



Avaya Solution & Interoperability Test Lab

Sample Quality of Service Configuration for Extreme Networks Switches for Avaya IP Telephones – Issue 1.0

Abstract

These Application Notes describe the basic concepts used in configuring Extreme Networks switches to provide proper Quality of Service for Avaya IP Telephones.

1. Introduction

Extreme Networks switches provide Quality of Service (QoS) features such as ingress 802.1p and DiffServ Code Point examination and prioritization on a per port basis. These Application Notes illustrate how to configure these Extreme Networks features to optimize QoS for Avaya IP telephony.

1.1. Overview

Figure 1 shows the sample network used in these Application Notes. Although an Extreme Networks Summit X450 is shown in the sample network, concepts in these Application Notes can be applied to other Extreme Networks switches. The sample network shows an Avaya Voice over IP (VoIP) infrastructure consisting of an Avaya S8710 Server, Avaya G650 Media Gateway, and Avaya IP Telephones. The Avaya S8710 Server and Avaya G650 Media Gateway are in a different routed network than the Avaya IP Telephones. The Extreme Networks switch is configured with a voice VLAN and a data VLAN to separate voice and data traffic. All Avaya IP Telephones are set to use the voice VLAN and have 802.1Q tagging enabled. Workstations are connected onto the network through Avaya IP Telephones and are assigned to the data VLAN.

The Extreme Networks switch manages 2 types of traffic flows in order to provide proper QoS for voice traffic. The first traffic flow is VoIP traffic going upstream, denoted by the number “1” arrow, traveling through the switch to the router. This single link must accommodate all network traffic from both data and voice VLANs that is destined to another IP network. Because Avaya IP Telephones are enabled for 802.1Q tagging, all VoIP traffic from Avaya IP Telephone will have the proper 802.1p layer-2 priority bits set. By enabling 802.1p examination on the switch port and by properly configuring priority queues, voice traffic can be prioritized above data traffic when exiting the switch. The second traffic flow is VoIP traffic going downstream to Avaya IP Telephones, denoted by the number “2” arrow, through the switch to Avaya IP Telephones. This single link accommodates all network traffic for both data and voice VLANs that is destined to the Avaya IP Telephone and the attached workstation. Without properly managing this downstream traffic from the switch, VoIP traffic may suffer delays during heavy data download of data to the workstation. Assuming ingress 802.1p examination is enabled and properly configured as mentioned above, local switch traffic will be prioritized properly. The concern is with VoIP traffic coming in from the router to the switch. Since the original 802.1p bits for VoIP traffic are not carried through the network, DiffServ Code Point (DSCP) examination must be enabled on the switch port connecting to the router. By enabling DSCP examination on the ingress switch port and by properly configuring priority queues, VoIP traffic from the router will be prioritized as it is exiting the switch to the Avaya IP Telephone.

There are other areas that may affect the QoS of VoIP traffic (e.g. router load, queuing priority of the router, network congestion in other parts of the IP networks, etc.) that are beyond the scope of these notes.

2. Configuration

Figure 1 illustrates the sample configuration used in these Application Notes. All Avaya IP Telephones are registered with the Avaya S8710 Server shown and are assigned to **ip-network-region 1**. Routing for the data and voice VLANs is performed by the router.

