Avaya Solution & Interoperability Test Lab

Application Notes for Configuring the Motorola Solutions PTP 800 Licensed Ethernet Microwave Solution with Avaya IP Office in a Wireless Multi-Site Converged VoIP and Data Network - Issue 1.0

Abstract

Application Notes for configuring the Motorola Solutions PTP 800 Licensed Ethernet Microwave solution with Avaya IP Office and Avaya IP Telephones in a multi-site wireless Converged VoIP and data network.

The Motorola Solutions PTP 800 Licensed Ethernet Microwave point-to-point radio solution is designed to satisfy the demand for high-throughput Internet Protocol (IP-based) traffic licensed-microwave solutions. The PTP 800 Series provides an Ethernet service between the data port at a local compact modem unit and the data port at an associated remote compact modem unit. The Ethernet service is based on conventional layer two transparent bridging.

Information in these Application Notes has been obtained through DevConnect compliance testing and additional technical discussions. Testing was conducted via the DevConnect Program at the Avaya Solution and Interoperability Test Lab.

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1. Introduction

These Application Notes describe a sample configuration of a multi-site Voice over IP (VoIP) solution using a Motorola Solutions PTP 800 with Avaya IP Office and Avaya IP Telephones in a multi-site wireless Converged VoIP and data network.

The Motorola Solutions PTP 800 Licensed Ethernet Microwave point-to-point radio solution is designed to satisfy the demand for high-throughput Internet Protocol (IP-based) licensed-microwave solutions for providing last-mile access in challenging environments. The PTP 800 Series provides an Ethernet service between the data port at a local compact modem unit (CMU) unit and the data port at an associated remote compact modem unit (CMU). The Ethernet service is based on conventional layer two transparent bridging.

The Motorola Solutions PTP 800 was compliance-tested with Avaya IP Office 500 and Avaya IP Telephones with emphasis placed on verifying voice quality in a multi-site converged VoIP and Data network scenario. QoS (Quality of Service) based on 802.1p (Layer 2 Priority) was implemented across the network to prioritize voice traffic over the LAN. The QoS settings are enforced in the network by the Motorola Solutions PTP 800. Tests were performed by oversubscribing the LAN interfaces with low priority data and verifying that good voice quality was achieved when calls were routed over all LAN interfaces. Compliance testing included QoS, throughput, Open, Direct Media and the G.711 and G.729 codecs.

The U.S. specification Motorola Solutions PTP 800 delivers up to 301 Mbps (full duplex) throughput with user-configurable channel bandwidths from 10 to 50 MHz. Operating in the 6 to 38 GHz1 radio frequency (RF) bands, PTP 800 solutions are available in several models to address your local regulatory guidelines and specific application requirements.

1.1. Interoperability Compliance Testing

Interoperability compliance testing covered feature functionality, serviceability, and performance testing. Compliance testing emphasis was placed on verifying voice quality in a multi-site converged VoIP and data network scenario. Specifically, compliance testing verified that when the Motorola Solutions PTP 800 interfaces are oversubscribed with low priority data traffic, the higher priority VoIP media and signaling traffic still gets through with good voice quality.

Note: Compliance did not include radio or distances testing. Testing tools were used interconnect the radios during testing at the Avaya DevConnect Lab.

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Feature functionality tested:

- Layer 2 Quality of Service (QoS)
- VLANs

The telephony features verified to operate correctly included:

- Attended/Unattended transfer
- Conference call add/drop/participation
- Multiple call appearances
- Caller ID operation
- Call forwarding
- Call Park,/Call pick-up
- Bridged call appearances
- Voicemail using Avaya Voicemail Pro
- Message Waiting Indicator (MWI)
- Hold/Return from hold
- Direct IP Media (Shuffling)
- G.711 and G.729 codecs

Serviceability testing:

- Serviceability testing was conducted to verify the ability of the Avaya/ Motorola Solutions solution to recover from adverse conditions, such as power cycling devices and disconnecting cables between the LAN interfaces. In all cases, the ability to recover after the network normalized was verified.

1.2. Support

Twenty four by seven Technical support for Motorola Solutions can be obtained through the following:

- Phone: + 1-866-961-9288
- Web support in the form of an online form at www.motorola.com/ptp/support

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2. Reference Configuration

The network diagram shown in **Figure 1** illustrates the network environment used for the compliance test. The Motorola Solutions PTP 800 Licensed Ethernet Microwave solution provides network connectivity for the voice and data traffic between the Corporate and Remote Sites.

The Avaya and Motorola Solutions components used to create the corporate site included:

- Avaya IP Office 500
- Avaya 9600-Series IP telephones (H.323)
- Avaya 1600-Series IP telephones (H.323)
- Avaya digital telephones
- Motorola Solutions PTP 800 Licensed Ethernet Microwave
- LAN router/switch
- DHCP/HTTP/TFTP Server

The Avaya and Motorola Solutions components used to create the remote site included:

- Avaya 9600-Series IP telephones (H.323)
- Avaya 1600-Series IP telephones (H.323)
- Motorola Solutions PTP 800 Licensed Ethernet Microwave
- LAN router/switch

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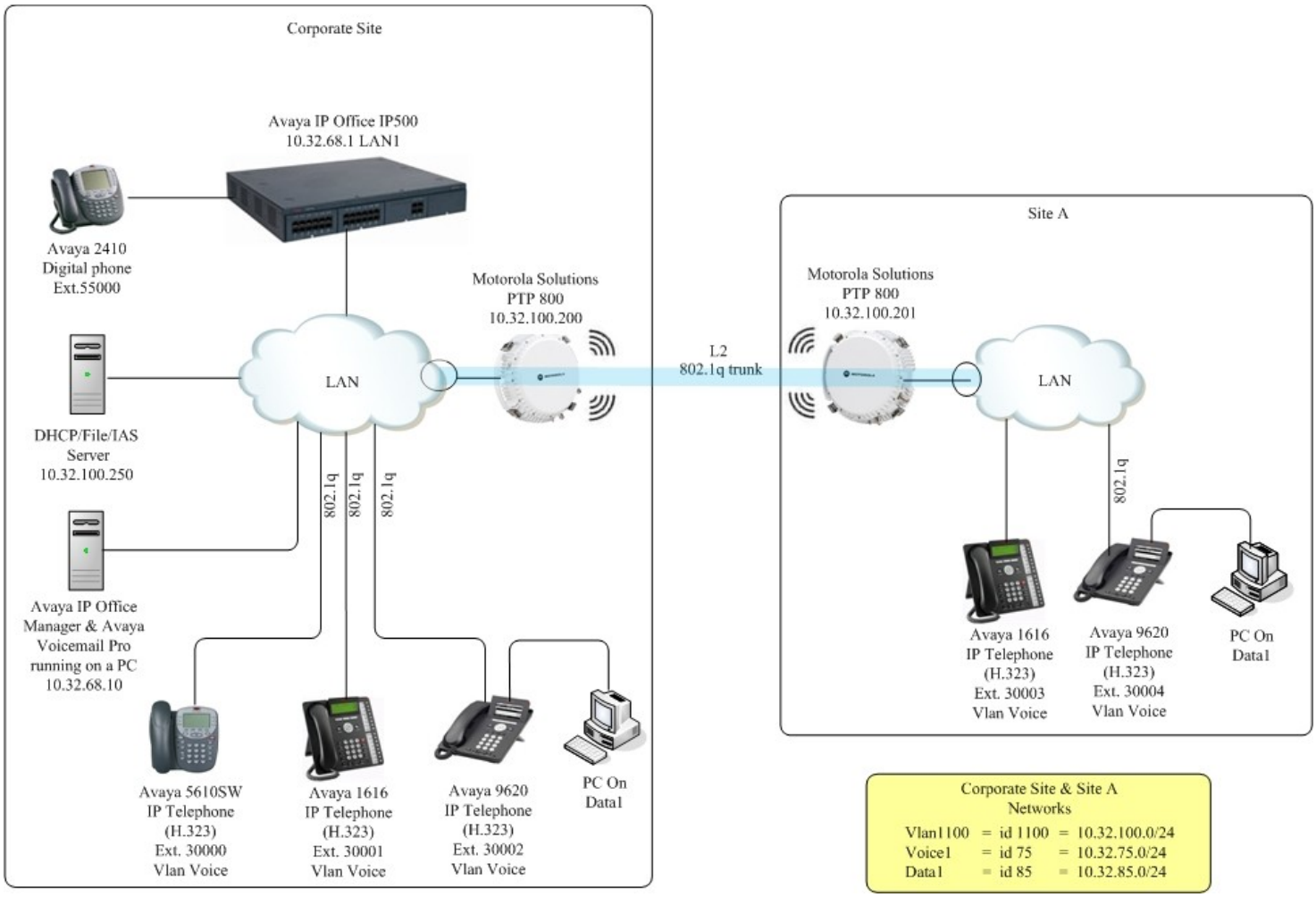

Figure 1: Avaya IP Telephony Network traversing Motorola Solutions PTP 800 Licensed Ethernet Microwave Solution

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3. Equipment and Software Validated

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

Equipment	Software/Firmware
Avaya PBX Products	
Avaya IP Office 500	6.0 (18)
Avaya IP Office Manager	8.0 (18)
Avaya Messaging (Voice Mail) Products	
Avaya Voicemail Pro	6.0.44
Avaya Telephony Sets	
Avaya 1600 Series IP Telephone (H.323)	1.2.2
Avaya 5600 Series IP Telephones (H.323)	8.016
Avaya 9600 Series IP Telephones (H.323)	S3.110b
Avaya 2410 Digital Telephone	NA
Motorola Solutions Products	
Motorola Solutions PTP 800 Licensed Ethernet Microwave	(02-04)
MS Products	
DHCP/HTTP/TFTP Server	Microsoft Windows 2003 Server

Table 1: Equipment and Software Tested

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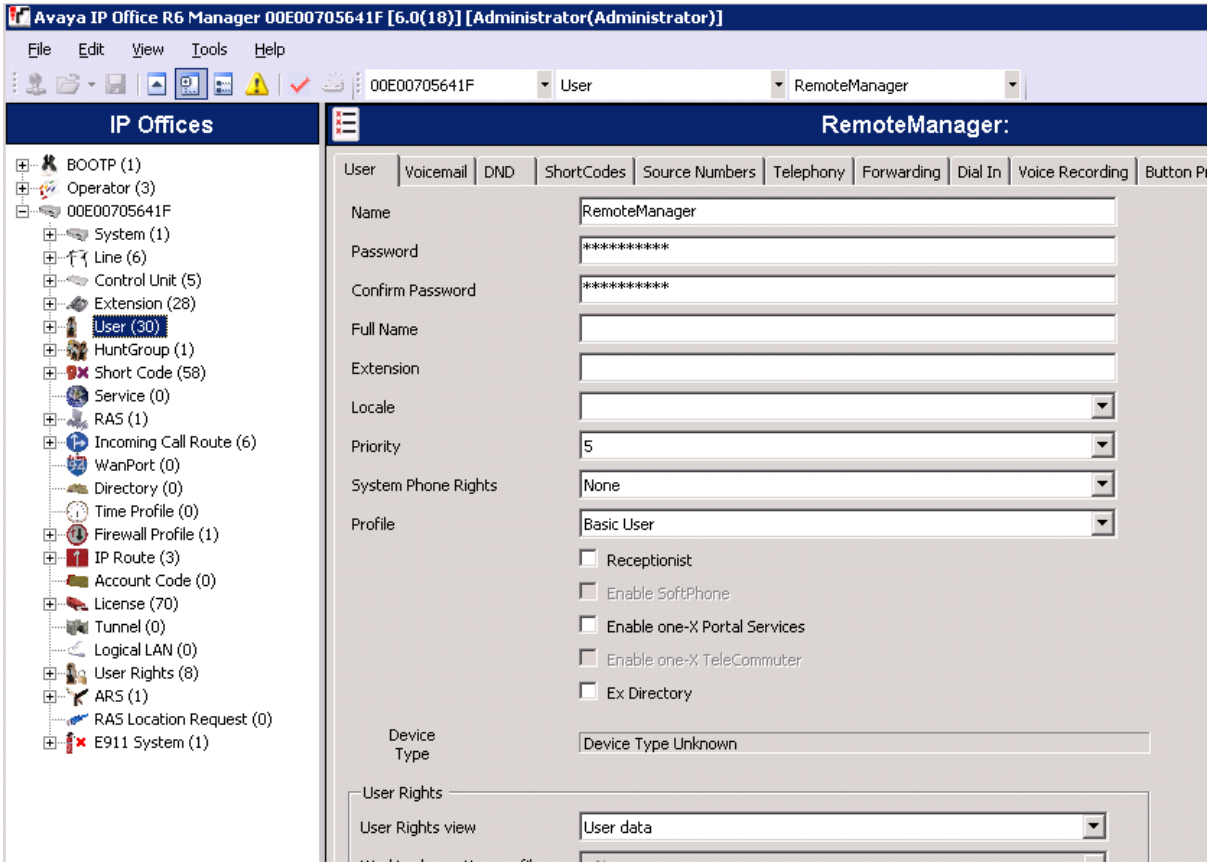
4. Avaya IP Office Settings

This section was included to verify that Avaya IP Office was configured correctly. Except where stated, the parameters in all steps are the default settings and are supplied for reference. For all other provisioning information such as provisioning of the trunks, call coverage, extensions, and voice mail, please refer to the Avaya IP Office product documentation in **Section 10**.

Step	Description
1.	Avaya IP Office is configured via the Avaya IP Office Manager program. Log into the Avaya IP Office Manager PC and select **Start → Programs → IP Office → Manager** to launch the Avaya IP Office Manager application. Log into the Avaya IP Office Manager application using the appropriate credentials.
2.	Avaya IP Office Manager Window. The main Avaya IP Office Manager window appears. The following steps refer to the Configuration Tree, which is in the left pane of the window. 

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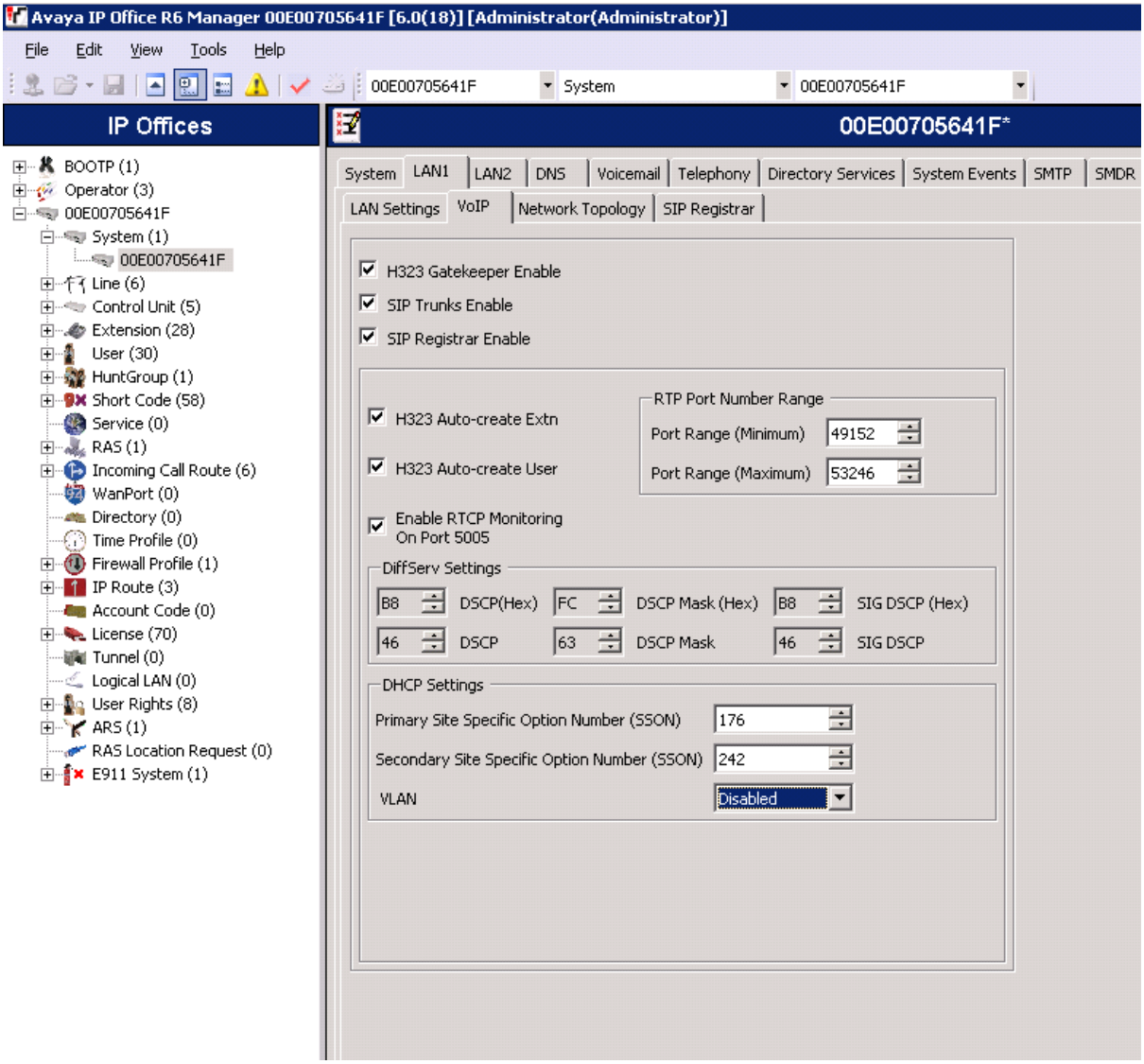
Step	Description
3.	Verify H323 Gatekeeper information. The Avaya IP Telephones will get differentiated services information from the Avaya IP Office. In the Manager window, go to the Configuration Tree and click **System**, select the **LAN1** tab, then select the **VoIP** tab. Verify that the **DiffServ Settings** for **DSCP** and **SIG DSCP** are set to **46** and **46**, respectively. 

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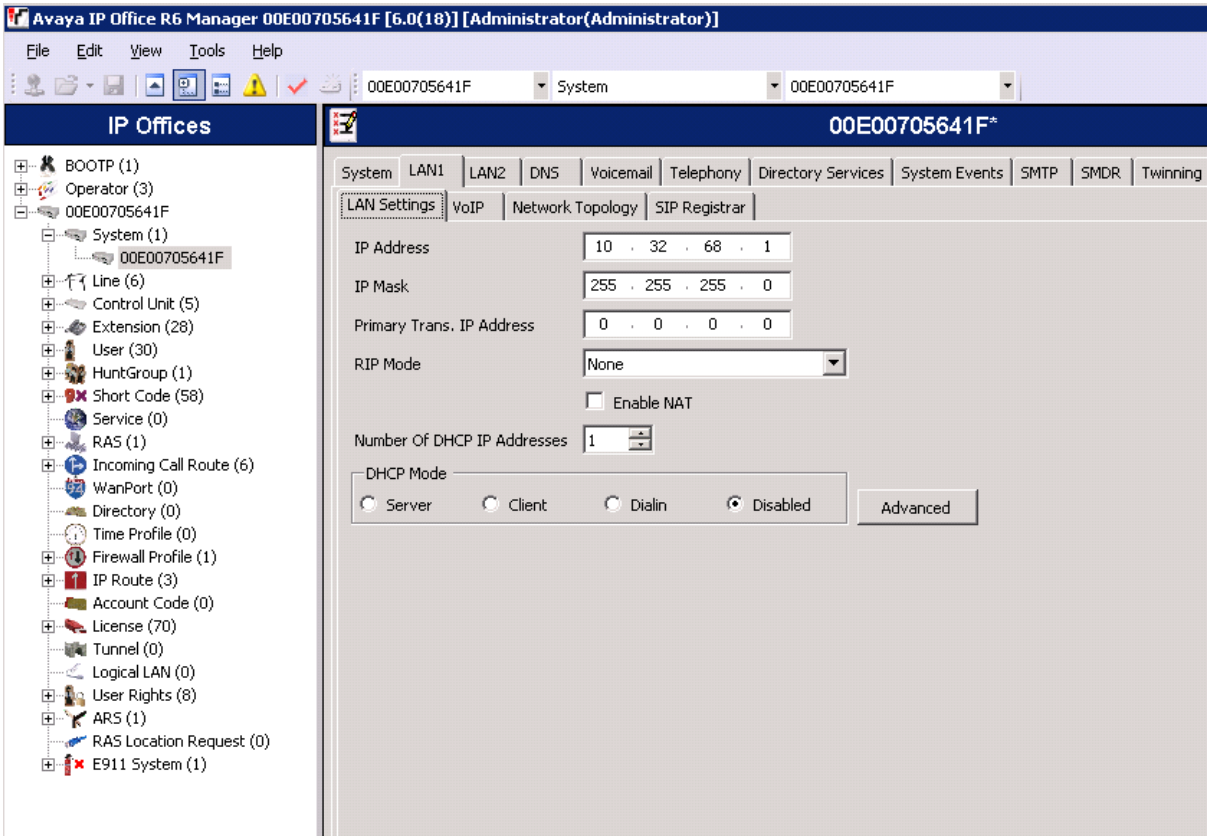
Step	Description
4.	Disable DHCP server on Avaya IP Office. Select the **LAN Settings** tab. Set the **DHCP Mode** to **Disabled**. Click **OK** to continue (not shown). 

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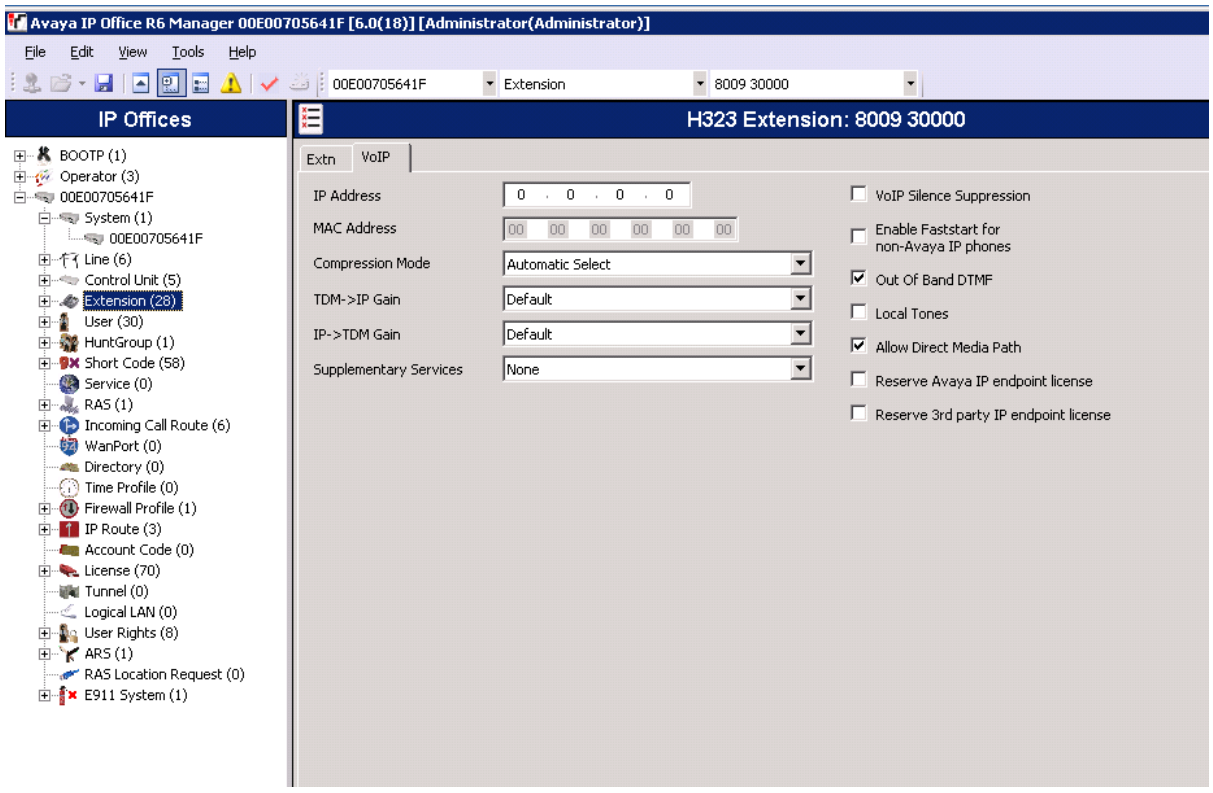
Step	Description
5.	Verify Direct Media Path. From the Configuration Tree, select **Extension**. Click on the IP telephone extension to verify. Select the **VoIP** tab. Verify that **Allow Direct Media Path** is checked. Click **OK** to continue. The changes must be saved before they will take effect, click the icon to save the configuration. 

