AlvariCRAFT™ Device Manager for BreezeACCESS® Family

User Manual

Software Version: 3.0
December 2009
P/N: 215488

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About This Manual

This manual describes how to use AlvariCRAFT with BreezeACCESS Device Driver Version 3.0 for managing BreezeACCESS family equipment using SW Version 6.0.

BreezeACCESS equipment that can be managed by AlvariCRAFT includes the BreezeACCESS VL, BreezeNET B and BreezeACCESS 4900 product lines (it does not includes previous generation BreezeACCESS GFSK and BreezeACCESS OFDM product lines and BreezeACCESS EZ products).

This manual is intended for personnel that are responsible for managing the equipment using AlvariCRAFT. It is assumed that the reader is familiar with the operation and administration of the managed system components. For more information refer to the AlvariCRAFT User Guide and to the relevant equipment System Manuals.

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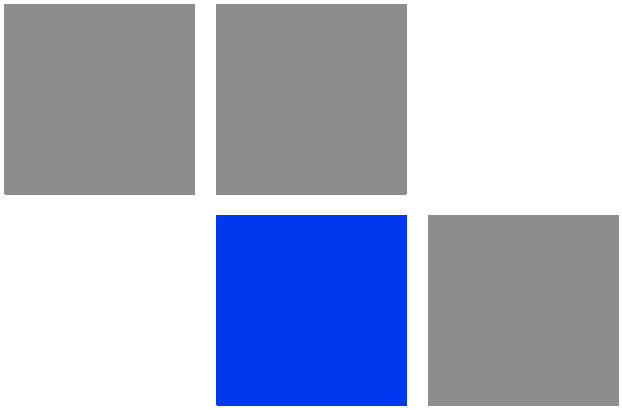
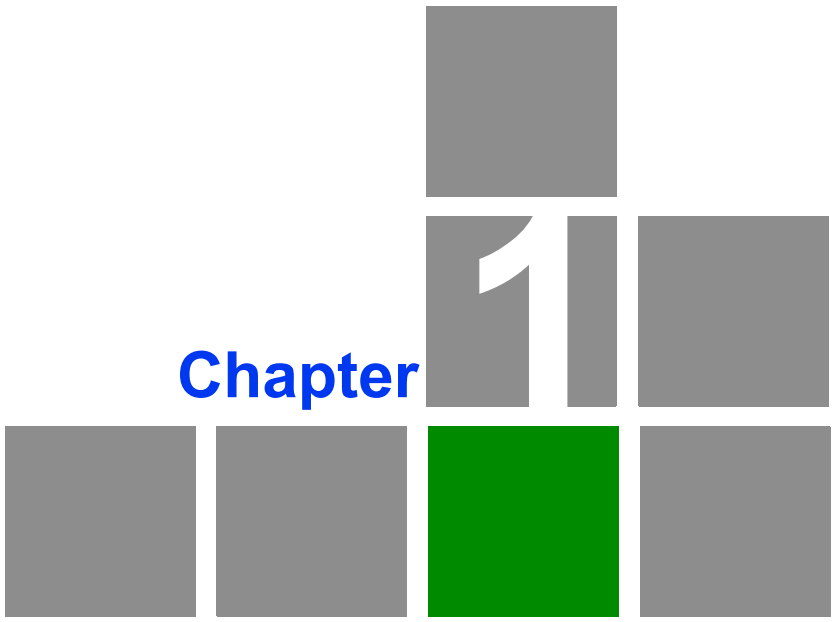




Chapter 1

Using AlvariCRAFT

In This Chapter:

1.1 Installing AlvariCRAFT

The executable AlvariCRAFT file (Install_<version number>.exe) is available in the CD package.

Run the executable file and follow the instructions to install the AlvariCRAFT utility with the BreezeACCESS Device Manager on your PC.

NOTE

Installing AlvariCRAFT will automatically uninstall a previously installed version of AlvariCRAFT.

When a previous version is uninstalled automatically, the list of managable devices that is kept as a part of AlvariCRAFT will be deleted.

The AlvariCRAFT application must be closed before starting installation of a new version.

1.2 Introduction

AlvariCRAFT for BreezeACCESS family can be used to manage BreezeACCESS VL, BreezeNET B, BreezeACCESS 4900 and BreezeACCESS EZ (AU-EZ) devices (it does not support management of previous generation BreezeACCESS GFSK and BreezeACCESS OFDM devices). The current release supports BreezeACCESS VL, BreezeACCESS 4900 and BreezeNET B equipment.

AlvariCRAFT enables on-line management of a selected single device, including configuration, performance monitoring, software upgrade and configuration backup/restore. It can also be used for managing an entire BreezeACCESS sector (all or some of the SUs connected to one AU), including multiple configuration and software upgrade.

1.3 Getting Started

To open the AlvariCRAFT Device Manager:

Double-click on the AlvariCRAFT icon or open it from the windows **Start** menu (**Programs>AlvariCRAFT**). The Main window opens, enabling to view the current list of the devices that can be managed by the AlvariCRAFT utility, add new devices to the list, delete devices from the list and edit the relevant properties of the devices in the list. You can open the Device Manager or establish a Telnet cut-through to a selected device.

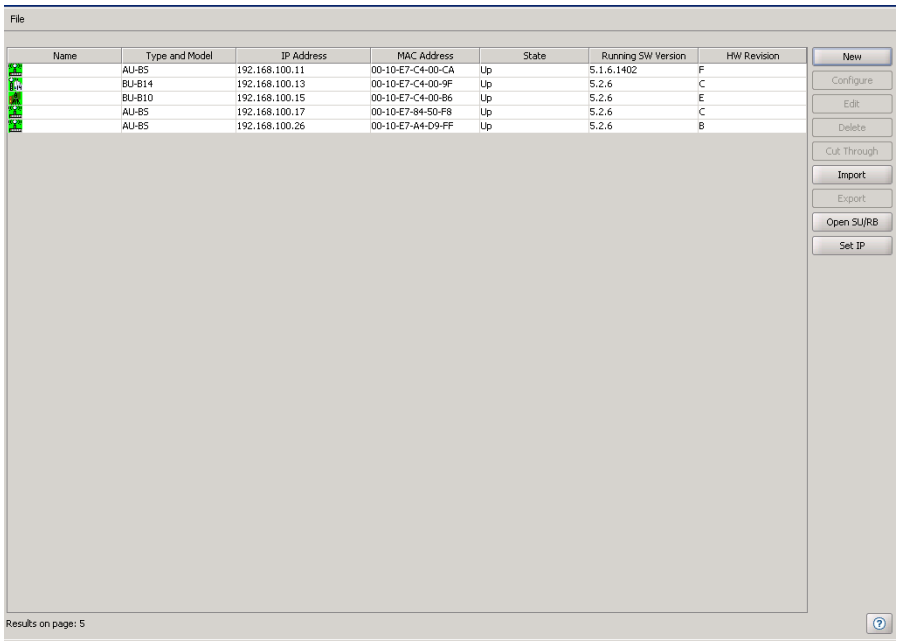


Figure 1-1: The Main Window

NOTE

When opened for the first time, the Managed Devices list is empty.

The following are the controls on the Main window:

Button	Description
New	Adds a new device to the list of devices that can be managed by the utility. The list can include AUs and/or BUs. SUs/ RBs are typically managed via the associated AU/BU. Refer to Open SU/RB below for details on managing an SU/RB directly.
Configure	Opens the Device Manager (see "Managing a Single Device/Cell" on page 21), allowing to manage the selected device. Not available if two or more devices are selected, or if the State is other than Up.
Edit	Opens the Equipment Editor (see below) for the selected device, allowing to edit the device's SNMP properties and its name in AlvariCRAFT. The IP Address of a defined device cannot be editted.
Delete	Deletes the selected device(s) from the database. Select the device(s) to remove and click **Delete**. The application prompts you for confirmation. You can always redefine deleted devices.
Cut Through	Opens a Telnet session to the selected device. Not available if more than one device is selected, or if the State is other than Up.
Export	Exports the list of selected devices with the relevant settings to a Comma Separated Values (csv) file.
Import	Imports a Comma Separated Values (csv) file with managed devices and their settings and adds them to the list of managed devices. An existing device will be skipped.
Open SU/RB	Enables defining the required SNMP properties of a selected SU/RB and openning the Device Manager for the specified unit. The details of this device will not be maintained in the managed devices list.
Set IP	Enables to define the IP parameters in a device based on its MAC address.

To add an AU or a BU to the Managed Devices list:

1 Click on the **New** button to open the Equipment Type selection window.

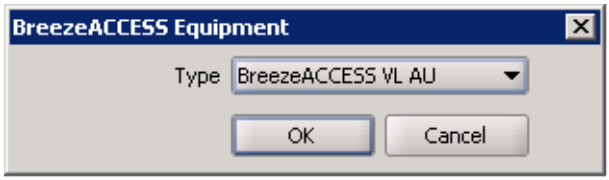


Figure 1-2: Equipment Type Selection

2 From the drop-down menu, select the Equipment Type: BreezeACCESS VL AU or BreezeNET B BU. Click **OK**. The Equipment Editor opens, allowing to define the Device Name and SNMP properties of the device to be managed.

