CHAPTER 24

STUN 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 pass-through of all SDLC traffic (including control frames, such as Receiver Ready) end-to-end between Synchronous 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, routers must first be enabled for STUN and 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 queuing for TCP encapsulated frames.

Use the commands in this chapter to configure STUN and SDLC Local Acknowledgment networks. For STUN configuration information and examples, refer to the "Configuring STUN" chapter in the *Router Products Configuration Guide*.

encapsulation stun

Use the **encapsulation stun** interface configuration command to enable STUN encapsulation on a specified serial interface.

encapsulation stun

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

You must 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.

Example

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

stun group
stun peer-name
stun protocol-group

locaddr-priority-list

Use the **locaddr-priority-list** interface configuration command to establish queuing priorities based upon the address of the logical unit (LU). Use the **no** form of this command to cancel all previous assignments.

locaddr-priority-list *list-number address-number queue-keyword*
no locaddr-priority-list

Syntax Description

list-number	Arbitrary integer between 1 and 10 that identifies the LU address priority list.
address-number	Value of the LOCADDR= parameter on the LU macro, which is a 1-byte address of the LU in hexadecimal.
queue-keyword	Priority queue type: high, medium, normal, or low.

Default

No queuing priorities are established.

Command Mode

Interface configuration

Example

The following example shows how to establish queuing priorities based on the address of the serial link on a STUN connection. Note that you must use the **priority-group** interface configuration command to assign a priority group to an input interface:

```
stun peer-name 131.108.254.6
stun protocol-group 1 sdlc
!
interface serial 0
no ip address
encapsulation stun
stun group 1
stun route address 4 interface serial 0 direct
locaddr priority 1
priority-group 1
!
locaddr-priority-list 1 02 high
locaddr-priority-list 1 03 high
locaddr-priority-list 1 04 medium
locaddr-priority-list 1 05 low
```

Related Command

priority-group

priority-group

Use the **priority-group** interface configuration command to assign a priority group to an interface. Use the **no** form of this command to remove assignments.

priority-group *list-number*
no priority-group *list-number*

Syntax Description

list-number	Priority list number assigned to the interface.

Default

No priority group is assigned.

Command Mode

Interface configuration

Example

The following example shows how to establish queuing priorities based on the address of the serial link on a STUN connection. Note that you must use the **priority-group list** interface configuration command to assign a priority group to an output interface.

```
! sample stun peer-name global command
stun peer-name 131.108.254.6
! sample protocol-group command for reference
stun protocol-group 1 sdlc
!
interface serial 0
! disable the ip address for interface serial 0
no ip address
! enable the interface for STUN
encapsulation stun
! sample stun group command
stun group 2
! sample stun route command
stun route address 10 tcp 131.108.254.8 local-ack priority
!
! assign priority group 1 to the input side of interface serial 0
priority-group 1
! assign a low priority to priority list 1 on serial link identified
! by group 2 and address A7
priority-list 1 stun low address 2 A7
```

Related Commands

locaddr-priority-list
priority-list protocol ip tcp
priority-list stun address

priority-list protocol ip tcp

Use the **priority-list protocol ip tcp** global configuration command to establish STUN queuing priorities based on the TCP port. Use the **no** form of this command to revert to normal priorities.

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

Syntax Description

list-number	Arbitrary integer between 1 and 10 that identifies the priority list selected by the user.
queue-keyword	Priority queue type: **high**, **medium**, **normal**, or **low**.
tcp-port-number	STUN port and priority settings are as follows: high (1994), medium (1990), normal (1991), and low (1992).

Default

Normal queue

Command Mode

Global configuration

Usage Guidelines

Use the **priority-list 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.

Example

In the following example, queuing 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
```

Related Commands

priority-group
priority-list stun address

priority-list stun address

Use the **priority-list stun address** global configuration command to establish STUN queuing priorities based on the address of the serial link. Use the **no** form of this command to revert to normal priorities.

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

Syntax Description

list-number	Arbitrary integer between 1 and 10 that identifies the priority list selected by the user.
queue-keyword	Priority queue type: **high**, **medium**, **normal**, or **low**.
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 hex value (for example, C1). For a non-SDLC link, the address format can be specified by the **stun schema** command.

Default

Normal queue

Command Mode

Global configuration

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 "System Management Commands" chapter.

Example

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

```
priority-list 1 stun high address 1 C1
```

Related Commands

priority-list protocol ip tcp
stun group
stun schema offset length format

sdlc virtual-multidrop

Use the **sdlc virtual-multidrop** interface configuration command 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 **no** form of this command to disable the SDLC broadcast feature.

sdlc virtual-multidrop
no sdlc virtual-multidrop

Syntax Description

This command has no arguments or keywords.

Command Mode

Interface configuration

Example

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

