry.
[0800.3201.00A1.0050]	RIF string in this RIF cache entry.

Examples of other **debug source event** messages follow.

In the following example messages, SRB*n* or RSRB*n* denotes a message associated with interface Token Ring *n*. An *n* of 99 denotes the remote side of the network.

```
SRBn: no path, s: <src MAC addr>d: <dst MAC addr>rif: <rif>
```

In the preceding example, a bridgeable packet came in on interface Token Ring *n* but there was nowhere to send it. This is most likely a configuration error. For example, an interface has source bridging turned on, but it is not connected to another source bridging interface or a ring group.

In the following example, a bridgeable packet has been forwarded from Token Ring *n* to the target ring. The two interfaces are directly linked.

```
SRBn: direct forward (srn <ring>bn <bridge>trn <ring>)
```

In the following examples, a proxy explorer reply was not generated because there was no way to get to the address from this interface. The packet came from the node with the first <address>.

```
SRBn: br dropped proxy XID,  <address> for <address>, wrong vring (rem)
SRBn: br dropped proxy TEST, <address> for <address>, wrong vring (rem)
SRBn: br dropped proxy XID,  <address> for <address>, wrong vring (local)
SRBn: br dropped proxy TEST, <address> for <address>, wrong vring (local)
SRBn: br dropped proxy XID,  <address> for <address>, no path
SRBn: br dropped proxy TEST, <address> for <address>, no path
```

In the following example, an appropriate proxy explorer reply was generated on behalf of the second <address>. It is sent to the first <address>.

```
SRBn: br sent proxy XID,  <address> for <address>[<rif>]
SRBn: br sent proxy TEST, <address> for <address>[<rif>]
```

The following example indicates that the broadcast bits were not set, or that the routing information indicator on the packet was not set:

```
SRB<unit#>: illegal explorer, s: <srcMACaddr> d: <destMACaddr> rif:
<RIFstring>
```

The following example indicates that the direction bit in the RIF field was set, or that an odd packet length was encountered. Such packets are dropped.

```
SRB<unit #>: bad explorer control, D set or odd
```

The following example indicates that a spanning explorer was dropped because the spanning option was not configured on the interface:

```
SRB<unit #>: span dropped, input off, s: <src mac addr> d: <dest mac addr>
rif: <rif string>
```

The following example indicates that a spanning explorer was dropped because it had traversed the ring previously:

```
SRB<unit #>: span violation, s: <src mac addr> d: <dest mac addr> rif:
<rif string>
```

The following example indicates that an explorer was dropped because the maximum hop count limit was reached on that interface:

```
SRB<unit #>: max hops reached - <hop cnt>, s: <src mac addr> d: <dest mac addr>
rif: <rif string>
```

The following example indicates that the ring exchange request was sent to the indicated peer. This request tells the remote side which rings this node has and asks for a reply indicating which rings that side has.

```
RSRB: sent RingXreq to <ring group>/<ip addr>
```

The following example indicates that a message was sent to the remote peer. The <label> variable can be AHDR (active header), PHDR (passive header), HDR (normal header), or DATA (data exchange), and <op> can be Forward, Explorer, Ring Xchg, Req, Ring Xchg, Rep, Unknown Ring Group, Unknown Peer, or Unknown Target Ring.

```
RSRB: <label>: sent <op> to <ring group>/<ip addr>
```

The following example indicates that the remote bridge and ring pair were removed from or added to the local ring group table because the remote peer changed:

```
RSRB: removing bn <bridge> rn <ring> from <ring group>/<ip addr>
RSRB: added bridge <bridge>, ring <ring> for <ring group>/<ip addr>
```

The following example shows miscellaneous remote peer connection establishment messages:

```
RSRB: peer <ring group>/<ip addr> closed [last state n]
RSRB: passive open <ip addr>(remote port) -> <local port>
RSRB: CONN: opening peer <ring group>/<ip addr>, attempt n
RSRB: CONN: Remote closed <ring group>/<ip addr> on open
RSRB: CONN: peer <ring group>/<ip addr> open failed, <reason>[code]
```

The following example shows that an explorer packet was propagated onto the local ring from the remote ring group:

```
RSRBn: sent local explorer, bridge <bridge> trn <ring>, [rif]
```

The following messages indicate that the remote source-route bridging code found the packet was in error:

```
RSRBn: ring group <ring group> not found
RSRBn: explorer rif [rif] not long enough
```

The following example indicates that a buffer could not be obtained for a ring exchange packet; this is an internal error.

```
RSRB: couldn’t get pak for ringXchg
```

The following example indicates that a ring exchange packet was received that had an incorrect length; this is an internal error.

```
RSRB: XCHG: req/reply badly formed, length <pak length>, peer <peer id>
```

The following example indicates that a ring entry was removed for the peer; the ring was possibly disconnected from the network, causing the remote router to send an update to all its peers.

```
RSRB: removing bridge <br #> ring <ring #> from <peer name> <ring type>
```

The following example indicates that a ring entry was added for the specified peer; the ring was possibly added to the network, causing the other router to send an update to all its peers.

```
RSRB: added bridge <br #>, ring <ring #> for <peer id>
```

The following example indicates that no memory was available to add a ring number to the ring group specified; this is an internal error.

```
RSRB: no memory for ring element <ring group #>
```

The following example indicates that memory was corrupted for a connection block; this is an internal error.

```
RSRB: CONN: corrupt connection block
```

The following example indicates that a connector process started, but that there was no packet to process; this is an internal error.

```
RSRB: CONN: warning, no initial packet, peer: <ip addr> <peer pointer>
```

The following example indicates that a packet was received with a version number different from the one present on the router:

```
RSRB: IF New version. local=<local version #>, remote=<remote version>,
<pak op code> <peer id>
```

The following example indicates that a packet with a bad op code was received for a direct encapsulation peer; this is an internal error.

```
RSRB: IFin: bad op <op code> (op code string) from <peer id>
```

The following example indicates that the virtual ring header will not fit on the packet to be sent to the peer; this is an internal error:

```
RSRB: vrif_sender, hdr won't fit
```

The following example indicates that the specified peer is being opened. The retry count specifies the number of times the opening operation is attempted.

```
RSRB: CONN: opening peer <peer id> <retry count>
```

The following example indicates that the router, configured for FST encapsulation, received a version reply to the version request packet it had sent previously:

```
RSRB: FST Rcvd version reply from <peer id> (version #)
```

The following example indicates that the router, configured for FST encapsulation, sent a version request packet to the specified peer:

```
RSRB: FST Version Request. op = <opcode>, <peer id>
```

The following example indicates that the router received a packet with a bad op code from the specified peer; this is an internal error.

```
RSRB: FSTin: bad op <opcode> (op code string) from <peer id>
```

The following example indicates that the TCP connection between the router and the specified peer is being aborted:

```
RSRB: aborting <ring group #>/<peer id> (vrtcpd_abort called)
```

The following example indicates that an attempt to establish a TCP connection to a remote peer timed out:

```
RSRB: CONN: attempt timed out
```

The following example indicates that a packet was dropped because the ring group number in the packet did not correlate with the ring groups configured on the router:

```
RSRB<unit #>: ring group <ring group #> not found
```

debug span

Use the **debug span** EXEC command to display information on changes in the spanning-tree topology when debugging a transparent bridge. The **no** form of this command disables debugging output.

debug span
no debug span

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Usage Guidelines

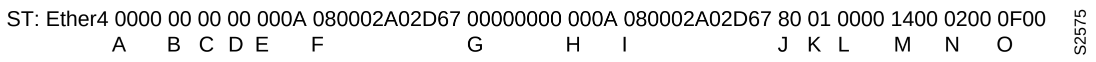
This command is useful for tracking and verifying that the spanning-tree protocol is operating correctly.

Sample Display—IEEE Spanning Tree

Sample **debug span** output for an IEEE BPDU packet follows:

```
ST: Ether4 0000000000000A080002A02D6700000000000A080002A02D678001000014000200 0F00
```

Figure 2-104 shows the preceding **debug span** output broken up by fields and labeled to aid documentation.



```
ST: Ether4 0000 00 00 00 000A 080002A02D67 00000000 000A 080002A02D67 80 01 0000 1400 0200 0F00
            A   B  C  D   E    F             G       H    I           J  K  L     M    N    O
```

Figure 2-104 Sample Debug Span Output for an IEEE BPDU Packet

Table 2-64 describes significant fields shown in Figure 2-104.

