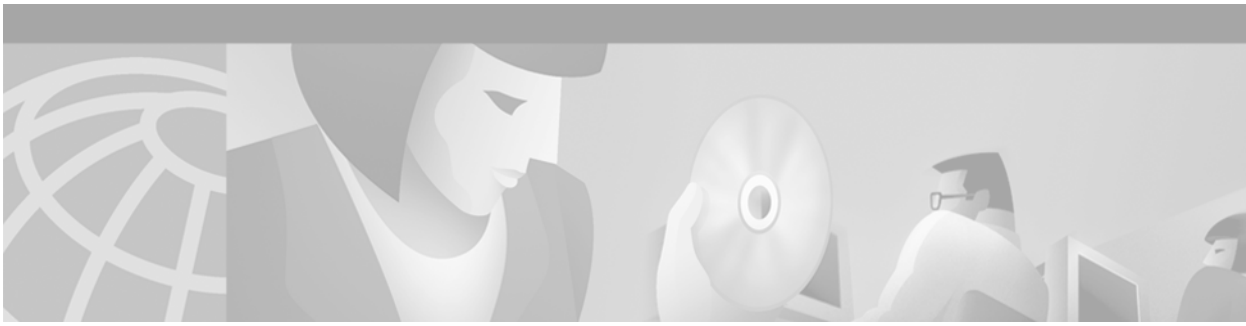

SDLC SNRM Timer and Window Size Enhancements

This feature module describes the Synchronous Data Link Control (SDLC) Set Normal Response Mode (SNRM) Timer and Window Size enhancements. It includes information on the configuration benefits of the feature, configuration tasks, new and modified commands, and provides examples where appropriate.

This document includes the following sections:

Feature Overview

The SDLC SNRM Timer and Window Size Enhancements feature in Cisco IOS Release 12.1(5)T introduces a new window size setting for SDLC configurations, and a new timeout setting for the response to a SNRM frame.

Window Size Setting

Prior to this feature, all SDLC addresses on a serial interface had the same window count. Now the window count can be configured on a Physical Unit (PU) or SDLC address level. This enhancement allows each device attached to the serial interface to have different bandwidth based on the priority of the device.

Timeout Setting for SNRM frame

Cisco IOS software SDLC implementation currently utilizes a common response timer (T1) for all outstanding commands. To determine the minimum value for the response timer for data frames, the maximum frame size and line speed must be calculated with the formula: max framesize * 8/linespeed (bits per second). This can produce a minimum response timer that is very large.

This same timer is also used for link activation. This is a problem on a multidrop, because stations that do not respond to the SNRM will cause a delay before the next active station can be polled. This enhancement helps reduce the amount of time the SDLC network is idle.

Benefits

The SDLC SNRM Timer and Window Size Enhancements offers the following benefits to customers:

- Reduces network overhead
- Adds new functionality without impacting current network performance

SDLC SNRM Timer and Retry Counts

- Allows users to fine-tune an SDLC network
- Improves network efficiency by giving users more control over response times

Window Size Setting

- Allows users to specify the window size on an SDLC address or PU basis
- Offers users more granularity and options with which to configure their networks
- Allows users to fine-tune bandwidth allocation on an SDLC network

Related Features and Technologies

The SDLC SNRM Timer and Window Size Enhancements provides improvements to the existing SDLC technology that is documented in the SDLC chapters of the *Cisco IOS Bridging and IBM Networking Configuration Guide,* Release 12.1, and the *Cisco IOS Bridging and IBM Networking Command Reference, Volume I*, Release 12.1.

SDLC is related to the existing DLSW+ technology that is documented in the DLSW chapters of the *Cisco IOS Bridging and IBM Networking Configuration Guide,* Release 12.1, and the *Cisco IOS Bridging and IBM Networking Command Reference, Volume I*, Release 12.1.

Related Documents

- *Cisco IOS Bridging and IBM Networking Command Reference, Volume I,* Release 12.1.
- *Cisco IOS Bridging and IBM Networking Configuration Guide,* Release 12.1.
- *Cisco IOS Interface Configuration Guide,* Release 12.1.
- *Cisco IOS Interface Command Reference,* Release 12.1.