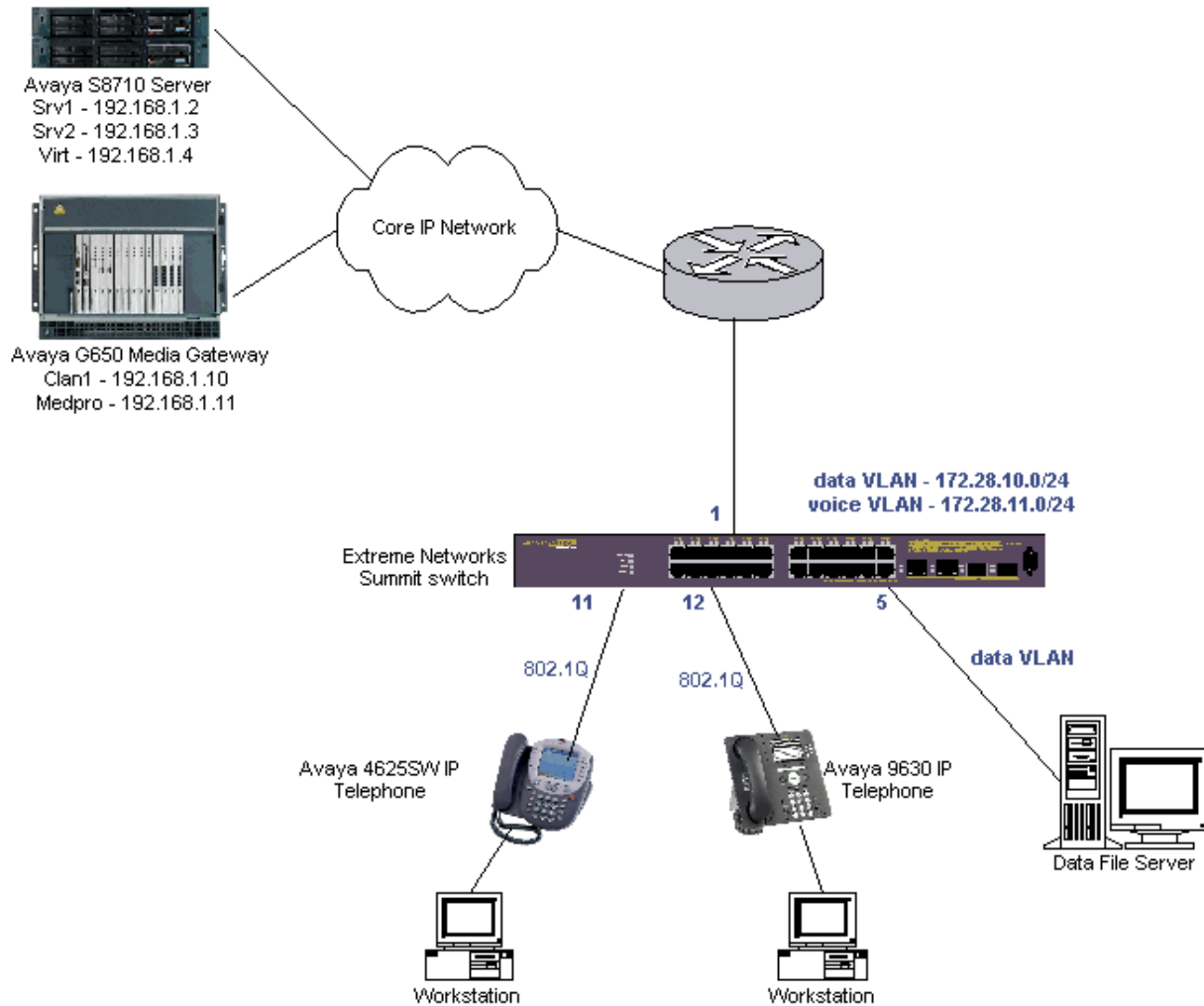


Figure 1: Sample Network Configuration

3. Equipment and Software Validated

The following equipment and software/firmware were used for the sample configuration:

DEVICE DESCRIPTION	VERSION TESTED
Avaya S8710 Server with Avaya G650 Media Gateway	Avaya Communication Manager R4.0.1 (R014x.00.1.731.2)
Avaya 9630 IP Telephone	R1.5 (H.323)
Avaya 4625SW IP Telephone	R.2.8.3 (H.323)
Extreme Networks Summit X450	XOS 12.0.1.11

4. Configure Extreme Networks switch

This section describes the configuration for Extreme Networks Summit switch as shown in **Figure 1**. Comments are enclosed between the “#” signs.

1. Connect to the Extreme Networks switch and log in using appropriate User name and Password.
2. Create the voice and data VLANs, assign names and ID's to the VLANs, and assign ports to VLANs as appropriate.

```
#
#---- Create and configure the "voice" and "data" VLANs-----#
#
Summit # create vlan voice
Summit # configure vlan voice tag 10
Summit # configure vlan voice add port 1,11-12 tagged
Summit # create vlan data
Summit # configure vlan data tag 11
Summit # configure vlan data add port 1 tagged
Summit # configure vlan data add port 5,11-12 untagged
```

3. Configure the priority queues in the switch. Depending on the model of the Extreme Networks switch being used, there are differences as to the number of default priority queues available. Two default priority queues, QP1 and QP8, are available for the Summit X450, X250, and X150 series switches. By default, most traffic types are assigned to QP1 (the lowest priority queue). The “show qosprofile” command can be used on the Extreme Networks Summit series switches to verify the number of priority queues configured in the switch. Instead of using the default priority queue QP8 which is normally reserved for network control traffic, create a new priority queue. The sample configuration create priority queue QP7.

