



## Configuring SNA Switching Services

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This chapter describes SNA Switching Services (SNASw), which supersedes all functionality previously available in the Advanced Peer-to-Peer Networking (APPN) feature in the Cisco IOS software. SNASw configuration will not accept the previous APPN configuration commands. Previous APPN users should use this chapter to configure APPN functionality using the new SNASw commands.

For a complete description of the SNASw commands mentioned in this chapter, refer to the “SNA Switching Services Commands” chapter of the *Cisco IOS Bridging and IBM Networking Command Reference, Volume II*. To locate documentation of other commands that appear in this chapter, use the command reference master index or search online.

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### Technical Overview

SNASw provides an easier way to design and implement networks with Systems Network Architecture (SNA) routing requirements. Previously, this network design was accomplished using APPN with full network node (NN) support in the Cisco router. This type of support provided the SNA routing functionality needed, but was inconsistent with the trends in Enterprise networks today. The corporate intranet is replacing the SNA WAN. Enterprises are replacing their traditional SNA network with an IP infrastructure that supports traffic from a variety of clients, using a variety of protocols, requiring access to applications on a variety of platforms, including SNA applications on enterprise servers.

While SNA routing is still required when multiple servers must be accessed, the number of nodes required to perform this function is decreasing as the IP infrastructure grows and as the amount of native SNA traffic in the network decreases.

SNASw enables an enterprise to develop their IP infrastructure, while meeting SNA routing requirements.

The number of NNs in the network and the amount of broadcast traffic are reduced. Configuration is simplified, and SNA data traffic can be transported within the IP infrastructure. The following features provide this functionality:

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## High Performance Routing (HPR)-Capable SNA Routing Services

SNASw provides the following SNA routing functions:

- Routes SNA sessions between clients and target SNA data hosts.
- Supports full SNA class of service (COS) features.
- Controls SNA traffic in a multiprotocol environment in conjunction with other Cisco IOS quality of service (QOS) features.
- Supports networks with a high proportion of SNA traffic and multiple enterprise servers, especially those that continue to support the traditional SNA endstation platform and new client types.
- Supports all types of SNA application traffic including traditional 3270 and peer LU 6.2.
- Supports an OS/390 Parallel Sysplex configuration, working in conjunction with the IBM Communications Server for S/390 (formerly VTAM) and the MVS Workload Manager, to provide higher availability in the data center using the HPR feature.
- Supports System Services Control Point (SSCP) services to downstream SNA devices using the Dependent LU Requester (DLUR) feature.
- Provides dynamic link connectivity using connection networks (CNs), which eliminates much of the configuration required in networks with numerous data hosts.

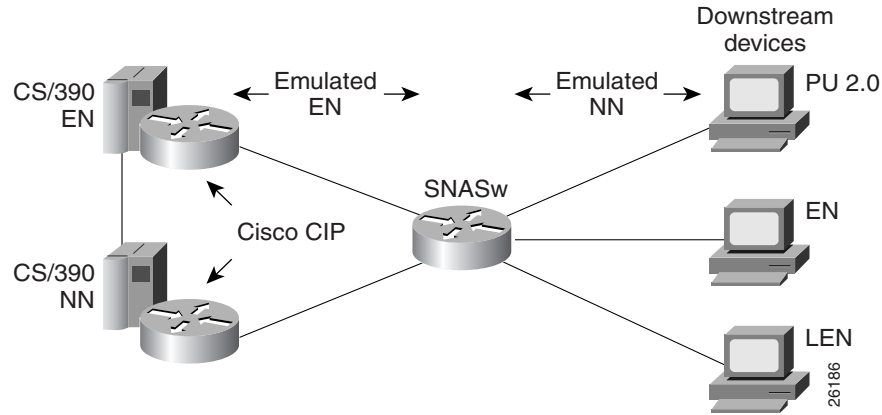
## Branch Extender

The Branch Extender (BEX) function enhances scalability and reliability of SNA routing nodes by eliminating topology updates and broadcast directory storms that can cause network instability. BEX appears as an NN to downstream end node (EN), low-entry networking (LEN) node, and PU 2.0 devices, while also appearing as an EN to upstream devices. The BEX function eliminates APPN topology and APPN broadcast search flows between SNASw nodes and the SNA data hosts in the network. This feature is key to providing a reliable turn-key installation because the network administrator no longer needs to develop in-depth knowledge of the level and characteristics of broadcast directory search and topology update traffic in the network. Such knowledge and analysis was commonly required to build successful networks utilizing NN technology without BEX.

SNASw enables BEX functionality by default. SNASw treats all defined links as BEX “uplinks” and all dynamic links created by stations connecting into SNASw as Branch Extender “downlinks.” No specific configuration is necessary to enable BEX functionality.

Figure 222 illustrates the BEX functionality.

**Figure 222 BEX Functionality**

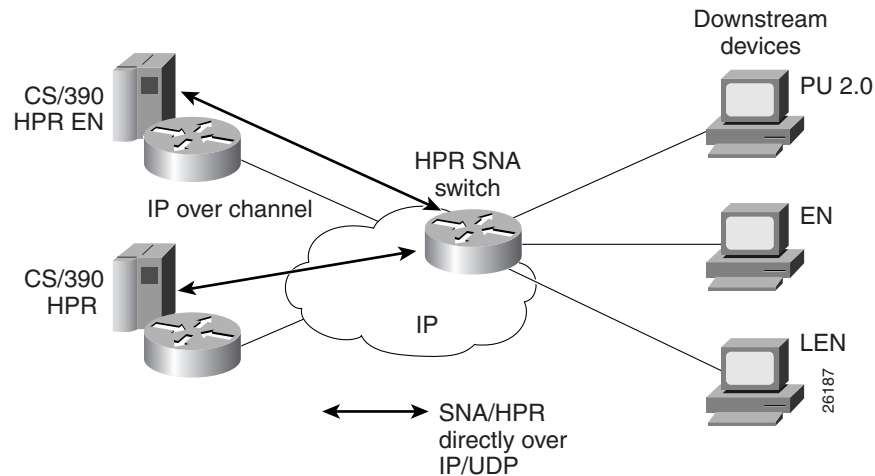


## Enterprise Extender (HPR/IP)

SNASw also supports the Enterprise Extender (EE) function. EE offers SNA HPR support directly over IP networks. EE also uses connectionless User Datagram Protocol (UDP) transport. SNA COS and transmission priority are maintained by mapping the transmission priority to the IP precedence and by mapping transmission priority to separate UDP port numbers, allowing the IP network to be configured based on these elements. Cisco’s IP prioritization technologies, such as weighted fair queuing (WFQ), prioritize the traffic through the IP network. EE support on the IBM Communications Server for S/390 allows users to build highly reliable SNA routed networks that run natively over an IP infrastructure directly to the Enterprise servers. These network designs reduce points of failure in the network and provide reliable SNA networks.

Figure 223 illustrates the EE functionality.

**Figure 223 EE Functionality**



## Usability Features

SNASw contains the following usability features designed to make SNA networks easier to design and maintain:

- Dynamic CP Name Generation Support
- Dynamic SNA BTU Size
- DLUR Connect-Out
- Responsive Mode Adaptive Rate-Based Flow Control
- User-Settable Port Limits

### Dynamic CP Name Generation Support

When scaling the SNASw function to hundreds or thousands of nodes, many network administrators find that defining a unique control point (CP) name on each node generates unnecessary configuration overhead. Dynamic CP name generation offers the ability to use the Cisco IOS hostname as the SNA CP name or to generate a CP name from an IP address. These facilities reuse one SNASw configuration across many routers and eliminate the specific configuration coordination previously required to configure a unique CP name for each SNA node in the network. Administrators can still explicitly configure the CPname within the SNASw configuration.

### Dynamic SNA BTU Size

SNASw analyzes the maximum transmission unit (MTU) size of router interfaces configured for native LAN interfaces such as Token Ring, Ethernet and FDDI, and dynamically assigns the best MTU values for that specific port. For other interface types, SNASw provides the maximum BTU parameter in the port configuration. For server-dependent PU 2.0 devices, SNASw uses the downstream MAXDATA value from the host and then dynamically sets the SNA BTU for that device to the MAXDATA value.

### DLUR Connect-Out

SNASw can receive connect-out instructions from the IBM Communications Server for S/390. This function allows the system to dynamically connect-out to devices that are configured on the host with the appropriate connect-out definitions. This feature allows connectivity to SNA devices in the network that were traditionally configured for connect-out from the host.



**Note**

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DLUR connect-out can be performed over any supported data-link type.

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### Responsive Mode Adaptive Rate-Based Flow Control

Early HPR implementations failed to perform well in environments subject to packet loss (for example, Frame Relay, IP transport) and performed poorly when combined with other protocols in multiprotocol networks. SNASw implements the second-generation HPR flow-control architecture, called Responsive Mode Adaptive Rate-Based (ARB) architecture. Responsive Mode ARB addresses all the drawbacks of the earlier ARB implementation, providing faster ramp-up, better tolerance of lost frames, and better tolerance of multiprotocol traffic.

## User-Settable Port Limits

SNASw offers full control over the number of devices supported by a specific port. The max-links configuration on the SNASw port controls the number of devices that are served by this port. When the max-links limit is reached, SNASw no longer responds to test frames attempting to establish new connections. SNASw allows load sharing among different SNASw nodes that offer service to the same SNA MAC addresses.

