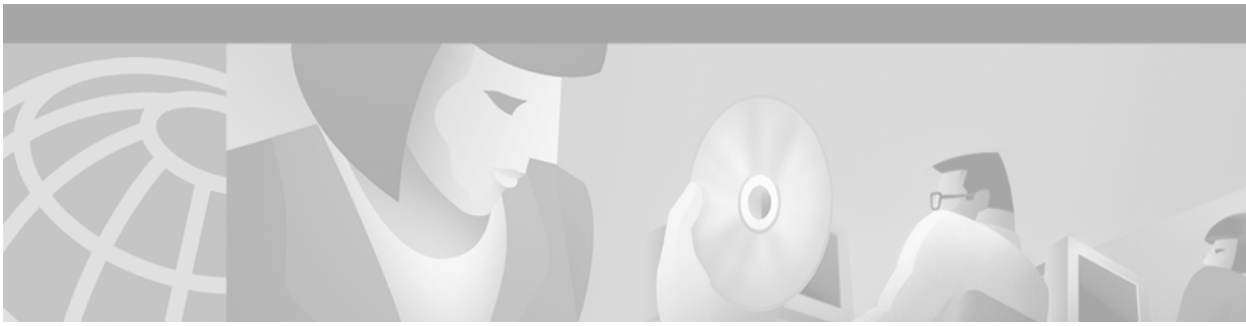

Serial Tunnel and Block Serial Tunnel Commands

Cisco's serial tunnel (STUN) feature allows Synchronous Data Link Control (SDLC) or High-Level Data Link Control (HDLC) devices to connect to one another through a multiprotocol internetwork rather than through a direct serial link. STUN encapsulates SDLC frames in either the Transmission Control Protocol/Internet Protocol (TCP/IP) or the HDLC protocol. STUN provides a straight passthrough of all SDLC traffic (including control frames, such as Receiver Ready) end-to-end between Systems Network Architecture (SNA) devices.

Cisco's SDLC local acknowledgment provides local termination of the SDLC session so that control frames no longer travel the WAN backbone networks. This means end nodes do not time out, and a loss of sessions does not occur. You can configure your network with STUN, or with STUN and SDLC local acknowledgment. To enable SDLC local acknowledgment, the Cisco IOS software must first be enabled for STUN and routers configured to appear on the network as primary or secondary SDLC nodes. TCP/IP encapsulation must be enabled. Cisco's SDLC transport feature also provides priority queueing for TCP encapsulated frames.

Cisco's block serial tunnel (BSTUN) implementation enables Cisco 2500, 3600, 4000, 4500, 4700 and 7200 series routers to support devices that use the Binary Synchronous Communications (Bisync) datalink protocol and asynchronous security protocols that include Adplex, ADT Security Systems, Inc., Diebold, asynchronous generic, and mdi traffic. Our support of the Bisync protocol enables enterprises to transport Bisync traffic and SNA multiprotocol traffic over the same network.

Use the commands in this chapter to configure BSTUN, Bisync, STUN, and SDLC local acknowledgment networks. For STUN and BSTUN configuration information and examples, refer to the "Configuring Serial Tunnel and Block Serial Tunnel" chapter in the *Cisco IOS Bridging and IBM Networking Configuration Guide*. To locate documentation of other commands, use the command reference master index or search online.

asp addr-offset

To configure an asynchronous port to send and receive polled asynchronous traffic through a BSTUN tunnel, use the **asp addr-offset** interface configuration command. To cancel the specification, use the **no** form of this command.

asp addr-offset *address-offset*

no asp addr-offset

Syntax Description

address-offset	Location of the address byte within the polled asynchronous frame being received.

Defaults

No default behavior or values.

Command Modes

Interface configuration

Command History

Release	Modification
11.2 F	This command was introduced.

Usage Guidelines

This command is used to specify the offset from the start of the frame where the address byte is located. This command only applies when the asynchronous-generic protocol has been specified on an interface using a combination of the **bstun protocol-group** global configuration command and the **bstun group** interface configuration command.

Interfaces configured to run the asynchronous-generic protocol have their baud rate set to 9600 bps, use 8 data bits, no parity, 1 start bit, and 1 stop bit. If different line configurations are required, use the **rxspeed**, **txspeed**, **databits**, **stopbits**, and **parity** line configuration commands to change the line attributes.

The addresses of the alarm panels should be used in the address field of the **bstun route address** interface configuration command.

Examples

The following example specifies that the first byte in the polled asynchronous frame contains the device address:

```
asp addr-offset 0
```

Related Commands

Command	Description
asp role	Specifies whether the router is acting as the primary end of the polled asynchronous link or as the secondary end of the polled asynchronous link connected to the serial interface, and whether the attached remote device is a security alarm control station.
asp rx-ift	Specifies a time period that, by expiring, signals the end of one frame being received and the start of the next.
bstun protocol-group	Defines a BSTUN group and the protocol it uses.
bstun route	Defines how frames will be forwarded from a BSTUN interface to a remote BSTUN peer.

asp role

To specify whether the router is acting as the primary end of the polled asynchronous link or as the secondary end of the polled asynchronous link connected to the serial interface and whether the attached remote device is a security alarm control station, use the **asp role** interface configuration command. To cancel the specification, use the **no** form of this command.

asp role {**primary** | **secondary**}

no asp role {**primary** | **secondary**}

Syntax Description

primary	Router is the primary end of the polled asynchronous link connected to the serial interface, and the attached remote devices are alarm panels.
secondary	Router is the secondary end of the polled asynchronous link connected to the serial interface, and the attached remote device is a security alarm control station.

Defaults

No default behavior or values.

Command Modes

Interface configuration

Command History

Release	Modification
11.2 F	This command was introduced.

Usage Guidelines

This command enables the interface on which ASP is configured. Configure the interface connected to the alarm console as a secondary router and the interface connected to the alarm panel as a primary router.

The addresses of the alarm panels should be used in the address field of the **bstun route address** interface configuration command.

Examples

The following example specifies the router as the primary end of the link:

```
asp role primary
```

Related Commands

Command	Description
bstun route	Defines how frames will be forwarded from a BSTUN interface to a remote BSTUN peer.

asp rx-ift

To specify a time period that, by expiring, signals the end of one frame being received and the start of the next, use the **asp rx-ift** interface configuration command. To cancel the specification, use the **no** form of this command.

asp rx-ift *interframe-timeout*

no asp rx-ift

Syntax Description

interframe-timeout	Number of milliseconds between the end of one frame being received and the start of the next frame. The default timeout value is 40 ms.

Defaults

The default timeout value is 40 ms.

Command Modes

Interface configuration

Command History

Release	Modification
11.2 F	This command was introduced.

Usage Guidelines

The interframe timeout is useful when different baud rates are used between the router and the alarm console or alarm panel. For example, you might set an interframe timeout of 6 ms if the polled asynchronous protocol is running at 9600 bps, but set the value to 40 ms if the protocol is running at 300 bps.

This command applies only when the asynchronous-generic protocol has been specified on an interface using a combination of the **bstun protocol-group** global configuration command and the **bstun group** interface configuration command.

Interfaces configured to run the asynchronous-generic protocol have their baud rate set to 9600 bps, use 8 data bits, no parity, 1 start bit, and 1 stop bit. If different line configurations are required, use the **rxspeed**, **txspeed**, **databits**, **stopbits**, and **parity** line configuration commands to change the line attributes.

The addresses of the alarm panels should be used in the address field of the **bstun route address** interface configuration command.

Examples

The following example sets the interframe timeout value to 6 ms because the polled asynchronous protocol is running at 9600 bps:

```
asp rx-ift 6
```

Related Commands

Command	Description
asp addr-offset	Configures an asynchronous port to send and receive polled asynchronous traffic through a BSTUN tunnel.
asp role	Specifies whether the router is acting as the primary end of the polled asynchronous link or as the secondary end of the polled asynchronous link connected to the serial interface, and whether the attached remote device is a security alarm control station.
bstun protocol-group	Defines a BSTUN group and the protocol it uses.
bstun route	Defines how frames will be forwarded from a BSTUN interface to a remote BSTUN peer.

bsc char-set

To specify the character set used by the Bisync support feature in this serial interface as either EBCDIC or ASCII, use the **bsc char-set** interface configuration command. To cancel the character set specification, use the **no** form of this command.

bsc char-set {**ascii** | **ebcdic**}

no bsc char-set {**ascii** | **ebcdic**}

Syntax Description

ascii	ASCII character set.
ebcdic	EBCDIC character set. This character set is the default.

Defaults

EBCDIC

Command Modes

Interface configuration

Command History

Release	Modification
11.0	This command was introduced.

