Configuring DSPU

This chapter describes our support for Systems Network Architecture (SNA) downstream physical unit (DSPU) devices. For a complete description of the commands mentioned in this chapter, refer to the "DSPU Configuration Commands" chapter of the *Router Products Command Reference* publication.

Cisco's Implementation of DSPU

DSPU is a software feature that enables the router to function as a physical unit (PU) concentrator for SNA PU type 2 nodes. PU concentration at the router simplifies the task of PU definition at the upstream host while providing additional flexibility and mobility for downstream PU devices.

The DSPU feature allows you to define downstream PU type 2 devices in the router. DSPU reduces the complexity of host configuration by letting you replace multiple PU definitions that represent each downstream device with one PU definition that represents the router.

Because you define the downstream PUs at the router rather than the host, you isolate the host from changes in the downstream network topology. Therefore you can insert and remove downstream PUs from the network without making any changes on the host.

The concentration of downstream PUs at the router also reduces network traffic on the wide-area Network (WAN) by limiting the number of sessions that must be established and maintained with the host. The termination of downstream sessions at the router ensures that idle session traffic does not appear on the WAN.

Figure 27-1 shows a router functioning as a DSPU concentrator.

**Figure 27-1   Router Acting as a DSPU Concentrator**
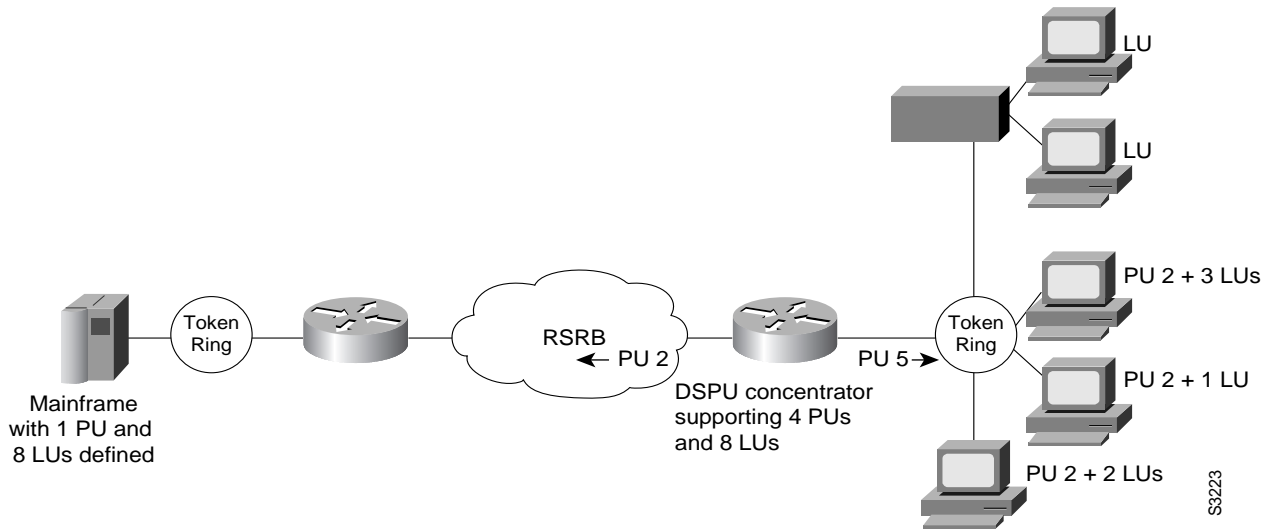
Typically, the router establishes one or more upstream connections with one or more hosts and many downstream connections with PU type 2 devices. From an SNA perspective, the router appears as a PU type 2 device to the upstream host and assumes the role of a System Services Control Point (SSCP) appearing as a PU type 5 device to its downstream PUs.

The SSCP sessions established between the router and its upstream host are completely independent of the SSCP sessions established between the router and its downstream PUs. SNA traffic is routed at a logical unit (LU) level using a routing algorithm that maps downstream LUs onto upstream LUs.

Figure 27-2 illustrates the SNA perspective of DSPU.