## Management Enhancements

SNASw contains the following enhanced tools for managing SNA networks:

- Console Message Archiving
- Data-Link Tracing
- Interprocess Signal Tracing
- Trap MIB Support for Advanced Network Management Awareness

### Console Message Archiving

Messages issued by SNASw are archived in a buffer log that is queried and searched at the console or transferred to a file server for analysis. Each message has a single line that identifies the nature of the event that occurred. The buffer log also maintains more detailed information about the message issued.

### Data-Link Tracing

SNA frames entering or leaving SNASw are traced to the console or to a cyclic buffer. These frames are analyzed at the router or transferred to a file server for analysis. The trace is sent to a file server in a SNA-formatted text file or in binary format readable by existing traffic analysis applications.

### Interprocess Signal Tracing

The SNASw internal information is traced in binary form, offering valuable detailed internal information to Cisco support personnel. This information helps diagnose suspected defects in SNASw.

### Trap MIB Support for Advanced Network Management Awareness

SNASw supports the APPN Trap Management Information Base (MIB), which proactively sends traps with information about changes in SNA resource status. This implementation reduces the frequency of SNMP polling necessary to manage SNA devices in the network.

## LAN and IP-Focused Connection Types

SNASw supports several connection types to serve all SNA connectivity options, including the following types:

- Token Ring, Ethernet, and FDDI
- Virtual Token Ring
- Virtual Data-Link Control
- Native IP Data-Link Control (HPR/IP)

### Token Ring, Ethernet, and FDDI

SNASw natively supports connectivity to Token Ring, Ethernet, and FDDI networks. In this configuration mode, the MAC address used by SNASw is the locally configured or default MAC address of the interface.

### Virtual Token Ring

Using virtual Token Ring allows SNASw access to a source-route bridging (SRB) network, which allows the following configuration:

- Attachment to Local LANs
- Connection to Frame Relay Transport Technologies
- Connection to Channel Interface Processor and Channel Port Adapter

#### Attachment to Local LANs

Virtual Token Ring allows you to connect to local LAN media through SRB technology. Virtual Token Ring and SRB allow SNASw to respond to multiple MAC addresses over the same physical interface. Because there is no limit to the number of virtual Token Ring interfaces that can connect to a specific LAN, you can configure multiple MAC addresses, which respond to SNA requests over the same LAN. When using native LAN support, SNASw responds only to requests that target the MAC address configured on the local interface.

#### Connection to Frame Relay Transport Technologies

Virtual Token Ring and SRB connect SNASw to a SNA Frame Relay infrastructure. FRAS host and SRB Frame Relay are configured to connect virtual Token Ring interfaces that offer SNASw support for Frame Relay boundary access node (BAN) or boundary network node (BNN) technology.

#### Connection to Channel Interface Processor and Channel Port Adapter

Virtual Token Ring and SRB can be used to connect SNASw to the Channel Interface Processor (CIP) or Channel Port Adapter (CPA) in routers that support those interfaces.

## Virtual Data-Link Control

SNASw uses Virtual Data-Link Control (VDLC) to connect to data-link switching plus (DLSw+) transport and local switching technologies. VDLC is used for a number of connectivity options, including the following two:

- Transport over DLSw+ Supported Media
- DLC Switching Support for Access to SDLC and QLLC

### Transport over DLSw+ Supported Media

Using VDLC, SNASw gains full access to the DLSw+ transport facilities, including DLSw+ transport over IP networks, DLSw+ transport over direct interfaces, and DLSw+ support of direct Frame Relay encapsulation (without using IP).

### DLC Switching Support for Access to SDLC and QLLC

Through VDLC, SNASw gains access to devices connecting through synchronous data link control (SDLC) and qualified logical link control (QLLC). This access allows devices connecting through SDLC and QLLC access to SNASw.

## Native IP Data-Link Control (HPR/IP)

SNASw support for the EE function provides direct HPR over UDP connectivity. This support is configured for any interface that has a configured IP address. HPR/IP uses the interface IP address as the source address for IP traffic originating from this node.

## Benefits of SNASw

SNASw provides the following benefits:

### Scalable APPN Networks

With the BEX function, the number of network nodes and the amount of broadcast traffic are reduced.

### IP Infrastructure Support

Limiting SNASw routers to the data center and using the BEX function eliminates SNA broadcasts from the IP network. With EE, SNA traffic is routed using the IP routing infrastructure while maintaining end-to-end SNA services.

### Reduced Configuration Requirements

By eliminating NNs and using the BEX function, configuration tasks are minimized. Additionally, Cisco has enhanced its auto-configuration capability to eliminate previously required commands.

## Network Design Simplicity

By placing all SNA routers in the data center, fewer SNA routers are required, and they can be easily configured using virtually identical configurations.

## Improved Availability

By adding Cisco-unique capabilities to connect-out and distribute traffic across multiple ports, access to resources is improved. Additionally, by supporting the newest HPR ARB flow control algorithm, bandwidth management for SNA traffic is improved.

## Increased Management Capabilities

Two new traces, interprocess and data-link, provide an easier way to view SNASw activity. The APPN Trap MIB allows the user to notify the operator in event of a debilitating problem. Console message archiving provides better tracking of network activity. The ability to format traces so that they are readable by other management products simplifies network management because results are more readily available.

## Architectural Compliance

SNASw interfaces with SNA implementations on the market: upstream NNs, ENs, LENs and PU 2.0. It also provides full DLUR support to allow dependent PU and LU traffic to flow over the APPN network to SNA data hosts.

# Configuring SNASw

To configure SNASw in your network, perform the tasks discussed in the following sections. Because of the hierarchical nature of SNASw definitions, configure SNASw in the order specified. Definition of an SNASw CP name and at least one SNASw port are required. The other tasks are optional. Depending on your network, the optional tasks might need to be performed.

- Defining an SNASw Control Point Name, page 547 (Required)
- Configuring a DLUS, page 547 (Optional)
- Configuring DLC Support, page 547 (Optional)
- Defining an SNASw Port, page 548 (Required)
- Defining an SNASw Link, page 549 (Optional)
- Defining an SNASw Partner LU Location, page 549 (Optional)
- Starting SNASw and SNASw Ports and Links, page 551 (Optional)
- Stopping SNASw and SNASw Ports and Links, page 551 (Optional)

## Defining an SNASw Control Point Name

An SNASw CP definition is required to use SNASw. This definition adds the fully-qualified CP name for the node. The fully-qualified CP name for the node is a combination of a network identifier and a CP name. The network identifier is typically configured to match the identifier configured in the SNA hosts in the network. The CP name identifies this node uniquely within the particular subnetwork.

To define an SNASw CP name, use the following command in global configuration mode:

Command	Purpose
Router# <b>snasw cpname</b> <i>netid.cpname</i> [ <b>hostname</b> ] [ <b>ip-address</b> <i>interface-name</i> ]	Defines an SNASw CP name.



### Note

Configuring a CP name activates SNASw. Conversely, removing a CP name definition deactivates it.

## Configuring a DLUS

If you plan to provide services to dependent LUs connecting to this SNASw node, you will be using the DLUR functionality within SNASw. SNASw defaults to using its current active upstream Network Node Server (NNS) as the preferred Dependent LU Server (DLUS) for the node. To override this default and explicitly configure the DLUS name, configure the **snasw dlus** command. In addition, you can configure node-wide defaults for the DLUS and backup DLUS that this node contacts.

To specify DLUR or DLUS services for this CP name, use the following command in SNASw control point configuration mode:

Command	Purpose
Router# <b>snasw dlus</b> <i>primary-dlus-name</i> [ <b>backup</b> <i>backup-dlus-name</i> ] [ <b>prefer-active</b> ] [ <b>retry</b> <i>interval</i> <i>count</i> ] [ <b>once</b> ]	Specifies the parameters related to DLUR/DLUS functionality.

## Configuring DLC Support

There are several ways that SNASw enables connectivity over different interface types. In the simplest cases, using automatically configured real LAN interfaces enables default interface definitions. SNASw is also capable of connecting to virtual interfaces that are not preconfigured on the router.

Virtual Token Ring interfaces are useful for connections to a CIP/CPA in the same router and for connectivity to Frame Relay transport solutions via SRB. Multiple virtual Token Ring interfaces allow SNASw to respond to multiple MAC addresses through the same real router LAN interface. Use the following commands to configure a virtual interface:

	Command	Purpose
Step 1	Router# <b>interface</b> <i>Virtual-TokenRing</i> <i>number</i>	Configures a virtual Token Ring interface to connect to an SRB infrastructure.
Step 2	Router# <b>source-bridge</b> <i>vring</i> <i>bridge</i> <i>ring-group</i>	Associates a virtual Token Ring interface with a source-route bridge group.
Step 3	Router# <b>source-bridge</b> <i>spanning</i>	Indicates this interface should respond to spanning-tree explorers.
Step 4	Router# <b>mac-address</b> <i>mac-address</i>	Configures a MAC address on a real or virtual LAN interface.

## Defining an SNASw Port

An SNASw port definition associates SNA capabilities with a specific interface that SNASw will use. Each interface that is used for SNASw communications requires an SNASw port definition statement.



### Note

SNASw ports do not dynamically adjust to interface configuration changes that are made when SNASw is active. For example, if you change an interface MAC address or MTU, SNASw may not recognize the new value. If you want to make changes to an interface and want SNASw to adjust to the new interface changes, you may need to either delete and redefine the port that is using that interface or stop and restart SNASw.