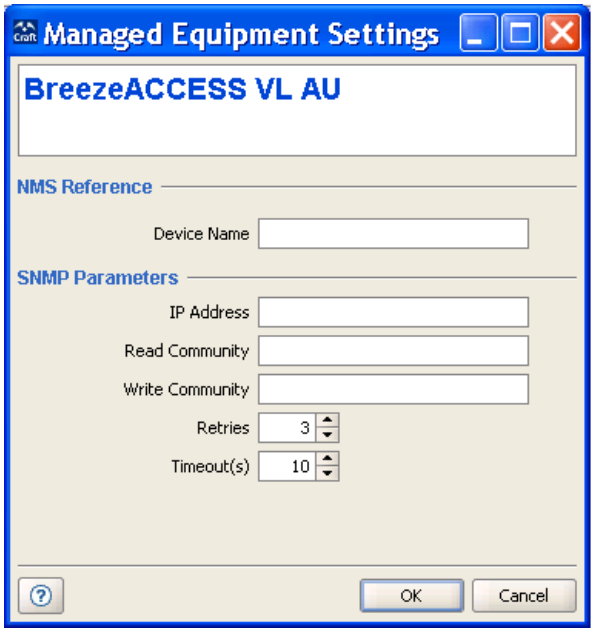


Figure 1-3: The Equipment Editor

The Equipment Editor includes the following fields:

Parameter	Description
NMS Reference	
Device Name	The device's name in the AlvariCRAFT utility.
SNMP Parameters	
IP Address	The device's IP Address. Read-only when editing the properties of a previously defined device.
Read Community	The Read community string (password) for SNMP get operations. This string is used by the SNMP agent to allow/disallow SNMP read access. The default Read Community is *public*.
Write Community	The Write community string (password) for SNMP set operations. This string is used by the SNMP agent to allow/disallow SNMP write access. The Write community can also be used for read (get) operations. The default Write Community is *private*.
Retries	The maximum number of retries for SNMP/TFTP communication with the Device. The range is from 0 to 255. The default is 3 retries.
Timeout(s)	The maximum time in seconds that the requesting process waits for a response from the Device before attempting a retransmission (or aborting if the maximum number of retries has been reached). The available range is 1 to 3600 seconds. The default is 10 seconds.

3 Enter the Device Name (optional), IP Address, Read community and Write community. Click **OK**.

NOTE

If the Read community string is entered in the Write Community text field, the user will get read-only access rights to the device. For increased security, ESSID parameters are not available to users with read-only access rights.

The Write community string may also be entered in the Read Community text field.

4 The device's is added to the Managed Devices list.

For each defined device, the following information is displayed in the Managed Devices list:

Parameter	Description
Name	The name of the device as defined in the Equipment Editor (may differ from the Device Name defined in the device).
Type and Model	The type and model of the device: AU-BS, RB-28, etc.
IP Address	The IP address of the device.
MAC Address	The MAC address of the device. Displayed only after connecting with the device.
State	The connection state of the device: ■ Up if AlvariCRAFT can communicate with the device ■ Unreachable for a device that was reached in the past but cannot be reached currently ■ Unknown for a device that was never reached by the AlvariCRAFT utility. ■ Unmanageable for an SU/RB that is presented by the AU/BU as up and running but cannot be managed by AlvariCRAFT. This can happen if the devices uses a SW version below 5.0 or if it's IP address is on a subnet that cannot be reached by AlvariCRAFT or if either its VLAN or Network Management parameters are configured so that it cannot be managed by the AlvariCRAFT station.
Running SW Version	The running software version of the device. Displayed only after connecting with the device.
HW Revision	The HW Revision of the device. Displayed only after connecting with the device.

NOTE

Configuring wrong communities during the initial definition of the device in the Equipment Editor will cause the device's State to be presented as Unknown or Unreacheable.

To manage a device that is included in the Managed Devices list:

Double-click on the selected entry in the Managed Devices list, or select it and click on the **Configure** button. The Device Manager for the selected entity opens, displaying the main page for the device.

To manage an SU or an RB:

1 Click on the **Open SU/RB** button. The Equipment Editor for SU/RB opens, allowing to define the Device Name and SNMP properties of the device to be managed.

2 Enter the Device Name (optional) and SNMP properties of the device you want to manage.

3 Click **OK**. The Device Manager for the specified device will open.

To use the Set IP feature:

The Set IP feature enables to configure the IP parameters in a device based on its MAC address. This enables managing a device whose previous IP parameters are not known.

1 Click on the **Set IP** button. The Set IP window opens.

2 Enter the MAC Address of the device using the format xx-xx-xx-xx-xx-xx.

3 Enter the IP parameters to be used by the device (IP Address, Subnet Mask, Default Gateway).

4 Enter the Read/Write Community string used by the device.

5 Click **OK**. After configuring the new values in the defined device it will be reset to apply the changes.

1.4 Using the Device Manager

This section includes:

- The Device Manager Components
- Common Control Buttons
- Hiding and Displaying the Navigation Pane
- Working with Tables

1.4.1 The Device Manager Components

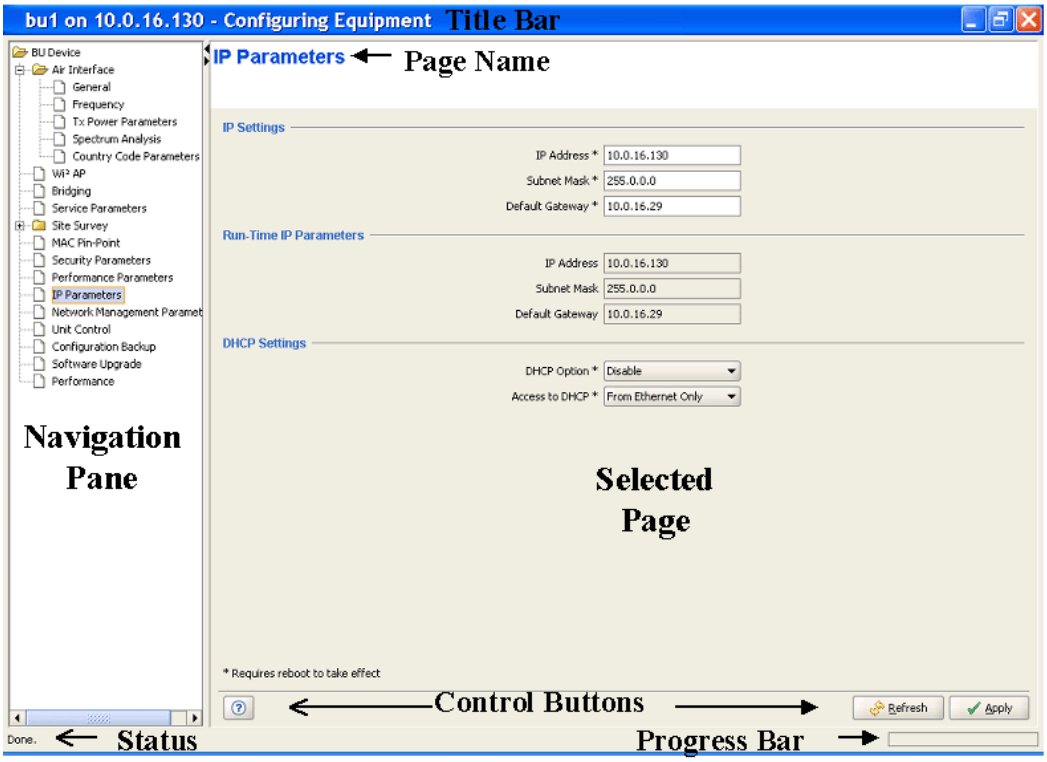


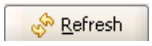
Figure 1-4: The Device Manager Window

The Device Manager window comprises the following components:

Component	Description
Title Bar	Identifies the managed device's name (if defined) and IP address. It also includes standard icons for minimizing, maximizing or closing the Device Manager.
Navigation Pane	Displays all configuration/information pages and enables opening a selected page by clicking on it.
Page Name	The name of the displayed page.
Selected Page	The selected page. Enables viewing/managing the applicable parameters.

1.4.2 Common Control Buttons

The following buttons are common to most configuration/information pages.

Button	Description
	Click on the Refresh button to update the information displayed in the page according to current values acquired from the device.
	Click on the Apply button to implement the modifications to the configuration of the device. Exiting the Device Manager or switching to another page without applying opens a confirmation dialog box, enabling to decide whether to discard the changes or continue editing. This button is not available in information pages that display read-only details and do not include any configurable parameters.
 *Help*	Click on the Help button to open the Help Navigator, displaying the Help topic for the current page.

1.4.3 Hiding and Displaying the Navigation Pane

By default, both the Navigation Pane and Work Area are displayed. When hovering the mouse over the separation bar between the Navigation Pane and Work Area, the mouse pointer becomes a double-headed arrow (↔). You can change the size of the Navigation Pane by dragging this arrow left/right until reaching the required display.

You can hide the Navigation Pane to increase the size of the Work Area or hide the Work area to increase the size of the Navigation Pane by clicking on the arrowheads () located on the separation bar.

With the Navigation Pane hidden or maximized, if clicking the arrowhead does not restore the display of both panes, manually drag the separation bar to restore the display.

1.4.4 Selecting Configurable Parameter's Values

The following methods for selecting the required value for parameters within the application are common to most configuration windows:

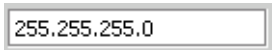
Dropdown Menus:

Parameters with several value options are configured using dropdown menus that include the available options. To configure these parameters, click on the Dropdown box and select the required option from the dropdown menu. The value is displayed in the field.

Up/Down Selection Arrows:

Parameters with value ranges are configured using up and down arrows to navigate through the range of values available. Click the up and down arrows until the required option is displayed in the field. You can also enter the required value directly into the field.

Text Field:



Parameters that are defined using a string of characters are configured using a text field. To change the setting, mark the current settings and enter the new string. Note that most parameters require a certain format (such as IP address, MAC address, printable characters, etc)

1.4.5 Grayed-out Fields

Grayed-out fields are read-only. This may be due to the particular parameter being read-only, or because another parameter must be changed to enable read-write access for the required parameter.