Examples

The following command specifies that the ASCII character set will be used:

```
bsc char-set ascii
```

bsc contention

To specify an address on a contention interface, use the **bsc contention** interface configuration command. To cancel the specification, use the **no** form of this command.

bsc contention *address*

no bsc contention

Syntax Description

address	Address assigned to contention interface. The range is 1 to 255. The default is 0x01.

Defaults

The default address is 0x01 to accommodate backward compatibility to the previous point-to-point contention implementation.

Command Modes

Interface configuration

Command History

Release	Modification
11.0	This command was introduced.

Examples

The following command specifies address 20 on the remote device:

```
bsc contention 20
```

Related Commands

Command	Description
bsc dial-contention	Specifies a router at the central site as a central router with dynamic allocation of serial interfaces.

bsc dial-contention

To specify a router at the central site as a central router with dynamic allocation of serial interfaces, use the **bsc dial-contention** interface configuration command. To cancel the specification, use the **no** form of this command.

bsc dial-contention *time-out*

no bsc dial-contention

Syntax Description

time-out	Amount of time interface can sit idle before it is returned to the idle interface pool. The range is 2 to 30 seconds. The default is 5 seconds.

Defaults

5 seconds

Command Modes

Interface configuration

Command History

Release	Modification
11.2 F	This command was introduced.

Usage Guidelines

A timeout value is configurable to ensure that an interface does not get locked out because of a device outage during sending of data.

Examples

The following command defines a dial-in interface at the central site with an idle timeout of 10 seconds:

```
bsc dial-contention 10
```

Related Commands

Command	Description
bsc contention	Specifies an address on a contention interface.

bsc host-timeout

To detect deactivation of devices at the host, use the **bsc host-timeout** interface configuration command. To cancel the configuration, use the **no** form of this command.

bsc host-timeout *interval*

no host-timeout *interval*

Syntax Description

interval	Timeout interval within which a poll or select for a control unit must be received. If this interval expires, the remote router is sent a teardown peer signal. The range is 30 to 3000 deciseconds. The default is 600 deciseconds (60 seconds).

Defaults

The default interval is 600 deciseconds (60 seconds).

Command Modes

Interface configuration

Command History

Release	Modification
11.2 F	This command was introduced.

Usage Guidelines

This command is used to detect deactivation of devices at the host. If the host is told to deactivate or not poll a device it will take time for the signal to propagate the network and get the remote end from polling. The timeout can be used to fine tune the delay in detecting the host outage. The remote peer will stop polling the control unit that has timed out in the interval 1 to 2 times the configured timeout value.

Examples

The following example configures a timeout of 500 deciseconds (50 seconds):

```
bsc host-timeout 500
```

Related Commands

Command	Description
bsc secondary	Specifies that the router is acting as the secondary end of the Bisync link connected to the serial interface, and the attached remote device is a Bisync control station.
bstun group	Specifies the BSTUN group to which the interface belongs.
bstun protocol-group	Defines a BSTUN group and the protocol it uses.

bsc pause

To specify the interval, to the tenth of a second, between starts of the polling cycle, use the **bsc pause** interface configuration command. To cancel the specification, use the **no** form of this command.

bsc pause *time*

no bsc pause *time*

Syntax Description

time	Interval in tenths of a second. The default value is 30 (that is, 30 tenths of a second, or 3 seconds). The maximum time is 255 tenths of a second (25.5 seconds).

Defaults

30 tenths of a second (3 seconds)

Command Modes

Interface configuration

Command History

Release	Modification
11.0	This command was introduced.

Usage Guidelines

The following command sets the interval to 20 tenths of a second (2 seconds):

```
bsc pause 20
```

bsc poll-timeout

To specify the timeout, in tenths of a second, for a poll or select sequence, use the **bsc poll-timeout** interface configuration command. To cancel the specification, use the **no** form of this command.

bsc poll-timeout *time*

no bsc poll-timeout *time*

Syntax Description

time	Time in tenths of a second. The default value is 30 (that is, 30 tenths of a second, or 3 seconds).

Defaults

30 tenths of a second (3 seconds)

Command Modes

Interface configuration

Command History

Release	Modification
11.0	This command was introduced.

Examples

The following command sets the interval to 20 tenths of a second (2 seconds):

```
bsc poll-timeout 20
```

bsc primary

To specify that the router is acting as the primary end of the Bisync link connected to the serial interface, and that the attached remote devices are Bisync tributary stations, use the **bsc primary** interface configuration command. To cancel the specification, use the **no** form of this command.

bsc primary

no bsc primary

Syntax Description

This command has no arguments or keywords.

Defaults

No default behavior or values.

Command Modes

Interface configuration

Command History

Release	Modification
11.0	This command was introduced.

Usage Guidelines

The Bisync support feature in the serial interface uses the address of the incoming encapsulation for reply.

Examples

The following example specifies the router as the primary role:

```
bsc primary
```

Related Commands

Command	Description
bstun route	Defines how frames will be forwarded from a BSTUN interface to a remote BSTUN peer.

bsc retries

To specify the number of retries performed before a device is considered to have failed, use the **bsc retries** interface configuration command. To cancel the specification, use the **no** form of this command.

bsc retries *retries*

no bsc retries *retries*

Syntax Description

retries	Number of retries before a device fails. The default is 5.

Defaults

5 retries

Command Modes

Interface configuration

Command History

Release	Modification
11.0	This commands was introduced.

Examples

The following command sets the retry count to 10:

```
bsc retries 10
```

bsc secondary

To specify that the router is acting as the secondary end of the Bisync link connected to the serial interface, and the attached remote device is a Bisync control station, use the **bsc secondary** interface configuration command. To cancel the specification, use the **no** form of this command.

bsc secondary

no bsc secondary

Syntax Description

This command has no arguments or keywords.

Defaults

No default behavior or values.

Command Modes

Interface configuration

Command History

Release	Modification
11.0	This command was introduced.

Usage Guidelines

The Bisync support feature in this serial interface uses the address of the poll or selection block in the framing encapsulation. It also generates an end of transmission (EOT) frame preceding each Bisync poll and selection.

Examples

The following example specifies the router as the secondary role:

```
bsc secondary
```

Related Commands

Command	Description
bstun route	Defines how frames will be forwarded from a BSTUN interface to a remote BSTUN peer.

bsc servlim

To specify the number of cycles of the active poll list that are performed between polls to control units in the inactive poll list, use the **bsc servlim** interface configuration command. To cancel the specification, use the **no** form of this command.

bsc servlim *servlim-count*

no bsc servlim *servlim-count*

Syntax Description

servlim-count	Number of cycles. The range is 1 to 50. The default is 3.

Defaults

3 cycles

Command Modes

Interface configuration

Command History

Release	Modification
11.0	This command was introduced.

Examples

The following command sets the number of cycles to 2:

```
bsc servlim 2
```

bsc spec-poll

To set specific polls, rather than general polls, used on the host-to-router connection, use the **bsc spec-poll** interface configuration command. To cancel the specification, use the **no** form of this command.

bsc spec-poll

no spec-poll

Syntax Description

This command has no arguments or keywords.

Defaults

No default behavior or values.

Command Modes

Interface configuration

Command History

Release	Modification
11.1	This command was introduced.

Usage Guidelines

Use the **bsc spec-poll** command when a router is connected to a host, and only when that host issues specific polls rather than general polls. Tandem hosts that poll ATM cash machines are typically configured to use specific polls rather than general polls.

Configuring a downstream (control-unit/device connected) router to support specific polling has no effect.

Examples

The following commands configure serial interface 0 to use specific poll:

```
interface serial 0
 description Connection to host.
 encapsulation bstun
 bstun group 1
 bsc secondary
 bsc spec-poll
 bsc char-set ebcdic
 bstun route all tcp 10.10.14.122
```

bstun group

To specify the BSTUN group to which the interface belongs, use the **bstun group** interface configuration command. To remove the interface from the BSTUN group, use the **no** form of this command.

bstun group *group-number*

no bstun group *group-number*

Syntax Description

group-number	BSTUN group to which the interface belongs.

Defaults

No default behavior or values.

Command Modes

Interface configuration

Command History

Release	Modification
11.0	This command was introduced.

Usage Guidelines

Each BSTUN-enabled interface must be placed in a BSTUN group that was previously defined by the **bstun protocol-group** command. Packets only travel between BSTUN-enabled interfaces that are in the same group.

Examples

The following example specifies that serial interface 1 belongs to the previously defined protocol group 1:

```
interface serial 1
 encapsulation bstun
 bstun group 1
```

Related Commands

Command	Description
bstun protocol-group	Defines a BSTUN group and the protocol it uses.
encapsulation bstun	Configures BSTUN on a particular serial interface.

bstun keepalive-count

To define the number of times to attempt a peer connection before declaring the peer connection to be down, use the **bstun keepalive-count** global configuration command. To cancel the definition, use the **no** form of this command.

bstun keepalive-count *count*

no bstun keepalive-count

Syntax Description

count	Number of connection attempts. The range is between 2 and 10 retries.

