Practical 6: Configure WFQ based on topology in GNS3

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I. INTRODUCTION

Aim of this practical is to Configure WFQ on the ethernet 0/1 interface of router R2. The output hold-queue size should be 128, length of 16 for congestive discard threshold, a maximum of 128 conversations and 4 queues for RSVP.

II. CONFIGURATION

Below steps are to be followed in order to initially configure IP address of router. Here Below are the configuration taken for configuring routers.

I. Setup WFQ

I.1 Enter to configuration mode

```
R1#conf t
```

I.2 Select interface to Configure WFQ

```
R1(config)#int ethernet0/1
```

I.3 Set interface 'up' - make active

```
R1(config-if)#no shut
```

I.4 set bandwidth to 64 kbps

```
R1(config-if)#bandwidth 64
```

I.5 Set fair queue

```
R1(config-if)#fair-queue 16 128 4
```

above command can be interpreted as:

```
fair-queue <congestive-discard-threshold> <number-dynamic-conversation-queue>
↪  <number-reservable-conversation-queue>
```

II. Set output hold-queue

```
R1(config-if)#hold-queue 128 out
```

R2

```
*Mar  1 00:00:04.923: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to down
*Mar  1 00:00:04.923: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/1, changed state to down
*Mar  1 00:00:04.927: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/2, changed state to down
*Mar  1 00:00:04.927: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/3, changed state to down
*Mar  1 00:00:04.931: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/0, changed state to down
*Mar  1 00:00:04.931: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/1, changed state to down
R2#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#int ethernet0/1
R2(config-if)#bandwidth?
bandwidth

R2(config-if)#bandwidth ?
  <1-10000000>  Bandwidth in kilobits
  inherit       Specify that bandwidth is inherited
  receive       Specify receive-side bandwidth

R2(config-if)#bandwidth 64
R2(config-if)#fair-queue ?
  <1-4096>  Congestive Discard Threshold
  <cr>

R2(config-if)#fair-queue 16 ?
  <16-4096>  Number Dynamic Conversation Queues
  <cr>

R2(config-if)#fair-queue 16 128 ?
  <0-1000>  Number Reservable Conversation Queues
  <cr>

R2(config-if)#fair-queue 16 128 4 ?
  <cr>

R2(config-if)#fair-queue 16 128 4
R2(config-if)#
R2(config-if)#hold-queue ?
  <0-4096>  Queue length

R2(config-if)#hold-queue 128 ?
  in   Input queue
  out  Output queue

R2(config-if)#hold-queue 128 out
R2(config-if)#
```

Figure 1: WFQ setup

III. Configure the hardware queue on router

```
R1(config-if)#tx-ring-limit 1
```

```
R2(config)#int ethernet0/1
R2(config-if)#tx-ring-limit ?
  <1-32767>  Number (ring limit)

R2(config-if)#tx-ring-limit 1
R2(config-if)#^Z
R2#
R2#
*Mar  1 00:07:57.431: %SYS-5-CONFIG_I: Configured from console by console
R2#show queuing ?
% Unrecognized command
R2#show queueing ?
  interface
  custom          custom queueing list configuration
  fair            fair queueing configuration
  priority        priority queueing list configuration
  random-detect   random early detection configuration
  |               Output modifiers
  <cr>
```

Figure 2: Configured the hardware queue on router

III.1 Write configuration

```
R1#wr
```

III.2 check status

```
R1#show queueing interface e0/1
```

```
R2#show queueing interface ethernet0/1
Interface Ethernet0/1 queueing strategy: fair
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: weighted fair
  Output queue: 0/128/16/0 (size/max total/threshold/drops)
     Conversations  0/0/128 (active/max active/max total)
     Reserved Conversations 0/0 (allocated/max allocated)
     Available Bandwidth 48 kilobits/sec
```

Figure 3: Configuration status
figure shows available bandwidth is 48 Kbps which is 75% of total 64Kbps

IV. Setup CBWFQ

Aim of this task is to st up class based WFQ on router with outbound Policy described below:

- HTTP traffic should get a bandwidth of 16Kbps and the queue should have a maximum of 12 packets.
- RTP traffic should get a bandwidth of 96Kbps and the queue should have a maximum of 32 packets.

