



PE UNI QoS

This chapter includes the following major topics:

- [PE UNI QoS Configuration, page 5-2](#)
- [PE UNI QoS Configuration with PWHE Access, page 5-4](#)

Enterprise Virtual Networks consists of traffic types that include voice, video, Critical applications traffic, and end user web traffic. All these traffic require different priorities and treatments based upon their nature and how critical to the business they are. While traffic is sent and received between PE and CE, QoS implementation on ASR9000 PE uses DSCP field in the IP header to ensure that traffic is properly treated as per its priority defined by DSCP. Two-level H-QoS is configured on the PE for both ingress and egress policies. In nV access topologies, the ingress QoS function, configured on the host for Virtual satellite access port, is offloaded to satellite so that only committed traffic enters the nV network and Fabric link oversubscription can be avoided.

The mapping shown in [Table 5-1](#) is used for different traffic classes to DSCP.

Table 5-1 Mapping for Different Traffic Classes to DSCP

Traffic Class	PHB	DSCP
Enterprise Voice and Real-time	EF	46
Enterprise Video Distribution	AF	32
Enterprise Critical: In Contract	AF	16
Enterprise Critical: Out of Contract	AF	8
Enterprise Best Effort	BE	0

PE configuration for QoS includes configuring class-maps for respective traffic classes and mapping them to the appropriate DSCP. Two-level ingress QoS does policing of traffic in individual classes of child policy. Parent policy is configured with keyword "child-conform-aware" to prevent the parent policer from dropping any ingress traffic that conforms to the maximum rate specified in the child policer. While configuring egress policy map, real-time traffic class CMAP-RT-dscp is configured with highest priority 1 and is policed to ensure low latency expedited forwarding. Rest classes are assigned with respective required bandwidth. WRED is used as congestion avoidance mechanism for Exp 1 and 2 traffic in the Enterprise critical class CMAP-EC-EXP. Shaping is configured on the Parent egress policy to ensure overall traffic does not exceed the committed bit rate (CBR). The ingress and egress policy-maps are applied to the PE interface connecting to CE in respective directions.

PE UNI QoS Configuration

Step 1 Configure class-map for business-critical traffic.

```
class-map match-any CMAP-BC-dscp
```

Step 2 Match DSCP 8 and 16.

```
match dscp 8 16
```

Step 3 Configure class-map for video traffic.

```
class-map match-any CMAP-BC-video-dscp
```

Step 4 Match DSCP 32.

```
match dscp 32
```

Step 5 Configure class-map for real-time traffic.

```
class-map match-any CMAP-RT-dscp
```

Step 6 Match DSCP expedited forwarding.

```
match dscp ef
```

Step 7 Configure Child Egress policy-map.

```
policy-map PMAP-BUS-CE-Child-E
```

Step 8 Configure RT class-map under policy-map.

```
class CMAP-RT-dscp
```

Step 9 Configure priority level 1 for RT class.

```
priority level 1
```

Step 10 Police traffic in RT class.

```
police rate 200 mbps
!
```

Step 11 Configure business-critical class under policy.

```
class CMAP-BC-dscp
```

Step 12 Assign Bandwidth to the class.

```
bandwidth percent 5
```

Step 13 Configure Video class under policy.

```
class CMAP-BC-video-dscp
```

Step 14 Assign Bandwidth to the class.

```
bandwidth percent 10
```

Step 15 Configure class-default for rest of the traffic.

```
class class-default
end-policy-map
!
```

- Step 16** Configure parent egress policy-map.
`policy-map PMAP-BUS-CE-Parent-E`
- Step 17** Configure class-default for the policy-map.
`class class-default`
- Step 18** Configure child policy under class-default.
`service-policy PMAP-BUS-CE-Child-E`
- Step 19** Configure shaping to ensure egress traffic does not exceed CBR.
`shape average 500 mbps`
- Step 20** Configure bandwidth for the class.
`bandwidth 300 mbps`
`-policy-map`
- Step 21** Configure ingress child policy-map.
`policy-map PMAP-BUS-CE-Child-I`
- Step 22** Configures real-time class-map under policy-map.
`class CMAP-RT-dscp`
- Step 23** Configure priority level 1 for real-time class.
`priority level 1`
- Step 24** Police traffic in real-time class.
`police rate 50 mbps`
`!`
- Step 25** Configure video class-map under policy-map.
`class CMAP-BC-video-dscp`
- Step 26** Configure priority level 2 for video class.
`priority level 2`
- Step 27** Police traffic in video class.
`police rate 100 mbps`
`!`
- Step 28** Configure business-critical class-map under policy-map.
`class CMAP-BC-dscp`
- Step 29** Police traffic in business-critical class.
`police rate 100 mbps peak-rate 200 mbps`
`exceed-action transmit`
`violate-action drop`
`!`
- Step 30** Configures class-default class-map under policy-map.
`class class-default`
- Step 31** Police traffic in default class.

```

    police rate 50 mbps
    exceed-action transmit
  end-policy-map
!
!