Supported Platforms

- Cisco 1000 series routers
- Cisco 1400 series routers
- Cisco 1600 series routers
- Cisco 1700 series routers
- Cisco 2500 series routers
- Cisco 2600 series routers
- Cisco 3600 access servers and routers
- Cisco 3800 series routers
- Cisco 4000/m series routers
- Cisco 4500 series routers
- Cisco 4700 series routers
- Cisco 6400 series routers
- Cisco 7200 series routers
- Cisco 7500 series routers
- Cisco uBR7200 series cable routers
- Cisco AS5200, AS5300, and AS5800 access servers
- Cisco C5RSM and C6RSM
- Cisco 12000 series gigabit switch router

Supported Standards, MIBs, and RFCs

Standards

- No new or modified standards are supported by this feature.

MIBs

- No new or modified MIBs are supported by this feature.

For descriptions of supported MIBs and how to use MIBs, see the Cisco MIB web site on CCO at http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml.

RFCs

- None

Configuration Tasks

See the following sections for the SDLC SNRM Timer and Window Size Enhancements configuration tasks. The list indicates whether the task is optional or required.

- Setting SDLC Timers and Retry Counts, page 4 (Optional)
- Setting SDLC Frame and Window Sizes, page 4 (Optional)

For a complete description of the new or modified SDLC commands in this feature module, refer to the Command Reference section.

Setting SDLC Timers and Retry Counts

When an SDLC station sends a frame, it waits for an acknowledgment from the receiver indicating that the frame was received. You can modify the time the router waits for an acknowledgment before resending the frame. You can also set the number of times that SDLC station re-sends a frame before terminating the SDLC session. By controlling these values, you can reduce network overhead while continuing to check transmission of frames.

Use the SNRM Timer only if you want to have a unique timeout period to wait for a reply to a SNRM. To specify a SNRM timer that is different from the T1 response time, set the SDLC SNRM timer using the **sdlc snrm-timer** command in interface configuration mode:

Command	Purpose
sdlc t1 *milliseconds*	Controls the amount of time the Cisco IOS software waits for a reply. Default value is 3000 milliseconds.
sdlc n2 *retry-count*	Sets the number of times the Cisco IOS software will retry an operation that has timed out.
sdlc snrm-timer *number*	Specifies the time to wait for a reply to a SNRM frame in milliseconds. Station role must be primary to enable this command. The range is 1-64000 milliseconds. The default is the **no** form of the command. **Note** If the number parameter of this command is not specified, or set to a default value of 0, the default value of t1 (3000 milliseconds) will be used for SNRM. If the **no** form of this command is specified, the value of the t1 timer will be used for the SNRM timer.

Setting SDLC Frame and Window Sizes

You can set the maximum size of an incoming frame and set the maximum number of I-frames (or window size) the router will receive before sending an acknowledgment to the sender. By using higher values, you can reduce network overhead. You can also assign a set of secondary stations attached to a serial link.

To set SDLC frame and window sizes, use any of the following commands in interface configuration mode:

Command	Purpose
sdlc n1 *bit-count*	Sets the maximum size of an incoming frame.
sdlc k *window-size*	Sets the local window size of the router. Default value is 7.
sdlc poll-limit-value *count*	Sets how many times a primary station will poll a secondary station.
sdlc address *hexbyte* [**echo**] [**ack-mode**] [**xid-poll**] [**switched**] [**seconly**] [**xid-passthru**] [**passive**] [**K** *num*]	Specifies the address used on the SDLC line, and any other unique options on how the address is treated. **Note** The **ack-mode** option supports applications that require local termination of an SDLC connection with address ff. This option is available only if the hexbyte parameter is configured with a value of ff. You should use this option only if you use the SDLC address ff as a regular (not a broadcast) address.

Verifying SDLC Stations

To verify the configuration of SDLC stations to determine which SDLC parameters need adjustment, use the following command in EXEC mode:

Command	Purpose
show interfaces serial	Displays SDLC station configuration information.

Monitoring and Maintaining SDLC Stations

To monitor the configuration of SDLC stations to determine which SDLC parameters need adjustment, use the following command in EXEC mode:

Command	Purpose
show interfaces serial	Displays SDLC station configuration information.