IV.1 Step 1

- Enter configuration mode

```
R1#conf t
```

- Select interface to Configure CBWFQ

```
R1(config)#int ethernet0/0
```

- set bandwidth to 128 kbps

```
R1(config-if)#bandwidth 128
```

- creating the class map HTTP and policy map CBWFQ

```
R1(config)#class-map HTTP
R1(config-cmap)#match protocol http
R1(config-cmap)#exit
R1(config)#class-map RTP
R1(config-cmap)#match protocol RTP
R1(config-cmap)#exit
R1(config)#class-map TELNET
R1(config-cmap)#match protocol telnet
R1(config-cmap)#exit
R1(config)#policy-map CBWFQ
```

- Limit HTTP traffic to 16kbps

```
R1(config-pmap)#class HTTP
R1(config-pmap-c)#bandwidth 16
```

- Limit HTTP queue to have a maximum of 12 packets

```
R1(config-pmap)#class HTTP
R1(config-pmap-c)#bandwidth 16
```

R1

```
R1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#int ethernet0/0
R1(config-if)#no shut
R1(config-if)#
*Mar  1 00:11:01.907: %LINK-3-UPDOWN: Interface Ethernet0/0, changed state to up
*Mar  1 00:11:02.907: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/0, changed state to up
R1(config-if)#ip address 192.168.23.2 255.255.255.0
R1(config-if)#
R1(config-if)#
R1(config-if)#int ethernet0/1
R1(config-if)#no shut
R1(config-if)#ip ad
*Mar  1 00:12:15.903: %LINK-3-UPDOWN: Interface Ethernet0/1, changed state to up
*Mar  1 00:12:16.903: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1, changed state to up
R1(config-if)#ip address 192.168.12.2 255.255.2
% Incomplete command.

R1(config-if)#ip address 192.168.12.2 255.255.2.0
Bad mask 0xFFFF0200 for address 192.168.12.2
R1(config-if)#ip address 192.168.12.2 255.255.2
% Incomplete command.

R1(config-if)#ip address 192.168.12.2 255.255.255.0
R1(config-if)#exit
R1(config)#int ethernet0/0
R1(config-if)#bandwidth 128
R1(config-if)#
R1(config-if)#exit
R1(config)#class map HTTP
                ^
% Invalid input detected at '^' marker.

R1(config)#class-map HTTP
R1(config-cmap)#match protocol http
R1(config-cmap)#exit
R1(config)#class-map TELNET
R1(config-cmap)#match protocol telnet
R1(config-cmap)#exit
R1(config)#policy-map CBWFQ
R1(config-pmap)#class HTTP
R1(config-pmap-c)#bandwidth 16
R1(config-pmap-c)#conf t
```

Figure 4: Class and policy configuration

- Limit HTTP queue to have a maximum of 12 packets

```
R1(config-pmap)#class HTTP
R1(config-pmap-c)#queue-limit 12
```

- Configure RTP queue to have a maximum of 32 packets and bandwidth 96kbps

```
R1(config-pmap)#class HTTP
R1(config-pmap-c)#bandwidth 96
R1(config-pmap-c)#queue-limit 12
```

R1

```
R1(config-cmap)#exit
R1(config)#policy-map CBWFQ
R1(config-pmap)#class HTTP
R1(config-pmap-c)#bandwidth 16
R1(config-pmap-c)#conf t
                  ^
% Invalid input detected at '^' marker.

R1(config-pmap-c)#exit
R1(config-pmap)#exit
R1(config)#no class-map TELNET
R1(config)#class-map RTP
R1(config-cmap)#match protocol RTP
R1(config-cmap)#
R1(config-cmap)#exit
R1(config)#policy-map CBWFQ
R1(config-pmap)#class HTTP
R1(config-pmap-c)#bandwidth 16
R1(config-pmap-c)#?
QoS policy-map class configuration commands:
  bandwidth        Bandwidth
  compression      Activate Compression
  drop             Drop all packets
  exit             Exit from QoS class action configuration mode
  netflow-sampler  NetFlow action
  no               Negate or set default values of a command
  police           Police
  priority         Strict Scheduling Priority for this Class
  queue-limit      Queue Max Threshold for Tail Drop
  random-detect    Enable Random Early Detection as drop policy
  service-policy   Configure Flow Next
  set              Set QoS values
  shape            Traffic Shaping

R1(config-pmap-c)#queue-limit 12
R1(config-pmap-c)#exit
R1(config-pmap)#class RTP
R1(config-pmap-c)#bandwidth 96
R1(config-pmap-c)#queue-limit 32
R1(config-pmap-c)#
R1(config-pmap-c)#^Z
R1#
*Mar  1 00:21:19.839: %SYS-5-CONFIG_I: Configured from console by console
R1#show run
```