```

Step 32 Configure parent egress policy-map.

```

    policy-map PMAP-BUS-CE-Parent-I

```

Step 33 Configure class-default for the policy-map.

```

    class class-default

```

Step 34 Child policy under class-default.

```

    service-policy PMAP-BUS-CE-Child-I

```

Step 35 Configure policing to ensure ingress traffic does not exceed CBR.

```

    police rate 500 mbps

```

Step 36 Configure child-conform-aware under class.

```

    child-conform-aware
  end-policy-map

```

In case of PWHE access, QoS is implemented on PE based on MPLS EXP bits as the received traffic is labeled.

PE UNI QoS Configuration with PWHE Access

Step 1 Configure business-critical class.

```

    class-map match-any CMAP-BC-EXP

```

Step 2 Match MPLS EXP of topmost label as 1,2.

```

    match mpls experimental topmost 1 2
  end-class-map

```

Step 3 Configure real-time class.

```

    class-map match-any CMAP-RT-EXP

```

Step 4 Match MPLS EXP of topmost label as 5.

```

    match mpls experimental topmost 5
  end-class-map

```

Step 5 Configures video class.

```

    class-map match-any CMAP-BUS-video-EXP

```

Step 6 Match MPLS EXP of topmost label as 3.

```

    match mpls experimental topmost 3
  end-class-map

```

Step 7 Configure ingress child policy-map.

- ```
policy-map PMAP-PWHE-NNI-C-I
```
- Step 8** Configure real-time class-map under policy-map.
- ```
class CMAP-RT-EXP
```
- Step 9** Configure priority level 1 for real-time class.
- ```
priority level 1
```
- Step 10** Police traffic in real-time class.
- ```
police rate 50 mbps
!
```
- Step 11** Configure video class-map under policy-map.
- ```
class CMAP-BUS-video-EXP
```
- Step 12** Configure priority level 2 for video class.
- ```
priority level 2
```
- Step 13** Police traffic in video class.
- ```
police rate 100 mbps
!
```
- Step 14** Configure business-critical class-map under policy-map.
- ```
class CMAP-BC-EXP
```
- Step 15** Configure priority level 1 for business-critical class.
- ```
police rate 100 mbps peak-rate 200 mbps
```
- Step 16** Police traffic in business-critical class.
- ```
exceed-action transmit
violate-action drop
```
- Step 17** Configure class-default class-map under policy-map.
- ```
class class-default
!
```
- Step 18** Police traffic in default class.
- ```
police rate 50 mbps
exceed-action transmit
end-policy-map
!
!
```
- Step 19** Configure parent egress policy-map.
- ```
policy-map PMAP-PWHE-NNI-P-I
```
- Step 20** Configure class-default for the policy-map.
- ```
class class-default
```
- Step 21** Configure child policy under class-default.
- ```
service-policy PMAP-PWHE-NNI-C-I
```
- Step 22** Configure policing to ensure ingress traffic does not exceed CBR.
- ```
police rate 500 mbps
```

Step 23 Configure child-conform-aware under class.

```
child-conform-aware
end-policy-map
```

Step 24 Configure child egress policy-map.

```
policy-map PMAP-PWHE-NNI-C-E
```

Step 25 Configure real-time class-map under policy-map.

```
class CMAP-RT-EXP
```

Step 26 Configure priority level 1 for real-time class.

```
priority level 1
```

Step 27 Police traffic in real-time class.

```
police rate 50 mbps
!
```

Step 28 Configure real-time class-map under policy-map.

```
class CMAP-BUS-video-EXP
```

Step 29 Configure priority level 2 for video class.

```
priority level 2
```

Step 30 Police traffic in video class.

```
police rate 100 mbps
```

Step 31 Configure WRED to congestion avoidance.

```
random-detect discard-class 3 80 ms 100 ms
!
```

Step 32 Configure business-critical class-map under policy-map.

```
class CMAP-BC-EXP
```

Step 33 Configure bandwidth for business-critical class.

```
bandwidth remaining percent 60
```

Step 34 Configure WRED to congestion avoidance for discard-class 2.

```
random-detect discard-class 2 60 ms 70 ms
```

Step 35 Configure WRED to congestion avoidance for discard-class 1.

```
random-detect discard-class 1 40 ms 50 ms
!
class class-default
end-policy-map
!
```

Step 36 Configure parent egress policy-map.

```
policy-map PMAP-PWHE-NNI-P-E
```

Step 37 Configure class-default for the policy-map.

```
class class-default
```

Step 38 Configure child policy under class-default.

```
service-policy PMAP-PWHE-NNI-C-E
```

Step 39 Configure shaping to ensure egress traffic does not exceed CBR.

```
shape average 500000000 bps
end-policy-map
```

Step 40 Service policies applied under PW-Ether interface.

```
interface PW-Ether100
service-policy input PMAP-PWHE-NNI-P-I
service-policy output PMAP-PWHE-NNI-P-E
vrf BUS-VPN2
```
