Avaya Solution & Interoperability Test Lab

Application Notes for Configuring Hitachi Cable WirelessIP-5000-A SIP Telephone with Avaya Communication Manager and Avaya SIP Enablement Services – Issue 1.0

Abstract

These Application Notes describe the configuration process for interoperability between the Hitachi Cable WirelessIP-5000-A SIP Telephone with Avaya Communication Manager and Avaya SIP Enablement Services. Information in these Application Notes has been obtained through Developer*Connection* compliance testing. Testing was conducted via the Developer*Connection* Program at the Avaya Solution and Interoperability Test Lab.

©2007 Avaya Inc. All Rights Reserved.

1. Introduction

Avaya Communication Manager and Avaya SIP Enablement Services have the capability to extend advanced telephony features to SIP stations. These features can be extended to non-Avaya SIP telephones such as the Hitachi Cable WirelessIP-5000-A SIP Telephone.

These Application Notes describe a sample solution for configuring the Hitachi Cable WirelessIP-5000-A SIP Telephone to interoperate with Avaya Communication Manager and Avaya SIP Enablement Services through an Aruba Networks wireless network. The Hitachi Cable WirelessIP-5000-A SIP Telephone is an 802.11b/g wireless SIP telephone capable of registering with Avaya SIP Enablement Services. The Hitachi Cable WirelessIP-5000-A SIP Telephone can be identified from other Hitachi Cable model telephones by the asterisk shaped speaker found on the back of the phone, see **Section 5.1 Step 1**. The Hitachi Cable WirelessIP-5000-A SIP Telephone has many additional features and supports a wide array of industry standards, please refer to **Section 10** [**3]** or the complete list of features and standards support.

1.1. Network Diagram

The network diagram shown in **Figure 1** illustrates the testing environment used for compliance testing. The network consists of an Avaya Communication Manager, Avaya SIP Enablement Services, wired IP telephones, wireless IP telephones, software based IP telephones, a digital telephone, and the wireless network infrastructure described below. Also included is Avaya IA 770 INTUITY AUDIX (IA770), which is bundled with Avaya Communication Manager and provides voicemail services. Two computers are also present in the network providing network services such as DHCP, TFTP, HTTP and RADIUS. The RADIUS service was provided by Microsoft Internet Authentication Server (IAS).

The wired IP telephones include the Avaya 9630, the Avaya 4610SW and the Avaya 4625SW IP Telephones. The wireless IP telephones are the Hitachi Cable WirelessIP-5000-A SIP Telephones. Present in the network is an Avaya 2420 Digital Telephone, which is directly connected to Avaya Communication Manager. Two wireless laptops, one running Avaya one-X Desktop Edition and the other running Avaya IP Softphone, are connected to the network.

The wireless network is provided by Aruba Networks and consists of an Aruba 2400 Mobility Controller and Aruba Access Points. Access point models include the Aruba AP-60, AP-65 and AP-70. Only one of the access points is on the same IP subnet as the Aruba 2400 Mobility Controller. The other two access points are on separate IP subnets.

©2007 Avaya Inc. All Rights Reserved.

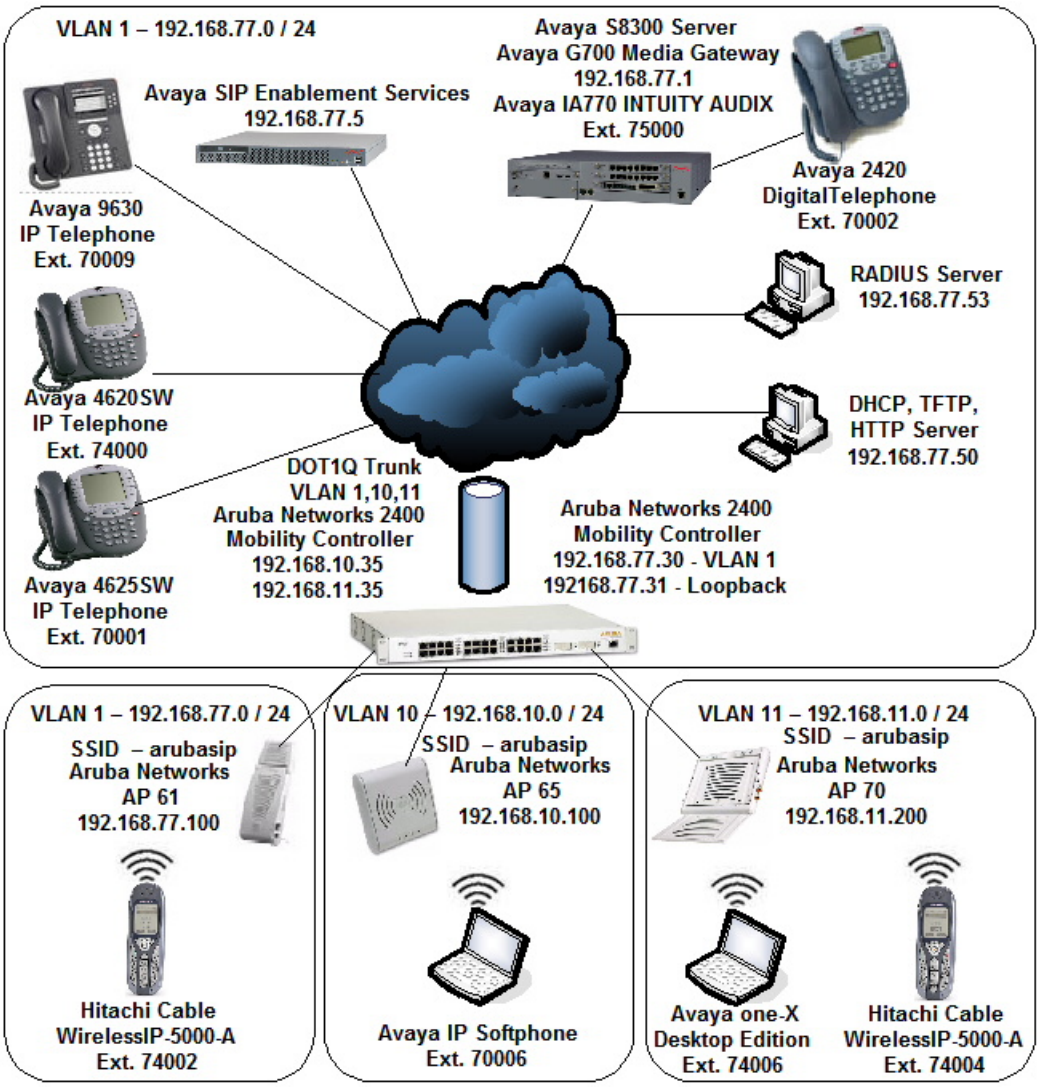


Figure 1: Sample Network Diagram for Hitachi Cable WirelessIP-5000-A SIP Telephone with Avaya Communication Manager and Avaya SIP Enablement Services

©2007 Avaya Inc. All Rights Reserved.

2. Equipment and Software Validated

The following equipment and software were used for the test environment:

Equipment	Software
Avaya S8300 Server	Avaya Communication Manager 4.0 (R014x.00.0.730.5) Avaya IA 770 INTUITY AUDIX 4.0-11.0
Avaya G700 Media Gateway • MM711 Analog Media Module • MM712 DCP Media Module	26.31.0 HW04 / FW87 HW05 / FW08
Avaya SIP Enablement Services	3.1.2 (SES-3.1.2.0-309.0)
Avaya 4610SW IP Telephone (SIP)	2.2.2
Avaya 4625SW IP Telephone (H.323)	2.8
Avaya 9630 IP Telephone (H.323)	1.5
Avaya 2420 Digital Telephone	N/A
Avaya one-X Desktop Edition	2.1 SP1
Avaya IP Softphone	6.0.0.25
Aruba 2400 Mobility Controller	3.1.0.7
Aruba AP-60, AP-65, AP-70	3.1.0.7
Hitachi Cable WirelessIP-5000-A SIP Telephone	Software : 2.5.1 Boot Rom : 1.1.4
Microsoft 2003 Server Internet Authentication Server	5.2.3790.0

3. Avaya Communication Manager and Avaya SIP Enablement Services Configuration

All of the telephones configured in the sample network in **Figure 1** were administered as H.323 or SIP stations in Avaya Communication Manager and Avaya SIP Enablement Services. SIP stations were administered as Off-PBX stations in Avaya Communication Manager. For complete references on how to administer these types of stations please refer to **Section 10** [**1**] and [**2**]. No additional or special configurations are needed in order for the Hitachi Cable WirelessIP-5000-A SIP Telephone to interoperate with Avaya Communication Manager or Avaya SIP Enablement Services. However, there are some configuration parameters regarding the IP network region in which Avaya Communication Manager resides, that the Hitachi Cable WirelessIP-5000-A SIP Telephone needs to match.

©2007 Avaya Inc. All Rights Reserved.

Step	Description
1.	The output of the "**display ip-network-region**" command is shown below. The fields highlighted in bold will need to be configured to match on the Hitachi Cable WirelessIP-5000-A SIP Telephone.

```
display ip-network-region 1                                   Page   1 of  19
                             IP NETWORK REGION
  Region: 1
Location:         Authoritative Domain: devcon7.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: 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


ESC-x=Cancel Esc-e=Submit Esc-p=Prev Pg Esc-n=Next Pg Esc-h=Help Esc-r=Refresh
```


©2007 Avaya Inc. All Rights Reserved.

4. Aruba 2400 Mobility Controller Configuration

The following steps detail the initial configuration for the Aruba Networks wireless network used for the compliance testing. The initial configuration is performed on a factory default system using the serial or console interface to provision the IP addressing and configure the local switch ports on the Aruba 2400 Mobility Controller. Once the system is initially provisioned, the remaining configurations are shown from the web interface.

Step	Description
1.	To perform the initial configuration on the Aruba 2400 Mobility Controller, setup a serial connection from a PC or laptop. Setup a terminal session with the following parameters: • 9600 baud • 8 bits • no parity • 1 stop bit • No flow control Log into the Aruba 2400 Mobility Controller using default credentials which can be obtained from the Aruba Networks documentation, see **Section 10** [**5**]. Provision the **System name**, **VLAN 1 interface IP address**, **VLAN 1 interface subnet mask, IP Default gateway, Switch Role** and confirm US country code on the Aruba 2400 Mobility Controller. Once all the information has been configured, the system confirms the acceptance of these changes and requires a reboot. Enter **System name** [Aruba2400]: **Aruba2400** Enter **VLAN 1 interface IP address** [172.16.0.254]: **192.168.77.30** Enter **VLAN 1 interface subnet mask** [255.255.255.0]: **255.255.255.0** Enter **IP Default gateway** [none]: **192.168.77.254** Enter **Switch Role**, (master|local) [master]: **master** This controller is restricted to Country code US for United States, please confirm (yes|no)?: **yes** If you accept the changes the switch will restart! Type <ctrl-P> to go back and change answer for any question Do you wish to accept the changes (yes|no)**yes** System will now restart!

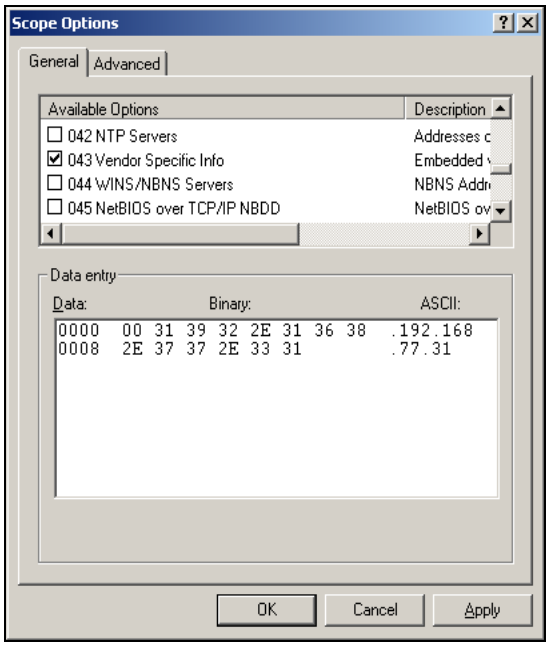
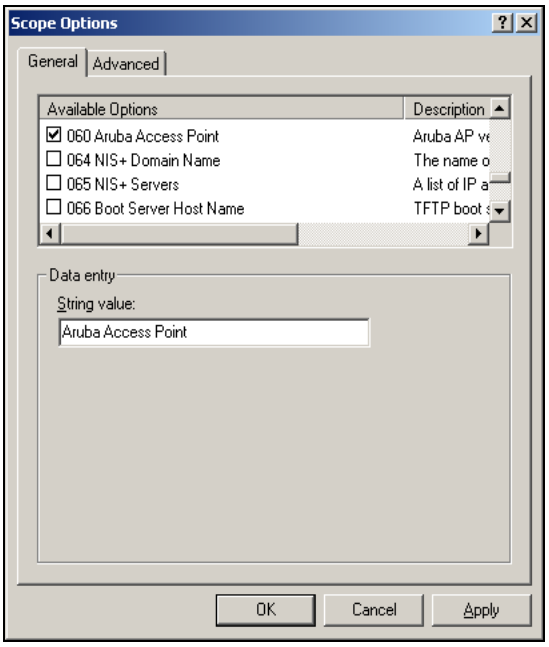
©2007 Avaya Inc. All Rights Reserved.

Step	Description
2.	Once the system has rebooted, login to the Command Line Interface (CLI) to provision the loopback interface on the Aruba 2400 Mobility Controller. The configuration of the loopback interface is required when using multiple VLANs. This requires a reboot of the system for the changes made to the loopback interface. (Aruba2400) #**configure t** (Aruba2400) (config) #**interface loopback** (Aruba2400) (config-loop)#**ip address 192.168.77.31** Switch IP Address is Modified. Switch should be rebooted now (Aruba2400) (config-loop)#**end** (Aruba2400) #**write mem** Saving Configuration... Configuration Saved. (Aruba2400) #**reload** Do you really want to reset the system(y/n): **y** System will now restart!

©2007 Avaya Inc. All Rights Reserved.

Step	Description
3.	Once the system has rebooted, login to the CLI to provision the local switch ports and save the configuration. The remainder of the configuration will be carried out using the web interface which can be accessed by using any web browser to access either the VLAN 1 or loopback IP address of the Aruba 2400 Mobility Controller. (Aruba2400) #**configure t** ! Create the two additional VLANs, VLAN 10 and VLAN 11 ! (Aruba2400) (config) #**vlan 10** (Aruba2400) (config) #**vlan 11** ! Provision the IP address on the two additional VLANs ! (Aruba2400) (config) #**interface vlan 10** (Aruba2400) (config-subif)#**ip address 192.168.10.35 255.255.255.0** (Aruba2400) (config-subif)#**interface vlan 11** (Aruba2400) (config-subif)#**ip address 192.168.11.35 255.255.255.0** ! Provision the local switch ports ! (Aruba2400) (config) #**interface fastethernet 1/0** (Aruba2400) (config-if)#**switchport mode access** (Aruba2400) (config-if)#**switchport access vlan 1** (Aruba2400) (config-if)#**interface fastethernet 1/2** (Aruba2400) (config-if)#**switchport mode access** (Aruba2400) (config-if)#**switchport access vlan 10** (Aruba2400) (config-if)#**interface fastethernet 1/4** (Aruba2400) (config-if)#**switchport mode access** (Aruba2400) (config-if)#**switchport access vlan 11** (Aruba2400) (config-if)#**interface gigabitethernet 1/25** (Aruba2400) (config-if)#**switchport mode trunk** (Aruba2400) (config-if)#**switchport trunk allowed vlan 1,10,11** (Aruba2400) (config-if)#**end** ! Save the Configuration ! (Aruba2400) #**write memory**

©2007 Avaya Inc. All Rights Reserved.

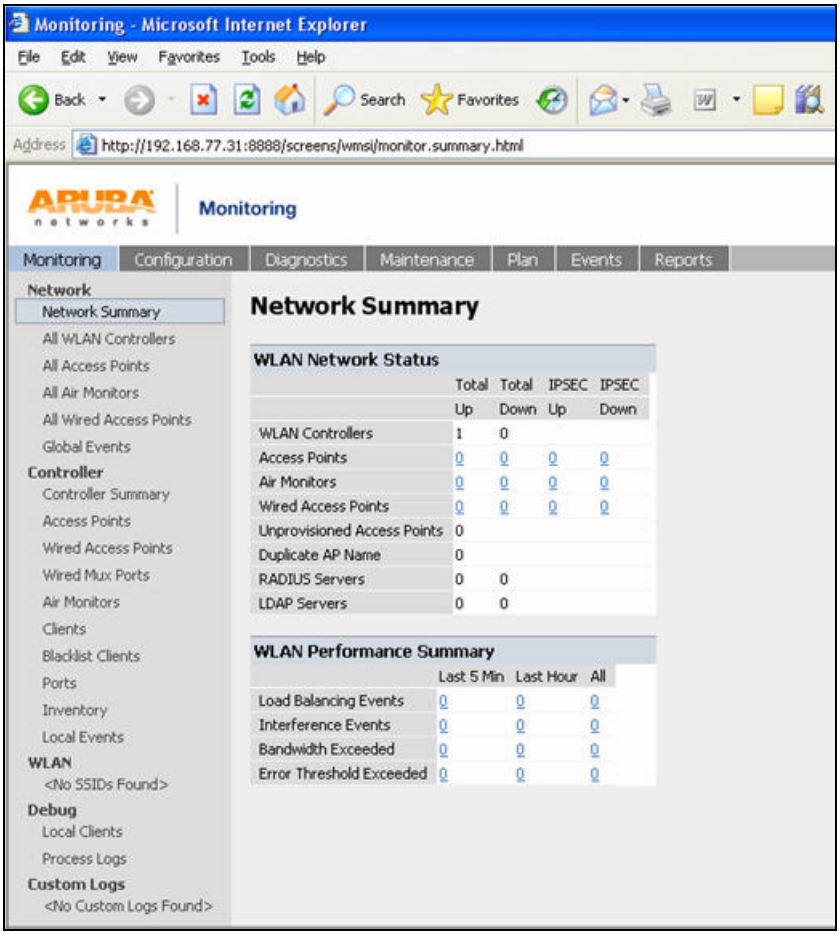
Step	Description
4.	In order for the Aruba access points to automatically register to the Aruba 2400 Mobility Controller the DHCP server needs to be configured in order to provide two options (Option 43 and 60). There are other methods, such as using DNS, in order for the Aruba access points to automatically register to Aruba Mobility Controllers. In the sample network, DHCP options 43 and 60 were used to provide the IP address to the Aruba 2400 Mobility Controller. Modify the DHCP server to provide Options 43 and 60. The ASCII value configured for DHCP Option 43 is the IP address of the loopback interface on the Aruba 2400 Mobility Controller. Option 60 needs to be configured to provide a String value which contains “Aruba Access Point”. The combination of these two DHCP options is what enables the Aruba access points to automatically register to the Aruba Mobility Controller.  

©2007 Avaya Inc. All Rights Reserved.

Step	Description
5.	Using a web browser, open a connection to the Aruba 2400 Mobility Controller by putting the IP address of the Aruba 2400 Mobility Controller's loopback interface into the URL (http://192.168.77.31 was used in the sample network). The user is presented with a login screen and must provide credentials in order to receive access to the system. Refer to **Section 10** [**5**] for information about obtaining login credentials.

