



**Link Layer Discovery Protocol - Media Endpoint Devices (LLDP-MED) Configuration of Avaya Ethernet Routing Switches (ERS) for VLAN Assignment to Avaya one-X® 9600, Avaya 1600 Series IP Phones and Avaya A175 Desktop Video Device with the Avaya Flare® Experience - Issue 1.0**

**Abstract**

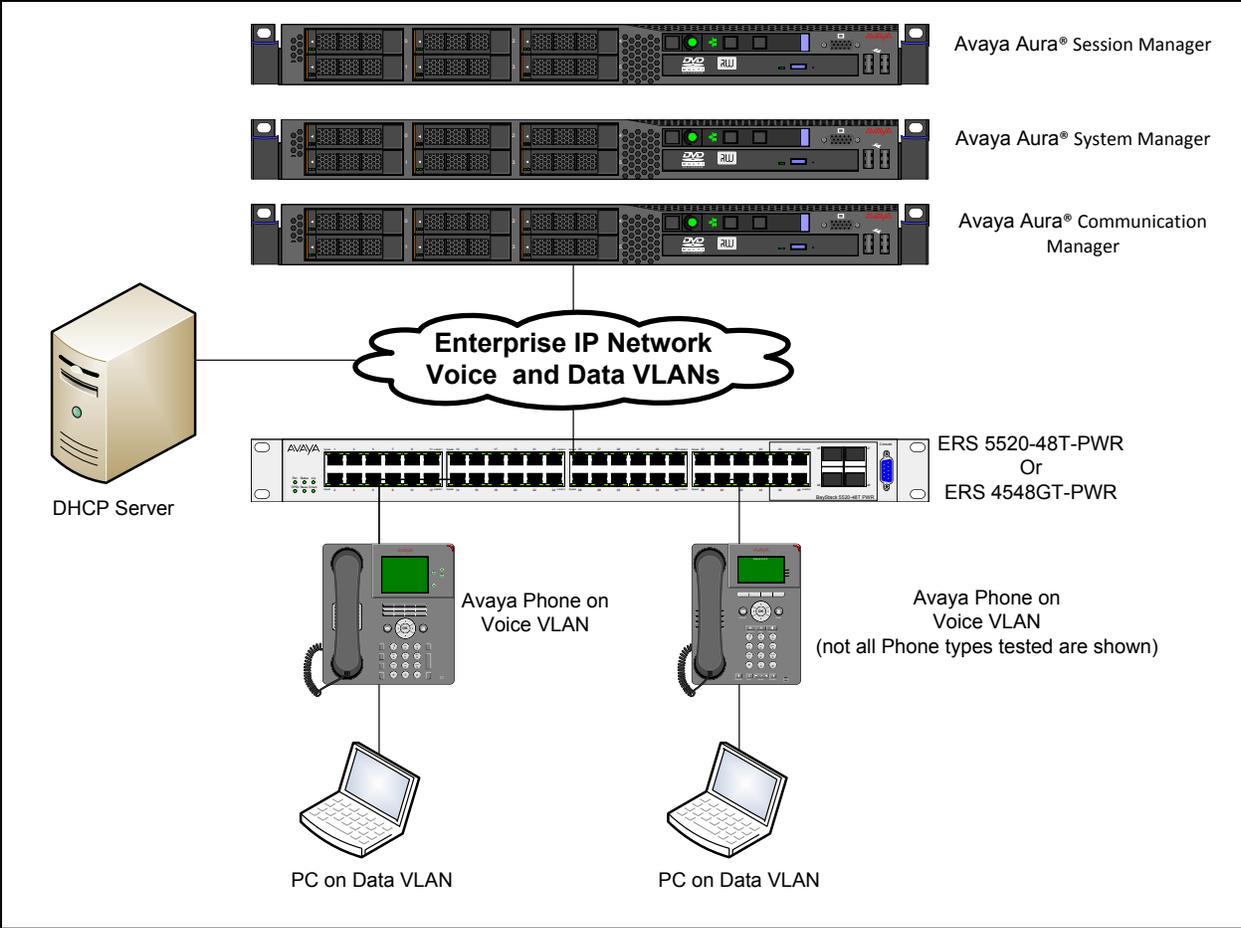
These Application Notes describe the steps for configuring Avaya Ethernet Routing Switches ERS5520 and ERS4548 to assign VLAN information to Avaya one-X® 9600, Avaya 1600 Series IP phones and Avaya A175 Desktop Video Device with the Avaya Flare® Experience. This sample configuration uses the Network Policy Type Length Value (TLV) within the Link Layer Discovery Protocol Media Endpoint Devices (LLDP-MED) to assign VLAN information to the IP phones.