Note: Other Extreme Networks switches such as the BlackDiamond 10808 and 12804 have 8 priority queues by default. This step can be omitted for these models of switches. The “show qosprofile port <port_list>” command can be used to verify the number of available priority queues in these other models of switches.

```
#
#----- Create new priority queue "QP7" -----#
#
Summit # create qosprofile qp7
#
#----- priority queues in the switch -----#
#
Summit # show qosprofile
      QP1      Weight = 1  Max Buffer Percent = 100
      QP7      Weight = 1  Max Buffer Percent = 100
      QP8      Weight = 1  Max Buffer Percent = 100
```

4. Assign DSCP and 802.1p values to the newly created QP7. According to the “**display ip-network-region**” form in Avaya Communication Manager as shown in **Section 5**, Avaya VoIP traffic uses **DIFFSERV/TOS PARAMETERS** of **46** and **802.1P/Q PARAMETERS** of **6** so those values are used here.

```
#
#----- Assign DSCP value 46 to QP7 -----#
#
Summit # configure diffserv examination code-point 46 qp7
#
#----- Assign 802.1p value 6 to QP7 -----#
#
Summit # config dot1p type 6 qp7
```

5. Configure the proper ingress port examination. 802.1p examination should be enabled for ports 5, 11, and 12. 802.1p examination is enabled by default for all ports so it does not need to be explicitly enabled. Enable DiffServ examination on port 1 of the switch. Use the “**show port <port#> info detail**” command to verify switch port settings.

Note: For the Extreme Networks Summit series switches, 802.1p (“dot1p”) examination must be disabled if DiffServ examination is used.

```
#
#----- Enable DiffServ examination on port 1 -----#
#----- Disable dot1p examination on port 1 -----#
#
Summit # enable diffserv examination port 1
Summit # disable dot1p examination port 1
#
#----- Verify port 1 ingress examination -----#
#
Summit # show port 1 info detail
Port: 1
  Virtual-router: VR-Default
  Type: UTP
  Random Early drop: Unsupported
  Admin state: Enabled with auto-speed sensing auto-duplex
  Link State: Ready
  Link Counter: Up 0 time(s)

  VLAN cfg:

  STP cfg:

  Protocol:
  Trunking: Load sharing is not enabled.
  EDP: Enabled
  ELSM: Disabled
  Learning: Enabled
  Unicast Flooding: Enabled
  Multicast Flooding: Enabled
  Broadcast Flooding: Enabled
  Jumbo: Disabled
  Link up/down SNMP trap filter setting: Enabled
  Egress Port Rate: No-limit
  Broadcast Rate: No-limit
  Multicast Rate: No-limit
  Unknown Dest Mac Rate: No-limit
  QoS Profile: None configured
  Ingress Rate Shaping : Unsupported
Ingress IPTOS Examination: Enabled
Ingress 802.1p Examination: Disabled
  Ingress 802.1p Inner Exam: Disabled
  Egress IPTOS Replacement: Disabled
  Egress 802.1p Replacement: Disabled
  NetLogin: Disabled
  NetLogin port mode: Port based VLANs
  Smart redundancy: Enabled
```

Software redundant port:	Disabled
auto-polarity:	Enabled

5. Configure Avaya Communication Manager

This section shows the steps needed to configure Avaya Communication Manager. For detailed information on the installation, maintenance, and configuration of Avaya Communication Manager, please consult references [1], [2], [3] and [4].

Use the **display ip-network-region** form to display and confirm the **Call Control PHB Value** and **Audio PHB Value** used for **DIFFSERV/TOS PARAMETERS** and **Call Control 802.1p Priority** and **Audio 802.1p Priority** used for **802.1P/Q PARAMETERS**.

```

display ip-network-region 1                                     Page 1 of 19
IP NETWORK REGION
Region: 1
Location: Authoritative Domain:
Name:
MEDIA PARAMETERS
  Codec Set: 1
  UDP Port Min: 2048
  UDP Port Max: 3329
  Intra-region IP-IP Direct Audio: yes
  Inter-region IP-IP Direct Audio: yes
  IP Audio Hairpinning? n
DIFFSERV/TOS PARAMETERS
  Call Control PHB Value: 46
  Audio PHB Value: 46
  Video PHB Value: 26
  RTCP Reporting Enabled? y
  RTCP MONITOR SERVER PARAMETERS
  Use Default Server Parameters? y
802.1P/Q PARAMETERS
  Call Control 802.1p Priority: 6
  Audio 802.1p Priority: 6
  Video 802.1p Priority: 5
  AUDIO RESOURCE RESERVATION PARAMETERS
  RSVP Enabled? n
H.323 IP ENDPOINTS
  H.323 Link Bounce Recovery? y
  Idle Traffic Interval (sec): 20
  Keep-Alive Interval (sec): 5
  Keep-Alive Count: 5