1.4.6 Parameters that Require Reset

Certain parameters are applied in runtime, meaning that a change becomes effective immediately after applying it (pressing the Apply button). Changes in other parameters require resetting the device: the change is stored in the device, but the new settings will take effect only after the device is reset. These parameters are marked with an *, indicating that after completing all configuration changes the device should be reset for the new settings to take effect.

1.4.7 Working with Tables

All AlvariCRAFT tables and lists allow sorting, resizing and rearranging the column display sequence.

To sort a table:

Tables can be sorted in an ascending order by clicking on any of the column headings. Click again on the column heading to sort in a descending order. Click a third time to return to no sorting (default mode). When any column is used for sorting in either ascending or descending order, the sorting order is indicated by a small triangle next to the column's heading.

To resize columns:

To resize a column, position the cursor on the border line between two columns headings. The cursor changes into a double-headed arrow. Drag the cursor to the left or to the right to increase or decrease the size of a column. All other columns are resized automatically. The overall width of the table, however, does not change.

To rearrange columns:

To rearrange the columns sequence, click a column header and drag it to the new desired position.

1.5 How to Get Help

Click the *Help* button  to open the Help Navigator window and the Help Topic window for a specific window.

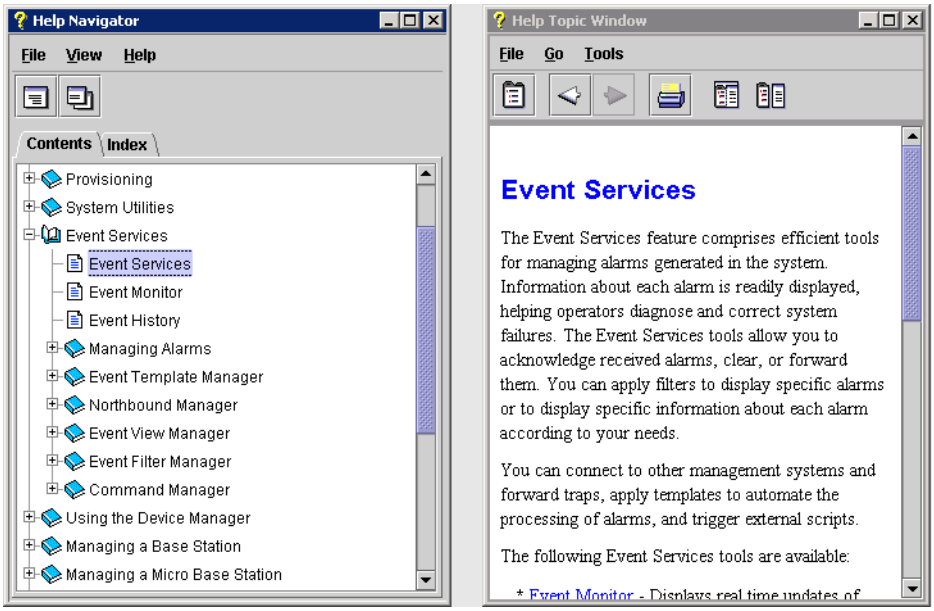


Figure 1-5: Help Navigator Window (Left) and Help Topic Window (Right)* in Undocked Mode

* This is an example: the contents of the Help Navigator and Help Topic Window are not applicable for AlvariCRAFT.

1.5.1 The Help Navigator

The Help Navigator window enables to view help contents, select a specific subject or search for information.

The Help Navigator window includes the following items:

Menus		
Menu	**Sub-Menu***	**Description**
File	Display <Ctrl-D>	Opens the selected topic in the Help Topic window. Selecting the topic and then selecting this menu is equivalent to double-clicking on the topic.
	Display in New Window <Ctrl-W>	Displays the selected topic in a new window, without closing a previously displayed topic.
	Print Tree <Ctrl-R>	Enables to print the topics tree as displayed on the Help Navigator. You can expand or collapse the tree nodes to change the display before printing.
	Print Topics <Ctrl-S>	Enables to print the selected topic that is displayed on the Help Topic window.
	Close <Ctrl-O>	Closes the Help Navigator window.
	Exit <Ctrl-X>	Closes all help windows and exits the Help Navigator.
View	Table of Contents	Displays the Table of Contents tab.
	Index	Displays the Index tab.
Help	About	Opens the About window, displaying the version details for the Help.
Toolbar		
Icon	**Tooltip**	**Description**
	Display	Opens the selected topic in the Help Topic window. Selecting the topic and then selecting this menu is equivalent to double-clicking on the topic.
	Display in New Window	Displays the selected topic in a new window, without closing a previously displayed topic.

* The keyboard shortcut is provided in angular brackets.

The Help Navigator window also includes the following tabs:

- Table of Contents Tab
- Index Tab

1.5.1.1 Table of Contents Tab

The Contents tab displays all the available topic nodes in tree structure. Click on the + symbol next to a topic node to expand it, or on -, to collapse it. Double-click on the topic to display it in the Help Topic window.

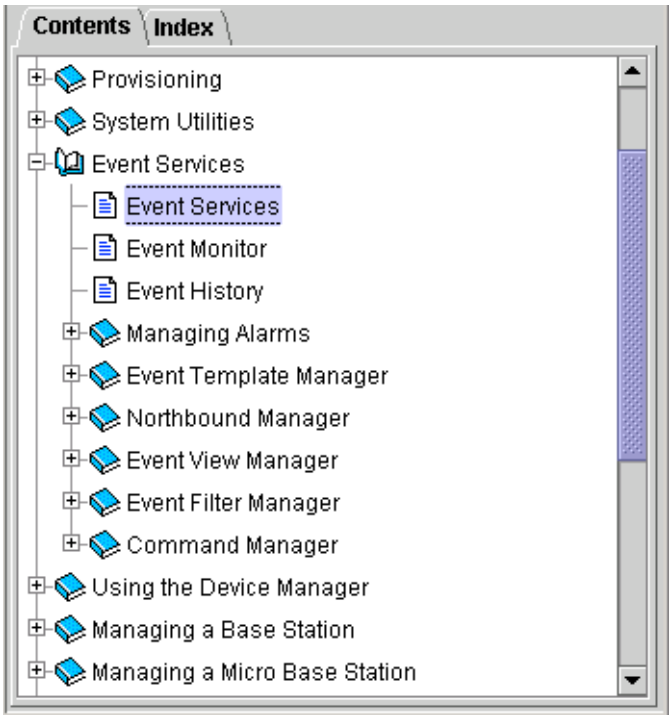


Figure 1-6: Contents Tab*

* This is an example: the contents of the Contents tab are not applicable for AlvariCRAFT.

1.5.1.2 Index Tab

The Index tab enables to search for specific content in all help topics.

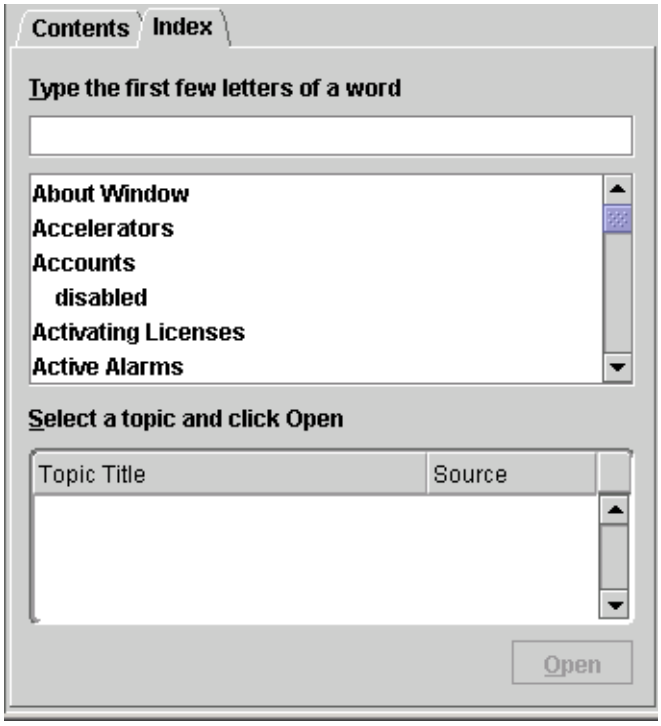


Figure 1-7: Index Tab*

* This is an example: the contents of the Index tab are not applicable for AlvariCRAFT.

To search for information:

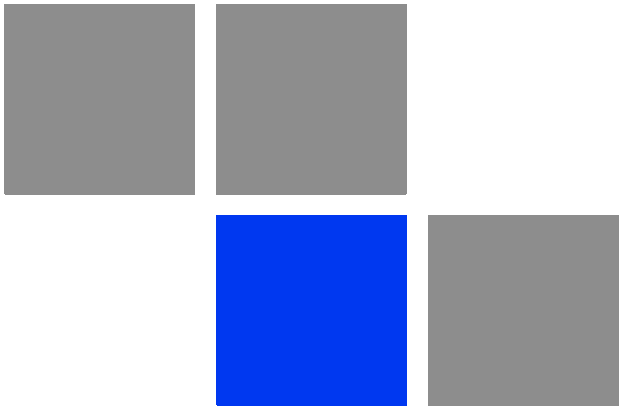
1. In the Index tab, type the keywords or the beginning of the keyword in the designated field. A list of matching topics is displayed.
2. Select the topic that matches your query. The list of available topics is displayed.
3. Select an item from the list and click Open to display the selected topic in the Help Topic window. You can also double-click on the list item to display its content.