Figure 27-2   SNA Perspective of DSPU
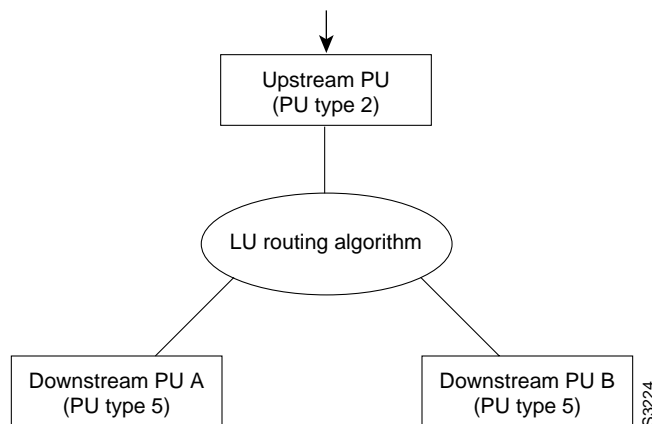
DSPU Configuration Task List

To configure DSPU, perform the tasks in the following sections. The last two tasks are optional.

- Define DSPU Upstream Hosts
- Define Downstream PUs
- Define DSPU LUs
- Configure DSPU to Use a Data Link Control
- Define the Number of Outstanding, Unacknowledged Activation RUs
- Monitor DSPU Feature Status

See the end of this chapter for "DSPU Configuration Examples."

Define DSPU Upstream Hosts

The upstream host provides LUs that the router will assign for use by its downstream PUs. Since one upstream host can only provide a maximum of 255 LUs, the DSPU feature supports multiple hosts. Multiple upstream host support allows the DSPU router to provide more than 255 LUs for use by its downstream PUs.

To define a DSPU host, perform the following task in global configuration mode:

Task	Command
Define a DSPU host.	**dspu host** *host-name* **xid-snd** *xid* **rmac** *remote-mac* [**rsap** *remote-sap*] [**lsap** *local-sap*] [**window** *window-size*] [**maxiframe** *max-iframe*] [**retries** *retry-count*] [**retry-timeout** *retry-timeout*] [**focalpoint**]

Define Downstream PUs

To define the downstream PUs, perform either of the tasks in the following sections, depending on your circumstances:

- Explicitly Define a Downstream PU
- Enable the Default PU Option

Explicitly Define a Downstream PU

Explicitly define a downstream PU if you require the router to perform verification checking on incoming downstream connections or to initiate an outgoing downstream connection.

To explicitly define a downstream PU, perform the following task in global configuration mode:

Task	Command
Explicitly define a downstream PU.	**dspu pu** *pu-name* [**rmac** *remote-mac*] [**rsap** *remote-sap*] [**lsap** *local-sap*] [**xid-rcv** *xid*] [**window** *window-size*] [**maxiframe** *max-iframe*] [**retries** *retry-count*] [**retry-timeout** *retry-timeout*]

If the router will perform verification checking on incoming downstream connections, there are several combinations of parameters that you can configure for verification matching:

- **xid-rcv**—Match on *xid* value only.

- **rmac**/**rsap**—Match on *remote-mac* and *remote-sap* only.

- **rmac**/**rsap** and **xid-rcv**—Match on values r*emote-mac*, *remote-sap*, and *xid*.

The router will reject any incoming downstream connections that do not match the parameters of a defined downstream PU unless the default PU option is also enabled.

Enable the Default PU Option

Configure the DSPU default PU option if you do not require the router to verify incoming downstream connections. The default PU option allows the router to accept incoming downstream connections without an explicit definition for the downstream PU.

To enable the default PU option, perform the following task in global configuration mode:

Task	Command
Enable the default PU option.	**dspu default-pu** [**window** *window-size*] [**maxiframe** *max-iframe*]

Define DSPU LUs

You must specify the LU routing algorithm used to map the upstream LUs to the downstream LUs and to define all LUs for each upstream and downstream PU.

The DSPU feature assigns upstream LUs onto downstream LUs based on the selected LU routing algorithm and performs the mapping necessary for SNA data transfer.

The DSPU feature supports two alternative mapping algorithms that are described in the following sections:

- Dedicated LU Routing

- Pooled LU Routing

An upstream host PU or downstream PU can support up to 255 LU sessions. The DSPU feature allows each LU to be individually configured for either dedicated LU routing or pooled LU routing.

Dedicated LU Routing

You can configure an upstream LU such that it is reserved, or dedicated, for use by a specific downstream LU.

To define a dedicated LU or a range of dedicated LUs for an upstream host and downstream PU, perform the following task in global configuration mode:

Task	Command
Define a dedicated LU or a range of dedicated LUs for a downstream PU.	**dspu lu** *lu-start* [*lu-end*] **host** *host-name host-lu-start* [**pu** *pu-name*]

See the "Dedicated LU Routing Example" section later in this chapter for an example of dedicated LU routing.