Table 2-65 Debug Span Field Descriptions for an IEEE BPDU Packet

Field	Description
ST:	Indication that this is a spanning tree packet.
Ether4	Interface receiving the packet.
(A) 0000	Indication that this is an IEEE BPDU packet.
(B) 00	Version.
(C) 00	Command mode: 00 indicates config BPDU. 80 indicates the Topology Change Notification (TCN) BPDU.
(D) 00	Topology change acknowledgment: 00 indicates no change. 80 indicates a change notification.
(E) 000A	Root priority.
(F) 080002A02D67	Root ID.
(G) 00000000	Root path cost (0 means the sender of this BPDU packet is the root bridge).
(H) 000A	Bridge priority.
(I) 080002A02D67	Bridge ID.
(J) 80	Port priority.
(K) 01	Port No. 1.
(L) 0000	Message age in 256ths of a second (0 seconds, in this case).
(M) 1400	Maximum age in 256ths of a second (20 seconds, in this case).
(N) 0200	Hello time in 256ths of a second (2 seconds, in this case).
(O) 0F00	Forward delay in 256ths of a second (15 seconds, in this case).

Sample Display—DEC Spanning Tree

Sample **debug span** output for a DEC BPDU packet follows:

```
ST: Ethernet4 E1190100000200000C01A2C90064008000000C0106CE0A01050F1E6A
```

Figure 2-105 shows the preceding **debug span** output broken up by fields and labeled to aid documentation.

```
E1  19  01  00  0002  00000C01A2C9  0064  0080  00000C0106CE  0A  01  05  0F  1E  6A
A   B   C   D   E     F             G     H     I             J   K   L   M   N   O
```
S2576

Figure 2-105 Sample Debug Span Output

Table 2-66 describes significant fields shown in Figure 2-105.

Table 2-66 Debug Span Field Descriptions for a DEC BPDU Packet

Field	Description
ST:	Indication that this is a spanning tree packet.
Ethernet4	Interface receiving the packet.
(A) E1	Indication that this is a DEC BPDU packet.
(B) 19	Indication that this is a DEC Hello packet. Possible values are as follows: 0x19—DEC Hello 0x02—Topology change notification (TCN)
(C) 01	DEC version.
(D) 00	Flag that is a bit field with the following mapping: 1—TCN 2—TCN acknowledgment 8—Use short timers
(E) 0002	Root priority.
(F) 00000C01A2C9	Root ID (MAC address).
(G) 0064	Root path cost (translated as 100 in decimal notation).
(H) 0080	Bridge priority.
(I) 00000C0106CE	Bridge ID.
(J) 0A	Port ID (in contrast to interface number).
(K) 01	Message age (in seconds).
(L) 05	Hello time (in seconds).
(M) 0F	Maximum age (in seconds).
(N) 1E	Forward delay (in seconds).
(O) 6A	Not applicable.

debug sse

Use the **debug sse** EXEC command to display information for the Silicon Switching Engine (SSE) processor. The **no** form of this command disables debugging output.

debug sse
no debug sse

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Usage Guidelines

By using the **debug sse** command, you can observe statistics and counters maintained by the SSE.

Sample Display

Figure 2-106 shows sample **debug sse** output.

```
router# debug sse
SSE: IP number of cache entries changed 273 274
SSE: IP number of cache entries changed 273 274
SSE: bridging enabled
SSE: interface Ethernet0/0 icb 0x30 addr 0x29 status 0x21A040 protos 0x11
SSE: interface Ethernet0/1 icb 0x33 addr 0x29 status 0x21A040 protos 0x11
SSE: interface Ethernet0/2 icb 0x36 addr 0x29 status 0x21A040 protos 0x10
SSE: interface Ethernet0/3 icb 0x39 addr 0x29 status 0x21A040 protos 0x11
SSE: interface Ethernet0/4 icb 0x3C addr 0x29 status 0x21A040 protos 0x10
SSE: interface Ethernet0/5 icb 0x3F addr 0x29 status 0x21A040 protos 0x11
SSE: interface Hssi1/0 icb 0x48 addr 0x122 status 0x421E080 protos 0x11
SSE: cache update took 316ms, elapsed 320ms
```

Figure 2-106 Sample Debug SSE Output

Explanations for representative lines of output in Figure 2-106 follow.

The following line indicates that the SSE cache is being updated due to a change in the IP fast switching cache:

```
SSE: IP number of cache entries changed 273 274
```

The following line indicates that bridging functions were enabled on the SSE:

```
SSE: bridging enabled
```

The following lines indicate that the SSE is now loaded with information about the interfaces:

```
SSE: interface Ethernet0/0 icb 0x30 addr 0x29 status 0x21A040 protos 0x11
SSE: interface Ethernet0/1 icb 0x33 addr 0x29 status 0x21A040 protos 0x11
SSE: interface Ethernet0/2 icb 0x36 addr 0x29 status 0x21A040 protos 0x10
SSE: interface Ethernet0/3 icb 0x39 addr 0x29 status 0x21A040 protos 0x11
SSE: interface Ethernet0/4 icb 0x3C addr 0x29 status 0x21A040 protos 0x10
SSE: interface Ethernet0/5 icb 0x3F addr 0x29 status 0x21A040 protos 0x11
SSE: interface Hssi1/0 icb 0x48 addr 0x122 status 0x421E080 protos 0x11
```

The following line indicates that the SSE took 316 ms of processor time to update the SSE cache. The value of 320 ms represents the total time elapsed while the cache updates were performed.

```
SSE: cache update took 316ms, elapsed 320ms
```

debug standby

Use the **debug standby** EXEC command to display hot standby protocol state changes. The **no** form of this command disables debugging output.

debug standby
no debug standby

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Usage Guidelines

The **debug standby** command displays hot standby protocol state changes and debugging information regarding transmission and receipt of hot standby protocol packets. Use this command to determine whether hot standby routers recognize one another and take the proper actions.

Sample Display

Figure 2-107 shows sample **debug standby** output.

```
router# debug standby

SB: Ethernet0 state Virgin -> Listen
SB: Starting up hot standby process
SB:Ethernet0 Hello in 198.92.72.21 Active pri 90 hel 3 hol 10 ip 198.92.72.29
SB:Ethernet0 Hello in 198.92.72.21 Active pri 90 hel 3 hol 10 ip 198.92.72.29
SB:Ethernet0 Hello in 198.92.72.21 Active pri 90 hel 3 hol 10 ip 198.92.72.29
SB:Ethernet0 Hello in 198.92.72.21 Active pri 90 hel 3 hol 10 ip 198.92.72.29
SB: Ethernet0 state Listen -> Speak
SB:Ethernet0 Hello out 198.92.72.20 Speak pri 100 hel 3 hol 10 ip 198.92.72.29
SB:Ethernet0 Hello in 198.92.72.21 Active pri 90 hel 3 hol 10 ip 198.92.72.29
SB:Ethernet0 Hello out 198.92.72.20 Speak pri 100 hel 3 hol 10 ip 198.92.72.29
SB:Ethernet0 Hello in 198.92.72.21 Active pri 90 hel 3 hol 10 ip 198.92.72.29
SB:Ethernet0 Hello out 198.92.72.20 Speak pri 100 hel 3 hol 10 ip 198.92.72.29
SB:Ethernet0 Hello in 198.92.72.21 Active pri 90 hel 3 hol 10 ip 198.92.72.29
SB: Ethernet0 state Speak -> Standby
SB:Ethernet0 Hello out 198.92.72.20 Standby pri 100 hel 3 hol 10 ip 198.92.72.29
SB:Ethernet0 Hello in 198.92.72.21 Active pri 90 hel 3 hol 10 ip 198.92.72.29
SB:Ethernet0 Hello out 198.92.72.20 Standby pri 100 hel 3 hol 10 ip 198.92.72.29
SB:Ethernet0 Hello in 198.92.72.21 Active pri 90 hel 3 hol 10 ip 198.92.72.29
SB:Ethernet0 Hello out 198.92.72.20 Standby pri 100 hel 3 hol 10 ip 198.92.72.29
SB:Ethernet0 Hello in 198.92.72.21 Active pri 90 hel 3 hol 10 ip 198.92.72.29
SB: Ethernet0 Coup out 198.92.72.20 Standby pri 100 hel 3 hol 10 ip 198.92.72.29
SB: Ethernet0 state Standby -> Active
SB:Ethernet0 Hello out 198.92.72.20 Active pri 100 hel 3 hol 10 ip 198.92.72.29
SB:Ethernet0 Hello in 198.92.72.21 Speak pri 90 hel 3 hol 10 ip 198.92.72.29
SB:Ethernet0 Hello out 198.92.72.20 Active pri 100 hel 3 hol 10 ip 198.92.72.29
SB:Ethernet0 Hello in 198.92.72.21 Speak pri 90 hel 3 hol 10 ip 198.92.72.29
SB:Ethernet0 Hello out 198.92.72.20 Active pri 100 hel 3 hol 10 ip 198.92.72.29
SB:Ethernet0 Hello in 198.92.72.21 Speak pri 90 hel 3 hol 10 ip 198.92.72.29
SB:Ethernet0 Hello out 198.92.72.20 Active pri 100 hel 3 hol 10 ip 198.92.72.29
SB:Ethernet0 Hello in 198.92.72.21 Standby pri 90 hel 3 hol 10 ip 198.92.72.29
SB:Ethernet0 Hello out 198.92.72.20 Active pri 100 hel 3 hol 10 ip 198.92.72.29
SB:Ethernet0 Hello in 198.92.72.21 Standby pri 90 hel 3 hol 10 ip 198.92.72.29
SB:Ethernet0 Hello out 198.92.72.20 Active pri 100 hel 3 hol 10 ip 198.92.72.29
```

