airClient™ TOTAL 241 Series

sB3415-01/sB3415-02/sB3415-03

User Guide

Version 2.0

CONTENTS

Congratulations on your purchase of sB product

Your airClient™ TOTAL 241 unit is designed so that you can set it up easily and be on your way to get unwired.

Important: Read all user instructions carefully before you use your device.

About This Document

This user guide is for the networking professional who installs, configures and manages the smartBridges' airClient™ TOTAL 241 series. Unless specifically stated, the configurations mentioned in the user guide are applicable to all the models of sB3415 (sB3415-01 / sB3415-02 / sB3415-03).

It provides detailed information on using the web-based configuration Graphics User Interface (GUI) to configure the airClient TOTAL sB3415 unit. This manual will help you gain a better understanding of how the various components of the sB3415 work.

To configure smartBridges' products, you need to have fundamental understanding of the concepts and technology of Local Area Networks (LAN) and wireless networking. The system installer will require expertise in the following areas:

- Outdoor radio equipment installation
- Network configuration
- Use of web browser for system configuration, monitoring and fault finding

In this chapter, you will find an overview of the user guide, and where to obtain additional information regarding installation and set-up.

Overview of User Guide

This document provides comprehensive information about the application needed to set up, configure and deploy the airClient TOTAL sB3415 unit. It is organized into several chapters:

Chapter 1:
- configuration features
- system requirements

Chapter 2:
- deploying the airClient TOTAL 241 in Router or NAT or Bridge (sB3415-03 only) modes
- modify of various configuration settings

Chapter 3:
- process of configuration on the radio performance parameters
- bandwidth Controller.

Chapter 4:
- display of the wireless traffic statistics.

Chapter 5:
- the site survey tool
- the system configuration tools

- backup/restore features
- firmware upgrade steps
- using the License Key feature for bandwidth upgrade on the unit.

The abbreviations and acronyms used in this user guide are explained in the Appendix.

Related Publications

In addition to this user guide, the following related publications provide complete information on the TOTAL series (airHaul™, airPoint™ and airClient™) of radio units:

- Quick Install Guide (QIG)
- Release Notes
- Technical Specification

All the information can also be found on our website at http://www.smartbridges.com/.

Technical Support Center

Comprehensive technical support by dedicated smartBridges engineers is available to all customers through the smartBridges support center website. The website provides updated tools and documents to help troubleshoot and resolve technical issues related to smartBridges products and technologies. To access the technical support resources, please visit the support center website at http://www.smartbridges.com/support/

For additional services and free downloads, you would need to register on the smartBridges support center website.

1. Introduction

This user manual will guide you through initial site preparation, installation, configuration, and troubleshooting of the airClient TOTAL 241 [sB3415] unit. A web-based management tool is provided to assist the user to configure the airClient TOTAL unit for different purposes.

The airClient TOTAL web-based management tool provides the user with the following features:

- System configuration
- Device operational mode configuration
- Ethernet and wireless IP configurations
- Radio parameter configuration
- Bandwidth management
- Traffic Statistics
- Site Survey
- Security
- User Management
- Link Budget Planning Calculator
- Upgrading the unit to higher bandwidth using License Key
- Converting from one model of sB3415 to another using License Key
- Saving/Restoring good configuration settings
- Restore to Default settings
- Firmware Upgrade

Note: Unless specifically stated, the configurations mentioned in the user guide are applicable to all the models of sB3415 (sB3415-01 / sB3415-02 / sB3415-03).

1.1. System Requirements

The following are the minimum system requirements for the airClient TOTAL web-based configuration management tool:

1. Operating System: Windows 98/2000/XP/NT or Linux

2. Connection to the Internet for downloading the latest firmware and Sun JRE

3. Web browser: either Internet Explorer 5.0 and higher, Netscape 7.2 and higher, Mozilla 1.7 and higher or Mozilla Firefox 0.8 and higher

4. SUN JRE: v1.5 and above. You may download it from http://java.sun.com/j2se/1.5.0/download.jsp

1.2. Checklists

Deployment time, link-up time and support time can be improved by adopting proper site survey analysis, link planning, pre-installation tests, and web-GUI familiarization. The following pre-installation and post-installation checklist attempts to give the installer the basic understanding on the points to consider for a wireless deployment.

Pre-Installation Checklist for airClient TOTAL

Organization Name/Site Name	
Address	
City	
State	
Zip Code	
Telephone Number	

Site Survey and Link Planning				
No	**Parameters**	**Units**	**Site A**	**Site B**
1	Regulatory Standard to be followed	FCC/ETSI		
2	Frequency Band	sB3415: 2.4GHz only		
3	Maximum Output Power as per the Regulatory Authority (EIRP)	100mW/1W/4W		
4	Latitude	Deg Min Sec		
5	Longitude	Deg Min Sec		
6	UPS Installed	Yes/No		
7	UPS specification if any	KVA		
8	Line Voltage	90V-264V AC,50-60 Hz		
9	Near Line of Site between sites	Yes/No		
10	Height of tower	Feet/Meters		
11	Required Throughput	Mbps		
12	Distance between sites	Miles/km		
13	Antenna Type	Internal/External		
14	Antenna Manufacturer	smartBridges/Other		
15	Gain of antenna	dBi		
16	Antenna Polarization	Horizontal/Vertical		
17	Beam width of antenna	Horizontal - deg		
		Vertical - deg		

No	Parameters	Units	Site A	Site B
18	Length of external cable connecting Radio and antenna	Feet/meters		
19	Fade Margin taken into account for link budgeting	Ideally between 15 to 20 dB		
20	Model of smartBridges airClient TOTAL equipment selected for a link. Please refer to note below for selecting the right equipment	sB3415		
21	Grounding- Earth to Neutral Voltage	Ideally less than 2 Volts		
22	Length of the Ethernet cable required for powering the unit	Feet/meters		
23	Choose the best channel which can be used with the help of the Site Survey Tool and scanning tools like Netstumbler	Specify channel number		

Pre Installation Lab Testing of Equipment				
No	**Parameters**	**Units**	**Site A**	**Site B**
1	Network diagram along with IP address of all the interfaces for link to be set up in place	Yes/No		
2	Availability of Quick Installation Guide	Yes/No		
3	Availability of User Guide and CD	Yes/No		
4	Ensure that all items listed in the "Package Contents" of Quick Installation Guide are included in the shipment	Yes/No		
5	Availability of Installation Kit	Yes/No		
6	Radio MAC address of Access Point	MAC ID no.		
7	Configured for pre-installation testing	Yes/No		
8	Ping response	ms		
9	Ping Success Rate	Percentage %		
10	Throughput test (Upload/Download)	Varies depending on the Bandwidth Control, signal strength, link quality and distance		

Note: Throughput for sB3415 Series

sB3415-01:
As much as 512 kbps data throughput with a range of up to 4 miles (6 km)
sB3415-02:
As much as 1 Mbps data throughput with a range of up to 4 miles (6 km)
sB3415-03:
As much as 3 Mbps data throughput with a range of upto 4 miles (6 km)

Signature of Engineer:	
Name:	
Email:	
Date:	

Post-Installation Checklist for airClient TOTAL

Organization Name/Site Name	
Address	
City	
State	
Zip Code	
Telephone Number	

General Configuration Information				
No	**Parameters**	**Units**	**Site A**	**Site B**
1	Radio operation mode	sB3415-01 / sB3415-02 : Router / NAT		
		sB3415-03 : Bridge / Router / NAT		
2	SSID of a Radio	Up to 32 characters		
3	IP address of Ethernet Port	32-bit numeric address		
4	IP address of Wireless Port	32-bit numeric address		
5	RSSI	dBm (At present, 'Level' in the current firmware version)		
6	Channel selected for link			
7	Radio TX Output Power	0 to +18 dBm		
8	Model of smartBridges airClient TOTAL equipment selected for a link.	sB3415		
9	Antenna Type	Internal/External		
10	Antenna Manufacturer	smartBridges/Name of other manufacturer		
11	Antenna Polarization	Horizontal/Vertical		
12	Beam width of antenna	Horizontal – deg		
		Vertical – deg		
13	Antenna Gain	dBi		

Checklist				
No	**Parameters**	**Units**	**Site A**	**Site B**
1	Check the crimping of the Ethernet cable at both the ends	Yes/No		
2	Check the proper grounding of the antenna and equipment	Yes/No		
3	Ensure that there are no extreme bends or kinks in the cable	Yes/No		
4	Ensure Ethernet cable is not running near a sharp edge	Yes/No		
5	Ensure antenna is aligned to get the best RSSI and link quality	Yes/No		
6	Ping response	ms		
7	Ping success rate	Percentage		
8	Throughput test (Upload/Download)	Mbps		
9	Link stability based on observation for 1 hour	Yes/No		
10	Shielded RJ-45 cable to be used from POE to the unit	Yes/No		

Signature of Engineer:	
Name:	
Email:	
Installation Date:	
Commissioned Date:	

For the latest information on smartBridges products, please visit our website at: http://www.smartbridges.com/

2. airClient TOTAL Configuration

The airClient TOTAL sB3415-01 and sB3415-02 can work in either Router or NAT mode.
The airClient TOTAL sB3415-03 can work in one of the three modes: Bridge, Router or NAT.

The procedures for configuring the various parameters in each mode are outlined in this chapter. Some of the details on the technical terms, acronyms and abbreviations used can be found in Appendix A.

2.1. Administrator Login and License Agreement

The airClient TOTAL unit comes with a pre-configured default Ethernet (wired-side) IP address: **192.168.0.225** and subnet mask: **255.255.255.0**. This default device IP address should be used when accessing the device configuration management interface for the first time using a web-browser. The PC must be on the same subnet as the airClient TOTAL unit.

Follow the steps below to login as an Administrator to the web-based configuration management interface:

1. Connect the airClient TOTAL using the Power over Ethernet (PoE) to a PC or network via the ETH (Ethernet) port. (Please refer to the Quick Install Guide for more information on connections).

2. Open a web browser on the PC, type the default device IP address, (http://192.168.0.225) in the web browser address field, and press the **Enter** key.

3. A user login box as shown below (Fig 2-1) will appear. Enter the **User name** and **Password**. The default user name is **administrator** and the password is **smartBridges** (case sensitive).

Figure 2-1 airClient TOTAL Administrator Login

4. Click on the **OK** button. A license agreement page will appear as shown in Fig 2-2 below.

5. Click **Accept**. The airClient TOTAL **Summary Information** page (Fig 2-3) will appear.

Terms of use :

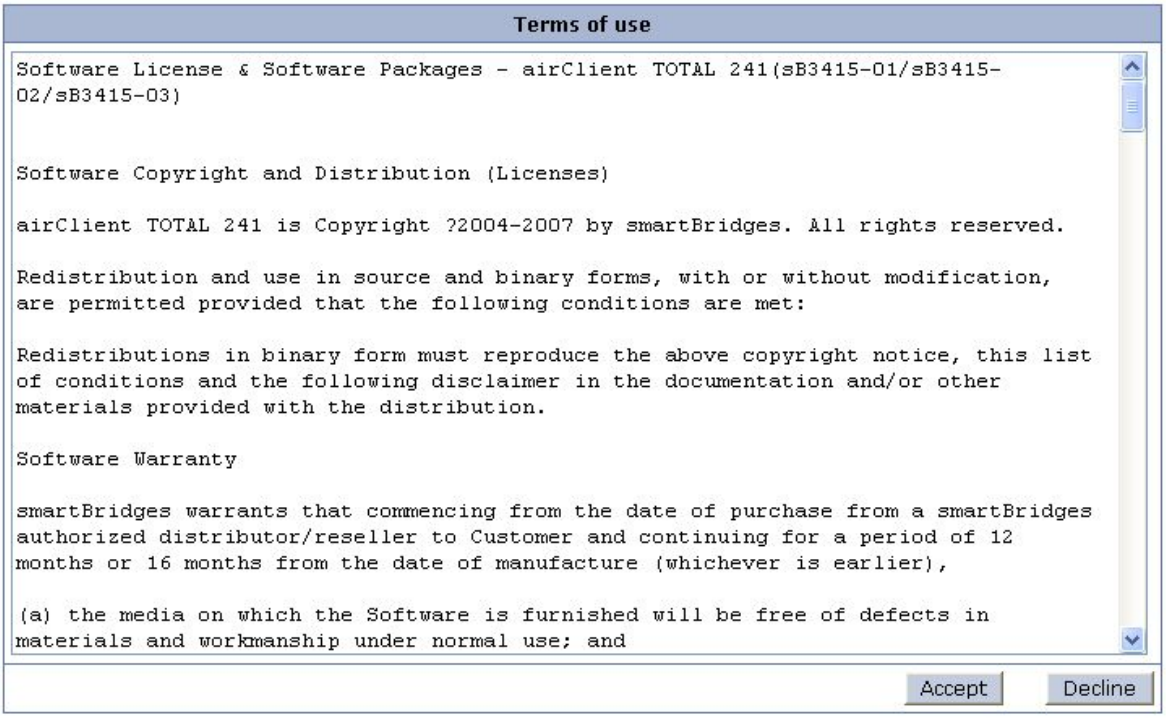

Figure 2-2 airClient TOTAL License Agreement Page

Home : Summary Information **airClient TOTAL (sB3415-03)** - NAT mode

LAN Settings	
LAN IP Mode	Static IP
System Name	SB3415-03
IP Address	192.168.0.225
Subnet Mask	255.255.255.0

WLAN Settings	
WLAN Type	Static
IP Address	192.168.2.225
Network Mask	255.255.255.0
Gateway Address	192.168.2.254
DNS Server	192.168.0.225
Secondary DNS	0.0.0.0

Wireless Settings	
SSID	NEXUS_MASTER
Channel	Current Channel 6: 2437MHz
Association Status	Not Associated
Wireless Mode	802.11g
Security Mode	Disable
Authentication	Open System
Data Rate(Mbps)	Best
Transmit Power	Max(18dBm)
Preamble	Long Preamble
Slot Time	Short Slot Time

DHCP Server Settings	
DHCP Server	Disable
Address Pool	System Define
Start Address	0.0.0.0
End Address	0.0.0.0
Lease Time	2880 Miniute(s)

NAT	
Virtual Server	0 Entri(es)

Routing Setting	
Static Routing	0 Entri(es)

Figure 2-3 airClient TOTAL Summary Information Page

The descriptions of the fields in the **Summary Information** page are provided in the table (Table 2-1) below:

Table 2-1 Description of the field items in the 'Summary Information' page

Field Items on Summary Info page		Descriptions
LAN Settings	LAN IP Mode	Set to Static IP by default
	System Name	This is the user defined name of the unit
	IP Address	Ethernet IP Address.
	Subnet Mask	Ethernet IP subnet Mask
WLAN Settings	WLAN Type	Static IP or Dynamic IP
	IP Address	Wireless IP address
	Network mask	Wireless IP Mask
	Gateway Address	Wireless IP Gateway
	DNS Server	Primary DNS Server
	Secondary DNS	Secondary DNS Server
Wireless Settings	SSID	Displays the SSID currently set for the device. This is the public name of the wireless link
	Channel	Displays the channel at which the Client is associated
	Association Status	Displays Associated or Not Associated status
	Wireless Mode	Wireless operating mode (802.11b / 802.11g)
	Security Mode	Displays if security is Enabled or Disabled
	Authentication	Open System / Shared Key / WPA-PSK
	Data Rate (Mbps)	This indicates the rate at which the radio has been asked to operate by the user.
	Transmit Power	This is used to set the output power of the radio.
	Preamble	The radio preamble is a section of data at the head of a packet. The preamble contains information that the radio needs when sending and receiving packets
	Slot Time	This can be set to Long Short time or Short time
DHCP Server Settings	DHCP Server	Displays if DHCP Server is Enabled or Disabled
	Address Pool	Allows the Address Pool to be System defined or User defined
	Start Address	The Starting address of the DHCP Client IP Address pool
	End Address	The Ending address of the DHCP Client IP Address pool
	Lease Time	The maximum time of the DHCP Leases. The maximum allowable limit is 2880 minutes.
NAT	Virtual Server	Displays the no. of entries in the IP/Port Forwarding Table
Routing Setting	Static Routing	Displays the no. of static routes in the Static Routing Table

2.2. Web GUI Administrator User Name and Password Change

The default administrator user name for the airClient TOTAL 3415 is **administrator** and administrator password is **smartBridges** (please note that this is case sensitive).