A port can also be associated with the VDLC or HPR/IP features. The VDLC feature enables SNASw to send and receive traffic to other Cisco IOS software features such as DLSw+. If a port is associated with a VDLC interface, that port does not take an interface name as generally required by the **snasw port** command.

The HPR/IP feature establishes SNASw links over IP networks. If a port is associated with an HPR/IP interface, then you must configure the **hpr-ip** keyword first, followed by the interface name.

To associate a port with a specific interface, use the following command in global configuration mode:

Command	Purpose
Router# <b>snasw port</b> <i>portname</i> [ <b>hpr-ip</b>   <b>vdlc</b> <i>vring</i> <i>mac</i> <i>mac-address</i> ] [ <i>interfacename</i> ] [ <b>conntype</b> <b>nohpr</b>   <b>len</b>   <b>dyncplen</b> ] [ <b>dplus-required</b> ] [ <b>hpr-sap</b> <i>hpr-sap-value</i> ] [ <b>max-links</b> <i>link-limit-value</i> ] [ <b>sap</b> <i>sap-value</i> ] [ <b>vname</b> <i>virtual-node-name</i> ] [ <b>nostart</b> ]	Specifies the DLCs used by SNASw.



### Note

The interface must be defined before the ports that use them are defined and activated.

**Note**

SNASw analyzes the maximum transmission unit (MTU) size of router interfaces configured for native LAN interfaces such as Token Ring, Ethernet and FDDI, and dynamically assigns the best MTU values for that specific port. For other interface types, SNASw provides the maximum BTU parameter in the port configuration. For server-dependent PU 2.0 devices, SNASw uses the downstream MAXDATA value from the host and then dynamically sets the SNA BTU for that device to the MAXDATA value.

**Caution**

Changing active SNASw interfaces might interrupt SNASw connections.

## Defining an SNASw Link

In many cases, if the partner node is initiating the connection, a link definition is not necessary. A link definition is built dynamically when the partner node initiates the connection. Links typically need to be defined for upstream connectivity. Downstream devices initiate connectivity into SNASw; therefore, links should not be defined on SNASw to downstream devices.

In SNASw link configuration, you must associate the link with the SNASw port that it will use. For all traditional links, the **snasw link** command must be associated with a remote MAC address. The MAC address identifies the partner address to which SNASw attempts to establish a link. For all HPR/IP links, the command is associated with a remote IP address. The IP address identifies the partner address to which SNASw attempts to establish a link.

To define an SNASw logical link, use the following command in global configuration mode:

Command	Purpose
Router# <b>snasw link</b> <i>linkname</i> <b>port</b> <i>portname</i> [ <b>r</b> mac <i>mac-address</i>   <b>ip-dest</b> <i>ip-address</i> ] [ <b>rsap</b> <i>sap-value</i> ] [ <b>nns</b> ] [ <b>tgp</b> [ <b>high</b>   <b>low</b>   <b>medium</b> ]] [ <b>nostart</b> ]	Defines an SNASw logical link.

## Defining an SNASw Partner LU Location

The SNASw directory stores names of resources and their owners. Usually this information is learned dynamically using Locate searches. You might want to manually define the location of specific resources. SNASw is known for its dynamic capabilities, not its need for system definition. For this reason, and for easier management, define location names only when necessary.

When a LEN node connects into an SNASw node, SNASw dynamically learns the CP name of the LEN and places it in its directory. In addition, SNASw dynamically learns the LU names of all LUs on the LEN that initiate independent sessions. Only define the location when an ILU on a LEN device is not sharing the node's CP name and does not initiate the first session. In all other cases the LU's location will be learned dynamically.

To define a resource location, use the following command in global configuration mode:

Command	Purpose
Router# <b>snasw location</b> <i>resource-name</i> <b>owning-cp</b> <i>cpname</i>	Configures the location of a resource.

**Note**

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You must configure an owning CP for each partner LU configured. The owning CP is the CP name for the LEN node on which the partner resource resides. Location definitions are never required for resources located on NNs or NNs.

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## Starting SNASw and SNASw Ports and Links

SNASw starts automatically when a CP name is configured. SNASw ports and links are also automatically started once they are configured. If stopped, they can be restarted using one of the following privileged EXEC commands:

Command	Purpose
Router# <b>snasw start</b>	Starts SNASw.
Router# <b>snasw start link</b> <i>linkname</i>	Activates the specified SNASw link.
Router# <b>snasw start port</b> <i>portname</i>	Activates the specified SNASw port.

## Stopping SNASw and SNASw Ports and Links

Unless otherwise defined with the **nostart** operand, SNASw and SNASw port and link definitions are started automatically when SNASw starts. To stop SNASw or to stop SNASw ports and links when making configuration changes or when resetting the ports or links, use one of the following commands in privileged EXEC mode:

Command	Purpose
Router# <b>snasw stop</b>	Deactivates SNASw.
Router# <b>snasw stop link</b> <i>linkname</i>	Deactivates the specified SNASw link.
Router# <b>snasw stop port</b> <i>portname</i>	Deactivates the specified SNASw port.



### Note

Removing a CP name definition stops SNASw.

## Verifying SNASw

To verify that you have connectivity between SNASw and other nodes supporting APINGD transaction program, issue the **ping sna** command. To start an independent LU-LU session and send simple APINGD test data traffic, also issue the **ping sna** command.

## Monitoring and Maintaining SNASw

You can monitor the status and configuration of SNASw by issuing any of the following commands in privileged EXEC mode:

Command	Purpose
Router# <b>ping sna</b> [-l] [-c <i>consecutive packets</i> ] [-i <i>number-iterations</i> ] [-m <i>mode</i> ] [-n] [-r] [-s <i>size</i> ] [-t <i>tpname</i> ] [-u <i>userid</i> -p <i>password</i> ] <i>destination</i>	Initiates APPC session and executes the APING transaction program.
Router# <b>show snasw class-of-service</b> [brief   detail]	Displays the predefined COS definitions.

Command	Purpose
Router# <b>show snasw connection-network</b> [brief   detail]	Displays the connection networks (virtual nodes) currently known to SNASw.
Router# <b>show snasw directory</b> [name <i>resourcenamefilter</i> ] [brief   detail]	Displays the SNASw directory entries.
Router# <b>show snasw dlus</b> [brief   detail]	Displays the SNASw DLUS objects.
Router# <b>show snasw link</b> [brief   detail] [cpname <i>cpnamefilter</i> ] [name <i>linknamefilter</i> ] [port <i>portnamefilter</i> ] [rmac <i>macfilter</i> ] [xid <i>xidfilter</i> ]	Displays the SNASw link objects.
Router# <b>show snasw lu</b> [brief   detail] [name <i>luname</i> ] [pu <i>pu</i> name]	Displays the SNASw dependent LUs.
Router# <b>show snasw mode</b>	Displays modes predefined to SNASw.
Router# <b>show snasw node</b>	Displays details of the SNASw operation.
Router# <b>show snasw port</b> [brief   detail] [name <i>portnamefilter</i> ]	Displays the SNASw port objects.
Router# <b>show snasw pu</b> [brief   detail] [dlus <i>dlusfilter</i> ] [name <i>pu</i> namefilter]	Displays the SNASw PUs.
Router# <b>show snasw rtp</b> [brief   detail] [class-of-service <i>cosname</i> ] [name <i>connectionnamefilter</i> ] [tcid <i>tcidconnection</i> ]	Displays the SNASw RTP connections.

## Troubleshooting Tips

You can troubleshoot SNASw by issuing any of the following commands in privileged EXEC mode:

Command	Purpose
Router# <b>ping sna</b> <i>netidid.remotelocationname</i>	Initiates LU6.2 sessions with a named partner node.
Router# <b>show snasw dlctrace</b> [all   last   next] [brief   detail] [filter <i>filter-string</i> ] [id <i>recordid</i> ]	Displays the captured DLC trace information to the console.
Router# <b>show snasw ipstrace</b> [all   next   last] [filter <i>filterstring</i> ] [id <i>recordid</i> ]	Displays interprocess signal trace on the router console.
Router# <b>show snasw pdlog</b> [brief   detail] [all] [last] [next] [filter <i>filterstring</i> ] [id <i>recordid</i> ]	Displays entries in the cyclical problem determination log to the console.
Router# <b>show snasw summary-ipstrace</b> [id <i>recordid</i> ] [last <i>number-records</i>   filter <i>number-records</i>   all   next   last]	Displays the special “footprint” summary interprocess signal trace on the router console.
Router# <b>snasw dump</b>	Initiates file transfer of SNASw trace files from internal buffers to a file server.