# 1. Introduction

These Application Notes describe a configuration for using Link Layer Discovery Protocol Media Endpoint Devices (LLDP-MED) to provision VLAN assignment for Avaya one-X® 9600 and Avaya 1600 Series IP phones. LLDP or 802.1AB is an IEEE standard designed for the discovery of directly attached adjacent network devices such as Ethernet switches, Routers, and other LLDP capable devices such as Avaya IP phones. LLDP advertisements are encapsulated in LLDP Data Units (LLDPDU) in the format of Type Length Value or TLV for short. The IEEE 802.1AB specification defines different types of TLVs – Standard and Optional. LLDP capable devices must support the advertisement of Standard TLVs such as Chassis ID, Port ID, and Time to Live TLVs. The same LLDP capable device may also include Network Policy, IEEE 802.3 (MAC/PHY Configuration/Status) and other Vendor specific optional TLVs as part of its LLDP advertisement. When the Avaya IP phone is powered up, the switch port of the phone is configured to receive frames with the LLDP group multicast destination address (01-80-C2-00-00-0E) on the Ethernet line. Please note that IEEE 802.1AB frames are not supported on the secondary Ethernet interface (PC port).

The sample network outlined in these Application Notes consists of Avaya ERS 5520-48T-PWR and 4548GT-PWR switches, serving as the connection point for the Avaya IP phones to connect into the network. The Ethernet switch ports are configured to support 2 VLANs, one for voice and one for data. The voice VLAN supports Avaya IP phone traffic and the data VLAN supports PC traffic. LLDP is enabled on these Ethernet ports and is configured to advertise the voice VLAN ID using the Network Policy LLDP TLV.

**Figure 1** illustrates the configuration used in these Application Notes.



**Figure 1: Avaya Interoperability Test Lab Reference Configuration**

## 2. Equipment and Software Validated

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

Equipment	Software/Firmware
Avaya S8800 Server	Avaya Aura® System Manager 6.1.0 Build No. - 6.1.0.0.7345-6.1.5.9
Avaya S8800 Server	Avaya Aura® Communication Manager 6.1.0 Build No. - 6.1.0.5.7420-6.1.5.2
Avaya S8800 Server	Avaya Aura® Session Manager 6.1.1 Build No. - 6.1.1.0.611004- 6.1.1.611017
Avaya Ethernet Routing Switch 4548GT-PWR	FW: 5.3.0.3 SW:V5.5.0.002
Avaya Ethernet Routing Switch 5520-48T-PWR	FW: 6.0.0.13 SW: V6.2.2.022
Avaya 1608-I Deskphone (H323)	ha1608ua1_300B.bin hb1608ua1_300B.bin
Avaya one-X® 9621 Deskphone (H323)	S9621_41HALBR6_0_16T_V452.tar S96x1_UKR_V7_V7.tar
Avaya one-X® 9670G Deskphone (H323)	ha9670ua3_1_02_S.bin hb9670ua3_1_02_S.bin
Avaya one-X® 9608 Deskphone (SIP)	S96X1_SALBR6_0_1_V452.tar S96x1_UKR_V4_V4.tar
Avaya one-X® 9650C Deskphone (SIP)	SIP96xx_2_6_4_0.bin hb96xxua3_00.bin
Avaya one-X® 9611G Deskphone (H323)	S9608_11HALBR6_0_16T_V452.tar S96x1_UKR_V7_V7.tar
Avaya one-X® 9620L Deskphone (H323)	Ha96xxua3_1_02_S.bin Hb96xxua3_1_02_S.bin
Avaya one-X® 9621G Deskphone (SIP)	S96x1_SALBR6_0_1_V452.tar S96x1_UKR_V4_V4.tar
Avaya A175 Desktop Video Device with the Avaya Flare® Experience	System Image: SIP_A175_1_1_0_007001.tar Kernel: 2.6.31.6-17.1.moblin2-mojo

### 3. Configure the Avaya ERS 5520 or 4548

This section describes the configuration for Avaya ERS 5520 and 4548 switches as shown in **Figure 1** using the Command Line Interface (CLI). In this example the data VLAN is 7 and the voice VLAN is 8. Port 48 is used as the uplink trunk port to the LAN and is configure for tagging.

1. Log into the Avaya ERS switch and enter enable mode.
2. Enter into configuration mode by typing **configure terminal**.
3. Configure the voice and data VLANs with the commands shown in **Figure 2**.

```
vlan configcontrol autopvid
vlan create 8 name voice type port
vlan create 7 name data type port
vlan members add 8 all
vlan members add 7 all
vlan members remove 1 all
auto-pvid
vlan ports 48 tagging tagall
```

**Figure 2: CLI Commands for VLAN Configuration**

4. Configure the ERS Switch for LLDP-MED with the commands shown in **Figure 3**. This will configure the ERS Switch to send LLDP-MED VLAN information to Avaya Phones connected to ports 1 thru10.

```
interface fastEthernet 1-10
lldp config-notification
lldp status txAndRx config-notification
lldp tx-tlv local-mgmt-addr port-desc sys-cap sys-desc sys-name
lldp tx-tlv med extendedPSE inventory location med-capabilities network-policy
lldp med-network-policies voice dscp 46 priority 6 tagging tagged vlan-id 8
exit
```

**Figure 3: CLI Commands for LLDP-MED Configuration**

### 4. Observations

All of the IP phones tested for interoperability with the ERS 5520 and 4548 switches as listed in **Section 2** of this document were able to obtain VLAN data from the switches using LLDP-MED with the exception of the A175. At the time of this interoperability testing the A175 did not support LLDP.