1.5.2 The Help Topic Window

The Help Topic window displays the content of the selected help topic. At the bottom of each displayed topic are a back arrow and/or a forward arrow, enabling to navigate between displayed topics. In addition, the Help Topic window includes the following components:

Menus		
Menu	**Sub-Menu***	**Description**
File	Print Topic <Ctrl+P>	Enables to print the selected topic on the active Help Topic window.
	Close <Ctrl+O>	Closes the Help Topic window.
	Exit <Ctrl+X>	Closes all help windows and exits the Help Navigator.
Go	Back <Alt-Left>	Displays the previous topic. When the first topic is displayed, this menu item is greyed out (unavailable for selection). Click Alt and the left arrow on your keyboard to display previous topics.
	Forward <Alt-Right>	Displays the next topic. When the last topic is displayed, this menu item is greyed out (unavailable for selection). Click Alt and the right arrow on your keyboard to display the next topics.
Tools	Navigator	Activates/opens the navigator window.
	Find <Ctrl-F>	Enables to search for text on the active topic.
	Dock/Undock <Ctrl-K>/<Ctrl-U>	Merges/separates the Help Navigator and Help Topic windows. When docked, a single menu bar displays all available menus (File, View, Go, Tools, Help).
Toolbar		
Icon	**Tooltip**	**Description**
	Navigator	Activates/opens the navigator window.
	Back	Displays the previous topic. When the first topic is displayed, this menu item is greyed out (unavailable for selection). Click Alt and the left arrow on your keyboard to display previous topics.
	Forward	Displays the next topic. When the last topic is displayed, this menu item is greyed out (unavailable for selection). Click Alt and the right arrow on your keyboard to display the next topics.
	Print Topic	Enables to print the selected topic on the active Help Topic window.

	Dock	Merges the Help Navigator and Help Topic windows. When docked, a single menu bar displays all available menus (File, View, Go, Tools, Help).
	Undock	Separates the docked Help Navigator and Help Topic windows.



Chapter 2

Managing a Single Device/Cell

2.1 Introduction to Device Management

The tree menu on the right side of the Device Manager window enables selecting the following view and configuration pages:

- "The Device Page" on page 24
- Air Interface:
  - "Air Interface General Page" on page 31
  - "Air Interface Frequency Page" on page 46
  - "Air Interface Tx Power Parameters Page" on page 54
  - "Air Interface Spectrum Analysis Page" on page 60
  - "Air Interface Country Code Parameters Page" on page 68
  - "Air Interface Noise Floor Parameters Page" on page 71
- "SUs Information Page (AU only)" on page 73
- "Gateways Page (AU Only)" on page 76
- "Wi2 APs (AU)/Wi2 AP (BU)" on page 77
- "Best AU Page (SU Only)/Best BU Page (RB Only)" on page 79
- Site Survey:
  - "Site Survey Ethernet Statistics Page" on page 84
  - "Site Survey Rx/Tx Counters Page" on page 85
  - "Site Survey Per SU Counters Page (AU) / Per RB Counters Page (BU)" on page 91
  - "Site Survey Per Modulation Level Counters Page (SU and RB Only)" on page 94
  - "Site Survey Hidden ESSID Page (SU and RB Only)" on page 96

- “Bridging Page” on page 97
- “Service Parameters Page” on page 117
- “MAC Pin-Point Page (AU and BU Only)” on page 138
- “Security Parameters Page” on page 139
- “Performance Parameters Page” on page 143
- “IP Parameters Page” on page 155
- “Network Management Parameters Page” on page 157
- “Unit Control Page” on page 162
- “Configuration Backup Page” on page 171
- “Software Upgrade Page” on page 173
- “Multiple Configuration Page (AU Only)” on page 177
- “Performance Page” on page 205

2.2 The Device Page

The Device page enables viewing general details of the selected device and its hardware and software versions. It also enables configuring the Ethernet Negotiation Mode of the device.

The Device page comprises two tabs:

- The Device General Tab
- The Device Versions Tab

2.2.1 The Device General Tab

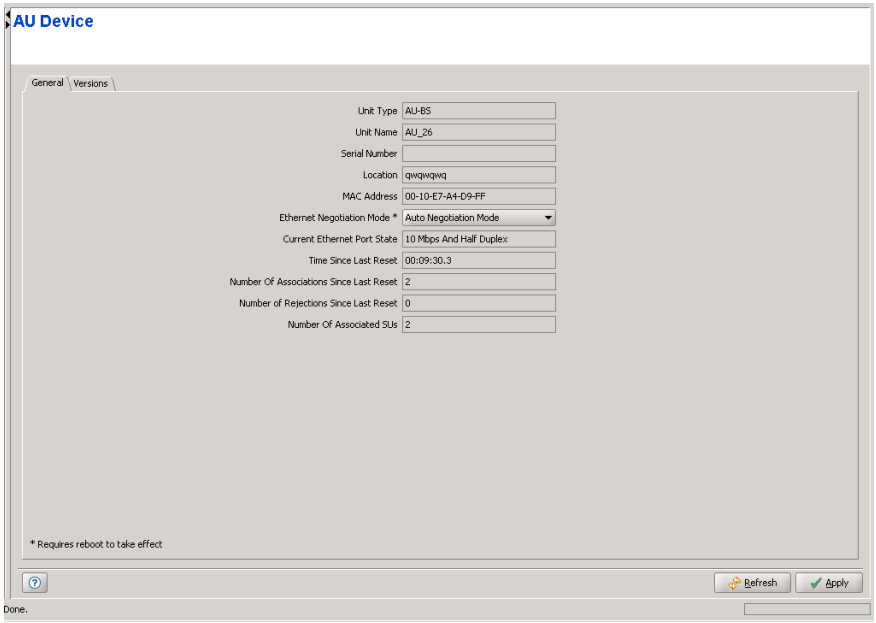


Figure 2-1: The Device Page General Tab - AU

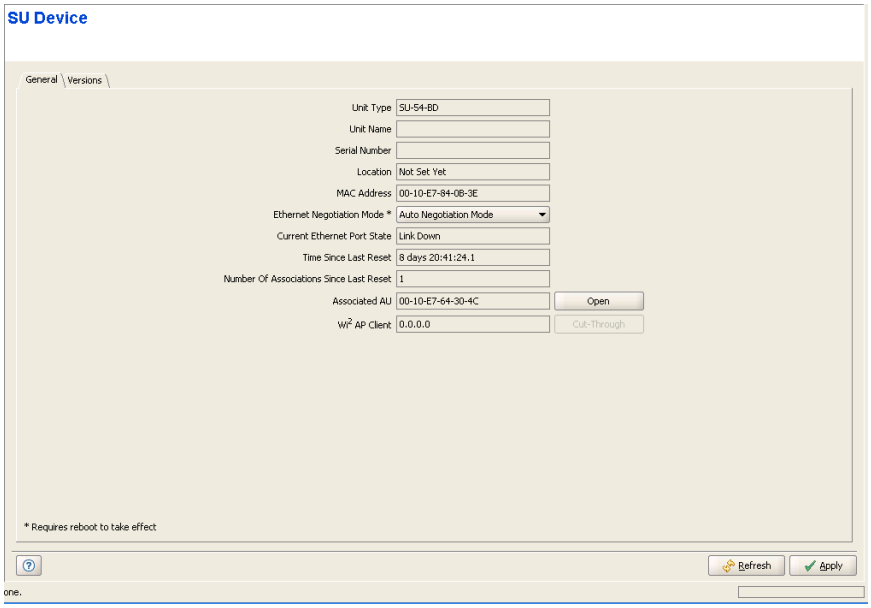


Figure 2-2: The Device Page General Tab - SU

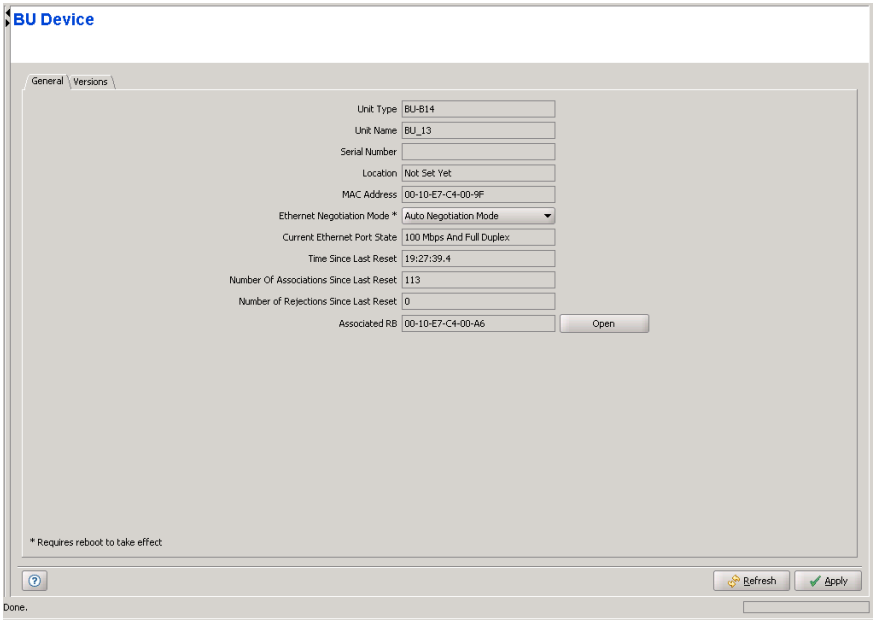


Figure 2-3: The Device Page General Tab - BU

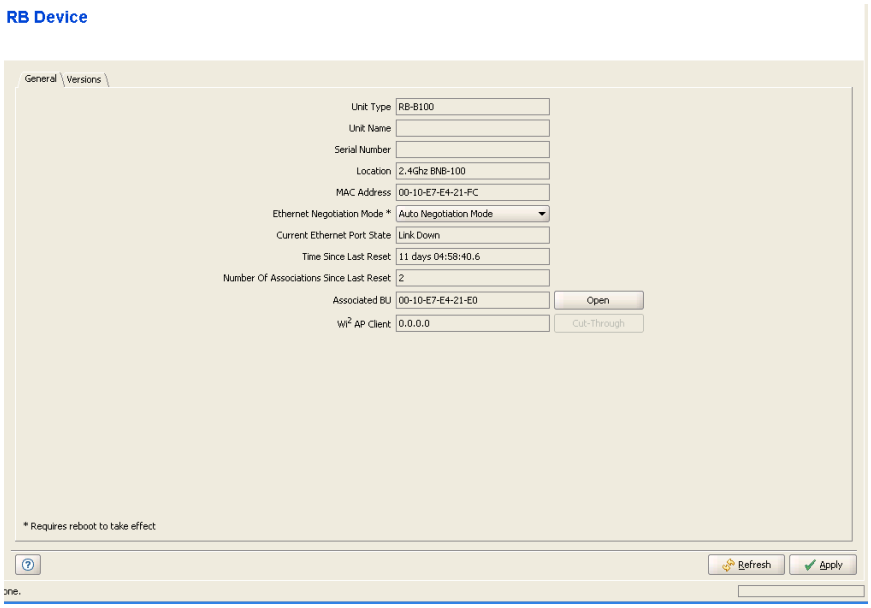


Figure 2-4: The Device Page General Tab - RB

The Device General tab includes the following parameters:

Parameter	Description
Unit Type	A read-only display of the unit's function (AU-BS, BU-100, etc).
Unit Name	A read-only display of the Unit Name (if configured). The Unit Name can be modified in the Unit Control page.
Serial Number	A read-only display of the unit's Serial Number. Applicable only to units supplied with SW version 4.5 and higher. In units upgraded from a version below 4.5 this parameter will be none (empty).
Location	A read-only display of the unit's Location (if configured). The device's Location can be modified in the Unit Control page.
MAC Address	A read-only display of the unit's unique IEEE MAC address.

Parameter	Description
Ethernet Negotiation Mode	The Ethernet Port Negotiation Mode dropdown menu enables defining the negotiation mode of the Ethernet port. The available options are: ■ Force 10 Mbps and Half-Duplex ■ Force 10 Mbps and Full-Duplex ■ Force 100 Mbps and Half-Duplex ■ Force 100 Mbps and Full-Duplex ■ Auto Negotiation Mode
Current Ethernet Port State	A read-only display of the current speed and duplex of the Ethernet port.
Time Since Last Reset	A read-only display of the elapsed time since the last reset of the device.
Number Of Associations Since Last Reset	A read-only display of the number of associations made by the device since the last reset. For SU/RB - The total number of associations with any AU/BU since the last reset, including duplicate associations with the same AU/BU. For AU/BU - The total number of associations with with any SU/RB since the last reset, including duplicate associations with the same unit.
Number of Units Rejected Since Last Reset	Applicable only for AU and BU. A read-only display of the number of units that were rejected because of a non-matching ESSID when the Hidden ESSID feature is enabled..

Parameter	Description
Number Of Associated SUs	Applicable only for AU. A read-only display of the total number of SUs that are currently included in the Associations Database. Note that this number may include units that are not currently active or associated. An SU is only removed from the list of associated SUs under one of the following conditions: ■ A SNAP frame is received from another AU indicating that the SU is now associated with the other AU. ■ The SU failed to respond to 100 consecutive data frames transmitted by the AU and is considered to have "aged out". ■ During the last 6 minutes (or more) the SU did not transmit any data frame, and failed to respond to certain frames that typically are transmitted by the AU every 10 seconds. Since the sampling interval for this state is about 10 minutes, it means that the decision to remove the SU from the Associations Database will take place between 6 to 16 minutes from the time the SU ceased sending data or responding to these "keep-alive" frames (for AUS the sampling interval is 1 minute, meaning decision time of 6 to 7 minutes).
Associated AU	Applicable only to SU. A read-only display of the MAC address of the AU with which the device is currently associated. If the device is not associated with any AU, the address defaults to the IEEE broadcast address, which is FF-FF-FF-FF-FF-FF (typically an SU that is not associated to any AU will not be reachable). Click on the Open button next to the display field to open a Device Manager window for the associated AU.
Associated BU	Applicable only to RB. A read-only display of the MAC address of the BU with which the device is currently associated. If the device is not associated with any BU, the address defaults to the IEEE broadcast address, which is FF-FF-FF-FF-FF-FF (typically an RB that is not associated to any BU will not be reachable). Click on the Open button next to the display field to open a Device Manager window for the associated BU.
Associated RB	Applicable only to BU. A read-only display of the MAC address of the RB with which the device is currently associated. If the device is not associated with any RB, the address defaults to the IEEE broadcast address, which is FF-FF-FF-FF-FF-FF. Click on the Open button next to the display field to open a Device Manager window for the associated RB.

Parameter	Description
WI^2 AP Client	Applicable only to SU and RB. A read-only display of the IP address of a WI^2 Access Point connected to the SU/RB (0.0.0.0 means none). The IP address of a connected WI^2 AP can be configured in the Network Management Parameters page. Click on the Cut-Through button next to the display field to open an HTTP session with the WI^2 Access Point.

2.2.2 The Device Versions Tab

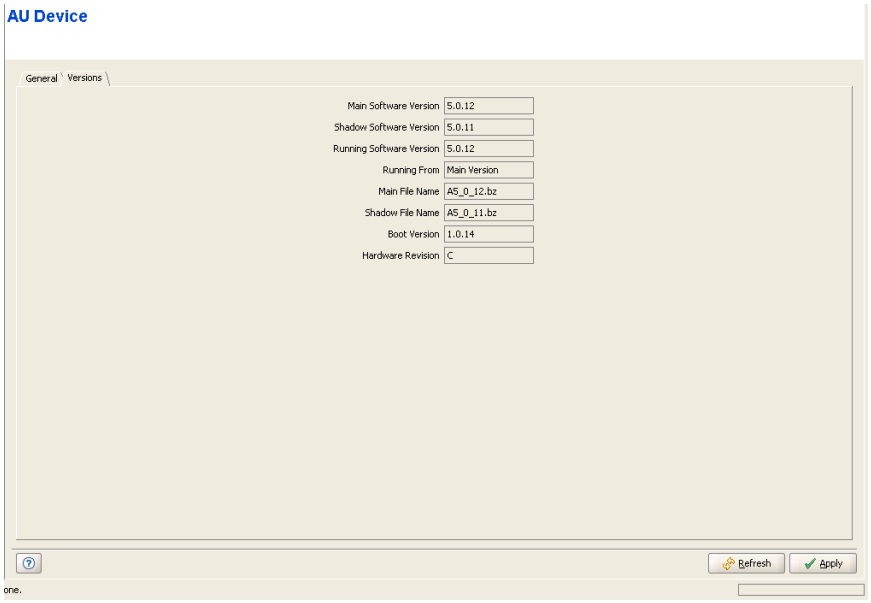


Figure 2-5: The Device Page Versions Tab (AU)

The Device Versions tab includes the following parameters:

Main Software Version	A read-only display of the software version currently defined as the main version.
Shadow Software Version	A read-only display of the software version currently defined as the shadow version.
Running Software Version	A read-only display of the software version of the currently running version.
Running From	A read-only display indicating whether the unit is running from the Main Version or from the Shadow Version.
Main File Name	A read-only display of the name of the compressed file (with a ".bz" extension) of the version currently defined as the main version.

Shadow File Name	A read-only display of the name of the compressed file (with a ".bz" extension) of the version currently defined as the shadow version.
Boot Version	A read-only display of the version of the BOOT firmware.
Hardware Revision	A read-only display of the revision of the unit hardware. Except to SU-I all-indoor units, this is the hardware revision of the outdoor unit.

For more details on software versions and how to manage them, refer to the Unit Control page.