You can also troubleshoot SNASw by issuing any of the following commands in global configuration mode:

Command	Purpose
Router# <b>snasw dlcfilter</b> [ <b>link</b> <i>linkname</i> ] [ <b>port</b> <i>portname</i> ] [ <b>rmac</b> <i>mac-address-value</i> ] [ <b>rtp</b> <i>rtpname</i> ] [ <b>type</b> <i>cls</i> ] [ <b>hpr-cntl</b> ] [ <b>hpr-data</b> ] [ <b>isr</b> ] [ <b>xid</b> ] [ <b>session</b> <i>session address</i> ]	Filters frames captured by the <b>snasw dcltrace</b> or <b>debug snasw dlc</b> commands.
Router# <b>snasw dcltrace</b> [ <b>buffer-size</b> <i>buffer-size-value</i> ] [ <b>file</b> <i>filename</i> ] [ <b>frame-size</b> <i>frame-size-value</i> ] [ <b>format</b> <i>brief</i>   <i>detail</i>   <i>analyzer</i> ]	Traces frames arriving at and leaving SNASw.
Router# <b>snasw event</b> [ <b>cpcp</b> ] [ <b>dlc</b> ] [ <b>implicit-ls</b> ] [ <b>port</b> ]	Indicates which events are logged to the console.
Router# <b>snasw ipsfilter</b> [ <b>as</b> ] [ <b>asm</b> ] [ <b>bm</b> ] [ <b>ch</b> ] [ <b>cpc</b> ] [ <b>cs</b> ] [ <b>di</b> ] [ <b>dlc</b> ] [ <b>dma</b> ] [ <b>dr</b> ] [ <b>ds</b> ] [ <b>es</b> ] [ <b>ha</b> ] [ <b>hpr</b> ] [ <b>hs</b> ] [ <b>lm</b> ] [ <b>mds</b> ] [ <b>ms</b> ] [ <b>nof</b> ] [ <b>pc</b> ] [ <b>ps</b> ] [ <b>pu</b> ] [ <b>px</b> ] [ <b>rm</b> ] [ <b>rtp</b> ] [ <b>ru</b> ] [ <b>scm</b> ] [ <b>sco</b> ] [ <b>sm</b> ] [ <b>spc</b> ] [ <b>ss</b> ] [ <b>trs</b> ]	Filters interprocess signal trace elements being traced via the <b>snasw ipstrace</b> or <b>debug snasw ips</b> commands.
Router# <b>snasw ipstrace</b> [ <b>buffer-size</b> <i>buffer-size-value</i> ] [ <b>file</b> <i>filename</i> ]	Sets up a trace buffer and begins tracing IPS trace elements.
Router# <b>snasw pdlog</b> [ <i>problem</i>   <i>error</i>   <i>info</i> ] [ <b>buffer-size</b> <i>buffer-size-value</i> ] [ <b>file</b> <i>filename</i> ]	Controls logging of messages to the console and the SNA problem determination log cyclic buffer.

## SNASw Configuration Examples

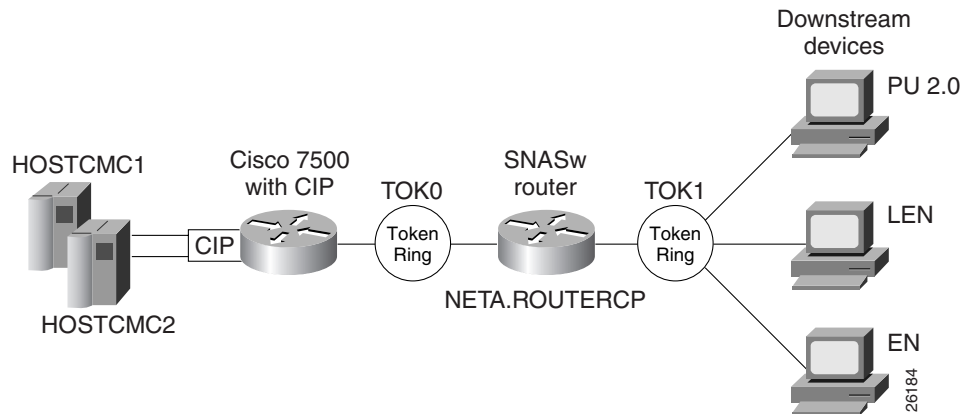
This section provides the following configuration examples:

- SNASw over Token Ring without HPR Configuration Example, page 554
- SNASw over Token Ring with HPR Configuration Example, page 555
- SNASw Connecting to a CIP over Virtual Token Ring with SRB Configuration Example, page 556
- SNASw over HPR/IP Configuration Example, page 557
- SNASw Using Local Switching with QLLC Configuration Example, page 558
- SNASw using Local Switching with SDLC Configuration Example, page 559
- SNASw with Ethernet LAN Emulation over ATM Configuration Example, page 560
- SNASw with SRB Frame Relay (Frame Relay BAN Support) Configuration Example, page 561
- SNASw with FRAS Host (Downstream Frame Relay BNN Support) Configuration Example, page 562
- SNASw Connecting VTAM to the CIP Using CMPC Configuration Example vs APPN Connecting VTAM to the CIP Using CMPC Configuration Example, page 563
- SNASw Connecting to VTAM on a Remote Router with DLUR Using CMPC vs APPN Connecting to VTAM on a Remote Router with DLUR Using CMPC Example, page 567
- SNASw Dial-out to a DLUR Downstream Configuration Example, page 570

## SNASw over Token Ring without HPR Configuration Example

Figure 224 illustrates a basic SNASw link over Token Ring without HPR. In this figure, Port TOK0 is used for upstream links toward the host, and Port TOK1 is used for downstream devices connecting to SNASw. These devices are configured to connect to 4000.1234.abcd. The conntype nohpr operand is designed to turn off HPR capabilities on upstream and downstream links.

**Figure 224** SNASw over Token Ring without HPR



The configuration for SNASw over Token Ring without HPR is as follows:

```
interface TokenRing0/0
  no ip address
  no ip directed-broadcast
  no ip route-cache
  no ip mroute-cache
  ring-speed 16

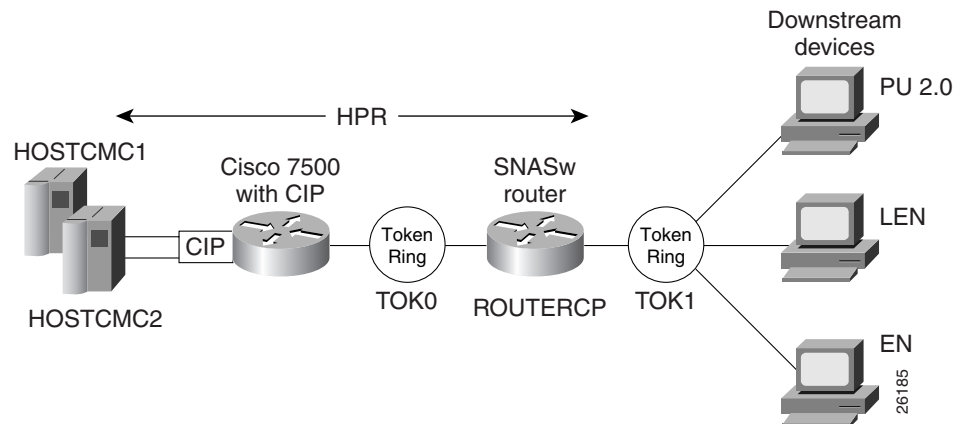
interface TokenRing0/1
  mac-address 4000.1234.abcd
  no ip address
  no ip directed-broadcast
  no ip route-cache
  no ip mroute-cache
  ring-speed 16

snasw cpname NETA.ROUTERCP
snasw dplus NETA.HOSTCMC1 backup NETA.HOSTCMC2
snasw port TOK0 TokenRing0/0 conntype nohpr
snasw port TOK1 TokenRing0/1 conntype nohpr
snasw link HOSTCMC1 port TOK0 rmac 4000.aaaa.cccc
snasw link HOSTCMC2 port TOK0 rmac 4000.aaaa.dddd
```

## SNASw over Token Ring with HPR Configuration Example

Figure 225 illustrates a basic SNASw link over Token Ring with HPR support. In this figure, Port TOK0 is used for upstream links toward the host, and Port TOK1 is used for downstream devices connecting to SNASw. These devices are configured to connect to 4000.1234.abcd.

**Figure 225** SNASw over Token Ring with HPR



The configuration for SNASw over Token Ring allowing HPR is as follows:

```
interface TokenRing0/0
  no ip address
  no ip directed-broadcast
  no ip route-cache
  no ip mroute-cache
  ring-speed 16

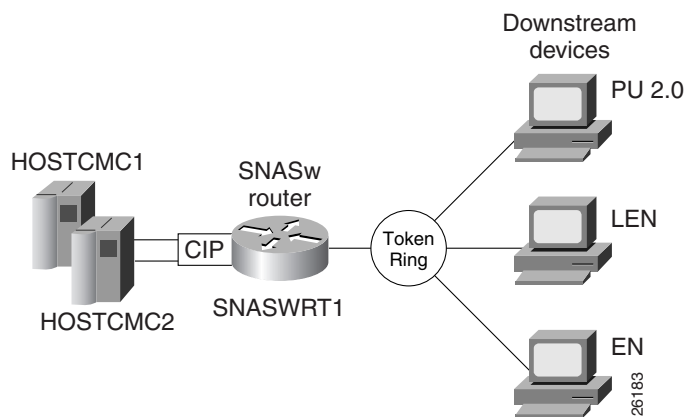
interface TokenRing0/1
  mac-address 4000.1234.abcd
  no ip address
  no ip directed-broadcast
  no ip route-cache
  no ip mroute-cache
  ring-speed 16

snasw cpname NETA.ROUTERCP
snasw dlus NETA.HOSTCMC1 backup NETA.HOSTCMC2
snasw port TOK0 TokenRing0/0
snasw port TOK1 TokenRing0/1
snasw link HOSTCMC1 port TOK0 rmac 4000.aaaa.cccc
snasw link HOSTCMC2 port TOK0 rmac 4000.aaaa.dddd
```

## SNASw Connecting to a CIP over Virtual Token Ring with SRB Configuration Example

In Figure 226, SNASw co-exists with CSNA CIP channel support in the same router. Two adapters are opened on the CIP, one from HOSTCMC1 on adapter 1 and one from HOSTCMC2 on adapter 2. SNASw is configured to connect these two hosts through port CIP via the SRB infrastructure. In addition, SNASw has two ports configured for downstream devices. Using this configuration, SNASw responds to downstream clients connecting to 4000.1234.1088 and 4000.1234.1089 through a single Token Ring interface (Token Ring 0/0). The router's hostname is used to derive an SNASw CP name, which is NETA.SNASWRT1.

