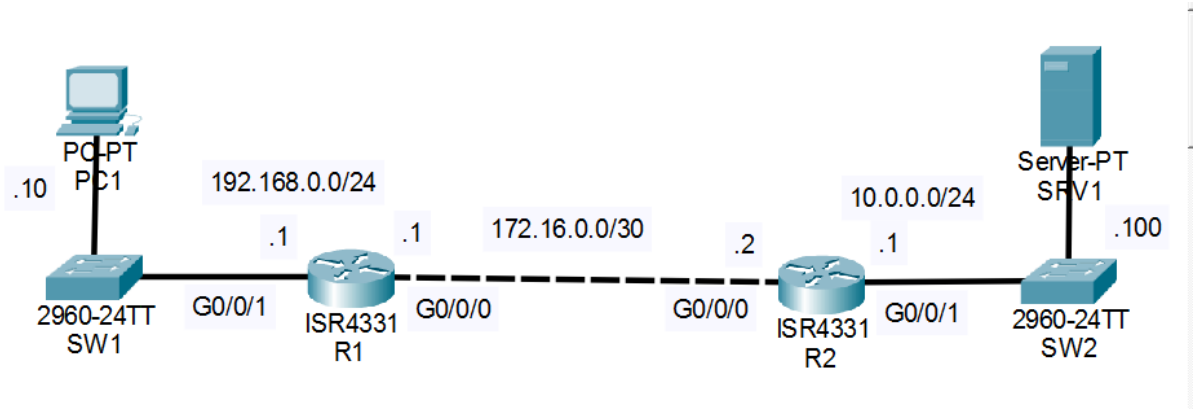
Network Topology:



I watched the tutorial video and followed along to do this lab, as QoS configuration is not a part of CCNA.

Instructions and actions:

Configure the following QoS settings on R1 and apply them outbound on interface G0/0/0:

1. Mark HTTPS traffic as AF31 – Provide a minimum 10% bandwidth as a priority queue.
2. Marh HTTP traffic as AF32 – Provide a minimum 10% bandwidth.
3. Mark ICMP traffic as CS2 – Provide a minimum 5% bandwidth.

```
R1>en
R1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#class ?
  WORD        class-map name
  match-all   Logical-AND all matching statements under this classmap
  match-any   Logical-OR all matching statements under this classmap
  type        type of the class-map
R1(config)#class-map FOR_HTTPS
R1(config-cmap)#match protocol https
R1(config-cmap)#exit
R1(config)#class-map FOR_HTTP
R1(config-cmap)#match protocol http
R1(config-cmap)#exit
R1(config)#class-map FOR_ICMP
R1(config-cmap)#match protocol ICMP
R1(config-cmap)#exit
R1(config)#
```

We used a ‘class-map’ to select the traffic and map it to a particular category based on protocol.
Now, we will use ‘policy-map’ to exactly configure what is to be done with that selected and mapped traffic.

```
R1(config)#policy-map ?
  WORD  policy-map name
  type  type of the policy-map
R1(config)#policy-map AT_R1
R1(config-pmap)#class FOR_HTTPS
R1(config-pmap-c)#set ip dscp af31
R1(config-pmap-c)#priority bandwidth percent 10
                           ^
% Invalid input detected at '^' marker.

R1(config-pmap-c)#priority percent 10
R1(config-pmap-c)#exit
R1(config-pmap)#class FOR_HTTP
R1(config-pmap-c)#set ip dscp af32
R1(config-pmap-c)#bandwidth percent 10
R1(config-pmap-c)#exit
R1(config-pmap)#class FOR_ICMP
R1(config-pmap-c)#set ip dscp cs2
R1(config-pmap-c)#bandwidth percent 5
R1(config-pmap-c)#exit
R1(config-pmap)#exit
R1(config)#do sh run | section class-map
class-map match-all FOR_HTTPS
 match protocol https
class-map match-all FOR_HTTP
 match protocol http
class-map match-all FOR_ICMP
 match protocol icmp
R1(config)#do sh run | section policy-map
policy-map AT_R1
 class FOR_HTTPS
  priority percent 10
  set ip dscp af31
 class FOR_HTTP
  bandwidth percent 10
  set ip dscp af32
 class FOR_ICMP
  bandwidth percent 5
  set ip dscp cs2
R1(config)#
```