Follow the steps below to change the administrator user name and/or password:

1. From the top navigation menu bar, click on **Tools** | **System Admin**. A System Administration interface will appear as shown below.
2. Enter the user name you wish in the **User Name** field.
3. Enter the new password in **Password** and **Verify Password** fields. Click on the **Save** button to save the settings.
4. Click on the **Save** button and a message box will appear to confirm if you wish to reboot the unit. Click OK to reboot the unit, and the new user name and password to take effect.

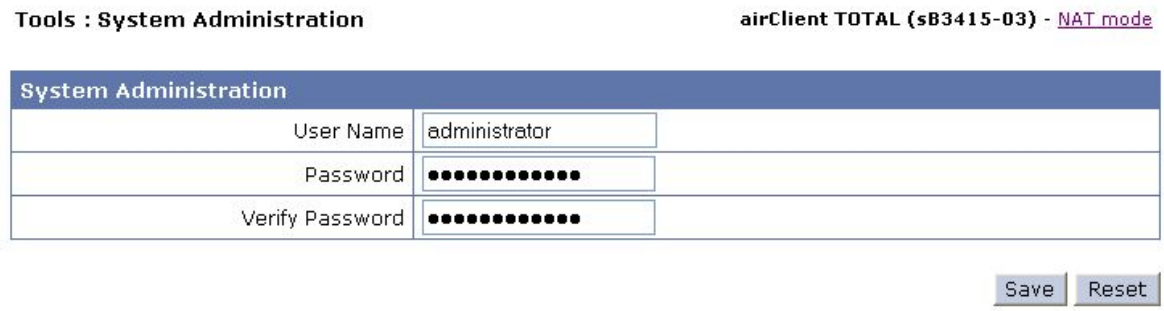

Figure 2-4 airClient TOTAL Administrator User Name/Password Change

2.3. Using the Configuration Pages

The airClient TOTAL configuration system comprises several pages for configuring each parameter. A common navigation menu bar is provided at the top of each page for easy navigation as shown in the figure below (Figure 2-5).

Home : Summary Information

airClient TOTAL (sB3415-03) - Router mode

LAN Settings	
LAN IP Mode	Static IP
System Name	SB3415-03
IP Address	192.168.0.225
Subnet Mask	255.255.255.0

Figure 2-5 airClient TOTAL Navigation Menu Bar

The Navigation menu bar contains menu items that allow the user to go to different configuration pages. The following table (Table 2-2) summarizes the functions available for the menu item links.

Table 2-2 Description of Menus

Menu Item	Menu Sub-items	Description
Home	Summary Information	Displays *read-only* summary page with information such as LAN Settings, WLAN Settings, Wireless Settings, DHCP Server Settings, Virtual Server and Routing Table Entries.
	LAN Settings	Allows user to set system name of the unit, IP Address and subnet mask on the wired side. Allows the user to set the gateway if the unit is in Bridge Mode (Note: This is only applicable for 3415-03 model).
	WLAN Settings	Allows user to set IP address, mask, gateway on the wireless side. Allows user to Enable or Disable DNS Passthrough. Allows user to set the Primary/Secondary DNS Server.

Menu Item	Menu Sub-items	Description
Networking	Wireless Statistics	Displays traffic statistics on the Wireless side
	Association Status	Shows the status of the association and the MAC of the AP associated with. Shows the Link Status Graph for the associated link.
	DHCP	Allows user to Enable or Disable DHCP Server Allows user to Enable/Disable DHCP Relay (Note: DHCP Relay feature is only applicable for the 3415-03 model).
	DHCP List	Displays the DHCP List; if DHCP Server is Enabled
	IP/Port Forwarding	Allows user to add entries to map Local Area Network IP Address (or port) behind the NAT to a global port accessible through the wireless interface. User will be able to use this option only when the unit is configured in the NAT mode.
	Routing Table	Allows the user to view, add and delete or update static routes. Allows the user to Enable or Disable RIP running on the device. RIPv2 is run by default on the device.
	Bandwidth Control	Allows bandwidth management of the wireless link
Radio	Wireless Settings	Allows the user to set SSID, Enable or Disable SSID Suppressed, select Internal or External antenna, configure Distance, select Data Rate, set Transmit Power, set Country settings, Preamble and Slot time
	Security	**Security:** Allows user to set the security mode for the device. User can choose Open System, Shared, or WPA-PSK. **Open System / Shared Key:** • Allows Allow user to turn on encryption using WEP at 64 or 128 bits and choose between Open Systems and Shared Key. • **WPA-PSK**: This mode allows user to use WPA pre-shared key and cipher as TKIP or AES for client authentication.

Menu Item	Menu Sub-items	Description
		Note: By default, the Security mode is Disabled. AES security mode is only available in 3415-03 model.
Tools	System Configuration	Allows user to switch the operation mode between Bridge (sB3415-03 Only), Router or NAT mode. Allows the user to Reset the unit, Restore unit to Factory defaults.
	SNTP Setting	Allows user to set the Network Time Server and the Time Zone.
	Site Survey	Shows all the standards based wireless devices operating in the area.
	System Admin	Allows user to change the Administrator user name and/or password.
	System User	Allows read only users to added, and their user names/passwords to be changed.
	SNMP Configuration	This allows the user to Enable/Disable SNMP, and set Read/Write community strings.
	Backup/Restore Settings	Allows user to save or restore good settings, backup the configuration file and upload it later, do a Factory Reset on the unit.
	Firmware Upgrade	Allows the user to upgrade/downgrade the firmware on the unit
	Product License Key	Allows the user to upgrade the unit to higher bandwidth or to convert the model from 3415-01 to 3415-02 / 3415-03, or vice versa.
	Link Budget Planning	Allows user to calculate the Link Budget between an airClient TOTAL unit and an Access Point.
	System Log	Allows user to display the system log locally or remotely. Currently, this device will only log in case of any problems with the unit.
	Reboot	Allows user to reboot the unit. **Note:** All changes made to the unit will take effect only after a Reboot is done.

Menu Item	Menu Sub-items	Description
Help	Technical Support	Information on Technical Support
	User Guide – Online	Link to online user guide
	Product Registration and Feedback	Allows user to register product and provide feedback or suggestions.
	Check for Updates	Checks smartBridges website for any software updates.
	About airClient TOTAL	General system description, software version information and warranty information.
Logout	Logout	Allows user to logout from the airClient TOTAL device.

2.4. Device Mode Configuration

The device operational mode is displayed at the top right hand corner of each page. The device mode configuration allows the user to configure the airClient TOTAL to a NAT (Network Address Translation) mode or Router mode for 3415-01 and 3415-02 models, and NAT or Router or Bridge mode for the 3415-03 model. These modes are explained below.

NAT: This is the default operating mode. This mode allows you to use one segment of private IP addresses for multiple hosts to access the external network using a single wireless IP address. This translation helps in protecting the access of internal hosts from external network. This mode is available in all sB3415 models.

Router: This mode allows you to configure different segment of IP address in Ethernet and Wireless interface. A standard routing functionality is available in this mode. This mode is available in all sB3415 models.

Bridge: A transparent bridging functionality is provided in this mode which uses WDS implementation. This functionality is only available in sB3415-03 model.

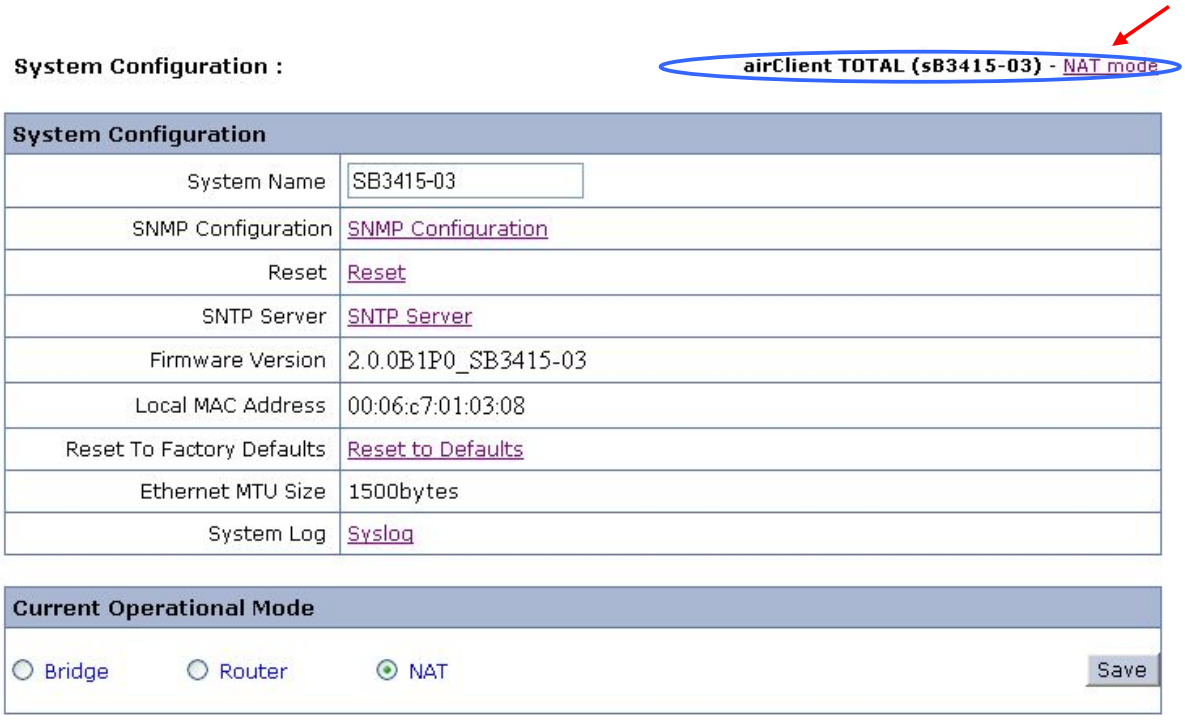

Figure 2-6 airClient TOTAL Device Mode Configuration

2.5. Changing from NAT to Router Mode

The default configuration of the airClient TOTAL is in the NAT mode.

Follow the steps below to change the airClient TOTAL from the default NAT mode to Router mode:

1. From the navigation menu bar, click on **Tools | System Configuration**. The **System Configuration** page will appear as shown below.
2. Under the **Current Operational Mode**, choose the operation mode **Router**.
3. Click on **Save** to reboot the unit and convert to Router mode.
4. The **IP Address**, **IP Mask** and **Gateway** for **LAN Settings** and **WLAN Settings** remain the same in the Router mode as it was in the NAT mode.

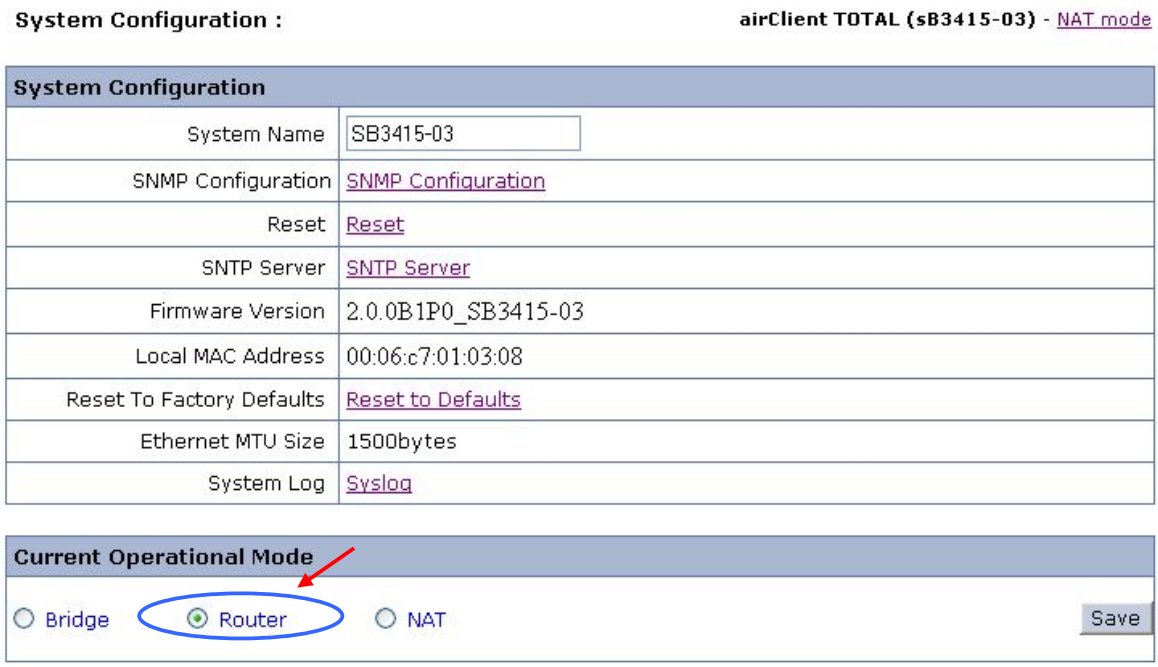

Figure 2-7 Changing NAT Mode to Router Mode

2.6. Changing from Router to NAT Mode

Follow the steps below to change the airClient TOTAL from Router Mode to NAT Mode:

1. From the navigation menu bar, click on **Tools | System Configuration**. The **System Configuration** screen will appear as shown below.
2. Under the **Current Operational Mode**, choose the operation mode **NAT**.
3. Click on **Save** to reboot the unit and convert to NAT mode.
4. The **IP Address**, **IP Mask** and **Gateway** for **Ethernet Configuration** and **Wireless Configuration** remains the same in the NAT mode as it was in the Router mode.

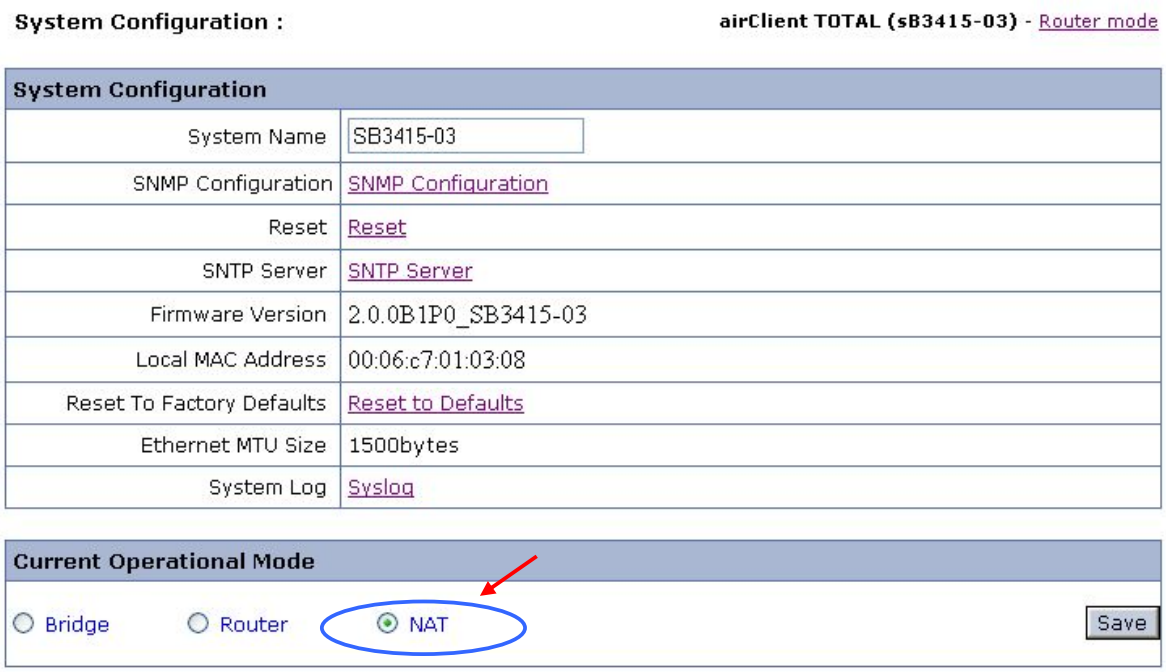

Figure 2-8 Changing Router Mode to NAT Mode

2.7. Changing from Router/NAT to Bridge Mode (sB3415-03 Only)

This section is only valid for the sB3415-03 model. Follow the steps below to change the airClient TOTAL from the Router or NAT mode to Bridge mode:

1. From the navigation menu bar, click on **Tools | System Configuration**. The **System Configuration** screen will appear as shown below.
2. Under the **Current Operational Mode** settings, choose **Bridge** option.
3. Click on **Save** to convert the unit to Bridge mode.

4. To configure the IP settings in Bridge mode, refer to Section 2.9.1.

5. To configure the Radio Settings in Bridge mode, refer to Section 2.9.2. (Note: Its mandatory to set the **MAC Address of the Remote AP** and the **Channel** when the unit is converted from Router/NAT mode to the Bridge Mode).

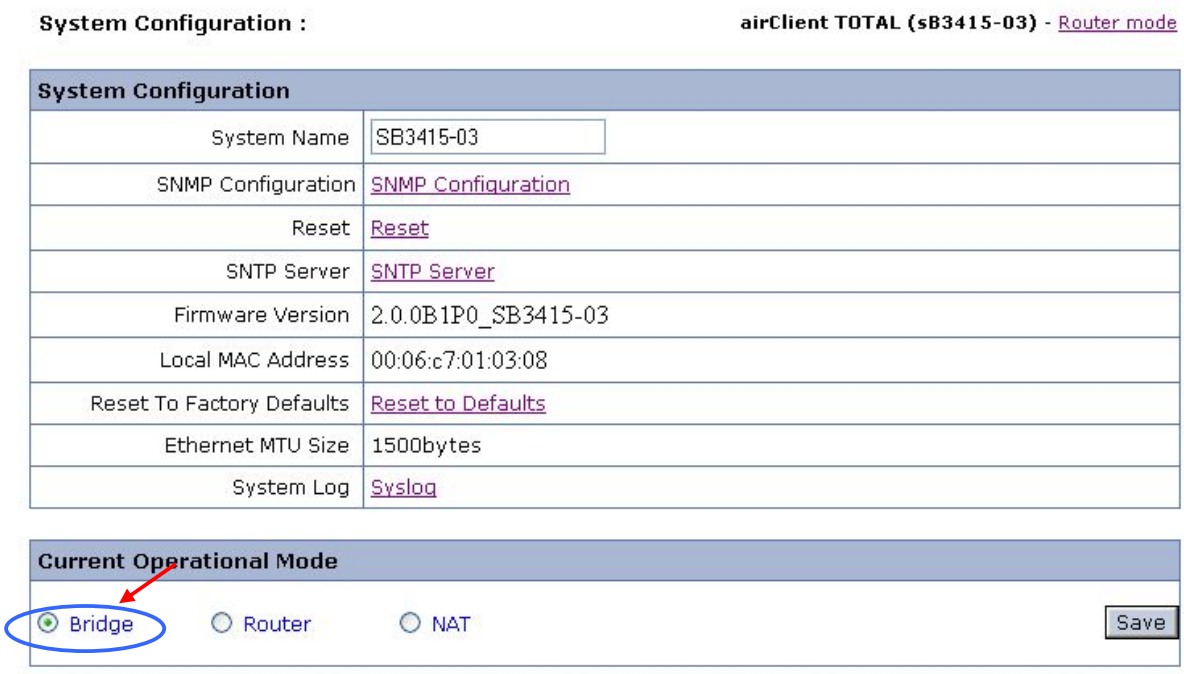

Figure 2-9 Changing Router/NAT Mode to Bridge Mode (sB3415-03 only)

2.8. Changing from Bridge to Router/NAT Mode (sB3415-03 Only)

This section is only valid for the sB3415-03 model. Follow the steps below to change the airClient TOTAL from the Bridge mode to Router/NAT mode.:

1. From the navigation menu bar, click on **Tools | System Configuration**. The **Operation Mode** screen will appear as shown below.

2. Under the **Current Operational Mode** settings, choose **Router** or **NAT** option.

3. Click on **Save** to reboot the unit and to convert the unit to Router/NAT mode.

4. To configure the Wired parameters, see Section 2.10.1

5. To configure the WLAN IP and Radio parameters, like SSID, see Section 2.10.2

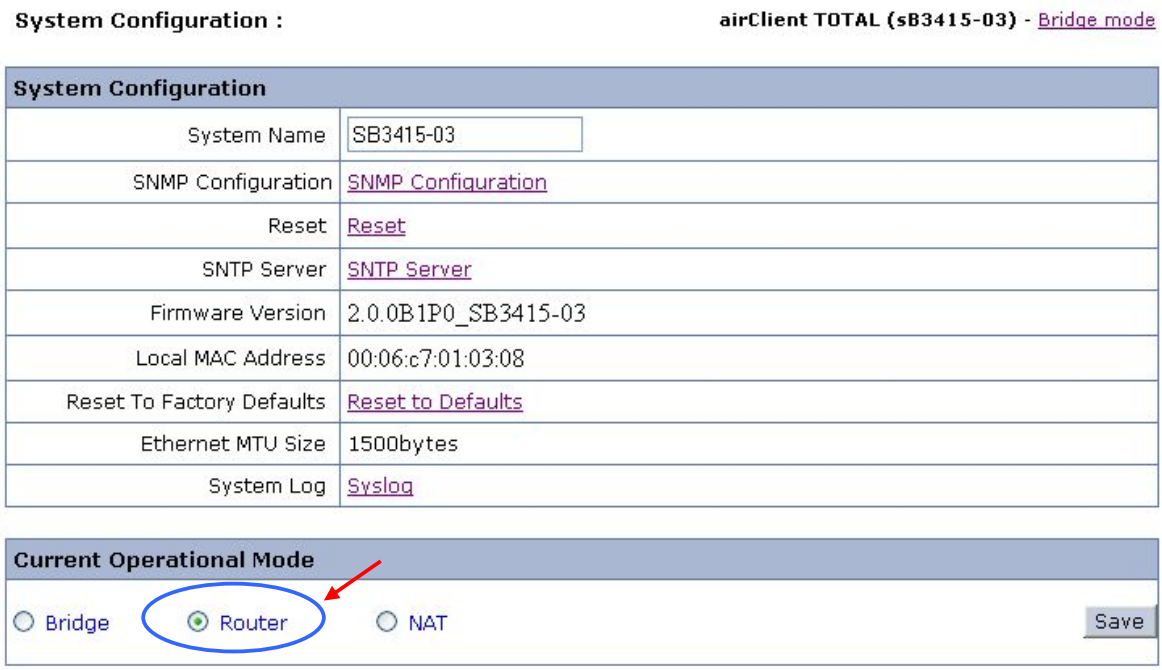

Figure 2-10 Changing Bridge Mode to Router (or NAT) Mode (sB3415-03 Only)

2.9. airClient TOTAL Bridge Configuration (sB3415-03 only)

This section is only valid for the sB3415-03 model. The airClient TOTAL in Bridge mode can associate only with a smartBridges airPoint access point in bridge mode, as they both use WDS link implementation.

2.9.1. LAN Settings

This section outlines the procedures for changing the IP settings for bridge mode –

1. From the navigation menu bar, click on **Home | LAN Settings** to change Ethernet/wired side parameters. The **LAN Settings** screen will appear as shown below in Fig 2-11.
2. Enter the **System Name** of the unit, if needed.
3. Enter the **IP address** and **Subnet mask** to set the LAN IP address and subnet mask, and any **Gateway Address** if required. Assign the unit a unique IP Address in the designated IP subnet.
4. Click on **Save** to save the changes. The settings will be applied after the reboot.

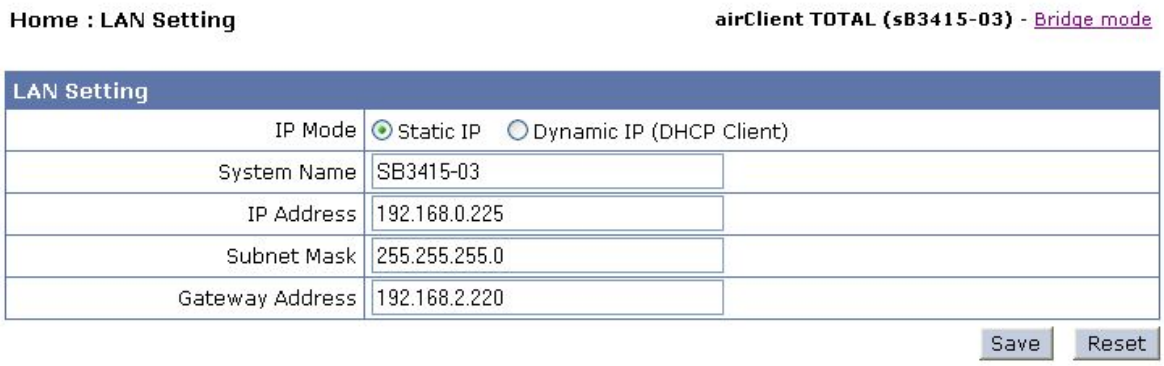

Figure 2-11 airClient TOTAL Bridge LAN Settings (sB3415-03 Only)

2.9.2. Radio Settings

Follow the steps below to configure the Radio parameters in the airClient TOTAL Bridge Mode :

1. From the navigation menu bar, click on **Radio | Wireless Settings** to set the radio parameters. The **Wireless Settings** screen will be displayed as shown in Fig 2-12.
2. Set the **SSID**, and the **wireless mode** to either 802.11 b/g.
3. Enter the **MAC address of the remote AP** (Note: This is mandatory to set when the unit is converted to Bridge Mode)
4. Set the **Channel** to the channel setting of the Access Point. (Note: This is mandatory to set when the unit is converted to Bridge Mode).

5. For the **Antenna Selection**, choose either Internal or External antenna, as per the requirement.
6. Select the **Country** for the domain settings.
7. Configure the **Distance** parameter to configure the Ack Window.
8. Select the **Data Rate** from the drop down menu. By default, the data rate is set to **Best**.
9. Set the **Default Data Rate** to set the data rate for transmitting beacons, broadcast and multicast traffic. By default, this rate is set to **1 Mbps**.
10. Select the **Transmit power** of the radio from the drop down menu.
11. Select the **Preamble** to be Long or Short. By default the preamble is set to **Long**.
12. Click on **Save** to reboot and for the settings to take effect. The unit will attempt to associate after the Reboot.

Note: The **Association Status** field in the Wireless Settings of the Summary Information page will show the status as **Associated** if the unit has associated successfully, as shown in Fig 2-13a below. Under **Networking | Association Status**, the status will also show the Access Point that the client is associated with, as shown in Fig 2-13b below.

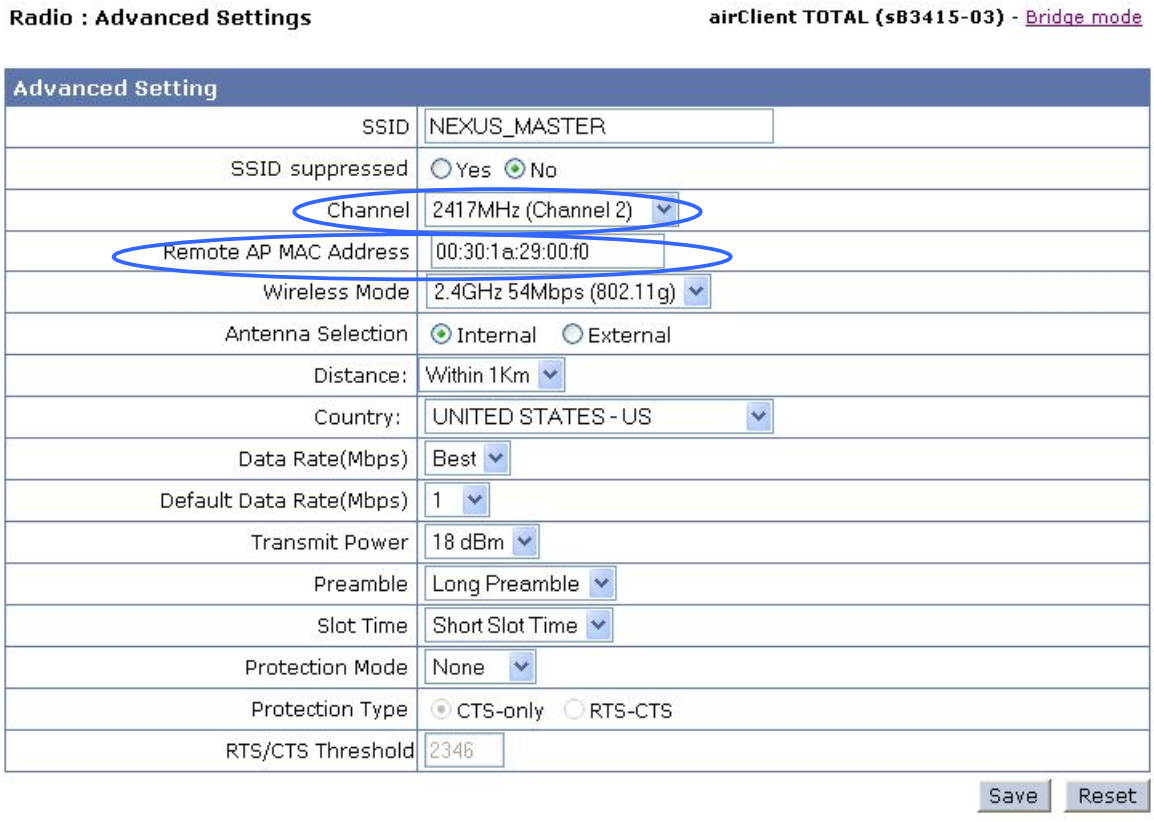

Figure 2-12 airClient TOTAL Bridge Radio Settings (sB3415-03 Only)

Wireless Settings	
SSID	NEXUS_MASTER
Channel	Current Channel 2: 2417MHz
Association Status	Associated
Wireless Mode	802.11g
Security Mode	Disable

Figure 2-13a airClient TOTAL Summary Information Page

Figure 2-13b airClient TOTAL Wireless Association Status

2.10. airClient TOTAL Router / NAT Configuration

This section covers the procedures for configuring various parameters in the Router and NAT modes.

2.10.1. LAN Settings

The LAN and the WLAN settings are maintained in two different subnets.

Follow the steps below to re-configure the airClient TOTAL Router/NAT Ethernet parameters:

1. From the navigation menu bar, click on **Home | LAN Settings** to change Ethernet/wired side parameters. The **LAN Settings** screen will appear as shown below.
2. Enter the **System Name** of the unit, if required.
3. Enter the **IP address** and **Subnet mask** to set the LAN IP address and subnet mask.
4. Click on **Save** to apply the settings.

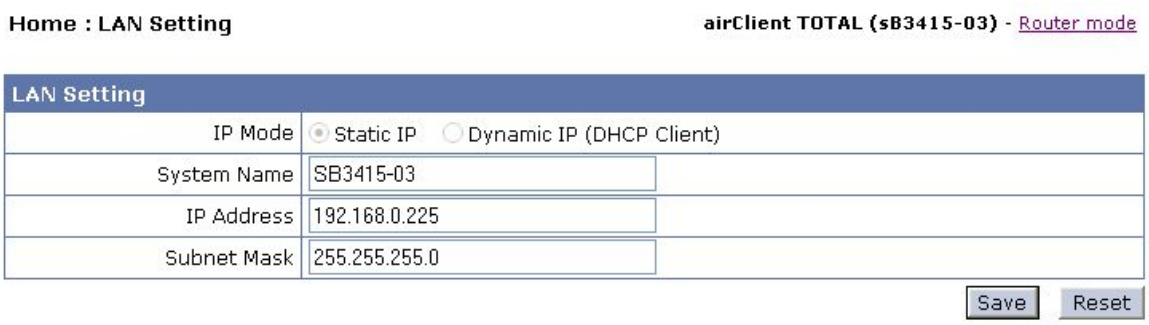

Figure 2-14 airClient TOTAL Router/NAT LAN Settings

2.10.2. WLAN Settings

The wireless parameters need to be configured to allow the airClient TOTAL unit to associate with an airPoint™ Nexus device or any other third party wireless access point.

Follow the steps below to configure the airClient TOTAL Router/NAT Mode Wireless IP Settings parameters:

1. From the navigation menu bar, click on the **Home** | **WLAN Settings** to set the wireless parameters for the unit. The **WLAN Settings** screen will be displayed as shown below.

2. Select the **Dynamic** checkbox if the IP address can be obtained automatically from the wireless link; else select the **Static** checkbox to manually configure the wireless IP/mask.

3. For Static Connection Type, enter the wireless **IP Address**, **Network Mask**, **Gateway Address** for the airClient TOTAL unit.

4. For Dynamic Connection Type, select the Connection Type as **Dynamic**. When connection type is changed to **Dynamic**, two buttons **Request** and **Release** will appear, as shown below in Figure 2.16. Click on the Request button to get the dynamic IP addresses from the DHCP Server. If the unit is associated, IP addresses will appear in the IP Address, Subnet Mask and Gateway Address fields. Click on **Release** button to release the assigned IP addresses.

5. To enable DNS Passthrough, check the **DNS Passthrough** checkbox.

6. Set the **Primary/Secondary DNS Server**, as required.

7. Click on **Save** to apply the settings.

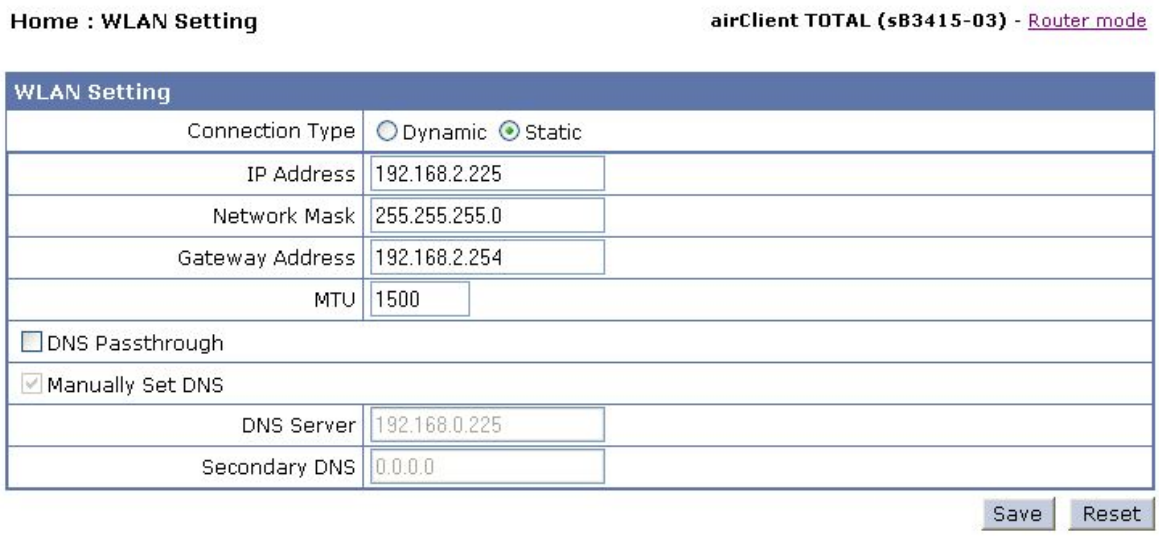

Figure 2-15 airClient TOTAL Router/NAT WLAN Settings – Static WLAN connection

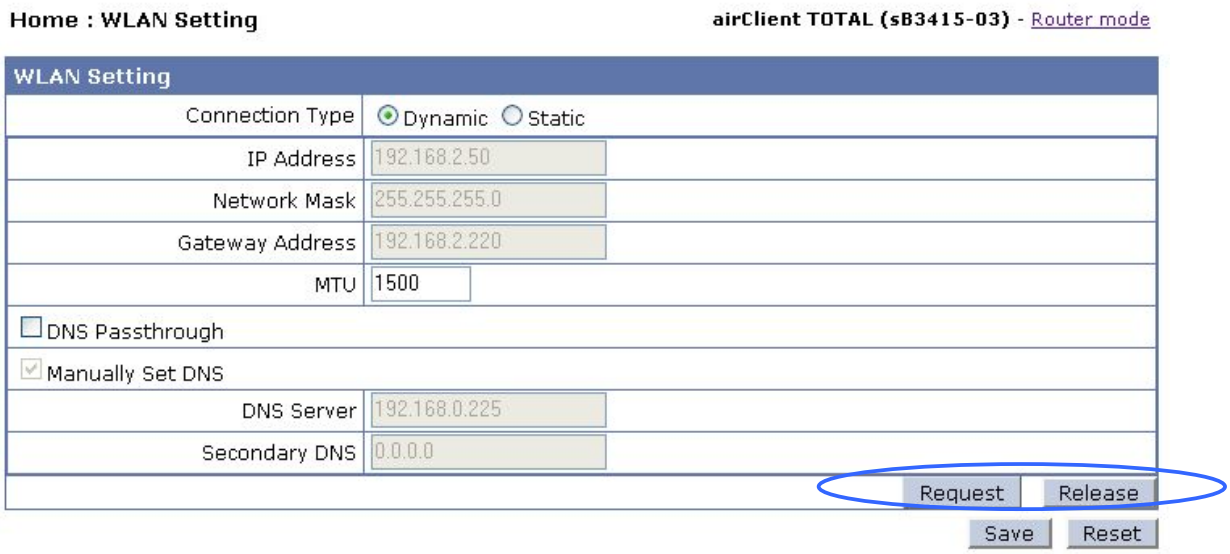

Figure 2.16 airClient TOTAL Router/NAT WLAN Settings – Dynamic WLAN Connection

For the airClient TOTAL device to associate with an access point, the user also needs to configure the access point's SSID, security (if used), and select External/Internal antenna options.

Follow the steps below to configure the airClient TOTAL Router/NAT Mode wireless association parameters:

1. From the navigation menu bar, click on **Radio | Wireless Settings** to set the SSID and wireless mode (802.11 b/g). The **Wireless Settings** screen will be displayed as shown in Fig 2-17.
2. Set the **SSID**, and the **wireless mode** to either 802.11 b/g.
3. The **Channel** selection is disabled in the Router/NAT mode. The airClient unit, once associated, will follow the corresponding AP.
4. The **Remote AP MAC Address** can be set to 00:00:00:00:00:00 in case the association is only to based on the SSID. Or, the **Remote AP MAC Address** can be set to a specific AP MAC Address, in case the airClient TOTAL unit needs to be associated with a specific Access Point.
5. For the **Antenna Selection**, choose either Internal or External antenna, as per the requirement.
6. Select the **Country** for the domain settings.
7. Configure the **Distance** parameter to configure the Ack Window.
8. Select the **Data rate** from the drop down menu. By default, the data rate is set to **Best**.
9. Select the **Transmit power** of the radio from the drop down menu.
10. Select the **Preamble** to be Long or Short. By default the preamble is set to Long.
11. Click on **Save** to reboot and for the settings to take effect. The unit will attempt to associate after the Reboot.

Note: The **Association Status** field in the Wireless Settings of the Summary Information page will show the status as **Associated** if the unit has associated successfully, as shown in Fig 2-18a below. Under **Networking** | **Association Status**, the status will also show the Access Point that the client is associated with, as shown in Fig 2-18b below. Click on **Show Graph** on this table to view the Association Status Graph, as shown in Fig 2-18c below.

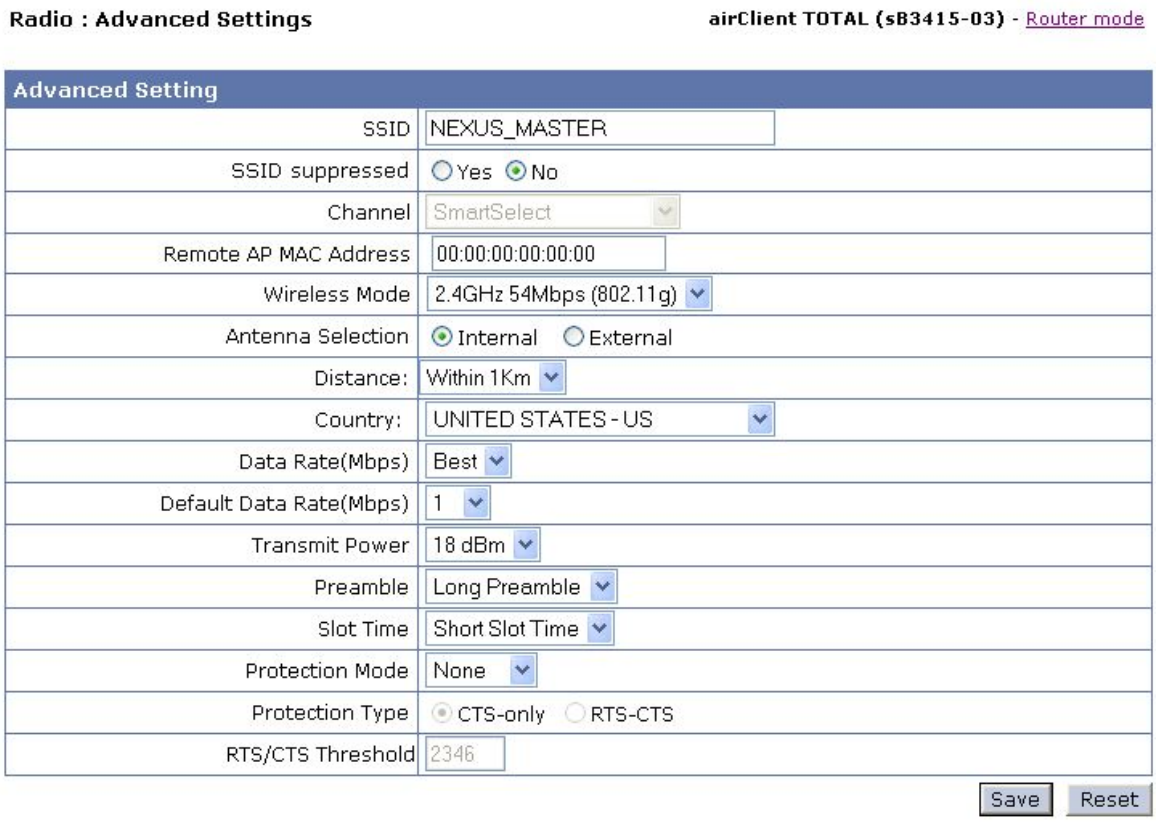

Figure 2-17 airClient TOTAL Router Wireless Settings

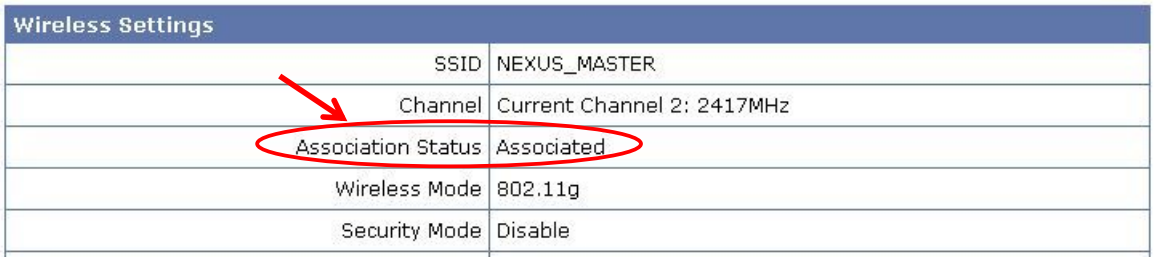

Figure 2-18a airClient TOTAL Summary Information page

Networking : Association Status

airClient TOTAL (sB3415-03) - Router mode

ID	MAC Address	Status	Signal Strength (RSSI)	NoiseFloor	
0	00:30:1A:29:00:F0	up	-43 dBm	-96 dBm	Show graph

Refresh

Figure 2-18b airClient TOTAL Wireless Association Status

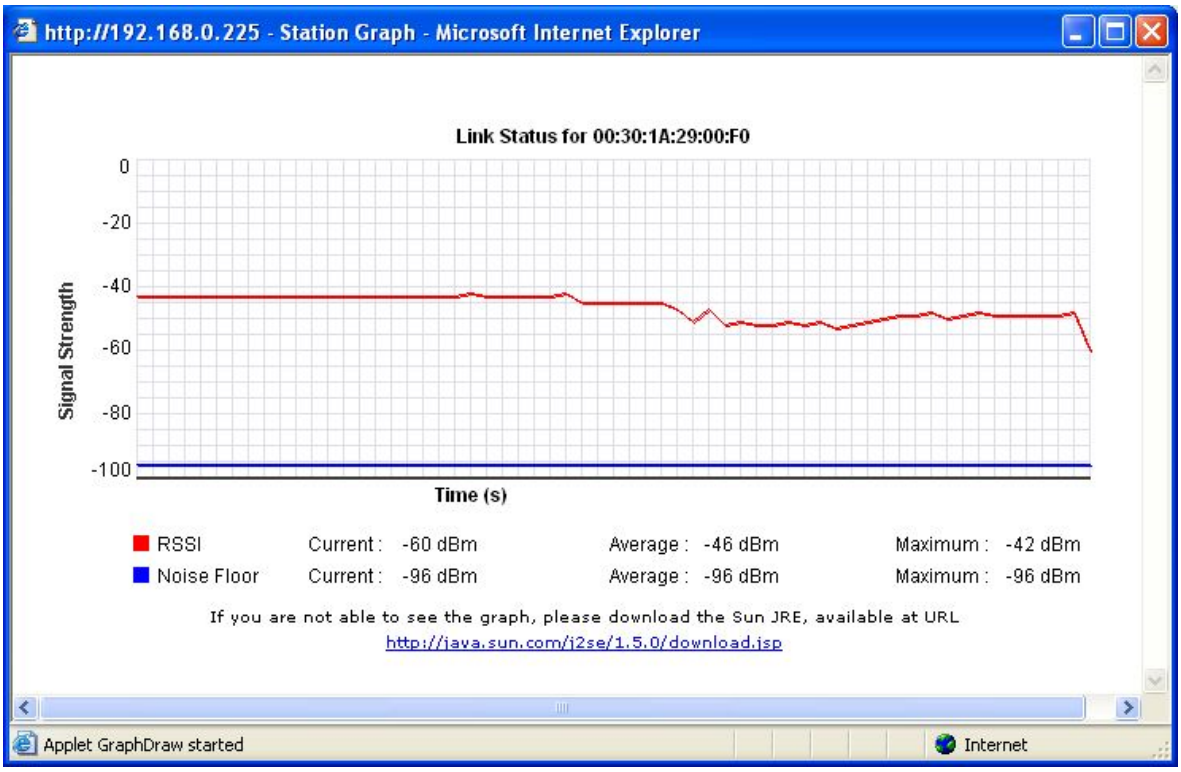

Figure 2-18c airClient TOTAL Association Status Graph

Noise Floor is the measurement of the signal created from the sum of all the noise sources and unwanted signals within a measurement system.

Note: If the Status Graph window does not appear, click on the Java link to download the JRE.

2.10.3. DHCP Configurations

The airClient TOTAL unit can be used as a DHCP server. DHCP (Dynamic Host Configuration Protocol) allows a host to be automatically assigned a new IP address out of a pool of preconfigured IP addresses for the network. This feature will only work when the unit is in Router or NAT operating mode.

Follow the steps below to configure the airClient TOTAL unit as a DHCP server:

1. From the Navigation menu bar, click on **Networking** | **DHCP** to access the DHCP configuration Page. Click on **Enable DHCP Server** button to open the DHCP Server settings page.
2. The **DHCP Server** screen will be displayed as shown below in Fig 2-19.
3. Select **System Define** if you wish the system to assign the IP addresses.
4. Select **User Define** if you wish to assign the IP address from the IP Address Pool.
5. If setting is **User Define**, enter the **Start IP address** and an **End IP Address** for the IP pool range that can be assigned to a DHCP client. Note that the Start and End IP address have to be in the same network segment as of the Ethernet IP address segment.
6. In case you require to reserve certain IP addresses for known devices, enter the corresponding MAC and IP address in the **DHCP server reserved entries** table.
7. Enter the lease time in **minutes**. The maximum lease time that is allowed is 2880 minutes.
8. Click on **Save** to apply the settings.
9. The revised DHCP settings will show up in the Summary Information page of the unit. If any DHCP client is added, it will appear in the Networking | DHCP List as shown below in Fig 2-20.