**Figure 226** SNASw Connecting to a CIP over Virtual Token Ring with SRB



The configuration for SNASw connecting to a CIP over virtual Token Ring with SRB is as follows:

```
hostname snaswrt1
!
source-bridge ring-group 100
source-bridge ring-group 200
!
interface Channel2/1
no ip address
no keepalive
csna E040 70
csna E020 72
!
interface Channel2/2
no ip address
no keepalive
lan TokenRing 0
source-bridge 101 1 100
adapter 0 4000.0000.cccc
adapter 1 4000.0000.dddd
!
interface TokenRing0/0
no ip address
ring-speed 16
source-bridge 201 1 200
source-bridge spanning
!
interface Virtual-TokenRing0
no ip address
```

```

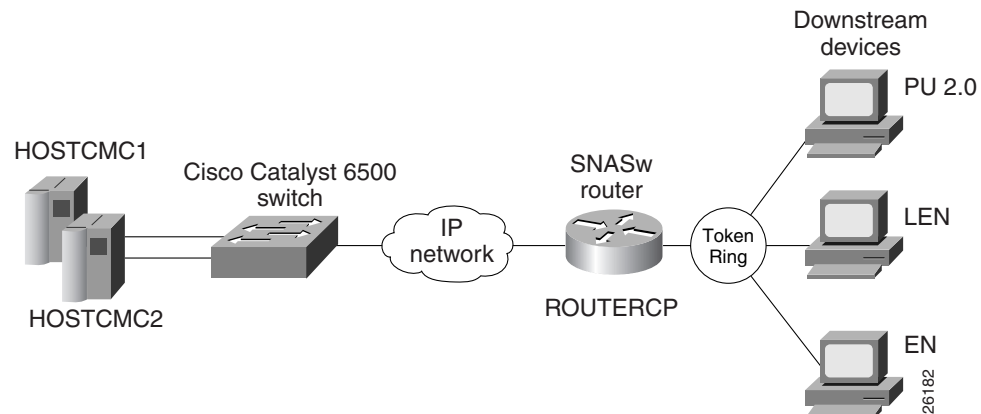
no ip directed-broadcast
ring-speed 16
source-bridge 102 1 100
source-bridge spanning
!
interface Virtual-TokenRing1
mac-address 4000.1234.1088
no ip address
no ip directed-broadcast
ring-speed 16
source-bridge 202 1 200
source-bridge spanning
!
interface Virtual-TokenRing2
mac-address 4000.1234.1089
no ip address
no ip directed-broadcast
ring-speed 16
source-bridge 203 1 200
!
snasw cpname NETA hostname
snasw dls NETA.HOSTCMC1 backup NETA.HOSTCMC2
snasw port CIP Virtual-TokenRing0
snasw port DOWNSTRM Virtual-TokenRing1 conntype no-hpr
snasw port DOWNSTRM Virtual-TokenRing2 conntype no-hpr
snasw link HOSTCMC1 port CIP rmac 4000.0000.cccc
snasw link HOSTCMC2 port CIP rmac 4000.0000.dddd

```

## SNASw over HPR/IP Configuration Example

Figure 227 illustrates a basic SNASw link over HPR/IP on the upstream connections to the host. The downstream devices connect through Token Ring 0/0.

**Figure 227** SNASw over HPR/IP



The configuration for SNASw over HPR/IP is as follows:

```

interface Ethernet1/0
ip address 172.18.49.28 255.255.255.0
no ip directed-broadcast
no ip route-cache
no ip mroute-cache
!
interface TokenRing0/0

```

```

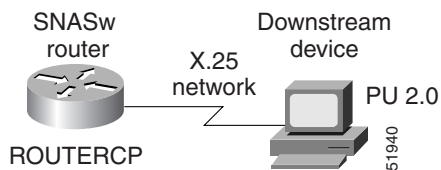
mac-address 4000.1234.1088
no ip address
no ip directed-broadcast
no ip route-cache
no ip mroute-cache
ring-speed 16
!
snasw cpname NETA.ROUTERCP
snasw dlus NETA.HOSTCMC1 backup NETA.CMCHOST2
snasw port HPRIP hpr-ip Ethernet1/0
snasw port TOK0 TokenRing0/0
snasw link HOSTCMC1 port HPRIP ip-dest 172.18.51.1
snasw link HOSTCMC2 port HPRIP ip-dest 172.18.51.2

```

## SNASw Using Local Switching with QLLC Configuration Example

Figure 228 illustrates a basic SNASw link using local switching with QLLC.

**Figure 228** SNASw using Local Switching with QLLC



### Note

This figure and example show only the configuration related to the downstream QLLC device. Upstream connectivity is not shown in this configuration.

The configuration for SNASw link using Local Switching with QLLC is as follows:

```

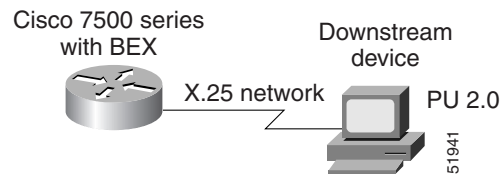
!
source-bridge ring-group 70
dlsw local-peer
!
interface Serial4/0
no ip address
no ip directed-broadcast
encapsulation x25
no ip mroute-cache
no keepalive
qllc accept-all-calls
clockrate 19200
qllc dlsw vmacaddr 4000.1111.1111 partner 4000.2222.2222
!
snasw cpname NETA.ROUTERCP
snasw port VDLCP vdlc 70 mac 4000.2222.2222 conntype nohpr

```

## SNASw using Local Switching with SDLC Configuration Example

Figure 229 illustrates a basic SNASw link using local switching with SDLC.

**Figure 229** SNASw using Local Switching with SDLC



**Note**

This figure and example show only the configuration related to the downstream SDLC device. Upstream connectivity is not shown in this configuration.

The configuration for SNASw link using local switching with SDLC is as follows:

```

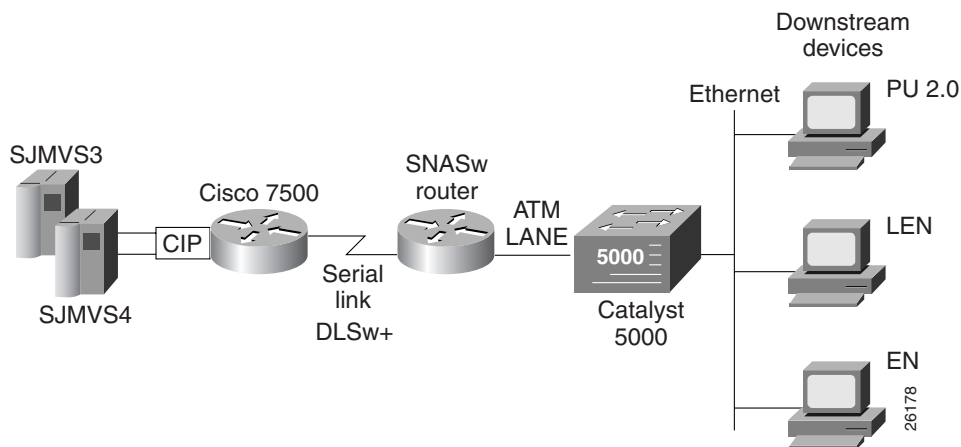
!
source-bridge ring-group 1689
dlsw local-peer
!
interface Serial1
no ip address
no ip directed-broadcast
encapsulation sdlc
no ip route-cache
no ip mroute-cache
no keepalive
clockrate 9600
sdlc role primary
sdlc vmac 4000.3174.0000
sdlc address C2
sdlc sdlc-largest-frame C2 521
sdlc xid C2 05DABBBB
sdlc partner 4000.4500.00f0 C2
sdlc dlsw C2
!
snasw cpname NETA.ROUTERCO
snasw port SDLC vdlc 1689 mac 4000.4500.00f0

```

## SNASw with Ethernet LAN Emulation over ATM Configuration Example

In Figure 230, downstream devices connect in SNASw over Asynchronous Transfer Mode (ATM) Ethernet LANE. Upstream connectivity is achieved using DLSw+ for connections to the host systems. Downstream devices connect to the standby MAC address on the ATM sub-interface.