Configuration Examples

This section provides the following configuration example:

- SDLC Configuration for DLSw+ Example, page 6

SDLC Configuration for DLSw+ Example

The following example describes the SDLC configuration with DLSw+ support implemented. In this example, 4000.3745.001 is the MAC address of the host. The router serves as the primary station, while the remote secondary stations, C1, C2, and C3, are reserved for DLSw+ and cannot be used by any other data link user. The SNRM timer is configured with a value of 2500 milliseconds

If the **k** parameter is not specified on the **sdlc address** command, the value will be the setting of the sdlc k parameter, which is specified as 1; thus C1 and C2 will use k value of 1, but the C3 station will have more bandwidth because it has a specified k value of 7.

```
interface serial 0
encapsulation sdlc
sdlc role primary
sdlc vmac 4000.3174.0000
   sdlc k 1
sdlc address c1
sdlc xid c1 01712345
sdlc partner 4000.3745.0001 c1
sdlc address c2
sdlc xid c2 01767890
sdlc partner 4000.3745.0001 c2
sdlc addr c3 k 7
sdlc xid c3 01754321
sdlc partner 4000.3745.0001 c3
sdlc snrm-timer 2500
   sdlc dlsw c1 c2 c3
```

Note If the **no** form of this command is specified, the value of the t1 timer will be used for the SNRM timer.

Command Reference

This section documents new or modified commands specific to the SDLC SNRM Timer and Window Size Enhancements.

- **sdlc address**
- **sdlc snrm-timer**
- **show interfaces serial**

All other commands used with this feature are documented in the Cisco IOS Release 12.1 command reference publications.

sdlc address

To assign a set of secondary stations attached to the serial link, use the **sdlc address** interface configuration command. To remove an assigned secondary station use the **no** form of this command.

To assign the IBM reserved address ff as a non-broadcast valid local address, configure the **sdlc address** interface configuration command with a hexbyte value of *ff* and specify the **ack-mode** option. To deactivate, use the **no** form of this command.

sdlc address *hexbyte* [**echo**] [**ack-mode**] [**xid-poll**] [**switched**] [**seconly**] [**xid-passthru**] [**passive**] [**K** *num*]

no sdlc address *hexbyte* [**echo**] [**ack-mode**] [**xid-poll**] [**switched**] [**seconly**] [**xid-passthru**] [**passive**] [**K** *num*]

Syntax Description

hexbyte	Hexadecimal number (base 16) that indicates the address of the serial link. The range is 1 to ff. If ff is configured, the **ack-mode** option must be specified.
echo	(Optional) Treats non-echo and echo SDLC addresses as the same address.
switched	(Optional) Configures the router to send an exchange identification (XID) to an SDLC attached device. When the device answers, then a proxy XID is sent to the peer.
ack-mode	(Optional) Supports applications that require local termination of an SDLC connection with address FF. This option should be used only if you use the SDLC address ff as a regular (not a broadcast) address.
xid-poll	(Optional) Configures the router to send a null XID to the Token Ring-attached host device. This tells the host device to start the session.
seconly	(Optional) Eliminates the need for counting PU4 lines on the Network Control Program (NCP) to determine the correct poll address. Since the router is always secondary, when **seconly** is coded, the polling address will be determined by the router.
xid-passthru	(Optional) Allows the router to pass the (XID) through the interface in both the host and end device's direction.
passive	(Optional) Causes the router to wait before sending a SNRM until it receives an XID from the host. This command is valid only when the role is primary.
K *num*	(Optional) Specifies the maximum number of information frames (I-frames) that a router can transmit before it expects an acknowledgment from the end device. The minimum window-size is 1 and the maximum size is 7. The default is 7.

Defaults

No secondary stations are assigned.

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.
11.0	The sdlc address **ack-mode** option was introduced.
11.3	The command was modified to include the **switched**, **passive**, **xid-poll**, and **xid-passthru** options.
11.3(T)	The command was modified to include the **seconly** option.
12.1(5)T	The **sdlc address** and **sdlc address ff ack-mode** commands were combined. The **K** option/parameter was added.

Usage Guidelines

Before you can use this command, you must first specify the encapsulation on the interface on which you want to enable SDLC; then, establish the router link station role. Next, assign secondary station addresses using the **sdlc address** command. The addresses are given one per line in hexadecimal (base 16).

The **sdlc address ff ack-mode** command is used to support applications that require local termination on an SDLC connection with address ff. This command should be used only if you use the SDLC address ff as a regular (not a broadcast) address.

The optional keyword **echo** is valid only for TG interfaces. When you use the **echo** keyword, *hexbyte* is the non-echo SDLC address.

