



Avaya Solution & Interoperability Test Lab

Application Notes for Configuring Extreme Networks BlackDiamond 8810 to Support Avaya Communication Manager – Issue 1.0

Abstract

These Application Notes present a sample configuration for running Avaya Communication Manager in a network comprised of an Extreme Networks BlackDiamond 8810 switch and Avaya C364T-PWR Converged Stackable switch. The Avaya Media Server and Media Gateway used in the compliance-tested configuration were the Avaya S8300 Media Server and Avaya G350 Media Gateway. During compliance testing, phone calls were successfully completed with good voice quality over the Extreme Networks Layer 2 infrastructure under various network conditions, including the presence of competing low priority data traffic. Information in these Application Notes has been obtained through Developer*Connection* compliance testing and additional technical discussions. Testing was conducted via the Developer*Connection* Program at the Avaya Solution and Interoperability Test Lab.

1. Introduction

These Application Notes present a sample configuration for running Avaya Communication Manager in a network comprised of an Extreme Networks BlackDiamond 8810 switch and an Avaya C364T-PWR Converged Stackable switch. The Avaya Media Server and Media Gateway used in the compliance-tested configuration were the Avaya S8300 Media Server and Avaya G350 Media Gateway. During compliance testing, phone calls were successfully completed over the Extreme Networks Layer 2 infrastructure under various network conditions, including the presence of competing low priority data traffic. The blades on the BlackDiamond 8810 consisted of the G48Te, G48Pe, G48P and the G48Xa. Tests were repeated with the Avaya Communication Manager, Avaya IP Telephones and Avaya C364T-PWR connected to the different blades.

Figure 1 illustrates a sample configuration used in these Application Notes. Avaya Communication Manager and Avaya G350 Media Gateway are directly connected into the BlackDiamond 8810 on the G48Te blade. All Avaya IP Telephones are registered with Avaya Communication Manager. The BlackDiamond 8810 switch is connected to the C364T-PWR via an 802.1Q trunk. Two separate VLANs are configured. VLAN vlan50 is configured to support voice traffic on Avaya Communication Manager, the Avaya G350 Media Gateway and Avaya IP telephones. VLAN vlan20 is configured to support data traffic.

Although an Avaya IP Telephone is shown directly attached to the BlackDiamond 8810 switch, a passive power supply must be used when connecting to the G48Te and G48Xa as they do not support Power over Ethernet.

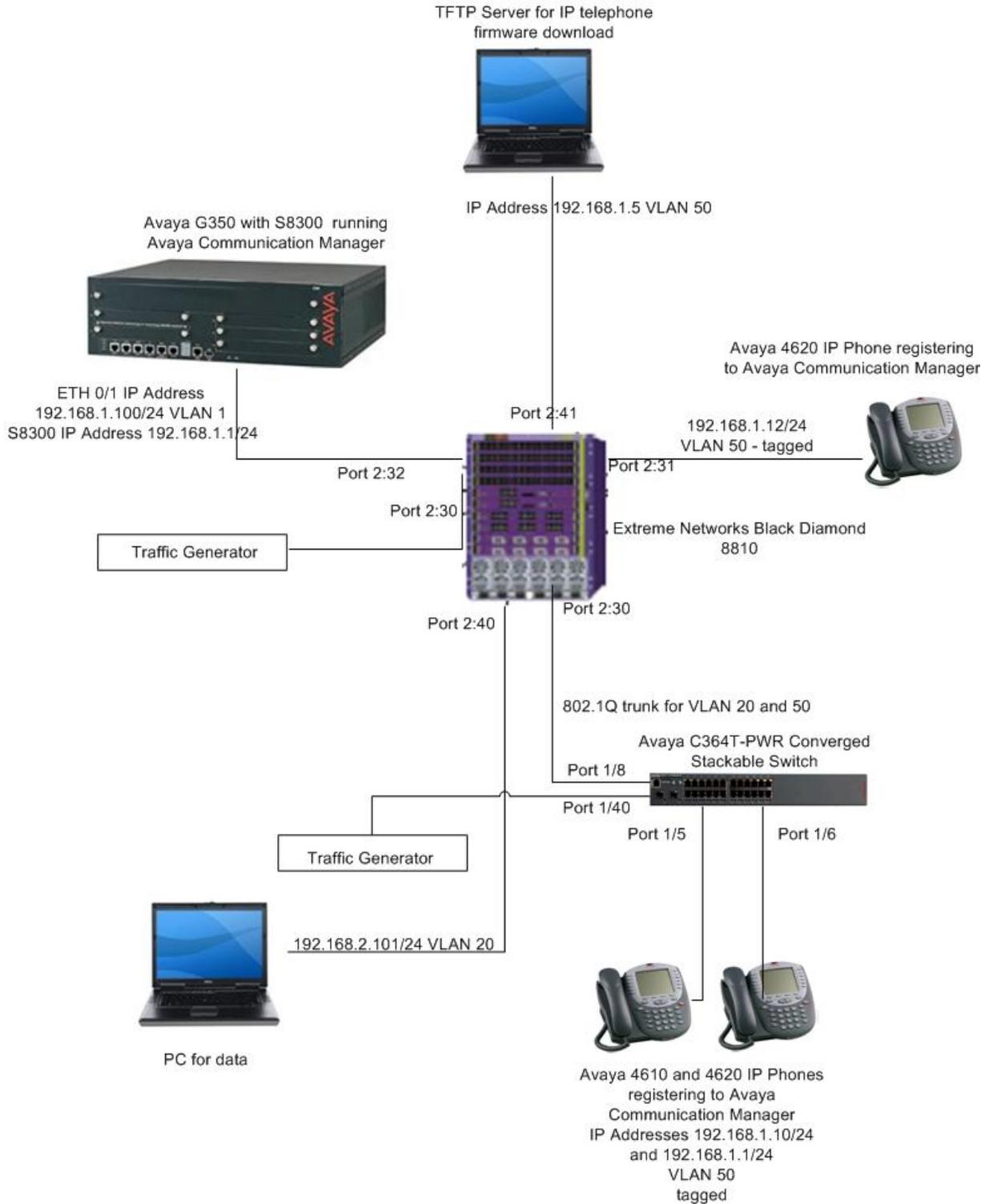


Figure 1 – Sample Test Configuration

2. Equipment and Software Validated

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

Equipment	Version
Avaya S8300 Media Server Avaya G350 Media Gateway	Avaya Communication Manager 3.1.2/R013x.01.2.632.1 GW: 25.29
Avaya 4610 IP Telephone (H.323)	2.4
Avaya 4620 IP Telephone (H.323)	2.5
Avaya C364T-PWR Converged Stackable Switch	4.5.14
Extreme BlackDiamond 8810 Switch G48Te Blade G48Pe Blade G48P Blade G48Xa Blade	Rev 2 Boot 1.0.1.10/IMG 11.5.2.8 Boot 1.0.1.10/IMG 11.5.2.8 Boot 1.0.1.10/IMG 11.5.2.8 Boot 1.0.1.10/IMG 11.5.2.8

Table 1: Equipment and Software Validated

3. Configure Avaya Communication Manager

The screens in this section are from the System Access Terminal (SAT). Log in with the appropriate credentials.

3.1. S8300 Configuration

Each Avaya VoIP component is assigned to an IP network region. An IP network region includes QoS parameters, as well as the codecs used within the region. G.711 is typically used to optimize voice quality for calls on high bandwidth paths. All Avaya VoIP components were assigned to a single IP network region. However, both G.711 and G.729 codecs were employed and verified during compliance testing.

1. Configure QoS parameters for the network region. Using the SAT, enter the **change ip-network-region M** (where M is a number from 1 to 250) command to configure an IP network region. Set the **Call Control 802.1p Priority** and **Audio 802.1p Priority** fields as needed. For this testing the call control and voice traffic priorities were set to the highest priority value.

```
change ip-network-region 1                               Page 1 of 19
                                     IP NETWORK REGION
Region: 1
Location:          Authoritative Domain:
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? y
UDP Port Max: 3327
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: 26
802.1P/Q PARAMETERS
Call Control 802.1p Priority: 6
Audio 802.1p Priority: 6
Video 802.1p Priority: 5                               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
```

2. Configure the codecs as needed. Using the SAT, enter the **change ip-codec-set N** (where N is the Codec Set number from Step 1) command to enter the supported audio codecs for calls. For example, G.711 MU is used to provide the best voice quality. The G.711MU parameters were left at their default values.

```
change ip-codec-set 1
Page 1 of 2

IP Codec Set

Codec Set: 1

Audio          Silence      Frames      Packet
Codec          Suppression  Per Pkt     Size(ms)
1: G.711MU      n          2         20
2:
3:
4:
```

3. Save the configuration. Using the SAT, enter the **save trans** command.

This system is restricted to authorized users for legitimate business purposes. Unauthorized access is a criminal violation of the law.
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Command: **save trans**
ESC-x=Cancel Esc-e=Submit Esc-p=Prev Pg Esc-n=Next Pg Esc-h=Help Esc r=Refresh

3.2. Avaya G350 Configuration

The Avaya G350 can be configured with the CLI interface. The following shows the configuration. Note that the connection from the Avaya G350 to the Extreme Networks BlackDiamond 8810 was an untagged port and not an 802.1Q trunk

The IP Address of Vlan 1 was configured as 192.168.1.100 and the Media Serve that the Avaya G350 registers to has an IP Address of 192.168.1.1.

```
G350-001<super># show run
! version 25.29.0
!
ds-mode t1
!
interface Vlan 1
  icc-vlan
  ip address 192.168.1.100 255.255.255.0
  pmi
  exit
!
interface FastEthernet 10/2
  exit
!
interface Console
  exit
!
interface USB-Modem
  shutdown
  exit
!
set mgc list 192.168.1.1
set mediaserver 192.168.1.1 192.168.1.1 23 telnet
set mediaserver 192.168.1.1 192.168.1.1 5023 sat
rtp-stat qos-trap
no rtp-stat fault
ip license-server
!#
!# End of configuration file. Press Enter to continue.
```

4. Extreme Networks BlackDiamond 8810 Configuration

The following steps describe how to configure the VLANs, tag the appropriate ports and configure QoS on the BlackDiamond 8810 Switch.

1. Connect to the BlackDiamond 8810. Log in using the appropriate login ID and password.

```
login:  
password:  
BD-8810.01 #
```

2. Create the VLAN for voice traffic. Ensure that the tag is set correctly.

```
BD-8810.2 # create vlan vlan50  
* BD-8810.3 # configure vlan50 tag 50
```

3. Assign ports to the VLAN. Add the Avaya Communication Manager port as untagged and all IP telephone ports as tagged. If the “tag” parameter is not present after the port number, the port gets added as untagged.

```
* BD 8810.6 # configure vlan50 add port 2:32  
* BD 8810.7 # configure vlan50 add port 2:31 tag
```

4. Assign the trunk that goes to the Avaya C364T-PWR switch for the 802.1Q trunk. Configuring a port as tagged indicates that it is an 802.1Q trunk.

```
*BD 8810.8 # configure vlan50 add port 2:30 tag
```

5. Create the data VLAN.

```
*BD 8810.9 # create vlan vlan20  
*BD 8810.10 # configure vlan20 tag 20
```

6. Assign PC ports to the data VLAN.

```
*BD 8810.11 # configure vlan20 add port 2:40
```

7. Assign the 802.1Q trunk port to the data VLAN as untagged.

```
*BD 8810.12 # configure vlan20 add port 2:30
```

8. Create a QoS profile. Configure the QoS profile that will be assigned to voice VLAN. Set the **weight** value to the same as the **Call Control 802.1p Priority:** that was configured in Step 1 of Section 3.1.

```
*BD 8810.13 # create qosprofile "QP4"  
* BD 8810.14# configure qosprofile QP4 weight 6
```

- 9 Assign the QoS profile to the voice VLAN.

```
* BD 8810.15# configure vlan50 qosprofile QP4
```

- 10 Save the configuration.

```
* BD-8810.16 # save  
The configuration file primary.cfg already exists.  
Do you want to save configuration to primary.cfg and overwrite it? (y/n) Yes  
Saving configuration on primary MSM ..... done!  
Configuration saved to primary.cfg successfully.
```

5. Avaya C364T-PWR Converged Stackable Switch Configuration

The following steps describe how to configure the VLANs, tag the appropriate ports and configure QoS on the Avaya C364T-PWR Converged Stackable Switch.