Pooled LU Routing

You can configure an upstream host LU such that it is a member of a pool of LUs. When a downstream connection is established and the downstream LU is configured as a pooled LU, the router selects an upstream LU from the pool for assignment to the downstream LU.

Pooled LU routing allows a limited number of upstream host LUs to be shared (at different times) among many downstream PUs.

To define a host LU or a range of host LUs in an LU pool, perform the following task in global configuration mode:

Task	Command
Define a host LU or a range of host LUs in an LU pool.	**dspu pool** *pool-name* **host** *host-name* **lu** *lu-start* [*lu-end*] [**inactivity-timeout** *inactivity-minutes*]

You can configure a downstream LU as a pooled LU. When a downstream connection is established and the downstream LU is configured as a pooled LU, the router selects an upstream LU from the specified pool for assignment to the downstream LU.

To define a pooled LU or a range of pooled LUs for a downstream PU, perform the following task in global configuration mode:

Task	Command
Define a pooled LU or a range of pooled LUs for a downstream PU.	**dspu lu** *lu-start* [*lu-end*] **pool** *pool-name* [**pu** *pu-name*]

See the "Pooled LU Routing Example" section later in this chapter for an example of pooled LU routing.

Configure DSPU to Use a Data Link Control

The final step in configuring DSPU is to define the data link controls that will be used for upstream host and downstream PU connections.

The DSPU feature supports the data link controls described in the following sections:

- Configure DSPU to Use Token Ring
- Configure DSPU to Use RSRB
- Configure DSPU to Use RSRB with Local Acknowledgment

You configure DSPU for a data link control by enabling a local SAP for either upstream or downstream connections. Each data link control owns 255 SAPs that can be enabled for DSPU connections. A local SAP can be enabled for either upstream or downstream connections; a local SAP cannot be enabled for both upstream and downstream connections on the same data link control.

Configure DSPU to Use Token Ring

To enable a local SAP on the Token Ring interface for use by upstream hosts, perform the following task in interface configuration mode:

Task	Command
Enable local SAP for upstream hosts.	**dspu enable-host** [**lsap** *local-sap*]

To enable a local SAP on the Token Ring interface for use by downstream PUs, perform the following task in interface configuration mode:

Task	Command
Enable local SAP for downstream PUs.	**dspu enable-pu** [**lsap** *local-sap*]

To initiate a connection with a remote upstream host or a downstream PU on the Token Ring interface, perform the following task in interface configuration mode:

Task	Command
Initiate connection with upstream host or downstream PU via Token Ring.	**dspu start** {*host-name* | *pu-name*}

Configure DSPU to Use RSRB

To configure DSPU to use RSRB you must create a DSPU/RSRB data link control.

Similar to our implementation of SDLLC, the DSPU/RSRB data link control uses the concept of a virtual Token Ring device residing on a virtual Token Ring to represent the router to upstream hosts and downstream PUs across an RSRB network.

Since the upstream host and/or downstream PU expects its peer to also be on a Token Ring, you must assign a virtual Token Ring address (the DSPU virtual MAC address) to the DSPU/RSRB data link control. Like real Token Ring addresses, the DSPU virtual MAC address must be unique across the network.

In addition to assigning the DSPU virtual Mac address, you must also assign a DSPU virtual ring number to the DSPU/RSRB data link control. The DSPU virtual ring number must be unique across the network.

Note   The DSPU virtual ring number is a different number than the virtual ring group numbers that you use to configure RSRB and multiport bridging.

The combination of the DSPU virtual MAC address and the DSPU virtual ring number identifies the DSPU/RSRB data link control interface to the rest of an RSRB network.

When an end station (either an upstream host or a downstream PU) attempts to connect with the DSPU router, the following occurs:

1 The end station sends explorer packets with the DSPU virtual MAC address as the destination address in the MAC headers.

2 The router configured with that DSPU virtual MAC address intercepts the frame, fills in the DSPU virtual ring number and the DSPU bridge number in the Routing Information Field (RIF), and sends the response back to the end station.