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5. Configure the Corporate Motorola Solutions PTP 800

It is assumed that all Motorola Solutions PTP 800 outdoor unit (ODU) and compact modem unit (CMU) components and all appropriate licenses are installed. For ODU and CMU instruction, refer to the Motorola Solutions PTP 800 User Guild, **Section 10**.

5.1. Connecting the PTP 800 to a PC

By default, the IP interface of the PTP 800 is configured for out-of-band local management with an IP address of 169.254.1.1, subnet mask of 255.255.0.0 and default gateway of 169.254.0.0.

Configure the PTP 800 using the built-in web-based Management Tool. Access this tool by establishing a web browser connection to the PTP 800. For more information on configuring PTP 800, please refer to **Section 10**.

Configure a PC with the following IP Address information:

- IP address - 169.254.0.20.
- Subnet Mask - 255.255.0.0.
- The default gateway can be left blank.

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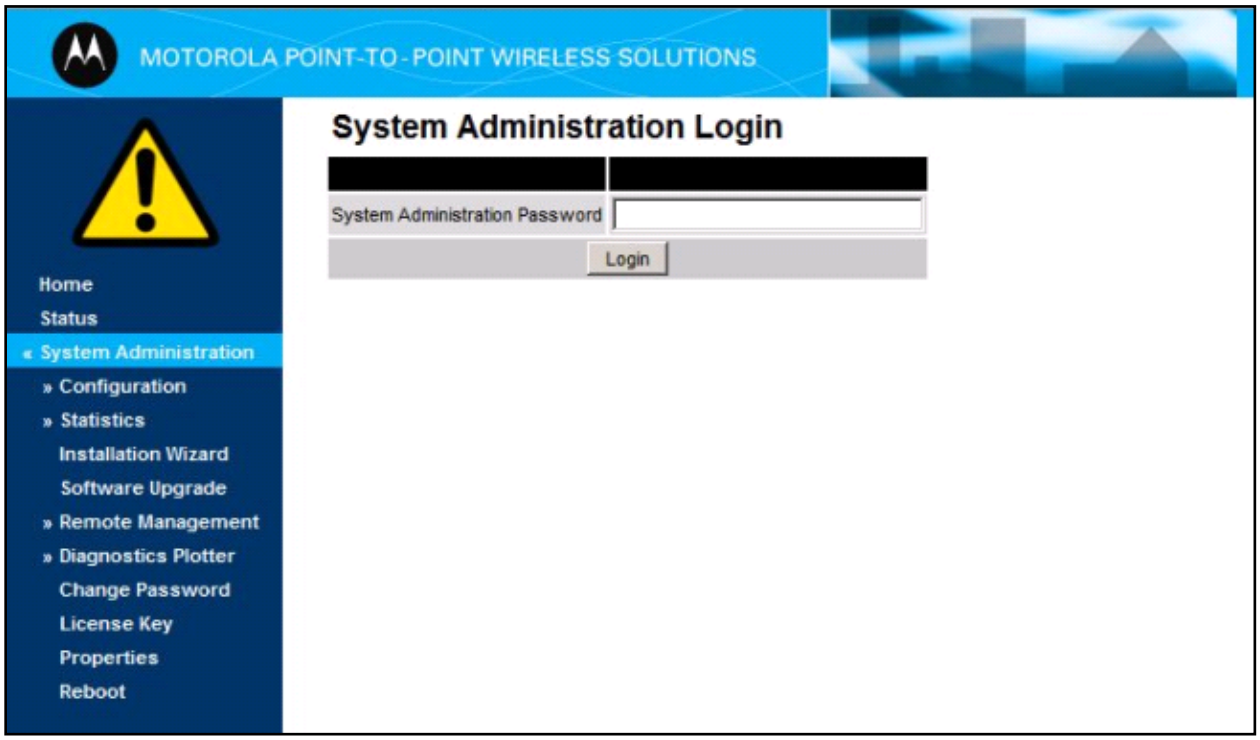
Connect the LAN port of the computer being used to the LAN port on the PTP 800. Start the web browser and enter **http://169.254.1.1**. The **System Administrator Login** page is displayed. Log into the PTP 800 using default credentials which can be obtained from the Motorola Solutions PTP 800 documentation, refer to **Section 10**.



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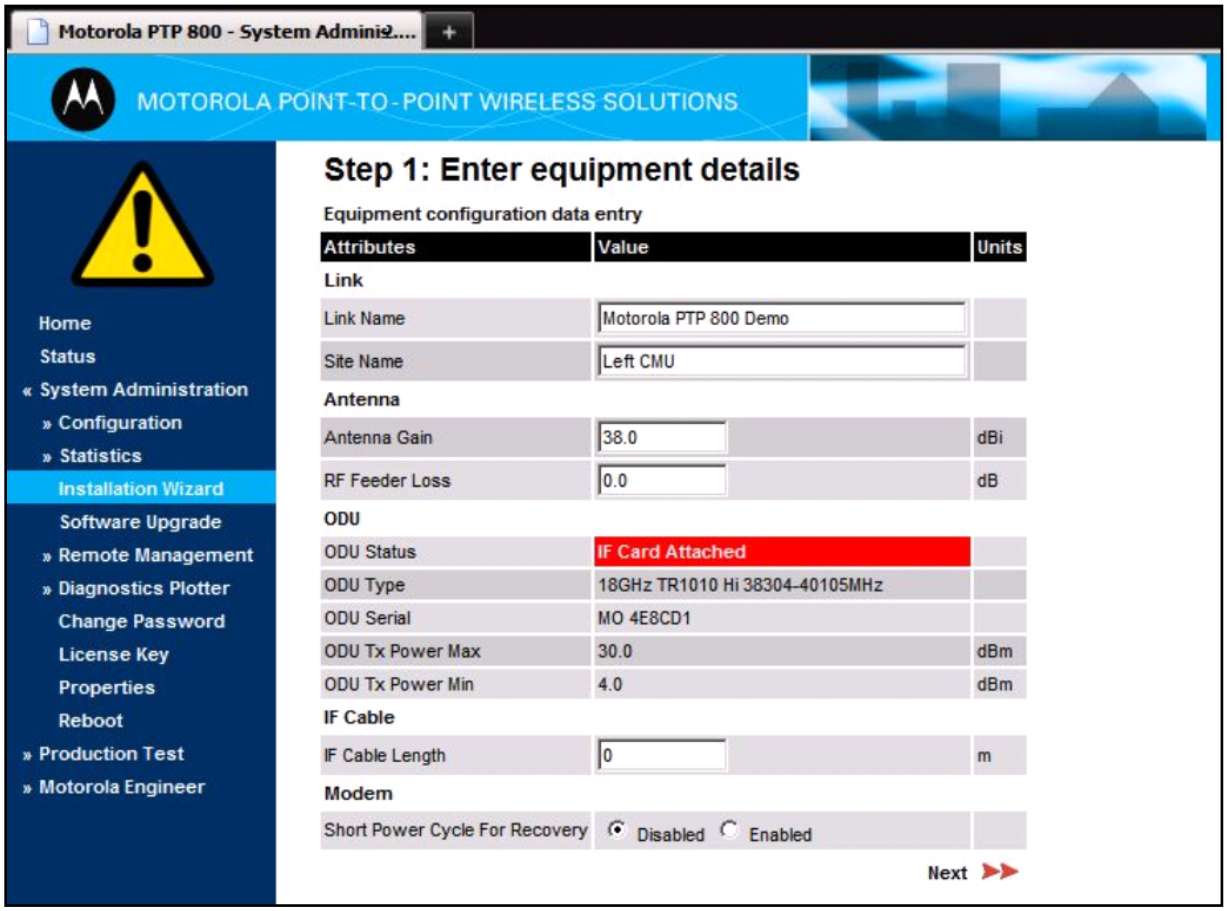
5.2. Run the Installation Wizard

The Radio Licenses and wireless setting will vary from installation to installation and are beyond the scope of the compliance testing and will not be covered in this document. **Steps 1**, **2** & **3** are shown for illustration purposes only. For more information on configuring PTP 800, please refer to **Section 10**.