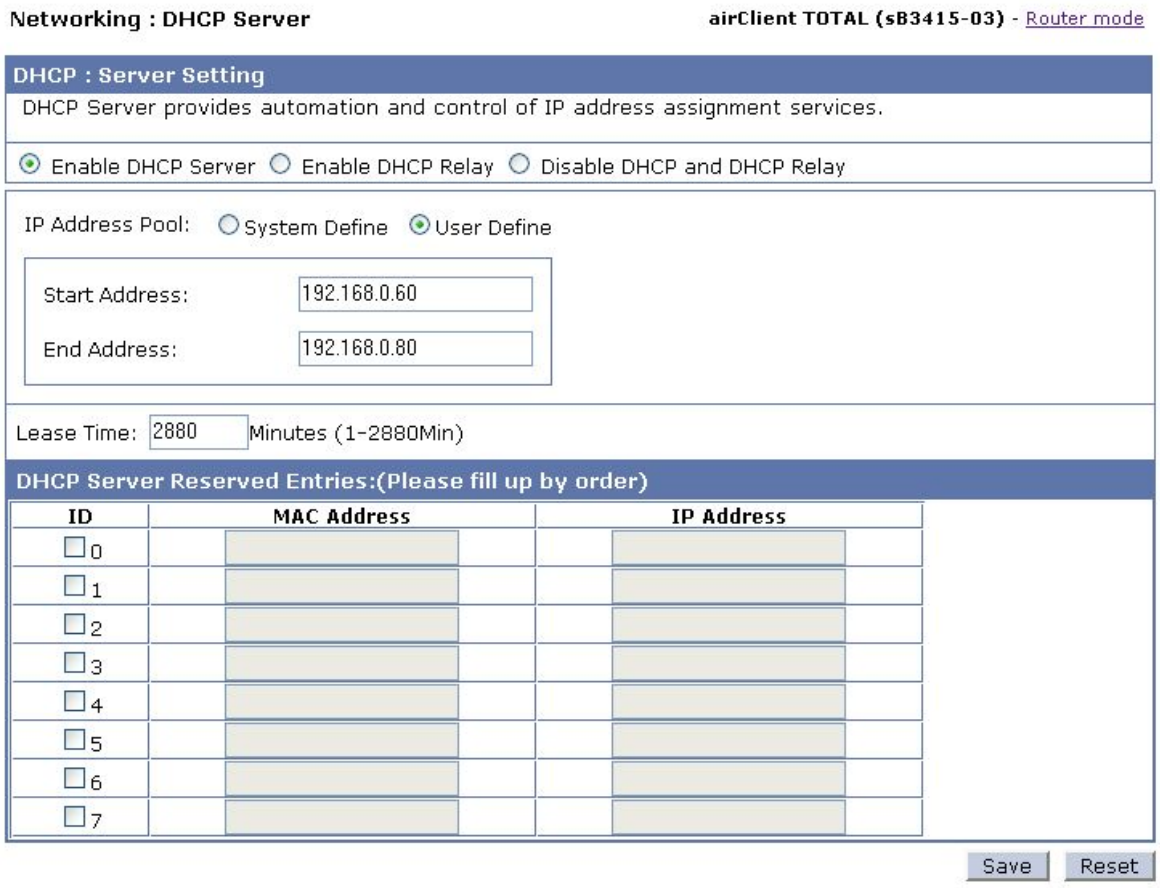

Figure 2-19 airClient TOTAL DHCP Server Configurations

Figure 2-20 airClient TOTAL DHCP List

Follow the steps below to disable the airClient TOTAL Router/NAT DHCP server:

1. From the Navigation menu bar, click on **Networking** | **DHCP Server** to access the DHCP configuration page.
2. Select the **DHCP and DHCP Relay** button to disable the DHCP server configuration.
3. Click on **Save** to save the settings. The settings will be applied after the Reboot.

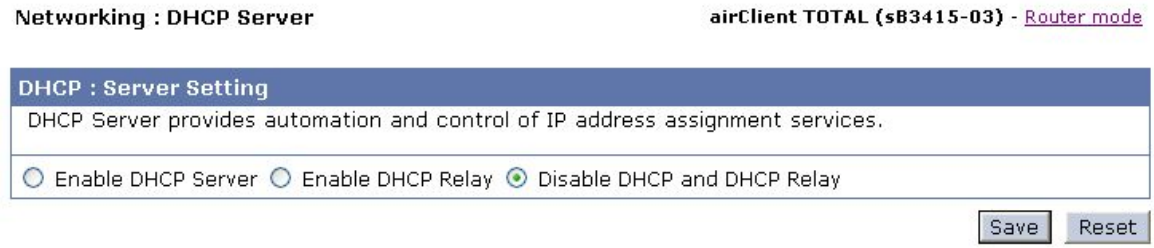

Figure 2-21 Disable DHCP and DHCP Relay

2.10.4. DHCP Relay Configuration

If the user has a DHCP Server, the airClient TOTAL Router can be configured as a DHCP Relay agent of the DHCP Server for IP address assignment.

Follow the steps below to configure the airClient TOTAL unit as a DHCP Relay Agent:

1. From the Navigation menu bar, click on **Networking** | **DHCP Server** to access the DHCP configuration page.
2. Click on **Enable DHCP Relay** to choose DHCP Relay mode.
3. Enter a valid DHCP Server IP.
4. Click on Save button to apply the settings and to start the DHCP relay agent.

Note: The system will validate the input parameters and notify users of invalid entry.
The DHCP Server IP will be in the same network segment as the device wireless Radio IP address.
The DHCP Server needs to be configured to serve IP range of the wired side Ethernet IP.
The DHCP Relay Agent is only available to hosts connected to the same LAN segment as the device wired-side Ethernet port.

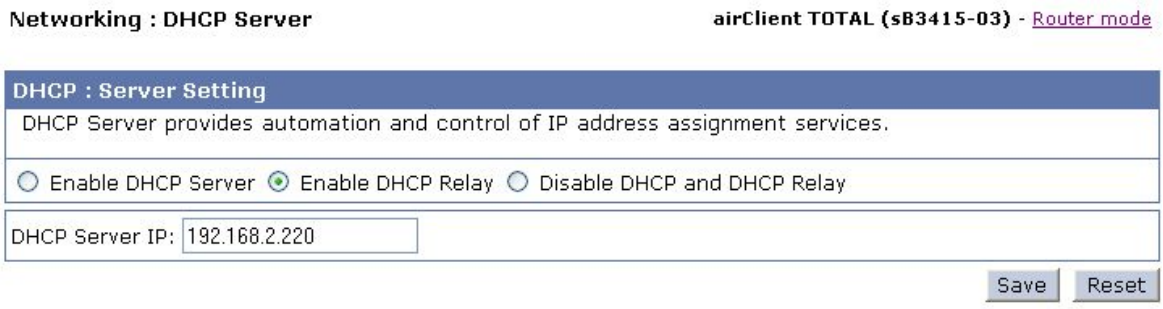

Figure 2-22 airClient TOTAL DHCP Relay Configuration

2.10.5. IP/Port Forwarding

IP/Port forwarding (also referred to as Virtual Server in this document) allows the user to define the port mapping between the local area network and the public network. This feature is only available when the device is configured in the NAT mode.

Follow the steps below to map a local port to the global port (accessible through the wireless interface):

1. Click on **Networking** | **IP/Port Forwarding** from the menu bar to access the IP Port Forwarding page.
2. Depending on the application, select the protocol as TCP/UDP.
3. Enter the **Local IP Address** and the **Local Port** and the corresponding **Global port** that can be used to access this Local IP/port through the wireless interface.
4. Activate/Deactivate the entry.
5. Click **Add** to add the entry into the IP Port Forwarding Table. This will result in an entry into the table as shown below.
6. Add multiple entries to the port forwarding table if required.
7. Click **Tools | Reboot** to save all the settings. The settings will be applied after the Reboot.
8. Upon the reboot, the total no. of entries in this table will show up in **Summary Information** page as shown in Fig 2-24.

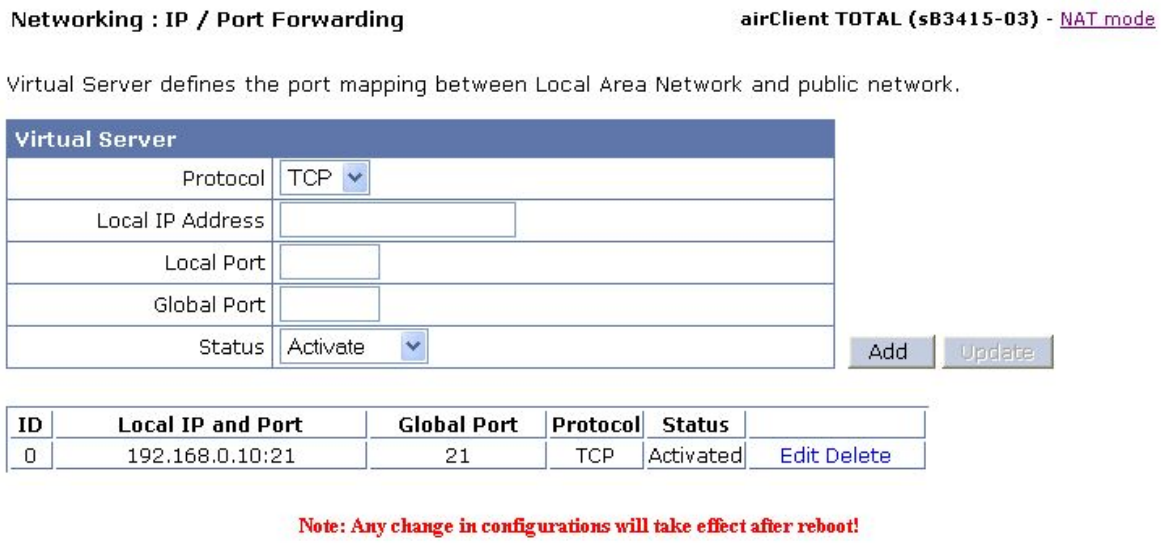

Figure 2-23 airClient TOTAL IP/Port Forwarding Table

Figure 2-24 IP/Port Forwarding Table Entries on Summary Page

Follow the steps below to edit or delete a port forwarding entry in the airClient TOTAL operating in NAT Mode.

1. Click on **Networking** | **IP/Port Forwarding** from the menu bar to access the Port Forwarding Table page.
2. In case you want to edit an existing entry, click on the **Edit** corresponding to the row. The entries will show up in the fields. Edit the entries and click the **Update** button to update the table.
3. In case you want to delete an existing entry from the Port Forwarding table, select the mapping you wish to delete, and click **Delete**.
4. Click on **Tools** | **Reboot** to reboot the unit for the changes to be effective.

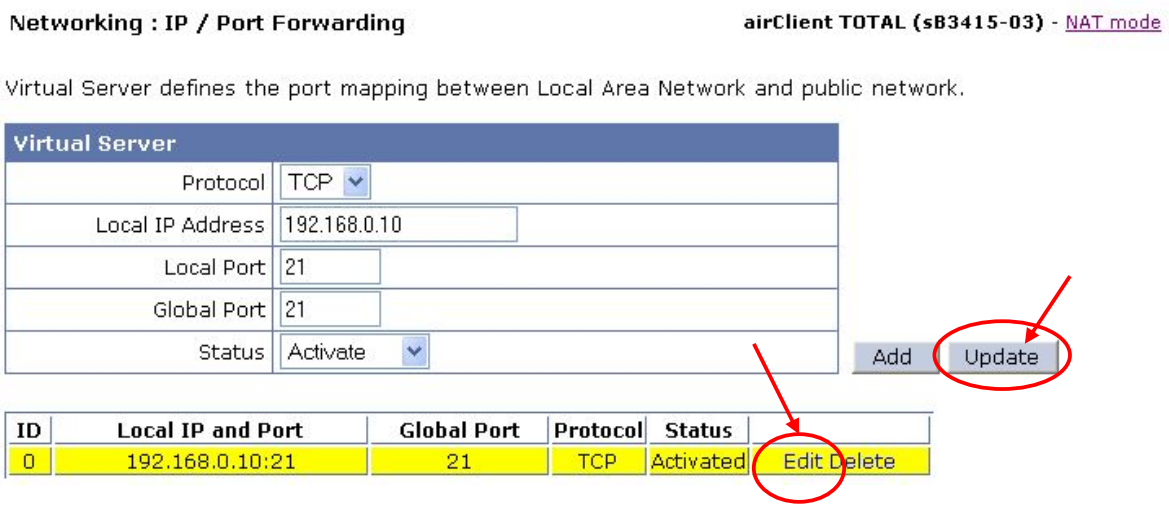

Figure 2-25 Editing IP/Port Forwarding Table Entry

2.10.6. Routing Table

The airClient TOTAL Router web-interface has the provision to add, delete or view static routes.

To view the routing table page, click on **Networking** | **Routing Table** from the menu bar.

To enable dynamic routing, select **Support RIP v2** on the Routing Table page. Dynamic Routing is enabled by default.

Adding and deleting static routes is allowed in the Router Mode of the airClient TOTAL.

Follow the steps below to add a static route entry in the airClient TOTAL operating in the Router Mode.

1. Click on **Networking** | **Routing Table** from the menu bar to access the routing table page.
2. Enter the **Destination IP**, **IP Mask**, **Gateway** for the new route. Select **Add** to add a new route as shown in Fig 2-16.
3. Select the **Status** to activate or deactivate the static route.
4. Click on **Tools** | **Reboot** to reboot the unit. The new routes will be activated or deactivated after the Reboot.
5. Upon the reboot, the total number of entries in this Routing Table will show up in **Summary Information** page as shown in Fig 2-27 below.

Figure 2-26 airClient TOTAL Add Static Route in Routing Table

Figure 2-27 Static Route Entries on Summary Page

Follow the steps below to edit or delete a static route entry in the airClient TOTAL operating in the Router Mode.

1. Click on **Networking** | **Routing Table** from the menu bar to access the view routing table page.
2. From the Routing table on this page, select the route you wish to delete, and click **Delete**, as shown in Fig 2-18.
3. In case you want to edit the existing entry, click on the **Edit** corresponding to the row. The entries will show up in the fields. Edit the entries and click the **Update** button to update the table.
4. Click on **Tools** | **Reboot** to reboot the unit for the changes to be effective.

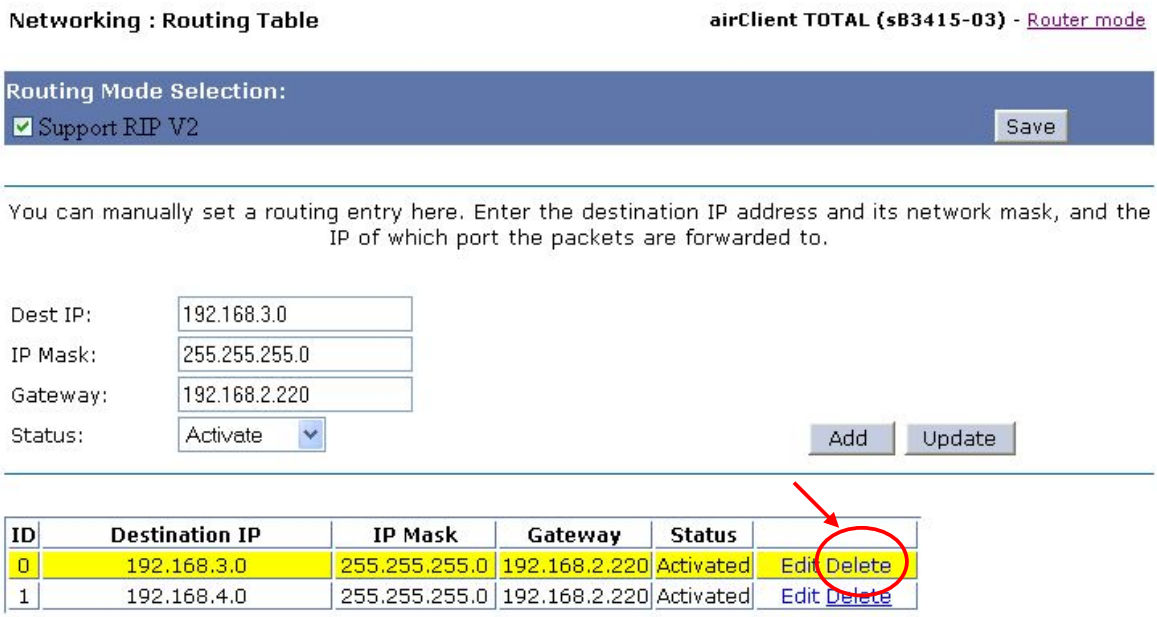

Figure 2-28 Deleting the Static Route

2.11. Security

This section allows you to configure wireless encryption to prevent unauthorized parties from accessing the network. The security options on the airClient TOTAL are as follows:

1. Open System
2. Shared Key
3. WPA –PSK

Note: By default, security is **Disabled.**

2.11.1. Open System / Shared Key

Open System/Shared Key authentication is used for security between the airClient TOTAL and the airPoint Nexus (or any other access point). To enable, disable or change security settings, the user needs to access the security setting page on the web interface. The following table describes the information for the security settings for the Open System or Shared Key authentication.