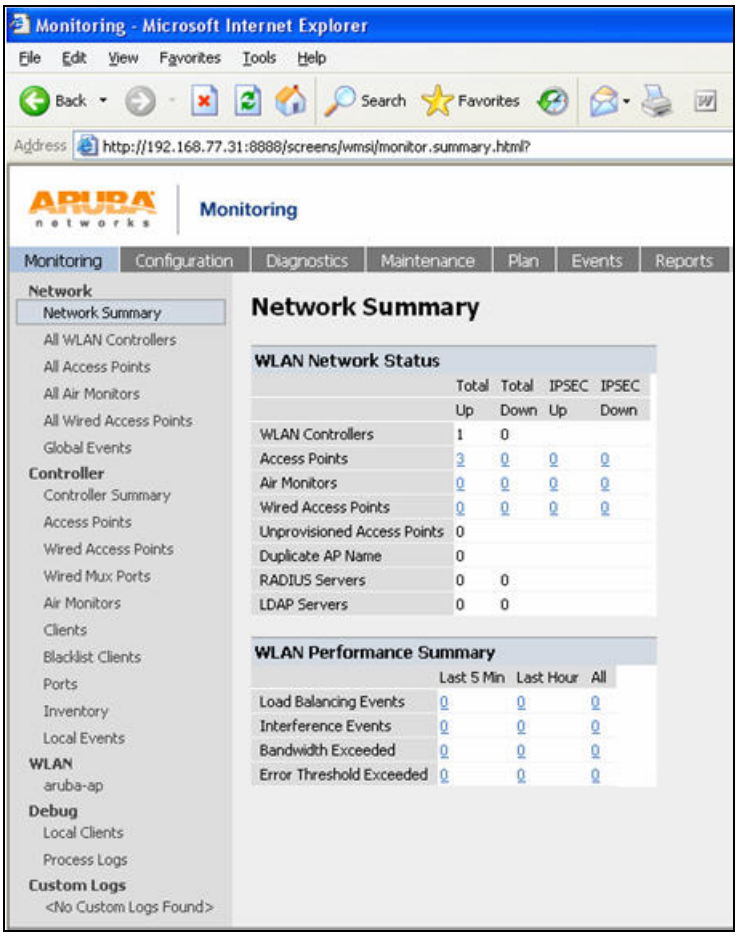
©2007 Avaya Inc. All Rights Reserved.

Step	Description
6.	Once logged into the Aruba 2400 Mobility Controller, the user is presented with the following status screen which indicates details such as number of controller and access points the system has found. No access points have been plugged into the controller and none are shown at this time.

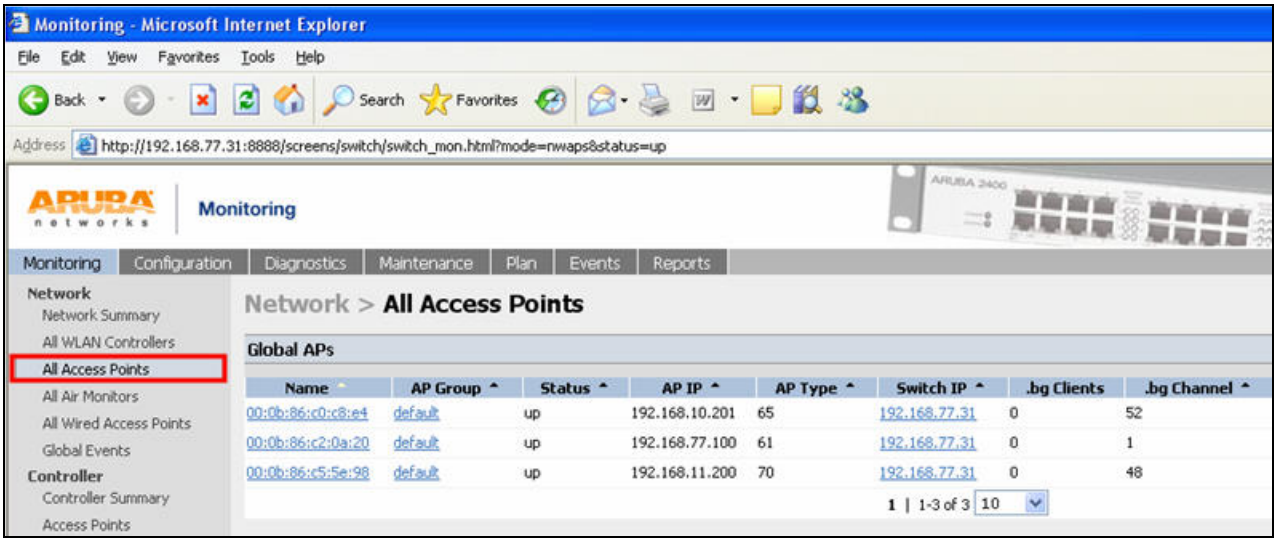
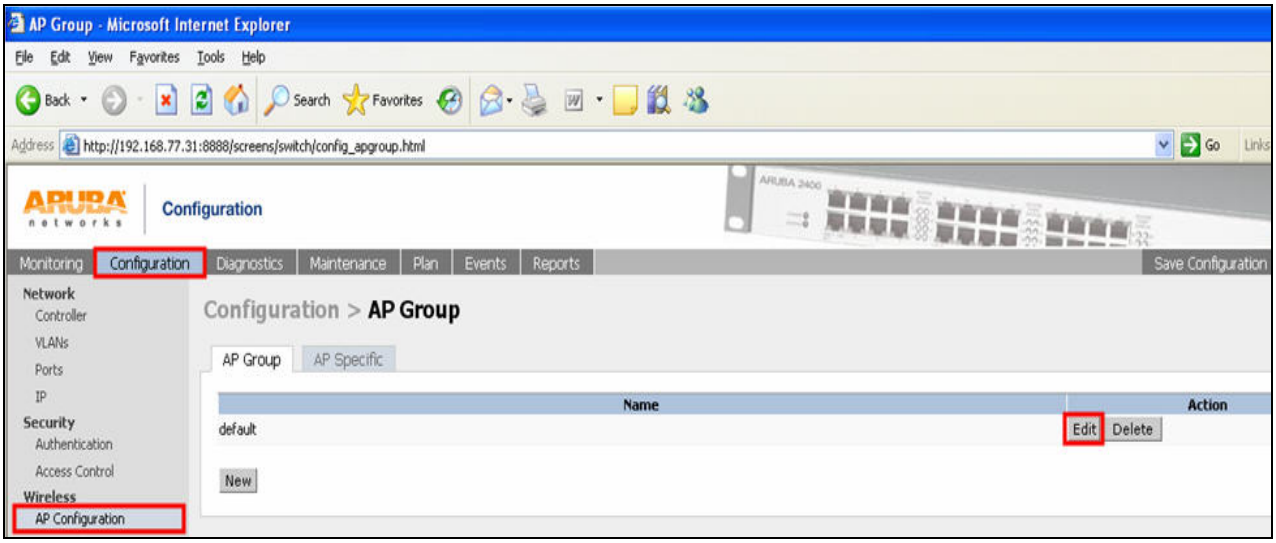


©2007 Avaya Inc. All Rights Reserved.

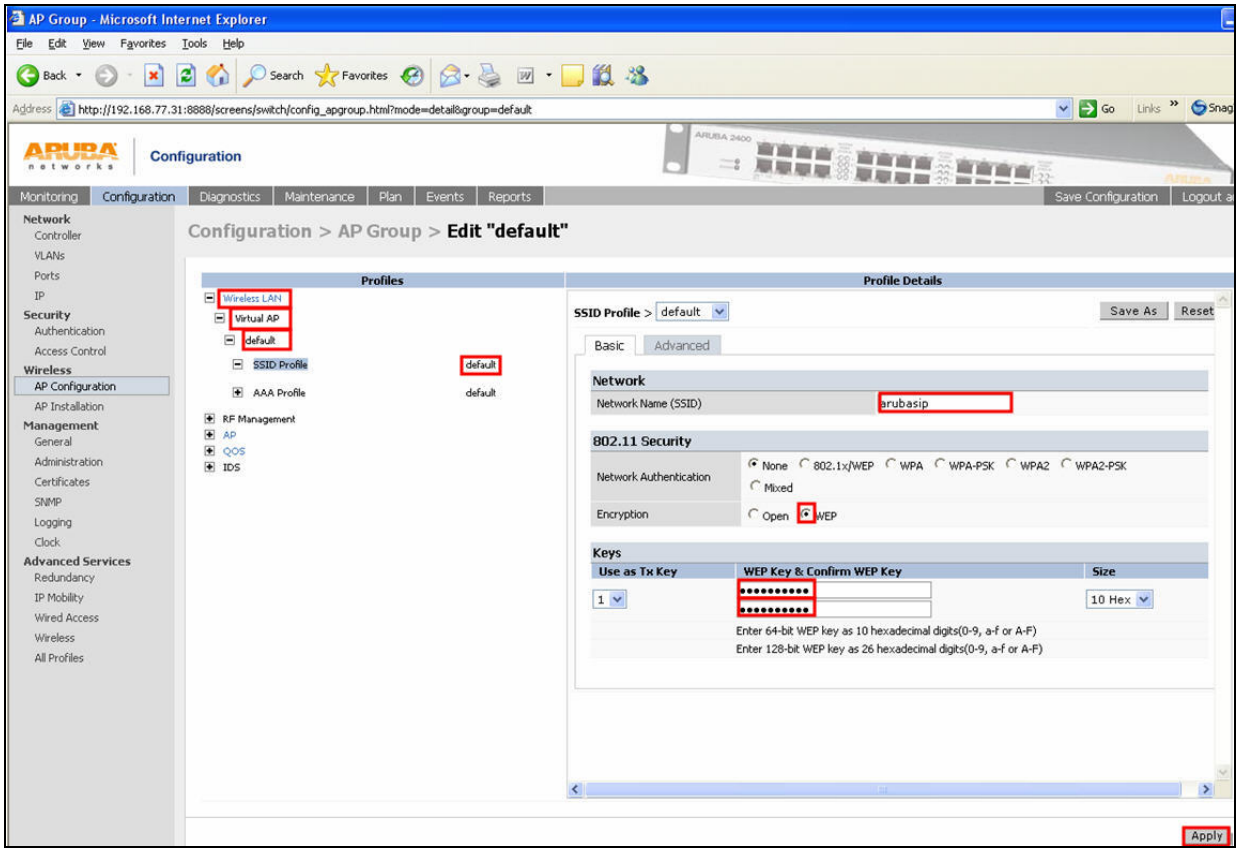
Step	Description
7.	At this time three access points were plugged directly into the Aruba 2400 Mobility Controller, one access point per VLAN (VLAN 1, VLAN 10, and VLAN 11). See **Figure 1** for an illustration of the sample network. Refresh the web page and the Access Points counter shows that three access points have been found.



©2007 Avaya Inc. All Rights Reserved.

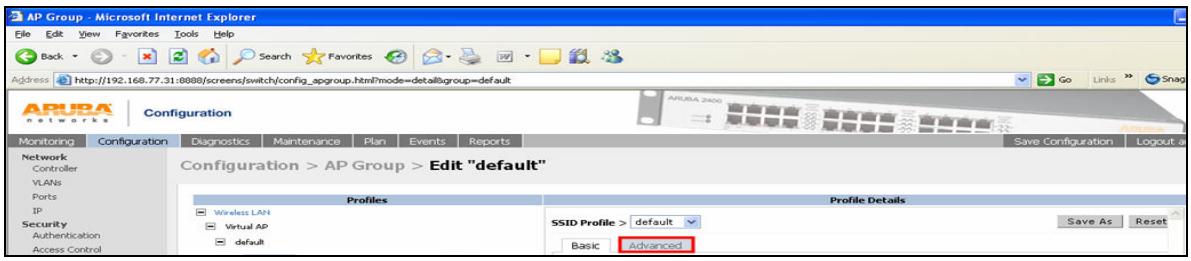
Step	Description
8.	Navigate to the **All Access Points** web page by clicking **All Access Points** from the menu present on the left side of the web page. This page can be used to quickly gauge the connectivity between the Aruba 2400 Mobility Controller and the Aruba access points. 
9.	Navigate to the **Edit default AP** web page by clicking **Configuration→AP Configuration→Edit**. 

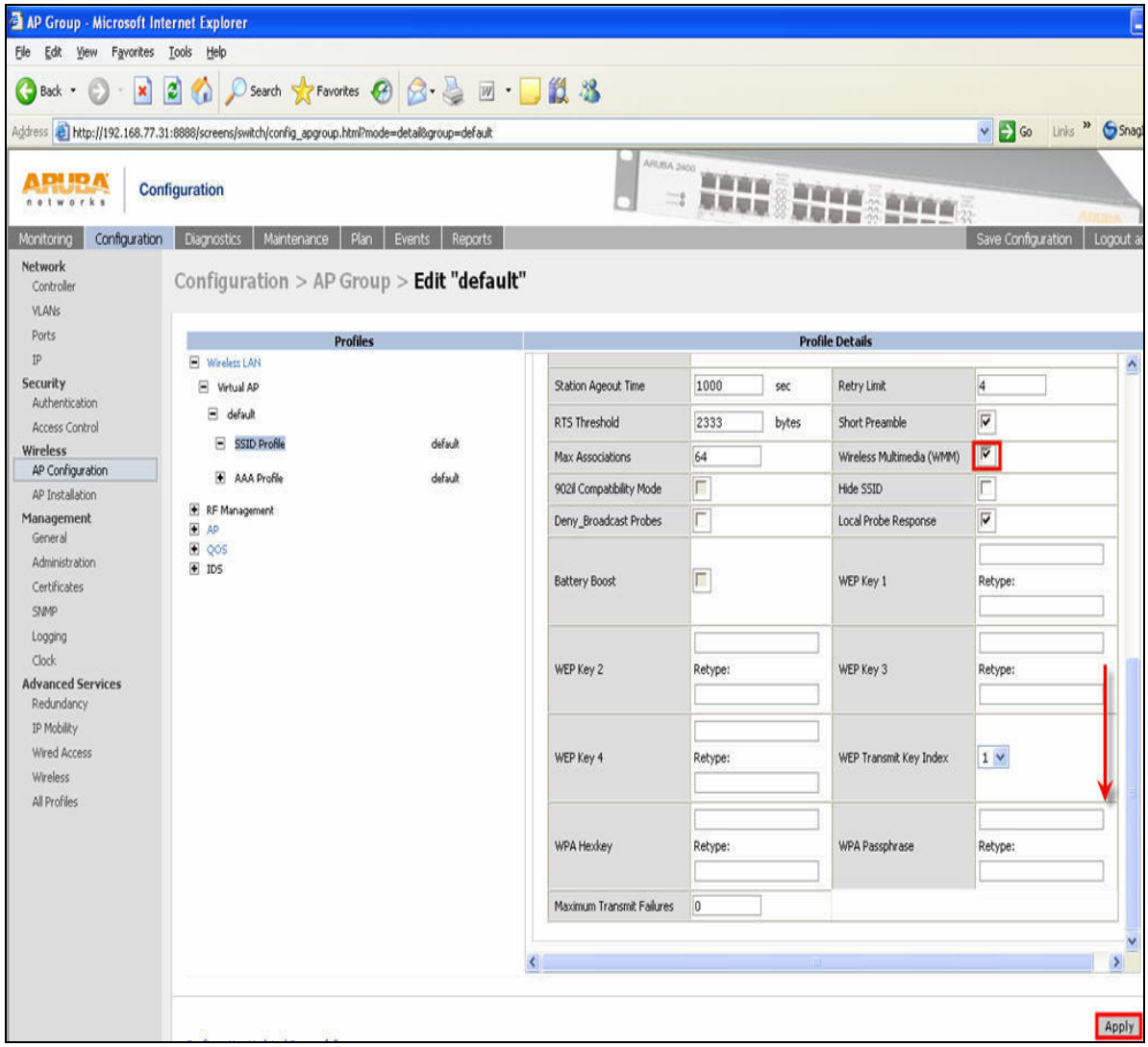
©2007 Avaya Inc. All Rights Reserved.

Step	Description
10.	From the **Edit default AP Group** web page navigate to the **SSID Profile** configuration page by clicking **Wireless LAN→Virtual AP→default→default** next to the SSID Profile. Configure the parameters seen below. The WEP Key configured here will need to match the value configured on the Hitachi Cable WirelessIP-5000-A SIP Telephone in **Section 5.2 Step 3.** Once all the settings have been configured, click **Apply**. Four different security schemas were verified: Clear, WEP, WPA-PSK TKIP and WPA2-AES 8021X-PEAP with Certificates. For complete details on how to configure the Aruba 2400 Mobility Controller to support these security schemas see **Section 10** [**5**]. 

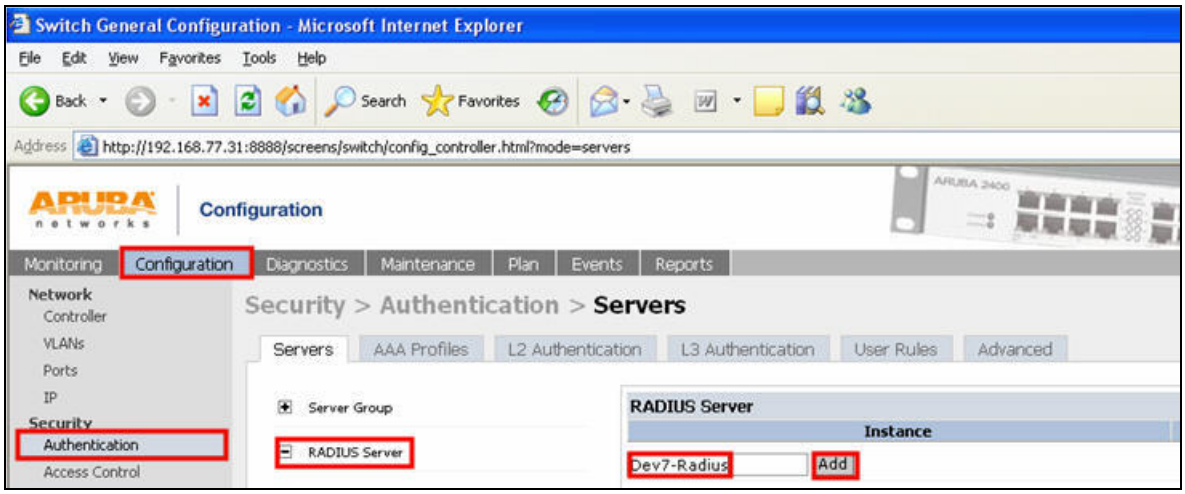
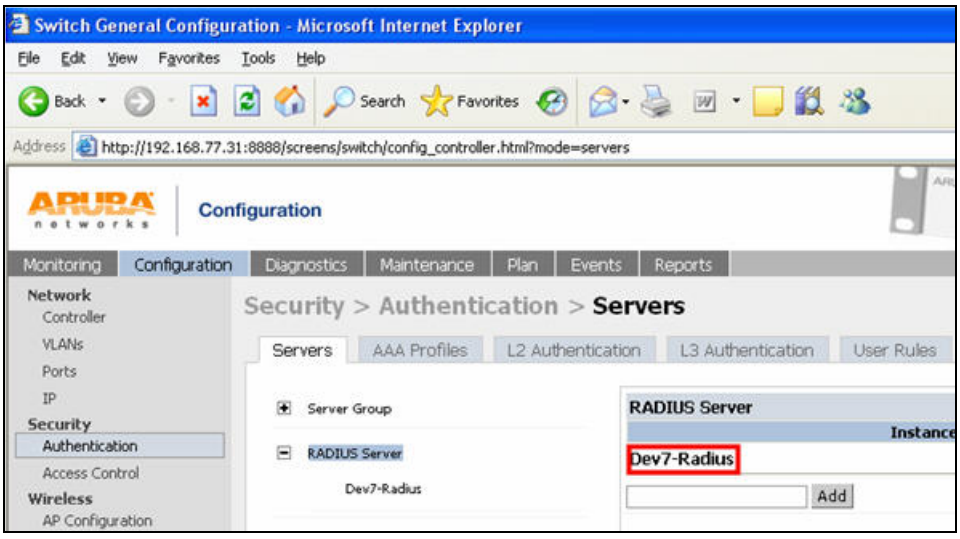
©2007 Avaya Inc. All Rights Reserved.

Step	Description
11.	Navigate to the **Advanced** configuration menu by clicking **Advanced**. Then using the pull down arrows, scroll down until the Wireless Multimedia (WMM) option becomes visible and check the **Wireless Multimedia (WMM)** check box. Click **Apply**.

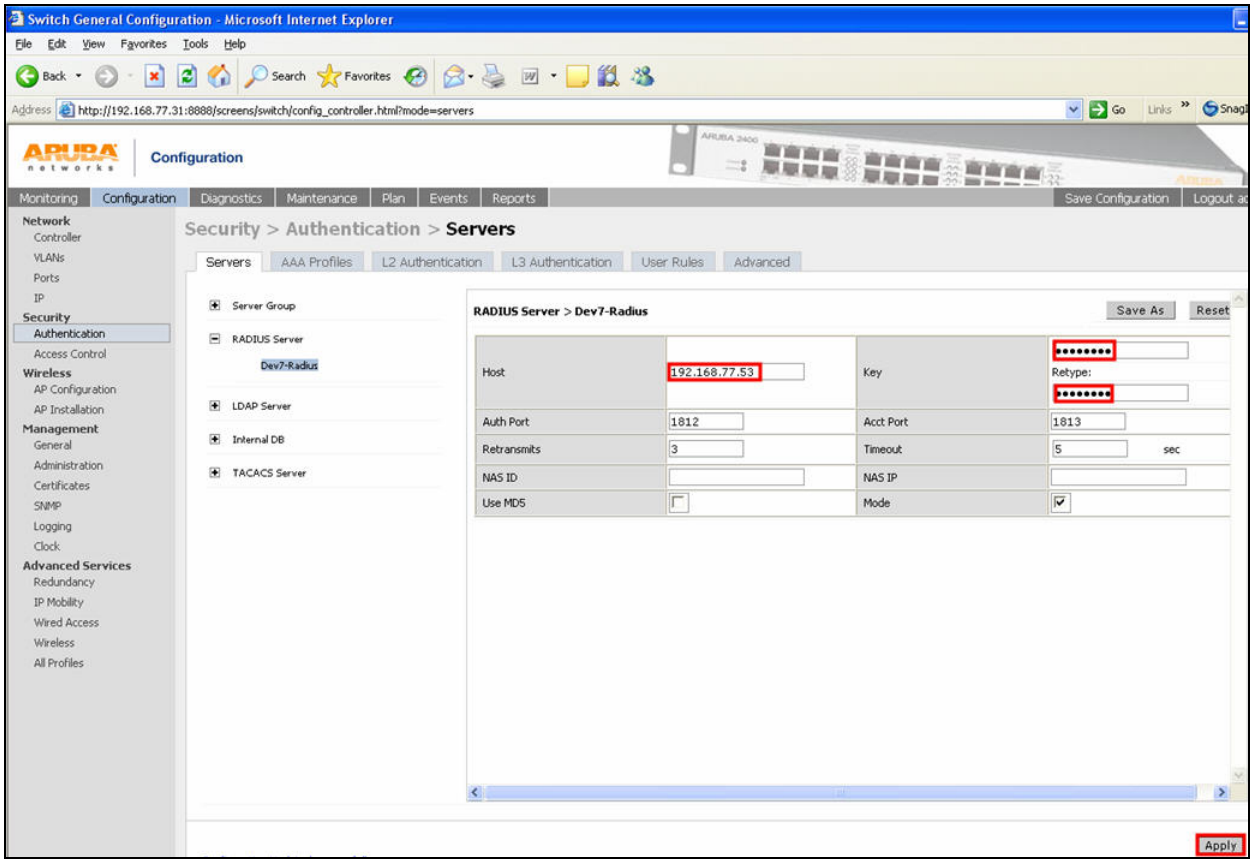




©2007 Avaya Inc. All Rights Reserved.

Step	Description
12.	Navigate to the **Server Configuration** web page by clicking **Configuration→Authentication→+ RADIUS Server** (the + becomes a – once it is clicked). Enter a descriptive label for the name of the RADIUS Server being added to the system, then click **Add**. In the sample network the name "Dev7-Radius" was chosen. 
13.	After the RADIUS Server has been added to the system, it now becomes a clickable item that will open a configuration dialogue for the RADIUS Server. Click on the name of the RADIUS Server configured in the previous step. 

©2007 Avaya Inc. All Rights Reserved.

Step	Description
14.	After clicking on the name of the RADIUS Server the user is presented with the following configuration screen. Configure the **Host** field to be the IP address of the RADIUS Server. The value configured for the **Key** field will need to match the value configured on the RADIUS Server. Click **Apply**. For complete details on the RADIUS/802.1X configuration on the Aruba 2400 Mobility Controller see **Section 10** [**5**]. 

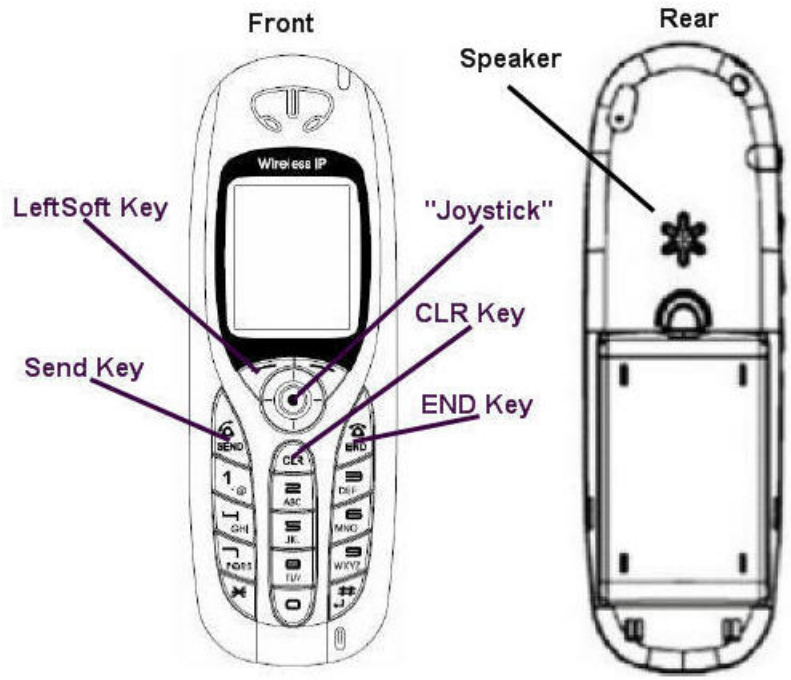
©2007 Avaya Inc. All Rights Reserved.

5. Hitachi Cable WirelessIP-5000-A SIP Telephone Configuration

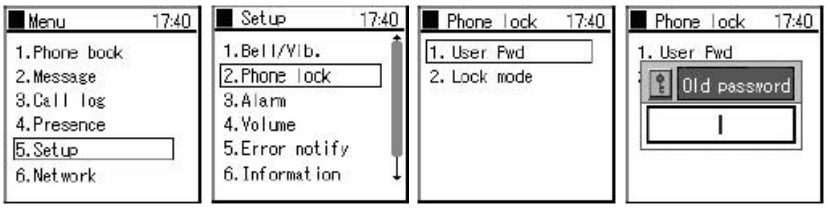
The following steps describe the configuration process for the Hitachi Cable WirelessIP-5000-A SIP Telephone to connect to a wireless network and register with Avaya SIP Enablement Services.

1.2. Administering the Initial Configuration of the Hitachi Cable WirelessIP-5000-A SIP Telephone

In order to connect the Hitachi Cable WirelessIP-5000-A SIP Telephone to a wireless network the user must first configure the telephone to create the initial WiFi binding. The user can either use the buttons on the face of the telephone or a USB cable connection to a computer with a specific software application. Once the Hitachi Cable WirelessIP-5000-A Telephone has a WiFi binding with an IP address, the user can complete the configuration process using the web server built into the telephone. There are some vendor specific configuration dependencies in the configuration file, consult with Hitachi support for specific inquiries.

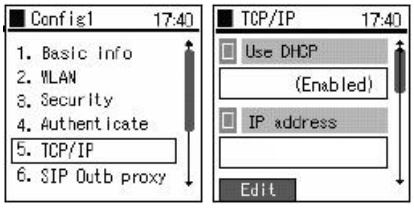
Step	Description
1.	A picture of the Hitachi Cable WirelessIP-5000-A SIP Telephone is shown below. The buttons used for configuring the telephone are referenced.  **Note:** For the complete description of each button and each button's functionality refer to the Hitachi Cable documentation found in **Section 10** [**3**] and [**4**]. To power on the Hitachi Cable WirelessIP-5000-A SIP Telephone press and hold the **"END Key"** until the phone powers up.

©2007 Avaya Inc. All Rights Reserved.

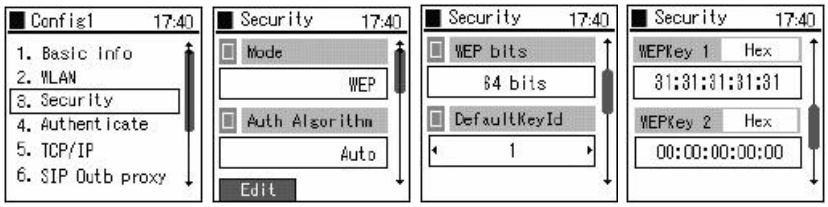
Step	Description
2.	Once the phone has powered up, press the **"LeftSoft Key"** to enter the menu. From the **Menu** screen, use the key sequence **"5", "2", "1" (Setup→Phone lock→User Pwd)** in order to obtain access to the **Admin** menu. Enter the correct password for accessing the **Admin** menu and press the **"Joystick"** in. A password is required to access this menu, for additional information refer to **Section 10** [**4**].  The user is now presented with the **Admin** menu.

©2007 Avaya Inc. All Rights Reserved.

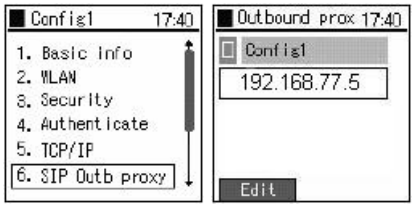
1.3. Administering the Network Configuration for Hitachi Cable WirelessIP-5000-A SIP Telephone

Step	Description
1.	From the **Admin** menu, press **"1"** to select **"Network config"**. From the **Network config** menu use the key sequence **"1", "1", "2" (Network config→Config1→WLAN)** to access the **WLAN** menu. Press the **"LeftSoft Key"** to select **Edit**. Use the keypad to enter the **SSID**, which must match the SSID configured on the wireless network.
2.	From the **Config1** menu press **"5"** to configure the TCP/IP parameters for the Hitachi Cable WirelessIP-5000-A SIP Telephone. If DHCP is not enabled press the **"LeftSoft Key"** and select **Edit** then using the **"JoyStick"** toggle left/right to enable DHCP. 

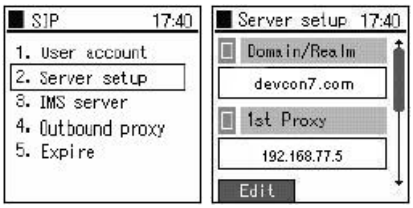
©2007 Avaya Inc. All Rights Reserved.

Step	Description
3.	From the **Config1** menu, press **"3"** to administer the **Security** configuration. Press the **"LeftSoft Key"** and select **Edit** to modify the security mode. The three supported modes on the Hitachi Cable WirelessIP-5000-A Handset are **"None"**, **"WEP"**, and **"WPA-PSK"**. Using the **"Joystick"** press left/right until the **"WEP"** option is selected. Then use the **"Joystick"** pressing up/down until the **"WEP bits"** option is selected and specify the correct number of bits used for encrypting, **64 bits** was used. Using the **"Joystick"** press up/down until the **"WEPKey 1"** option is highlighted. Using the key pad specify the Hex key assigned to the SSID. Press the **"Joystick"** in to complete the Security configuration. This Hex value must match the one configured on the wireless network, see **Section 4 Step 10**.  For the procedures to enable the Hitachi Cable WirelessIP-5000-A SIP Telephone to support the additional security schemas tested refer to **Section 10** [**3**] and [**4**].

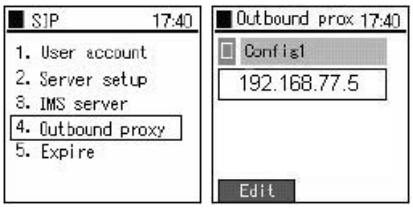
1.4. Administering the SIP Configuration on Hitachi Cable WirelessIP-5000-A SIP Telephone

Step	Description
1.	From the **Config1** menu, press **"6"** to specify the **SIP Outb proxy**. Use the **"LeftSoft Key"** and select **Edit**. Enter **192.168.77.5**, which is the IP address of Avaya SIP Enablement Services. 

©2007 Avaya Inc. All Rights Reserved.

Step	Description
2.	From the **Network config** menu, press **"2"**, **"1" (SIP→User Account)** to specify the **SIP** and **User Account** information. Press the **"LeftSoft Key"** and select **Edit** to input the **User Account** information into the Hitachi Cable WirelessIP-5000-A SIP Telephone. Using the **"JoyStick"** navigate by pressing up/down and enter the following information. The **URL scheme** must be selected using the **"JoyStick"** by toggling left/right until **SIP** is configured. Press the **"JoyStick"** inward to input the newly specified parameters. In order to configure the **User ID, User Password** and **URL Scheme** the operator must navigate by pressing the "**Joystick**" down until those options appear. • **Display Name 74002** • **Phone Number 74002** • **User ID 74002** • **User Password 123456** • **URL Scheme SIP**
3.	From the **SIP** menu, press **"2"** to enter the **Server setup** configuration menu. Press the **"LeftSoft Key"** and select **Edit** to configure the **Server setup** information. Using the keypad configure the **Domain/Realm**, **1st Proxy** and **1st Registrar** information. Press the **"JoyStick"** inward to input the newly specified parameters. To navigate to the **1st Registrar** press the "**Joystick**" down to scroll the screen. The Domain/Realm is the domain name of Avaya SIP Enablement Services. The 1st Proxy and 1st Registrar are the IP address of Avaya SIP Enablement Services, **192.168.77.5** in the sample network. • **Domain/Realm devcon7.com** • **1st Proxy 192.168.77.5** • **1st Registrar 192.168.77.5** 

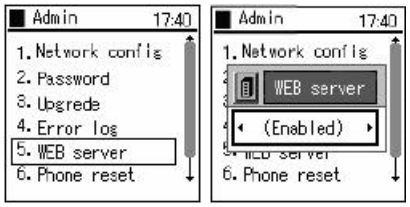
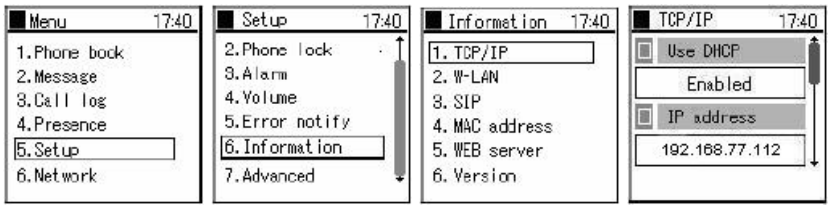
©2007 Avaya Inc. All Rights Reserved.

Step	Description
4.	From the **SIP** menu, press **"4"** to enter the **Outbound proxy** configuration menu. Press the **"LeftSoft Key"** and select **Edit** to input the **Outbound proxy** information. Press the **"JoyStick"** inward to input the newly specified parameters. Press the **"END Key"** to exit the **Admin** menu of the Hitachi Cable WirelessIP-5000-A SIP Telephone. The **Outbound proxy** is the IP address of Avaya SIP Enablement Services, **192.168.77.5** in the sample network. 

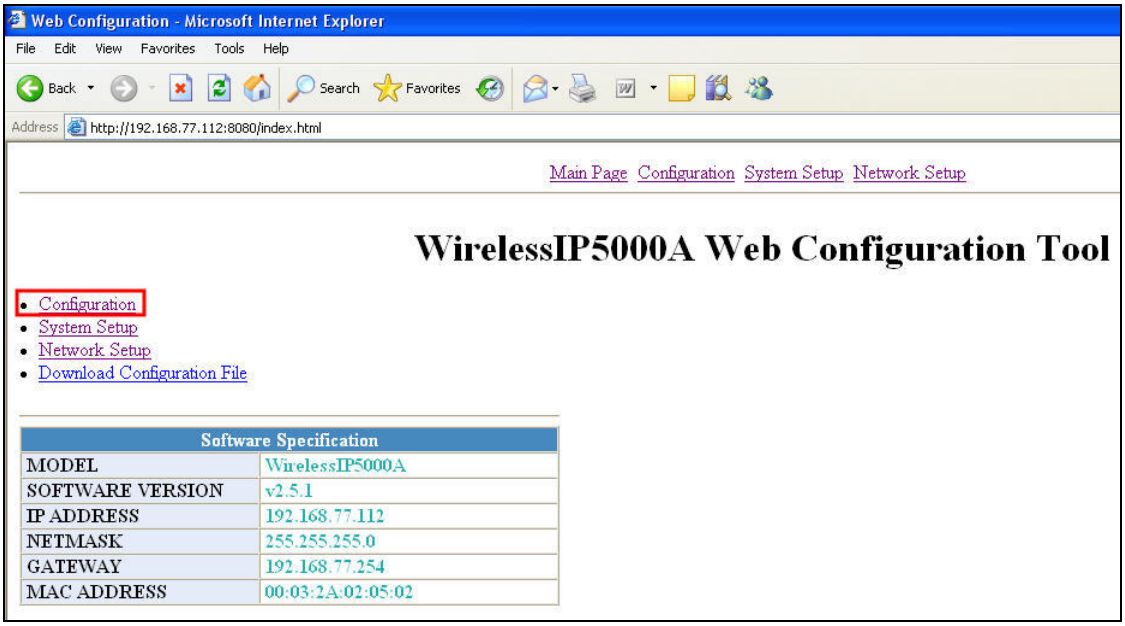
©2007 Avaya Inc. All Rights Reserved.

1.5. Administering Additional Configuration Information on Hitachi Cable WirelessIP-5000-A SIP Telephone

This section details other configurations necessary for interoperability between the Hitachi Cable WirelessIP-5000-A SIP Telephones with Avaya SIP Enablement Services Server. The following settings are configured by using the web server built-in to the Hitachi Cable WirelessIP-5000-A SIP Telephone and require a web browser (such as Internet Explorer). Only modifications made to default values are shown.

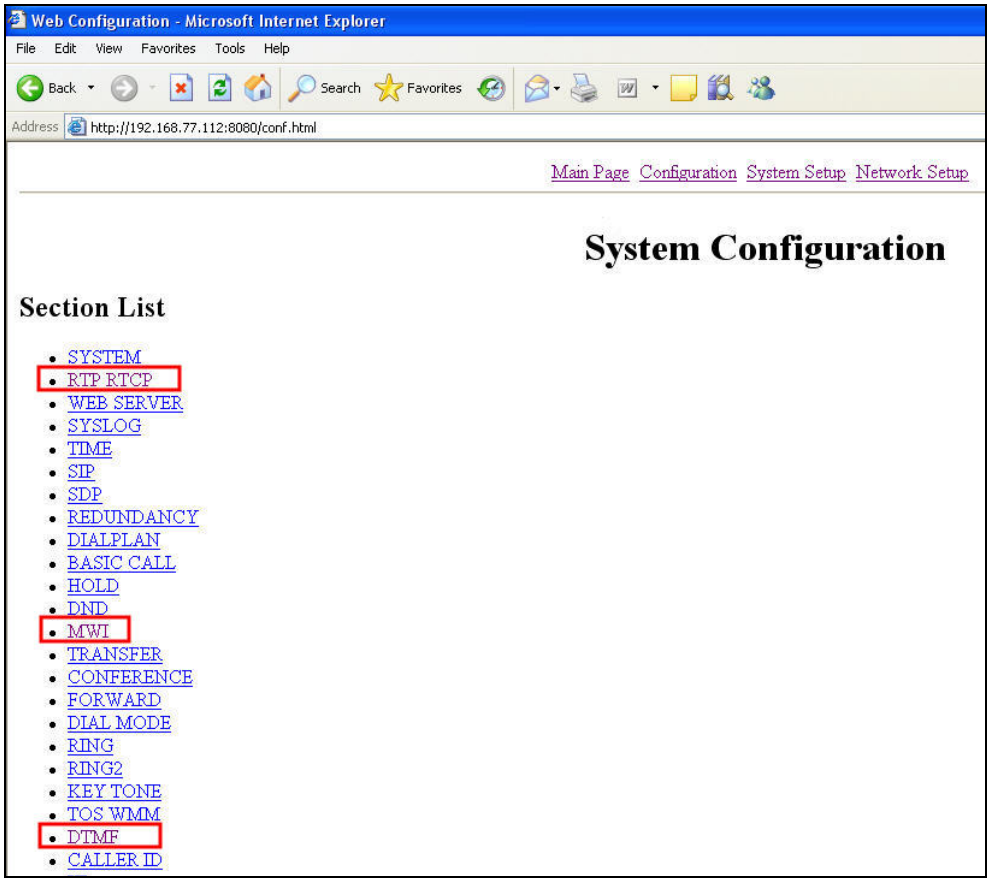
Step	Description
1.	In order to verify the web server is running on the Hitachi Cable WirelessIP-5000-A SIP Telephone use the **Admin** menu. From the **Admin** menu, press **"5"** to check the status of the web server. Should the web server be disabled, use the **"JoyStick"** and toggle left/right and select **Enabled**. Press the **"JoyStick"** inward.  To obtain the IP address assigned via DHCP to the Hitachi Cable WirelessIP-5000-A SIP Telephone use the key sequence **"5"**, **"6"**, **"1" (Setup→Information→TCP/IP)** from the **Menu** menu. 

©2007 Avaya Inc. All Rights Reserved.

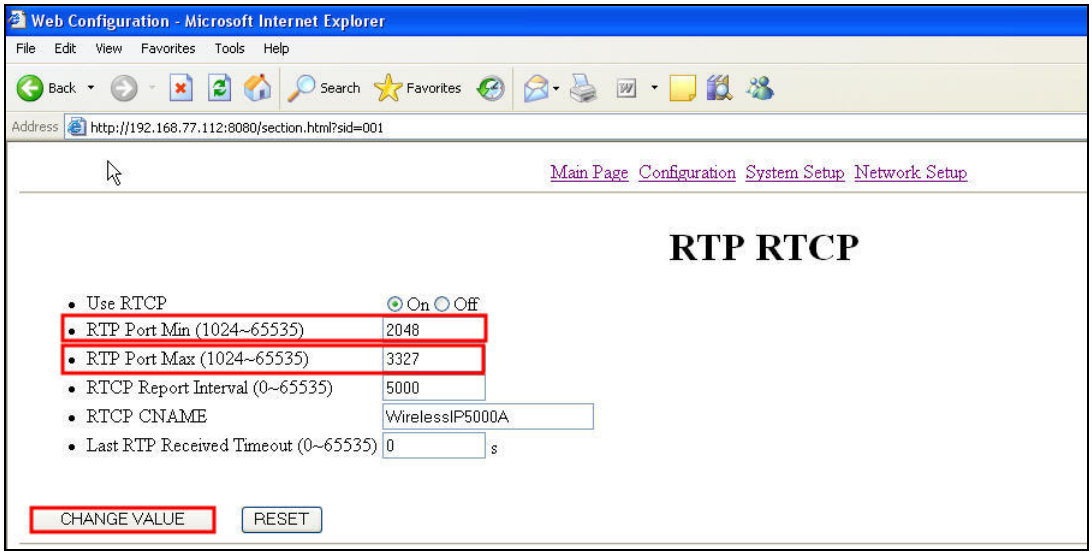
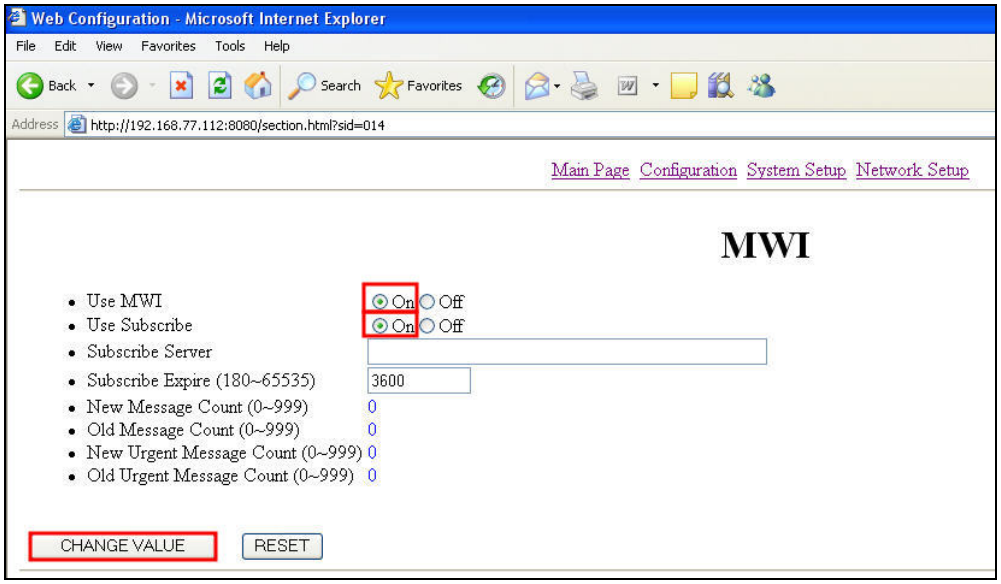
Step	Description
2.	From a web browser running on a PC with IP connectivity to the Hitachi Cable WirelessIP-5000-A SIP Telephone, administer the telephone as follows. Place the IP address of the telephone into the URL address field specifying the port 8080. The web server inside the Hitachi Cable WirelessIP-5000-A SIP Telephone operates at port 8080. The URL string to access the web server of a telephone (which has an IP address of 192.168.77.112) is http://192.168.77.112:8080. The user will be required to supply a username and password to access the web interface, consult the Hitachi Cable documentation for the appropriate credentials, see **Section 10** [**4**]. Click **Configuration**. 

©2007 Avaya Inc. All Rights Reserved.

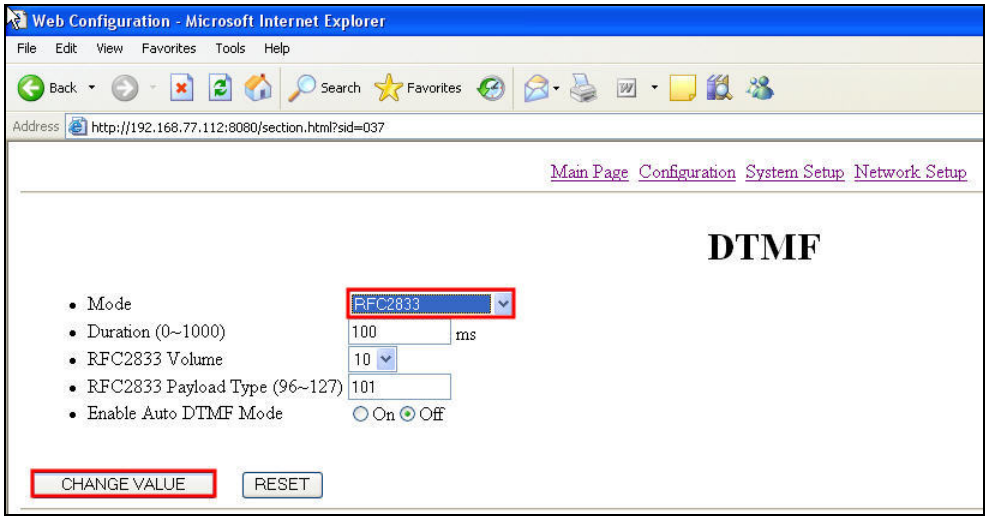
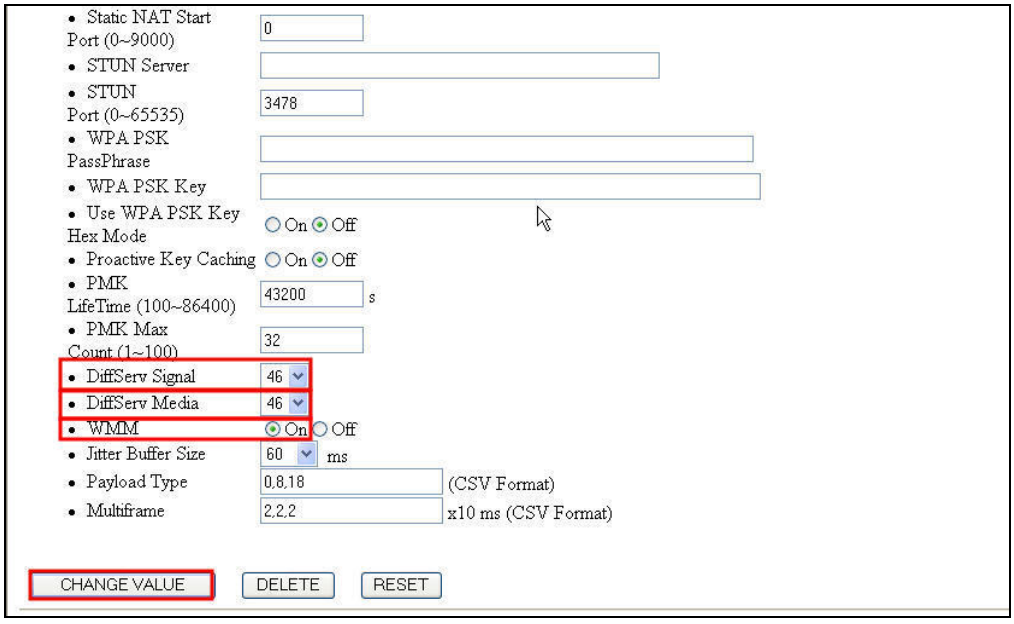
Step	Description
3.	From the **System Configuration** web page, three options need to be configured. Click **"RTP RTCP"**, **"MWI"**, and **"DTMF"** and configure the following parameters.



©2007 Avaya Inc. All Rights Reserved.