From the left hand menu, select **System Administration → Installation Wizard**. The **Step 1: Enter equipment details** page appears. Select **Next** to continue.



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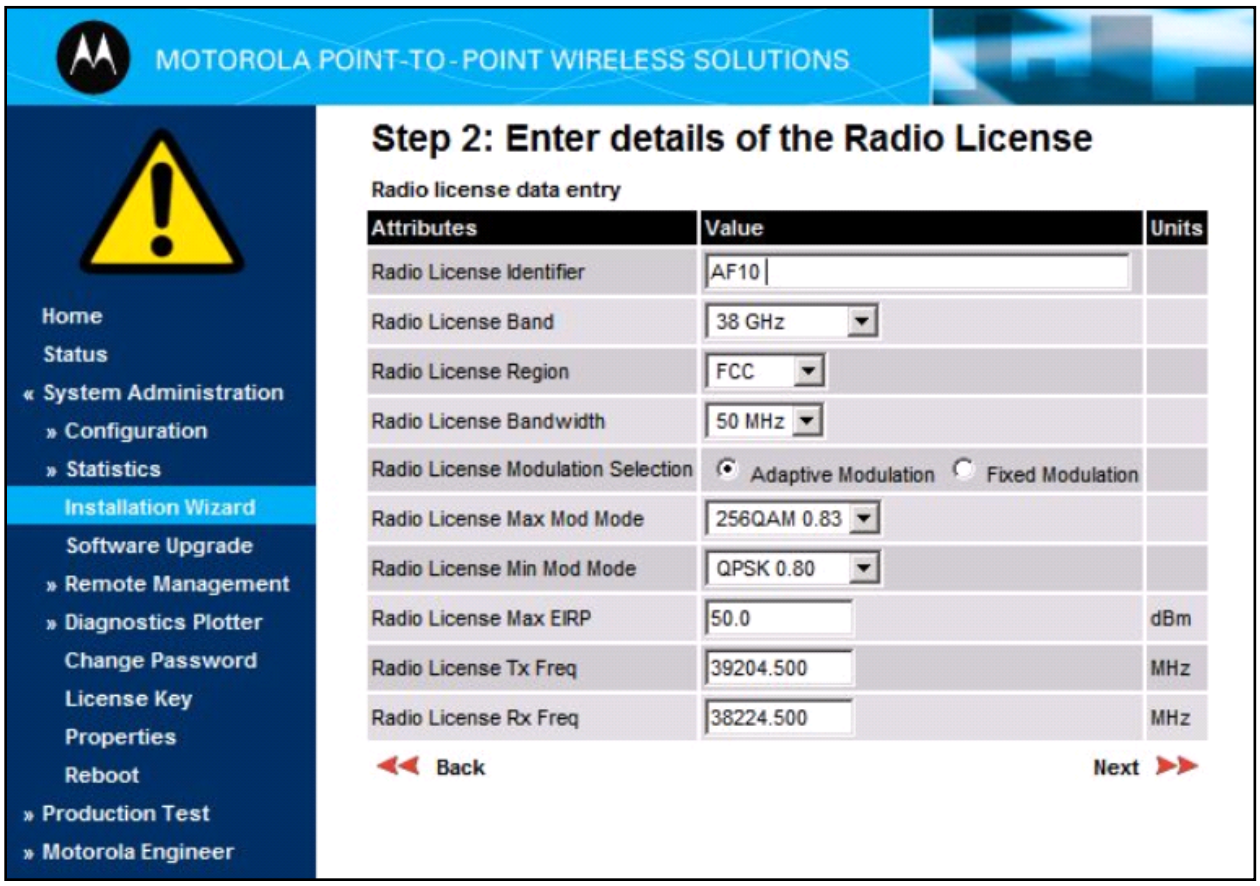
The **Step 2: Enter details of the Radio License** page appears. Select **Next** to continue.



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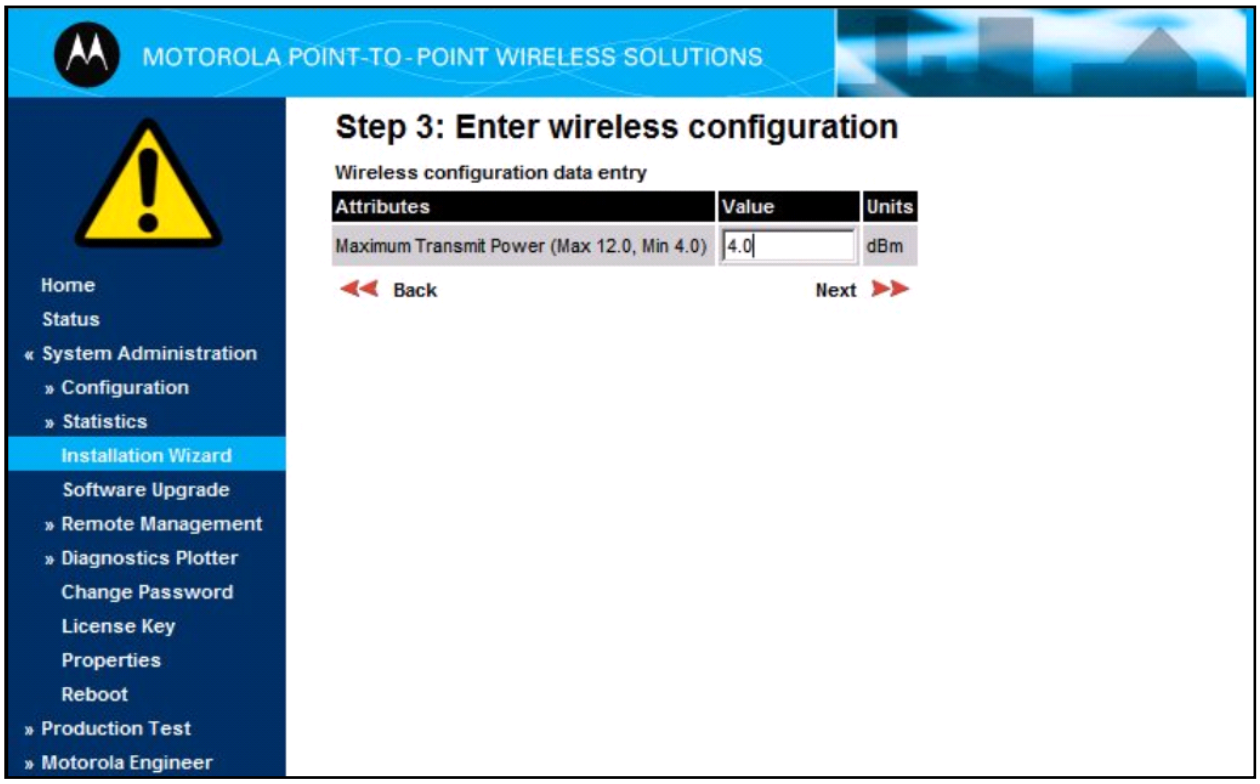
The **Step 3: Enter wireless configuration** page appears. Enter a desired value for **Maximum Transmit Power (Max 12, Min 4.0) Value**. Select **Next** to continue.



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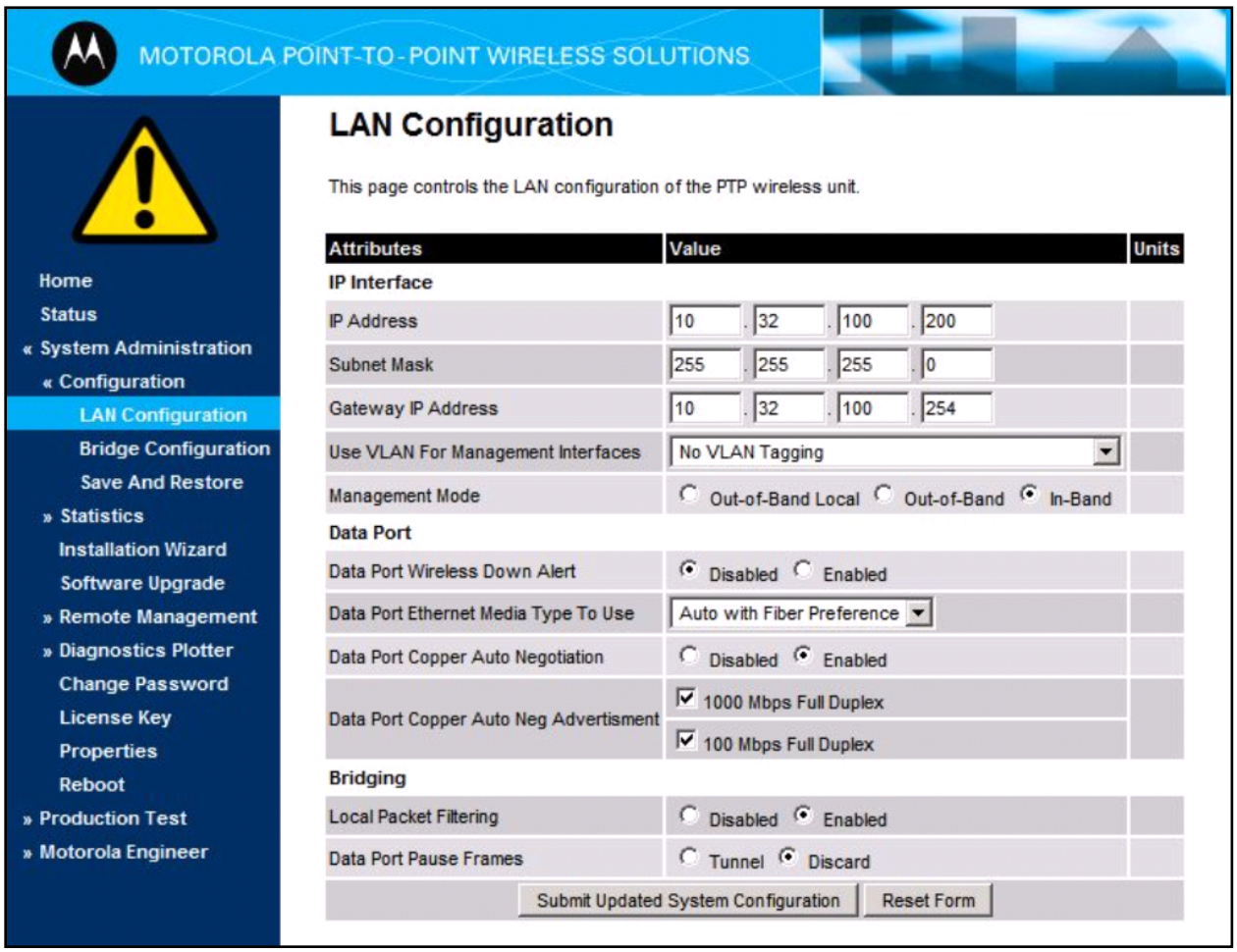
5.3. Configuring the IP interface of the PTP 800

Perform this task to review and update the IP interface settings of an operational or newly installed PTP 800 link. The IP interface allows users to connect to the PTP 800 web interface, either from a locally connected computer or from a management network.

Note: Before setting Management Mode to 'Out-of-Band' or 'In-Band', ensure that the local and remote CMUs are configured with different IP addresses, otherwise the management agent will not be able to distinguish between the two CMUs.

From the left hand menu, select **System Administration → Configuration → LAN Configuration**. The LAN Configuration page is displayed. Update the IP interface attributes with the IP information shown in **Figure 1**. Select **Submit Updated System Configuration**. If there is a requirement to reboot the CMU in order to implement the updated attributes, perform a rebooting of the CMU.



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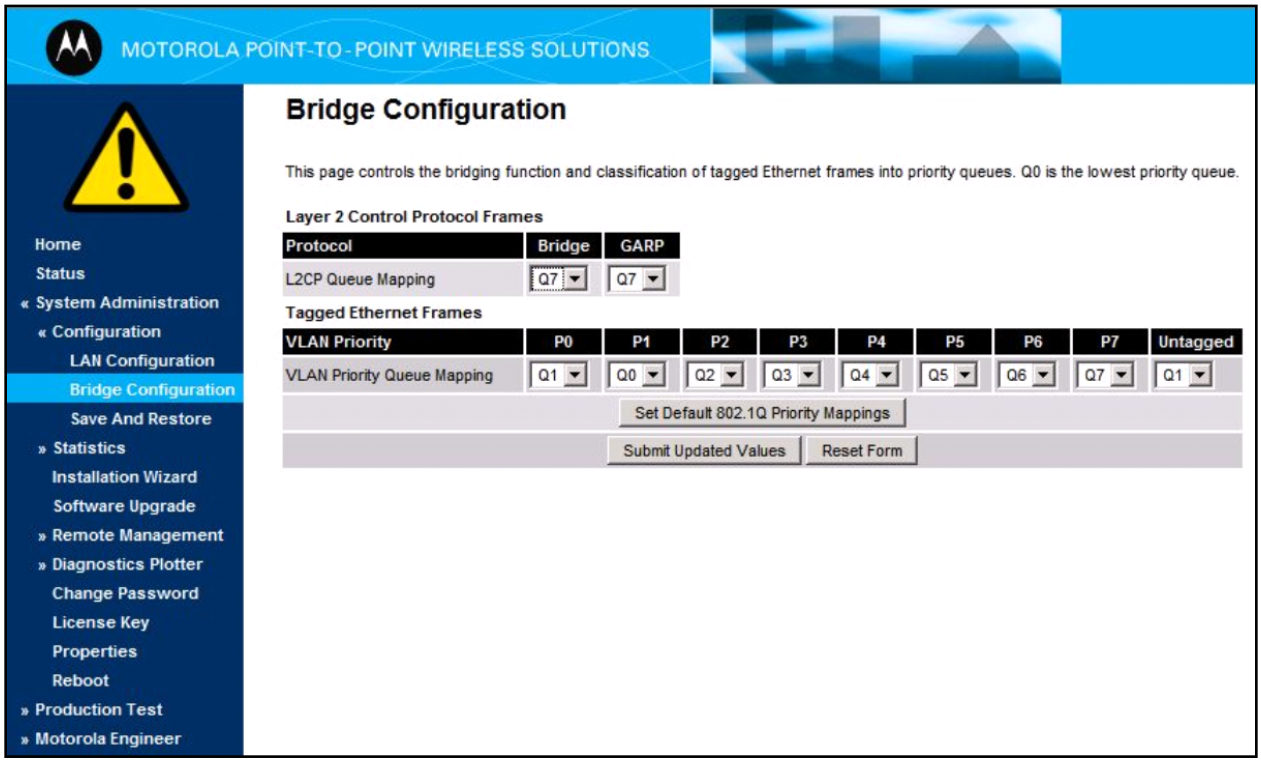
5.4. Configuring Quality of Service

Perform this task to configure the classification of Layer 2 Control Protocol frames and priority encoded Ethernet frames into up to eight traffic classes. To configure quality of service, proceed as follows:

From the left hand menu, select **System Administration → Configuration → Bridge Configuration**. The **Bridge Configuration** page is displayed. Select the **Set Default 802.1Q Priority Mappings**. Select **Submit Updated Values** to continue.