Defaults

No default behavior or values.

Command Modes

Global configuration

Command History

Release	Modification
11.1	This command was introduced.

Usage Guidelines

The following example sets the number of times to retry a connection to a peer to 4:

```
bstun keepalive-count 4
```

Related Commands

Command	Description
bstun remote-peer-keepalive	Enables detection of the loss of a peer.

bstun lisnsap

To configure a SAP on which to listen for incoming calls, use the **bstun lisnsap** global configuration command. To cancel the SAP on which to listen, use the **no** form of this command.

bstun lisnsap *sap-value*

no bstun lisnsap

Syntax Description

sap-value	SAP on which to listen for incoming calls. The default is 04.

Defaults

The default SAP value is 04.

Command Modes

Global configuration

Command History

Release	Modification
11.2 F	This command was introduced.

Usage Guidelines

Changes to the **bstun lisnsap** command configuration will not take effect until after the router has been reloaded.

Examples

The following example configures a SAP for listening:

```
bstun lisnsap
```

Related Commands

Command	Description
bstun route (Frame Relay)	Defines how frames will be forwarded from a BSTUN interface to a remote BSTUN peer over Frame Relay.
frame-relay map bstun	Configures BSTUN over Frame Relay for passthrough.
frame-relay map llc2	Configures BSTUN over Frame Relay when using Bisync local acknowledgment.

bstun peer-name

To enable the BSTUN function, use the **bstun peer-name** global configuration command. To disable the function, use the **no** form of this command.

bstun peer-name *ip-address*

no bstun peer-name *ip-address*

Syntax Description

ip-address	Address by which this BSTUN peer is known to other BSTUN peers that are using the TCP transport.

Defaults

No default behavior or values.

Command Modes

Global configuration

Command History

Release	Modification
11.0	This command was introduced.

Usage Guidelines

The IP address defines the address by which this BSTUN peer is known to other BSTUN peers that are using the TCP transport. If this command is unconfigured or the **no** form of this command is specified, all BSTUN routing commands with IP addresses are deleted. BSTUN routing commands without IP addresses are not affected by this command.

Examples

The following example enables the BSTUN function:

```
bstun peer-name 150.10.254.201
```

Related Commands

Command	Description
bstun protocol-group	Defines a BSTUN group and the protocol it uses.

bstun protocol-group

To define a BSTUN group and the protocol it uses, use the **bstun protocol-group** global configuration command. To delete the BSTUN group, use the **no** form of this command.

bstun protocol-group *group-number protocol*

no bstun protocol-group *group-number protocol*

Syntax Description

group-number	BSTUN group number. Valid numbers are decimal integers in the range 1 to 255.
protocol	Block serial protocol, selected from the following: • **adplex** • **adt-poll-select** • **adt-vari-poll** • **async-generic** • **bsc** • **bsc-local-ack** • **diebold** • **mdi**

Defaults

No default behavior or values.

Command Modes

Global configuration

Command History

Release	Modification
11.0	This command was introduced.

Usage Guidelines

Interfaces configured to run the Adplex protocol have their baud rate set to 4800 bps, use even parity, 8 data bits, 1 start bit, and 1 stop bit.

Interfaces configured to run the adt-vari-poll and adt-poll-select protocols have their baud rate set to 600 bps, use even parity, 8 data bits, 1 start bit, and 1.5 stop bits. If different line configurations are required, use the **rxspeed**, **txspeed**, **databits**, **stopbits**, and **parity** line configuration commands to change the line attributes.

Interfaces configured to run the asynchronous-generic protocol have their baud rate set to 9600 bps, use no parity, 8 data bits, 1 start bit, and 1 stop bit. If different line configurations are required, use the **rxspeed**, **txspeed**, **databits**, **stopbits**, and **parity** line configuration commands to change the line attributes.

Interfaces configured to run the mdi protocol have their baud rate set to 600 bps, use even parity, 8 data bits, 1 start bit, and 1.5 stop bits. If different line configurations are required, use the **rxspeed**, **txspeed**, **databits**, **stopbits**, and **parity** line configuration commands to change the line attributes. The mdi protocol allows alarm panels to be sent to the MDI alarm console.

Examples

The following example defines BSTUN group 1, specifies that it uses the Bisync protocol, and indicates that frames will be locally acknowledged:

```
bstun protocol-group 1 bsc-local-ack
```

Related Commands

Command	Description
bstun group	Specifies the BSTUN group to which the interface belongs.

bstun remote-peer-keepalive

To enable detection of the loss of a peer, use the **bstun remote-peer-keepalive** global configuration command. To disable detection, use the **no** form of this command.

bstun remote-peer-keepalive *seconds*

no bstun remote-peer-keepalive

Syntax Description

seconds	Keepalive interval, in seconds. The range is 1 to 300 seconds. The default is 30 seconds.

Defaults

30 seconds

Command Modes

Global configuration

Command History

Release	Modification
11.1	This command was introduced.

Examples

In the following example, the remote-peer-keepalive interval is set to 60 seconds:

```
bstun remote-peer-keepalive 60
```

Related Commands

Command	Description
bstun keepalive-count	Defines the number of times to attempt a peer connection before declaring the peer connection to be down.

bstun route

To define how frames will be forwarded from a BSTUN interface to a remote BSTUN peer, use the **bstun route** interface configuration command. To cancel the definition, use the **no** form of this command.

bstun route {**all** | **address** *address-number*} {**tcp** *ip-address* | **interface serial** *number*}

no bstun route {**all** | **address** *address-number*} {**tcp** *ip-address* | **interface serial** *number*}

Syntax Description

all	All BSTUN traffic received on the input interface is propagated, regardless of the address contained in the serial frame.
address	Serial frame that contains a specific address is propagated.
address-number	Poll address, a hexadecimal number from 01 to FF (but not all values are valid). The reply address to be used on the return leg is calculated from the configured poll address.
tcp	TCP encapsulation is used to propagate frames that match the entry.
ip-address	IP address of the remote BSTUN peer.
interface serial	HDLC encapsulation is used to propagate the serial frames.
number	Serial line to an appropriately configured router on the other end.

Defaults

No default behavior or values.

Command Modes

Interface configuration

Command History

Release	Modification
11.0	This command was introduced.

Usage Guidelines

When the ADplex protocol is specified in the **bstun protocol-group** command, ADplex device addresses are limited to the range 1 to 127 because ADplex alarm panels invert the device address in the ADplex frame when responding to alarm console commands.

When the adt-poll-select protocol is specified in the **bstun protocol-group** command, routes for specific addresses cannot be specified on the downstream router (connected to the alarm panel), because no address field is provided within frames that are sent back to the alarm console. The only way to route traffic back to the alarm console is to use the **bstun route all** form of the **bstun route** command. This is also true for the diebold protocol and any other protocol supported by the asynchronous-generic protocol group that does not include a device address in the frame.

When the adt-vari-poll protocol is specified in the **bstun protocol-group** command, ADT device addresses are limited to the range 0 to 255, and address 0 is reserved for use as a broadcast address for adt-vari-poll only. If address 0 is specified in the **bstun route address** form of the **bstun route** command, the address is propagated to all configured BSTUN peers.

It is possible to use both the **all** and the **address** keywords on different **bstun route** commands on the same serial interface. When this is done, the **address** specifications take precedence; if none of these match, then the **all** specification is used to propagate the frame.

Examples

In the following example, all BSTUN traffic received on serial interface 0 is propagated, regardless of the address contained in the serial frame:

```
bstun route all interface serial 0
```

bstun route (Frame Relay)

To define how frames will be forwarded from a BSTUN interface to a remote BSTUN peer over Frame Relay, use the **bstun route** (Frame Relay) interface configuration command. To cancel the definition, use the **no** form of this command.

bstun route {**all** | **address** *cu-address*} **interface serial** *number* [**dlci** *dlci rsap*] [**priority** *priority*]

no bstun route {**all** | **address** *cu-address*} **interface serial** *number* [**dlci** *dlci rsap*] [**priority** *priority*]

Syntax Description

all	All BSTUN traffic received on the input interface is propagated, regardless of the address contained in the serial frame.
address	Serial frames that contain a specific address are propagated.
cu-address	Control unit address for the Bisync end station.
interface serial *number*	Specify a serial interface on which Frame Relay encapsulation is used to propagate serial frames.
dlci *dlci*	(Optional) Data-link connection identifier to be used on the Frame Relay interface.
rsap	(Optional) Remote SAP, to be used when initiating an LLC2 session. This argument is configurable only if the interface group number supports local acknowledgment.
priority *priority*	(Optional) Priority port to be used for this LLC2 session. Configurable only if the interface group number supports local acknowledgment.

Defaults

No default behavior or values.