3 The end station establishes a session with the DSPU router.

To define the DSPU/RSRB data link control interface, perform the following tasks in global configuration mode:

Task	Command
Define an RSRB ring group.	**source-bridge ring-group** *ring-group*

Task	Command
Define the DSPU/RSRB interface.	**dspu rsrb** *local-virtual-ring bridge-number target-virtual-ring virtual-macaddr*

After you define the DSPU RSRB data link control, you configure DSPU to use the RSRB data link control by enabling a local SAP for either upstream or downstream connections.

To enable a local SAP on RSRB for use by upstream hosts, perform the following task in global configuration mode:

Task	Command
Enable local SAP for upstream hosts.	**dspu rsrb enable-host** [**lsap** *local-sap*]

To enable a local SAP on RSRB for use by downstream PUs, perform the following task in global configuration mode:

Task	Command
Enable local SAP for downstream PUs.	**dspu rsrb enable-pu** [**lsap** *local-sap*]

To initiate a connection with a remote upstream host or downstream PU over RSRB, perform the following task in global configuration mode:

Task	Command
Initiate connection with upstream host or downstream PU via RSRB.	**dspu rsrb start** {*host-name*	*pu-name*}

Configure DSPU to Use RSRB with Local Acknowledgment

Configuring DSPU to use RSRB with local acknowledgment is identical to configuring RSRB with local acknowledgment. If you add the **local-ack** keyword to the **source-bridge remote-peer** configuration command DSPU will use local-acknowledgment for any end stations that connect to DSPU from that peer.

To configure DSPU to use RSRB with local acknowledgment, perform the following tasks in global configuration mode:

Task	Command
Define an RSRB ring group.	**source-bridge ring-group** *ring-group*
Define a remote peer with the local acknowledgment feature.	**source-bridge remote-peername ring-group** *ring-group* **tcp** *ip-address* **local-ack**
Define the DSPU/RSRB interface.	**dspu rsrb** *local-virtual-ring bridge-number target-virtual-ring virtual-macaddr*

Define the Number of Outstanding, Unacknowledged Activation RUs

The DSPU feature allows you to define the number of activation request units (RUs) such as ACTLUs or DDDLU NMVTs that can be sent by the router before waiting for responses from the remote PU.

The DSPU activation window provides pacing to avoid depleting the router buffer pool during PU activation. Increasing the window size allows more LUs to become active in a shorter amount of time (assuming the required buffers for activation RUs are available). Decreasing the window size limits the amount of buffers the DSPU may use during PU activation. Typically, you do not need to change the default window size.

To define the number of unacknowledged activation RUs that can be outstanding, perform the following task in global configuration mode:

Task	Command
Define number of unacknowledged activation RUs.	**dspu activation-window** *window-size*

Monitor DSPU Feature Status

You can monitor the status of the DSPU feature. To display information about the state of the DSPU feature, perform the following tasks in EXEC mode:

Task	Command
Show the status of DSPU hosts or downstream PUs.	**show dspu pu** {*host-name*	*pu-name*} [**all**]
Show the status of the DSPU pool.	**show dspu pool** *pool-name* [**all**]

DSPU Configuration Examples

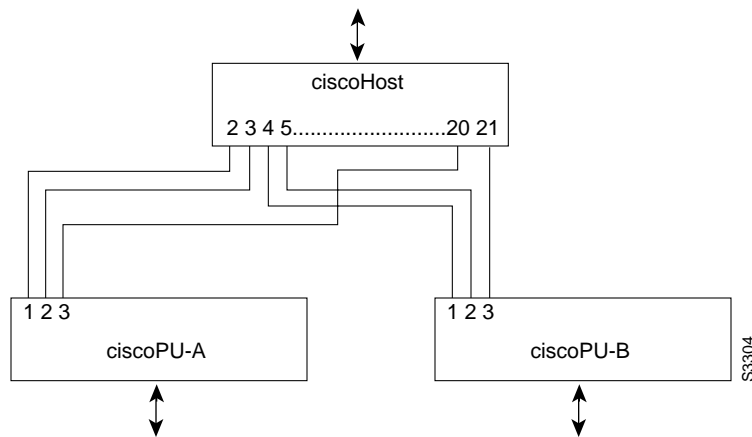The following sections provide DSPU configuration examples:

- Dedicated LU Routing Example
- Pooled LU Routing Example
- DSPU Configuration Example

Dedicated LU Routing Example

Figure 27-3 illustrates the use of dedicated LU routing. Each upstream host LU is dedicated for use by a specific downstream LU.