## 5. Verification Steps

The following steps may be used to verify the configuration:

1. Use the **show lldp med-network-policies** command to verify LLDP-MED port configurations.

```
ERS5520#show lldp med-network-policies
-----
LLDP-MED network-policies
-----
Unit/  Application Type  VlanID  Tagging  DSCP  Priority
Port
-----
1      Voice             8        tagged   46    6
2      Voice             8        tagged   46    6
3      Voice             8        tagged   46    6
4      Voice             8        tagged   46    6
5      Voice             8        tagged   46    6
6      Voice             8        tagged   46    6
7      Voice             8        tagged   46    6
8      Voice             8        tagged   46    6
9      Voice             8        tagged   46    6
10     Voice             8        tagged   46    6
-----
ERS5520#
```

**Figure 4: Verify LLDP port configurations**

2. Use the **show lldp port 1** command to verify the status of the port. The output in **Figure 5** shows that LLDP is enabled for transmit and receive on port 1.

```
ERS5520#show lldp port 1
-----
lldp admin port status
-----
Port    AdminStatus    ConfigNotificationEnable
-----
1       txAndRx       enabled
-----
ERS5520#
```

**Figure 5: Verify LLDP Port Status**

3. Use the **show lldp port 1 neighbors detail** command to verify the detailed information of the LLDP neighbor on port 1. From the output shown in **Figure 6** it can be confirmed that the phone on port 1 of the switch is using the correct VLAN ID and has been assigned an IP address from the DHCP server on the proper subnet for this VLAN.

```
ERS5520>show lldp port 1 neighbor detail
-----
                                lldp neighbor
-----
Port: 1      Index: 11          Time: 0 days, 03:28:35
  ChassisId: Network address   IPv4  10.10.98.3
  PortId:    MAC address       3c:b1:5b:5d:1d:71
  SysName:   AVX5D1D71
  SysCap:    TB / TB           (Supported/Enabled)

PVID:
VLAN Name List: none          PPVID Supported: none
                               PPVID Enabled: none

Dot3-MAC/PHY Auto-neg: supported/enabled      OperMAUtype: 100BaseTXFD
PMD auto-neg:          100Base(TX, TXFD, T2FD), (FdxS, FdxB)Pause, 1000Base(
                        XFD, T)

MED-Capabilities: CNDI / CNDI          (Supported/Current)
MED-Device type:  Endpoint Class 3
MED-Application Type: Voice              VLAN ID: 8
L2 Priority: 6          DSCP Value: 46    Tagged Vlan, Policy defined
MED-Application Type: Voice Signaling    VLAN ID: 8
L2 Priority: 6          DSCP Value: 46    Tagged Vlan, Policy defined
Med-Power Type: PD Device                Power Source: Unknown
Power Priority: High                       Power Value: 5.7 Watt
HWRev: 1608D01A                           FWRev: hb1608ual_3000.bin
SWRev: ha1608ual_3000.bin                 SerialNumber: 11WZ125508EK
ManufName: Avaya                          ModelName: 1608
AssetID:

-----
Sys capability: O-Other; R-Repeater; B-Bridge; W-WLAN accesspoint; r-Router;
T-Telephone; D-DOCSIS cable device; S-Station only.
Total neighbors: 1
Med Capabilities-C: N-Network Policy; L-Location Identification; I-Inventory;
S-Extended Power via MDI - PSE; D-Extended Power via MDI - PD.
ERS5520>
```

**Figure 6: Verify LLDP Neighbor Details**

## 6. Conclusion

These Application Notes have described the administration steps required to configure the Avaya Ethernet Routing Switches ERS5520 and ERS4548 to use LLDP-MED advertisement to perform VLAN assignment for Avaya one-X® 9600 and 1600 series IP phones.

## 7. Additional References

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

[1] *Avaya IP Telephony Deployment Technical Configuration Guide*, Doc # NN48500-517, Version: 7.1, January 2011

[2] *Avaya one-X Deskphone H.323 Installation and Maintenance Guide Release 6.1 for 9608, 9611G, 9621G, and 9641G Deskphones*, Doc # 16-603603 Issue 2, May 2011

[3] *Avaya one-X™ Deskphone Edition for 9600 Series IP Telephones Installation and Maintenance Guide Release 3.1*, Doc # 16-300694 Issue 7, November 2009

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