Figure 2-107 Sample Debug Standby Output

Table 2-67 describes significant fields shown in Figure 2-107.

Table 2-67 Debug Standby Field Descriptions

Field	Description
SB	An abbreviation for “standby.”
Ethernet0	The interface on which a hot standby packet was sent or received.
Hello in	Hello packet received from the specified IP address.
Hello out	Hello packet sent from the specified IP address.
pri	Priority advertised in the hello packet.
hel	Hello interval advertised in the hello packet.
hol	Holddown interval advertised in the hello packet.
ip *address*	Hot standby group IP address advertised in the hello packet.
state	Transition from one state to another.
Coup out *address*	Coup packet sent by the router from the specified IP address.

Explanations for representative lines of output in Figure 2-107 follow.

The following line indicates that the router is initiating the hot standby protocol. The **standby ip** interface configuration command enables hot standby.

```
SB: Starting up hot standby process
```

The following line indicates that a state transition occurred on the interface:

```
SB: Ethernet0 state Listen -> Speak
```

debug stun packet

Use the **debug stun packet** EXEC command to display information on packets traveling through the STUN links. Use the **no** form of this command to disable debugging output.

debug stun packet [*group*] [*address*]
no debug stun packet [*group*] [*address*]

Syntax Description

group	(Optional) Decimal integer assigned to a group. Using this option limits output to packets associated with the specified STUN group.
address	(Optional) Output is further limited to only those packets containing the specified STUN address. The *address* argument is in the appropriate format for the STUN protocol running for the specified group.

Command Mode

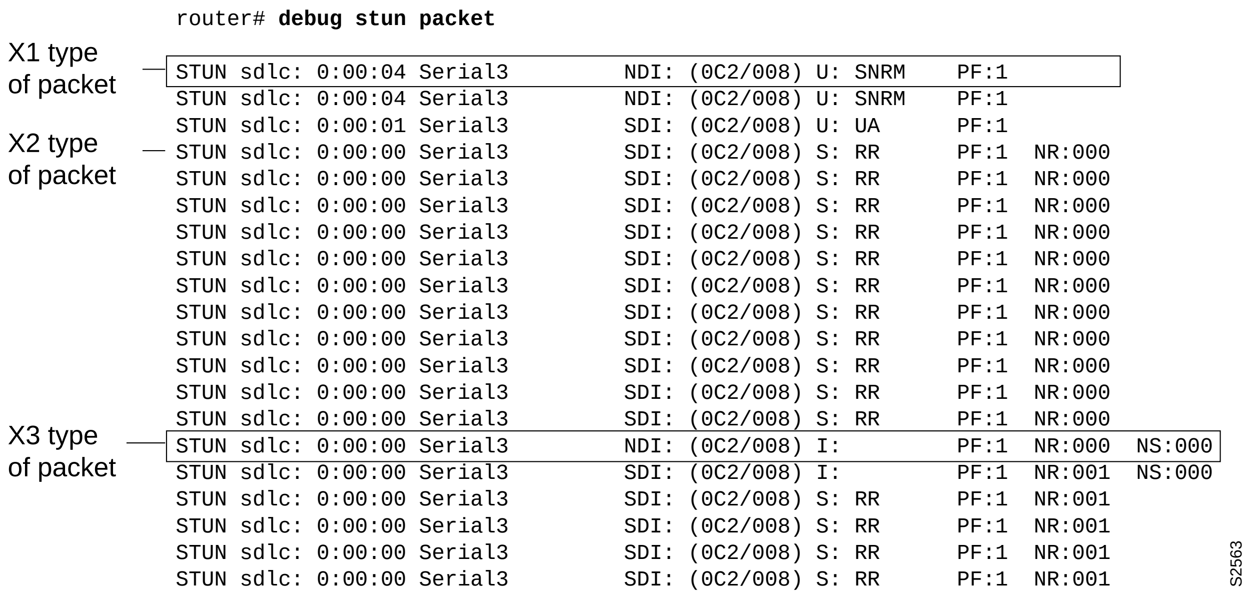
EXEC

Usage Guidelines

Because using this command is processor intensive, it is best to use it after hours, rather than in a production environment. It is also best to turn this command on by itself, rather than use it in conjunction with other debug commands.

Sample Display

Figure 2-108 shows sample **debug stun packet** output.



```
router# debug stun packet
STUN sdlc: 0:00:04 Serial3         NDI: (0C2/008) U: SNRM    PF:1
STUN sdlc: 0:00:04 Serial3         NDI: (0C2/008) U: SNRM    PF:1
STUN sdlc: 0:00:01 Serial3         SDI: (0C2/008) U: UA      PF:1
STUN sdlc: 0:00:00 Serial3         SDI: (0C2/008) S: RR      PF:1  NR:000
STUN sdlc: 0:00:00 Serial3         SDI: (0C2/008) S: RR      PF:1  NR:000
STUN sdlc: 0:00:00 Serial3         SDI: (0C2/008) S: RR      PF:1  NR:000
STUN sdlc: 0:00:00 Serial3         SDI: (0C2/008) S: RR      PF:1  NR:000
STUN sdlc: 0:00:00 Serial3         SDI: (0C2/008) S: RR      PF:1  NR:000
STUN sdlc: 0:00:00 Serial3         SDI: (0C2/008) S: RR      PF:1  NR:000
STUN sdlc: 0:00:00 Serial3         SDI: (0C2/008) S: RR      PF:1  NR:000
STUN sdlc: 0:00:00 Serial3         SDI: (0C2/008) S: RR      PF:1  NR:000
STUN sdlc: 0:00:00 Serial3         SDI: (0C2/008) S: RR      PF:1  NR:000
STUN sdlc: 0:00:00 Serial3         SDI: (0C2/008) S: RR      PF:1  NR:000
STUN sdlc: 0:00:00 Serial3         SDI: (0C2/008) S: RR      PF:1  NR:000
STUN sdlc: 0:00:00 Serial3         NDI: (0C2/008) I:         PF:1  NR:000  NS:000
STUN sdlc: 0:00:00 Serial3         SDI: (0C2/008) I:         PF:1  NR:001  NS:000
STUN sdlc: 0:00:00 Serial3         SDI: (0C2/008) S: RR      PF:1  NR:001
STUN sdlc: 0:00:00 Serial3         SDI: (0C2/008) S: RR      PF:1  NR:001
STUN sdlc: 0:00:00 Serial3         SDI: (0C2/008) S: RR      PF:1  NR:001
STUN sdlc: 0:00:00 Serial3         SDI: (0C2/008) S: RR      PF:1  NR:001
```

Figure 2-108 Sample Debug STUN Packet Output

Explanations for individual lines of output from Figure 2-108 follow.