Follow the steps below to configure the Data Encryption parameters:

1. Click on **Radio** | **Security** from the main menu, and a screen as shown in Fig 2-19 will be displayed.
2. Choose the **Authentication Type** as **Open System** or **Shared Key** in the drop down menu.
3. Choose the **Key Entry Method** as HEX or ASCII. ***Key should be HEX when trying to associate with the airPoint Nexus Access Point.***
4. Choose the **Key length** (64 bits or 128 bits) from the drop down list. For HEX entry method, Key length is 10 characters for 64 bits, and 26 characters for 128 bits.
5. Enter the **WEP** key in the Key Table entries.
6. Select the **Key ID** of the index of the key to be used to associate.
7. Click **Save** to save the settings.
8. Select **Tools** | **Reboot** to reboot the unit. The settings will be effective after the reboot

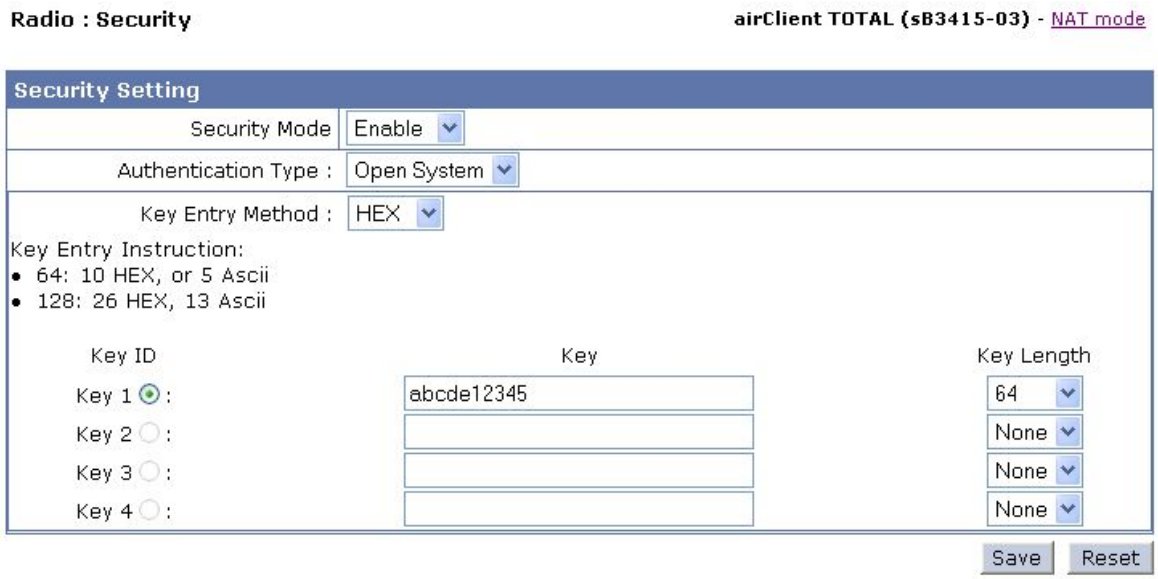

Figure 2-29 airClient TOTAL Security - Open System/Shared Key Configuration

Table 2-4 Security Settings for Open System/Shared Key

Page Items	Descriptions
Authentication Type	Choose between open system and shared key authentication modes Open System: Open System is null authentication. With WEP enabled

Page Items	Descriptions
	and valid WEP key on both ends, it provides data encryption. Shared Key: Strict authentication for both authentication and data encryption. Clients must provide valid WEP key to associate
Key Entry Method	Choose HEX if the key entered is the Hexadecimal format, choose ASCII if the key entered is in ASCII format.
Key ID	Select one of the key indexes from the 1 to 4.
Key	The value of the encryption key
Key Length	Choose encryption key size between 64bits and 128bits 64 bits: User has to input 10 HEX digits. 128 bits: User has to input 26 HEX digits.

2.11.2. WPA-PSK

In order to configure WPA-PSK follow the steps as shown below:

1. Click on **Radio | Security** from the main menu. A screen as shown in the figure below will appear for the **WPA-PSK** settings.
2. Select the **Authentication Type** as WPA-PSK from the drop down menu.
3. Enter the **Key Entry Method** as ASCII or HEX.
4. Enter the WPA-Shared Key in the **Passphrase** field.
5. Select the Cipher as **TKIP** or **AES**. (Note: AES cipher is only available in 3415-03 model).
6. Click on **Save** and click on **Tools** | **Reboot** to reboot the unit. The settings will take effect after the reboot.

Note: For the 3415-03 model, WPA-PSK security modes will only work when the airClient TOTAL unit is in Router/NAT modes.

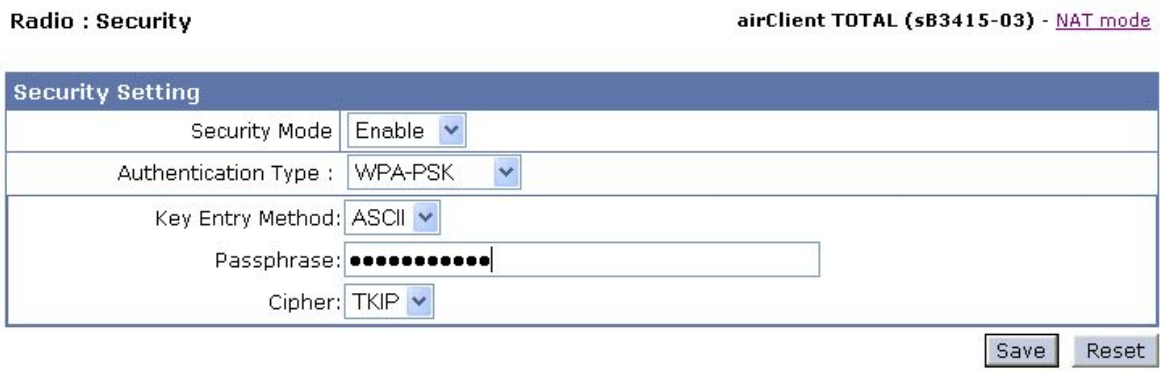

Figure: 2-30 airClient TOTAL Security - WPA-PSK Configuration

Table 2-5 Security Settings for WPA-PSK

Page Items	Descriptions
WPA-PSK	WPA-PSK is an extra-strong encryption where encryption keys are automatically changed (called **rekeying**) and authenticated between devices after a specified period of time, or after a specified number of packets has been transmitted. WPA-PSK is far superior to WEP and provides stronger protection for the home or SOHO users. The process used to generate the encryption key is very rigorous and the re-keying (or key changing) is done very quickly. This stops even the most determined hacker from gathering enough data to break the encryption.
Key Entry Method	Key entry method can be HEX or ASCII. To associate with the airPoint Nexus device, this value should be set to ASCII.
Passphrase	This key is used by the client to become authenticated with the airPoint Nexus or any third party WPA capable device.
Cipher	This can be set to TKIP or AES Note: AES is only supported in 3415-03 model.

3. Wireless Settings and Bandwidth Controller

3.1. Wireless Settings

The Wireless Settings can be accessed from the **Radio** | **Wireless Settings** in the navigation menu bar.

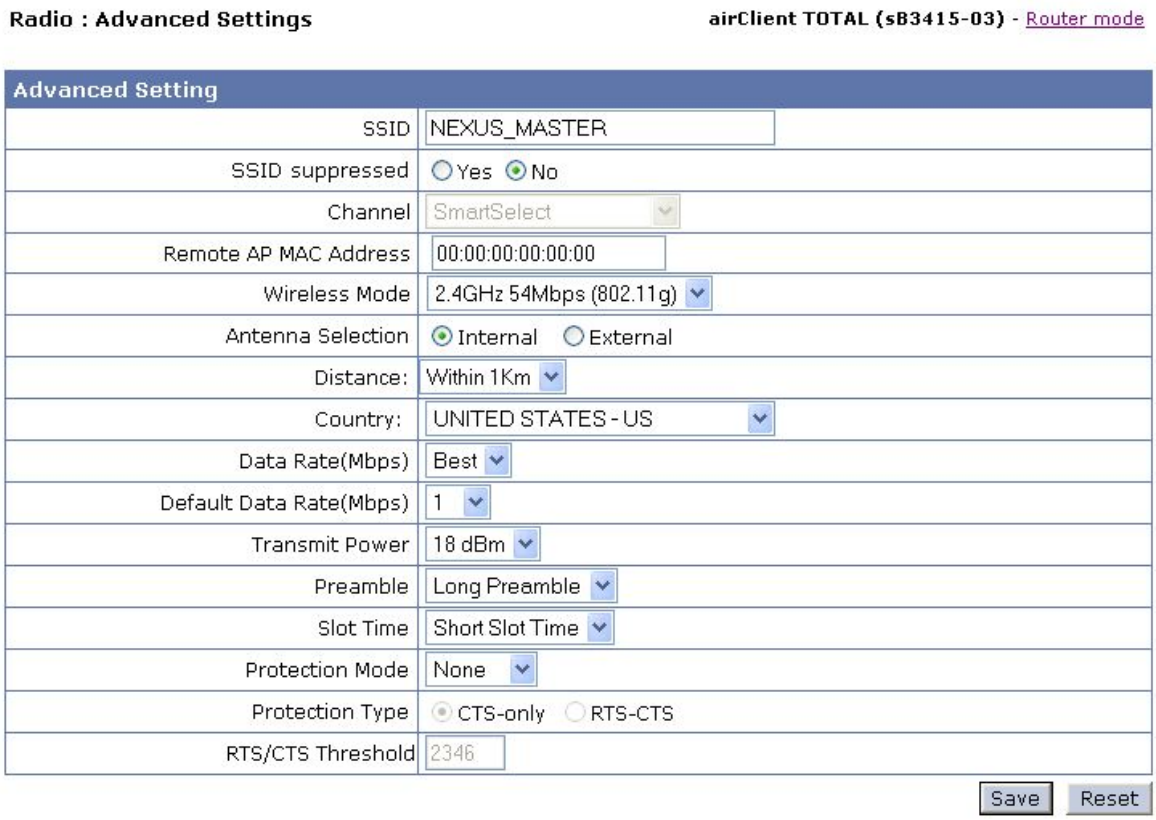

Figure 3-1 airClient TOTAL Wireless Settings

The following table summarizes the information for the wireless settings.

Table 2-3 Wireless Settings

Page Items	Descriptions
SSID	The **network name** for the wireless network.
SSID Suppressed	Shows if the SSID Suppressed is Enable or Disabled
Channel	This is not selectable in the current Router/NAT device configuration. The client will follow the channel of the AP to be associated with. The channel has to be set in the Bridge Mode configuration (sB3415-03 only)
Remote AP MAC Address	This is the MAC address of the remote Access Point. This has to be set in Bridge Mode configuration (sB3415-03 only)

Page Items	Descriptions
Wireless Mode	This is the radio operating mode of the client. This can be set to the wireless 802.11b or 802.11g.
Antenna Selection	This sets the Antenna to Internal or External.
Distance	The range of the link which corresponds to ACK window size
Country	This allows the selection of a country to change the radio regulatory domain.
Data Rate	This rate at which the operator wants radio to operate. By default, this rate is set to **Best**.
Default Data Rate	Data rate for transmitting beacons, broadcast and multicast packets. By default, this rate is set to 1 Mbps.
Transmit Power	This is used to set the output power of the radio. The valid radio power range is from 0 to 18 dBm.
Preamble	The radio preamble is a section of data at the head of a packet that contains information the airClient device needs when sending and receiving packets By default this value is set to Long.
Slot Time	This can be set to Long Short Time or Short Slot time.
Protection Mode	Select None, Always or Auto
Protection Type	Select CTS only or RTS-CTS
RTS/CTS Threshold	Default value is 2346 bytes. The range of value is from 256 to 2346 bytes

3.2. Bandwidth Control

Using the Bandwidth Controller, the user can limit the wireless link bandwidth speed. The maximum allowable bandwidth is up to 512Kbps in sB3415-01, 1 Mbps in 3415-02 and 3 Mbps in 3415-03. This is subject to the available upstream bandwidth, signal level and distance.

Note: For the 3415-03 model only, the user can control the upload and the download bandwidth for the wireless link.

Follow the steps below to change the bandwidth parameters:

1. From the navigation menu bar, click on **Networking** | **Bandwidth Control**.

2. Click on the **Bandwidth Control** button to enable the bandwidth controlling feature.

3. Enter the desired value in kbps. The maximum bandwidth allowable is 512 kbps for 3415-01, 1024 kbps for 3415-02 and 3072 kbps for 3415-03 models.

4. For the 3415-03 model, the user can configure the upload and download limit separately, as shown below in Fig 3.3.

5. Click on **Save** to save the settings. The settings will take effect after the Reboot.

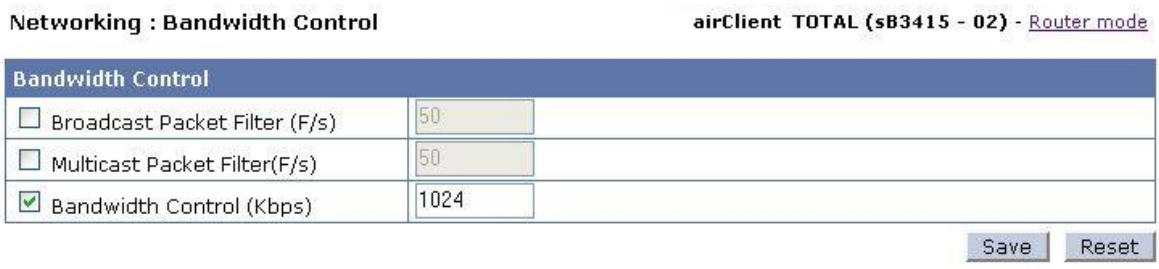

Figure 3-2 airClient TOTAL Bandwidth Control (sB3415-01 / sB3415-02)

Figure 3-3 airClient TOTAL Bandwidth Control (sB3415-03)

4. Traffic Statistics

Wireless Statistics can be displayed by clicking on **Networking** | **Wireless Statistics** from the navigation menu. The following figure shows the statistics page.

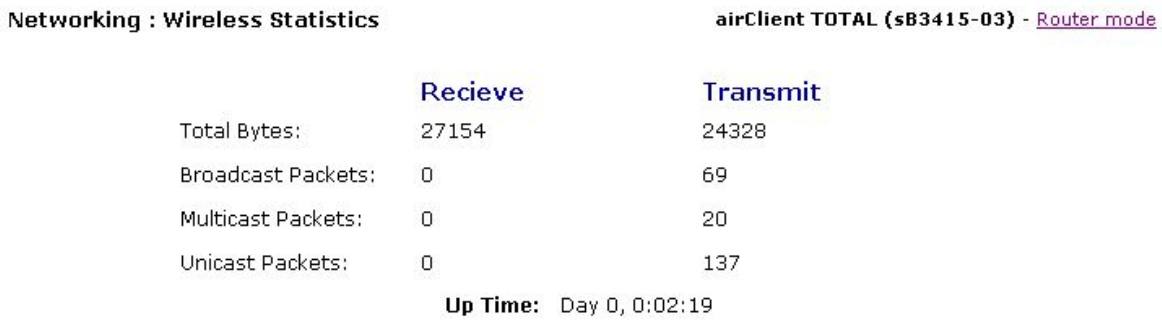

Figure 4-1 airClient TOTAL Wireless Statistics

The following table summarizes the information for the wireless traffic settings.

Table 4-1 Wireless Traffic Statistics

Wireless Traffic Statistics	
Total Bytes Receive	Total no. of bytes received on the wireless interface.
Total Bytes Transmit	Total no. of bytes transmitted on the wireless interface.
Broadcast Packets Receive	Total no. of broadcast packets received.
Broadcast Packets Transmit	Total no. of broadcast packets transmitted.
Multicast Packets Receive	Total no. of multicast packets received.
Multicast Packets Transmit	Total no. of multicast packets transmitted.
Unicast Packets Receive	Total no. of unicast packets received from a specific destination.
Unicast Packets Transmit	Total no. of unicast packets transmitted to a specific destination.
Up Time	Displays the time since the last reboot of the device.

