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Avaya Solution & Interoperability Test Lab

Configuring the Avaya 9620C, 9620L, and 9650C IP Telephones for Power Over Ethernet and QoS with Avaya Communication Manager, Extreme Networks Summit X250e-48p Switch and Extreme Networks X450e-24p Switch – Issue 1.0

Abstract

These Application Notes describe the configuration of the new Avaya 9620C, 9620L, and 9650C IP Telephones registered to Avaya Communication Manager with Extreme Networks Summit X250e-48p Switch and Extreme Networks X450e-24p Switch. The configuration includes Power over Ethernet (PoE) and Quality of Service (QoS).

1. Introduction

The Avaya one-X Deskphone Edition 9620L IP Telephone is based on the Avaya one-X Deskphone Edition 9620 IP Telephone, but does not have support for USB or Add-On Devices. As a result it consumes less power and has a Class 1 signature. The Avaya one-X Deskphone Edition 9620C IP Telephone is also based on the Avaya one-X Deskphone Edition 9620, but adds a color display, and has a Class 2 signature. The Avaya one-X Deskphone Edition 9650C IP Telephone is based on the Avaya one-X Deskphone Edition 9650 IP Telephone and has a color display. These new IP Telephones are supported with the R3.0 firmware release.

Power over Ethernet (PoE) allows both power and data to be simultaneously carried over standard Ethernet cables. PoE-enabled Ethernet switches can supply power directly to Ethernet devices, thereby simplifying installation and removing the need for separate power supplies for those devices. The IEEE 802.3af standard defines the mechanisms for Power Sourcing Equipment (PSE), such as PoE-enabled Ethernet switches, to detect, classify, and supply power to Powered Devices (PDs), such as PoE-enabled IP telephones. The Extreme Networks Summit X250e-48p switch provides 48 ports with PoE. The Extreme Networks Summit X450e-24p switch provides 24 ports with PoE.

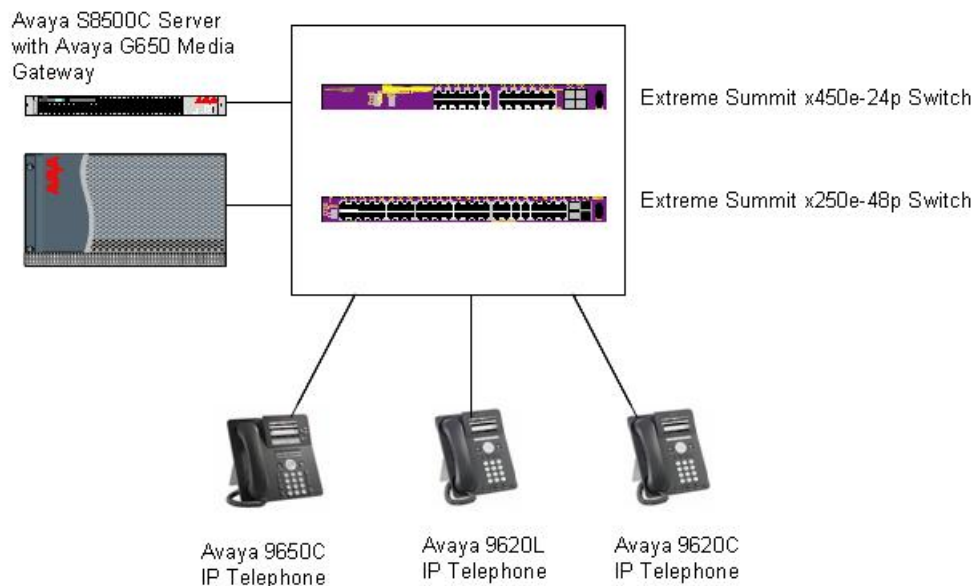**Figure 1** shows the configuration used for PoE.

Figure 1: PoE Configuration

Quality of Service allows for the prioritization of voice traffic over data traffic, by tagging voice packets with priority tags that allow switches to differentiate the traffic and deliver it in a more expeditious manner. Two common methods are Diffserv (Layer 3), and 802.1p (Layer 2). Avaya IP Telephones and Extreme switches support both, and a sample configuration is covered in these application notes.

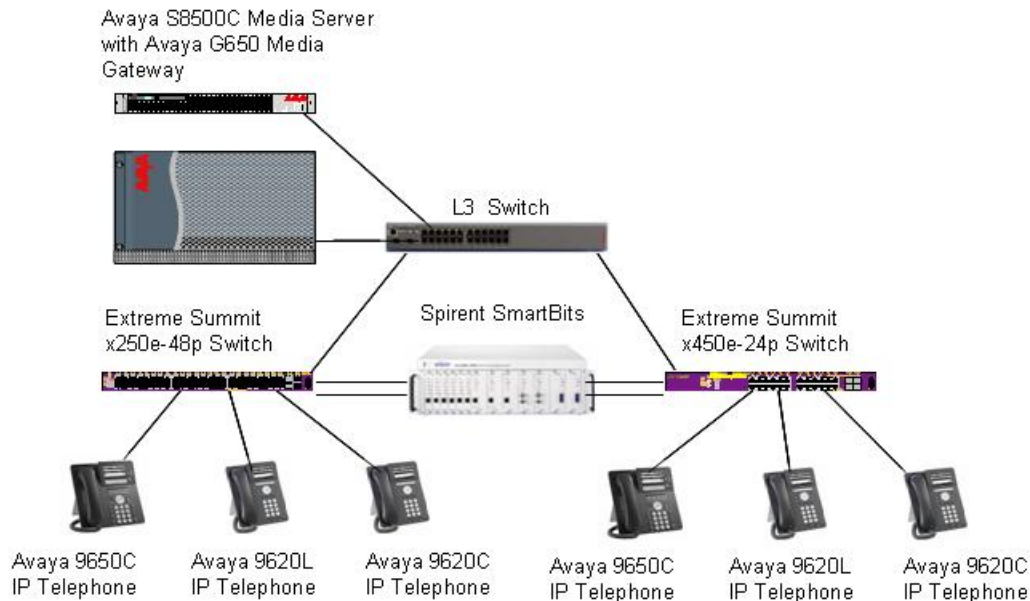**Figure 2** shows the configuration used for QoS**.**

Figure 2: QoS Network Configuration

2. Equipment and Software Validated

The following equipment and software were used for the configuration provided:

Equipment	Version
Avaya S8500 Server with Avaya G650 Media Gateway	Avaya Communication Manager R5.1 (R015x.01.0.414.3)
Avaya one-X Deskphone Edition 9620L IP Telephone	3.0 (ha96xxua3_00r12ASt.bin)
Avaya one-X Deskphone Edition 9620C IP Telephone	3.0 (ha96xxua3_00r12ASt.bin)
Avaya one-X Deskphone Edition 9650C IP Telephone	3.0 (ha96xxua3_00r12ASt.bin)
Extreme Networks Summit X450e-24p	Extreme XOS v12.0.3.16
Extreme Networks Summit X250e-48p	Extreme XOS v12.0.1.11

3. Configuration of the Avaya Endpoints

There is no configuration requirement on the Avaya endpoints to use PoE. For details on configuring Avaya Communication Manager Servers, Gateways, or Endpoints, consult the Administrator Guide for Avaya Communication Manager [1].

JPA; Reviewed:
SPOC 2/20/2009
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Avaya IP Telephones receive QoS tagging information from Avaya Communication Manager. The appropriate QoS values are configured in the network region form. When an IP telephone registers with Avaya Communication Manager, it is assigned to a network region based on the CLAN that it registers with, or based on its IP Address if specified in a network map form.

The network region map form below shows that endpoints with IP Addresses in the range 172.128.200.200 → 172.128.200.254 will be associated with network region 1.

```
change ip-network-map                                       Page   1 of  32
                        IP ADDRESS MAPPING

                                                          Emergency
                                      Subnet              Location
 From IP Address  (To IP Address    or Mask)  Region    VLAN   Extension
 172.128.200.200  172.128.200.254             1         n
```

The network region 1 form below shows the L3 Diffserv and L2 802.1p fields used to assign the QoS priorities to the IP Telephones. In the example below, IP telephones registered in network region 1 will be told to use 46 as the Diffserv L3 tag for both Call Control packets and voice packets, and 6 as the L2 802.1p tag for both Call Control packets and voice packets.

```
change ip-network-region 1                                 Page   1 of  19
                            IP NETWORK REGION
  Region: 1
Location:          Authoritative Domain: interop.com
    Name:
MEDIA PARAMETERS                       Intra-region IP-IP Direct Audio: yes
      Codec Set: 1                     Inter-region IP-IP Direct Audio: yes
   UDP Port Min: 2048                            IP Audio Hairpinning? n
   UDP Port Max: 3329
DIFFSERV/TOS PARAMETERS                        RTCP Reporting Enabled? y
 Call Control PHB Value: 46       RTCP MONITOR SERVER PARAMETERS
        Audio PHB Value: 46        Use Default Server Parameters? y
        Video PHB Value: 0
802.1P/Q PARAMETERS
 Call Control 802.1p Priority: 6
        Audio 802.1p Priority: 6
        Video 802.1p Priority: 0     AUDIO RESOURCE RESERVATION PARAMETERS
H.323 IP ENDPOINTS                                     RSVP Enabled? n
  H.323 Link Bounce Recovery? y
 Idle Traffic Interval (sec): 20
   Keep-Alive Interval (sec): 5
           Keep-Alive Count: 5
```

4. Configuration of the Extreme Network Switches

The Extreme Networks Summit X250e-48p and Extreme Networks Summit X450e-24p use Extreme XOS, and therefore the commands listed here apply to both switches.

