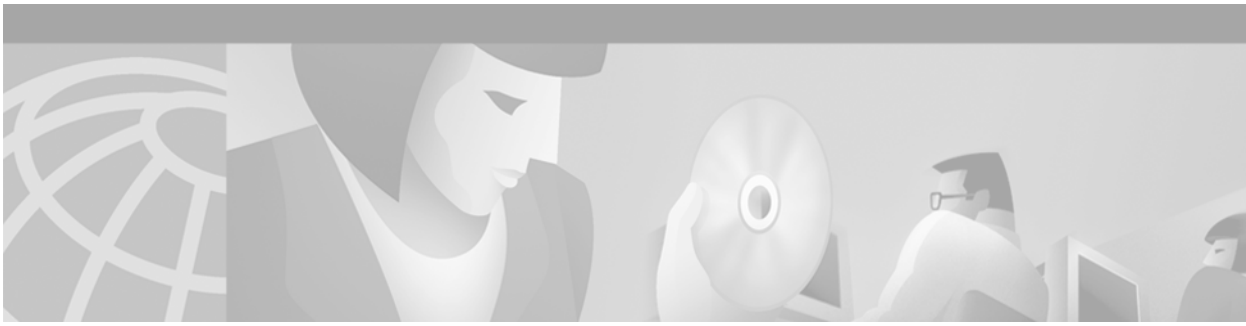

# Dynamic Packet Transport OC-12c Interface Processor for 7500

This feature module describes the OC-12c Dynamic Packet Transport Interface Processor (DPTIP) feature.

This document includes the following sections:



# Feature Overview

The OC-12c Dynamic Packet Transport (DPT) Interface Processor is available on Cisco 7500 series routers. The DPT is an OC-12c interface that uses second-generation Versatile Interface Processor (VIP2) technology to provide a shared IP-over-SONET capability and it complies with IEEE 802.3 specifications for multicast and broadcast media. The DPTIP assembly consists of a VIP2 with a dual-width DPT interface processor permanently attached to it.

## Benefits

The following benefits are offered by the DPTIP for the Cisco 7500 series routers:

- Accommodates large-scale network topology
- Applicable IEEE 802.3 standards
- Supports Intelligent Protection Switching (IPS)

## Related Documents

For related information on this feature, refer to the following documents:

- Cisco IOS *OC-12c Dynamic Packet Transport (DPT) Interface Processor Installation and Configuration*
- *Dynamic Packet Transport (DPT)* feature module

# Supported Platforms

- Cisco 7500 series routers

# Supported Standards, MIBs, and RFCs

### Standards

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

### MIBs

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

### RFCs

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

# Prerequisites

The DPTIP is compatible with any Cisco 7500 series router equipped with the correct Route Switch Processor (RSP2 or RSP4), running Cisco IOS Release 12.0(6)S or later.

# Configuration Tasks

See the following sections for configuration tasks for the DPT interface. Each task in the list indicates if the task is optional or required.

- Configuring the Dynamic Packet Transport Interface (Required)
- Configuring Intelligent Protection Switching (Optional)
- Configuring DPT Topology (Optional)

For information on other configuration tasks for the DPTIP interface processor, refer to the “Configure an Ethernet” section in the “Configuring Interfaces” chapter of the *Configuration Fundamentals Configuration Guide*.

For information on other commands that can be used by the DPT interface, refer to the Cisco IOS Release 12.1 configuration guides.

# Configuring the Dynamic Packet Transport Interface

| | Command | Purpose |
|---|---|---|
| **Step 1** | `Router# show running-config` | Confirms that the system recognizes the DPTIP. |
| **Step 2** | `Router# configure terminal` | Enables configuration mode. |
| **Step 3** | `Router(config)# ip routing` | Enables IP routing. |
| **Step 4** | `Router(config)# interface srp` *slot/port-adapter/port* | Specify interface.<br>The interface type of the DPTIP is SRP[1]. |
| **Step 5** | `Router(config-if)# ip address 10.0.0.0 10.255.255.255` | Assign an IP address and subnet mask to the interface. |
| **Step 6** | Add any additional configuration subcommands required to enable routing protocols, and set the interface characteristics for your configuration requirements. | |
| **Step 7** | `Router(config)# no shutdown` | Changes the shutdown state to up and enables the interface. |
| **Step 8** | **Ctrl-Z** | When you have included all the configuration subcommands to complete the configuration, press Ctrl-Z to exit configuration mode. |
| **Step 9** | `Router# copy running-config startup-config` | Writes the new configuration to the start up configuration. |

1. SRP= Spatial Reuse Protocol

The system displays an OK message when the configuration has been stored.

# Verifying DPTIP

**Step 1** Use the **show running-config** command to display the currently running configuration. The example below shows that the current software version is 12.0(8)S, a DPTIP is installed (the DPTIP is shown as interface SRP1/0/0), and the IP address of the DPTIP:

```
Router# show running-config
Building configuration...
Current configuration:
version 12.0(8)S
service timestamps debug uptime
service timestamps log datetime
no service password-encryption
service udp-small-servers
service tcp-small-servers
!
hostname uut2
!
interface SRP1/0/0
 mac-address 0010.5555.6666
 ip address 192.168.0.20 255.255.255.0
 no ip directed-broadcast
ip route-cache distributed
```

**Step 2** Use the **show version** command to display the configuration of the system hardware and Cisco IOS software information. The following example shows that the Cisco IOS version is 12.0(8)S and a DPTIP is installed:

```
Router# show version
Cisco Internetwork Operating System Software
IOS (tm) RSP Software (RSP-JSV-M), Version 12.0(8)S, EARLY DEPLOYMENT RELEASE SOFTWARE
(fc1)
Copyright (c) 1986-1999 by cisco Systems, Inc.
Compiled Sat 18-Dec-99 00:28 by htseng
Image text-base:0x60010908, data-base:0x610B2000

ROM:System Bootstrap, Version 11.1(2) [nitin 2], RELEASE SOFTWARE (fc1)
BOOTFLASH:GS Software (RSP-BOOT-M), Version 11.1(8)CA1, EARLY DEPLOYMENT RELEASE SOFTWARE
(fc1)

manta uptime is 8 minutes
System returned to ROM by reload
System image file is "tftp://223.255.254.254/muck/shirjosh/rsp-jsv-mz.120-8.S"

cisco RSP2 (R4700) processor with 131072K/2072K bytes of memory.
R4700 CPU at 100Mhz, Implementation 33, Rev 1.0
Last reset from power-on
G.703/E1 software, Version 1.0.
G.703/JT2 software, Version 1.0.
X.25 software, Version 3.0.0.
SuperLAT software (copyright 1990 by Meridian Technology Corp).
Bridging software.
TN3270 Emulation software.
Chassis Interface.
1 EIP controller (2 Ethernet).
2 VIP2 controllers (2 FastEthernet)(1 POS).
1 FEIP controller (2 FastEthernet).
2 Ethernet/IEEE 802.3 interface(s)
4 FastEthernet/IEEE 802.3 interface(s)
1 Packet over SONET network interface(s)
123K bytes of non-volatile configuration memory.

20480K bytes of Flash PCMCIA card at slot 0 (Sector size 128K).
8192K bytes of Flash internal SIMM (Sector size 256K).
No slave installed in slot 3.
Configuration register is 0x0
```

# Configuring Intelligent Protection Switching

The SRP interface uses ring architecture to provide redundancy and protection from a failed node or a fiber cut by using the Intelligent Protection Switching (IPS). The tasks described in this section are optional.

| | Command | Purpose |
|---|---|---|
| **Step 1** | `Router# configure terminal` | Enables configuration mode. |
| **Step 2** | `Router(config)# interface srp` *slot/port-adapter/port* | Configure an SRP interface. |
| **Step 3** | `Router(config-if)# srp ips request manual-switch a` | Specifies an IPS manual switch on side A. |
| **Step 4** | `Router(config-if)# srp ips wtr-timer 10` | Specifies a wait-to-restore request (in seconds) to prevent switch oscillations. |

| | Command | Purpose |
|---|---|---|
| **Step 5** | `Router(config-if)# srp ips timer 20 a` | Configures a message timer to be sent to the inner and outer rings to control the frequency of IPS message transmissions on side A. |
| **Step 6** | `Router(config-if)# ^Z` | Exits back to EXEC mode so you can perform verification steps. |

# Verifying Intelligent Protection Switching

Use the **show srp** command to determine whether an intelligent protection switch is enabled or idle:

```
Router# show srp ips srp 2/0/0
IPS Information for Interface SRP2/0/0
MAC Addresses
   Side A (Outer ring RX) neighbor 0000.0000.0002
   Side B (Inner ring RX) neighbor 0000.0000.0001
   Node MAC address 0000.0000.0004
IPS State
   Side A not wrapped
   Side B not wrapped
   Side A (Inner ring TX) IPS pkt. sent every 1 sec. (next pkt. after 0 sec.)
   Side B (Outer ring TX) IPS pkt. sent every 1 sec. (next pkt. after 0 sec.)
   IPS WTR period is 60 sec. (timer is inactive)
   Node IPS State IDLE
IPS Self Detected Requests     IPS Remote Requests
   Side A IDLE                    Side A IDLE
   Side B IDLE                    Side B IDLE
IPS messages received
   Side A (Outer ring RX) {0000.0000.0002,IDLE,S}, TTL 128   age 00:00:04
   Side B (Inner ring RX) {0000.0000.0001,IDLE,S}, TTL 128   age 00:00:00
IPS messages transmitted
   Side A (Inner ring TX) {0000.0000.0004,IDLE,S}, TTL 128
   Side B (Outer ring TX) {0000.0000.0004,IDLE,S}, TTL 128
```

# Configuring DPT Topology

Every node on a DPT ring maintains a topology map of the ring, so that it knows where to route traffic. It updates the topology map by periodically sending a query, called a topology discovery packet, out onto the outer-ring path. Each node on the ring adds its own MAC address to the packet. When the discovery packet returns to the originating node, the contents of the packet are used to update the topology map. You use the **srp topology-timer** command to set the frequency with which the node sends out topology discovery packets.

| | Command | Purpose |
|---|---|---|
| **Step 1** | `Router# configure terminal` | Enables configuration mode. |
| **Step 2** | `Router(config)# interface srp` *slot/port-adapter/port* | Configure an SRP interface. |
| **Step 3** | `Router(config-if)# srp topology-timer` *seconds* | Configures the frequency of the topology message timer in seconds. |

| | Command | Purpose |
|---|---|---|
| **Step 4** | `Router(config-if)# ^Z` | Exits back to EXEC mode so you can perform verification steps. |
| **Step 5** | `Router# show srp topology` | Confirm the identity of the nodes on the ring by entering the **show srp topology** command. The command output also shows the number of hops between nodes and identifies the nodes that are in wrap mode. |

## Verifying DPT Topology

Enter the **show srp topology** command to confirm the identity of the nodes on the ring. The command output also shows the number of hops between nodes and identifies the nodes that are in wrap mode:

Use the **show srp topology** command to show the identity of the nodes on the DPT ring according to their MAC addresses. The following example shows a three-node DPT ring.

```
Router# show srp topology
Topology Map for Interface SRP2/0/0
  Topology pkt. sent every 5 sec. (next pkt. after 4 sec.)
  Last received topology pkt. 00:00:00
  Nodes on the ring:4
  Hops (outer ring)      MAC       IP Address      Wrapped Name
      0             0000.0000.0004 2.2.2.4           No    stingray
      1             0000.0000.0001 2.2.2.1           No    npe300
      2             0000.0000.0005 2.2.2.5           No    gsr
      3             0000.0000.0002 2.2.2.2           No    tuna
```

# Configuration Examples

This section provides the following configuration examples:

- DPTIP Interface Processor
- IPS
- DPT Topology

## DPTIP Interface Processor

In the following example, the OC-12c DPTIP SRP interface is specified and the IP address and subnet mask is assigned to the interface.

```
Router(config)# interface srp 0/1/0
Router(config-if)# ip address 192.168.2.3 255.255.255.0
```

# IPS

In the following example the SRP IPS options are configured:

```
Router(config)# interface srp slot/port-adapter/port
srp ips request manual-switch a
srp ips wtr-timer 60
srp ips timer 90
```

# DPT Topology

In the following example, the identity of the nodes on the DPT ring according to their MAC addresses is shown. The following example shows a three-node DPT ring:

```
Router# show srp top
Topology Map for Interface SRP2/0/0
  Topology pkt. sent every 5 sec. (next pkt. after 4 sec.)
  Last received topology pkt. 00:00:00
  Nodes on the ring:4
  Hops (outer ring)      MAC       IP Address      Wrapped Name
      0             0000.0000.0004 2.2.2.4           No    stingray
      1             0000.0000.0001 2.2.2.1           No    npe300
      2             0000.0000.0005 2.2.2.5           No    gsr
      3             0000.0000.0002 2.2.2.2           No    tuna
```

# Command Reference

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

- **srp buffer-size**
- **srp deficit-round-robin**
- **srp loopback**
- **srp priority-map**
- **srp random-detect**
- **srp shutdown**
- **srp tx-traffic-rate**

The SRP interface provides commands to enforce quality of service (QoS) functionality on the transmit side and receive side of Cisco routers. SRP uses the IP type of service (ToS) field values to determine packet priority.

On the transmit side the SRP interface classifies traffic into high- and low-priority traffic. High-priority traffic is rate shaped and has higher priority than low-priority traffic. The user has the option to configure high- or low-priority traffic and can rate limit the high-priority traffic.

# srp buffer-size

To make adjustments to buffer settings on the receive side for different priority traffic, use the **srp buffer-size** interface configuration command. Use the **no** form of this command to disable buffer size configurations.

**srp buffer-size** *receive* [*high* | *medium*]

**no srp buffer-size** *receive* [*high* | *medium*]

## Syntax Description

| | |
|---|---|
| *receive* | Allocates synchronous dynamic random-access memory (SDRAM) buffer for incoming packets. |
| *high* \| *medium* | Buffer size for high- or medium-priority packets. Any number from 16 to 8192 in bytes. |

## Defaults

high = 4096 kbytes, medium = 4096 kbytes, low = 8192 kbytes

## Command Modes

Interface configuration

## Command History

| Release | Modification |
|---|---|
| 12.0(6)S | This command was introduced. |
| 12.0(7)XE1 | This command was introduced on Cisco 7500 series routers. |
| 12.1(5)T | This command was integrated into Cisco IOS Release 12.1(5)T. |

## Examples

The following example shows the buffer size for the receive side at the high setting of 17 kbytes:

```
Router(config-if)# srp buffer-size receive high 17
```

## Related Commands

| Command | Description |
|---|---|
| **mtu** *bytes* | Adjusts the maximum packet size MTU size.[1] |
| **srp deficit-round-robin** | Sets SRP parameters. |

1. MTU = maximum transmission unit

# srp deficit-round-robin

To transfer packets from the internal receive buffer to IOS, use the **srp deficit-round-robin** configuration command. Use the **no** form of this command to disable **srp deficit-round-robin**.

**srp deficit-round-robin** [*input* | *output*] [*high* | *medium* | *low*] [*quantum* | *deficit*]

**no srp deficit-round-robin**

## Syntax Description

| | |
|---|---|
| *input* \| *output* | Either input or output is specified. |
| *high* \| *medium* \| *low* | Priority queue level. |
| *quantum* | DRR quantum value. Any number from 9216 to 32767. The default is 9216. |
| *deficit* | DRR deficit value. Any number from 0 to 65535. The default is 16384. |

## Defaults

quantum = 9216
deficit = 16384

## Command Modes

Configuration

## Command History

| Release | Modification |
|---|---|
| 12.0(6)S | This command was introduced. |
| 12.0(7)XE1 | This command was introduced on Cisco 7500 series routers. |
| 12.1(5)T | This command was integrated into Cisco IOS Release 12.1(5)T. |