2.3 Air Interface General Page

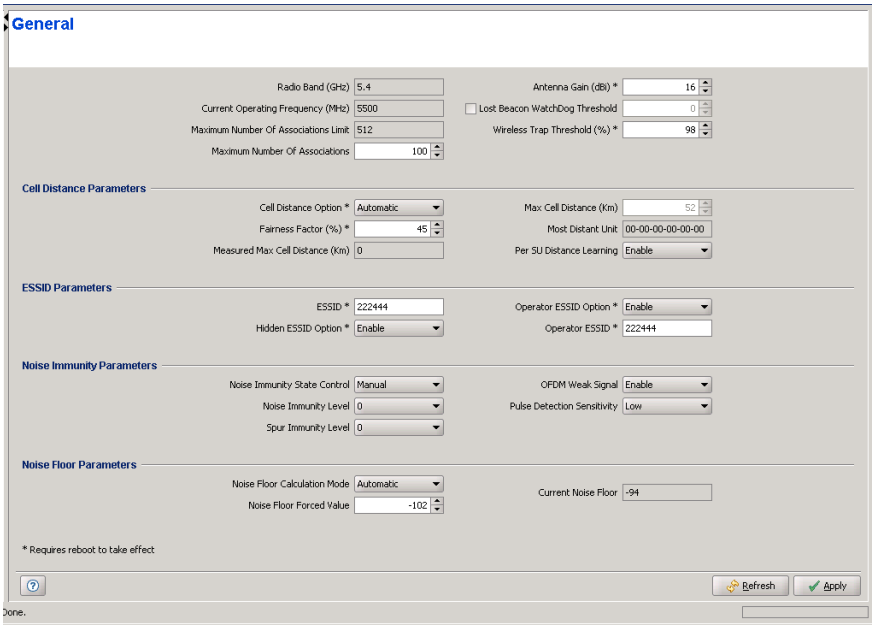


Figure 2-6: Air Interface General Page - AU

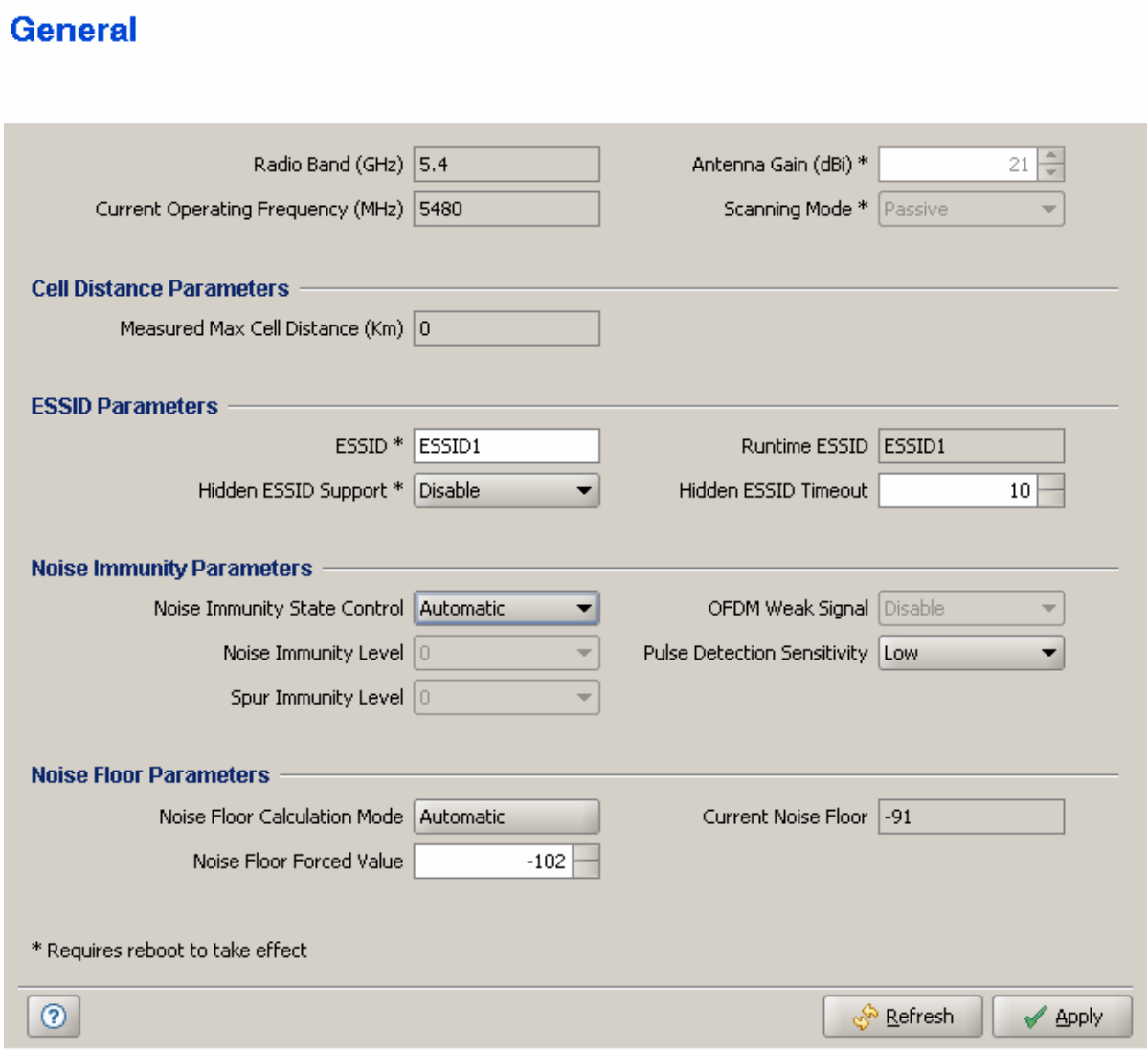


Figure 2-7: Air Interface General Page - SU

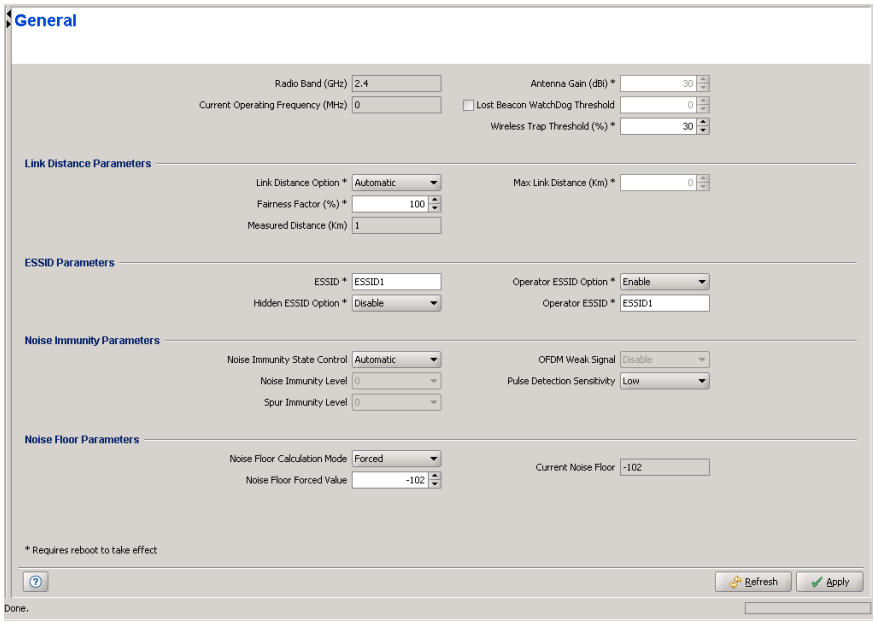


Figure 2-8: Air Interface General Page - BU

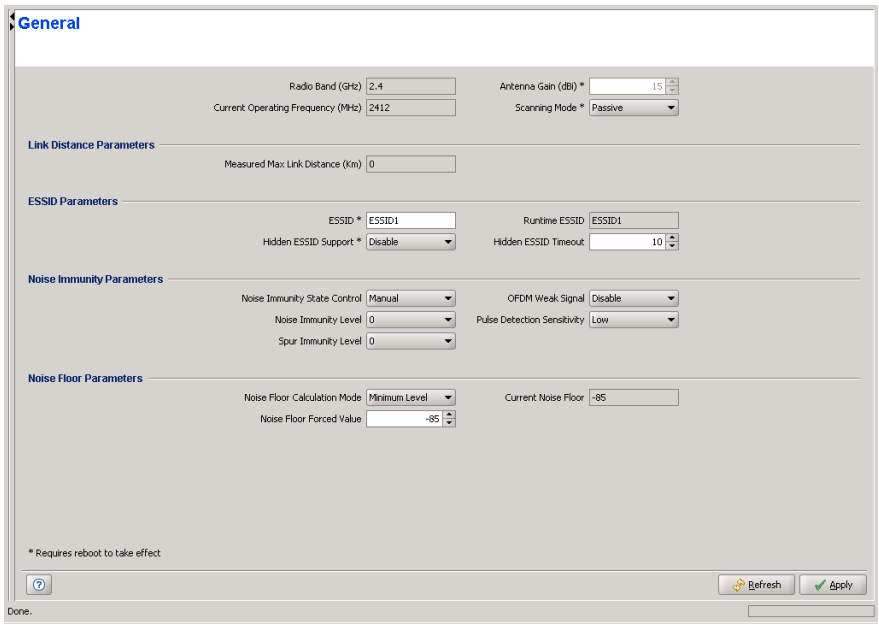


Figure 2-9: Air Interface General Page - RB

The Air Interface General page includes the following sections:

- General Parameters

- Cell Distance Parameters (BreezeACCESS VL)
- Link Distance Parameters (BreezeNET B)
- ESSID Parameters
- Noise Immunity Parameters
- Noise Floor Parameters

2.3.1 General Parameters

Radio Band (GHz)	A read-only display of the radio band of the unit.
Current Operating Frequency (MHz)	A read-only display of the current operating frequency of the device. For details on setting frequenies, refer to the Air Interface Frequency page.
Maximum Number Of Associations Limit	Applicable only for AU. A read-only display of the maximum number of SUs that can associate with the AU. For a regular AU, the Maximum Number Of Association Limit is 512 when data encrypyion is disabled and 124 when data encryption is enabled. For AUS the Maximum Number Of Association Limit is 8.
Maximum Number Of Associations	Applicable only for AU. The Maximum Number Of Associations parameter defines the maximum number of SUs that can become associated with the AU, while still guaranteeing the required quality of service to customers. Available values range from 0 to 512 for a regular AU (0 to 124 when data encryption is enabled), 0 to 8 for AUS. Note that for a regular AU the Maximum Number Of Associations must be set to a value of 124 or lower to enable data encryption. As long as data encryption is enabled, the Maximum Number Of Associations cannot be set to a value higher than 124.
Antenna Gain (dB)	The Antenna Gain parameter enables to define the net gain of a detached antenna. The configured gain should take into account the attenuation of the cable connecting the antenna to the unit. The Antenna Gain is important especially in countries where there is a limit on the EIRP allowed for the unit; where the maximum allowed value for the Transmit Power parameters cannot exceed the value of (EIRP - Antenna Gain). The EIRP is defined in the selected Sub-Band. In certain units with an integral antenna the Antenna Gain is not configurable, and it is available as a read-only display of the net gain of the inegral antenna. The range (in dBi) is from 0 to either 50 or Regulation Maximum EIRP + 10 (the lowest of the two values). If Regulation Maximum RIRP is No Limit, than the highest limit is 50). A value of "Don't Care" (presented as -2) means that the actual value is not important since there is no limitation on the EIRP in the Country Code being used by the unit. A value of "Not Set Yet" (presented as -1) means that the unit will not transmit until the actual value is configured. Once a value is configured, it is not possible to reconfigure the unit to either "Don't Care" or "Not Set Yet".