Command Modes

Interface configuration

Command History

Release	Modification
11.1	This command was introduced.

Examples

The following example configures BSTUN over Frame Relay. All BSTUN traffic is propagated to serial interface 0 regardless of the address contained in the serial frame:

```
bstun route all interface serial 0 dlci 16
```

encapsulation bstun

To configure BSTUN on a particular serial interface, use the **encapsulation bstun** interface configuration command. To disable the BSTUN function on the interface, use the **no** form of this command.

encapsulation bstun

no encapsulation bstun

Syntax Description

This command has no arguments or keywords.

Defaults

No default behavior or values.

Command Modes

Interface configuration

Command History

Release	Modification
11.0	This command was introduced.

Usage Guidelines

The **encapsulation bstun** command must be configured on an interface before any further BSTUN or Bisync commands are configured for the interface.

You must use this command to enable BSTUN on an interface. Before using this command, complete the following two tasks:

- Enable BSTUN on a global basis by identifying BSTUN on IP addresses. The command is **bstun peer-name**.
- Define a protocol group number to be applied to the interface. Packets only travel between interfaces that are in the same protocol group. The command is **bstun protocol-group**.

After using the **encapsulation bstun** command, use the **bstun group** command to place the interface in the previously defined protocol group.

Examples

The following example configures the BSTUN function on serial interface 0:

```
interface serial 0
 no ip address
 encapsulation bstun
```

Related Commands

Command	Description
bstun group	Specifies the BSTUN group to which the interface belongs.
bstun peer-name	Enables the BSTUN function.
bstun protocol-group	Defines a BSTUN group and the protocol it uses.

encapsulation stun

To enable STUN encapsulation on a specified serial interface, use the **encapsulation stun** interface configuration command.

encapsulation stun

Syntax Description

This command has no arguments or keywords.

Defaults

STUN encapsulation is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

Use this command to enable STUN on an interface. Before using this command, complete the following two tasks:

- Enable STUN on a global basis by identifying STUN on IP addresses. The command is **stun peer-name**.
- Define a protocol group number to be applied to the interface. Packets only travel between interfaces that are in the same protocol group. The command is **stun protocol-group**.

After using the **encapsulation stun** command, use the **stun group** command to place the interface in the previously defined protocol group.

To disable stun encapsulation, configure the default interface encapsulation using the **encapsulation** command and specify hdlc as the encapsulation-type

There is not a **no** form for this command.

Examples

This partial configuration example shows how to enable serial interface 5 for STUN traffic:

```
! sample stun peer name and stun protocol-group global commands
stun peer-name 131.108.254.6
stun protocol-group 2 sdlc
!
interface serial 5
! sample ip address command
no ip address
! enable the interface for STUN; must specify encapsulation stun
! command to further configure the interface
encapsulation stun
! place interface serial 5 in previously defined STUN group 2
stun group 2
! enter stun route command
stun route 7 tcp 131.108.254.7
```

Related Commands

Command	Description
stun group	Places each STUN-enabled interface on a router in a previously defined STUN group.
stun peer-name	Enables STUN for an IP address.
stun protocol-group	Creates a protocol group.

frame-relay map bstun

To configure BSTUN over Frame Relay for passthrough, use the **frame-relay map bstun** interface configuration command. To cancel the configuration, use the **no** form of this command.

frame-relay map bstun *dlci*

no frame-relay map bstun *dlci*

Syntax Description

dlci	Frame Relay DLCI number on which to support passthrough.

Defaults

No default behavior or values.

Command Modes

Interface configuration

Command History

Release	Modification
11.2 F	This command was introduced.

Usage Guidelines

Direct encapsulation over Frame Relay is supported only for an encapsulation type of cisco, configured using the **encapsulation frame-relay** command.

Examples

The following example maps BSTUN traffic to DLCI number 16:

```
frame-relay map bstun 16
```

Related Commands

Command	Description
bstun lisnsap	Configures a SAP on which to listen for incoming calls.
bstun protocol-group	Defines a BSTUN group and the protocol it uses.
encapsulation frame-relay	Enables Frame Relay encapsulation.

priority-list protocol bstun

To establish BSTUN queueing priorities based on the BSTUN header, use the **priority-list protocol bstun** global configuration command. To revert to normal priorities, use the **no** form of this command.

priority-list *list-number* **protocol bstun** *queue* [**gt** | **lt** *packetsize*] [**address** *bstun-group bsc-addr*]

no priority-list *list-number* **protocol bstun** *queue* [**gt** | **lt** *packetsize*] [**address** *bstun-group bsc-addr*]

Syntax Description

list-number	Arbitrary integer between 1 and 10 that identifies the priority list selected by the user.
queue	Priority queue type: **high**, **medium**, **normal**, or **low**.
gt | **lt** *packetsize*	(Optional) Output interface examines header information *and* packet size and places packets with the BSTUN header that match criteria (gt or lt specified packet size) on specified output.
address *bstun-group bsc-addr*	(Optional) Output interface examines header information and Bisync address and places packets with the BSTUN header that match Bisync address on the specified output queue.

Defaults

Prioritize based on BSTUN header.

Command Modes

Global configuration

Command History

Release	Modification
11.0	This command was introduced.

Examples

In the following example, the output interface examines the header information and places packets with the BSTUN header on the output queue specified as medium.

```
priority-list 1 protocol bstun medium
```

Related Commands

Command	Description
encapsulation bstun	Configures BSTUN on a particular serial interface.

priority-list protocol ip tcp

To establish BSTUN or STUN queueing priorities based on the TCP port, use the **priority-list protocol ip tcp** global configuration command. To revert to normal priorities, use the **no** form of this command.

priority-list *list-number* **protocol ip** *queue* **tcp** *tcp-port-number*

no priority-list *list-number* **protocol ip** *queue* **tcp** *tcp-port-number*

Syntax Description

list-number	Arbitrary integer between 1 and 10 that identifies the priority list selected by the user.
queue	Priority queue type: **high**, **medium**, **normal**, or **low**. The default *queue* value is **normal**.
tcp-port-number	BSTUN port and priority settings are as follows: • High—BSTUN port 1976 • Medium—BSTUN port 1977 • Normal—BSTUN port 1978 • Low—BSTUN port 1979 STUN port and priority settings are as follows: • High—STUN port 1994 • Medium—STUN port 1990 • Normal—STUN port 1991 • Low—STUN port 1992

Defaults

The default *queue* value is **normal**.

Command Modes

Global configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

Use the **priority-list protocol stun address** command first. Priority settings created with this command are assigned to SDLC ports.

Note SDLC local acknowledgment with the priority option must be enabled using the **stun route address tcp** command.

Examples

In the following example, queueing priority for address C1 using priority list 1 is set to high. A priority queue of high is assigned to the SDLC port 1994.

```
priority-list 1 stun high address 1 c1
priority-list 1 protocol ip high tcp 1994
```

In the following example, queueing priority for address C1 using priority list 1 is set to high. A priority queue of high is assigned to BSTUN port 1976.

```
priority-list bstun high address 1 c1
priority-list 1 protocol ip high 1976
```

Related Commands

Command	Description
bstun protocol-group	Defines a BSTUN group and the protocol it uses.
encapsulation bstun	Configures BSTUN on a particular serial interface.
encapsulation stun	Enables STUN encapsulation on a specified serial interface.
priority-list protocol bstun	Establishes BSTUN queueing priorities based on the BSTUN header.
priority-list protocol stun address	Establishes STUN queueing priorities based on the address of the serial link.
stun route address tcp	Specifies TCP encapsulation and optionally establishes SDLC local acknowledgment (SDLC transport) for STUN.

priority-list protocol stun address

To establish STUN queueing priorities based on the address of the serial link, use the **priority-list protocol stun address** global configuration command. To revert to normal priorities, use the **no** form of this command.

priority-list *list-number* **protocol stun** *queue* **address** *group-number address-number*

no priority-list *list-number* **protocol stun** *queue-keyword* **address** *group-number address-number*

Syntax Description

list-number	Arbitrary integer between 1 and 16 that identifies the priority list selected by the user.
queue	Enables a priority queue type: Valid queue values and their equivalent priority queue type level are: • **high—**Priority queue type is high. • **medium—**Priority queue type is medium. • **normal**—Priority queue type is normal. • **low**—Priority queue type is low. The default *queue* value is **normal**.
group-number	Group number that is used in the **stun group** command.
address-number	Address of the serial link. For an SDLC link, the format is a 1-byte hexadecimal value (for example, C1). For a non-SDLC link, the address format can be specified by the **stun schema** command.

Defaults

The default *queue* value is **normal**.

Command Modes

Global configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

Note SDLC local acknowledgment with the priority option must be enabled using the **stun route address interface serial** command.