## Examples

The following example shows packets configured for the high-priority input queue:

```
Router(config-if)# srp deficit-round-robin input high deficit
```

## Related Commands

| Command | Description |
|---|---|
| **srp priority-map receive** | Enables classification of packets as high, medium, or low based on the IP TOS value |
| **srp buffer-size** | Modifies the buffer space allocated for different priority traffic. By default high- and medium-priority packets get 4 MB of buffer space, and low-priority packets get 8 MB of buffer space. |
| **srp random-detect** | Enables user to tune WRED parameters on packets received through the SRP interface. |

# srp loopback

To loop the SRP interface on a OC-12c DPTIP, use the **srp loopback** interface configuration command. Use the **no** form of this command to remove the loopback.

**srp loopback** {**internal** | **line**} {**a** | **b**}

**no srp loopback**

## Syntax Description

| | |
|---|---|
| **internal** \| **line** | Sets the loopback toward the network before going through the framer (internal), or loops the payload data toward the network (line). |
| **a** | Loopback the A side of the interface (inner tx, outer rx). |
| **b** | Loopback the B side of the interface (outer tx, inner rx). |

## Defaults

Disabled

## Command Modes

Interface configuration

## Command History

| Release | Modification |
|---|---|
| 12.0(6)S | This command was modified. |
| 12.0(7)XE1 | This command was introduced on Cisco 7500 series routers. |
| 12.1(5)T | This command was integrated into Cisco IOS Release 12.1(5)T. |

## Usage Guidelines

Use this command for troubleshooting purposes.

## Examples

The following example configures the loopback test on the A side of the SRP interface:

```
srp loopback line a
```

# srp priority-map

To set priority mapping for transmitting and receiving packets, use the **srp priority-map** configuration command. Use the **no** form of this command to disable priority mapping.

**srp priority-map** {**receive**} {*high* | *medium* | *low*} {**transmit**} {*high* | *medium*}

**no srp priority-map**

## Syntax Description

| | |
|---|---|
| **receive** \| **transmit** | Receiving or transmitting. |
| *high* \| *medium* | Mapping for high- or medium-priority packets. Range is between 1 and 8. |
| *low* | Specifies mapping for low-priority packets on the receive side. |

## Defaults

receive high = 5, receive medium = 3, transmit = 7

## Command Modes

Configuration

## Command History

| Release | Modification |
|---|---|
| 12.0(6)S | This command was introduced. |
| 12.0(7)XE1 | This command was introduced on Cisco 7500 series routers. |
| 12.1(5)T | This command was integrated into Cisco IOS Release 12.1(5)T. |

## Usage Guidelines

The SRP interface provides commands to enforce quality of service (QoS) functionality on the transmit side and receive side of Cisco routers. SRP uses the IP type of service (ToS) field values to determine packet priority.

The SRP interface classifies traffic on the transmit side into high- and low-priority traffic. High-priority traffic is rate shaped and has higher priority than low-priority traffic. You have the option to configure high- or low-priority traffic and can rate limit the high-priority traffic.

The command **srp priority-map transmit** enables the user to specify IP packets with values equal to or greater than the ToS value to be considered as high-priority traffic.

On the receive side, when WRED is enabled, SRP hardware classifies packets into high-, medium-, and low-priority packets based on IP ToS value. After classification, it stores the packet into the internal receive buffer. The receive buffer is partitioned for each priority packet. Cisco routers can employ WRED based on the IP ToS value. Routers also employ the Deficit Round Robin (DRR) algorithm to transfer packets from the internal receive buffer to IOS.

The command **srp priority-map receive** enables the user to classify packets as high, medium, or low based on the IP ToS value.

## Examples

The following example configures Cisco 7500 series routers to transmit packets with priority greater than 5 as high-priority packets:

```
Router(config-if)# srp priority-map transmit 5
```

## Related Commands

| Command | Description |
|---|---|
| **random detect** | Configures WRED parameters on packets received through an SRP interface. |

# srp random-detect

To configure WRED parameters on packets received through an SRP interface, use the **srp random-detect interface** configuration command. Use the **no** form of this command to return the value to the default.