**Figure 230** SNASw with Ethernet LANE over ATM



The configuration for SNASw with Ethernet LANE over ATM is as follows:

```

!
source-bridge ring-group 111
dlsw local-peer peer-id 10.56.56.1 keepalive 10 promiscuous
dlsw remote-peer 0 tcp 10.56.56.2
!
interface ATM2/0
mtu 1500
no ip address
no ip directed-broadcast
atm clock INTERNAL
atm pvc 1 0 5 qsaal
atm pvc 2 0 16 ilmi
atm pvc 60 1 36 aal5nlpid
no atm ilmi-keepalive
!
interface ATM2/0.1 multipoint
no ip directed-broadcast
lane client ethernet RED
no cdp enable
!
interface ATM2/0.2 multipoint
ip address 10.10.50.60 255.255.255.0
no ip redirects
no ip directed-broadcast
lane client ethernet BLUE
no cdp enable
standby 1 priority 200 preempt
standby 1 authentication xxxx
standby 1 mac-address 000b.e291.0000
standby 1 ip 10.10.50.70
!
interface Serial3/1
ip address 10.56.56.1 255.255.255.0
no ip directed-broadcast
encapsulation ppp

```

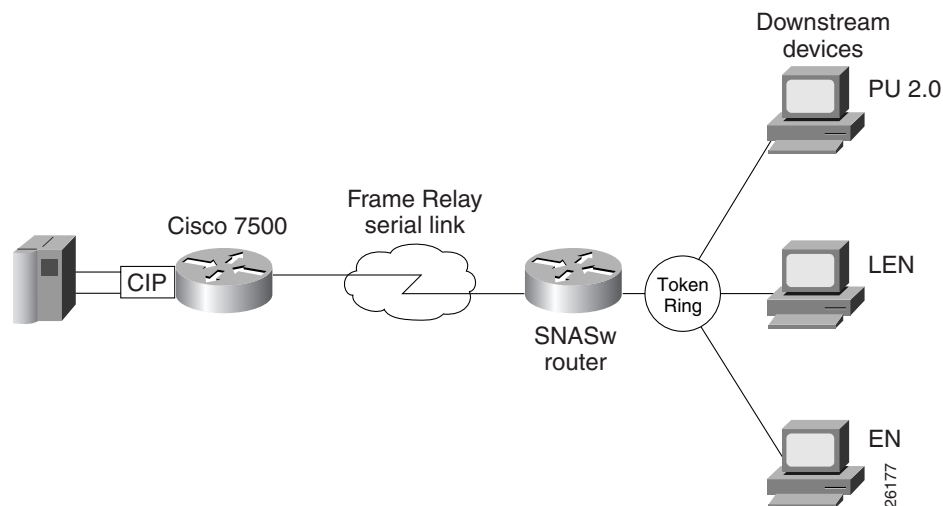
```

no keepalive
no fair-queue
clockrate 56000
!
snasw cpname NETA.ROUTERCP
snasw dls NETA.SJMVS3 backup NETA.HOSTCMC2
snasw port ATM202 ATM2/0.2 conntype nohpr
snasw port DLSWP vdlc 111 mac 4000.0189.0016 conntype nohpr
snasw link HOSTCMC1 port DLSWP rmac 4000.aaaa.cccc
snasw link HOSTCMC2 port DLSWP rmac 4000.aaaa.dddd
!
```

## SNASw with SRB Frame Relay (Frame Relay BAN Support) Configuration Example

Figure 231 illustrates how to combine SNASw and SRB over Frame Relay functionality to provide native RFC 1490 connectivity over Frame Relay BAN. The host is configured to respond to 4000.aaaa.cccc through the Frame Relay connection over Serial1. Downstream would be configured to connect into Virtual TokenRing0.

**Figure 231** SNASw with SRB Frame Relay (Frame Relay BAN Support)



The configuration for SNASw with SRB Frame Relay (Frame Relay BAN Support) is as follows:

```

source-bridge ring-group 100
source-bridge ring-group 200
!
interface TokenRing0
no ip address
no ip directed-broadcast
ring-speed 16
source-bridge 202 1 200
!
interface Virtual-TokenRing0
mac-address 4000.1234.1001
no ip address
no ip directed-broadcast
ring-speed 16
```

```

source-bridge 201 1 200
!
interface Serial1
 encapsulation frame-relay
!
interface serial 1.1 point-to-point
 frame-relay interface-dlci 30 ietf
 source-bridge 101 1 100
!
interface Virtual-TokenRing1
 mac-address 4000.1111.2222
 no ip address
 no ip directed-broadcast
 ring-speed 16
 source-bridge 102 1 100
 source-bridge spanning
!
snasw cpname NETA.ROUTERCP
snasw port frame virtual tokenring 1 conntype nohpr
snasw link HOSTFRAM port FRAME rmac 4000.aaaa.cccc

```

On the CIP router, configure the following:

```

source-bridge ring-group 300
interface serial 1/0
 encapsulation frame-relay
!
interface serial 1/0.1 point-to-point
 frame-relay interface 30 ietf
 source-bridge 101 1 300
!
interface channel 2/1
 no ip-address
 no keep alive
 csna E040 70
!
interface serial channel 2/2
 no ip-address
 no keep alive
 lan tokenring 0
 source-bridge 301 1 300
 adapter 0 4000.aaaa.cccc

```

## SNASw with FRAS Host (Downstream Frame Relay BNN Support) Configuration Example

Figure 232 illustrates how to connect a downstream Frame Relay BNN device (Frame Relay Access Device) over native RFC 1490 in SNASw.

**Figure 232** SNASw with FRAS Host (Downstream Frame Relay BNN Support)



**Note**

---

This figure and example show only the configuration related to downstream Frame Relay BNN Support. Upstream connectivity is not shown in this configuration segment.

---

The configuration SNASw with FRAS Host (Downstream Frame Relay BNN Support) is as follows:

```
source-bridge ring-group 200
interface serial 1/2
  no ip-address
  encapsulation frame-relay letf
  frame-relay map llc2 17
  !
interface virtual-tokenring 0
  mac-address 4000.1234.1001
  ring-speed 16
  source-bridge 201 1 200
  !
interface virtual-tokenring 1
  ring-speed 16
  source-bridge 202 1 200
  fras-host bnn serial 1/2 fr-lsap 04 umac 4000.1234.2002 hmac 4000.1234.1001
```

## SNASw Connecting VTAM to the CIP Using CMPC Configuration Example vs APPN Connecting VTAM to the CIP Using CMPC Configuration Example

The following section compares the configuration of SNASw vs APPN connecting VTAM to the CIP using CMPC.

**Note**

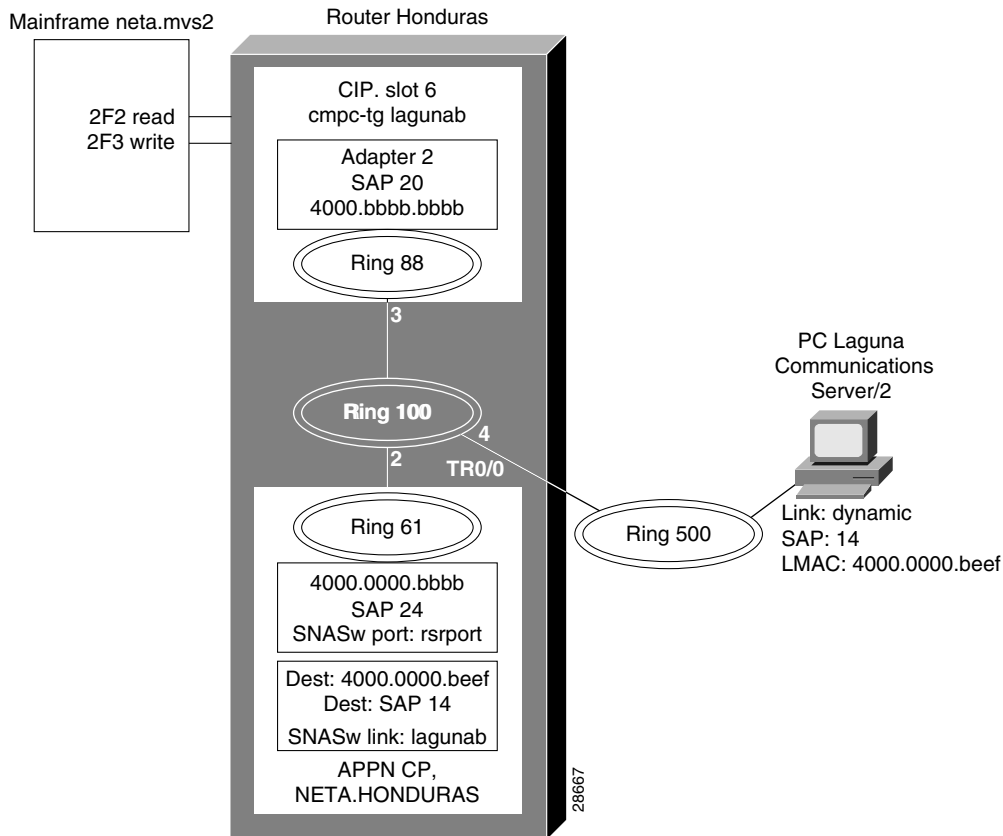
---

SNASw supersedes all functionality previously available in the APPN feature in the Cisco IOS software. SNASw configuration will not accept the previous APPN configuration commands and APPN is no longer supported. Previous APPN users should use this chapter to configure APPN functionality using the new SNASw commands.

---

Figure 233 illustrates the VTAM connecting to SNASw on the CIP using CMPC.