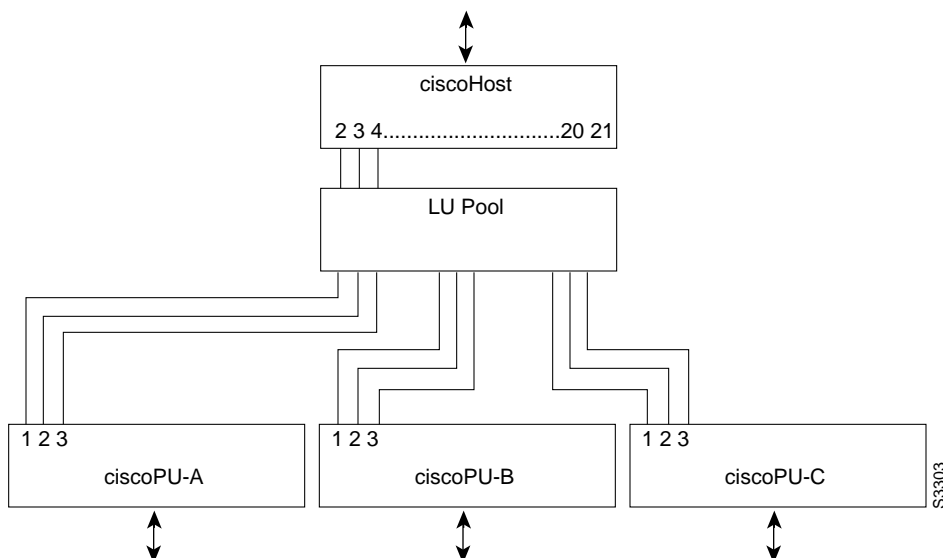**Figure 27-3   Dedicated LU Routing**

The following is a configuration file for the dedicated LU routing shown in Figure 27-3:

```
dspu host ciscohost xid-snd 06500001 rmac 4000.3745.0001
dspu pu ciscopu-a xid-rcv 05D00001 rmac 1000.5AED.0001
dspu lu 1 2 host ciscohost 2
dspu lu 3 3 host ciscohost 20
dspu pu ciscopu-b xid-rcv 05D00002 rmac 1000.5AED.0002
dspu lu 1 2 host ciscohost 4
dspu lu 3 3 host ciscohost 21
```

Pooled LU Routing Example

Figure 27-4 illustrates the use of pooled LU routing. Each upstream LU is configured in the LU pool and each downstream LU is configured as a pooled LU.

Figure 27-4   Pooled LU Routing

The following is the configuration example for the pooled LU routing shown in Figure 27-4:

```
dspu host ciscohost xid-snd 06500001 rmac 4000.3745.0001
dspu pool lupool host ciscohost lu 2 21
dspu pu ciscopu-a xid-rcv 05D00001 rmac 1000.5AED.0001
dspu lu 1 3 pool lupool
dspu pu ciscopu-b xid-rcv 05D00002 rmac 1000.5AED.0002
dspu lu 1 3 pool lupool
dspu pu ciscopu-c xid-rcv 05D00003 rmac 1000.5AED.0003
dspu lu 1 3 pool lupool
```

DSPU Configuration Example

The following configuration example represents one possible definition for the network topology shown earlier in Figure 27-1:

```
source-bridge ring-group 99
source-bridge remote-peer 99 tcp 150.10.13.1
source-bridge remote-peer 99 tcp 150.10.13.2 local-ack

dspu rsrb 88 1 99 4000.ffff.0001
dspu rsrb enable-host lsap 4

dspu host ciscohost xid-snd 06500001 rmac 4000.1111.0001 lsap 04 focalpoint
dspu pool ciscopool host ciscohost lu 2 8
dspu rsrb start ciscohost

dspu pu ciscopu1 xid-rcv 05d00001 lsap 04
dspu lu 2 3 pool ciscopool

dspu pu ciscopu2 xid-rcv 05d00002 lsap 04
dspu lu 2 4 pool ciscopool

dspu pu ciscopu3 xid-rcv 05d00003 lsap 12
dspu lu 2 2 pool ciscopool

dspu pu ciscopu4 xid-rcv 05d00004 lsap 20
dspu lu 2 2 pool ciscopool
dspu lu 3 3 host ciscohost 9
```

```
interface TokenRing 0
ring-speed 16
dspu enable-pu lsap 4
dspu enable-pu lsap 12
dspu enable-pu lsap 20
```