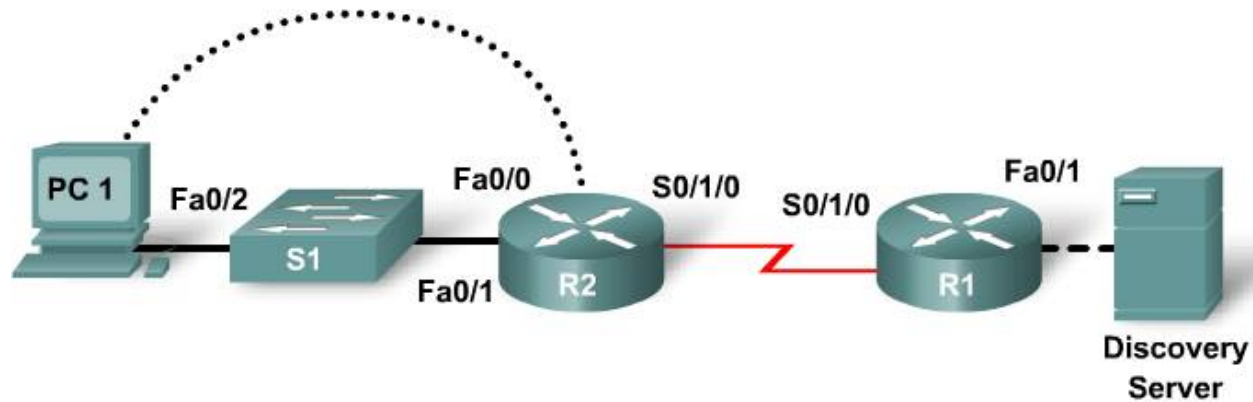


Lab 4.3.4 Exploring Network QoS



Straight-through cable



Serial cable



Console (Rollover)



Crossover cable



Device Designation	Device Name	Address	Subnet Mask
Discovery Server	Network Services	172.17.1.1	255.255.0.0
R1	ISP	Fa0/1 172.17.0.1 S0/1/0 10.10.0.1	255.255.0.0 255.255.255.252
R2	FC-CPE-1	Fa0/0 10.0.0.1 S0/1/0 10.10.0.2	255.255.255.0 255.255.255.252
S1	FC-ASW-1	—	—
PC1	Host1	10.0.0.200	255.255.255.0

Objective

- Explain where QoS can be implemented to affect traffic flow.

Expected Results and Success Criteria

Before starting this lab, read through the tasks that you are expected to perform. What do you expect the result of performing these tasks will be?

Why is establishing priorities for different types of network traffic important?

What information does a network administrator need to set QoS requirements on the network?

Background / Preparation

FilmCompany is an expanding advertising company moving into interactive advertising media, including video presentations. This company has just been awarded a large big video support contract by the StadiumCompany. With this new contract, FilmCompany expects to see their business grow approximately 70 percent.

The required network upgrade to support this growth in business will need to be able to carry a variety of data traffic types. Some of these data types may require priority access to network resources to ensure their useful and effective delivery.

In this lab, you will examine and apply some of the Cisco IOS commands to configure priority queuing on a router.

Step 1: Cable and configure the network

NOTE: If the PC used in this lab is also connected to your Academy LAN or to the Internet, ensure that you record the cable connections and TCP/IP settings so that these can be restored at the conclusion of the lab.

- a. Connect and configure the devices in accordance with the given topology and configuration.
 - 1) Routing will have to be configured across the serial WAN link to establish data communications.
 - 2) Configure Telnet access on each router.

NOTE: Your instructor may substitute for Discovery Server an equivalent server for this lab.

- b. Ping between Host1 and Discovery Server to confirm network connectivity.
 - 1) Confirm Application Layer connectivity by telnetting from R2 to R1.
 - 2) Troubleshoot and establish connectivity if the pings or Telnet fail.
- c. After confirming the initial configurations, maintain a console terminal session connection with R2.

Step 2: Examine priority queue commands

Configuring Priority Queueing

Configuring priority queueing (PQ) has two required steps and an optional third step:

1. Define the priority list (Required)
2. Assign the priority list to an Interface (Required)
3. Monitor priority queueing lists (Optional)

A priority list contains the definitions for a set of priority queues. The priority list specifies which queue a packet will be placed in and, optionally, the maximum length of the different queues. To perform queueing using a priority list, you must assign the list to an interface. The same priority list can be applied to multiple interfaces. Alternatively, you can create many different priority policies to apply to different interfaces.