1. Connect to the C364T-PWR switch. Log in using the appropriate login ID and password.
2. Create the Voice VLAN.

```
C360-1(super)# set vlan 50  
VLAN ID 50 created.
```

3. Assign ports to the VLAN.

```
C360-1(super)# set port vlan 50 1/5-6  
VLAN 50 modified.  
VLAN Mod/Ports  
-----  
50 1/5,6
```

4. Create the 802.1Q trunk for the connection to the BlackDiamond 8810 switch. This includes configuring the port as a trunk, assigning the port to the voice VLAN and then binding the port to all configured VLANs, allowing the data traffic to traverse the link as well.

```
C360-1(super)# set trunk 1/8 dot1q
C360-1(super)# set port vlan 50 1/8
VLAN 50 modified.
VLAN Mod/Ports
-----
 50 1/5,6,8
C360-1(super)# set port vlan-binding-mode 1/8 bind-to-configured
```

5. Set the port levels of each of the IP telephones to provide higher priority. Set the priority level to the same value as the **Call Control 802.1p Priority:** that was configured in Step 1 of Section 3.1.

```
C360-1(super)# set port level 1/5-6 6
Port 1/5 level set to 6.
Port 1/6 level set to 6.
```

6. Create the data VLAN.

```
C360-1(super)# set vlan 20
VLAN ID 50 created.
```

7. Assign ports to the data VLAN.

```
C360-1(super)# set port vlan 20 1/40
VLAN 20 modified.
VLAN Mod/Ports
-----
 20 1/40
```

6. Avaya 4600 Series IP Telephone Configuration

Enter the following to manually configure the Avaya IP telephone:

Plug the phone into the LAN. The bin files begin to load. The telephone then displays the following message.

1000 Mbps Ethernet
Press * to program

Press the “*” key when this is displayed.

At the prompts, enter the following data to repeat this configuration:

Prompt	Data	Meaning
Phone=	192.168.1.10	The IP Telephone’s IP Address – this is different for each telephone
CallSv=	192.168.1.1	The Avaya S8300 IP Address
CallSvPort=	1719	The registration port
Router=	192.168.1.100	The Avaya G350 Ethernet IP Address
Mask=	255.255.255.0	The subnet mask
FileSv=	192.168.1.5	The File Server for IP Telephone firmware updates
802.1Q=	On	Activates VLAN/Layer 2 priority tagging
VLAN ID	50	VLAN to use for registration – in this case the VLAN for voice traffic
VLANTEST	60	Number of seconds to wait for a response when using a non-zero VLAN ID
Save New Values	#	OK to accept values (and restart the phone) if necessary.

7. Interoperability Compliance Testing

The interoperability compliance testing focused on assessing the ability of the Extreme Networks BlackDiamond 8810 to support Avaya Communication Manager, Avaya G350 Media Gateway and Avaya IP Telephones.

7.1. General Test Approach

The general test approach was to configure the BlackDiamond 8810 in a basic sample network similar to how the switch may be implemented in an enterprise environment. An Avaya C364T-PWR was used in the sample network to verify basic Layer 2 interoperability with the BlackDiamond 8810. QoS was verified by injecting simulated data traffic into the network while calls were being established and maintained with Avaya IP Telephones.

7.2. Test Results

The Extreme Networks BlackDiamond 8810 successfully supported the Layer 2 infrastructure. Two VLANs were created for voice and data. The voice VLAN was given a higher priority than the data VLAN. QoS was verified by having bidirectional voice and data traffic traverse through the 802.1Q trunk and ensuring that voice traffic pre-empted data traffic. Voice Quality was subjectively verified. Tagged parameters were verified on the voice VLAN.