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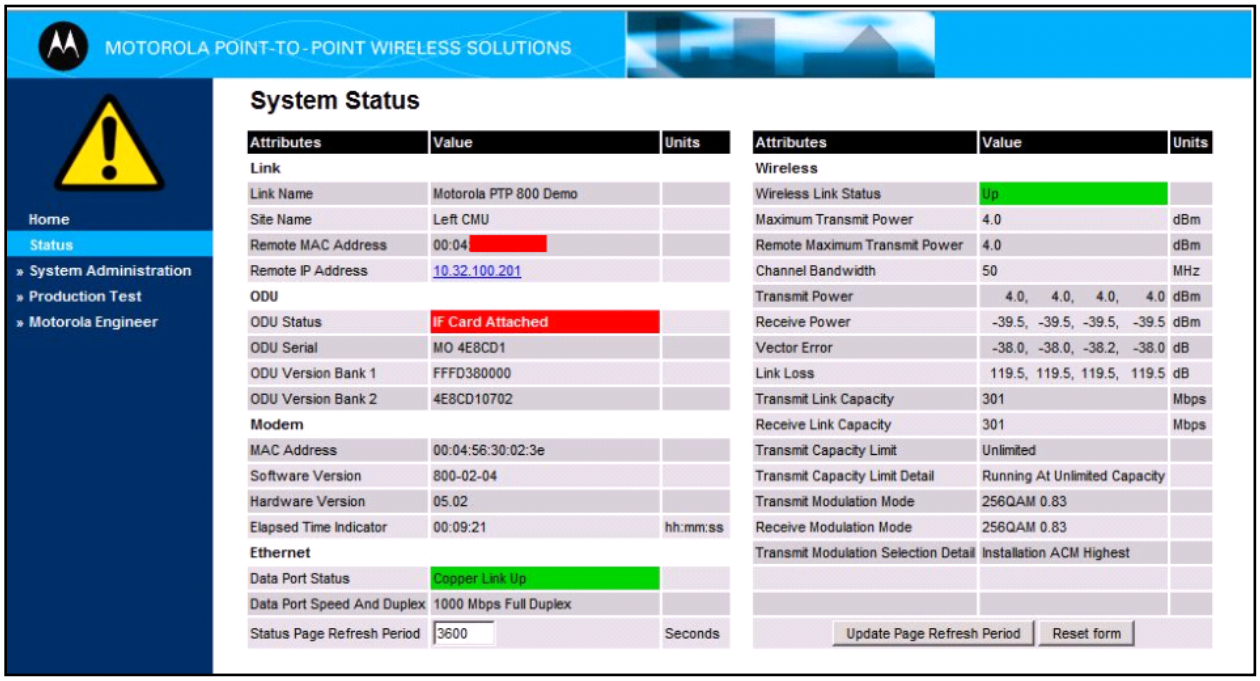
5.5. Check System Status

Once the System is back up, check the status of the PTP 800. From the left hand menu, select **Status**. Verify that the **Data Port Status** and **Wireless Link Status** are up.



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6. Configure Site A Motorola Solutions PTP 800

Repeat **Step 5.1** to connect the PC to configure the Site PTP 800.

6.1. Configuring the IP interface of the PTP 800

Perform this task to review and update the IP interface settings of an operational or newly installed PTP 800 link. The IP interface allows users to connect to the PTP 800 web interface, either from a locally connected computer or from a management network.

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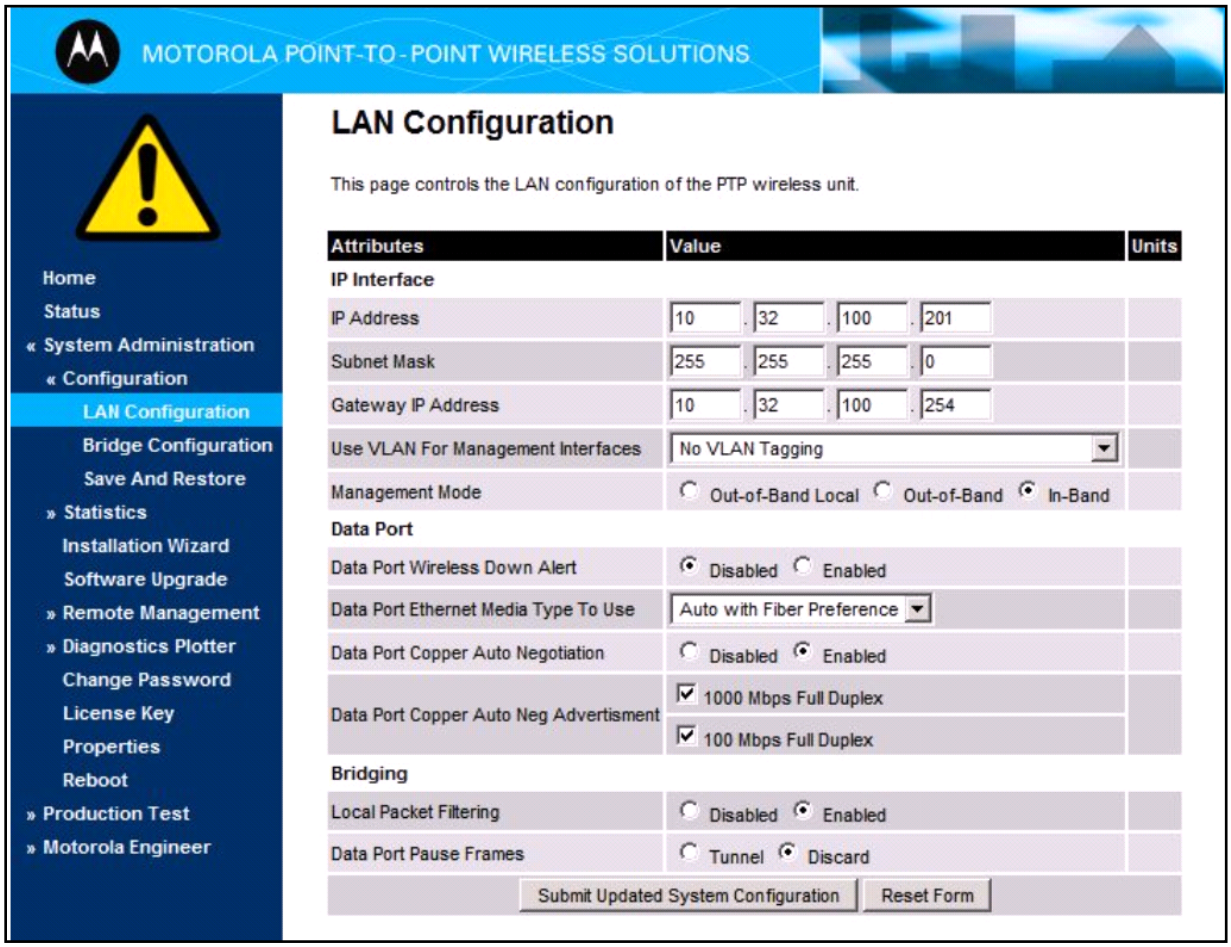