**srp random-detect** {*compute-interval* | *enable* | *input* | [*high* | *low* | *medium*] |

*exponential-weight* | *precedence*]

**no srp random-detect**

## Syntax Description

| | |
|---|---|
| *compute-interval* | Interval in the range of 1 to 128 nsec used to specify the queue depth compute interval. |
| *enable* | Enable WRED |
| *input* | WRED on packet input path. |
| *high* \| *low* \| *medium* | Priority queue level. |
| *exponential-weight* | Queue weight in bits. Any number from 0 to 6. |
| *precedence* | Input queue precedence. |

## Defaults

128 seconds

## Command Modes

Interface configuration

## Command History

| Release | Modification |
|---|---|
| 12.0(6)S | This command was introduced. |
| 12.0(7)XE1 | This command was introduced on Cisco 7500 series routers. |
| 12.1(5)T | This command was integrated into Cisco IOS Release 12.1(5)T. |

## Examples

The following example has configured WRED parameters on packets received through an SRP interface with a weight factor of 5:

```
Router(config-if)# srp random-detect input high exponential-weight 5
```

# srp shutdown

To disable the SRP interface, use the **shutdown** interface configuration command. To restart a disabled interface, use the **no** form of this command.

**srp shutdown** [*a* | *b*]

**no srp shutdown** [*a* | *b*]

## Syntax Description

| | |
|---|---|
| *a* | Specifies side A of the SRP interface. |
| *b* | Specifies side B of the SRP interface. |

## Defaults

Not enabled

## Command Modes

Interface configuration

## Command History

| Release | Modification |
|---|---|
| 12.0(6)S | This command was introduced. |
| 12.0(7)XE1 | This command was introduced on Cisco 7500 series routers. |
| 12.1(5)T | This command was integrated into Cisco IOS Release 12.1(5)T. |

## Usage Guidelines

The **srp shutdown** command disables all functions on the specified side.

## Examples

The following example turns off the A side of the SRP interface:

```
srp shutdown a
```

# srp tx-traffic-rate

To limit the amount of high-priority traffic that the SRP interface can handle, use the **srp tx-traffic-rate** configuration command. Use the **no** form of this command to disable transmitted traffic rate.

**srp tx-traffic** *number*

**no srp tx-traffic** *number*

## Syntax Description

| | |
|---|---|
| *number* | The range in kilobits. The range is 1 to 65535. |

## Defaults

10 Mbps

## Command Modes

Configuration

## Command History

| Release | Modification |
|---|---|
| 12.0(6)S | This command was introduced. |
| 12.0(7)XE1 | This command was introduced on Cisco 7500 series routers. |
| 12.1(5)T | This command was integrated into Cisco IOS Release 12.1(5)T. |

## Examples

The following example shows SRP transmitted traffic transmitting at 1000 kilobits per second:

```
Router(config-if)# srp tx-traffic-rate 1000
```

# Glossary

**DPT**—Dynamic Packet Transport.

**DPTIP**—Dynamic Packet Transport Interface Processor.

**DRR**—Deficit Round Robin.

**IPS**—Intelligent Protection Switching.

**MAC**—Media Access Control.

**MTU**—Maximum Transmission Unit.

**QoS**—Quality of service.

**RSP**—Route Switch Processor.

**SDRAM**—Synchronous Dynamic Random-access Memory.

**SONET**—Synchronous Optical Network. An American National Standards Institute (ANSI) standard (T1.1051988) for optical digital transmission at hierarchical rates from 51.840 Mbps (OC-1) to 2.488 Gbps (OC-48) and higher.

**SRP**—Spatial Reuse Protocol. A Layer 2 MAC protocol for use with DPT, SONET, and SDH rings that runs over a dual-ring network topology and is characterized by shared media, statistical multiplexing, global fairness, and spatial reuse.

**ToS**—Type of service.

**VIP2**—Versatile Interface Processor.

**WRED**—Weighted Random Early Detection.