The following line describes an X1 type of packet:

```
STUN sdlc: 0:00:04 Serial3         NDI: (0C2/008) U: SNRM    PF:1
```

Table 2-68 describes significant fields shown in this line of **debug stun packet** output.

Table 2-68 Debug STUN Packet Field Descriptions

Field	Description
STUN sdlc:	Indication that the STUN feature is providing the information.
0:00:04	Time elapsed since receipt of previous packet.
Serial3	Interface type and unit number reporting the event.
NDI:	The type of cloud separating the SDLC end nodes. Possible values follow: NDI—Network input SDI—Serial link
0C2	SDLC address of the SDLC connection.

Field	Description
008	A modulo value of 8.
U:SNRM	The frame type followed by the command or response type. In this case it is an Unnumbered frame that contains an SNRM (Set Normal Response Mode) command. The possible frame types are as follows: I—Information frame S—Supervisory frame. The possible commands and responses are: RR (Receive Ready), RNR (Receive Not Ready), and REJ (Reject). U—Unnumbered frame. The possible commands are: UI (Unnumbered Information), SNRM, DISC/RD (Disconnect/Request Disconnect), SIM/RIM, XID Exchange Identification), TEST. The possible responses are UA (unnumbered acknowledgment), DM (Disconnected Mode), and FRMR (Frame Reject Mode)
PF:1	Poll/Final bit. 0—Off 1—On

The following line of output describes an X2 type of packet:

```
STUN sdlc: 0:00:00 Serial3         SDI: (0C2/008) S: RR      PF:1  NR:000
```

All the fields in the previous line of output match those for an X1 type of packet, except the last field, which is additional. NR:000 indicates a receive count of 0; the range for the receive count is 0 to 7.

The following line of output describes an X3 type of packet:

```
STUN sdlc: 0:00:00 Serial3         SDI: (0C2/008) S:I PF:1  NR:000 NS:000
```

All fields in the previous line of output match those for an X2 type of packet, except the last field, which is additional. NS:000 indicates a send count of 0; the range for the send count is 0 to 7.

debug tftp

Use the **debug tftp** EXEC command to display TFTP debugging information when encountering problems netbooting or using the **configure network** or **write network** commands. The **no** form of this command disables debugging output.

debug tftp
no debug tftp

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Sample Display

Figure 2-109 shows sample **debug tftp** output from the EXEC command **write network**.

```
router# debug tftp

TFTP: msclock 0x292B4; Sending  write request (retry 0), socket_id 0x301DA8
TFTP: msclock 0x2A63C; Sending  write request (retry 1), socket_id 0x301DA8
TFTP: msclock 0x2A6DC; Received ACK for block 0,   socket_id 0x301DA8
TFTP: msclock 0x2A6DC; Received ACK for block 0,   socket_id 0x301DA8
TFTP: msclock 0x2A6DC; Sending  block 1 (retry 0), socket_id 0x301DA8
TFTP: msclock 0x2A6E4; Received ACK for block 1,   socket_id 0x301DA8
```

Figure 2-109 Sample Debug TFTP Output

Table 2-69 describes significant fields shown in the first line of output from Figure 2-109.

Table 2-69 Debug TFTP Field Descriptions

Message	Description
TFTP:	This entry describes a TFTP packet.
msclock 0x292B4;	Internal timekeeping clock (in milliseconds).
Sending write request (retry 0)	The TFTP operation.
socket_id 0x301DA8	Unique memory address for the socket for the TFTP connection.

debug token ring

Use the **debug token ring** EXEC command to display messages about Token Ring interface activity. The **no** form of this command disables debugging output.

debug token ring
no debug token ring

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Usage Guidelines

This command reports several lines of information for each packet sent or received and is intended for low traffic, detailed debugging.

The Token Ring interface records provide information regarding the current state of the ring. These messages are only displayed when the **debug token events** command is enabled.

The **debug token ring** command invokes verbose Token Ring hardware debugging. This includes detailed displays as traffic arrives and departs the unit.

Note It is best to use this command only on router/bridges with light loads.

Sample Display

Figure 2-110 shows sample **debug token ring** output.

```
router# debug token ring

TR0: Interface is alive, phys. addr 5000.1234.5678
TR0:  in: MAC: acfc: 0x1105 Dst: c000.ffff.ffff Src: 5000.1234.5678  bf: 0x45
TR0:  in:      riflen 0, rd_offset 0, llc_offset 40
TR0: out: MAC: acfc: 0x0040 Dst: 5000.1234.5678 Src: 5000.1234.5678  bf: 0x00
TR0: out: LLC: AAAA0300 00009000 00000100 AAC00000 00000802 50001234 ln: 28
TR0:  in: MAC: acfc: 0x1140 Dst: 5000.1234.5678 Src: 5000.1234.5678  bf: 0x09
TR0:  in: LLC: AAAA0300 00009000 00000100 AAC0B24A 4B4A6768 74732072 ln: 28
TR0:  in:      riflen 0, rd_offset 0, llc_offset 14
TR0: out: MAC: acfc: 0x0040 Dst: 5000.1234.5678 Src: 5000.1234.5678  bf: 0x00
TR0: out: LLC: AAAA0300 00009000 00000100 D1D00000 FE11E636 96884006 ln: 28
TR0:  in: MAC: acfc: 0x1140 Dst: 5000.1234.5678 Src: 5000.1234.5678  bf: 0x09
TR0:  in: LLC: AAAA0300 00009000 00000100 D1D0774C 4DC2078B 3D000160 ln: 28
TR0:  in:      riflen 0, rd_offset 0, llc_offset 14
TR0: out: MAC: acfc: 0x0040 Dst: 5000.1234.5678 Src: 5000.1234.5678  bf: 0x00
TR0: out: LLC: AAAA0300 00009000 00000100 F8E00000 FE11E636 96884006 ln: 28
```

Figure 2-110 Sample Debug Token Ring Output

Table 2-70 describes significant fields shown in the second line of output from Figure 2-110.

Table 2-70 Debug Token Ring Field Descriptions—Part 1

Message	Description
TR0:	Name of the interface associated with the Token Ring event.
in:	Indication of whether the packet was input to the interface (in) or output from the interface (out).
MAC:	The type of packet, as follows: MAC—Media Access Control LLC—Link Level Control
acfc: 0x1105	Access Control, Frame Control bytes, as defined by the IEEE 802.5 standard.
Dst: c000.ffff.ffff	Destination address of the frame.
Src: 5000.1234.5678	Source address of the frame.
bf: 0x45	Bridge flags for internal use by technical support staff.

Table 2-71 describes significant fields shown in the third line of output from Figure 2-110.

Table 2-71 Debug Token Ring Field Descriptions—Part 2

Message	Description
TR0:	Name of the interface associated with the Token Ring event.
in:	Indication of whether the packet was input to the interface (in) or output from the interface (out).
riflen 0	Length of the RIF field (in bytes).
rd_offset 0	Offset (in bytes) of the frame pointing to the start of the RIF field.
llc_offset 40	Offset in the frame pointing to the start of the LLC field.

Table 2-72 describes significant fields shown in the fifth line of output from Figure 2-110.