The **priority-list** command is described in greater detail in the "Performance Management Commands" chapter in the *Cisco IOS Configuration Fundamentals Command Reference*.

Examples

In the following example, queueing priority for address C1 using priority list 1 is set to high:

```
priority-list 1 stun high address 1 c1
```

Related Commands

Command	Description
priority-list protocol ip tcp	Establishes BSTUN or STUN queueing priorities based on the TCP port.
stun group	Places each STUN-enabled interface on a router in a previously defined STUN group.
stun route address interface serial	Forwards all HDLC traffic on a serial interface.
stun schema offset length format	Defines a protocol other than SDLC for use with STUN.

queue-list protocol bstun

To customize BSTUN queueing priorities based on the BSTUN header, use the **queue-list protocol bstun** global configuration command. To revert to normal priorities, use the **no** form of this command.

queue-list *list-number* **protocol bstun** *queue* [**gt** | **lt** *packetsize*] [**address** *bstun-group bsc-addr*]

no queue-list *list-number* **protocol bstun** *queue* [**gt** | **lt** *packetsize*] [**address** *bstun-group bsc-addr*]

Syntax Description

list-number	Arbitrary integer between 1 and 10 that identifies the priority list selected by the user.
queue	Enables a priority queue type: Valid queue-keyword values and their equivalent priority queue type level are: • **high—**Priority queue type is high. • **medium—**Priority queue type is medium. • **normal**—Priority queue type is normal. • **low**—Priority queue type is low.
gt | **lt** *packetsize*	(Optional) Output interface examines header information *and* packet size and places packets with the BSTUN header that match criteria (**gt** or **lt** specified packet size) on specified output.
address *bstun-group bsc-addr*	(Optional) Output interface examines header information and Bisync address and places packets with the BSTUN header that match Bisync address on the specified output queue.

Defaults

Prioritize based on BSTUN header.

Command Modes

Global configuration

Command History

Release	Modification
11.0	This command was introduced.

Examples

In the following example, the output interface examines the header information and places packets with the BSTUN header on the output queue specified as medium.

```
queue-list 1 protocol bstun medium
```

Related Commands

Command	Description
encapsulation bstun	Configures BSTUN on a particular serial interface.

queue-list protocol ip tcp

To customize BSTUN queueing priorities based on the TCP port, use the **queue-list protocol ip tcp** global configuration command. To revert to normal priorities, use the **no** form of this command.

queue-list *list-number* **protocol ip** *queue* **tcp** *tcp-port-number*

no queue-list *list-number* **protocol ip** *queue* **tcp** *tcp-port-number*

Syntax Description

list-number	Arbitrary integer between 1 and 10 that identifies the priority list selected by the user.
queue	Enables a priority queue type: Valid queue-keyword values and their equivalent priority queue type level are: • **high**—Priority queue type is high. • **medium**—Priority queue type is medium. • **normal**—Priority queue type is normal. • **low**—Priority queue type is low. The default *queue* value is **normal**.
tcp-port-number	BSTUN port and priority settings are as follows: • High—BSTUN port 1976 • Medium—BSTUN port 1977 • Normal—BSTUN port 1978 • Low—BSTUN port 1979 STUN port and priority settings are as follows: • High—STUN port 1994 • Medium—STUN port 1990 • Normal—STUN port 1991 • Low—STUN port 1992

Defaults

The default *queue* value is **normal**.

Command Modes

Global configuration

Command History

Release	Modification
11.0	This command was introduced.

Examples

In the following example, queueing priority for address C1 using priority list 1 is set to high. A priority queue of high is assigned to BSTUN port 1976.

```
queue-list bstun high address 1 c1
queue-list 1 protocol ip high 1976
```

Related Commands

Command	Description
encapsulation bstun	Configures BSTUN on a particular serial interface.

sdlc virtual-multidrop

To allow SDLC broadcast address FF to be replicated for each of the STUN peers, so each of the end stations receive the broadcast frame, use the **sdlc virtual-multidrop** interface configuration command. To disable the SDLC broadcast feature, use the **no** form of this command.

sdlc virtual-multidrop

no sdlc virtual-multidrop

Syntax Description

This command has no arguments or keywords.

Defaults

SDLC broadcast is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
10.3	This command was introduced.

Examples

The following example allows each STUN peer to receive a broadcast frame:

```
sdlc virtual-multidrop
```

Related Commands

Command	Description
stun route address tcp	Specifies TCP encapsulation and optionally establishes SDLC local acknowledgment (SDLC transport) for STUN.

show bsc

To display statistics about the interfaces on which Bisync is configured, use the **show bsc** privileged EXEC command.

show bsc [**group** *bstun-group-number*] [**address** *address-list*]

Syntax Description

group *bstun-group-number*	(Optional) BSTUN group number. Valid numbers are decimal integers in the range 1 to 255.
address *address-list*	(Optional) List of poll addresses.

Command Modes

Privileged EXEC

Command History

Release	Modification
11.0	This command was introduced.

Examples

The following is sample output from the **show bsc** command:

```
Router# show bsc

BSC pass-through on Serial4:
HDX enforcement state: IDLE.
Frame sequencing state: IDLE.
Total Tx Counts: 0 frames(total). 0 frames(data). 0 bytes.
Total Rx Counts: 0 frames(total). 0 frames(data). 0 bytes.

BSC local-ack on serial5:
Secondary state is CU_Idle.
Control units on this interface:

        Poll address: C2. Select address: E2.
        State is Active.
        Tx Counts: 1137 frames(total). 0 frames(data). 1137 bytes.
        Rx Counts: 1142 frames(total). 0 frames(data). 5710 bytes.

        Poll address: C3. Select address: E3 *CURRENT-CU*
        State is Active.
        Tx Counts: 1136 frames(total). 0 frames(data). 1136 bytes.
        Rx Counts: 1142 frames(total). 0 frames(data). 5710 bytes.

Total Tx Counts: 2273 frames(total). 0 frames(data). 2273 bytes.
Total Rx Counts: 2284 frames(total). 0 frames(data). 11420 bytes.
```

The following is sample output from the **show bsc** command specifying BSTUN group 50:

```
Router# show bsc group 50

BSC local-ack on serial5:
Secondary state is CU_Idle.
Control units on this interface:

        Poll address: C2. Select address: E2.
        State is Active.
        Tx Counts: 1217 frames(total). 0 frames(data). 1217 bytes.
        Rx Counts: 1222 frames(total). 0 frames(data). 6110 bytes.

        Poll address: C3. Select address: E3 *CURRENT-CU*
        State is Active.
        Tx Counts: 1214 frames(total). 0 frames(data). 1214 bytes.
        Rx Counts: 1220 frames(total). 0 frames(data). 6100 bytes.

Total Tx Counts: 2431 frames(total). 0 frames(data). 2431 bytes.
Total Rx Counts: 2442 frames(total). 0 frames(data). 12200 bytes.
```

The following is sample output from the **show bsc** command specifying BSTUN group 50 and poll address C2:

```
Router# show bsc group 50 address C2

BSC local-ack on serial5:
Secondary state is CU_Idle.
Control units on this interface:

        Poll address: C2. Select address: E2.
        State is Active.
        Tx Counts: 1217 frames(total). 0 frames(data). 1217 bytes.
        Rx Counts: 1222 frames(total). 0 frames(data). 6110 bytes.

Total Tx Counts: 1217 frames(total). 0 frames(data). 1217 bytes.
Total Rx Counts: 1222 frames(total). 0 frames(data). 6110 bytes.
```

The following is sample output from the **show bsc** command specifying poll address C2:

```
Router# show bsc address C2

BSC pass-through on Serial4:
HDX enforcement state: IDLE.
Frame sequencing state: IDLE.
Total Tx Counts: 0 frames(total). 0 frames(data). 0 bytes.
Total Rx Counts: 0 frames(total). 0 frames(data). 0 bytes.

BSC local-ack on serial5:
Secondary state is CU_Idle.
Control units on this interface:

        Poll address: C2. Select address: E2.
        State is Active.
        Tx Counts: 1137 frames(total). 0 frames(data). 1137 bytes.
        Rx Counts: 1142 frames(total). 0 frames(data). 5710 bytes.

Total Tx Counts: 1137 frames(total). 0 frames(data). 1137 bytes.
Total Rx Counts: 1142 frames(total). 0 frames(data). 5710 bytes.
```

Table 39 describes significant fields shown in the display.