PoE is enabled by default in the Extreme Networks Summit switches. If the configuration has changed, PoE can be enabled on a port by using the command "enable inline-power". The example below enables PoE on port 4.

```
X450e-24p # enable inline-power port 4
```

The command "disable inline-power" can be used to disable PoE on a port when a device attached to it does not use PoE. The example below disables PoE on port 4.

```
X450e-24p # disable inline-power port 4
```

It is recommended that QoS be always enabled on ports supporting Avaya IP Telephones. Extreme Networks switches support both Diffserv and 802.1p analysis on a port but not at the same time, therefore it is recommended to use one method or the other. Diffserv is enabled by default.

If the Avaya Communication Manager Network Region form will be used to send QoS data to the IP Telephones, the use of Diffserv is recommended with the current releases of Avaya Communication Manager and Avaya IP Telephones. The commands below show how L3 Diffserv examination is configured. Similar commands exist for L2 802.1p (dot1p keyword in the CLI), but they are not shown here.

The "enable diffserv examination" command can be used to enable Diffserv analysis on a port. The example below enables Diffserv analysis on ports 1-12.

```
X450e-24p # enable diffserv examination ports 1-12
```

The "disable diffserv examination" command can be used to disable Diffserv analysis on a port. The example below disables Diffserv analysis on ports 1-12.

```
X450e-24p # disable diffserv examination ports 1-12
```

A QoS profile needs to be created and the QoS values used by the IP Telephones need to be assigned to the QoS profile. The command "create qosprofile " creates a QoS profile, and the command "configure diffserv examination" assigns Diffserv values to a profile.

```
X450e-24p # create qosprofile qp6
X450e-24p # configure diffserv examination code-point 46 qosprofile qp6
```

5. Observations

The following table shows power classification and measured power reported by Extreme Networks Summit X450e-24p and Extreme Networks Summit X250e-48p switches. IP Telephones were connected directly to the switch. Cables of different lengths were used. Cable length and impedance affects power usage, so the measurements listed here may vary based on the cable used. The power measurements reported here are only for reference purposes. The measurements were very close for both switches.

Avaya Powered Device	802.3af Class	Measured Power While Idle (W)
Avaya one-X Deskphone Edition 9620L IP Telephone	1	2.2
Avaya one-X Deskphone Edition 9620C IP Telephone	2	4.1
Avaya one-X Deskphone Edition 9650C IP Telephone	2	4.1

With the release used for this testing it is recommended that Diffserv be used, instead of 802.1p, for QoS when using the IP Network-Region form to set the values on the IP Telephones.

6. Verification Steps

When the IP Telephones are properly powered, the IP Telephones should register and receive dial tone when they are off-hook. If the IP Telephones are not receiving power, check the cable used and check the port configuration to ensure PoE was enabled on the port.

The "show inline-power config" command can be used to see if PoE is enabled on a port. The example below shows PoE is enabled on port 4.

```
X450e-24p # show inline-power config port 4

Port    Config     Operator Limit    Priority    Label
4       Enabled      15400 mW         0
```

The "show inline-power info" command can be used to see the amount power being delivered and the Class. The example below shows this information for port 4.

```
X450e-24p # show inline-power info port 4

Port   State            Class      Volts   Curr     Power      Fault
                                           (mA)    (Watts)
4      delivering       class2     50.5    81       4.100      None
```

To verify QoS is working, place calls while there is a background load that exceeds the available bandwidth between the switches, and verify the call can complete and that voice quality is good.

The "show port x qosmonitor" command can be used to verify the traffic is entering the appropriate QoS queue. The example below shows call traffic on port 4 entering QP6, as expected.

```
X450e-24p # show port 4 qosmonitor

Qos Monitor Req Summary                            Mon Dec 15 12:39:11 2008
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
==========================================================================
4       5         0         0         0         0         4592      0         2
```

7. Conclusion

These Application Notes described the configuration of the Avaya IP Telephones with Extreme Network switches. The Extreme Networks switches were able to provide PoE and QoS for the Avaya IP Telephones to work properly.

8. Additional References

The Avaya product documentation is available at http://support.avaya.com.
The Extreme Networks documentation is available at http://www.extremenetworks.com.

[1] Administrator Guide for Avaya Communication Manager, Issue 4.0, Release 5.0, January 2008, Document Number: 03-300509.