```

6. Verification Steps

The following steps may be used to verify the test configuration for the Extreme Networks switch:

1. The “**show port <port#> qosmonitor**” command can be used to verify that VoIP traffic is being assigned to the proper priority queue. For the sample network, VoIP traffic is assigned to QP7 and non-tagged data traffic is assigned to QP1.

```

Summit # show port 1 qosmonitor
Qos Monitor Req Summary                                     Wed Oct 17 01:59:20 2007
Port      QP1      QP2      QP3      QP4      QP5      QP6      QP7      QP8
          Pkt      Pkt      Pkt      Pkt      Pkt      Pkt      Pkt      Pkt
          Xmts      Xmts      Xmts      Xmts      Xmts      Xmts      Xmts      Xmts
=====
1         1022650  0         0         0         0         0         669694  57

```

- The “**show diffserv examination**” command can be used to verify the DiffServ Code Point (DSCP) value is being assigned to the appropriate priority queue.

```
#
#----- Verify DSCP mapping to QP7 -----#
#
Summit # show diffserv examination
CodePoint->QOSProfile mapping:
    00->QP1 01->QP1 02->QP1 03->QP1 04->QP1 05->QP1 06->QP1 07->QP1
    08->QP1 09->QP1 10->QP1 11->QP1 12->QP1 13->QP1 14->QP1 15->QP1
    16->QP1 17->QP1 18->QP1 19->QP1 20->QP1 21->QP1 22->QP1 23->QP1
    24->QP1 25->QP1 26->QP1 27->QP1 28->QP1 29->QP1 30->QP1 31->QP1
    32->QP1 33->QP1 34->QP1 35->QP1 36->QP1 37->QP1 38->QP1 39->QP1
    40->QP1 41->QP1 42->QP1 43->QP1 44->QP1 45->QP1 46->QP7 47->QP1
    48->QP1 49->QP1 50->QP1 51->QP1 52->QP1 53->QP1 54->QP1 55->QP1
    56->QP8 57->QP8 58->QP8 59->QP8 60->QP8 61->QP8 62->QP8 63->QP8
```

- The “**show dot1p**” command can be used to verify the 802.1p value is being assigned to the appropriate priority queue.

```
#
#----- Verify 802.1p mapping to QP7 -----#
#
Summit # show dot1p
    802.1p Priority Value      QOS Profile
          0                QP1
          1                QP1
          2                QP1
          3                QP1
          4                QP1
          5                QP1
          6                QP7
          7                QP8
```

7. Conclusion

These Application Notes have described the administration steps required to configure an Extreme Networks switch to properly prioritize Avaya VoIP traffic in a converged voice, data network.

8. Additional References

Product documentation for Avaya products may be found at <http://support.avaya.com>

- [1] *Administrator Guide for Avaya Communication Manager*, Doc # 03-300509, Issue 3.1, February 2007
- [2] *Avaya Communication Manager Advanced Administration Quick Reference*, Doc # 03-300364, Issue 3, February 2007
- [3] *Administration for Network Connectivity for Avaya Communication Manager*, Doc # 555-233-504, Issue 12, February 2007
- [4] *Avaya IP Telephony Implementation Guide*, May 1, 2006
- [5] *Configuring Link Layer Discovery Protocol (LLDP) and 802.1X Protocol on Extreme Networks BlackDiamond 8810 for an Avaya IP Telephone with an Attached PC*, Issue 1.1, Dec 18, 2006

Product documentation for Extreme Networks products may be found at <http://www.extremenetworks.com>

- [1] *ExtremeXOS Concepts Guide, Software Version 12.0*, Part number 100262-00 Rev. 02, July 2007
- [2] *ExtremeXOS Command Reference Guide, Software Version 12.0*, Part number 100261-00 Rev. 02, 2007, July 2007

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