Table 2-72 Debug Token Ring Field Descriptions—Part 3

Message	Description
TR0:	Name of the interface associated with the Token Ring event.
out:	Indication of whether the packet was input to the interface (in) or output from the interface (out).
LLC:	The type of frame, as follows: MAC—Media Access Control LLC—Link Level Control
AAAA0300	This and the octets that follow it indicate the contents (hex) of the frame.
ln: 28	The length of the information field (in bytes).

debug vines arp

Use the **debug vines arp** EXEC command to display debugging information on all Virtual Integrated Network Service (VINES) Address Resolution Protocol (ARP) packets that the router sends or receives. The **no** form of this command disables debugging output.

debug vines arp
no debug vines arp

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Sample Display

Figure 2-111 shows sample **debug vines arp** output.

```
router# debug vines arp

VNSARP: received ARP type 0 from 0260.8c43.a7e4
VNSARP: sending ARP type 1 to 0260.8c43.a7e4
VNSARP: received ARP type 2 from 0260.8c43.a7e4
VNSARP: sending ARP type 3 to 0260.8c43.a7e4 assigning address 3001153C:8004
VSARP: received ARP type 0 from 0260.8342.1501
VSARP: sending ARP type 1 to 0260.8342.1501
VSARP: received ARP type 2 from 0260.8342.1501
VSARP: sending ARP type 3 to 0260.8342.1501 assigning address 3001153C:8005,
       sequence 143C, metric 2
```

Figure 2-111 Sample Debug VINES ARP Output

In Figure 2-111, first four lines show a non-sequenced ARP transaction and the second four lines show a sequenced ARP transaction. Within the first group of four lines, the first line shows that the router received an ARP request (type 0) from indicated station address 0260.8c43.a7e4. The second line shows that the router is sending back the ARP service response (type 1), indicating that it is willing to assign VINES Internet addresses. The third line shows that the router received a VINES Internet address assignment request (type 2) from address 0260.8c43.a7e4. The fourth line shows that the router is responding (type 3) to the address assignment request from the client and assigning it the address 3001153C:8004.

Within the second group of four lines, the sequenced ARP packet also includes the router’ current sequence number and the metric value between the router and the client.

Table 2-73 describes significant fields shown in Figure 2-111.

Table 2-73 Debug VINES ARP Field Descriptions

Field	Description
VNSARP:	Indicates that this is a Banyan VINES nonsequenced ARP message.
VSARP:	Indicates that this is a Banyan VINES sequenced ARP message.
received ARP type 0	Indicates that an ARP request of type 0 was received. Possible type values follow: 0—Query request. The ARP client broadcasts a type 0 message to request an ARP service to respond. 1—Service response. The ARP service responds with a type 1 message to an ARP client’s query request. 2—Assignment request. The ARP client responds to a service response with a type 2 message to request a Banyan VINES Internet address. 3—Assignment response. The ARP service responds to an assignment request with a type 3 message that includes the assigned Banyan VINES Internet address.
from 0260.8c43.a7e4	Indicates the source address of the packet.

debug vines echo

Use the **debug vines echo** EXEC command to display information on all MAC-level echo packets that the router sends or receives. Banyan VINES interface testing programs make use of these echo packets. The **no** form of this command disables debugging output.

debug vines echo
no debug vines echo

Syntax Description

This command has no arguments or keywords.

Note These echo packets do not include network layer addresses.

Command Mode

EXEC

Sample Display

Figure 2-112 shows sample **debug vines echo** output.

```
router# debug vines echo

VINESECHO: 100 byte packet from 0260.8c43.a7e4
```

Figure 2-112 Sample Debug VINES Echo Output

Table 2-74 describes the fields shown in Figure 2-112.

Table 2-74 Debug VINES Echo Field Descriptions

Field	Description
VINESECHO	Indication that this is a **debug vines echo** message.
100 byte packet	Packet size in bytes.
from 0260.8c43.a7e4	Source address of the echo packet.

debug vines ipc

Use the **debug vines ipc** EXEC command to display information on all transactions that occur at the VINES IPC layer, which is one of the two VINES transport layers. The **no** form of this command disables debugging output.

debug vines ipc
no debug vines ipc

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Usage Guidelines

You can use the **debug vines ipc** command to discover why an IPC layer process on the router is not communicating with another IPC layer process on another router or Banyan VINES server.

Sample Display

Figure 2-113 shows sample **debug vines ipc** output for three pairs of transactions. For more information about these fields or their values, refer to Banyan VINES documentation.

```
router# debug vines ipc

VIPC: sending IPC Data to Townsaver port 7 from port 7
 r_cid 0, l_cid 1, seq 1, ack 0, length 12
VIPC: received IPC Data from Townsaver port 7 to port 7
 r_cid 51, l_cid 1, seq 1, ack 1, length 32
VIPC: sending IPC Ack to Townsaver port 0 from port 0
 r_cid 51, l_cid 1, seq 1, ack 1, length 0
```

Figure 2-113 Sample Debug VINES IPC Output

Table 2-75 describes the fields shown in Figure 2-113.

Table 2-75 VINES IPC Field Descriptions

Field	Description
VIPC:	Indicates that this is output from the **debug vines ipc** command.
sending	Indicates that the router is either sending an IPC packet to another router or has received an IPC packet from another router.
IPC Data to	Indicates the type of IPC frame: Acknowledgment Data Datagram Disconnect Error Probe
Townsaver port 7	Indicates the machine name as assigned using the VINES **host** command, or IP address of the other router. Also indicates the port on that machine through which the packet has been transmitted.
from port 7	Indicates the port on the router through which the packet has been transmitted.
r_cid 0, l_cid 1, seq 1, ack 0, length 12	Indicates the values for various fields in the IPC layer header of this packet. Refer to Banyan VINES documentation for more information.

debug vines netrpc

Use the **debug vines netrpc** EXEC command to display information on all transactions that occur at the VINES NetRPC layer, which is the VINES Session/Presentation layer. The **no** form of this command disables debugging output.

debug vines netrpc
no debug vines netrpc

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Usage Guidelines

You can use the **debug vines netrpc** command to discover why a NetRPC layer process on the router is not communicating with another NetRPC layer process on another router or Banyan server.

Sample Display

Figure 2-114 shows sample **debug vines netrpc** output. For more information about these fields or their values, refer to Banyan VINES documentation.

```
router# debug vines netrpc

VRPC: sending RPC call to Townsaver
VRPC: received RPC return from Townsaver
```

Figure 2-114 Sample Debug VINES NetRPC Output

Table 2-76 describes the fields shown in the first line of output in Figure 2-114.

Table 2-76 Debug VINES NetRPC Field Descriptions

Field	Description
VRPC:	Indicates that this is output from the **debug vines netrpc** command.
sending RPC	Indicates that the router is either sending a NetRPC packet to another router or has received a NetRPC packet from another router.
call	Indicates the transaction type: abort call reject return return address search search all
Townsaver	Indicates the machine name as assigned using the VINES **host** command or IP address of the other router.

debug vines packet

Use the **debug vines packet** EXEC command to display general VINES debugging information. This information includes packets received, generated, and forwarded, as well as failed access checks and other operations. The **no** form of this command disables debugging output.

debug vines packet
no debug vines packet

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Sample Display

Figure 2-115 shows sample **debug vines packet** output.

```
router# debug vines packet

VINES: s=30028CF9:1 (Ether2), d=FFFFFFFF:FFFF, rcvd w/ hops 0
VINES: s=3000CBD4:1 (Ether1), d=3002ABEA:1 (Ether2), g=3002ABEA:1, sent
VINES: s=3000CBD4:1 (Ether1), d=3000B959:1, rcvd by gw
VINES: s=3000B959:1 (local), d=3000CBD4:1 (Ether1), g=3000CBD4:1, sent
```

Figure 2-115 Sample Debug VINES Packet Output

The following information describes selected lines of output from Figure 2-115.

Table 2-77 describes the fields shown in the first line of output.

Table 2-77 Debug VINES Packet Field Descriptions

Field	Description
VINES:	Indicates that this is a Banyan VINES packet.
s = 30028CF9:1	Indicates source address of the packet.
(Ether2)	Indicates the interface through which the packet was received.
d = FFFFFFFF:FFFF	Indicates that the destination is a broadcast address.
rcvd w/ hops 0	Indicates that the packet was received because it was a local broadcast packet. The remaining hop count in the packet was zero (0).