Defining the Priority List

The priority list is defined by:

1. Assigning packets to priority queues
2. Specifying the maximum size of the priority queues (Optional)

Packets are assigned to priority queues based on the protocol type and the interface where the packets enter the router.

The **priority-list** commands are read in order of appearance until a matching protocol or interface type is found. When a match is found, the packet is assigned to the appropriate queue and the search ends. Packets that do not match other assignment rules are assigned to the default queue.

The following global configuration mode commands are used to specify in which queue a packet is placed.

The command format is **priority-list** *list-number*

Use a list-number of 1 and note the options available.

- a. Enter the following command and note the options available.

```
FC-CPE-1(config)#priority-list 1 ?
```

- b. Note some of the protocol options available.

```
FC-CPE-1(config)#priority-list 1 protocol ?
```

- c. Note the IP protocol options available.

```
FC-CPE-1(config)#priority-list 1 protocol ip ?
```

- d. Note the HTTP protocol options available.

```
FC-CPE-1(config)#priority-list 1 protocol http ?
```

- e. Note the IP protocol high priority options available.

```
FC-CPE-1(config)#priority-list 1 protocol ip high ?
```

- f. Note the IP protocol high priority TCP options available.

```
FC-CPE-1(config)#priority-list 1 protocol ip high tcp ?
```

Step 3: Configure an example priority queue

From the global configuration mode, issue the following commands.

```
FC-CPE-1(config)#priority-list 1 protocol http high
FC-CPE-1(config)#priority-list 1 protocol ip normal tcp ftp
FC-CPE-1(config)#priority-list 1 protocol ip medium tcp telnet
```

What do these commands establish?

Step 4: Assign the priority list to an interface

- a. From the global configuration mode, issue the following commands to assign the priority list to interface serial 0/1/0.

```
FC-CPE-1(config)#int s0/1/0
FC-CPE-1(config-if)#priority-group 1
```

- b. Confirm the priority list configuration. From the privileged EXEC mode, issue the **show running-config** command.

Which statements in the configuration show that the priority list has been configured and applied correctly?

- c. Confirm that issuing the **show queueing priority** command from the privileged EXEC mode produces the following output:

```
FC-CPE-1#show queueing priority
Current DLCI priority queue configuration:
Current priority queue configuration:

List   Queue  Args
1      high   protocol http
1      normal protocol ip          tcp port ftp
1      medium protocol ip          tcp port telnet
```

Step 5: Examine the priority queues operation

- a. On Host1, launch a web browser and enter the URL **http://172.17.1.1** to access the web services configured on the server.
- b. Use FTP to download a file. On Host1, launch a new web browser window and enter the URL **ftp://172.17.1.1**, or from the command line issue **ftp 172.17.1.1**
- c. Download a large file from the server; for example, a Wireshark or Thunderbird setup program file.
- d. From the privileged EXEC mode, issue the following command:

```
FC-CPE-1#show queueing interface s0/1/0
```

Output similar to this should be displayed:

```
Interface Serial0/1/0 queueing strategy: priority

Output queue utilization (queue/count)
      high/94 medium/0 normal/106759 low/0
```

Note the packet count for each queue:

High _____ Medium _____ Normal _____ Low _____

- e. Initiate a Telnet session from R2 to R1 and issue some **show** commands on R1.
- f. Close the Telnet session.
- g. Issue the following command from the R2 privileged EXEC mode:

```
FC-CPE-1#show queueing interface s0/1/0
```

Note the packet count for each queue:

High _____ Medium _____ Normal _____ Low _____

What is the significant difference when compared to the previous output from this command in Step 5d?

Step 6: Determine the priority queue requirements for the case study

- Using the FilmCompany case study, what would you expect the priority queue requirements to be?
- Discuss and compare your priorities with other students.

- Amend your priority list statements to include traffic associated with the proposed network upgrade.

Step 7: Clean up

Erase the configurations and reload the routers and switches. Disconnect and store the cabling. For PC hosts that are normally connected to other networks (such as the school LAN or to the Internet), reconnect the appropriate cabling and restore the TCP/IP settings.

Challenge

The following privileged EXEC command displays the contents of packets inside a queue for a particular interface:

show queue *interface-type interface-number*

However, in this lab, it is not likely that sufficient data traffic was generated at one time for the interface queues to hold packets long enough to be inspected.

Discuss how a network has to be load tested to ensure that all traffic priorities are met.

FilmCompany Branch Layout