5. Tools

In this section, you will find relevant information for changing the operating mode of the device, saving the configuration, restoring to factory defaults and upgrading the firmware.

5.1. System Configuration

The System Configuration page allows the user to change the operating mode of the unit.
Click on **Tools** | **System Configuration** from the navigation menu bar, to access the System Configuration page. The following figure displays the System Configuration page.

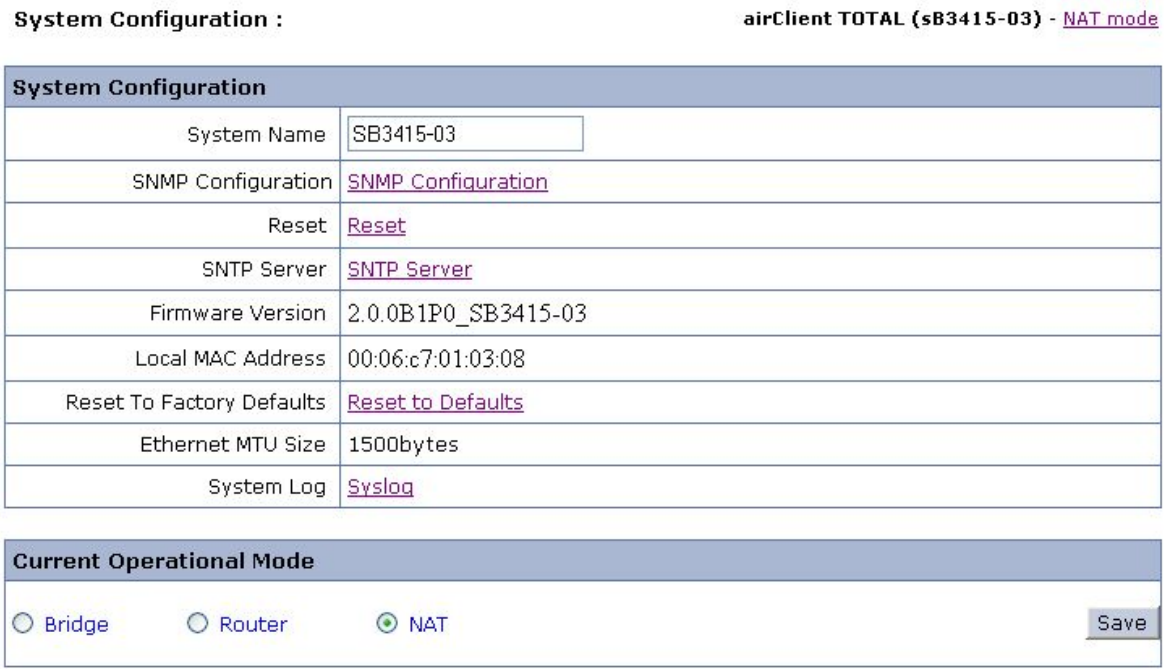

Figure 5-1 airClient TOTAL System Configuration

The following table summarizes the information for the System Configuration page.

Table 5-1 System Configuration Page Items

Page Item	Descriptions.
System Name	Name of the airClient TOTAL.
SNMP Configuration	This field links to the SNMP Configuration page settings.
Reset	This button Resets the airClient TOTAL unit. A message box is prompted to the user to confirm the reboot.
SNTP Server	Allows user to set the Network Time Server and Time Zone
Firmware Version	The version of the firmware installed on the unit currently.
Local MAC Address	The MAC Address of the local airClient TOTAL unit.
Reset to Factory Defaults	This button resets the unit to the factory default settings. A message box is prompted to the user to confirm resetting the unit to factory defaults.
Ethernet MTU Size	Displays the Ethernet MTU size.
System Log	This links to the System Log page settings.
Current Operational Mode	Displays the operating mode of the unit. This could be **Router** or **NAT** for sB3415-01 and sB3415-02 models. This could be **Bridge** or **Router** or **NAT** for sB3415-03 model.

5.2. SNTP Setting

The device time comes from the network time information source. The device needs access to a network timer (NTP time server) source. The NTP time server IP can be configured as follows:

1. From the navigation menu bar, click on **Tools** | **SNTP Setting** to configure the NTP Server. A page as shown below will appear.
2. Enter a valid **SNTP server IP address** and select the **Time Zone**. The default NTP server is 128.250.36.2 and the default Time Zone is Singapore.
3. Click on the **Save** button to configure the NTP.
4. After the Save/Reboot, the network time will appear on the browser, if the NTP server is contactable.

Figure 5.2 airClient TOTAL SNTP Time Settings

5.3. Site Survey

From the navigation menu bar, click on **Tools** | **Site Survey** to access the Site Survey page. A screen, similar to the one below, would show all the standards-based wireless devices operating in the area.

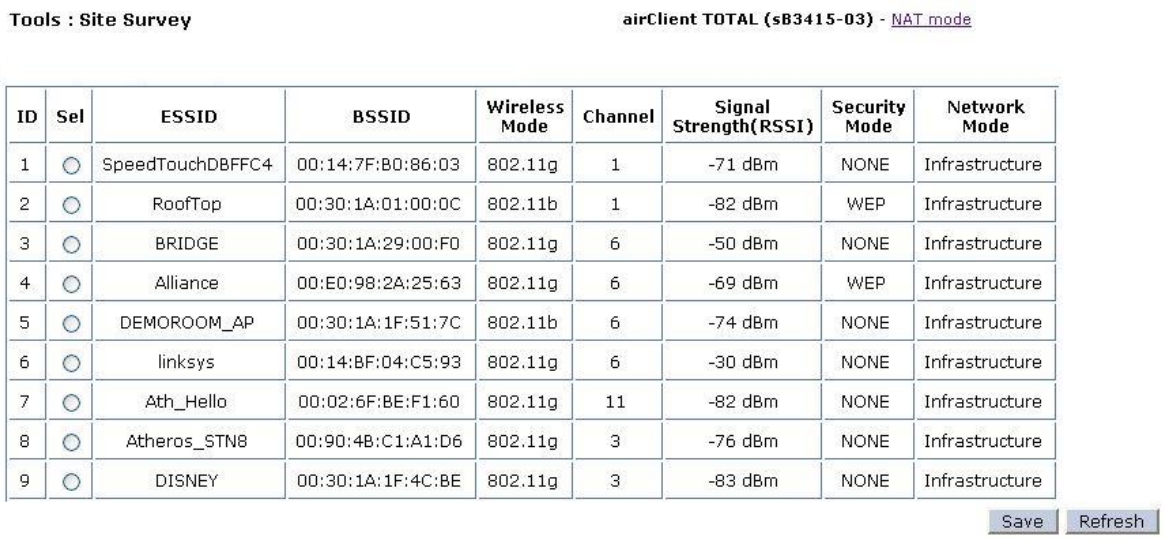

Figure 5-3 airClient TOTAL Site Survey

The following table summarizes the information for the Site Survey items.

Table 5-2 Site Survey Page Items

Page Item	Descriptions.
Sel	Allows the airClient TOTAL to associate with a different Access Point
ESSID	The network name for the wireless network.
BSSID	The MAC address of the device
Wireless Mode	Displays the radio operating mode of the device.
Channel	Displays the channel at which the device is operating.
RSSI	Displays the signal strength of the corresponding device.
Security	Displays the security mode that the device is currently operating in. If WEP or security option is enabled on the Access Point, then WEP needs to be enabled on the airClient TOTAL, and WEP key defined prior to association.
Network Mode	Displays the current wireless mode of the device. This could be Infrastructure or Ad-Hoc
Save button	Select a different SSID, and select on the Save button to move to another AP.
Refresh button	Refreshes the Site Survey page

5.4. System Admin

This menu option allows the user to change the User Name and/or password to access the unit. Refer to chapter 2.2 to change the user name and/or administrator password.

The default user name is **administrator** and the default password is **smartBridges** (case sensitive).

5.5. System User

The airClient TOTAL unit allows the user to create Read Only users, to only allow the users to only view the configurations of the unit. This Read Only user cannot edit any configurations, and cannot reboot the unit or restore the unit to factory default settings.

This menu option allows the user to change the Read Only user name and/or password to access the unit. Follow the steps here to change the user name and/or password for this Read Only User –

1. From the top navigation menu bar, click on **Tools** | **System User**. A System User interface will appear as shown below.
2. Enter the user name you wish in the **Common User** field.
3. Enter the new password in **Password** and **Verify Password** fields. Click on the **Save** button to save the settings.
4. Click on the **Save** button to save the settings.

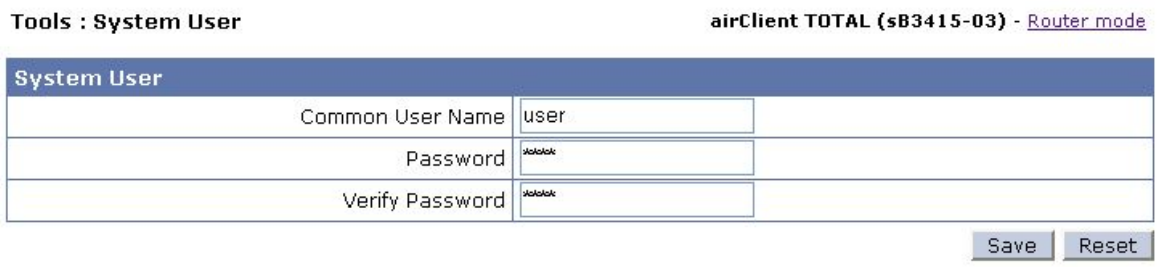

Figure 5-4 airClient TOTAL Read Only User Configuration

5.6. SNMP Configuration

The user can enable or disable the SNMP configuration using this tool.

Follow the steps below to change the SNMP settings:

1. Click on **Tools** | **SNMP Configuration** to access the SNMP Configuration page, as shown below in Fig 5-5.

2. **Enable or Disable** SNMP by using the checkbox.
3. Set the **Read Community String** to smartBridges.
4. Set the **System Contact/Location** on the page, if required.
5. Click on the **Save** button for the changes to take effect.

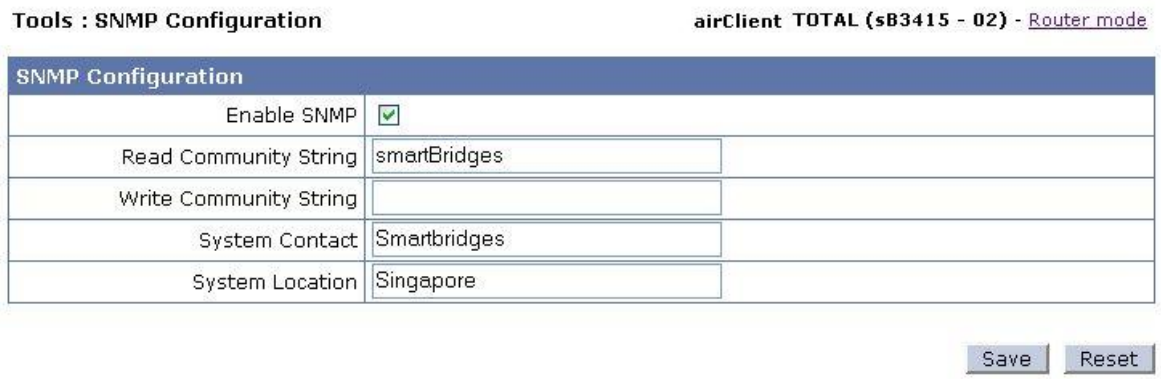

Figure 5-5 airClient TOTAL SNMP Configuration

5.7. Backup/Restore Settings

The Backup/Restore page backs up good configuration settings of the system. This can be used to restore the unit in case of any undesired circumstances.

Follow the steps below to change the Backup/Restore settings:

1. From the navigation menu bar, click on **Tools** | **Backup/Restore** to save or restore the settings on the unit. A page will appear as shown below.
2. Click on the **Save** button to save the current good settings of the system.
3. In the event the unit needs to be restored, select the **Restore & Reboot** button to recover the settings of unit that was saved earlier. This action will also reboot the system for the new settings to take effect.
4. The user can also save the current settings of the system to the PC through the Ethernet interface. Click on **Here** to save the options to a PC.
5. The saved file can be used to restore the system at a later time. (Note: The system will currently only allow a file with the name **apcfg** to be uploaded).
6. By clicking the **FactoryReset & Reboot** button, the unit will reset and go back to the factory defaults.

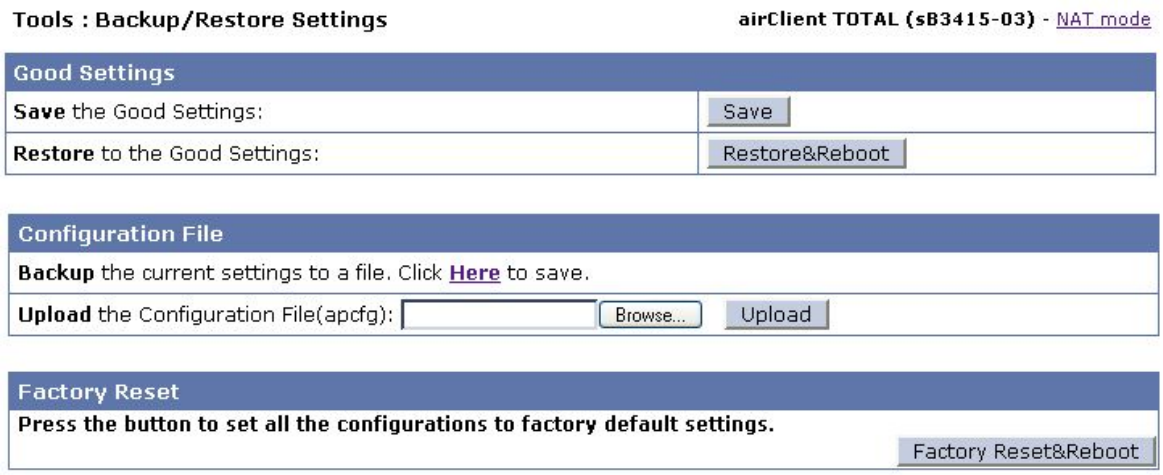

Figure 5-6 airClient TOTAL Backup/Restore Settings

5.8. Firmware Upgrade

The airClient TOTAL unit firmware can be upgraded from the web management interface.

The latest firmware for airClient TOTAL is available for download from the smartBridges support website at http://www.smartbridges.com/support/aCT241.asp.

Follow the steps below to upgrade the airClient TOTAL firmware:

1. Download the latest (or a particular release version) of the airClient TOTAL firmware from the web URL - http://www.smartbridges.com/support/aCT241.asp for sB3415.
2. Unzip the downloaded file to get firmware file with the name eg. sB3415-03_v200B1P0. The prefix is the model name of the airClient TOTAL (sB3415-01 / sB3415-02 / sB3415-03). The suffix is the firmware version no.
3. Login to the device web interface. Click on **Tools | Firmware Upgrade** from the drop down menu. The Firmware Upgrade page will be displayed as shown below.
4. Use the **Browse** button to select the location of this firmware file.
5. Click on the **Upload** button to upload the firmware. Wait for around 60 seconds to allow the new firmware to be uploaded to the unit.
6. When the firmware file transfer is completed successfully, a message will be displayed on the web-page, as shown in Fig 5-9.
7. Reboot the unit by clicking **Tools** | **Reboot** for the new firmware to take effect. (Note: The new firmware will take effect only after the reboot).

Note: During the upgrade period (about 1 minute), the airClient TOTAL unit MUST NOT be reset or power cycled. Improper actions can damage the unit.