Examples

The following example shows how to configure serial interface 0 with two SDLC secondary stations attached to it through a modem-sharing device with addresses C1 and C2:

```
interface serial 0
 encapsulation sdlc
 sdlc role primary
 sdlc address c1
 sdlc address c2
```

Related Commands

Command	Description
encapsulation sdlc	Used to configure an SDLC interface to implement DLSw+ or Frame Relay access support.
encapsulation sdlc-primary	Configures the router as the primary SDLC station if you plan to configure the SDLLC media translation feature.
encapsulation sdlc-secondary	Configures the router as a secondary SDLC station if you plan to configure the SDLLC media translation feature.
show llc2	Displays the LLC2 connections active in the router.
stun route address tcp	Specifies TCP encapsulation and optionally establishes SDLC local acknowledgment (SDLC transport) for STUN.
sdlc role	Establishes a router to be either a primary or secondary SDLC station.

sdlc snrm-timer

Use the SNRM Timer only if you want to have a unique timeout period to wait for a reply to a SNRM. To specify a SNRM timer that is different from the T1 response time, set the SDLC SNRM timer using the **sdlc snrm-timer** command in interface configuration mode. To deactivate, use the **no** form of this command.

sdlc snrm-timer *number*

no sdlc snrm-timer *number*

Syntax Description

number	Specifies the time to wait for a reply to a SNRM frame in milliseconds, and is enabled only if the station role is primary. Range is 1-64000 milliseconds, and default is the **no** form of the command.

Defaults

No default behavior or values.

Command Modes

Interface configuration

Command History

Release	Modification
12.1(5)T	This command was introduced.

Usage Guidelines

The **sdlc snrm-timer** command is used to specify the time to wait for a reply to a SNRM frame in milliseconds. This parameter is enabled only if the station role is primary.

Examples

The following configuration defines serial interface 0 as the primary SDLC station with two SDLC secondary stations, C1 and C2, attached to it through a modem-sharing device. SDLC simultaneous half-datamode is enabled, and the time to wait for a reply to a SNRM frame is 2500 milliseconds.

```
interface serial 0
 encapsulation sdlc
 sdlc role primary
 sdlc address c1
 sdlc address c2
 sdlc simultaneous half-datamode
 sdlc snrm-timer 2500
```

Related Commands

Command	Description
encapsulation sdlc	Used to configure an SDLC interface to implement DLSw+ or Frame Relay access support.
sdlc role primary	Establishes the router as a primary SDLC station.

Command	Description
sdlc t1 *milliseconds*	Controls the amount of time the Cisco IOS software waits for a reply. Default value is 3000 milliseconds.
sdlc n2 *retry-count*	Sets the number of times the Cisco IOS software will retry an operation that has timed out.
sdlc simultaneous	Enables an interface configured as a primary SDLC station to operatie in two-way simultaneous mode.

show interfaces serial

To display information about a serial interface, use the **show interfaces serial** privileged EXEC command. When using the SDLC encapsulation, use the **show interfaces serial** EXEC command to display information about the multicast DLCI, the DLCIs used on the interface, and the DLCI used for the Local Management Interface (LMI).

Cisco 2500 Series

show interfaces serial [*number*]

Cisco 2600 Series

show interfaces serial [*slot/port*]

Cisco 3600 Series

show interfaces serial [*slot/port*]

Cisco 4000 Series

show interfaces serial [*number* [**:***channel-group*] [**accounting**]

Cisco 7200 Series

show interfaces serial [*slot***/***port*] [**accounting**]

Cisco 7000 and Cisco 7500 Series with the RSP7000, RSP7000CI, or Ports on VIPs

show interfaces serial [*slot***/***port-adapter***/***port*]

Cisco 7500 Series

show interfaces serial [*slot***/***port* [**:***channel-group*]] [**accounting**]

Cisco 7500 Series with a CT3IP

show interfaces serial [*slot***/***port-adapter***/***port*] [**:***t1-channel*] [**accounting** | **crb**]

Cisco AS5800 Access Servers

show interfaces serial *dial-shelf***/***slot***/***t3-port***:***t1-num***:***chan-group*

Syntax Description

number	(Optional) Number of the port being configured.
accounting	(Optional) Displays the number of packets of each protocol type that have been sent through the interface.
:*channel-group*	(Optional) On the Cisco 4000 series with an NPM or Cisco 7500 series routers with a MIP, specifies the T1 channel-group number in the range of 0 to 23 defined with the **channel-group** controller configuration command.
slot	(Optional) Number of the slot being configured. Refer to the appropriate hardware manual for slot and port information.