**Figure 233 Topology for VTAM-to-SNASw Connection on the CIP**



**Configuration for TRL Node LAGTRLB**

```
LAGTRB  VBUILD TYPE=TRL
LAGTRLB TRLE LNCTL=MPC,MAXBFRU=8,REPLYTO=3.0, X
        READ=(2F2), X
        WRITE=(2F3)
```

**Local SNA Major Node LAGLNB**

```
LAGNNB  VBUILD TYPE=LOCAL
LAGPUB  PU TRLE=LAGTRLB, X
        ISTATUS=ACTIVE, X
        XID=YES,CONNTYPE=APPN,CPCP=YES
```

**Honduras Router**

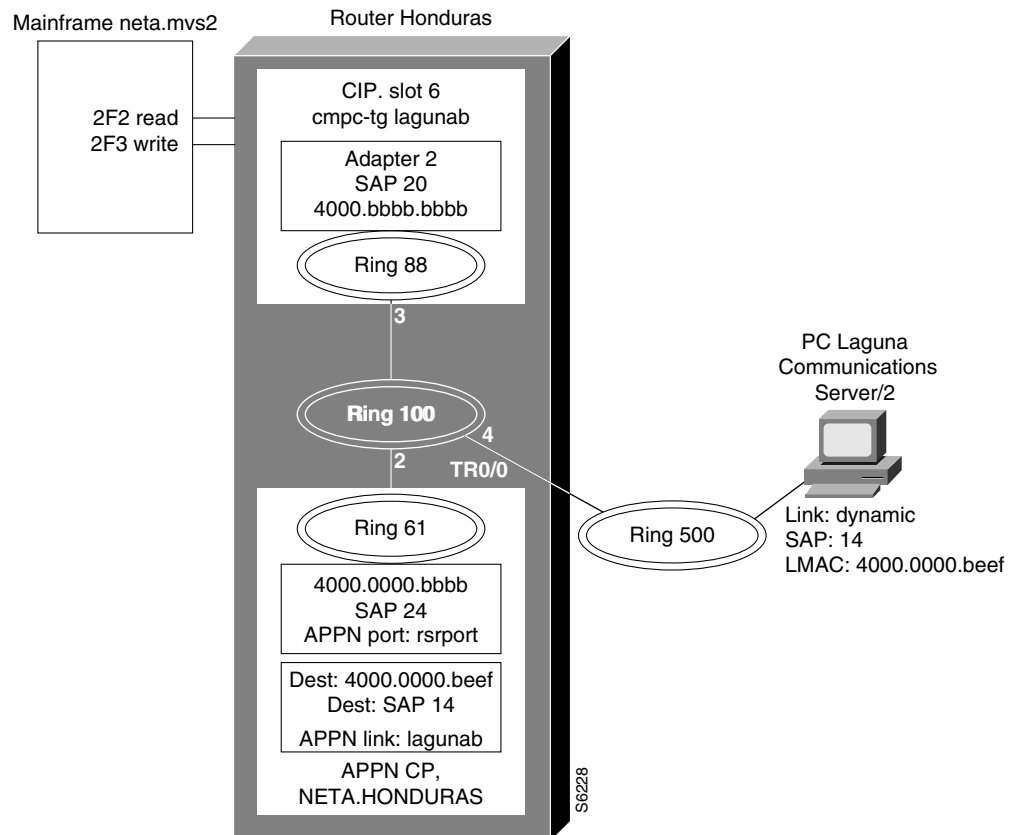
```
source-bridge ring-group 100
!
interface Channel6/1
no ip address
no keepalive
cmpc C020 F2 LAGUNAB READ
```

```

cmpc C020 F3 LAGUNAB WRITE
!
interface Channel6/2
no ip address
no keepalive
lan TokenRing 0
source-bridge 88 3 100
adapter 2 4000.bbbb.bbbb
lan TokenRing 2
tg LAGUNAB llc token-adapter 2 20 rmac 4000.0000.bbbb rsap 24
!
!
interface Virtual-TokenRing0
mac-address 4000.0000.bbbb
no ip address
no ip directed-broadcast
ring-speed 16
source-bridge 61 2 100
!
snasw cpname NETA.HONDURAS
snasw port VTOK Virtual-TokenRing0
snasw link MVS2D port VTOK rmac 4000.bbbb.bbbb
    
```

By comparison, Figure 234 illustrates the VTAM connecting to the APPN NN on the CIP using CMPC.

**Figure 234** Topology for VTAM-to-APPN NN Configuration on the CIP



**Configuration for TRL Node LAGTRLB**

```
LAGTRB  VBUILD TYPE=TRL
LAGTRLB  TRLE  LNCTL=MPC,MAXBFRU=8,REPLYTO=3.0,      X
          READ=(2F2),                                X
          WRITE=(2F3)
```

**Local SNA Major Node LAGLNB**

```
LAGNNB  VBUILD TYPE=LOCAL
LAGPUB  PU      TRLE=LAGTRLB,                        X
          ISTATUS=ACTIVE,                            X
          XID=YES,CONNTYPE=APPN,CPCP=YES
```

**Honduras Router**

```
interface Channel6/1
no ip address
no keepalive
cmpr C020 F2 LAGUNAB READ
cmpr C020 F3 LAGUNAB WRITE
!
interface Channel6/2
no ip address
no keepalive
lan TokenRing 0
source-bridge 88 3 100
adapter 2 4000.bbbb.bbbb
lan TokenRing 2
tg LAGUNAB llc token-adapter 2 20 rmac 4000.0000.bbbb rsap 24
!
!
appn control-point NETA.HONDURAS
complete
!
appn port RSRBPORT rsrp
local-sap 24
desired-max-send-btu-size 4096
max-rcv-btu-size 4096
rsrp-virtual-station 4000.0000.bbbb 61 2 100
complete
!
appn link-station LAGUNAB
port RSRBPORT
lan-dest-address 4000.0000.beef 14
complete
router eigrp 109
network 172.18.0.0
```

# SNASw Connecting to VTAM on a Remote Router with DLUR Using CMPC vs APPN Connecting to VTAM on a Remote Router with DLUR Using CMPC Example

The following section compares the configurations of SNASw vs APPN while connecting to VTAM on a remote router with DLUR using CMPC.

In the example shown in Figure 235 and Figure 236, DLUS is running on the MVS host. DLUR is running on a remote Cisco 4000 router. The connection from MPC to the APPN stack on the Cisco 4000 is via LLC2. There is no NN on the Cisco 7500. The PC is running Communications Server/2.

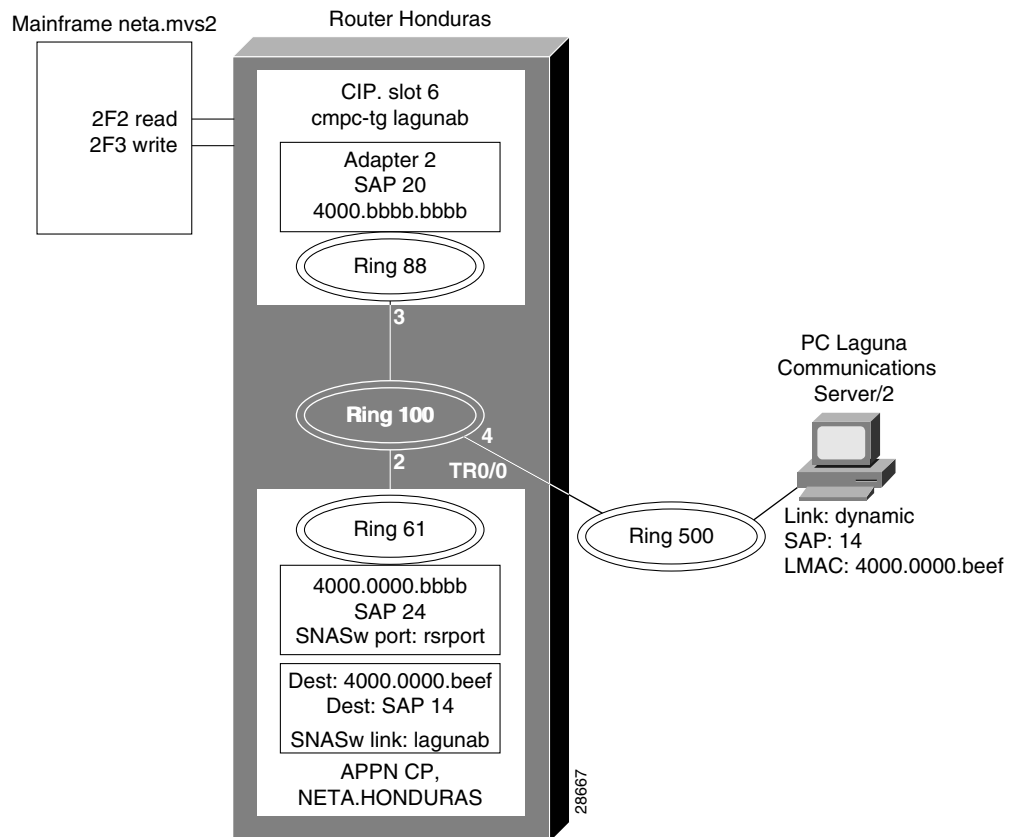
Figure 235 illustrates a DLUS-to-DLUR configuration using SNASw.



**Note**

SNASw supersedes all functionality previously available in the APPN feature in the Cisco IOS software. SNASw configuration will not accept the previous APPN configuration commands and APPN is no longer supported. Previous APPN users should use this chapter to configure APPN functionality using the new SNASw commands.