Lost Beacon Watchdog Threshold	Applicable only for AU and BU. When it is unable to send beacon frames for a predetermined period of time, such as in the case of interferences, the AU/BU resets itself. The Lost Beacon Watchdog Threshold parameter defines the number of consecutive lost beacons after which the unit will reset itself. The configurable range for this parameter is 100 - 1000. When the checkbox is unchecked, the parameter is set to 0, disabling the feature (internal refresh will never be performed). To activate the feature, check the checkbox.
Wireless Trap Threshold (%)	Applicable only for AU and BU. The Wireless Trap Threshold parameter defines the threshold for the wireless quality trap, indicating that the quality of the wireless link has dropped below (On trap) or has increased above (Off trap) the specified threshold. The Wireless Trap Threshold is in percentage of retransmissions, and the range is from 1 to 100 (%).
Scanning Mode	Applicable only for SU and RB. The Scanning Mode parameter defines whether the device will use Passive or Active scanning when searching for an AU/BU. In passive scanning, the device "listens" to the wireless medium for approximately two seconds at each frequency, searching for beacons. The disassociation period, which is the time from the moment the link was lost until the device decides that it should start searching for another AU/BU, is approximately seven seconds. In some situations when there is a high probability that SU/RB may need to roam among different AUs/BUs, the use of active scanning enables to significantly reduce the link establishment time. This is achieved by using shorter dwell periods, transmitting a Probe Request at each frequency. This reduces the time spent at each frequency as well as the disassociation period. When DFS is supported by the Country Code being used by the unit, Scanning Mode is forced to Passive.

2.3.2 Cell Distance Parameters (BreezeACCESS VL)

The higher the distance of an SU from the AU that is serving it, the higher the time it takes for messages sent by one of them to reach the other. To ensure appropriate services to all SUs regardless of their distance from the AU, while maintaining a high overall performance level, two parameters are adapted to the distances of SUs from the serving AU:

1 The time that a unit waits for a response message before retransmission (ACK timeout) should take into account the round trip propagation delay between the AU and the SU (The one-way propagation delay at 5 GHz is 3.3

microseconds per km/5 microseconds per mile.). The higher the distance from the AU of the SU served by it, the higher the ACK timeout should be.
The ACK timeout in microseconds is: 20+Distance (km)*2*3.3 or 20+Distance (miles)*2*5.

2 To ensure fairness in the contention back-off algorithm between SUs located at different distances from the AU, the size of the time slot should also take into account the one-way propagation delay. The size of the time slot of all units in the cell should be proportional to the distance from the AU of the farthest SU served by it.

The Cell Distance Option in an AU defines the method of computing distances. When set to Manual, the Max Cell Distance parameter should be configured with the estimated distance of the farthest SU served by the AU. When set to Automatic, the AU uses a special algorithm to estimate its distance from each of the SUs it serves, determine which SU is located the farthest and use the estimated distance of the farthest SU as the maximum cell/link distance. The value of the maximum cell distance parameter (either computed or configured manually) is transmitted in the beacon messages to all SUs served by the AU, and is used by all units to calculate the size of the time slot, that must be the same for all units in the same sector. When the Per SU Distance Learning option is enabled, the AU uses the re-association message to send to each SU its estimated distance from the AU. The per-SU distance is used to calculate the ACK timeout to be used by the SU. When the Per SU Distance Learning option is disabled (or if it cannot be used because the SU uses a SW version that does not support this feature), the SU will use the maximum cell distance to calculate the ACK timeout. The AU always uses the maximum cell distance to calculate the ACK timeout.

It should be noted that if the size of the time slot used by all units is adapted to the distance of the farthest unit, then no unit will have an advantage when competing for services. However, this reduces the overall achievable throughput of the cell. In certain situations, the operator may decide to improve the overall throughput by reducing the slot size below the value required for full fairness. This means that when there is competition for bandwidth, the back-off algorithm will give an advantage to SUs that are located closer to the AU

The Cell Distance parameters includes the following:

Cell Distance Option	Applicable only for AU. The Cell Distance Option defines whether the maximum distance of the AU from any of the SUs it serves will be determined manually (using the Maximum Cell Distance parameter) or automatically. The Options are Automatic or Manual.

Fairness Factor (%)	Applicable only for AU. The Fairness Factor enables to define the level of fairness in providing services to different SUs. When set to 100%, all SUs have the same probability of getting services when competing for bandwidth. If set to X%, then SUs located up to X% of the maximum distance from the AU will have an advantage in getting services over SUs located farther than this distance. The range is from 0 to 100 (%).
Measured Max Cell Distance (Km)	A read-only display of the measured distance from the AU of the farthest unit served by it.
Max Cell Distance (Km)	Applicable only for AU. The Maximum Cell Distance parameter allows configuring the maximum distance when the Cell Distance Option is set to Manual. The range is from 0 to 54 (Km). The value of 0 has a special meaning of No Compensation: Acknowledge Time Out is set to a value representing the maximum distance of 54 km. The time slot size is set to its minimal value of 9 microseconds. The default is 0 (No Compensation).
Most Distant Unit	Applicable only for AU. A read-only display of the MAC Address of the most distant unit served by the AU
Per SU Distance Learning	Applicable only for AU. Available only when the Cell Distance Mode is set to Automatic. The Per SU Distance Learning option defines the mode in which SUs calculate the ACK timeout: based on the maximum cell distance or on the actual distance from the AU. When this feature is disabled, all SUs in the cell use for the calculation of the ACK timeout the maximum cell distance; when enabled, each SU uses instead its actual distance from the AU. The options are Disable or Enable.

2.3.3 Link Distance Parameters (BreezeNET B)

The higher the distance between the RB and the BU that is serving it, the higher the time it takes for messages sent by one of them to reach the other. The time that a unit waits for a response message before retransmission (acknowledge time delay) should take into account the round trip propagation delay between the two units (the one-way propagation delay at 5 GHz is 3.3 microseconds per km/5 microseconds per mile). The higher the distance between the BU and the RB, the higher the acknowledge time delay used by both units should be. The ACK timeout in microseconds is: 20+Distance (km)*2*3.3 or 20+Distance (miles)*2*5.

The distance between the BU and the RB can be determined either manually or automatically. In manual mode, the estimated distance between the two units is

used for manually configuring the Max Link distance. In automatic mode, the BU uses a special algorithm to estimate its distance from the RB.

The Link Distance parameters includes the following:

Link Distance Option	Applicable only for BU. The Link Distance Option defines whether the distance between the BU and the RB will be determined manually (using the Max Link Distance parameter) or automatically. The Options are Automatic or Manual.
Fairness Factor (%)	Applicable only for BU. The Fairness Factor defines the effect of the Link Distance (calculated or configured manually) on the slot size. In good quality links, the minimal slot size (9 microseconds) can be used, providing maximum throughput. In a link with poor conditions (such as a high interference level), the slot size should be increased to enable better performance. The higher the Fairness Factor, the higher is the impact of the Link Distance on the actual slot size. The range is from 0 to 100 (%). A value of 100 (%) means maximum impact of the distance on the slot size.
Measured Max Link Distance (Km)	A read-only display of the measured distance between the BU and the RB.
Max Link Distance (Km)	Applicable only for BU. The Max Link Distance parameter allows configuring the estimated distance between the two units when the Link Distance Option is set to Manual. The range is from 0 to 54 (Km). The value of 0 has a special meaning of No Compensation: Acknowledge Time Out is set to a value representing the maximum distance of 54 km. The time slot size is set to its minimal value of 9 microseconds.

2.3.4 ESSID Parameters

The ESSID (Extended Service Set ID) is a string used to identify a wireless network and to prevent the unintentional merging of two wireless networks or two sectors in the same network. Typically, a different ESSID is defined for each AU/BU. To facilitate easy addition of an SU/RB to an existing network without a prior knowledge of which specific AU/BU will serve it, and to support the Best AU/Best BU feature, a secondary “global” ESSID, namely “Operator ESSID”, can be configured in the AU/BU. If the Operator ESSID Option is enabled at the AU/BU, the Beacon frames transmitted by it will include both the ESSID and Operator ESSID. The SU/RB shall regard such frames if either the ESSID or the Operator ESSID matches it own ESSID. The ESSID of the AU/BU with which the SU/RB is eventually associated is defined as the Run-Time ESSID of the SU/RB. Typically, the initial ESSID of the SU/RB is configured to the value of the Operator ESSID.

When the SU/RB has become associated with a specific AU/BU, its ESSID can be reconfigured to the value of the ESSID of the AU/BU.

To support increased security the ESSID may be hidden. When this feature is activated in AU/BU it will not broadcast the ESSID in Beacon frames (null characters will be transmitted instead of the ESSID). The ESSID will not be transmitted also in Distance messages transmitted by either the AU/BU or the associated SUs/RB.