In the following line, the destination is the address 3002ABEA:1 associated with interface Ether2. Source address 3000CBD4:1 sent a packet to this destination through the gateway at address 3000ABEA:1.

```
VINES: s=3000CBD4:1 (Ether1), d=3002ABEA:1 (Ethernet2), g=3002ABEA:1, sent
```

In the following line, the router being debugged is the destination address (3000B959:1):

```
VINES: s=3000CBD4:1 (Ether1), d=3000B959:1, rcvd by gw
```

In the following line, (local) indicates that the router being debugged generated the packet:

```
VINES: s=3000B959:1 (local), d=3000CBD4:1 (Ether1), g=3000CBD4:1, sent
```

debug vines routing

Use the **debug vines routing** EXEC command to display information on all VINES RTP update messages sent or received and all routing table activities that occur in the router. The **no** form of this command disables debugging output.

debug vines routing [**verbose**]
no debug vines routing

Syntax Description

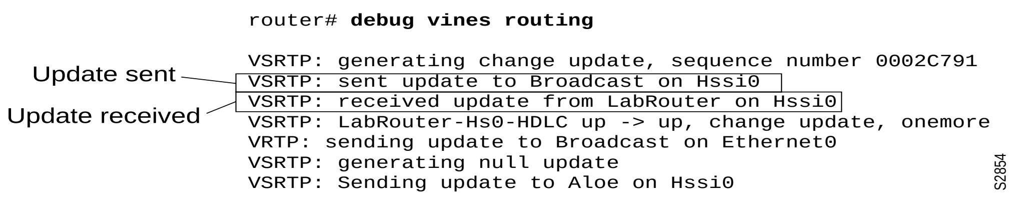
verbose	(Optional) Provides detailed information about the contents of each update.

Command Mode

EXEC

Sample Displays

Figure 2-116 shows sample **debug vines routing** output.



```
router# debug vines routing

VSRTP: generating change update, sequence number 0002C791
VSRTP: sent update to Broadcast on Hssi0
VSRTP: received update from LabRouter on Hssi0
VSRTP: LabRouter-Hs0-HDLC up -> up, change update, onemore
VRTP: sending update to Broadcast on Ethernet0
VSRTP: generating null update
VSRTP: Sending update to Aloe on Hssi0
```

Figure 2-116 Sample Debug VINES Routing Output

Figure 2-117 shows sample **debug vines routing verbose** output.

```
router# debug vines routing verbose

VRTP: sending update to Broadcast on Ethernet0
    network 30011E7E, metric 0020 (0.4000 seconds)
    network 30015800, metric 0010 (0.2000 seconds)
    network 3003148A, metric 0020 (0.4000 seconds)
VSRTP: generating change update, sequence number 0002C795
    network Router9       metric 0010, seq 00000000, flags 09
    network RouterZZ      metric 0230, seq 00052194, flags 02
VSRTP: sent update to Broadcast on Hssi0
VSRTP: received update from LabRouter on Hssi0
    update: type 00, flags 07, id 000E, ofst 0000, seq 15DFC, met 0010
    network LabRouter from the server
    network Router9       metric 0020, seq 00000000, flags 09
VSRTP: LabRouter-Hs0-HDLC up -> up, change update, onemore
```

Figure 2-117 Sample Debug VINES Routing Verbose Output

Figure 2-117 describes two VINES routing updates; the first includes two entries and the second includes three entries. The following information describes selected lines of output.

The following line shows that the router sent a periodic routing update to the broadcast address FFFFFFFF:FFFF through the Ethernet0 interface:

```
VRTP: sending update to Broadcast on Ethernet0
```

The following line indicates that the router knows how to reach network 30011E7E, which is a metric of 0020 away from the router. The value that follows the metric (0.4000 seconds) interprets the metric in seconds.

```
network 30011E7E, metric 0020 (0.4000 seconds)
```

The following lines show that the router sent a change routing update to the Broadcast addresses on the Hssi0 interface using the SRTP routing protocol:

```
VSRTP: generating change update, sequence number 0002C795
VSRTP: Sending update to Broadcast on Hssi0
```

The lines in between the previous two indicate that the router knows how to reach network Router9, which is a metric of 0010 (0.2000 seconds) away from the router. The sequence number for Router9 is zero, and according to the 0x08 bit in the flags field, is invalid. The 0x01 bit of the flags field indicates that Router9 is attached via a LAN interface.

```
network Router9        metric 0010, seq 00000000, flags 09
```

The next lines indicate that the router can reach network RouterZZ, which is a metric of 0230 (7.0000 seconds) away from the router. The sequence number for RouterZZ is 0052194. The 0x02 bit of the flags field indicates that RouterZZ is attached via a WAN interface.

```
network RouterZZ       metric 0230, seq 00052194, flags 02
```

The following line indicates that the router received a routing update from the router LabRouter through the Hssi0 interface:

```
VINESRTP: received update from LabRouter on Hssi0
```

The following line displays all SRTP values contained in the header of the SRTP packet. This is a type 00 packet, which is a routing update, and the flags field is set to 07, indicating that this is a change update (0x04) and contains both the beginning (0x01) and end (0x02) of the update. This overall update is update number 000E from the router, and this fragment of the update contains the routes beginning at offset 0000 of the update. The sending router's sequence number is currently 00015DFC, and its configured metric for this interface is 0010.

```
update: type 00, flags 07, id 000E, ofst 0000, seq 00015DFC, met 0010
```

The following line implies that the server sending this update is directly accessible to the router (even though VINES servers do not explicitly list themselves in routing updates). Because this is an implicit entry in the table, the other information for this entry is taken from the previous line.

```
network LabRouter from the server
```

As the first actual entry in the routing update from LabRouter, the following line indicates that Router9 can be reached by sending to this server. This network is a metric of 0020 away from the sending server.

```
network Router9        metric 0020, seq 00000000, flags 09
```

debug vines service

Use the **debug vines service** EXEC command to display information on all transactions that occur at the VINES Service (or applications) layer. The **no** form of this command disables debugging output.

debug vines service
no debug vines service

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

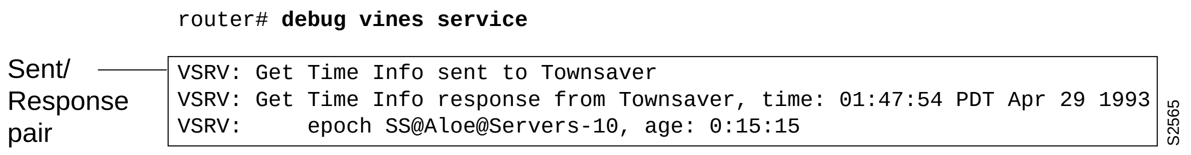
Usage Guidelines

You can use the **debug vines service** command to discover why a VINES Service layer process on the router is not communicating with another Service layer process on another router or Banyan server.

Note Because the **debug vines service** command provides the highest level overview of VINES traffic through the router, it is best to begin debugging using this command, and then proceed to use lower-level VINES **debug** commands as necessary.

Sample Display

Figure 2-118 shows sample **debug vines service** output.



```
router# debug vines service
VSRV: Get Time Info sent to Townsaver
VSRV: Get Time Info response from Townsaver, time: 01:47:54 PDT Apr 29 1993
VSRV:     epoch SS@Aloe@Servers-10, age: 0:15:15
```

Figure 2-118 Sample Debug VINES Service Output

As Figure 2-118 suggests, **debug vines service** lines of output appear as activity pairs—either a sent/response pair as shown, or as a received/sent pair.

Table 2-78 describes the fields shown in the second line of output in Figure 2-118. For more information about these fields or their values, refer to Banyan VINES documentation.

Table 2-78 Debug VINES Service Field Descriptions—Part 1

Field	Description
VSRV:	Indicates that this is output from the **debug vines service** command.
Get Time Info	Indicates one of three packet types: Get Time Info Time Set Time Sync
response from	Indicates whether the packet was sent to another router, a response from another router, or received from another router.
Townsaver	Indicates the machine name as assigned using the VINES **host** command, or IP address of the other router.
time: 01:47:54 PDT Apr 29 1993	Indicates the current time in hours:minutes:seconds and current date.

Table 2-79 describes the fields shown in the third line of output in Figure 2-118. This line is an extension of the first two lines of output. For more information about these fields or their values, refer to Banyan VINES documentation.