Now, to apply these policies on the selected traffic going through a particular interface physically, we will use the 'service-policy' command on the interface.

```
R1(config)#int g0/0/0
R1(config-if)#service-policy ?
  input   Assign policy-map to the input of an interface
  output  Assign policy-map to the output of an interface
R1(config-if)#service-policy output ?
  WORD  policy-map name
R1(config-if)#service-policy output AT_R1
R1(config-if)#end
```

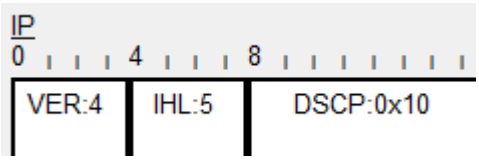
Analysing outputs using simulation mode:

1. ICMP ping from PC1 to SRV1

   PC1:

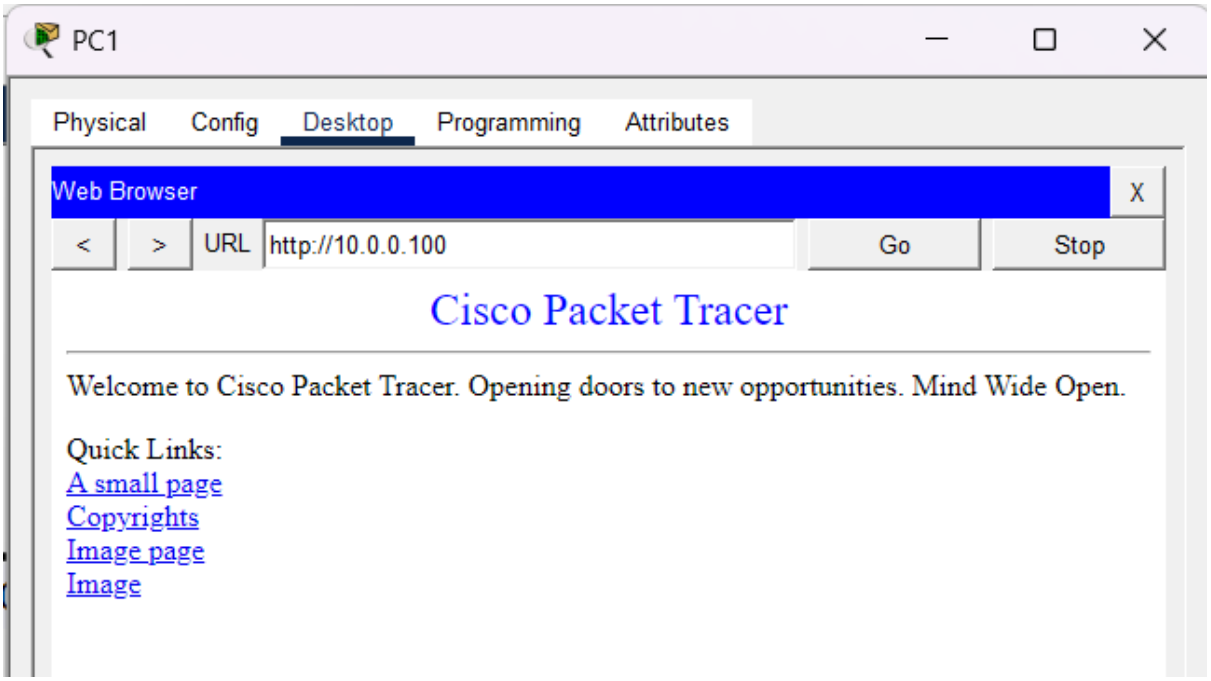
```
C:\>ping 10.0.0.100

Pinging 10.0.0.100 with 32 bytes of data:

Reply from 10.0.0.100: bytes=32 time=10ms TTL=126
Reply from 10.0.0.100: bytes=32 time=10ms TTL=126
Reply from 10.0.0.100: bytes=32 time=10ms TTL=126
Reply from 10.0.0.100: bytes=32 time=10ms TTL=126

Ping statistics for 10.0.0.100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 10ms, Maximum = 10ms, Average = 10ms
```

