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# DLSw+ FID4 LLC2-to-SDLC Conversion for PU4/5 Devices

Document ID: 12357

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## Introduction

### Prerequisites

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- Components Used
- Conventions

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## Introduction

The Synchronous Data Link Control (SDLC) to Logical Link Control, type 2 (LLC2) conversion for FID4 frames is a data-link switching (DLSw+) feature available in IOS® Software Release 11.3T and later releases. This feature allows communication in these scenarios:

- SDLC-attached front end processor (FEP) to LAN-attached FEP across an IP cloud using DLSw+
- SDLC-attached FEP to a Channel Interface Processor (CIP) mainframe-attached router across an IP cloud using DLSw+

- SDLC–attached FEP to LAN–attached FEP: both FEPs are attached to the same router (DLSw+ Local Switching)
- SDLC–attached FEP to CIP: both the CIP and FEP are attached to the same router (DLSw+ Local Switching)

This feature reduces costs by allowing network consolidation of links carrying FEP traffic. It provides a smooth migration from a FEP to a CIP. It also enables DLSw+ to transport Systems Network Administration (SNA) Network Interconnection (SNI) traffic between FEPs when one of the FEPs is serially attached.

The feature received a major improvement with the introduction of software defect CSCdm00503, which was integrated in IOS Software Releases 11.3(10)T, 12.0(5) and 12.0(5)T. If using the first and second scenarios, only the router next to the SDLC FEP needs to run the level of IOS previously indicated. The third and fourth scenarios require the IOS upgrade.

## Prerequisites

### Requirements

There are no specific requirements for this document.

### Components Used

The information in this document is based on these software and hardware versions:

- CSCdm00503, which was integrated in IOS Software Releases 11.3(10)T, 12.0(5) and 12.0(5)T

### Conventions

Refer to Cisco Technical Tips Conventions for more information on document conventions.

## Network Control Program (NCP) SDLC Addressing Considerations

The single most important consideration is the method in which NCP determines the polling SDLC address on a physical unit 4 (PU4)–to–PU4 link. NCP determines the poll sdlc address to use (if it is primary) from the location of the line definition within the NCP gen deck relative to the start and other lines defined for PUTYPE=4 (subarea connections). Hence, the first PU4 line in the deck uses SDLC address 0x01, the second line uses 0x02, and so on. IBM recently changed the method how address assignments are issued for Internode Network (INN) links. Now, both INN and switched connections are counted for addresses. This means that Token Ring user adapter control blocks (UACBs) are included.

The enhancements, introduced by CSCdm00503, include a new configuration option called **seconly** which applies to the **sdlc address** command. For example:

```
sdlc address 01 seconly
```

### Note on NCP Echo Defeat Support

The IBM Informational APAR II02209 explains the detection and handling of line errors caused by line facility echo. Echo defeat code has been added to NCP INN link support to recover from echoed SDLC

frames. This is performed by using dissimilar addressing between NCPs when they are operating in a non-configurable state, such as a primary/secondary relationship. When in this state, the primary station sends the SDLC addressing character (from 0x01 to 0x7E) with bit 0 = OFF. The secondary station sends the addressing character with bit 0 = ON. If the primary receives a frame with bit 0 = OFF, it assumes the frame is an echo and retransmits the frame. If the secondary receives a frame with address character (bit 0 = ON), the same assumption is made and the frame is retransmitted by the secondary. For example, if primary uses address 0x04, the secondary responds using 0x84.

Echo defeat support is agreed by both sides during the exchange identification (XID) negotiation. For that purpose, exchange identification format 2 (XID2) includes the echo supported bit, byte 0x24 bit 4.

## Considerations Before seconly Option

Before CSCdm00503 and the seconly option, it was recommended configuring the SDLC links to IBM routers as near to the top of the configuration deck as possible. This ensured that subsequent configurations did not change the relative position of those lines in the generation (gen) deck.

It was also recommended that links be in a group of their own at the top of the deck, and that any additional related links are configured in order of receipt at the end of the group. Then, all remaining non-Cisco lines configured after this group.

After this, if the SDLC-attached FEP had the highest subarea number, you needed to count the number of lines in the gen deck. Then, you configured the appropriate sdlc address in the router.

Another issue that needed to be considered before CSCdm00503, was that the SDLC-attached FEP must be the SDLC primary device. Generally, the FEP with the highest subarea number becomes the primary device. Under such conditions, customers needed to ensure that this was the case on their setup.

The changes introduced by CSCdm00503 greatly improved the previous issue.

## Considerations After seconly Option

With the introduction of the seconly option, there is no need to count the number of lines in the NCP deck. This simplifies the configuration process.

This new parameter forces the SDLC-attached FEP to always become the primary device, regardless of the subarea number. Also, the seconly option turns the echo supported bit OFF. The Token Ring-attached FEP or CIP side is forced to be secondary. The implication of this change is that it allows the SDLC router to use any SDLC address. There is no longer the need to count the number of lines present in the NCP deck. You can configure any SDLC address value in the router.

With seconly configured, this is the expected flow of SDLC frames:

1. XID negotiation takes place between both FEPs. On the SDLC side, all XIDs flow addressed to the broadcast SDLC address (0xFF).
2. When XID exchange finishes, the SDLC FEP sends an FF93. For example, all stations Set Normal Response Mode (SNRM) command.
3. The SDLC-attached router responds with an Unnumbered Acknowledgment (UA) with the form xx73, where xx is the configured SDLC address in the router.
4. Communication continues using SDLC address xx. Note that the value xx was randomly chosen by the Network Administrator and that it does not match any other parameter in NCP or the router configuration.

**Note:** It is recommended to always use the secondly option.

# Virtual Telecommunications Access Method (VTAM)/NCP and Router Configuration Considerations

## SDLC Role in Router

Before CScdm00503, the SDLC-attached FEP had to be the SDLC primary device. There are two methods to achieve this:

- Assign a higher subarea number to the SDLC-attached FEP.
- Do not configure a secondary SDLCST entry on the GROUP statement for the SDLC line. For example:

```
SDLCPRIM SDLCST GROUP=xxxx

SDLCSEC SDLCST GROUP=yyyy
GROUP SDLCST=( SDLCPRIM, )

NAME1 LINE ADDR=nnn

NAME2 PU PUTYPE=4
```

With the secondly enhancement, the SDLC-attached FEP is always primary and there is no need to make any changes to the NCP configuration.