Table 39 show bsc Field Descriptions

Field	Description
BSC *x* on *interface y*	Indicates whether the router is configured for passthrough or local acknowledgment on the indicated interface.
Output queue depth	Packets queued on this interface. This field is only displayed when the value is not zero.
Frame builder state	Current frame building state. This field is only displayed when the state is not IDLE.
HDX enforcement state	Current half-duplex send enforcement state. The possible values are: • IDLE—Waiting for communication activity. • PND_COMP—Waiting for router to send. • PND_RCV—Waiting for attached device to respond to data sent.
Frame sequencing state	Frame sequencing state to protect against network latencies. When the router is configured as the primary end of the link, the possible values are: • IDLE—Waiting for a poll. • SEC—In a session with a device. When the router is configured as the secondary end of the link, the possible values are: • IDLE—Waiting for a poll. • PRI—In a session with a device. When the router is configured for point-to-point contention, the possible values are: • IDLE—Waiting for a poll. • PEND—Waiting for the first data frame. • PRI—Connected device is acting as a primary device. • SEC—Connected device is acting as a secondary device.
Total Tx Counts	Total transmit frame count for the indicated interface.
Total Rx Count	Total receive frame count for the indicated interface.

Table 39 show bsc Field Descriptions (continued)

Field	Description
Primary state is …	The current state when the router is configured as the primary end of the link. The possible values are: • TCU_Down—Waiting for the line to become active. • TCU_EOFile—A valid block ending in ETX has been received. • TCU_Idle—Waiting for work or notification of completion of the sending of EOT. • TCU_InFile—A valid block ending in ETB has been received. • TCU_Polled—A general poll has been issued. • TCU_Selected—A select has been issued. • TCU_SpecPolled—A specific poll has been sent. • TCU_TtdDelay—An ETB block was acknowledged, but the next block to be sent has not yet been received. • TCU_TtdSent—A TTD has been sent because no data was received by the time the timeout for sending Ttd expired. • TCU_TxEOFile—A block of data ending in ETX has been sent. • TCU_TxInFile—A block of data ending in ETB has been sent. • TCU_TxRetry—Trying to send a frame again.
Secondary state is …	The current state when the router is configured as the secondary end of the link. The possible values are: • CU_DevBusy—A select has been refused with WACK or RVI. • CU_Down—Waiting for the line to become active. • CU_EOFile—A valid block ending in ETX has been received. • CU_Idle—Waiting for a poll or select action. • CU_InFile—A valid block ending in ETB has been received. • CU_Selected—A select has been acknowledged. • CU_TtdDelay—An ETB block was acknowledged, but the next block to be sent has not yet been received. • CU_TtdSent—A TTD has been sent because no data was received by the time the timeout for sending Ttd expired. • CU_TxEOFile—A block of data ending in ETX has been sent. • CU_TxInFile—A block of data ending in ETB has been sent. • CU_TxRetry—Trying to send a frame again. • CU_TxSpecPollData—A data frame (typically S/S) has been used to answer a specific poll. • CU_TxStatus—Host has polled for device-specific status.
Poll address	Address used when the host wants to get device information.
Select address	Address used when the host wants to send data to the device.

Table 39 show bsc Field Descriptions (continued)

Field	Description
State is …	Current initialization state of this control unit. The possible values are: • Active—The remote device is active. • Inactive—The remote device is dead. • Initializing—No response from remote device yet.
Tx Counts	Transmit frame count for this control unit.
Rx Counts	Receive frame count for this control unit.
Total Tx Counts	Total transmit frame count for the indicated interface.
Total Rx Counts	Total receive frame count for the indicated interface.

show bstun

To display the current status of STUN connections, use the **show bstun** privileged EXEC command.

show bstun [**group** *bstun-group-number*] [**address** *address-list*]

Syntax Description

group *bstun-group-number*	(Optional) BSTUN group number. Valid numbers are decimal integers in the range 1 to 255.
address *address-list*	(Optional) List of poll addresses.

Command Modes

Privileged EXEC

Command History

Release	Modification
11.0	This command was introduced.

Examples

The following is sample output from the **show bstun** command with no options:

```
Router# show bstun

This peer: 22.22.1.107
 *Serial0  (group 1 [bsc])
route  transport  address     state     rx_pkts   tx_pkts   drops
all    TCP        22.22.1.108 closed        0         0       0

  Serial4  (group 3 [bsc])
route  transport  address     state     rx_pkts   tx_pkts   drops
C2     TCP        22.22.2.108 closed        0         0       0
C1     TCP        22.22.2.108 closed        0         0       0
40     TCP        22.22.1.108 closed        0         0       0

  Serial5  (group 50 [bsc])
route  transport  address     state     rx_pkts   tx_pkts   drops
C2     TCP        22.22.2.108 open          4         4       0
C3     TCP        22.22.2.108 open          3         3       0
```

The following is sample output from the **show bstun** command specifying BSTUN group 3:

```
Router# show bstun group 3

This peer: 22.22.1.107
  Serial4  (group 3 [bsc])
route  transport  address     state     rx_pkts   tx_pkts   drops
C2     TCP        22.22.2.108 closed        0         0       0
C1     TCP        22.22.2.108 closed        0         0       0
40     TCP        22.22.1.108 closed        0         0       0
```

The following is sample output from the **show bstun** command specifying BSTUN group 3 and poll address C1:

```
Router# show bstun group 3 address C1

This peer: 22.22.1.107
  Serial4  (group 3 [bsc])
route  transport  address     state     rx_pkts   tx_pkts   drops
C1     TCP        22.22.2.108 closed        0         0       0
```

The following is sample output from the **show bstun** command specifying poll address C2:

```
Router# show bstun address C2

This peer: 22.22.1.107
  Serial4  (group 3 [bsc])
route  transport  address     state     rx_pkts   tx_pkts   drops
C2     TCP        22.22.2.108 closed        0         0       0

  Serial5  (group 50 [bsc])
route  transport  address     state     rx_pkts   tx_pkts   drops
C2     TCP        22.22.2.108 open          4         4       0
```

Table 40 describes significant fields shown in the output.

Table 40 show bstun Field Descriptions

Field	Description
This peer	Lists the peer name or address. The interface name (as defined by the **description** command), its BSTUN group number, and the protocol associated with the group are shown on the next header line.
route	Bisync control unit address.
transport	Description of link, either a serial interface using serial transport (indicated by IF followed by interface name), or a TCP connection to a remote router (TCP followed by IP address).
address	Address or the word *all* if the default forwarding entry is specified, followed by a repeat of the group number given for the interface.
state	State of the link: open is the normal, working state; direct indicates a direct link to another line, as specified with the **direct** keyword on the **bstun route** command.
rx_pkts	Number of received packets.
tx_pkts	Number of sent packets.
drops	Number of packets that had to be dropped for whatever reason.

show stun

To display the current status of STUN connections, use the **show stun** privileged EXEC command.

show stun

Syntax Description

This command has no arguments or keywords.

Command Modes

Privileged EXEC

Command History

Release	Modification
10.0	This command was introduced.

Examples

The following is sample output from the **show stun** command:

```
Router# show stun

This peer: 131.108.10.1
Serial0 -- 3174 Controller for test lab (group 1 [sdlc])
                          state   rx-pkts  tx-pkts  drops  poll
  7[1] IF Serial1         open     20334    86440      5  8P
 10[1] TCP 131.108.8.1    open      6771     7331      0
all[1] TCP 131.108.8.1    open    612301  2338550   1005
```

In the display, the first entry reports proxy polling is enabled for address 7 and serial 0 is running with modulus 8 on the primary side of the link. The link has received 20,334 packets, sent 86,440 packets, and dropped 5 packets.

Table 41 describes significant fields shown in the output.

Table 41 show stun Field Descriptions

Field	Description
This peer	Lists the peer name or address. The interface name (as defined by the **description** command), its STUN group number, and the protocol associated with the group are shown on the header line.
STUN address	Address or the word *all* if the default forwarding entry is specified, followed by a repeat of the group number given for the interface.
Type of link	Description of link, either a serial interface using serial transport (indicated by IF followed by interface name), or a TCP connection to a remote router (TCP followed by IP address).
state	State of the link: open is the normal, working state; direct indicates a direct link to another line, as specified with the **direct** keyword on the **stun route** command.
rx_pkts	Number of received packets.

Table 41 show stun Field Descriptions (continued)

Field	Description
tx_pkts	Number of sent packets.
drops	Number of packets that for whatever reason had to be dropped.
poll	Report of the proxy poll parameters, if any. P indicates a primary and S indicates a secondary node. The number before the letter is the modulus of the link.

stun group

To place each STUN-enabled interface on a router in a previously defined STUN group, use the **stun group** interface configuration command. To remove an interface from a group, use the **no** form of this command.

stun group *group-number*

no stun group *group-number*

Syntax Description

group-number	Integer in the range 1 to 255.

Defaults

Disabled

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

Before using this command, complete the following steps:

Step 1 Enable STUN on a global basis with the **stun peer-name** command.

Step 2 Define the protocol group in which you want to place this interface with the **stun protocol-group** command.

Step 3 Enable STUN on the interface using the **encapsulation stun** command.