ICMP packet checked in simulation mode at R1 (outbound):

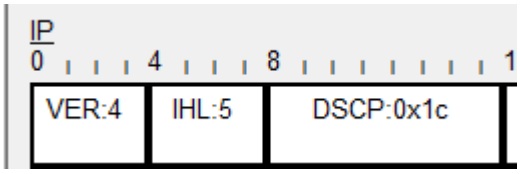


2. HTTP request

   PC1 web browser:

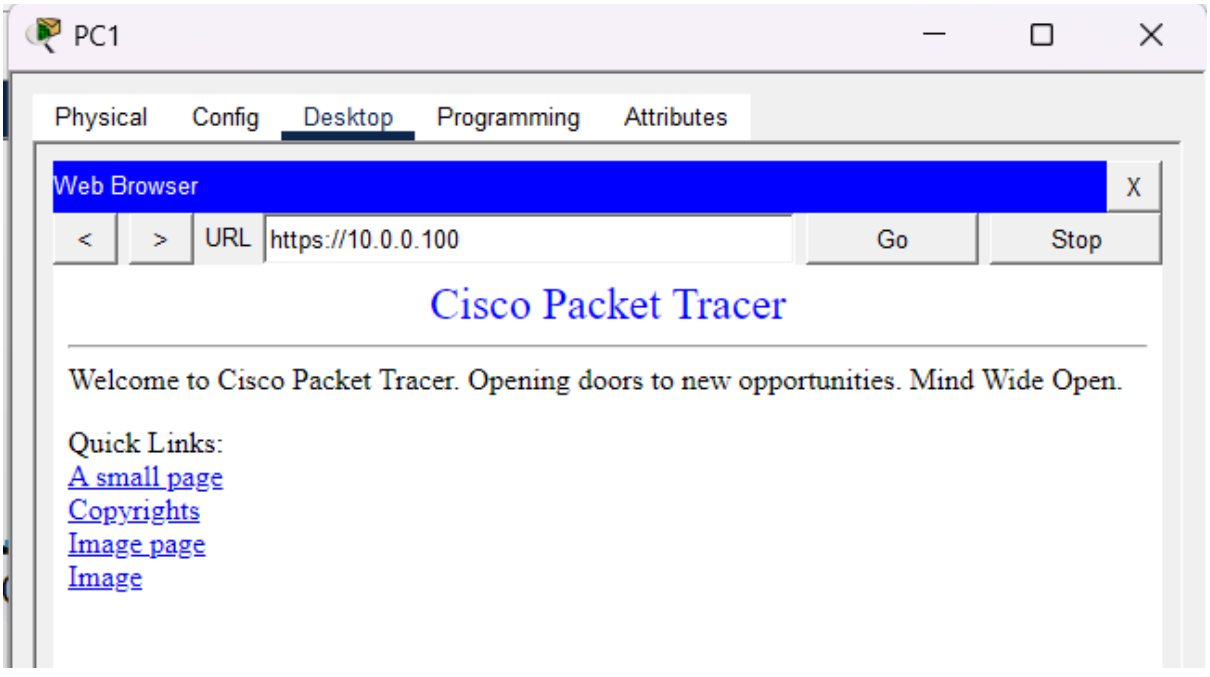


   Packet:

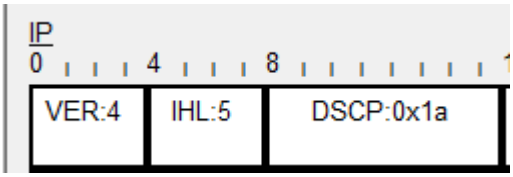


3. HTTPS request

   PC1 browser:



Packet:



DSCP explanation: