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Avaya Solution & Interoperability Test Lab

Application Notes for MobileAccess Networks MA-850 Intelligent RF Switching Hub with Avaya AP-6, AP-8 and W110 Access Points - Issue 1.0

Abstract

These Application Notes describe the steps required to configure the MobileAccess Networks MA-850 Intelligent RF Switching Hub to distribute Radio Frequency (RF) signals from Avaya AP-6, AP-8 and W110 Access Points (APs) over passive antennas. This allows the MA-850 to "cluster" APs within secure telecom closets to simplify ongoing management and maintenance. In addition, a single AP may be associated with more than one antenna on the MA-850, allowing that AP to serve a wider coverage area. An Avaya IP Telephony Infrastructure was used to verify voice quality on calls established with Avaya 3616/3626 Wireless IP Telephones and mobile laptops running Avaya IP Softphone and Avaya Phone Manager Pro. Information in these Application Notes has been obtained through compliance testing and additional technical discussions. Testing was conducted via the Developer*Connection* Program at the Avaya Solution and Interoperability Test Lab.

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1. Introduction

These Application Notes describe the steps required to configure the MobileAccess MA-850 Intelligent RF Switching Hub to distribute Radio Frequency (RF) signals from Avaya AP-6, AP-8 and W110 Access Points (APs) over passive antennas[1]. An Avaya IP Telephony Infrastructure was used to verify voice quality on calls established with Avaya 3616/3626 Wireless IP Telephones and mobile laptops running Avaya IP Softphone and Avaya Phone Manager Pro.

The MobileAccess MA-850 (MA-850) Intelligent RF Switching Hub is a wireless distribution system used to propagate wireless signals throughout building and campus environments. The MA-850 receives RF signals from connected 802.11b/g access points and then uses broadband coaxial cables to distribute those signals to passive antennas typically mounted on ceilings. This allows the MA-850 to "cluster" the APs within secure telecom closets to simplify ongoing management and maintenance. In addition, a single AP may be associated with more than one antenna on the MA-850, allowing that AP to serve a wider coverage area.
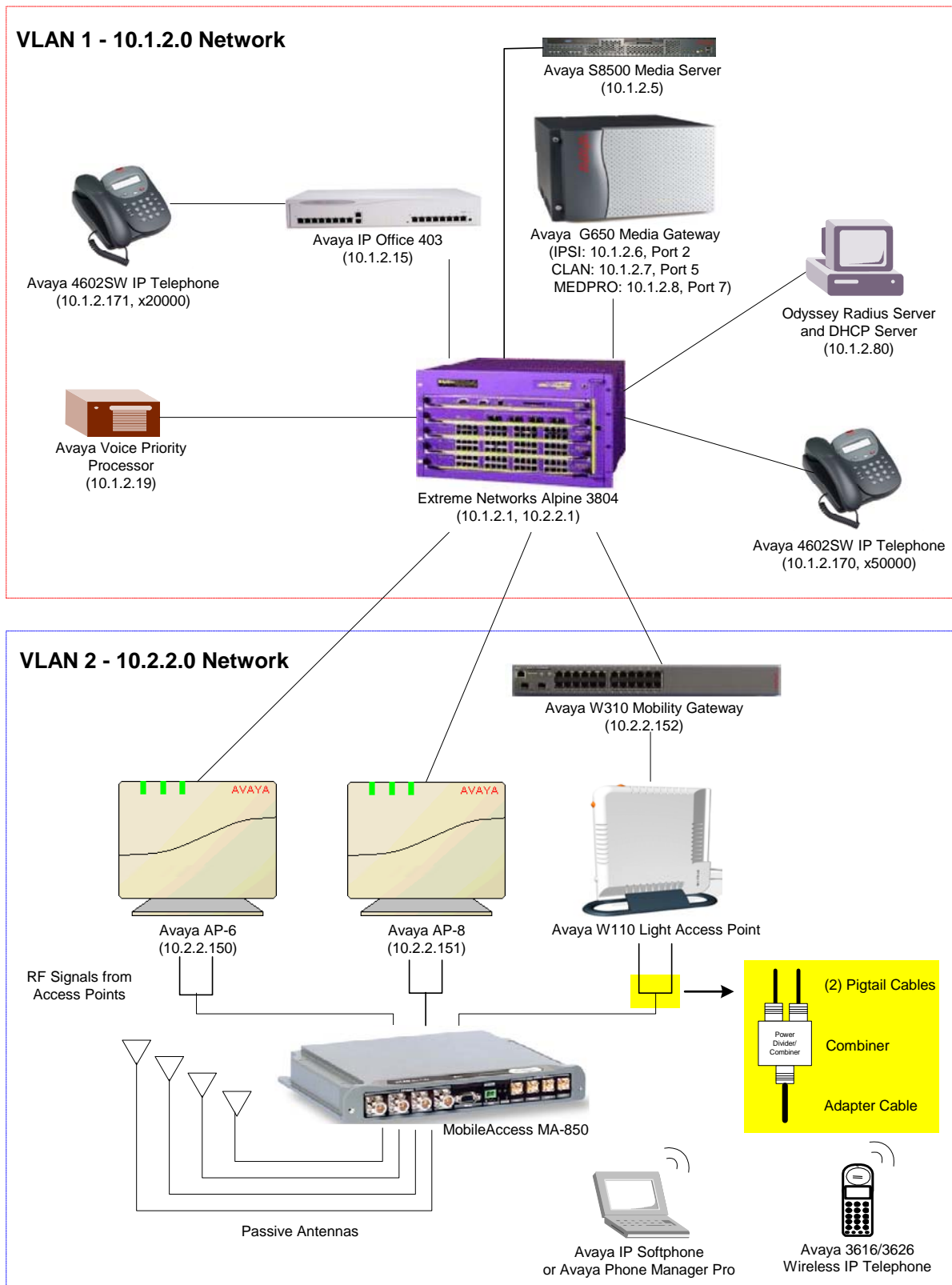
The MA-850 and its associated antenna system are part of a "technology agnostic" wireless distribution system. The MA-850 carries 802.11b/g signals, but it does not engage with any aspect of the embedded AP signaling or LAN protocols. The MA-850 provides four ports for 802.11b/g and four ports for passive antennas. The MA-850 uses a 50-ohm coax cable to connect to APs. An Avaya wireless pigtail cable is required to connect the antenna ports of the MA-850 to the external antennas of the Avaya AP-6, AP-8 and W110 Access Points. The pigtail cable is available through Avaya (Comcode 700322498) and the same cable can be used for the aforementioned Avaya APs. Two pigtail cables are required for each AP, which has two external antenna connections associated with its embedded 802.11b/g radio. See Section 3 for details on the AP antenna configuration.

Figure 1 illustrates the wireless network configuration used for the compliance testing. It consists of Avaya APs connected via a pigtail coax cable to the MA-850, which distributes the AP signals over passive antennas. The Avaya wireless devices obtain network access through the Avaya APs and MA-850, and register with Avaya Communication Manager or Avaya IP Office. The Avaya Voice Priority Processor is used to support the SpectraLink Voice Priority (SVP) Protocol from the Avaya wireless IP telephones and Avaya APs.

These Application Notes focus on the interoperability between the Avaya APs and the MobileAccess MA-850. The reader should consult [6] for the steps required to configure the other Avaya products, such as the Avaya Voice Priority Processor, shown in **Figure 1**.

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[1] The term *passive* means that the antenna does nothing to the signal it receives. For example, a passive antenna does not have an amplifier to increase the signal.

VLAN 1 - 10.1.2.0 Network

Avaya S8500 Media Server
(10.1.2.5)

Avaya 4602SW IP Telephone
(10.1.2.171, x20000)

Avaya IP Office 403
(10.1.2.15)

Avaya G650 Media Gateway
(IPSI: 10.1.2.6, Port 2
CLAN: 10.1.2.7, Port 5
MEDPRO: 10.1.2.8, Port 7)

Odyssey Radius Server
and DHCP Server
(10.1.2.80)

Avaya Voice Priority
Processor
(10.1.2.19)

Extreme Networks Alpine 3804
(10.1.2.1, 10.2.2.1)

Avaya 4602SW IP Telephone
(10.1.2.170, x50000)

VLAN 2 - 10.2.2.0 Network

Avaya W310 Mobility Gateway
(10.2.2.152)

Avaya AP-6
(10.2.2.150)

Avaya AP-8
(10.2.2.151)

Avaya W110 Light Access Point

RF Signals from
Access Points

(2) Pigtail Cables

Power
Divider/
Combiner

Combiner

Adapter Cable

MobileAccess MA-850

Passive Antennas

Avaya IP Softphone
or Avaya Phone Manager Pro

Avaya 3616/3626
Wireless IP Telephone

Figure 1: Avaya and MobileAccess Wireless LAN Configuration

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2. Equipment and Software Validated

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

Equipment	Software
Avaya S8500 Media Server with Avaya G650 Media Gateway	Communication Manager 2.1 (R012x.01.0.411.7)
Avaya IP Office 403	2.1.15
Avaya Voice Priority Processor	33/02
Avaya AP-6 Access Point	2.4.5
Avaya AP-8 Access Point	2.4.10
Avaya W310 Mobility Gateway	4.3.47
Avaya W110 Light Access Point	1.1.16
Avaya 4602SW IP Telephones	2.1
Avaya 3616/3626 IP Wireless Telephones	96.024
Avaya IP Softphone	5.1
Avaya Phone Manager Pro	2.1.7
Extreme Networks Alpine 3804 Ethernet Switch	7.2.0 Build 25
MobileAccess MA-850 Intelligent RF Switching Hub	1.6
MobileAccess 850 Customer Tool	1.8

3. Configure the Avaya Access Points

This section covers the configuration of the Avaya AP-6, AP-8, and W110 Access Points. The W110 Light Access Point is configured through the W310 Mobility Gateway. These Avaya APs support 802.11b/g on an embedded antenna and two external antennas.   The Avaya AP-8 and W110 also support 802.11a, which is not supported by the MA-850 Software Version 1.6. The embedded antenna in each AP supports diversity. Diversity allows an AP to select the better signal being received on two separate antennas simultaneously. In order for the MA-850 to operate properly, antenna diversity must be **disabled** on the Avaya APs.

Important Note: To disable antenna diversity on the Avaya APs, two coaxial pigtail cables were connected to each external antenna connection on the Avaya AP. By doing so, the integrated antenna is disabled. The two pigtail cables from the Avaya APs then connect to a Combiner adapter, which combines the two transmit signals into one. The Combiner in turn connects to the MA-850 via an adapter cable.   This antenna configuration essentially eliminates antenna diversity on the Avaya APs. Refer to the Avaya AP documentation listed in Section 12 for further details.

3.1. Configure the Avaya AP-6 and AP-8

It is assumed that the Avaya AP-6 and AP-8 have already been configured with an IP address. Initially, the APs may be accessed using their default IP address of 169.254.128.132. Alternatively, the ScanTool software utility can be used to initially configure the IP address of the APs as described in [1] and [2]. Once each AP has a valid IP address and Ethernet connection, the AP can be configured using a web browser. To access the HTTP interface, open

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a web browser on a network computer and specify the AP's IP address in the URL. Log in using the appropriate credentials in the **Enter Network Password** screen that appears (not shown). The **System Status** screen is displayed (not shown) which has the same format as **Figure 2**. The AP-6 consists of a single radio that supports 802.11b/g and the AP-8 consists of dual radios, supporting 802.11a and 802.11b/g, respectively. As a result, the configuration screens vary slightly and these differences are highlighted below. The configuration steps in this section are described from the perspective of an AP-6.

From **System Status** screen, select the **Interfaces** tab to configure the AP's operational mode and wireless interface settings. The operational mode specifies the mode of communication between a wireless client and the Access Point. In the **Operational Mode** sub-tab, configure the operational mode of the wireless interface as *802.11b only*, *802.11g only*, or *802.11bg*. On the AP-6, the 802.11b/g radio is referred to as the **Wireless – A** interface. On the AP-8, the 802.11b/g radio is referred to as the **Wireless – B** interface. When configuring the AP-8, ensure that the operational mode is configured for the 802.11b/g radio.
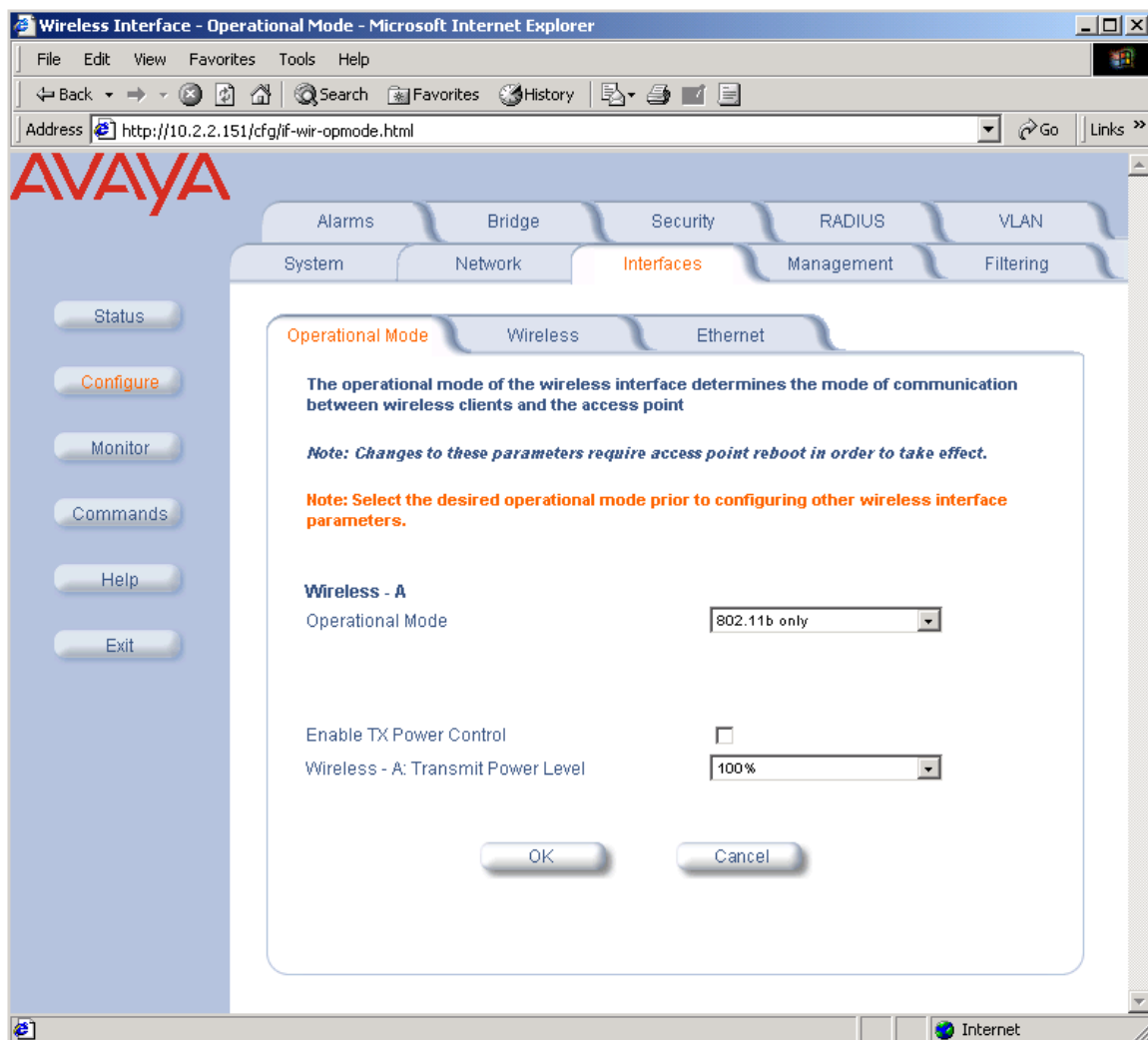
Figure 2: Interfaces Tab – Operational Mode for AP-6

In the **Wireless** sub-tab, configure the radio parameters for the wireless interface. Specify a unique **Network Name (SSID)** for the wireless network. In this configuration, the SSID was set to *MA850*. Deselect the **Enable Auto Channel Select** checkbox to allow the **Frequency Channel** of the AP to be selected. In this configuration, the AP-6 was configured to use channel 11. Selecting a free and relatively unused communication channel helps prevent interference problems and increases network performance. When configuring the AP-8, there are two Wireless interface sub-tabs corresponding to each radio. Ensure that the **Wireless – B** sub-tab, which corresponds to the 802.11b/g radio, is the one being configured. The AP-8 was configured to use frequency channel 1.
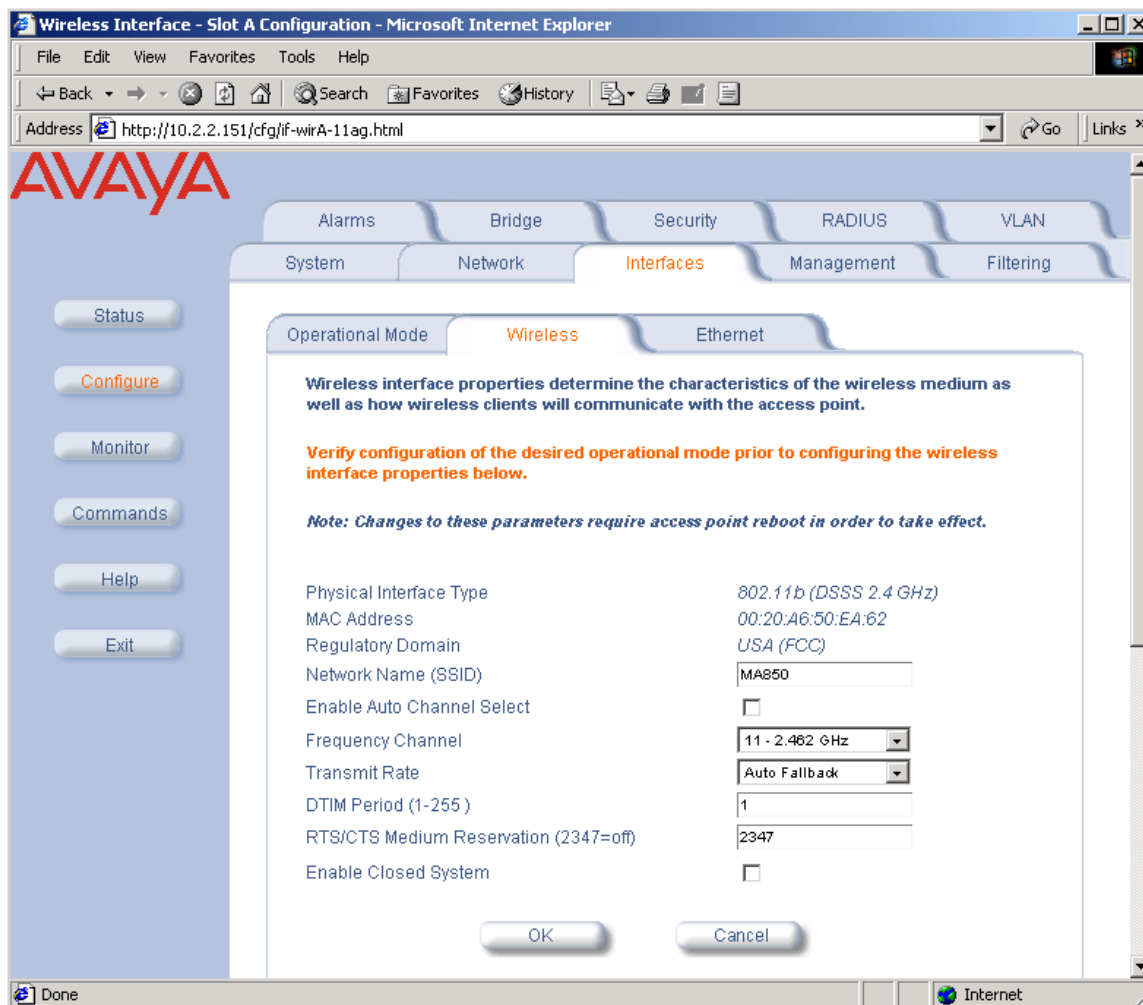
Figure 3: Interfaces Tab – Wireless Interface for AP-6

Reboot the AP so that the configuration changes take effect. To reboot the AP, select the **Commands** button on the left pane and then click on the **Reboot** option. On the subsequent web page, click the **Reboot** button.

3.2. Configure the Avaya W310 Mobility Gateway and W110 Light Access Point

This section covers the configuration of the Avaya W310 Mobility Gateway and the W110 Light Access Point. The W110 Light Access Point (LAP) is configured via the W310 Mobility Gateway. The W310 Mobility Gateway also provides power over Ethernet (PoE) to the W110 LAP. After certain commands are entered, the system will prompt the user to reboot the W110 LAP.

Step	Commands
1.	To perform the initial configuration of the W310 and W110, set up a serial connection from a PC or laptop. From the PC or laptop, set up a terminal session as follows: ▪ Baud Rate – 9600 ▪ Data Bits – 8 ▪ Parity – None ▪ Stop Bit – 1 ▪ Flow Control – None ▪ Terminal Emulation – VT-100 Log in as *root* to access the W310 CLI. After assigning an IP address to the W310, a telnet session may be used to access the W310 CLI.
2.	Assign an IP address to the management inband interface of the W310 and add a default route. The default gateway is the Alpine 3804. Create VLAN 2 and assign it to ports 1 and 2. Port 1 connects to the Alpine 3804 and port 2 connects to the W110 LAP. `W310-1(super)# `**`set vlan 2 name VLAN2`** `W310-1(super)# `**`set interface inband 2 10.2.2.152 255.255.255.0`** `W310-1(super)# `**`set port vlan 2 1/1-2`** `W310-1(super)# `**`set ip route 0.0.0.0 10.2.2.1`**
3.	Set the IP address of the master mobility server/controller. There must be one W310 configured as the system mobility controller. Other W310s in the wireless domain can be configured as backup system mobility controllers. The system mobility controller stores the information regarding a client's configuration, such as MAC address, IP address, gateway, VLAN, policy, user group, etc. This information is used when a wireless client roams from one W110 LAP to another W110 LAP connected to a different W310. In this configuration, there is no backup mobility server. `W310-1(super)# `**`wireless-domain-servers 10.2.2.152`**
4.	Enable the SpectraLink Voice over IP (VoIP) feature on the W110 LAP. `W310-1(super)# `**`spectralink-compatible-phone support`**

Step	Commands
5.	Create a Service Set Identifier (SSID) and enter SSID command mode. The SSID is the wireless network name. In this configuration, the SSID was set to *MA850*. Assign VLAN 2 to this SSID. Enable a broadcast SSID for the wireless network. This is done in response to a broadcast SSID probe request where a wireless device is actively seeking an access point. Disable closed system to enable broadcast to transmit the SSID through its broadcast beacon. Note that a relaxed security policy was used to verify this solution. A more secure policy can be configured on the W310 to meet a customer's requirements. ``` W310-1(super)# ssid MA850 W310-1(super/SSID MA850)# vlan 2 accessible W310-1(super/SSID MA850)# closed-system accept-any W310-1(super/SSID MA850)# broadcast transmit W310-1(super/SSID MA850)# exit ```
6.	Enter LAP command mode and configure the W110 LAP connected to port 2. The W110 LAP supports 802.11a/b/g. In the following example, the operational mode of the W110 LAP is set to 802.11b. Enter the radio card command mode and assign the attributes of SSID MA850 to the W110 LAP via the **ssid MA850** command. Next, select the frequency channel for 802.11b. In this example, channel 6 was used. ``` W310-1(super)# lap port-02 W310-1(super/LAP port-02)# operational-mode 802.11b W310-1(super/LAP port-02)# radio-card-802.11 802.11g first-slot W310-1(super/LAP port-02/802.11g first-slot)# ssid MA850 W310-1(super/LAP port-02/802.11g first-slot)# channel-selection selective W310-1(super/LAP port-02/802.11g first-slot)# channel-frequency 6 W310-1(super/LAP port-02/802.11g first-slot)# exit W310-1(super/LAP port-02)# exit ```

4. Configure MobileAccess MA-850

The MA-850 is configured using the **850 Customer Tool** running on a Windows PC or laptop. Establish a serial connection between the PC or laptop and the MA-850. Launch the **850 Customer Tool** and click the **Connect** button to establish communication with the MA-850. After the **850 Customer Tool** has connected to the MA-850, the button name will change to *Disconnect* and the LED next to the button will turn green.

In the **850 Customer Tool**, select the configuration for the MA-850 that corresponds to the number of APs that will be connected. The configuration options available for the MA-850 are listed in **Figure 5**. This is the only configuration required to connect the AP ports to the antenna ports on the MA-850. Use 50-ohm terminators on all unconnected AP and antenna ports. See [7] for more details on installing and configuring the MA-850.
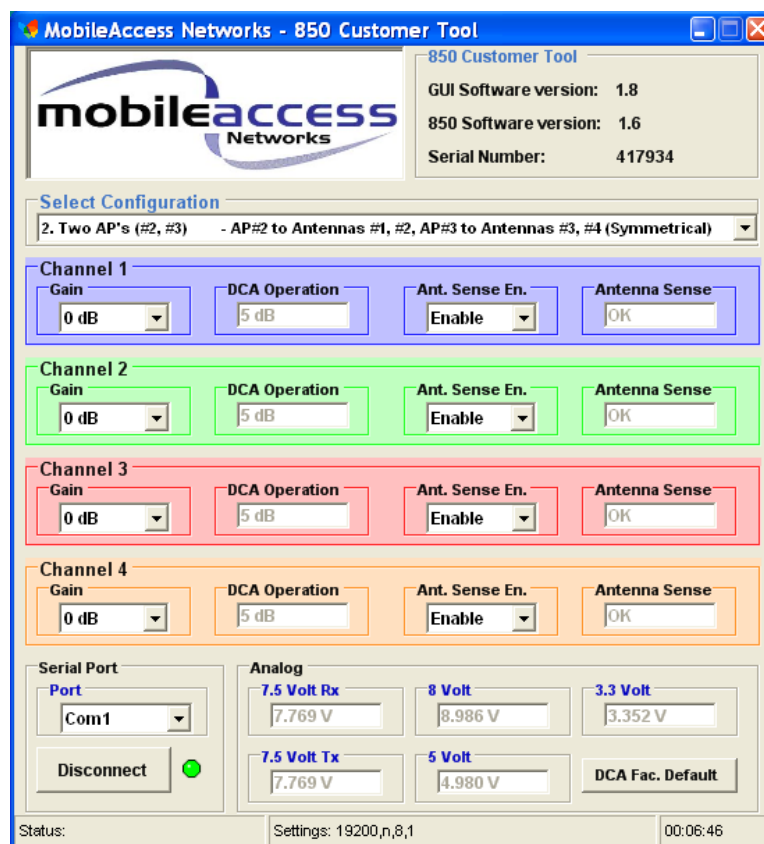
Figure 4: 805 Customer Tool

Figure 5: MA-850 Configuration Options

5. Interoperability Compliance Testing

This section describes the interoperability compliance testing used to verify the ability of the MA-850 to distribute RF signals from Avaya APs over passive antennas and to achieve good voice quality on wireless calls using Avaya 3616/3626 Wireless IP Telephones, Avaya IP Softphone, and Avaya Phone Manager Pro. This section covers the general test approach and the test results.

5.1. General Test Approach

The MA-850 was used to propagate RF signals from the Avaya AP-6, AP-8, and W110 Access Points over passive antennas. In the configuration used for compliance testing, acceptable voice quality was verified on wireless calls between Avaya wireless telephones and mobile laptops running Avaya IP Softphone and Avaya Phone Manager Pro. The following configurations were used to verify MA-850 functionality:

- One Avaya AP connected to the MA-850 with the MA-850 distributing the AP's signal to up to three passive antennas using 802.11b/g.

- Multiple Avaya APs connected to the MA-850 with the MA-850 distributing the signal of each AP over a passive antenna using 802.11b/g.

- Roaming between passive antennas associated with the same or different AP was also verified.

5.2. Test Results

All test cases passed. The MA-850 was able to distribute the signal from multiple Avaya APs over passive antennas using 802.11b/g.

Note: During compliance testing, it was noted that the MA-850 configuration specified by the **850 Customer Tool** (see **Figure 4**) would have to be re-configured after an MA-850 reboot to establish the correct antenna connections through the switch matrix of the MA-850.

6. Verification Steps

This section provides verification steps that may be performed in the field to verify that the wireless IP endpoints have connectivity to the network through the MA-850.