## SDLC Modulo Support

This feature only supports MODULO 8 for the SDLC connection. Always ensure that the SDLC group/line and SDLCST groups have MODULO = 8 and MAXOUT = 7 configured.

## SDLC Interface Maximum Transmission Unit (MTU) Size

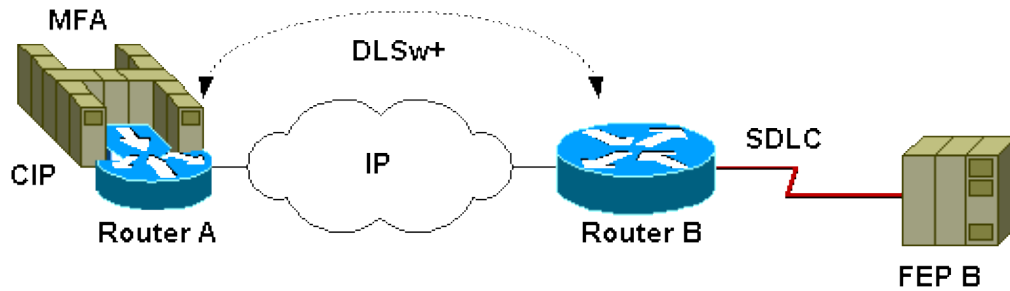
When determining SDLC interface MTU size, perform these steps:

1. Configure the SDLC interface MTU size of the route to be slightly larger than the value of the maximum packet size that NCP sends down the line. The maximum amount of data a line can send is  $\text{TRANSFR} * \text{BFRS} - 18$  (BFRS on build statement, TRANSFR is coded on the line, 18 is the NCP buffer header size).
2. Alternatively, check the value of MAXDATA in the channel attach major nodes for the FEP as the FEP cannot send a packet bigger than it can receive from VTAM.
3. Code SDLC N1 equal to  $(\text{MTU} + 2) * 8$ . This is the MTU size plus 2 bytes (of SDLC header). N1 is coded in bits (hence \* 8). MTU is coded in bytes. For example, common values are:

- ◆ mtu 4096
- ◆ sdlc n1 32784

## VTAM/XCA Limitations

This diagram is not strictly supported. This is because of a known limitation of VTAM. You cannot own a remote NCP through an external communications adapter (XCA) major node. In this case, the remote NCP must be owned by another VTAM.



## Miscellaneous Settings

- If the router provides clock to the FEP, code the clockrate. For example: clockrate 9600.
- Configure **nrzi-encoding** if the FEP SDLC line has NRZI=YES. By default, router uses NRZ encoding.
- Configure **half-duplex** if the FEP SDLC line has DUPLEX=HALF. By default, router uses FULL duplex.

## XID2 Frame Format

XID commands and responses enable communicating link stations to establish mutually-acceptable link station roles and link characteristics. These commands and responses also convey certain node characteristics and capabilities before they transmit data. There are several XID formats used, depending on the type of end devices. XID format 2 type 4 (XID24) is used for T4/5 to T4/5 subarea node exchanges.

Throughout this document, some of the most relevant bytes in the XID frame are explained. For example: bytes 18, 19, 20, 35 and 38. The bits and bytes, in decimals, of the received or transmitted XID2 are explained in this table:

Bytes	Value
8	bit 0 = 1 – Transmission group (TG) active bit 1 = 1 – Multilink TG support
11–12	Maximum path information unit (PIU) that this NCP can receive
13	TG number
14–17	Subarea address of the sender
18	This is the error byte. Values for bits 1 – 4: <ul style="list-style-type: none"> <li>• 1000 – XID parameters are not compatible.</li> <li>• 1001 – Incompatible parameters in the XID for a link station to be added to a TG that is already active. For example: maximum PIU length.</li> <li>• 1010 – The TG is not defined (no routing).</li> <li>• 1100 – The TG between the subarea nodes is active, but the multilink TG bit is set to 0 or the Data Link Control (DLC) type (byte 30) is incompatible with the active TG.</li> </ul>

19	0x00 – Contact has been received by XID sender. 0x07 – XID response sender is already loaded (sent by secondary only). 0x09 – Load required
20–27	The initial program load (IPL) name is in extended binary–coded decimal interchange code (EBCDIC).
30	01 – SDLC 02 – Channel–to–FEP 03 – Channel–to–channel 04 – Write multipath channel 05 – Read multipath channel
31	1 = 1 – Asynchronous Balanced Mode (ABM) combined station 2 = 1 – Secondary network node 3 = 1 – Primary network node
32–33	<del>Maximum iframes the sender can receive</del>
35	<del>4 – 1 – Echo is supported</del>
38	Maxout. If the value is less than $7 = \text{mod}8$ ; if it is greater than $7 = \text{mod}128$

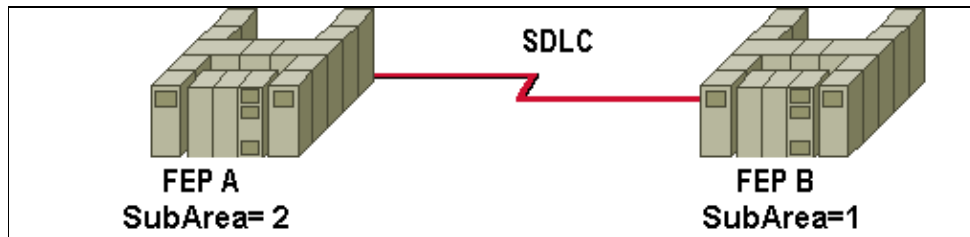
## FEP/CIP Scenarios

This section displays several network scenarios where NCP SDLC addressing issues can occur. The objective is to inform you about the flow of frames associated with each example. The section starts with a basic FEP–to–FEP SDLC (no router) example and progresses from there, adding routers and CIP cards. The advantages of using the secondly option are evident in this section. Refer to the Sample Configurations section of this document for more information.

**Note:** Throughout this section, the character (@) is used to represent the hex value of SDLC addresses. Common SDLC control field types, such as SNRM, Set Normal Response Mode Exchange (SNRME), and UA, are also mentioned.

### FEP to FEP – SDLC without Router

This example demonstrates basic FEP–to–FEP over SDLC. If echo is set ON on both sides, the primary network node sends the @snrm(e) and the secondary responds with the address (@) + 0x80. The address the primary node uses is the relative offset of the station in the NCP gen deck. This randomizes the SDLC addresses used so any line swap can be detected.

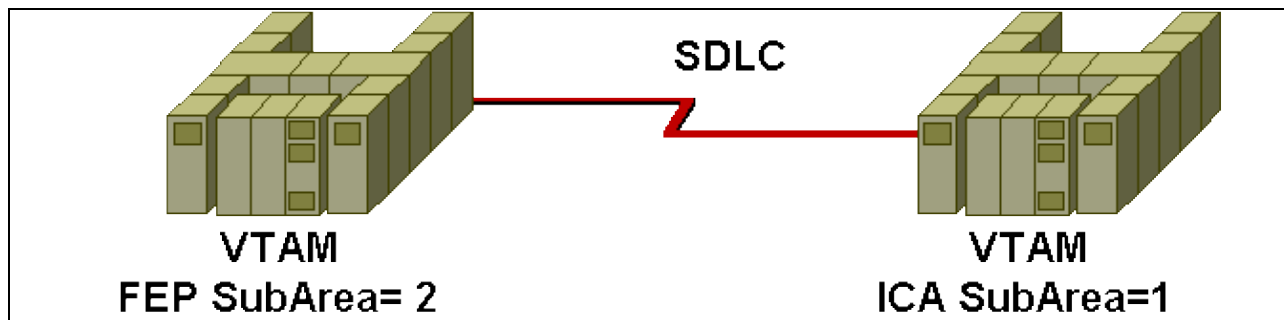


The flow between the two FEPs is displayed:

```
actlnk->
    dsr comes up
    will answer anything with a dm
<+rsp
contact->
    sends xid, pri+sec+echo->
    <-sends xid pri+sec+echo
        ....
    agree on tg number, tg active, etc.
    <-sends xid with byte 19 set to 07
    @snrm(e)----->
    <-----@+x'80'ua
    @r/r----->
    <-----@+x'80'r/r
<-contacted
        contacted->
            iframes
            ...
```

## FEP to ICA – SDLC without Router

This example demonstrates FEP-to-VTAM Integrated Communications Adapter (ICA). If echo is not set on both sides, the primary node sends a ffsnrm(e) and the secondary responds with address(@)ua. The address is usually the subarea address.

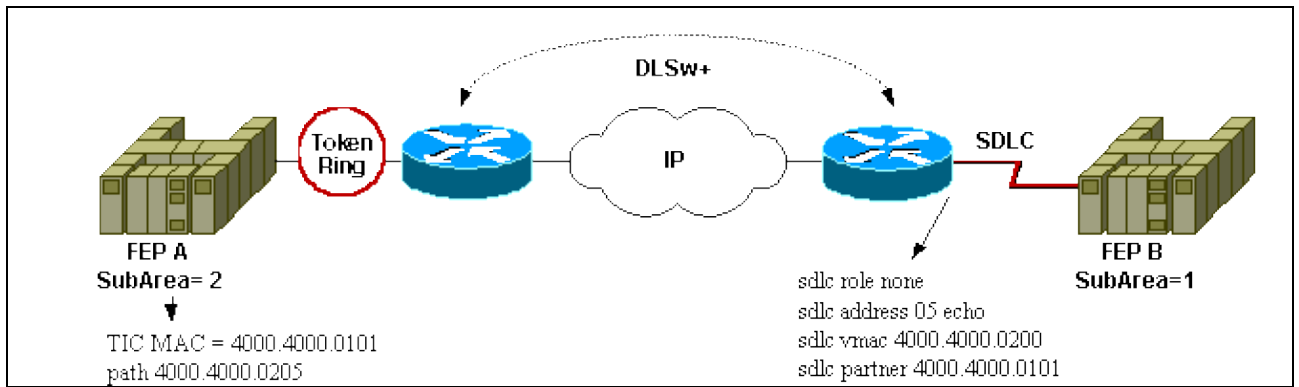


The flow between the FEP and ICA is displayed:

```
actlnk->
    dsr comes up
    will answer anything with a dm
<+rsp
contact->
    sends xid, pri+sec+echo->
<---sends xid pri+sec
    agree on tg number, tg active, etc.
<-sends xid with byte 19 set to 07
ffsnrm(e)----->
<-----sa@ua
@r/r----->
<-----@r/r
<-contacted
                    contacted->
                    iframes
                    ...
```

## FEP to FEP – TR to SDLC with TR FEP with Highest Subarea Number

This example adds a Token Ring-attached FEP to the network. The Token Ring-attached FEP sets the echo bit. In this diagram, the Token Ring FEP is the primary node or highest subarea number. Because the SDLC-attached router becomes primary, it can use any polling SDLC address ranging from 0x01 – 7e. There is no need to count lines on the SDLC-attached FEP NCP gen deck.



The flow between the two FEPs is displayed:

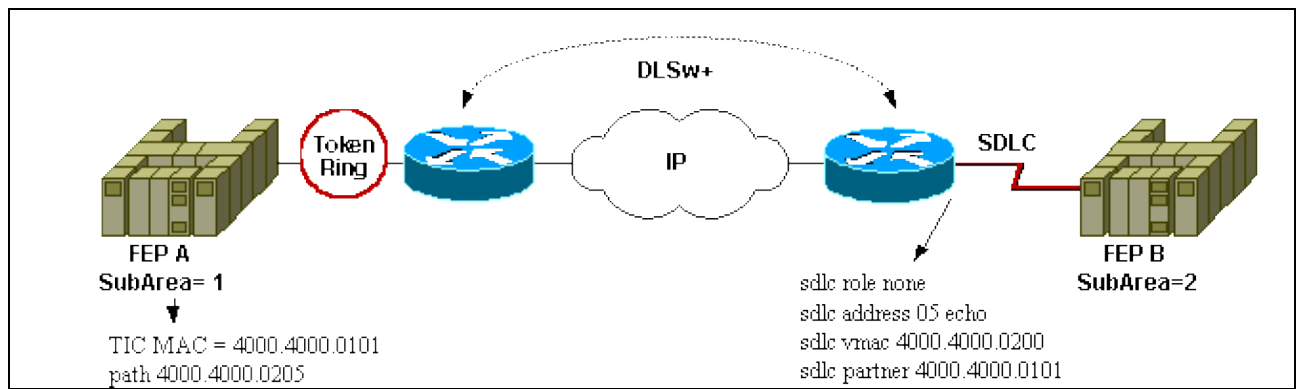
```

contact->
    sends xid, pri+sec+echo----->
<-----sends xid pri+sec+echo
    agree on tg number, tg active, and so on
<-sends xid with byte 19 set to 07
sabme->
    -----dlsw contact>
        @snrm--->
            <--@+0x80ua
<-----dlsw contacted
<-----ua
r/r---->
<----r/r
<--contacted
        @r/r----->
            <-----@+0x80ua
                contacted-->

```

## FEP to FEP – TR to SDLC with SDLC FEP with Highest Subarea Number

In this example, the Token Ring-attached FEP becomes the secondary device or lowest subarea number. Therefore, the SDLC-attached router is secondary as well. If you are not using the secondly option, you must count the lines at the NCP gen deck of SDLC-attached FEP and use that count as the SDLC address configured in the router. This is not the recommended method. Refer to CIP to SDLC FEP – Using secondly Option for an example using secondly.



The flow between the two FEPs is displayed:

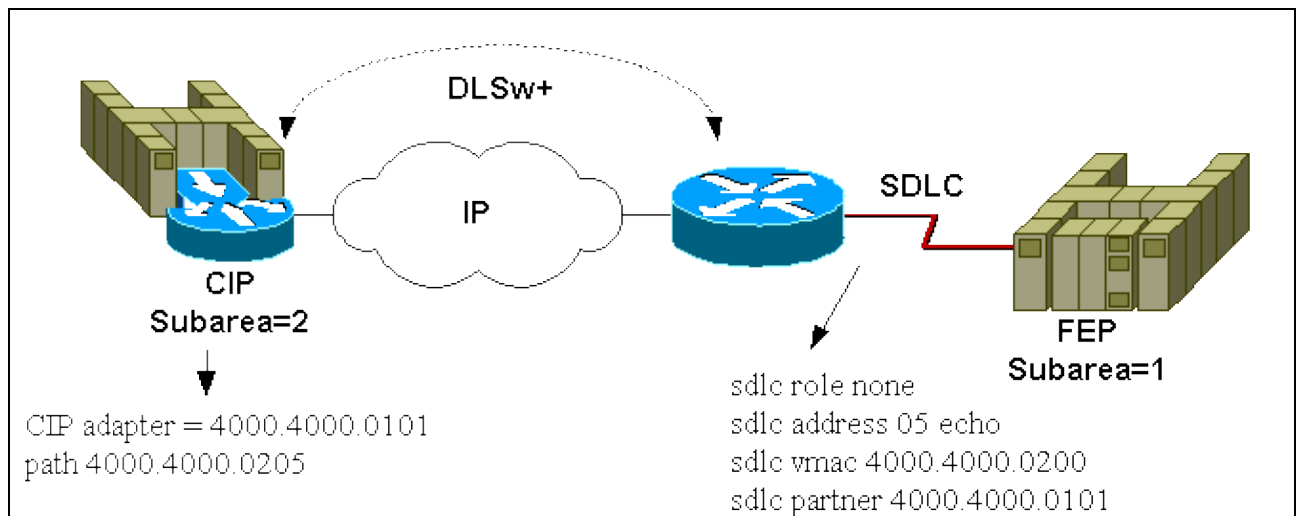
```

contact->
    sends xid, pri+sec+echo----->
<-----sends xid pri+sec+echo
    agree on tg number, tg active, etc.
                                <--@snrm
                                <-----dlsw contact
                                <----sabme
                                ua----->
                                dlsw contacted----->
<-----IOS waits for the next snrm
<-----@snrm
                                @+0x80ua
                                <----r/r
                                r/r---->
<-contacted
                                <----@r/r
                                @+0x80-r/r
                                contacted
  
```

## CIP to SDLC FEP – with CIP with Highest Subarea Number

In this example, the Token-Ring FEP is replaced with a CIP.

**Note:** This works the same with an ICA (see FEP to ICA – SDLC without Router). Echo defeat support is OFF.



The flow between the CIP and FEP is displayed:

```

contact->

sends xid, pri+sec+echo----->

<-----sends xid pri+sec+echo

agree on tg number, tg active, etc.

sabme---->

-----dlsw contacted-->

@sncrm->

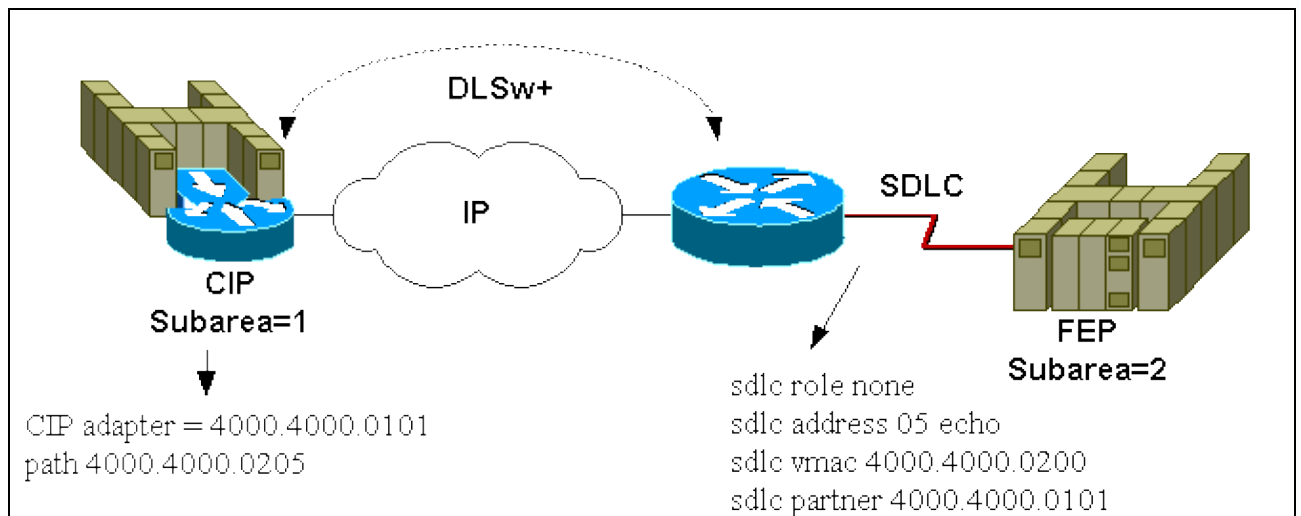
<--ffdm