Table 2-79 Debug VINES Service Field Descriptions—Part 2

Field	Description
VSRV:	Output from the **debug vines service** command.
epoch	Line of output that describes a VINES epoch.
SS@Aloe@Servers-10	Epoch name.
age: 0:15:15	Epoch—elapsed time since the time was last set in the network.

debug vines state

Use the **debug vines state** EXEC command to display information on the VINES SRTP state machine transactions. The **no** form of this command disables debugging output.

debug vines state
no debug vines state

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Usage Guidelines

This command provides a subset of the information provided by the **debug vines routing** command, showing only the transactions made by the SRTP state machine. Refer to the **debug vines routing** command for descriptions of output from the **debug vines state** command.

debug vines table

Use the **debug vines table** EXEC command to display information on all modifications to the VINES routing table. The **no** form of this command disables debugging output.

debug vines table
no debug vines table

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Usage Guidelines

This command provides a subset of the information produced by the **debug vines routing** command, as well as some more detailed information on table additions and deletions.

Sample Display

Figure 2-119 shows sample **debug vines table** output.

```
router# debug vines table

VINESRTP: create neighbor 3001153C:8004, interface Ethernet0
```

Figure 2-119 Sample Debug VINES Table Output

Table 2-80 describes significant fields shown in Figure 2-119.

Table 2-80 Debug VINES Table Field Descriptions

Field	Description
VINESRTP:	Indicates that this is a **debug vines routing** or **debug vines table** message.
create neighbor 3001153C:8004	Indicates that the client at address 3001153C:8004 has been added to the Banyan VINES neighbor table.
interface Ethernet 0	Indicates that this neighbor can be reached through the router interface named Ethernet0.

debug x25 all

Use the **debug x25 all** EXEC command to display information on all X.25 traffic, including data, control messages, and flow control (RR and RNR) packets. The **no** form of this command disables debugging output.

debug x25 all
no debug x25 all

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Usage Guidelines

This command is particularly useful for diagnosing problems encountered when placing CALLs.

The **debug x25 all** output includes data, control messages, and flow control packets for all of the router's virtual circuits. The **debug x25 events** and **debug x25 vc** commands provide a subset of this output.

Caution Because **debug x25 all** displays all X.25 traffic, it is processor intensive and can render the router useless. Only use **debug x25 all** when the aggregate of all X.25 traffic is fewer than five packets per second.

Sample Display

Figure 2-120 shows sample **debug x25 all** output.

```
router# debug x25 all

Serial2: X25 O R3 RESTART (5) 8 lci 0 cause 7 diag 0
Serial2: X25 I R3 RESTART (5) 8 lci 0 cause 0 diag 0
Serial2: X25 I P1 CALL REQUEST (11) 8 lci 1024
From (2): 49 To(2): 46
  Facilities: (0)
  Call User Data (4): 0xCC 00 00 00 (ip)
Serial2: X25 O P4 CALL CONNECTED (3) 8 lci 1024
Serial2: X25 I P4 DATA (103) 8 lci 1024 PS 0 PR 0
Serial2: X25 O D1 DATA (103) 8 lci 1024 PS 0 PR 1
Serial2: X25 I D1 DATA (103) 8 lci 1024 PS 1 PR 0
Serial2: X25 O D1 DATA (103) 8 lci 1024 PS 1 PR 2
Serial2: X25 I D1 RR (3) 8 lci 1024 PR 2
Serial2: X25 I D1 DATA (103) 8 lci 1024 PS 2 PR 2
Serial2: X25 O D1 DATA (103) 8 lci 1024 PS 2 PR 3
Serial2: X25 I D1 CLEAR REQUEST (5) 8 lci 1024 cause 0 diag 122
Serial2: X25 O D1 CLEAR CONFIRMATION (3) 8 lci 1024
XOT: X25 O D1 PVC-SETUP, waiting to connect (29) <Serial2 pvc 3><Serial2 pvc 1> 2/1 128/64
XOT: X25 I D1 PVC-SETUP, connected (29) <Serial2 pvc 3><Serial2 pvc 1> 2/1 128/64
Serial2: X25 O D1 RESET REQUEST (5) 8 lci 3 cause 15 diag 0
Serial2: X25 I D1 RESET CONFIRMATION (3) 8 lci 3
```

Figure 2-120 Sample Debug X25 All Output

Figure 2-120 shows a typical exchange of packets between two X.25 devices on a network. The first line of output in Figure 2-120 describes a RESTART packet. Table 2-81 describes the fields in this line of output.

Table 2-81 Debug X25 All Field Descriptions

Field	Description
Serial2	The interface on which the X.25 event occured. Events that occur on an X.25-over-TCP connection report XOT.
X25	That this message describes an X.25 event.
O	Indication of whether the X.25 message was input (I) or output (O) through the interface.
R3	State of the virtual circuit. Possible values follow: D1—Flow control ready D2—DTE reset request D3—DCE reset indication P1—Idle P2—DTE waiting for DCE to connect CALL P3—DCE waiting for DTE to accept CALL P4—Data transfer P5—CALL collision P6—DTE clear request P7—DCE clear indication R1—Packet level ready R2—DTE restart request R3—DCE restart indication X1—Nonstandard state for a virtual circuit in hold-down See Annex B of the 1984 ITU-T X.25 Recommendation for more information on these states.

Field	Description
RESTART	Describes the type of X.25 packet. Possible values follow: CALL CONNECTED CALL REQUEST CLEAR CONFIRMATION CLEAR REQUEST DATA DIAGNOSTIC ILLEGAL INTR CONFIRMATION INTR (interrupt) PVC-SETUP REGISTRATION REGISTRATION CONFIRMATION RESET CONFIRMATION RESET REQUEST RESTART RESTART CONFIRMATION RNR (Receiver Not Ready) RR (Receiver Ready)
(5)	Number of bytes in the packet.
8	Modulo of the virtual circuit. Possible values are 8 or 128.
lci 0	Virtual circuit number. See Annex A of the 1984 ITU-T X.25 Recommendation for information on VC assignment.
cause 7	Code indicating the event that triggered the packet. The cause field can only appear in entries for CLEAR REQUEST, RESET REQUEST, and RESTART packets. Possible values for the cause field can vary, depending on the type of packet. Refer to the “X.25 Cause and Diagnostic Codes” appendix for explanations of these codes.
diag 0	Code providing an additional hint as to what, if anything, went wrong. The diag field can only appear in entries for CLEAR REQUEST, DIAGNOSTIC (as “error 0”), RESET REQUEST and RESTART packets. Because of the large number of possible values, they are listed in the “X.25 Cause and Diagnostic Codes” appendix.

Table 2-82 describes the PS and PR fields that can appear in a **debug x25 all** display.

Table 2-82 Debug X25 All PS and PR Field Descriptions

Field	Description
PS 0	Packet send sequence number; used for flow control of the outgoing packet stream. Present only in DATA packets.
PR 0	Packet receive sequence number used for flow control of the incoming packet stream by indicating the PS value that the sender next expects to see.

In Figure 2-120, notice also that the CALL REQUEST packet precedes three other lines of output that have a unique format.

```
Serial2: X25 I P1 CALL REQUEST (11) 8 lci 1024
From (2): 49 To(2): 46
  Facilities: (0)
  Call User Data (4): 0xCC 00 00 00 (ip)
Serial2: X25 O P4 CALL CONNECTED (3) 8 lci 1024
```

These lines indicate that the CALL REQUEST packet has a two-digit source address, 49, and a two-digit destination address, 46. These are X.121 addresses that can be from 0 to 15 digits in length. The Facilities field is (0) bytes in length, indicating that no X.25 facilities are being requested. The optional call user data field is 4 bytes in length. Any encapsulation protocol identification (PID) in the Call User Data will have the encoding values printed and identified. Multiprotocol Virtual Circuits can also have PID information in Data packets; the debug output for these packets will also describe the PID.

The two lines of output in Figure 2-120 that begin with XOT are shown below.

```
XOT: X25 O D1 PVC-SETUP, waiting to connect (29) <Serial2 pvc 3><Serial2 pvc 1> 2/1 128/64
XOT: X25 I D1 PVC-SETUP, connected (29) <Serial2 pvc 3><Serial2 pvc 1> 2/1 128/64
```

These lines of output do not describe standard X.25 packets. Instead, they describe messages that represent a tunneled PVC setup between two routers. Table 2-83 describes the fields these two lines of output.