Figure 5: configuring bandwidth for traffic policies

```
!
!
!
!
ip tcp synwait-time 5
!
class-map match-all HTTP
 match protocol http
class-map match-all RTP
 match protocol rtp
!
!
policy-map CBWFQ
 class HTTP
  bandwidth 16
  queue-limit 12
 class RTP
  bandwidth 96
  queue-limit 32
!
!
```

Figure 6: Class maps of system

```
Service-policy output: CBWFQ

  Class-map: HTTP (match-all)
    0 packets, 0 bytes
    5 minute offered rate 0 bps, drop rate 0 bps
    Match: protocol http
    Queueing
      Output Queue: Conversation 41
      Bandwidth 16 (kbps)Max Threshold 12 (packets)
      (pkts matched/bytes matched) 0/0
      (depth/total drops/no-buffer drops) 0/0/0

  Class-map: RTP (match-all)
    0 packets, 0 bytes
    5 minute offered rate 0 bps, drop rate 0 bps
    Match: protocol rtp
    Queueing
      Output Queue: Conversation 42
      Bandwidth 96 (kbps)Max Threshold 32 (packets)
      (pkts matched/bytes matched) 0/0
      (depth/total drops/no-buffer drops) 0/0/0

  Class-map: class-default (match-any)
    13 packets, 1063 bytes
    5 minute offered rate 0 bps, drop rate 0 bps
    Match: any
R1#
R1#
R1#
```

Figure 7: Explaining CBWFQ

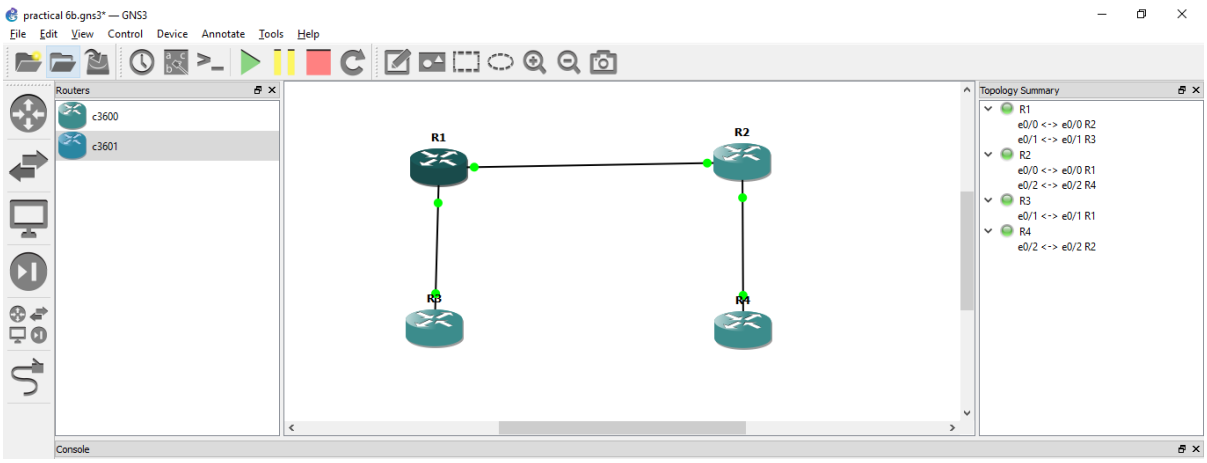

Figure 8: Final topology