```

Because echo is OFF, the SDLC-attached FEP is expecting a FFSNRM, while the router just sends @SNRM. This causes the SDLC-attached FEP to respond with a FF disconnect mode (DM). Therefore, in this case, communication is not established. Refer to CIP to SDLC FEP – Using secondly Option to establish communication.

## CIP to SDLC FEP – with SDLC FEP with Highest Subarea Number

This example is the same as the previous one, but the FEP is now in a higher subarea.



The flow between the CIP and FEP is displayed:

```

contact->

      sends xid, pri+sec+echo----->
<-----sends xid pri+sec+echo
      agree on tg number, tg active, etc.

                                <----ffsnrm

                                <-----dlsw contact

      <----sabme

      ua----->

                                dlsw contacted----->
<!---IOS waits for the next snrm                                <-- ffsnrm

                                @ua----->

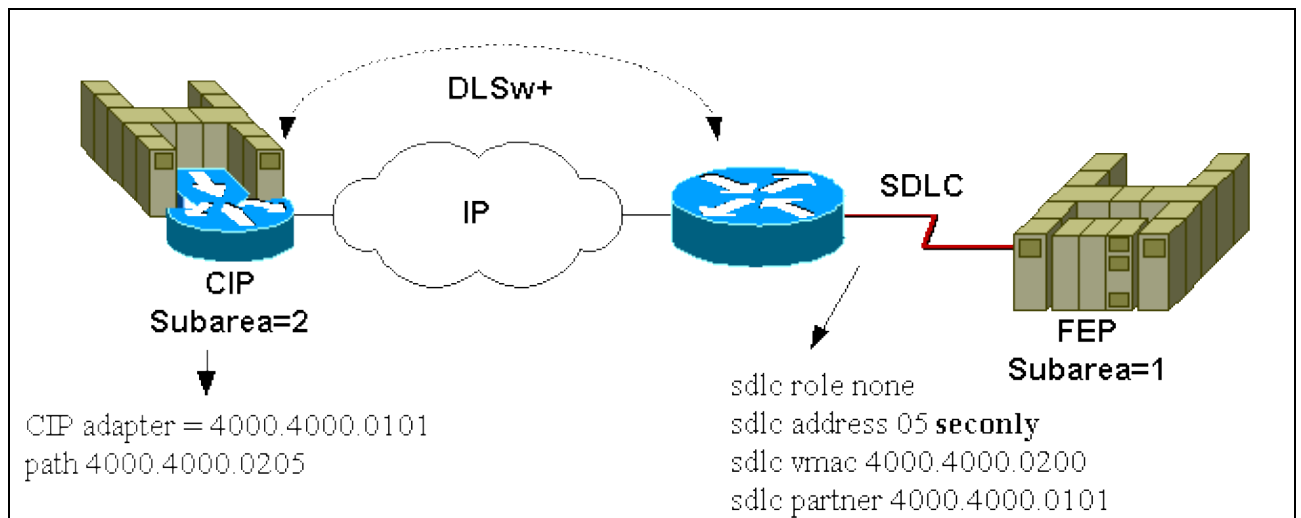
      ....

```

## CIP to SDLC FEP – Using secondly Option

This example adds the **SECONLY** keyword. This keyword eliminates the need for counting PU4 lines on the NCP to determine the correct polling address. Because the SDLC-attached router is always secondary when **secondly** is coded, the polling address is determined by the router. Remember that **echo** is OFF when using this option.

**Note:** To perform configuration tasks easily, it is always recommended to use the **secondly** option. The **secondly** option can be used in any of the scenarios described in this section.



The flow between the CIP and FEP is displayed:

```

contact->
    sends xid, pri+sec+echo----->xid, sec---->
                                     <---sends xid pri+sec+echo
    <-----xid pri
    agree on tg number, tg active, etc.
                                     <-----ffsnrm
    <-----dlsw contact
    <---sabme
    ua----->
                                     dlsw contacted----->
<!---IOS waits for the next snrm                                     <-- ffsnrm
                                     @ua----->
    ....
  
```

## Sample Configurations

In this section, you are presented with the information to configure the features described in this document.

This document uses these sample configurations:

- Router Sample Configurations:
  - ◆ DLSw Remote Peer Connection (Two Routers)
  - ◆ DLSw Local-Switching Connection (One Router)
- NCP and VTAM Sample Configurations:

- ◆ FEP SDLC
- ◆ FEP Token Ring Subarea
- ◆ VTAM XCA Subarea Major Node

**Note:** Use the Command Lookup Tool ( registered customers only) to find more information on the commands used in this document.

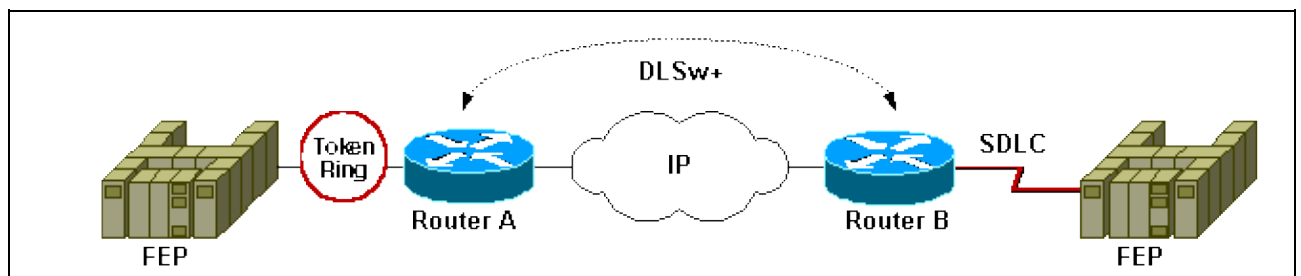
## DLSw Remote Peer Connection (Two Routers)

The most common router configuration mistake is to use the wrong SDLC partner MAC address. In all the sample router configurations, 4000.1111.0020 matches the CIP adapter 0 MAC address for CIP case, and matches the FEP tic LOCADD value for the subarea Token Ring case.

**Note:** All configurations are not exact and can be manipulated where needed, for example: nrzi, clockrate, mtu, sdlc n1.

This scenario shows two DLSw+ routers connected by an IP network. Each one of these routers has a connection to a FEP. One side is attached through a Token Ring interface and the other via an SDLC line.

### SDLC-Attached FEP to LAN-Attached FEP Across an IP Cloud using DLSw+



#### Router A

```
source-bridge ring-group 1111
dlsw local-peer peer-id 10.1.1.1
dlsw remote-peer 0 tcp 10.2.2.2
interface token ring 6/0
 ring-speed 16
 source-bridge 2 1 1111
```

#### Router B

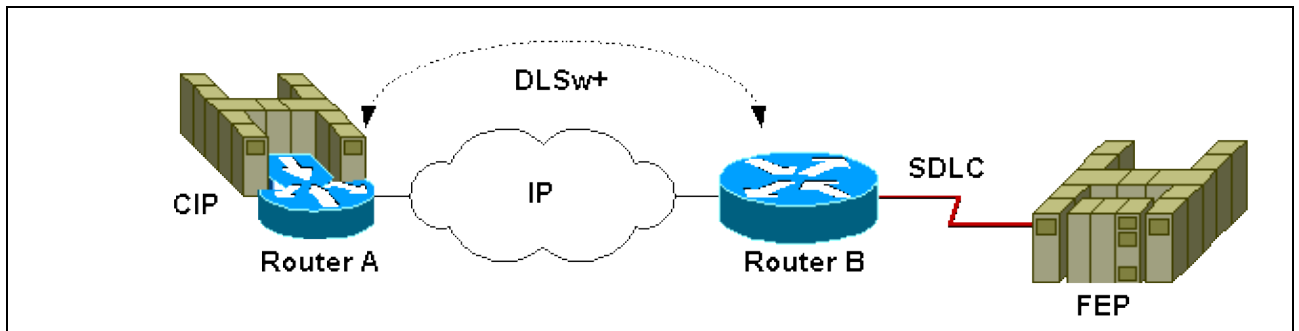
```
dlsw local-peer peer-id 10.2.2.2
dlsw remote-peer 0 tcp 10.1.1.1

interface Serial1
 description Sdlc configuration PU4/PU4
 mtu 6000
 no ip address
 encapsulation sdhc
 no keepalive
 clockrate 9600
 sdlc vmac 4000.3745.0000
 sdlc N1 48016
 sdlc address 04 seconly
 sdlc partner 4000.1111.0020 04
```

```
sdlc dlsw 4
```

This scenario shows two DLSw+ routers connected by an IP network. Router A has a direct channel connection to the mainframe using a CIP/CPA card. Router B has an SDLC connection to a FEP.

### SDLC-Attached FEP to a Cisco CIP Mainframe-Attached Router Across an IP cloud Using DLSw+



#### Router A

```
source-bridge ring-group 1111
dlsw local-peer peer-id 10.1.1.1
dlsw remote-peer 0 tcp 10.2.2.2
interface Channel5/0
  csna 0100 20
interface Channel5/2
  lan TokenRing 0
  source-bridge 1 1 1111
  adapter 0 4000.1111.0020
```

#### Router B

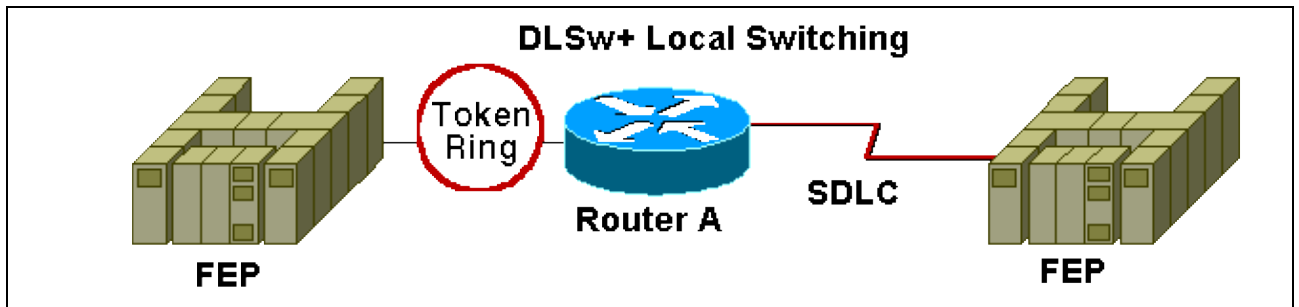
```
dlsw local-peer peer-id 10.2.2.2
dlsw remote-peer 0 tcp 10.1.1.1

interface Serial1
  description Sdlc configuration PU4/PU4
  mtu 6000
  no ip address
  encapsulation sdlc
  no keepalive
  clockrate 9600
  sdlc vmac 4000.3745.0000
  sdlc N1 48016
  sdlc address 04 seconly
  sdlc partner 4000.1111.0020 04
  sdlc dlsw 4
```

## DLSw Local-Switching Connection (One Router)

This scenario shows two FEPs attached to the same router. One FEP connects via a Token Ring interface and the other one via an SDLC line. The router is configured for DLSw+ local-switching (no dlsw remote-peer configured).

### SDLC-Attached FEP to LAN-Attached FEP Using DLSw+ Local Switching



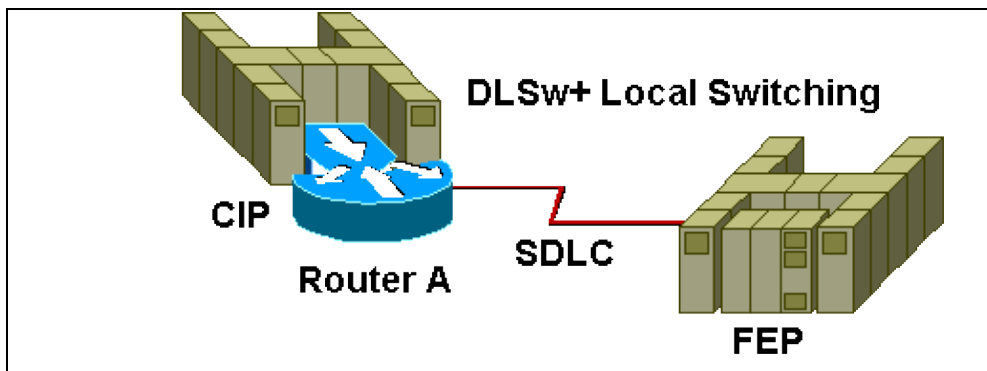
```

Router A
source-bridge ring-group 1111
dlsw local-peer
interface Serial1/0
  description Sdlc configuration PU4/PU4
  mtu 6000
  no ip address
  encapsulation sdlc
  no keepalive
  clockrate 9600
  sdlc vmac 4000.3745.0000
  sdlc N1 48016
  sdlc address 04 seconly
  sdlc partner 4000.1111.0020 04
  sdlc dlsw 4
interface token ring 6/0
  ring-speed 16
  source-bridge 2 1 1111

```

This scenario shows a CIP-attached mainframe and a SDLC-attached FEP connecting into the same router. The router is configured for DLSw+ local-switching (no dlsw remote-peer configured).

### SDLC-Attached FEP to CIP Using DLSw+ Local Switching



```

Router A
source-bridge ring-group 1111
dlsw local-peer

interface Serial1/0
  description Sdlc configuration PU4/PU4
  mtu 6000
  no ip address
  encapsulation sdlc

```

```

no keepalive
clockrate 9600
sdhc vmac 4000.3745.0000
sdhc N1 48016
sdhc address 04 seconly
sdhc partner 4000.1111.0020 04
sdhc dlsw 4
interface Channel5/0
csna 0100 20
interface Channel5/2
lan TokenRing 0
source-bridge 1 1 1111
adapter 0 4000.1111.0020

```

## NCP and VTAM Sample Configurations

The most common NCP/VTAM configuration mistake is to use the wrong MAC address when defining the PU4 MAC address of the remote. In the NCP/VTAM sample configurations, notice the PU ADDR field of the NCP and the XCA MACADDR field of the VTAM. Both are pointing to the value 4000.3745.0004. This number is equal to the sdhc vmac MAC configured in the router (4000.3745.0000) plus the configured sdhc address (0x04). Most users initially point to the sdhc vmac value and fail to add the sdhc address.

**Note:** Remember that the sdhc address is used to modify the last byte of the sdhc vmac.

### FEP SDLC

FEP SDLC			
00084	*****		
00085	SDLCPRIM	SDLCST GROUP=INNPRIM,	SDLC STATEMENTS FOR INN *
00086		MAXOUT=7,	*
00087		MODE=PRIMARY,	*
00088		PASSLIM=254,	*
00089		RETRIES=(5,2,5),	*
00090		SERVLIM=4	
00091	SDLCSEC	SDLCST GROUP=INNSEC,	SDLC STATEMENTS FOR INN *
00092		MAXOUT=7,	*
00093		MODE=SECONDARY,	*
00094		PASSLIM=254,	*
00095		RETRIES=(5,2,5)	
00139	*****		LV910409
00140	*		LV910409
00141	*	GROUP STATEMENT FOR INN STATIONS	LV910409
00142	*		LV910409
00143	*****		LV910409
00144	INNPRIM	GROUP DIAL=NO,	*
00145		LNCTL=SDLC,	*
00146		MODE=PRIMARY,	*
00147		REPLYTO=60	
00148	INNSEC	GROUP DIAL=NO,	*
00149		LNCTL=SDLC,	*
00150		MODE=SECONDARY,	*
00151		REPLYTO=NONE	
00286	*****		"
00287	*		"
00288	*	GROUP MACROS FOR INN CONNECTIONS	"
00289	*		"
00290	*****		"
00291	GRPINN	GROUP ACTIVTO=60,	SEC WAIT FOR PRIM *
00292		ANS=CONT,	*

```

00293          CLOCKNG=EXT,          *
00294          DATRATE=HIGH,         *
00295          DIAL=NO,               *
00296          DUPLEX=FULL,          *
00297          IRETRY=NO,             *
00298          ISTATUS=ACTIVE,       *
00299          LNCTL=SDLC,           *
00300          MAXOUT=7,              *
00301          MAXPU=1,              *
00302          MONLINK=YES,          *
00303          NEWSYNC=NO,           *
00304          NRZI=NO,              *
00305          PASSLIM=254,          *
00306          PAUSE=0.2,            *
00307          REPLYTO=1,            *
00308          RETRIES=(3,1,3),     *
00309          SDLCST=(SDLCPRIM,SDLCSEC), *
00310          SERVLIM=255,          *
00311          TGN=2,                *
00312          TRANSFR=27,          *
00313          TYPE=NCP
00314 * "
00315 ERNLN012 LINE ADDRESS=012,ISTATUS=ACTIVE
00316 ERNPU012 PU PUTYPE=4
00317 * "

```

## FEP Token Ring Subarea

FEP Token Ring Subarea	
*****	06260099
* SDLCST STATEMENT FOR SDLC CONNECTED NCP-NCP LINKS *	06270099
*****	06280099
N46DPRIS SDLCST GROUP=N46DPRIG, *	X06290099
MAXOUT=7, * FRAMES RECIEVED BEFORE RESPONSEX06300099	
MODE=PRIMARY, * PRIMARY MODE X06310099	
PASSLIM=254, * MAXIMUM # OF PIUS SENT TO PU X06320099	
RETRIES=(3,2,30), * RETRIES X06330099	
SERVLIM=4 * REGULAR / SPECIAL SCANS 06340099	
N46DSECS SDLCST GROUP=N46DSECG, X06350099	
MAXOUT=7, X06360099	
MODE=SECONDARY, X06370099	
PASSLIM=254, X06380099	
RETRIES=3 06390099	
*****	45570099
* GROUP STATEMENTS FOR INN LINKS *	45580099
*****	45590099
N46DPRIG GROUP DIAL=NO, * NON-SW LINE CONTROL *	X45600099
LNCTL=SDLC, * SDLC PROTOCOLS *	X45610099
MODE=PRIMARY, * PRIMARY MODE *	X45620099
REPLYTO=1 * TIMEOUT IF NO MSG RESP WITHIN 10 SEC*	45630099
* REQUIRED FOR REMOTE LOADS	45640099
N46DSECG GROUP ACTIVTO=180, * TIMEOUT IF NO CONTACT FOR 7 MIN *	X45650099
DIAL=NO, * NON-SW LINE CONTROL *	X45660099
LNCTL=SDLC, * SDLC PROTOCOLS *	X45670099
MODE=SECONDARY, * SECONDARY MODE *	X45680099
REPLYTO=NONE * DONT TIMEOUT - SECONDARY END ONLY *	45690099
*****	46680099
* TOKEN RING PHYSICAL DEFINTIONS *	46690099
*****	46700099
N46DPTR1 GROUP ECLTYPE=(PHYSICAL,SUBAREA), X46710099	
NPACOLL=YES 46720099	

```

N46LYA  LINE  ADDRESS=(1088,FULL),      TIC ADDRESS      X46730099
ISTATUS=ACTIVE,                          X46743099
PORTADD=1,                                X46760099
MAXTSL=1108,                              X46770099
RCVBUFC=4095,          MAX FROM RING TO NCP      X46780099
LOCADD=400011110020  3745 ADDRESS ON RING      46790099
N46PYA  PU    ANS=CONT                      46800099
N46UYA  LU    ISTATUS=INACTIVE      DUMMY LU        46810099
*          STATOPT=OMIT                  46820099
*****
*          TOKEN RING LOGICAL DEFINITIONS - SUBAREA LINKS * 46830099
*****
N46DLTR1 GROUP ECLTYPE=(LOGICAL,SUBAREA), * LOGICAL SUBAREA GROUP * X46830299
ISTATUS=INACTIVE,                          X46830399
NPACOLL=YES,                                X46830499
PHYSRSC=N46PYA                              46830699
N46LXA47 LINE SDLCST=(N46DPRIS,N46DSECS), ISTATUS=ACTIVE      46830799
N46PXA47 PU    ADDR=04400037450004      46830999

```

## VTAM XCA Subarea Major Node

VTAM XCA Subarea Major Node			
00001		VBUILD TYPE=XCA	
00002	SUBAPRT	PORT ADAPNO=0,	*
00003		CUADDR=120,	*
00004		MEDIUM=RING,	*
00005		SAPADDR=4,	*
00006		TIMER=30	
00007	SUBAGRP	GROUP DIAL=NO	
00008	SUBALN	LINE USER=SNA	
00009	SUBAPU	PU MACADDR=400037450004,	*
00010		PUTYPE=4,	*
00011		SAPADDR=4,	*
00012		SUBAREA=63,	*
00013		TGN=2	

## Verify

There is currently no verification procedure available for this configuration.

## Troubleshoot

This section provides information to troubleshoot your configuration.

## Troubleshooting Procedure

Follow these instructions to troubleshoot your configuration. Refer to Troubleshooting DLSw for additional information on troubleshooting.

1. Ensure the sdlc partner MAC address configured in the router matches the CIP adapter MAC address (if using CIP), or the FEP TIC MAC address.
2. Verify that the PU4 MAC address configured in the XCA major node definition (if using CIP) or in the TIC logical definitions, matches the SDLC-attached router VMAC + SDLC address. Remember that the SDLC address is used to modify the last byte of the SDLC VMAC.
3. Issue the router command **show interface serial x/y** to display the statistics related to the SDLC

interface. Verify that input and output packets are being recorded there. If any of the counters is equal to zero, check the HDX/FDX and NRZ/NRZI settings. By default, IOS defaults to NRZ encoding and Full duplex.

4. If the DLSw+ circuit fails to connect, issue the command **show dlsw reachability** to verify that the routers have the correct information about the location of the MAC addresses involved. If the SDLC VMAC address does not appear, check if the SDLC interface is UP and that input and output packets counters are incrementing. If the CIP adapter or FEP TIC MAC address is missing from the reachability table, perform standard CIP CSNA troubleshooting (if using CIP), or check the physical status of the TIC (if using FEP Token Ring subarea). Remember that the reachability information is only used during circuit setup and never used afterwards. Therefore, you can end up in a situation where the reachability table is empty, but there are working DLSw+ circuits. Refer to Troubleshooting DLSw Reachability for more information.
5. If the XID is sent on only one side, verify that both sides are pending contact, such as PCTD1 or PCTD2.
6. If both sides are continuously sending XIDs, check the TG active bit.
7. If the SNRM is being answered with a DM, the FEP sends a SNRME, when it can be sending a SNRM. A router doing local ack for an sdhc interface does not accept an incoming SNRME (which attempts to set the window size to 128). This is not supported, so verify that the MAXOUT parameter is not greater than seven (7).
8. Another case where the router can send a DM is when the FEP sends ffsnrm but is sending @snrm instead. If echo is OFF, the router is expecting to get ffsnrm.
9. Also, check XID2 error byte (byte 18) for non 0 values. Bytes 18 and 19 are easy to spot; just look for the load module name as it is at byte 20.
10. In the case where the sdhc router receives snrm, IOS waits for the next snrm after the dlsw contact/contacted has completed. If NCP has a replyto code > 40s, the IOS sdhc code times out the connection. Replyto must be coded between 1 and 3 seconds.
11. Issue the command **show dlsw circuit** to verify the status of the connection. Look for STATE equal to CONNECTED. If using only one router, such as DLSw+ Local Switching, issue the command **show dlsw local**. Refer to Troubleshooting DLSw+ Circuit Connectivity for more information.

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