1. Check that the Avaya wireless IP endpoints are associated with an Avaya AP. On the AP-6 and AP-8, this can be verified via the station statistics web page. To access the **Station Statistics**, click the **Monitor** button on the left pane as shown in **Figure 2** and then click on the **Station Statistics** link at the bottom of the page. The following web page is displayed that lists the wireless endpoints associated with the AP.
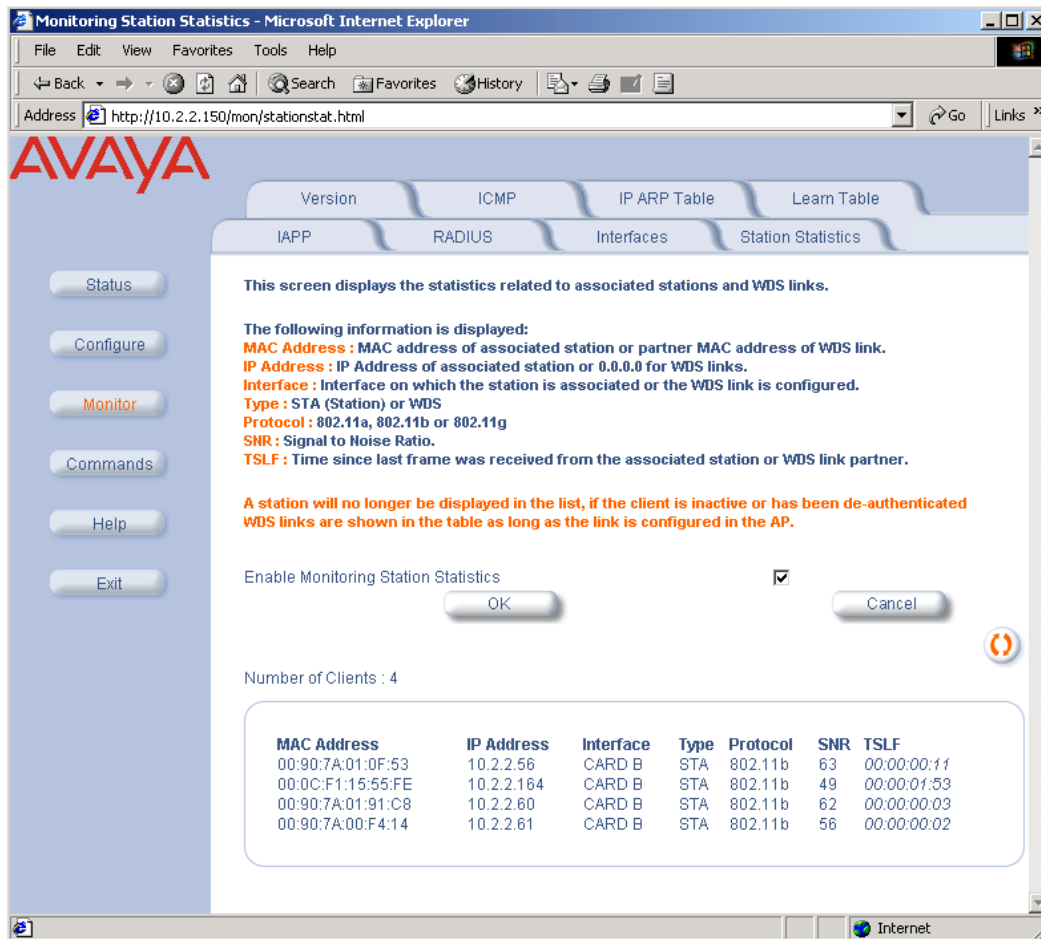
2. Check that the Avaya wireless IP endpoints have successfully registered with Avaya Communication Manager by typing the **list registered-ip-stations** command on the SAT. A sample output of this command is shown below.

```
list registered-ip-stations

                         REGISTERED IP STATIONS

Station   Set      Product    Prod  Station           Net Orig       Gatekeeper
Ext       Type     ID         Rel   IP Address        Rgn Port       IP Address
50000     4602     IP_Phone   1.800 10.1.2.170        1              10.1.2.7
50003     4620     IP_Soft    5.146 10.2.2.162        1              10.1.2.7
50005     4620     IP_Phone   1.500 10.1.2.19         1              10.1.2.7
```

3. Verify that a wireless call can be established successfully.

7. Support

For technical support on the MobileAccess 850, contact MobileAccess Customer Support by calling 1-800-787-1266.

8. Conclusion

These Application Notes describe the configuration steps required to connect the Avaya AP-6, AP-8, and W110 Access Points to the MA-850 intelligent RF switching hub. By doing so, the MA-850 is able to distribute the RF signal from the APs to different locations in a building using passive antennas. This allows the Avaya APs to be clustered together in a single location, such as a secure telecom closet, for easy maintenance access. In addition, the MA-850 can increase AP coverage by propagating the signal from a single AP to multiple passive antennas located in different locations within a building. This solution was verified using an Avaya IP Telephony Infrastructure as shown in **Figure 1**.

9. References

This section references the Avaya and MobileAccess Networks product documentation that are relevant to these Application Notes.

The following Avaya product documentation can be found at http://support.avaya.com.

[1] *Avaya Wireless AP-4/5/6 User's Guide for Release 2.4.5*, January 2004, Document Number 555-301-708.
[2] *Avaya Wireless AP-8 User's Guide for Release 2.4.10*, March 2004, Document Number 21-300142.
[3] *Avaya W310 WLAN Gateway Installation and Configuration User Guide*, October 2004, Document Number 21-300041.
[4] *Avaya W310 WLAN Gateway Command Reference Guide*, March 2004, Document Number 21-300040.
[5] *Avaya W110 WLAN Access Point Quick Start Guide*, June 2004, Document Number 21-300159.

The following Application Notes are available at
http://www1.avaya.com/enterprise/resourcelibrary/applicationnotes/devconnect_network.html.

[6] *Application Notes for Trapeze Networks Mobility System with an Avaya IP Telephony Infrastructure*, Issue 1.0.

The following MA-850 product documentation is available from MobileAccess. For additional product and company information, visit http://www.mobileaccess.com.

[7] *MobileAccess MA-850 Installation and Configuration Guide*, Rev 1.2, August 2004.