Packets only travel between STUN-enabled interfaces that are in the same group. Once a given serial link is configured for the STUN function, it is no longer a shared multiprotocol link. All traffic that arrives on the link is transported to the corresponding peer as determined by the current STUN configuration.

Examples

The following example places serial interface 0 in STUN group 2, which is defined to run the SDLC transport:

```
! sample stun peer-name global command
stun peer-name 131.108.254.6
! sample protocol-group command telling group 2 to use the SDLC protocol
stun protocol-group 2 sdlc
!
interface serial 0
! sample ip address subcommand
 no ip address
! sample encapsulation stun subcommand
 encapsulation stun
! place interface serial0 in previously defined STUN group 2
 stun group 2
! enter stun route command
 stun route 7 tcp 131.108.254.7
```

Related Commands

Command	Description
encapsulation stun	Enables STUN encapsulation on a specified serial interface.
priority-list protocol stun address	Establishes STUN queueing priorities based on the address of the serial link.
stun peer-name	Enables STUN for an IP address.
stun protocol-group	Creates a protocol group.

stun keepalive-count

To define the number of times to attempt a peer connection before declaring the peer connection to be down, use the **stun keepalive-count** global configuration command. To cancel the definition, use the **no** form of this command.

stun keepalive-count *count*

no stun keepalive-count

Syntax Description

count	Number of connection attempts. The range is between 2 and 10 retries.

Defaults

No default behavior or values.

Command Modes

Global configuration

Command History

Release	Modification
10.0	This command was introduced.

Examples

The following example sets the number of times to retry a connection to a peer to 4:

```
stun keepalive-count 4
```

Related Commands

Command	Description
stun remote-peer-keepalive	Enables detection of the loss of a peer.

stun peer-name

To enable STUN for an IP address, use the **stun peer-name** global configuration command. To disable STUN for an IP address, use the **no** form of this command.

stun peer-name *ip-address* **cls**

no stun peer-name *ip-address* **cls**

Syntax Description

ip-address	IP address by which this STUN peer is known to other STUN peers.
cls	Use Cisco Link Services (CLS) to access the Frame Relay network.

Defaults

STUN is disabled.

Command Modes

Global configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

Use this command to enable any further STUN features. After using this command, complete the following steps:

Step 1 Define the protocol group in which you want to place this interface with the **stun protocol-group** command.

Step 2 Enable STUN on the interface using the **encapsulation stun** command.

Step 3 Place the interface in a STUN group with the **stun group** command.

Examples

The following example assigns IP address 131.108.254.6 as the STUN peer:

```
stun peer-name 131.108.254.6 cls
```

Related Commands

Command	Description
encapsulation stun	Enables STUN encapsulation on a specified serial interface.
stun group	Places each STUN-enabled interface on a router in a previously defined STUN group.
stun protocol-group	Creates a protocol group.

stun protocol-group

To create a protocol group, use the **stun protocol-group** global configuration command. To remove an interface from the group, use the **no** form of this command.

stun protocol-group *group-number* {**basic** | **sdlc** [**sdlc-tg**] | **schema**}

no stun protocol-group

Syntax Description

group-number	Integer in the range 1 to 255.
basic	Indicates a non-SDLC protocol.
sdlc	Indicates an SDLC protocol.
sdlc-tg	(Optional) Identifies the group as part of an SNA TG.
schema	Indicates a custom protocol.

Defaults

No protocol group established.

Command Modes

Global configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

Use the **sdlc** keyword to specify an SDLC protocol. You must specify either the **sdlc** or the **sdlc-tg** keyword before you can enable SDLC local acknowledgment. SDLC local acknowledgment is established with the **stun route address tcp** command.

Use the **basic** keyword to specify a non-SDLC protocol, such as HDLC.

Use the **schema** keyword to specify a custom protocol. The custom protocol must have been previously created with the **stun schema** command.

Use the optional **sdlc-tg** keyword, in conjunction with the **sdlc** keyword, to establish an SNA TG. A TG is a set of protocol groups providing parallel links to the same pair of IBM establishment controllers. This provides redundancy of paths. In case one or more links go down, an alternate path will be used. All STUN connections in a TG must connect to the same IP address. SDLC local acknowledgment must be enabled.

Note If you specify the keyword **sdlc** in the **stun protocol group** command string, you cannot specify the **stun route all** command on that interface.

Examples

The following example specifies that group 7 will use the SDLC STUN protocol to route frames within that group:

```
stun protocol-group 7 sdlc
```

The following example specifies that group 5 use the basic protocol, wherein the serial addressing is unimportant and you have a point-to-point link:

```
stun protocol-group 5 basic
```

Related Commands

Command	Description
encapsulation stun	Enables STUN encapsulation on a specified serial interface.
stun route address interface serial	Forwards all HDLC traffic on a serial interface.
stun route address tcp	Specifies TCP encapsulation and optionally establishes SDLC local acknowledgment (SDLC transport) for STUN.
stun schema offset length format	Defines a protocol other than SDLC for use with STUN.

stun quick-response

To enable STUN quick-response, which can be used with local acknowledgment, use the **stun quick-response** global configuration command. To disable STUN quick-response, use the **no** form of this command.

stun quick-response

no stun quick-response

Syntax Description

This command has no arguments or keywords.

Defaults

STUN quick-response is disabled.

Command Modes

Global configuration

Command History

Release	Modification
10.3(5)	This command was introduced.

Usage Guidelines

This command is used with local acknowledgment (local ack).

When STUN quick-response is enabled, the router responds to an exchange identification (XID) or a Set Normal Response Mode (SNRM) request with a Disconnect Mode (DM) response when the device is not in the CONNECT state. The request is then passed to the remote router and, if the device responds, the reply is cached. The next time the device is sent an XID or SNRM, the router replies with the cached DM response.

Note Using STUN quick-response avoids an AS/400 line reset problem by eliminating the Non-Productive Receive Timer (NPR) expiration in the AS/400. With quick-response enabled, the AS/400 receives a response from the polled device, even when the device is down. If the device does not respond to the forwarded request, the router continues to respond with the cached DM response.

Examples

The following example enables STUN quick-response:

```
stun quick-response
```

Related Commands

Command	Description
stun route address interface dlci	Configures direct Frame Relay encapsulation between STUN peers with SDLC local acknowledgment.
stun route address interface serial	Forwards all HDLC traffic on a serial interface.
stun route address tcp	Specifies TCP encapsulation and optionally establishes SDLC local acknowledgment (SDLC transport) for STUN.
stun route all interface serial	Encapsulates and forwards all STUN traffic using HDLC encapsulation on a serial interface.
stun route all tcp	Used with TCP encapsulation, forwards all STUN traffic on an interface regardless of which address is contained in the serial frame.

stun remote-peer-keepalive

To enable detection of the loss of a peer, use the **stun remote-peer-keepalive** global configuration command. To disable detection, use the **no** form of this command.

stun remote-peer-keepalive *seconds*

no stun remote-peer-keepalive

Syntax Description

seconds	Keepalive interval, in seconds. The range is 1 to 300 seconds. The default is 30 seconds.

Defaults

30 seconds

Command Modes

Global configuration

Command History

Release	Modification
10.0	This command was introduced.

Examples

In the following example, the remote-peer-keepalive interval is set to 60 seconds:

```
stun remote-peer-keepalive 60
```

Related Commands

Command	Description
stun keepalive-count	Defines the number of times to attempt a peer connection before declaring the peer connection to be down.

stun route address interface dlci

To configure direct Frame Relay encapsulation between STUN peers with SDLC local acknowledgment, use the **stun route address interface dlci** interface configuration command. To disable the configuration, use the **no** form of this command.

stun route address *sdlc-addr* **interface** *frame-relay-port* **dlci** *number localsap* **local-ack cls**

no stun route address *sdlc-addr* **interface** *frame-relay-port* **dlci** *number localsap* **local-ack cls**

Syntax Description

sdlc-addr	Address of the serial interface.
frame-relay-port	Port number.
number	Data-link connection identifier (DLCI) number.
localsap	Local connecting SAP.
local-ack	Enable local acknowledgment.
cls	Use Cisco Link Services (CLS) to access the Frame Relay network.

Defaults

The configuration is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
11.0	This command was introduced.

Examples

The following command enables Frame Relay encapsulation between STUN peers with SDLC local acknowledgment:

```
stun route address c1 interface serial1 dlci 22 04 local-ack
```

Related Commands

Command	Description
stun route all interface serial	Encapsulates and forwards all STUN traffic using HDLC encapsulation on a serial interface.

stun route address interface serial

To forward all HDLC traffic on a serial interface, use the **stun route address interface serial** interface configuration command. To disable this method of HDLC encapsulation, use the **no** form of this command.

stun route address *address-number* **interface serial** *number* [**direct**]

no stun route address *address-number* **interface serial** *number*

Syntax Description

address-number	Address of the serial interface.
number	Number assigned to the serial interface.
direct	(Optional) Forwards all HDLC traffic on a direct STUN link.