**Figure 235** Topology for VTAM-to-SNASw on a Remote Router with DLUR Connection



**mvs2trld**

```

MVS2TRD  VBUILD TYPE=TRL
MVS2TRLD TRLE  LNCTL=MPC,MAXBFRU=8,REPLYTO=3.0,      X
          READ=(2F7),                                X
          WRITE=(2F6)

```

**mvs2lnd**

```

MVS2NND  VBUILD TYPE=LOCAL
MVS2PUD  PU      TRLE=MVS2TRLD,                      X
          ISTATUS=ACTIVE,                            X
          XID=YES,CONNTYPE=APPN,CPCP=YES

```

**Additional Configuration for Router Honduras**

```

interface Channel6/1
  cmpc C020 F6 CONFIGD WRITE
  cmpc C020 F7 CONFIGD READ
!
interface Channel6/2
  lan TokenRing 0
  source-bridge 88 3 100
  adapter 4 4000.dddd.dddd
  tg CONFIGD llc token-adapter 4 40 rmac 4000.0000.dddd rsap 44

```

**Router Dustin**

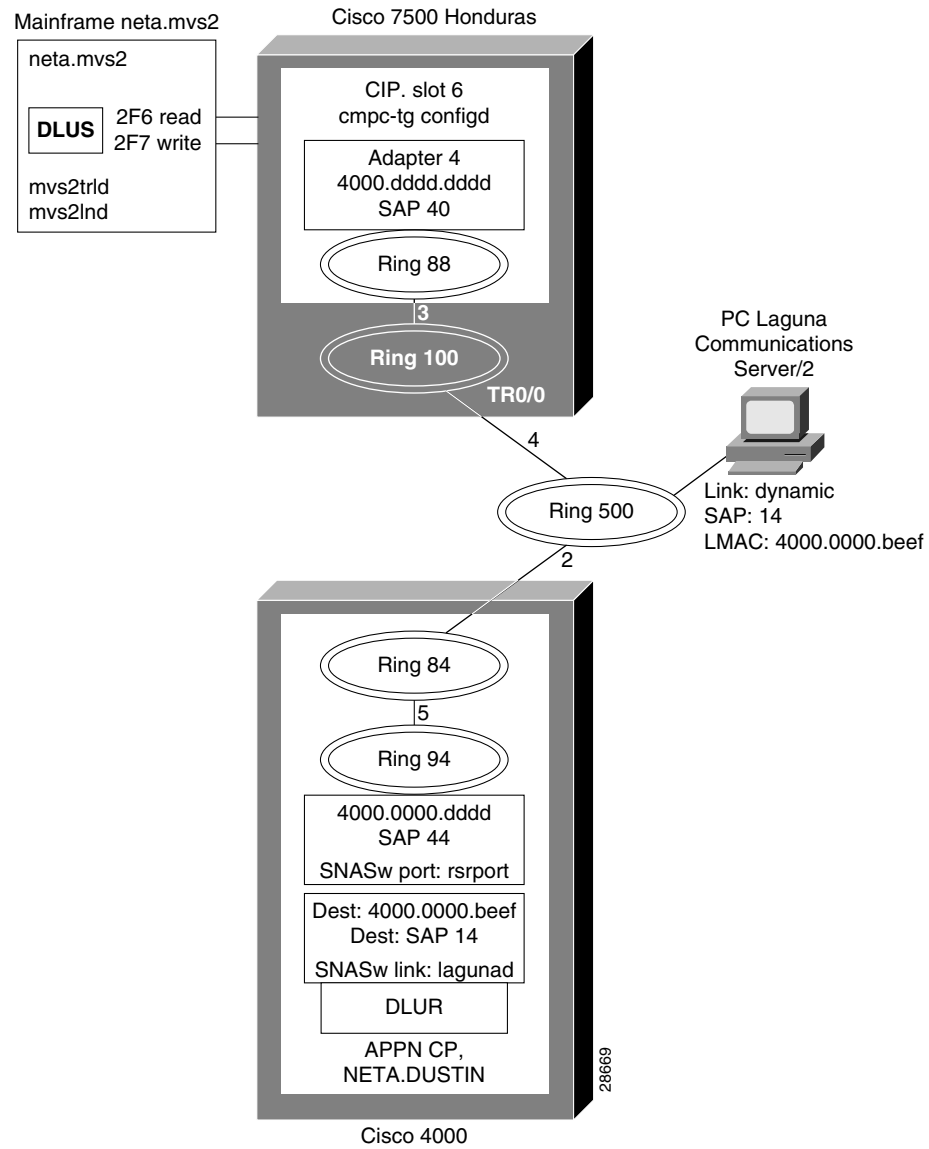
```

source-bridge ring-group 84
interface Ethernet0
  ip address 172.18.3.36 255.255.255.0
  media-type 10BaseT
!
interface TokenRing0
  no ip address
  ring-speed 16
  source-bridge 500 2 84
!
appn control-point NETA.DUSTIN
  dlus NETA.MVS2
  dlur
  complete
!
interface Virtual-TokenRing0
  mac-address 4000.0000.dddd
  no ip address
  no ip directed-broadcast
  ring-speed 16
  source-bridge 94 5 84
!
snasw cpname NETA.DUSTIN
snasw port VTOK Virtual-TokenRing0
snasw link MVS2D port VTOK rmace 4000.dddd.dddd

```

By comparison, Figure 236 illustrates a DLUS-to-DLUR configuration using APPN.

**Figure 236 Topology for VTAM-to-APPN NN on a Remote Router with DLUR Connection**



**mvs2trld**

```
MVS2TRD  VBUILD TYPE=TRL
MVS2TRLD TRLE LNCTL=MPC, MAXBFRU=8, REPLYTO=3.0, X
          READ= (2F7) , X
          WRITE= (2F6)
```

**mvs2lnd**

```
MVS2NND  VBUILD TYPE=LOCAL
MVS2PUD  PU TRLE=MVS2TRLD, X
          ISTATUS=ACTIVE, X
          XID=YES, CONNTYPE=APPN, CPCP=YES
```

**Additional Configuration for Router Honduras**

```

interface Channel6/1
  cmpc C020 F6 CONFIGD WRITE
  cmpc C020 F7 CONFIGD READ
!
interface Channel6/2
  lan TokenRing 0
  source-bridge 88 3 100
  adapter 4 4000.dddd.dddd
  tg CONFIGD 11c token-adapter 4 40 rmac 4000.0000.dddd rsap 44

```

**Router Dustin**

```

source-bridge ring-group 84
interface Ethernet0
  ip address 172.18.3.36 255.255.255.0
  media-type 10BaseT
!
interface TokenRing0
  no ip address
  ring-speed 16
  source-bridge 500 2 84
!
appn control-point NETA.DUSTIN
  dlus NETA.MVS2
  dlur
  complete
!
appn port RSRBPORT rsrb
  local-sap 44
  desired-max-send-btu-size 4096
  max-rcv-btu-size 4096
  rsrb-virtual-station 4000.0000.dddd 94 5 84
  complete
!
appn link-station LAGUNAD
  port RSRBPORT
  lan-dest-address 4000.0000.beef 14
  complete
!
appn link-station MVS2D
  port RSRBPORT
  lan-dest-address 4000.dddd.dddd 40
  complete

```

## SNASw Dial-out to a DLUR Downstream Configuration Example

SNASw downstream connections are usually initiated by downstream devices. Alternatively, VTAM has a “dial-out” function where the downstream connectivity information is configured at VTAM, and passed down to SNASw to initiate the connection from SNASw to the downstream device. This section describes the SNASw and VTAM changes that are needed for this configuration.

The following example shows how to configure SNASw on SNA7200:

**Router SNA7200**

```

source-bridge ring-group 84
interface FastEthernet0/0
 ip address 172.18.3.36 255.255.255.0
!
interface TokenRing0
 no ip address
 ring-speed 16
 source-bridge 500 2 84
!
snasw cpname NETA.SNA7200
snasw dlus NETA.MVSD
snasw port FA01EE hpr-ip FastEthernet0/0
snasw port TOK0 TokenRing4/0 conntype dialoutlen
snasw link MVSDIP port FA01EE ip-dest 172.18.1.41

```

**Note**


---

“conntype dialoutlen” on the downstream port definition (TOK0) is needed only when LU 6.2 communications is used by the downstream device.

---

The VTAM switched major node syntax is as follows:

```

PATH DLURNAME=<NETID.CP name of SNASw router>,
      DLCADDR=(1,C,TR), <specifies token ring address format>
      DLCADDR=(2,X,<name of downstream port in SNASw config, expressed in hex EBCDIC
format>),
-OR -
      DLCADDR=(2,C,<name of downstream port in SNASw config expressed in character
format>),
      DLCADDR=(3,X, <sap value, usually 04>),
      DLCADDR=(4,X,<mac address of the downstream device in token ring format>)

```

The following example shows how to configure VTAM for a downstream dial out PU where the downstream device on a Token Ring has the MAC address of 1000.5a6d.32ab:

```

EXPUPATH PATH DLURNAME=NETA.SNA7200,
             DLCADDR=(1,C,TR),
             DLCADDR=(2,C,TOK0),
             DLCADDR=(3,X,04),
             DLCADDR=(4,X,10005A6D32AB)

```

In Cisco IOS Release 12.3(14) and earlier, you must use hexadecimal EBCDIC format for DLCADDR parameter 2, as such:

```

EXPUPATH PATH DLURNAME=NETA.SNA7200,
             DLCADDR=(1,C,TR),
             DLCADDR=(2,X,E3D6D2F0),
             DLCADDR=(3,X,04),
             DLCADDR=(4,X,10005A6D32AB)

```