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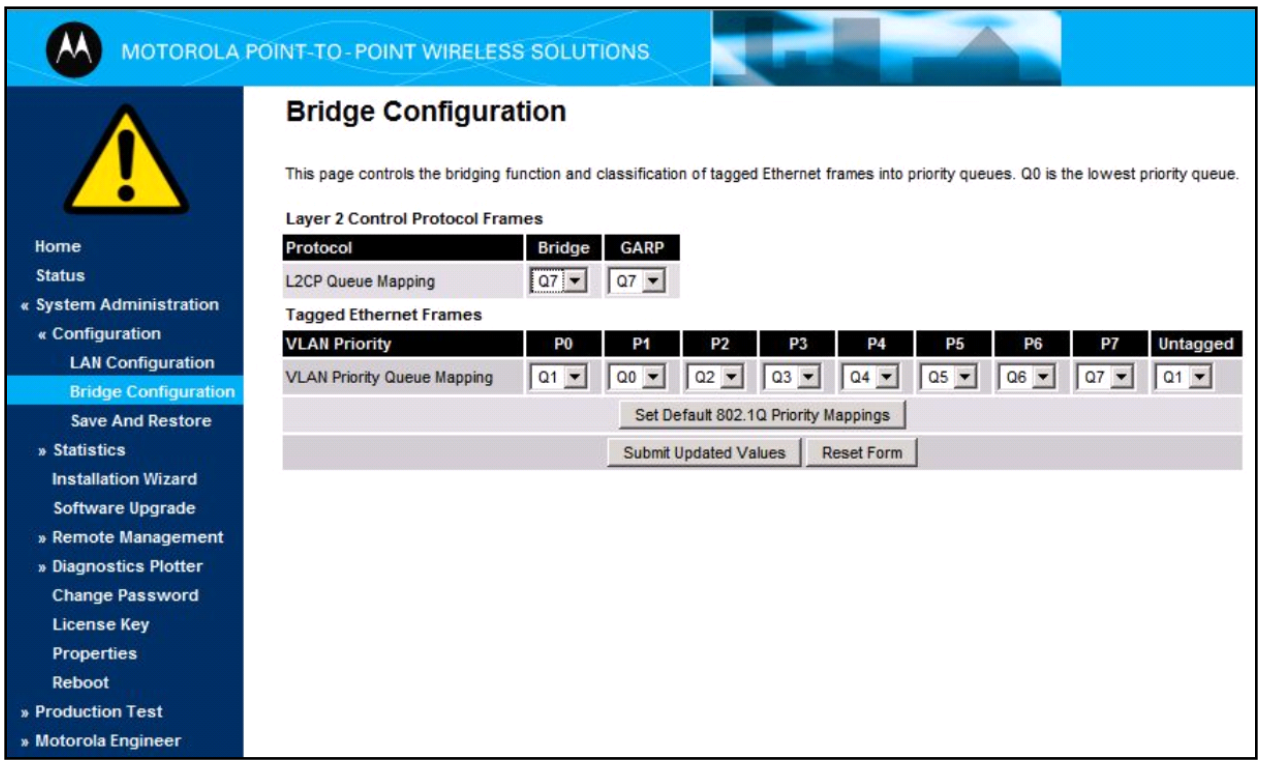

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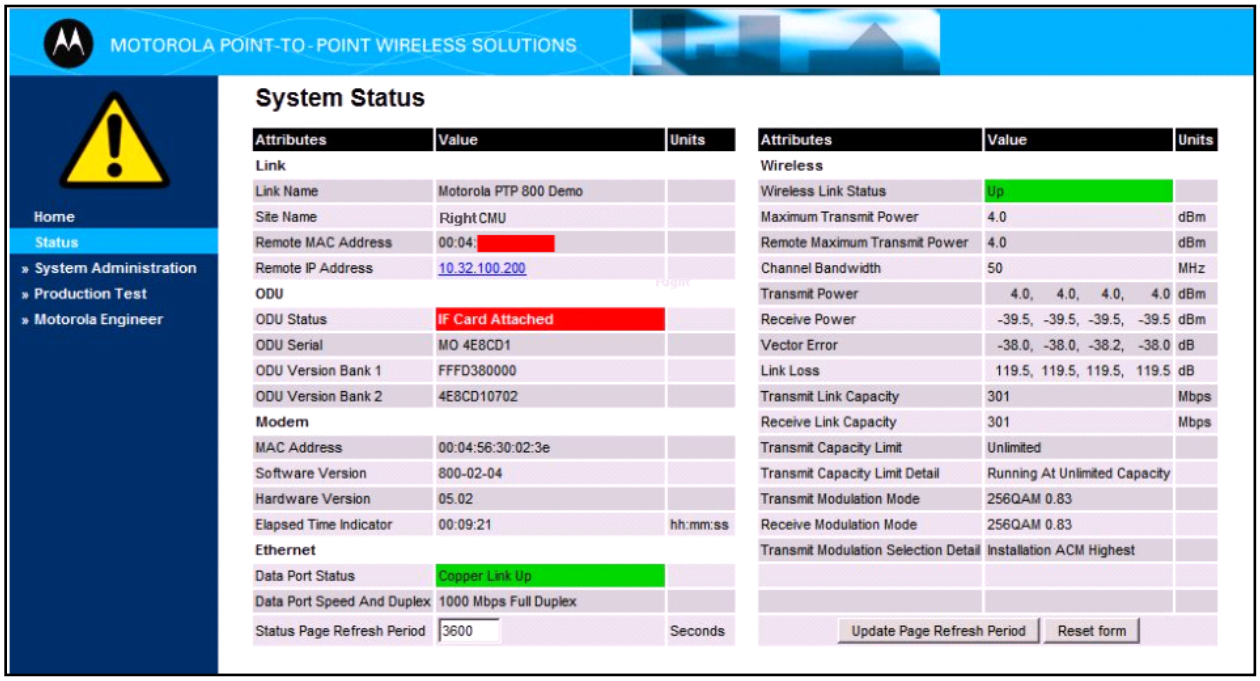
Once the System is back up, check the status of the PTP 800. From the left hand menu, select **Status**. Verify that the **Data Port Status** and **Wireless Link Status** are up.



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7. General Test Approach and Test Results

The general test approach was to configure a multi-site Voice over IP (VoIP) Solution using the Motorola Solutions PTP 800 Licensed Ethernet Microwave Solution with Avaya IP Office and Avaya IP Telephones with emphasis placed on voice quality. The configuration, (shown in **Figure 1**) was used to exercise the features and functionality listed in **Section 1.1**.

The Motorola Solutions PTP 800 Licensed Ethernet Microwave Solution with Avaya IP Office and Avaya IP Telephones passed compliance testing.

8. Verification Steps

This section provides the steps for verifying end-to-end network connectivity and QoS. In general, the verification steps include:

- Place calls between the corporate and Remote Site Avaya IP Telephones.
- Place calls between the Avaya 2410 Digital Telephone and Avaya IP Telephones at the remote site.
- Verify DHCP relay is functioning by confirming that the Avaya IP Telephones in the remote site received their IP addresses from the DHCP server connected to the corporate network.

9. Conclusion

These Application Notes describe the configuration necessary for integrating the Motorola Solutions PTP 800 Licensed Ethernet Microwave Solution into an Avaya Telephony Infrastructure with Avaya IP Office and Avaya IP Telephones in a Wireless multi-site Converged VoIP and data network.

For the configuration described in these Application Notes, the Motorola Solutions PTP 800 Licensed Ethernet Microwave Solution was responsible for network connectivity for the voice and data traffic between the Corporate and Remote Sites and enforcing QoS. Good voice quality was successfully achieved in the Avaya/Motorola Solutions configuration described herein.

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10. References

This section references the documentation relevant to these Application Notes. Additional Avaya product documentation is available at http://support.avaya.com.

[1] *IP Office 6.0 Documentation CD*, February 2010.
[2] *IP Office Installation,* Document number15-601042, May 2010.
[3] *IP Office Manager,* Document number15-601011, May 2010.
[4] *System Status Application,* Document number15-601758, February 2010.
[5] *Avaya one-X Deskphone Edition for 9600 Series IP Telephones Administrator Guide,* November 2009, Document Number 16-300698.
[6] *Avaya one-X Deskphone Edition for 9600 Series IP Telephones Administrator Guide Release 3.0,* Document Number 16-300698.
[7] *Avaya one-X Deskphone SIP for 9600 Series IP Telephones Administrator Guide, Release*

The following product documentation is provided by Motorola Solutions. For additional product and company information, visit: www.motorola.com/ptp/software.

[8] *Motorola Solutions PTP 800 User Guild,* System Release 800-02-04

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