Defaults

The configuration is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Examples

In the following example, serial frames with a STUN route address of 4 are forwarded through serial interface 0 using HDLC encapsulation:

```
stun route address 4 interface serial 0
```

In the following example, serial frames with STUN route address 4 are propagated through serial interface 0 using STUN encapsulation:

```
stun route address 4 interface serial 0 direct
```

Related Commands

Command	Description
stun route all interface serial	Encapsulates and forwards all STUN traffic using HDLC encapsulation on a serial interface.

stun route address tcp

To specify TCP encapsulation and optionally establish SDLC local acknowledgment (SDLC transport) for STUN, use the **stun route address tcp** interface configuration command. To disable this method of TCP encapsulation, use the **no** form of this command.

stun route address *address-number* **tcp** *ip-address* [**local-ack**] [**priority**] [**tcp-queue-max**] [**passive**]

no stun route address *address-number* **tcp** *ip-address* [**local-ack**] [**priority**] [**tcp-queue-max**] [**passive**]

Syntax Description

address-number	Number that conforms to SDLC addressing conventions.
ip-address	IP address by which this STUN peer is known to other STUN peers that are using the TCP as the STUN encapsulation.
local-ack	(Optional) Enables local acknowledgment for STUN.
priority	(Optional) Establishes the four levels used in priority queueing: low, medium, normal, and high.
tcp-queue-max	(Optional) Sets the maximum size of the outbound TCP queue for the SDLC link. The default is 100.
passive	(Optional) Prevents the STUN peer from initiating a TCP connection. Normally, the STUN peer connects to the SDLC primary device and initiates a TCP connection to another STUN peer. If the STUN peers connect to non-SDLC devices, such as voice equipment, both STUN peers might try to start a TCP connection at the same time, which can delay the TCP connection setup. The **passive** keyword, used in STUN basic mode, enables this STUN peer to wait for the other STUN peer to initiate the TCP connection.

Defaults

TCP encapsulation is not established; TCP queue size default is 100.

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.
11.1	The **tcp-queue-max** keyword was added.
12.0	The **passive** keyword was added.

Usage Guidelines

SDLC transport participates in SDLC windowing and resending through support of local acknowledgment. SDLC sessions require that end nodes send acknowledgments for a set amount of data frames received before allowing further data to be sent. Local acknowledgment provides local termination of the SDLC session, so that control frames no longer travel the WAN backbone networks. This means end nodes do not time out, and a loss of sessions does not occur.

Examples

In the following example, a frame with a source-route address of 10 is propagated using TCP encapsulation to a device with an IP address of 131.108.8.1:

```
stun route address 10 tcp 131.108.8.1
```

Related Commands

Command	Description
sdlc address ff ack-mode	Configures the IBM reserved address FF as a valid local address.
stun route all tcp	Used with TCP encapsulation, forwards all STUN traffic on an interface regardless of which address is contained in the serial frame.

stun route all interface serial

To encapsulate and forward all STUN traffic using HDLC encapsulation on a serial interface, use the **stun route all interface serial** interface configuration command. To disable this method of encapsulation, use the **no** form of this command.

stun route all interface serial *number* [**direct**]

no stun route all interface serial *number* [**direct**]

Syntax Description

number	Number assigned to the serial interface.
direct	(Optional) Indicates that the specified interface is also a direct STUN link, rather than a serial connection to another peer.

Defaults

No default behavior or values.

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

An appropriately configured router must exist on the other end of the designated serial line. The outgoing serial link still can be used for other kinds of traffic (the frame is not TCP encapsulated). This mode is used when TCP/IP encapsulation is not needed or when higher performance is required. Enter the serial line number connected to the router for the *interface-number* argument.

Examples

In the following example, all traffic on serial interface 0 is propagated using STUN encapsulation:

```
stun route all interface serial 0
```

In the following example, serial interface 1 is a direct STUN link, not a serial connection to another peer:

```
stun route all interface serial 1 direct
```

Related Commands

Command	Description
stun route address interface serial	Forwards all HDLC traffic on a serial interface.

stun route all tcp

To forward all STUN traffic on an interface regardless of which address is contained in the serial frame, use the **stun route all tcp** interface configuration command with TCP encapsulation. To disable traffic from being forwarded with this method of encapsulation, use the **no** form of this command.

stun route all tcp *ip-address* [**passive**]

no stun route all tcp *ip-address* [**passive**]

Syntax Description

ip-address	IP address by which this remote STUN peer is known to other STUN peers. Use the address that identifies the remote STUN peer that is connected to the remote serial link.
passive	(Optional) Prevents the STUN peer from initiating a TCP connection. Normally, the STUN peer connects to the SDLC primary device and initiates a TCP connection to another STUN peer. If the STUN peers connect to non-SDLC devices, such as voice equipment, both STUN peers might start a TCP connection at the same time. The **passive** keyword enables a delay when setting up a TCP connection.

Defaults

Disabled

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.
12.0	The **passive** keyword was added.

Usage Guidelines

TCP/IP encapsulation allows movement of serial frames across arbitrary media types and topologies. This is particularly useful for building shared, multiprotocol enterprise network backbones.

Examples

In the following example, all STUN traffic received will be propagated through the bridge:

```
stun route all tcp 131.108.10.1
```

stun schema offset length format

To define a protocol other than SDLC for use with STUN, use the **stun schema offset length format** global configuration command. To disable the new protocol, use the **no** form of this command.

stun schema *name* **offset** *constant-offset* **length** *address-length* **format** *format-keyword*

no stun schema *name* **offset** *constant-offset* **length** *address-length* **format** *format-keyword*

Syntax Description

name	Name that defines your protocol. It can be up to 20 characters in length.
constant-offset	Constant offset, in bytes, for the address to be found in the frame.
address-length	Length in one of the following formats: decimal (4 bytes), hexadecimal (8 bytes), or octal (4 bytes).
format-keyword	Identifies format to be used to specify and display addresses for routes on interfaces that use this STUN protocol. Valid format keyword values and their ranges are: • **decimal**—0 to 9 • **hexadecimal**—0 to F • **octal**—0 to 7

Defaults

No protocol is defined.

Command Modes

Global configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

Use this command before defining the protocol group (**stun protocol-group** command). The serial protocol you define must meet the following criteria:

- The protocol uses full-duplex conventions (RTS/CTS always high).
- The protocol uses standard HDLC checksum and framing (beginning and end of frames, data between frames).
- Addresses are contained in a constant location (offset) within the frame.
- Addresses are found on a byte boundary.

Examples

In the following example, a protocol named *new-sdlc* is created. In the protocol frame structure, the constant offset is 0, the address length is 1 byte, and the address format is hexadecimal.

```
stun schema new-sdlc offset 0 length 1 format hexadecimal
```

Related Commands

Command	Description
priority-list protocol stun address	Establishes STUN queueing priorities based on the address of the serial link.
stun protocol-group	Creates a protocol group.

stun sdlc-role primary

To assign the router the role of SDLC primary node, use the **stun sdlc-role primary** interface configuration command. Primary nodes poll secondary nodes in a predetermined order. To disable the primary node role assignment, use the **no** form of this command.

stun sdlc-role primary

no stun sdlc-role

Syntax Description

This command has no arguments or keywords.

Defaults

No role is assigned.

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

If the router is connected to a cluster controller, for example a 3x74, it should appear as a front-end processor (FEP) such as a 37x5, and must be assigned the role of a primary node.

Examples

The following example assigns the router the role of SDLC primary node:

```
stun sdlc-role primary
```

Related Commands

Command	Description
encapsulation stun	Enables STUN encapsulation on a specified serial interface.
stun sdlc-role secondary	Assigns the router the role of SDLC secondary node. Secondary nodes respond to polls sent by the SDLC primary by sending any outgoing data they may have.

stun sdlc-role secondary

To assign the router the role of SDLC secondary node, use the **stun sdlc-role secondary** interface configuration command. Secondary nodes respond to polls sent by the SDLC primary by transmitting any outgoing data they may have. To disable the assignment, use the no form of this command.

stun sdlc-role secondary

no stun sdlc-role

Syntax Description

This command has no arguments or keywords.

Defaults

No secondary role is assigned.

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

If the router is connected to a front-end processor, for example a 37x5, it should appear as a cluster controller such as a 3x74, and must be assigned the role of a secondary node.

Examples

The following example assigns the router the role of SDLC secondary node:

```
stun sdlc-role secondary
```

Related Commands

Command	Description
encapsulation stun	Enables STUN encapsulation on a specified serial interface.
stun sdlc-role primary	Assigns the router the role of SDLC primary node. Primary nodes poll secondary nodes in a predetermined order.