Table 2-83 Debug X25 All Field Descriptions for Packets Representing Tunneled PVC Activity

Field	Description
XOT	This message travels over a TCP connection.
X25	This message describes an X.25 event.
O	Indication of whether the X.25 message was input (I) or output (O) through the connection.
D1	State of the permanent virtual circuit. Possible values follow. D1—Flow control ready D2—DTE reset request D3—DCE reset indication See Annex B of the 1984 ITU-T X.25 Recommendation for more information on these states.

Field	Description
wait to connect	State of the PVC. Some of these strings only apply to PVCs that are remotely tunneled over a TCP connection. The %X25-3-PVCBAD system error message (as documented in the *System Error Messages* publication), and the **show x25 vc** command (as documented in the *Router Products Command Reference* publication) also use these PVC state strings. Possible values follow: awaiting PVC-SETUP reply can’t support flow control values connected dest. disconnected dest. interface is not up dest. PVC configuration mismatch mismatched flow control values no such dest. interface no such dest. PVC non-X.25 dest. interface PVC setup protocol error PVC/TCP connect timed out PVC/TCP connection refused PVC/TCP routing error trying to connect via TCP waiting to connect
(29)	Incoming/outgoing message size (in bytes).
<Serial2 pvc 3>	Interface and PVC number that originated the message (originator).
<Serial2 pvc 1>	Interface and PVC number that responded to that message (responder).
2/1	Window sizes (in packets).
128/64	Maximum packet sizes (in bytes).

debug x25 events

Use the **debug x25 events** EXEC command to display information on all X.25 traffic except X.25 data or acknowledgment packets. The **no** form of this command disables debugging output.

debug x25 events
no debug x25 events

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Usage Guidelines

The **debug x25 events** command is useful for debugging X.25 problems, because it shows changes that occur in the virtual circuits handled by the router. Because most X.25 connectivity problems stem from errors that CLEAR or RESET virtual circuits, you can use **debug x25 events** to identify these errors.

While **debug x25 all** output includes both data and control messages for all of the router's virtual circuits, **debug x25 events** output includes only control messages for all of the router's VCs. In contrast, **debug x25 vc** output filters the output for a single VC number. Thus, **debug x25 events** output is a subset of **debug x25 all** output, and **debug x25 vc** output modifies either of them to further limit the output.

Note Because **debug x25 events** displays a subset of all X.25 traffic, it is safer to use than **debug x25 all** during production hours.

Sample Display

Figure 2-121 shows sample **debug x25 events** output.

```
router# debug x25 events
Serial2: X25 I R3 RESTART (5) 8 lci 0 cause 0 diag 0
Serial2: X25 I P1 CALL REQUEST (11) 8 lci 1024
From (2): 49 To(2): 46
  Facilities: (0)
  Call User Data (4): 0xCC 00 00 00 (ip)
Serial2: X25 O P4 CALL CONNECTED (3) 8 lci 1024
Serial2: X25 I D1 CLEAR REQUEST (5) 8 lci 1024 cause 0 diag 122
Serial2: X25 O D1 CLEAR CONFIRMATION (3) 8 lci 1024
Serial2: X25 O D1 RESET REQUEST (5) 8 lci 1 cause 0 diag 122
Serial2: X25 I D1 RESET CONFIRMATION (3) 8 lci 1
```

Figure 2-121 Sample Debug X25 Events Output

See the **debug x25 all** command description for information on the fields in **debug x25 events** output.

debug x25 vc

Use the **debug x25 vc** EXEC command to display information on traffic for a particular virtual circuit in order to solve any connectivity or performance problems it is exhibiting. The **no** form of this command removes the filter for a particular virtual circuit from the **debug x25 all** or **debug x25 events** output.

debug x25 vc *number*
no debug x25 vc *number*

Syntax Description

number	VC number associated with the virtual circuit(s) you want to monitor

Command Mode

EXEC

Usage Guidelines

Because no interface is specified, traffic on any VC that has the specified *number* is reported.

The **debug x25 vc** command limits the output of **debug x25 all** or **debug x25 events** output to the packets occurring on a particular VC number. This command modifies the operation of the **debug x25 all** or **debug x25 events** commands, so one of those commands must be used with **debug x25 vc** to produce output.

VC 0 cannot be specified. It is used for X.25 service messages, such as RESTART packets, not VC traffic. VC0 can be monitored only when no VC filter is used.

Note Because **debug x25 vc** only displays traffic for a small subset of virtual circuits, it is safe to use even under heavy traffic conditions, as long as events for that virtual circuit are fewer than 25 packets per second.

Sample Display

Figure 2-122 shows sample **debug x25 vc** output.

```
router# debug x25 events
X25 special event debugging is on
router# debug x25 vc 1
X25 debugging output restricted to VC1
router# show debug
X.25 (debugging restricted to VC number 1):
 X25 special event debugging is on

Serial0: X25 0 P2 CALL REQUEST (19) 8 lci 1
 From(14): 31250000000101 To(14): 31109090096101
  Facilities (0)
Serial0: X25 I P2 CLEAR REQUEST (5) 8 lci 1 cause diag 122
```

Figure 2-122 Sample Debug X25 VC Output

See the **debug x25 all** command description for information on the fields in **debug x25 vc** output.

debug xns packet

Use the **debug xns packet** EXEC command to display information on XNS packet traffic, including the addresses for source, destination, and next hop router of each packet. The **no** form of this command disables debugging output.

debug xns packet
no debug xns packet

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Usage Guidelines

To gain the fullest understanding of XNS routing activity, you should enable **debug xns routing** and **debug xns packet** together.

Sample Display

Figure 2-123 shows sample **debug xns packet** output.

```
router# debug xns packet

XNS: src=5.0000.0c02.6d04, dst=5.ffff.ffff.ffff, packet sent
XNS: src=1.0000.0c00.440f, dst=1.ffff.ffff.ffff, rcvd. on Ethernet0
XNS: src=1.0000.0c00.440f, dst=1.ffff.ffff.ffff, local processing
```

Figure 2-123 Sample Debug XNS Packet Output.

Table 2-84 describes significant fields shown in Figure 2-123.

Table 2-84 Debug XNS Packet Field Descriptions

Field	Description
XNS:	Indicates that this is an XNS packet.
src = 5.0000.0c02.6d04	Indicates that the source address for this message is 0000.0c02.6d04 on network 5.
dst = 5.ffff.ffff.ffff	Indicates that the destination address for this message is the broadcast address ffff.ffff.ffff on network 5.
packet sent	Indicates that the packet to destination address 5.ffff.ffff.ffff in Figure 2-123, as displayed using the **debug xns packet** command, was queued on the output interface.
rcvd. on Ethernet0	Indicates that the router just received this packet through the Ethernet0 interface.
local processing	Indicates that the router has examined the packet and determined that it must process it, rather than forwarding it.

debug xns routing

Use the **debug xns routing** EXEC command to display information on XNS routing transactions. The **no** form of this command disables debugging output.

debug xns routing
no debug xns routing

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Usage Guidelines

To gain the fullest understanding of XNS routing activity, enable **debug xns routing** and **debug xns packet** together.

Sample Display

Figure 2-124 shows sample **debug xns routing** output.

```
router# debug xns routing

XNSRIP: sending standard periodic update to 5.ffff.ffff.ffff via Ethernet2
  network 1, hop count 1
  network 2, hop count 2

XNSRIP: got standard update from 1.0000.0c00.440f socket 1 via Ethernet0
  net 2: 1 hops
```

Figure 2-124 Sample Debug XNS Routing Output

Table 2-85 describes significant fields shown in Figure 2-124.

Table 2-85 Debug XNS Routing Field Descriptions

Field	Description
XNSRIP:	This is an XNS routing packet.
sending standard periodic update	Router indicates that this is a periodic XNS routing information update.
to 5.ffff.ffff.ffff	Destination address is ffff.ffff.ffff on network 5.
via Ethernet2	Name of the output interface.
network 1, hop count 1	Network 1 is one hop away from this router.
got standard update from 1.0000.0c00.440f	Router indicates that it has received an XNS routing information update from address 0000.0c00.440f on network 1.
socket 1	The socket number is a well-known port for XNS. Possible values include 1—routing information 2—echo 3—router error