8. Verification Steps

The following steps may be used to verify the configuration:

- Place call between the Avaya IP Telephones.
- Use the **show port <port #> info detail** command on the BlackDiamond 8810 to display port configuration detail.

8.1. Avaya Communication Manager

The registration of the Avaya IP telephones can be seen in the SAT. Before the phone is registered, use the **list trace ras ip-address <ip address>**, where <ip address> is the IP telephone's IP Address command to see the protocol messages.

```
list trace ras ip-address 192.168.1.12                               Page 1
                               LIST TRACE
time          data
16:05:05      rcv GRQ endpt 192.168.1.12:49300 switch 192.168.1.1:1719 ext 20002
16:05:05      snd GCF endpt 192.168.1.12:49300 switch 192.168.1.1:1719 ext 20002
16:05:05      rcv RRQ endpt 192.168.1.12:49300 switch 192.168.1.1:1719 ext 20002
16:05:05      snd RCF endpt 192.168.1.12:49300 switch 192.168.1.1:1719 ext 20002
```

Verify that calls can be placed between IP telephones.

8.2. Extreme Networks Black Diamond Switch

Verify that the VLANs have the correct VLAN IDs. If the data traffic or voice traffic is not getting to the appropriate endpoint (i.e. the IP telephone or Avaya Communication Manager), ensure that the correct tags are configured for the Voice and Data VLANs. If the tag is not correct, see Step 5 in Section 4 to configure the tags.

```
BD-8810.1 # show vlan
-----
Name          VID  Protocol Addr          Flags          Proto  Ports
Virtual  Active router
-----
Default      1   -----          ANY    0 /0   VR-D
default
vlan20      20  -----          ANY    1 /8   VR-D
default
vlan50     50  -----          ANY    3 /20  VR-D
default
-----
Flags : (C) EAPS Control vlan, (d) NetLogin Dynamically created VLAN,
        (D) VLAN Admin Disabled, (E) ESRP Enabled, (f) IP Forwarding Enabled,
        (i) ISIS Enabled, (I) IP Forwarding lpm-routing Enabled, (L) Loopback En
        abled,
        (m) IPmc Forwarding Enabled, (n) IP Multinetting Enabled,
        (N) Network LogIn vlan, (o) OSPF Enabled, (p) PIM Enabled,
        (P) EAPS protected vlan, (r) RIP Enabled,
        (T) Member of STP Domain, (v) VRRP Enabled
Total number of Vlan(s) : 3
BD-8810.2 #
```

Use the **show port <port #> info detail** command to see information about a particular port.

```
* BD-8810.1 # show port 2:8 info de
Port: 2:8
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:
    Name: vlan50, 802.1Q Tag = 50, MAC-limit = No-limit, Virtual
ro
uter: VR-Default
    Name: vlan250, 802.1Q Tag = 250, MAC-limit = No-limit,
Virtual
router: VR-Default
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
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: Disabled
Ingress 802.1p Examination: Enabled
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
* BD-8810.2 #
```

9. Support

For technical support on Extreme Networks products, consult the support pages at <http://www.extremenetworks.com/services> or contact the Extreme Networks Worldwide TAC at:

Toll free: 800-998-2408

Phone: 408-579-2826

E-mail: support@extremenetworks.com

10. Conclusion

These Application Notes illustrate the procedure for configuring a converged voice/data network comprised of Avaya IP Telephony products and an Extreme Networks switch. The Avaya IP Telephony products included the Avaya S8300 Media Server running Avaya Communication Manager software, the Avaya G350 Media Gateway and an Avaya C364T-PWR Converged Stackable switch. The Extreme Networks BlackDiamond 8810 switch with the G48Te, G44Pe, G48P and G48Xa blades was used for the testing. The joint solution was successfully compliance-tested as phone calls successfully completed with good voice quality over the Extreme Networks Layer 2 infrastructure under various network conditions, including the presence of competing low priority data traffic.

11. Additional References

- Feature Description and Implementation For Avaya Avaya Communication Manager, Issue 4.0, Feb 2006, Document Number 555-245-205 is available at <http://support.avaya.com>.
- Product documentation for Extreme Networks products may be found at: <http://www.extremenetworks.com/services/documentation>.

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