```
sdlc virtual-multidrop
```

Related Command

stun route address tcp

show stun

Use the **show stun** privileged EXEC command to display the current status of STUN connections.

show stun

Syntax Description

This command has no arguments or keywords.

Command Mode

Privileged EXEC

Sample Display

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 enabled for address 7 and that Serial 0 is running with modulus 8 on the primary side of the link. The link has received 20,334 packets, transmitted 86,440 packets, and dropped 5 packets.

Table 24-1 describes significant fields shown in the output.

Table 24-1 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 (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.
tx_pkts	Number of transmitted 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

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

stun group *group-number*
no stun group *group-number*

Syntax Description

group-number	Integer in the range 1 through 255.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

Before using this command, complete the following steps: 1) enable STUN on a global basis with the **stun peer-name** command, 2) define the protocol group in which you want to place this interface with the **stun protocol-group** command, and 3) enable STUN on the interface using the **encapsulation stun** command.

Packets will 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 will be transported to the corresponding peer as determined by the current STUN configuration.

Example

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

encapsulation stun
priority-list stun address
stun peer-name
stun protocol-group

stun keepalive-count

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

stun keepalive-count *count*
no stun keepalive-count

Syntax Description

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

Default

Disabled

Command Mode

Global configuration

Example

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

```
stun keepalive-count 4
```

Related Command

stun remote-peer-keepalive

stun peer-name

Use the **stun peer-name** global configuration command to enable STUN on IP addresses. Use the **no** form of this command to disable STUN on an IP address.

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

Syntax Description

ip-address	IP address by which this STUN peer is known to other STUN peers.

Default

Disabled

Command Mode

Global configuration

Usage Guidelines

You must 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.

Example

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

```
stun peer-name 131.108.254.6
```

Related Commands

encapsulation stun
stun group
stun protocol-group

stun protocol-group

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

stun protocol-group *group-number* {**basic** | **sdlc** | **schema**} [**sdlc-tg**]
no stun protocol-group

Syntax Description

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

Default

No protocol group established.

Command Mode

Global configuration

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 transmission group. A transmission group 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 transmission group 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 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

encapsulation stun
stun route address interface serial
stun route address tcp
stun schema offset length format

stun remote-peer-keepalive

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

stun remote-peer-keepalive *seconds*
no stun remote-peer-keepalive

Syntax Description

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

Default

30 seconds

Command Mode

Global configuration

Example

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

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

Related Command

stun keepalive-count

stun route address interface serial

Use the **stun route address interface serial** interface configuration command to forward all HDLC traffic of a serial interface. Use the **no** form of this command to disable this method of HDLC encapsulation.

stun route address *address-number* **interface serial** *interface-number* [**direct**]
no stun route address *address-number* **interface serial** *interface-number*

Syntax Description

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

Default

Disabled

Command Mode

Interface configuration

Example

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 Command

stun route all interface serial

stun route address tcp

Use the **stun route address tcp** global configuration command to specify TCP encapsulation and optionally establish SDLC Local Acknowledgment (SDLC Transport) for STUN. Use the **no** form of this command to disable this method of TCP encapsulation.

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

Syntax Description

address-number	Number that conforms to TCP addressing conventions.
tcp	Specifies TCP encapsulation.
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 queuing: low, medium, normal, and high.
tcp-queue-max	(Optional) Sets the maximum size of the outbound TCP queue for the SDLC link.

Default

TCP encapsulation not established
TCP queue size default 100

Command Mode

Global configuration

Usage Guidelines

SDLC Transport participates in SDLC windowing and retransmission 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 transmitted. 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.

Example

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

A dagger (†) indicates that the command is documented in another chapter.

sdlc address FF ack-mode †
stun route all tcp

stun route all interface serial

Use the **stun route all interface serial** interface configuration command to encapsulate and forward all STUN traffic using HDLC encapsulation on a serial interface.

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

Syntax Description

interface-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.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

There must be an appropriately configured router 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.

Example

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

```
! propagate serial frames through serial 0 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 Command

stun route address interface serial

stun route all tcp

Use the **stun route all tcp** interface configuration command to use TCP encapsulation and forward all STUN traffic on an interface regardless of what address is contained in the serial frame.

stun route all tcp *ip-address*

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 far serial link.

Default

Disabled

Command Mode

Interface configuration

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.

Example

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

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

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	Format to be used to specify and display addresses for routes on interfaces that use this STUN protocol. The allowable format keywords are decimal (0 through 9), hexadecimal (0 through F), and octal (0 through 7).

Default

Disabled

Command Mode

Global configuration

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/end of frames, data between frames).
- Addresses are contained in a constant location (offset) within the frame.
- Addresses are found on a byte boundary.

Example

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

A dagger (†) indicates that the command is documented in another chapter.

priority-list stun †
stun protocol-group

stun sdlc-role primary

Use the **stun sdlc-role primary** interface configuration command to assign the router the role of SDLC primary node. Primary nodes poll secondary nodes in a predetermined order.

stun sdlc-role primary

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

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

Example

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

```
stun sdlc-role primary
```

Related Commands

encapsulation stun
stun sdlc-role secondary

stun sdlc-role secondary

Use the **stun sdlc-role secondary** interface configuration command to assign the router the role of SDLC secondary node. Secondary nodes respond to polls sent by the SDLC primary by transmitting any outgoing data they may have.

stun sdlc-role secondary

Syntax Description

This command has no arguments or keywords.

Default

Unassigned

Command Mode

Interface configuration

Usage Guidelines

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

Example

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

```
stun sdlc-role secondary
```

Related Commands

encapsulation stun
stun sdlc-role primary