port	(Optional) Number of the port being configured. Refer to the appropriate hardware manual for slot and port information.
port-adapter	(Optional) Number of the port-adapter being configured. Refer to the appropriate hardware manual for information about port adapter compatibility.
:*t1-channel*	(Optional) For the CT3IP, the T1 channel is a number between 1 and 28. T1 channels on the CT3IP are numbered 1 to 28 rather than the more traditional zero-based scheme (0 to 27) used with other Cisco products. This is to ensure consistency with telco numbering schemes for T1 channels within channelized T3 equipment.
crb	(Optional) Shows interface routing and bridging information.
dial-shelf	Dial shelf chassis in the Cisco AS5800 access server containing the CT3 interface card.
slot	Location of the CT3 interface card in the dial shelf chassis.
t3-port	T3 port number. The only valid value is 0.
t1-num	T1 timeslot in the T3 line. The value can be from 1 to 28.
chan-group	Channel group identifier.

Command Modes

Privileged EXEC

EXEC when using Frame Relay encapsulation.

Command History

Release	Modification
10.0	This command was introduced for the Cisco 4000 series routers.
11.0	This command was introduced for the Cisco 7000 series routers.
11.1 CA	This command was modified to include sample output for the PA-2JT2 serial port adapter, PA-E3 serial port adapter, and PA-T3 serial port adapter.
11.3	This command was modified to include the CT3IP.
12.0(3)T	This command was modified to include support for the Cisco AS5800 access servers.
12.1(5)T	This command was modified to include an output change for SDLC.

Usage Guidelines

Use this command to determine the status of the serial interface and SDLC link.

Examples

The following is sample output from the **show interfaces serial** command for a serial interface configured for SDLC:

```
Router# show interfaces serial

R3#sh interfaces s1/1
Serial1/1 is up, line protocol is up
   Hardware is CD2430 in sync mode
   MTU 1500 bytes, BW 128 Kbit, DLY 20000 usec,
   reliability 255/255, txload 1/255, rxload 1/255
   Encapsulation SDLC, loopback not set
     Router link station role:PRIMARY (DTE)
     Router link station metrics:
     slow-poll 2 seconds
     T1 (reply time out) 300 milliseconds
     SNRM Timer (SNRM reply time out) 70 milliseconds
     N1 (max frame size) 12016 bits
     N2 (retry count) 5
     poll-pause-timer 200 milliseconds
     poll-limit-value 1
     k (windowsize) 7
     modulo 8
     sdlc vmac:4000.2600.00--
   sdlc addr C3 state is USBUSY
     cls_state is CLS_STN_CLOSED
     k (windowsize) override 1
     VS 0, VR 0, Remote VR 0, Current retransmit count 0
     Hold queue:0/200 IFRAMEs 1980/491
     TESTs 0/0 XIDs 0/0, DMs 0/49 FRMRs 0/0
     RNRs 9392/0 SNRMs 79/0 DISC/RDs 12/0 REJs 0/0
     Poll:set, Poll count:0, chain:C2/C4
```

Note If the k parameter is not specified under **sdlc address**, the k (window size) override statement will not be displayed. If the **sdlc snrm-timer** is not configured, the SNRM Timer (SNRM reply timeout) statement will not be displayed.

Glossary

CLI—Command Line Interface. Interface that allows the user to interact with the operating system by entering commands and optional arguments. The UNIX operating system and DOS provide CLIs.

DLSW+ —Data-link Switching Plus. Cisco implementation of the DLSw standard for SNA and NetBIOS traffic forwarding. DLSw+ goes beyond the standard to include the advanced features of the current Cisco RSRB implementation, and provides additional functionality to increase the overall scalability of data-link switching.

LMI—Local Management Interface. Set of enhancements to the basic Frame Relay specification. LMI includes support for a keepalive mechanism, which verifies that data is flowing; a multicast mechanism, which provides the network server with its local DLCI and the multicast DLCI; global addressing, which gives DLCIs global rather than local significance in Frame Relay networks; and a status mechanism, which provides an on-going status report on the DLCIs known to the switch.

NCP—Network Control Program. In SNA, a program that routes and controls the flow of data between a communications controller (in which it resides) and other network resources.

PU—Physical Unit. SNA component that manages and monitors the resources of a node, as requested by an SSCP. There is one PU per node.

SDLC—Synchronous Data Link Control. SNA data link layer communications protocol. SDLC is a bit-oriented, full-duplex serial protocol that has spawned numerous similar protocols, including HDLC and LAPB.

SNRM—Set Normal Response mode.

XID—exchange identification. Request and response packets exchanged prior to a session between a router and a Token Ring host. If the parameters of the serial device contained in the XID packet do not match the configuration of the host, the session is dropped.