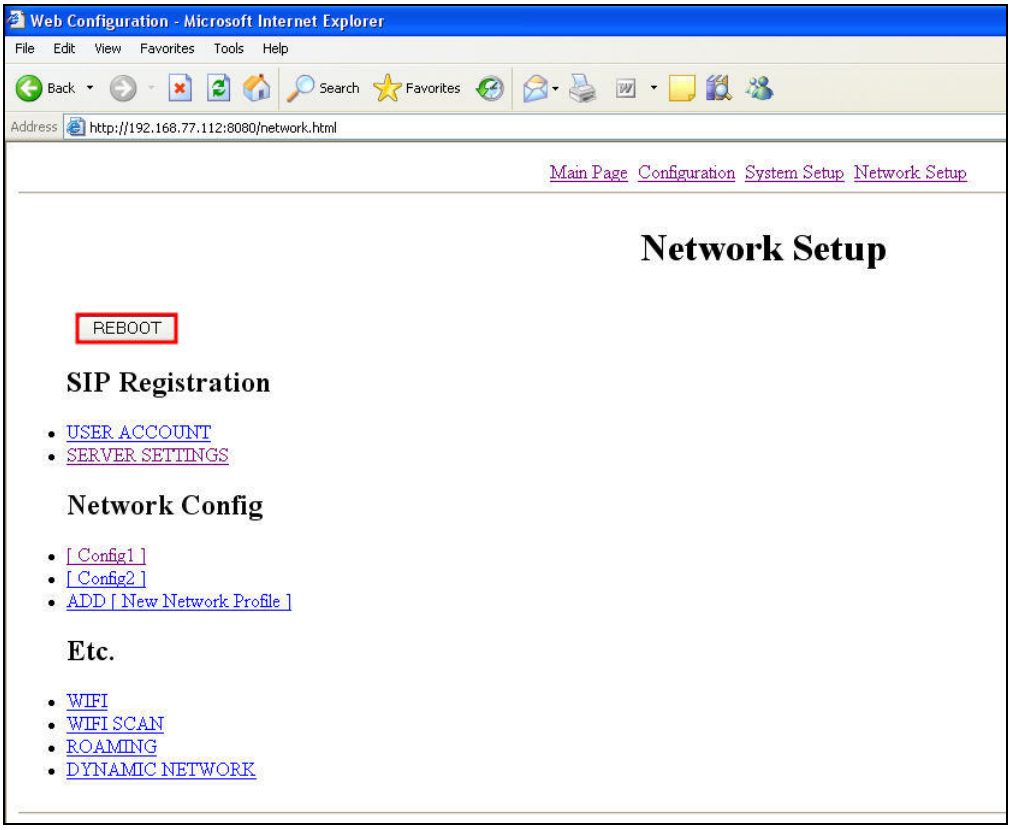
Step	Description
4.	From the **RTP RTCP** web page configure the **"RTP Port Min (1024~65535)"** and **"RTP Port Max (1024~65535)"** parameter to match those configured on Avaya Communication Manager, see **Section 3 Step 1**. Click **"CHANGE VALUE"**. 
5.	From the **MWI** web page turn on **"Use MWI"** and **"Use Subscribe"**. Click **"CHANGE VALUE"**. 

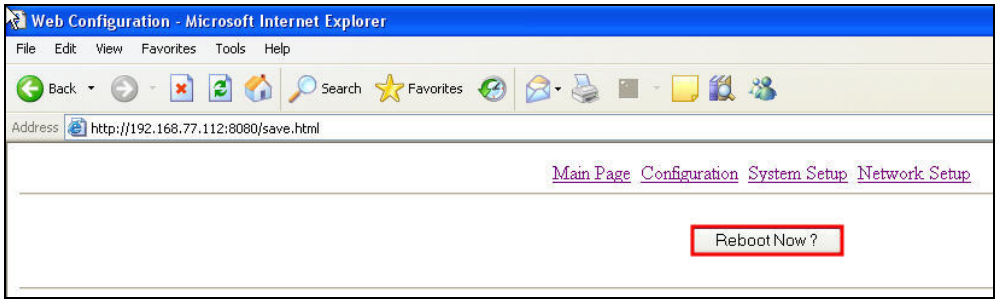
©2007 Avaya Inc. All Rights Reserved.

Step	Description
6.	From the **DTMF** web page, use the pull down menu for the **Mode** field and select **"RFC2833"**. Click **"CHANGE VALUE"**. 
7.	From the **Main Page**, see **Step 2**, click **"Network Setup"**. From the **Network Setup** web page many additional configurations options are presented to the user. Using the navigation bars, scroll down to the second half of the web page and using the pull down menu configure **"DiffServ Signal"** and **"DiffServ Media"** for a value of **46**. Use the radio button and enable "**WMM**". Click **"CHANGE VALUE"**. 

©2007 Avaya Inc. All Rights Reserved.

Step	Description
8.	Return to the **Network Setup** web page and click **"REBOOT"**. Click **"Reboot Now ?"**. In order for the new configuration to take effect the phone needs to be rebooted.





©2007 Avaya Inc. All Rights Reserved.

6. Interoperability Compliance Testing

The interoperability compliance testing focused on verifying the capability of the Hitachi Cable WirelessIP-5000-A SIP Telephone to register with Avaya Communication Manager and Avaya SIP Enablement Services Server. Testing also verified the interoperability between Hitachi Cable WirelessIP-5000-A SIP Telephone, Avaya SIP phones, Avaya H.323 phones, Avaya softphones (SIP and H.323) and Avaya digital phones.

Avaya's formal testing and Declaration of Conformity is provided only on the headsets/handsets that carry the Avaya brand or logo. Avaya may conduct testing of non-Avaya headset/handset to determine interoperability with Avaya phones. However, Avaya does not conduct the testing of non-Avaya headsets/handsets for: Acoustic Pressure, Safety, Hearing Aid Compliance, EMC regulations, or any other tests to ensure conformity with safety, audio quality, long-term reliability or any regulation requirements. As a result, Avaya makes no representations whether a particular non-Avaya headset will work with Avaya's telephones or with a different generation of the same Avaya telephone.

Since there is no industry standard for handset interfaces, different manufacturers utilize different handset/headset interfaces with their telephones. Therefore, any claim made by a headset vendor that its product is compatible with Avaya telephones does not equate to a guarantee that the headset will provide adequate safety protection or audio quality.

1.6. General Test Approach

The general test approach was to register the Hitachi Cable WirelessIP-5000-A SIP Telephone with Avaya Communication Manager and Avaya SIP Enablement Services through the Aruba Networks wireless network. Calls were made between both wired and wireless telephones and specific calling features were exercised. To validate Quality of Service, low priority background traffic was injected into the network and the Aruba Networks wireless network was verified to maintain voice calls while dropping the low priority traffic. Network level tests included verifying roaming from one access point to another.

1.7. Test Results

The Hitachi Cable WirelessIP-5000-A SIP Telephone passed all test cases. The Hitachi Cable WirelessIP-5000-A SIP Telephone was verified to successfully register with Avaya Communication Manager and Avaya SIP Enablement Services. The compliance testing also focused on verifying Quality of Service for voice traffic while low priority background traffic was competing for bandwidth. The Hitachi Cable WirelessIP-5000-A SIP Telephone was verified to roam successfully between access points on the same network (Layer 2 roaming) and between access points on a different network (Layer 3 roaming) while maintaining voice calls. Four different security schemas were tested: Clear, WEP, WPA-PSK TKIP and WPA2-AES 802.1X-PEAP with Certificates. Two codecs were used for testing: G.711MU and G.729AB. Telephone calls were verified to operate correctly with the media path direct between the telephones (shuffling enabled) and with the media path centralized through Avaya Communication Manager (shuffling disabled). Calls were maintained for durations over one minute without degradation to voice quality. The telephony features verified to operate correctly

©2007 Avaya Inc. All Rights Reserved.

included attended/unattended transfer, conference call participation, conference call add/drop, multiple call appearances, caller ID operation, call forwarding unconditional, call forwarding on busy, call forwarding clear, voicemail using Avaya IA 770 INTUITY AUDIX, MWI, hold and return from hold.

7. Verification Steps

The following steps may be used to verify that the configuration is working properly.

1.8. Avaya Communication Manager and Avaya SIP Enablement Services Server Verification Steps

- Place calls with the Hitachi Cable WirelessIP-5000-A SIP Telephone. Exercise calling features such as conference, transfer and hold and verify proper operation of those features.
- Log into Avaya Communication Manager and verify that the stations are configured as Off-PBX OPS stations see **Section 10** [**1**].
- Log into Avaya SIP Enablement Services and verify that the SIP stations haven properly administered see **Section 10** documents [**1**] and [**2**].
- Ensure that Avaya SIP Enablement Services has been updated after any new stations have been configured.

1.9. Hitachi Cable WirelessIP-5000-A SIP Telephone Verification Steps

- Verify that the Hitachi Cable WirelessIP-5000-A SIP Telephone has the correct SSID configured. Use the steps outlined in **Section 5.2 Step 1** to confirm all of the settings are correct.
- Verify that the Hitachi Cable WirelessIP-5000-A SIP Telephone has an IP address assigned and is configured for DHCP, see **Section 5.4 Step 1**.
- Verify that the Hitachi Cable WirelessIP-5000-A SIP Telephone has the correct SIP server configuration. Use the steps outlined in **Section 5.3 Step 3** to confirm all the settings and IP address information are correct.
- Verify that the Hitachi Cable WirelessIP-5000-A SIP Telephone has the correct RTP port information configured. First check the settings configured on the Avaya Communication Manager (see **Section 3 Step 1**) and verify the Hitachi Cable WirelessIP-5000-A SIP Telephone is configured to use those same settings (see **Section 5.4 Step 4**).
- Verify the Hitachi Cable WirelessIP-5000-A SIP Telephone can place and receive calls both to and from stations within the network and that two-way audio is heard.

8. Support

For technical support on the Hitachi Cable WirelessIP-5000-A SIP Telephone use the information below.

- **Phone:** 1-914-993-0990
- **Email:** Hitachi Cable America, White Plains, NY - info@hitachi-cable.com
- **Web :** http://www.wirelessip5000.com/eng/index.html

©2007 Avaya Inc. All Rights Reserved.

9. Conclusion

These Applications Notes described the configuration steps to make the Hitachi Cable WirelessIP-5000-A SIP Telephone interoperate with Avaya Communication Manager and Avaya SIP Enablement Services Server through an Aruba Network's 2400 Mobility Controller with Aruba Network's access points.

10. Additional References

[1] Administrator Guide for Avaya Communication Manager, May 2006, Issue 2.1 Document Number 03-300509

[2] *Installing and Administering SIP Enablement Services R3.1.1*, August 2006, Issue 2.0, Document Number 03-600768

[3] *WirelessIP5000E-A Administrator Manual*, Document Number TD61-2896E

[4] *WirelessIP5000E-A User's Manual*, Document Number TD61-2894E

[5] *ArubaOS User Guide Aruba Version 3.1*, February 2007, Document Number 0510286-01

©2007 Avaya Inc. All Rights Reserved.

©2007 Avaya Inc. All Rights Reserved.
Avaya and the Avaya Logo are trademarks of Avaya Inc. All trademarks identified by ® and ™ are registered trademarks or trademarks, respectively, of Avaya Inc. All other trademarks are the property of their respective owners. The information provided in these Application Notes is subject to change without notice. The configurations, technical data, and recommendations provided in these Application Notes are believed to be accurate and dependable, but are presented without express or implied warranty. Users are responsible for their application of any products specified in these Application Notes.

Please e-mail any questions or comments pertaining to these Application Notes along with the full title name and filename, located in the lower right corner, directly to the Avaya Developer*Connection* Program at devconnect@avaya.com.