CO513 - Lab 05
Quality of Service - QoS

Quality of Service - QoS

Service availability is a crucial foundation element of QoS. The network infrastructure must be designed to be highly available before you can successfully implement QoS. The target for High Availability is 99.999 % uptime, with only five minutes of downtime permitted per year. The transmission quality of the network is determined by the following factors:

- *Loss*—A relative measure of the number of packets that were not received compared to the total number of packets transmitted. Loss is typically a function of availability. If the network is Highly Available, then loss during periods of non-congestion would be essentially zero. During periods of congestion, however, QoS mechanisms can determine which packets are more suitable to be selectively dropped to alleviate the congestion.

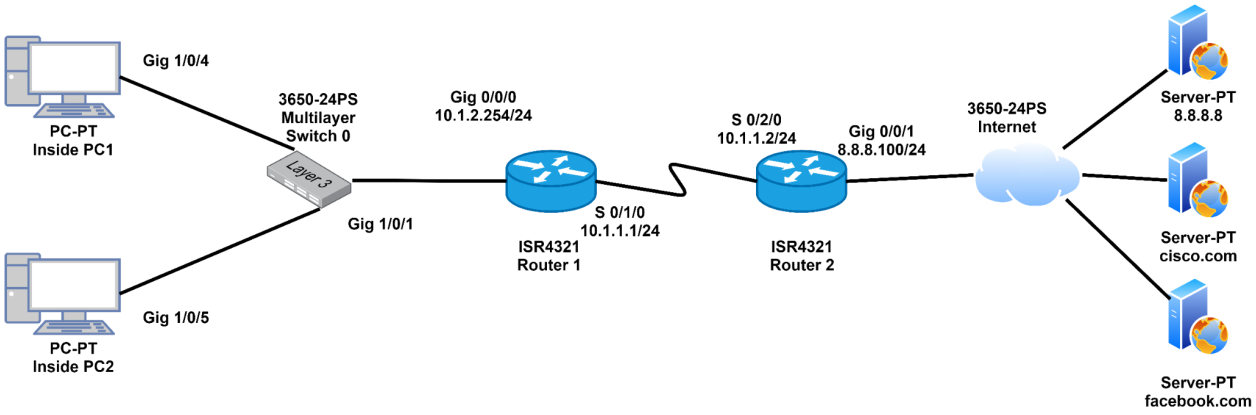
- *Delay*—The finite amount of time it takes a packet to reach the receiving endpoint after being transmitted from the sending endpoint. In the case of voice, this is the amount of time it takes for a sound to travel from the speaker's mouth to a listener's ear.

- *Delay variation (Jitter)*—The difference in the end-to-end delay between packets. For example, if one packet requires 100 ms to traverse the network from the source endpoint to the destination endpoint and the following packet requires 125 ms to make the same trip, then the delay variation is 25 ms. Each end station in a Voice over IP (VoIP) or Video over IP conversation uses a jitter buffer to smooth out changes in the arrival times of voice data packets. Although jitter buffers are dynamic and adaptive, they may not be able to compensate for instantaneous changes in arrival times of packets. This can lead to jitter buffer overruns and under-runs, both of which result in an audible degradation of call quality.

In this packet tracer lab, you need to configure Quality of Service or QoS. In this lab we're going to cover quality of service topics such as matching traffic, marking traffic, doing something with the traffic such as providing a minimum bandwidth guarantee. Now in the real world, you would follow a quality of service policy document. In other words, you would decide which traffic types are important in your network and then allocate bandwidth accordingly or implement quality of service mechanisms such as policing, shaping, queuing and others based on your quality service policy document. In this lab, we're going to implement a basic quality of service policy. So that you can get familiar with class maps, policy maps, service policies and other commands used for quality of service in CISCO environments.

Lab Exercise

1. Implement the following network using Cisco packet tracer. Perform any IP configuration accordingly within each of the devices. Make sure the network is up and running.



QoS Configurations

2. On router 1
    a. Match traffic:
        i. Voice traffic using NBAR (rtp) - Set DSCP to EF
        ii. HTTP using NBAR (http) - Set DSCP to AF31
        iii. ICMP using NBAR (icmp) - Set DSCP to AF11
    b. Bind outbound on S 0/1/0
        i. Voice should get priority bandwidth of 100kbps
        ii. HTTP should get minimum bandwidth 50kbps
        iii. ICMP should get minimum bandwidth 25kbps
3. On router 2
    a. Match traffic:
        i. Voice traffic using DSCP EF - Set IP precedence to 5.
        ii. HTTP using DSCP AF31 - Set IP precedence to 3.
        iii. ICMP using DSCP AF11 - Set IP precedence to 0.
    b. Bind inbound on S 0/2/0.

Verification

4.
    a. Open browser on PC1 and PC2 and browse to cisco.com and facebook.com - Verify matches in policy.
    b. Ping cisco.com from PC1 and PC2 - Verify matches in policy.
    c. Use simulation mode to view DSCP and IP Precedence Packet markings.

Submission

Create a report renamed as **E16XXX_report.pdf** (XXX is your E Number) including the **screenshots for your observations, simulations, CLIs (Show Command Outputs and Necessary Configurations), and answers** related to each of the steps.

- Submit a zip file **E16XXX_Lab05.zip** (XXX is your E Number) which contains the following.
    - **E16XXX_report.pdf**
    - **E16XXX.pkt** (Packet Tracer Activity File)

Note: Make sure that you have copied your running configuration to startup configurations before submitting the .pkt file (i.e. save your configurations correctly before submission).