Figure 5-7 airClient TOTAL Firmware Upgrade page

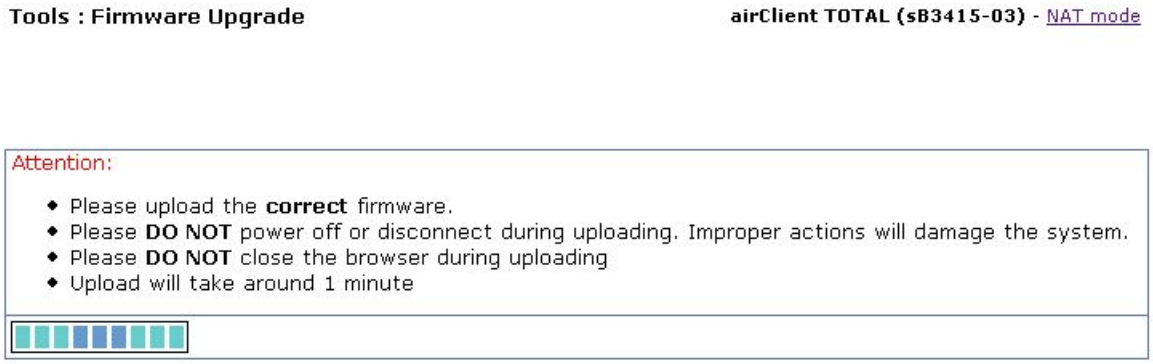

Figure 5-8 airClient TOTAL Firmware Upgrade

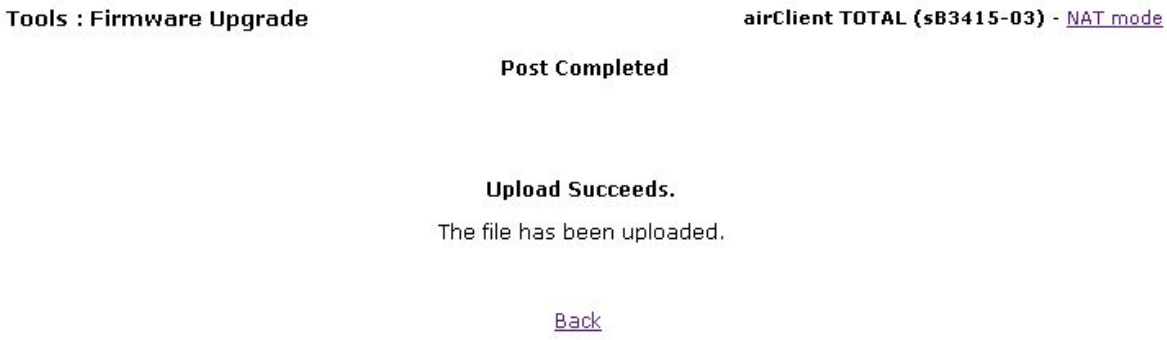

Figure 5-9 airClient TOTAL Successful Firmware Upgrade message

5.9. Product License Key

This feature is used to enhance/upgrade the default bandwidth on the airClient TOTAL units, and to convert the models between sB3415-01, sB3415-02 and sB3415-03.

By default, the 3415-01 allows a maximum bandwidth of 512 kbps, 3415-02 allows a bandwidth of 1 Mbps, and 3415-03 allows a bandwidth of 3 Mbps. Using the Product License Key feature, this default bandwidth can be enhanced to higher bandwidths depending upon the end user application needs.

There might also be a market need to convert an originally bought 3415-01 model to a 3415-03 model with Bridge Mode capabilities. By default, the cross-up gradation between models is not allowed. This means that the 3415-01 model cannot be loaded with a 3415-03 image. It can only be upgraded to future software releases of the same model, i.e 3415-01. However, if a special key is inserted, it is possible to upgrade between models.

The license key is based on the MAC address of the device, bandwidth desired for the upgrade and the model number / name. Follow the steps to convert between models or to enhance the unit to higher bandwidths -

1. Go to **Tools | System Configuration** to read the **Local MAC address** of the unit.
2. Send the MAC Address of the unit, model name of the unit, and the bandwidth needed for the upgrade to smartBridges Technical Support Staff at **support@smartbridges.com**.
3. The smartBridges Technical Support Staff will generate a unique license key, based on these 3 parameters, and pass the key via email.
4. Click on **Tools | Product License Key** to enter this unique license key and select the **Save** button to apply the settings.
5. If the license key feature was desired for higher bandwidth, the unit would be upgraded upon the reboot.
6. If the license key feature was desired for the cross upgrade of models, the changed model name will appear in the top right corner of the web interface, and it will now be possible to upload the changed model firmware to the unit.

Note: The license key feature will not work if the MAC address of the unit is provided wrongly to the smartBridges Technical Support Staff.

Figure 5-10 airClient TOTAL Product License Key Input

5.10. Link Budget Planning

Link Budget Planning is a very useful tool for link budget estimation.

A GPS Calculator is provided in the Link Budget Planning Calculator page to calculate the distance between an airClient TOTAL unit and an access point.

To calculate the distance between the two, follow the steps below:

1. From the top navigation menu bar, click on **Tools** | **Link Budget Planning**. The Link Budget Planning web page will appear as shown below in Fig 5-11.
2. Enter the GPS co-ordinates of Station 1 (Latitude1 and Longitude1) and Station 2 (Latitude 2 and Longitude 2). GPS co-ordinates may be entered in DD:MM:SS or DD:MM:SS.SS formats.
3. Select the distance in units (miles or kilometers).
4. Click the **Compute Distance** button to calculate the distance between the two stations.
5. The distance will be displayed in the Distance text box.

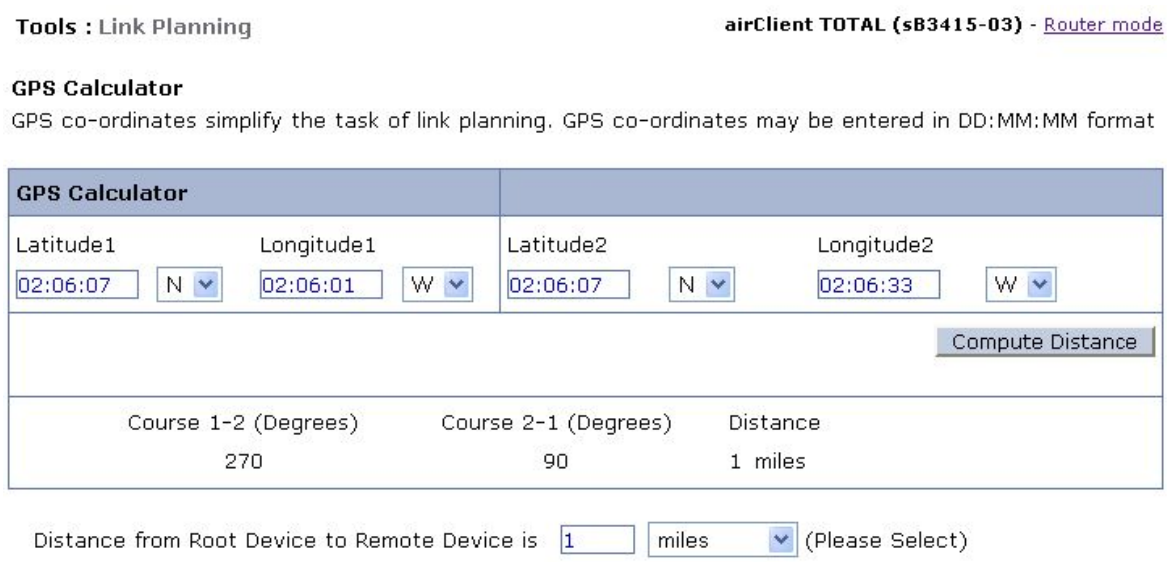

Figure 5-11 airClient TOTAL Link Budget Planning GPS Calculator

Once the distance is computed follow the steps below for the link budget calculations. Alternatively, the distance parameter can be manually entered in miles or kilometers without filling in the latitude/longitude coordinates:

1. Select the **Radio Mode** for station 1 and 2.
2. Enter the **Transmit Output Power** in dBm for station 1 and 2.
3. Enter the **Antenna Gain** in dB for station 1 and 2.
4. Enter the **RF Cable Losses** in dB for station 1 and 2.

5. Click the **Compute Link Budget** button to calculate the link budget information.
6. The link budget information will be displayed as shown below in Fig 5-9.

The link budget information includes the EIRP, Free Space Loss and Theoretical RSSI.

The Receive Sensitivity, Maximum Transmit Power, System Gain and Available Fade Margin at various Link Speeds are also computed and displayed in a table.

The Ideal fade margin for a link is between 10 dB to 20 dB for a stable link base on the environmental condition of a region.

Fresnel Zone Clearance Required will also be displayed.

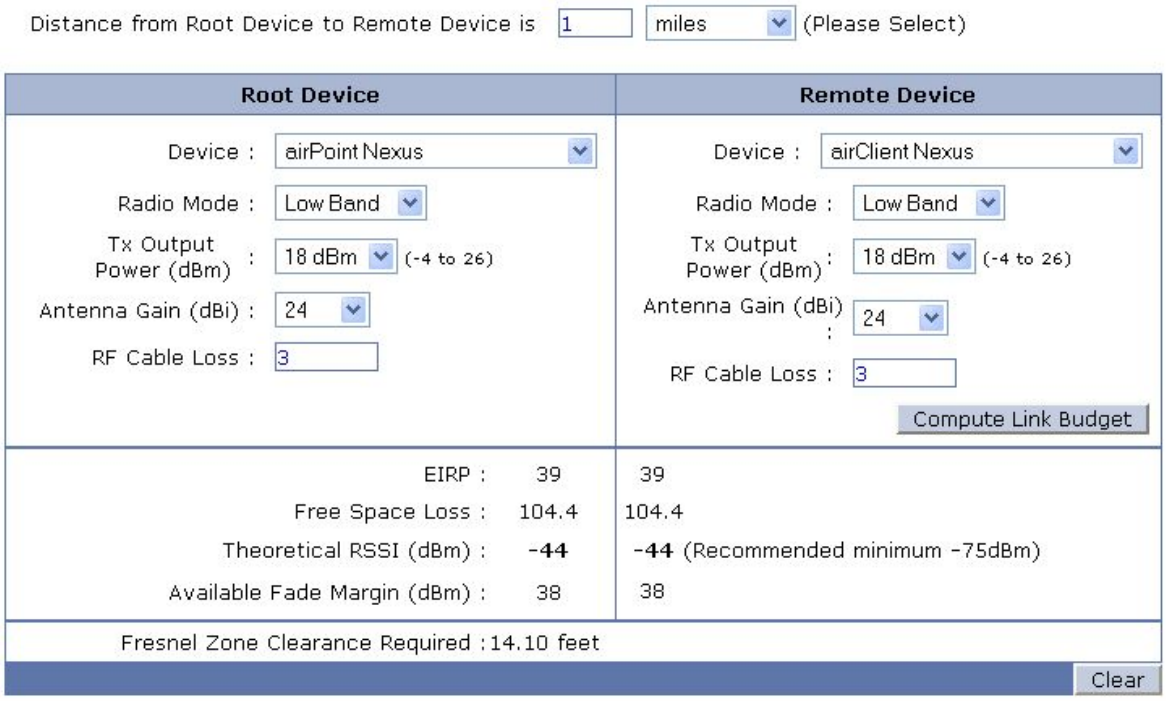

Figure 5-12 airClient TOTAL Link Budget Planning Calculator

Note: For the SB3415 models, the device can be selected as airClient NEXUS.

5.11. Reboot

The device would need to be rebooted in case any changes are to be made to the system, or a new firmware is downloaded. Click on **Tools** | **Reboot** to reboot the unit. A figure showing the countdown to 0 will appear as shown below during the Reboot process.

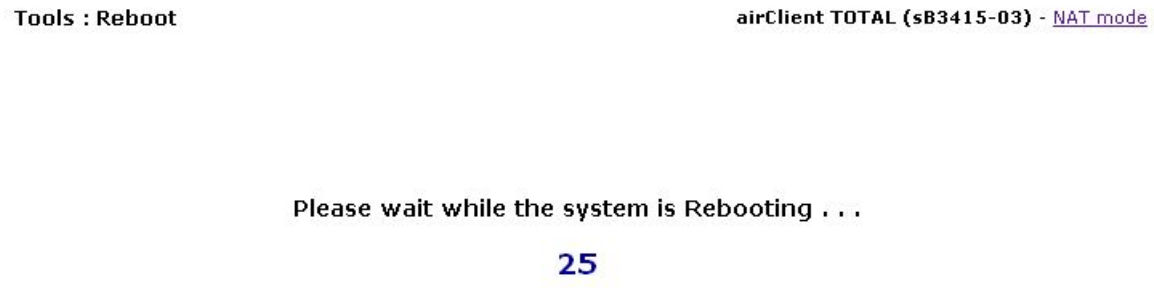

Figure 5-13 airClient TOTAL Reboot page

Note: The reboot may take around 30 seconds to complete

Once the reboot is complete, click **Here** on the following screen to get the last page prior to the reboot.

Figure 5-14 airClient TOTAL Reboot page 2

This concludes the user guide. For the latest updates, tools and documents to help troubleshoot the sB3415, visit the support section of the smartBridges website at http://www.smartbridges.com/support/.

Appendix A – Some useful terms and definitions

Acronyms and Abbreviations	
MAC	Media Access Control
RSSI	Receive Signal Sensitivity Indication
SSID	Service Set Identifier
DHCP	Dynamic Host Configuration Protocol
ACL	Access Control List
SNMP	Simple Network Management Protocol
SNTP	Simple Network Time Protocol
STP	Spanning Tree Protocol
TCP	Transmission Control Protocol
IP	Internet Protocol
WDS	Wireless Distribution System

SSID

Each ESS has a Service Set Identifier (SSID) used to identify the Radio that belongs to the ESS. Radios can be configured with the **SSID** of the **ESS** to which they should associate. By default, radios broadcast their **SSID** to advertise their presence.

WDS

Wireless Distribution System (WDS) is a system that provides a means to extend the range of Wireless Local Area Network. It allows the creation of large wireless networks by linking several wireless stations with WDS links. To create a WDS link, peer MAC addresses need to be exchanged (as can be done through the Wireless Settings page for 3415-03 Bridge Mode). All stations in WDS should be configured to use the same radio channel and share the same WEP keys, if they are used. smartBridges radios functions as a transparent bridge while operating as WDS links.

WEP

According to the IEEE 802.11 standard, Wired Equivalent Privacy (WEP) is intended to provide "confidentiality that is subjectively equivalent to the confidentiality of a wired local area network medium and that does not employ cryptographic techniques to enhance privacy."
WEP relies on a secret key that is shared between a mobile station and an access point. **WEP** uses the RC4 stream cipher invented by RSA Data Security. RC4 is a symmetric stream cipher that uses the same variable length key for encryption and decryption. With WEP enabled, the sender encrypts the data frame payload and replaces the original payload with the encrypted payload. The sender then forwards the encrypted frame to its destination. The encrypted data frames are sent with the MAC header **WEP** bit set. Thus, the receiver knows to use the shared **WEP** key to decrypt the payload and recover the original frame. The new frame, with an unencrypted payload can then be passed to an upper layer protocol.
WEP keys can be either statically configured or dynamically generated. In either case, **WEP** has been found to be easily broken.

WPA

Wi-Fi Protected Access (WPA) is a replacement security standard for WEP. It is a subset of the IEEE 802.11i standard being developed. **WPA** makes use of **TKIP** to deliver security superior to WEP. 802.1X access control is still employed. The **Authentication Server** provides the material for creating the keys.

COFDM

COFDM involves modulating the data onto a large number of carriers using the OFDM technique. The Key features which makes it work, in a manner is so well suited to terrestrial channels, includes:

- Orthogonality (the “O” of COFDM);
- The addition of Guard interval;
- The use of error coding (the “C” of COFDM), interleaving and channel-state information

COFDM is resistant to multipath effects because it uses multiple carriers to transmit the same signal.

RIP

The most popular of the TCP/IP interior routing protocols is the *Routing Information Protocol (RIP)*. RIP is used to dynamically exchange routing information. RIP routers broadcast their routing tables every 30 seconds by default. Other RIP equipments will listen for these RIP broadcasts and update their own route tables.

DHCP

DHCP stands for ‘Dynamic Host Configuration Protocol’ and is a means for networked computers to get their TCP/IP networking settings from a central server. Importantly, DHCP assigns IP addresses and other TCP/IP configuration parameters automatically.

SNMP

Short for ***S****imple* ***N****etwork* ***M****anagement* ***P****rotocol,* a set of protocols for managing complex networks. The first versions of SNMP were developed in the early 80s. SNMP works by sending messages, called *protocol data units (PDUs)*, to different parts of a network. SNMP-compliant devices, called *agents,* store data about themselves in *Management Information Bases (MIB)* and return this data to the SNMP requesters.

SYSLOG

In order to track information on events, device jobs, and packets flows, most security devices out put these events using the syslog information model.