The impact of the Hidden ESSID feature on the operation of SU/RB is as follows:

- If the Hidden ESSID Support parameter in the SU/RB is set to Disable, the SU/RB will not try to Associate with an AU/BU that is working with Hidden ESSID Enabled

- If the Hidden ESSID Support parameter in the SU/RB is set to Enable the SU/RB will try to Associate with an AU/BU that is working with Hidden ESSID. The SU/RB will send the Association Request that will contain the ESSID of the SU/RB; the AU/BU will check the SU/RB's ESSID versus its own ESSID and if there is a match the AU/BU will associate the SU/RB. If the SU/RB uses a different ESSID the AU/BU will reject it and the Association Response will include the reason for rejection. The SU/RB will add this AU/BU to a table that contains the AUs/BUs that rejected it because of wrong ESSID and it will not try again to associate with this AU/BU until the Hidden ESSID Time-out expires.

- If Hidden ESSID Support parameter in the SU/RB is set to Enable and the SU/RB finds an AU/BU that is not working with Hidden ESSID the SU/RB will try to associate with this AU/BU only if the AUs/BUs ESSID or Operator ESSID is the same as the SU's/RB's ESSID.

The impact of the Hidden ESSID feature on the operation of AU/BU is as follows:

- When the AU/BU receives Probe Request form an SU/RB it will check if the ESSID in the Probe Request is that same as its own ESSID. It will generate the Probe Response only if there is a match.

- The Authentication process is not affected by the Hidden ESSID feature.

- When the AU/BU receives an Association Request and the ESSID included in the frame matches its own ESSID the AU/BU sends the Association Response with Status Code OK - meaning that the SU/RB is associated. If there is no match the AU/BU sends the Association Response with Status code Rejected -

meaning that SU/RB is not associated, and the reason of rejection - wrong ESSID.

An SU/RB that is trying to associate with AUs/BUs that are working with Hidden ESSID will keep a list with AUs/BUs that rejected. The AU/BU will be kept in this list until the Hidden ESSID Time-out expires for it or if the list is full and another AU/BU that is not in the list rejects the SU/RB because of wrong ESSID.

The AU/BU that is working with Hidden ESSID enable will keep a counter that will be incremental for each SU/RB that is rejected because of wrong ESSID.

The Operator ESSID feature still works when Hidden ESSID is enabled. The only differences is that the Runtime ESSID displayed by SU/RB, when the SU/RB is associated because of Operator ESSID, will be the ESSID of the SU/RB and not the ESSID of the AU/BU as it is when Hidden ESSID is disabled.

The ESSID parameters includes the following:

ESSID	The ESSID of the unit. Valid values: A string of up to 31 printable ASCII characters, case sensitive.
Operator ESSID Option	Applicable only for AU and BU. The Operator ESSID Option enables or disables the use of Operator ESSID for establishing association with SUs/RB.
Operator ESSID	Applicable only for AU and BU. The Operator ESSID. Valid values: A string of up to 31 printable ASCII characters, case sensitive.
Runtime ESSID	Applicable only for SU and RB. Read-only display of the actual ESSID used by the unit.
Hidden ESSID Option	Applicable only for AU and BU. The Hidden ESSID Option enables or disables the Hidden ESSID feature. When enabled, the ESSID will not be broadcasted by the AU/BU.
Hidden ESSID Support	Applicable only for SU and RB. The Hidden ESSID Support option enables or disables the Hidden ESSID feature in the SU/RB.
Hidden ESSID Timeout	Applicable only for SU and RB. The Hidden ESSID Timeout parameter defines the time that SU/RB will not try again to associate with an AU/BU that is working with Hidden ESSID if the AU/BU rejected Association Request sent by the SU/RB because of wrong ESSID. The range is from 1 to 60 minutes.

2.3.5 Noise Immunity Parameters

Noise Immunity parameters are available only for units with HW Revision C and higher, except to Pulse Detection Sensitivity that is available also for units with HW Revision B.

The Adaptive Noise Immunity (ANI) mechanism is designed to reduce the wireless physical layer errors and by that enhance the processing power of the AU/BU, delivering higher packet processing efficiency.

This ANI mechanism is triggered by the rate of detected Physical Errors and it is modifying different thresholds affecting the immunity to specific interference types.

This feature, active by default, exists in all units with HW revision C and higher running SW version 3.0 and higher. Starting in SW version 4.0, the processing power of the system has been increased dramatically. When using version 4.0 or higher, the units are capable to process more packets per seconds, including physical error packets. As a result, the ANI mechanism (triggered by the number of received error packets) may not function properly in certain scenarios, resulting in link performances that are far below the expectations. The option of manually controlling the various parameters used by the ANI mechanism enables to achieve optimal performance in certain deployments where the automatic ANI mechanism may not function properly.

It is strongly recommended to consult with Alvarion's experts before switching to manual mode and modifying any of the parameters.

The general rules for using the Noise Immunity Control parameters are:

In the SU/RB, if performance (Modulation Level) is lower than expected based on the SNR, try switching to Manual mode without changing any of the parameters.

CAUTION

Do not change any of the SU's/RB's Noise Immunity Control parameters (except the Noise Immunity State Control) from remote, as it may result in loss of connectivity to the unit.

In the AU/BU, try switching to Manual mode if overall throughput is too low or if SUs/RB are lost although communication conditions are sufficient for good connectivity.

In many deployments the transition to Manual mode is sufficient. If not, you may try changing the Noise Immunity Level and/or Spur Immunity Level parameters. The target is to reduce the amount of Phy Error rate reported by the unit (see Total Rx events in "Site Survey Rx/Tx Counters Page" on page 85). To ensure that sensitivity is not reduced too much and SUs are not lost, verify that the Age of all

SUs/RB is below 20 seconds (The age of all SUs/RB can be viewed in the Display Association Info option of the AU/BU MAC Address Database using Telnet).

Do not activate the OFDM Weak Signal parameter if the SNR is below 36 dB. Under normal conditions, the OFDM Weak Signal should never be activated in the AU/BU, since the SNR of all SUs/RB served by it will be below 36 dB when ATPC is enabled.

The Noise Immunity parameters includes the following:

Noise Immunity State Control	The Noise Immunity State Control defines the activation mode of the Adaptive Noise Immunity mechanism: Automatic or Manual. The following parameters of the Noise Immunity Control mechanism are applicable only for Manual mode (except to Pulse Detection Sensitivity that is applicable regardliss of the selected option for this parameter).
Noise Immunity Level	The Noise Immunity Level parameter sets the threshold for immunity against broadband interfering signals. A higher value may reduce the number of errors at the expense of reduced sensitivity. The range is from 0 to 4. In the current version only 0 and 4 should be used.
Spur Immunity Level	The Spur Immunity Level parameter sets the threshold for immunity against narrow band interfering signals such as spurious from signals at other frequencies. A higher value may reduce the number of errors at the expense of reduced sensitivity. The range is from 0 to 7.
OFDM Weak Signal	The OFDM Week Signal parameter sets the threshold for immunity against interfering OFDM signals. The available options are Disable and Enable. Enable means that the unit will immediately reject OFDM packets with a relatively low SNR.
Pulse Detection Sensitivity	The Pulse Detection Sensitivity parameter affects the Phy error count: If it is set to Low, than all Phy errors will be reported as regular Phy errors, regardless of the signal level. If it is set to High, all Phy errors with levels bellow a certain threshold (not accessible to the user) will be reported as regular Phy errors, while those with levels higher than the threshold will be reported as detected radar pulses. When DFS (radar detection) is used, or during Spectrum analysis test, the Pulse Detection Sensitivity is set internally to High (regardless of the configured option).

2.3.6 Noise Floor Parameters

The Noise Floor calculation mechanism incorporated in the units is used for estimating the level of the noise floor. This value is used for estimating SNR values and for decisions on existence of signals in the channel. In some cases, especially when a very strong signal exists in neighboring channels, the noise floor calculated by the built-in mechanism may be significantly below the actual noise floor level.

Typically, the expected noise floor level is:

- 5 MHz bandwidth: -102 (dBm)
- 10 MHz bandwidth: -99 (dBm)
- 20 MHz bandwidth: -96 (dBm)

The default calculation mode is Fully Automatic, using only the built-in mechanism. If you experience problems in the wireless link such as excessively long association process or very low throughput, it may be caused by errors in noise floor calculation. In this case, it is recommended to perform a Spectrum Analysis and view the Average Noise Floor values. If the calculated Noise Floor is lower by more than 5 dB from the expected value, it is recommended to change the calculation mode to Automatic with Minimum Value, using the expected value as the minimum (Forced Value).

Note that if the SNR of received signals is very low (typically below 10 dB), it is recommended to maintain the default calculation mode (Fully Automatic). Changing the calculation mode to Automatic with Minimum Value may result in loss of connectivity with units for which the calculated SNR before the change was relatively low.

The Noise Floor Parameters include the following:

Noise Floor Calculation Mode	The Calculation Mode defines the method used for calculation the Noise Floor value to be used by the device for estimating the quality of received signals. The available options are: ■ Fully Automatic: According to the built-in noise floor calculation mechanism. ■ Forced: The Noise Floor value is set manually to the value configured for the Forced Value parameter (see below). Typically this mode should be used only for special testing purposes. ■ Automatic with Minimum Value: If the calculated Noise Floor using the built-in mechanism is higher than the value configured for the Forced Value parameter, the calculated value will be used. Otherwise, the Forced Value will be used.
Noise Floor Forced Value	The Forced Value parameter enables configuring the Noise Floor to be used if the selected Calculation Mode is Forced. This is also the minimum value to be used if the selected Calculation Mode is Automatic with Minimum Value. If you decided to change the calculation mode to Automatic with Minimum Value and you still experience problems in the link (long association time, exceptionally low throughput), try to improve it by increasing the configured Forced Value. The available range is from -107 to -55 (dBm)
Current Noise Floor	The current value used by the device (in dBm)

2.4 Air Interface Frequency Page

To simplify installation and changes, most of the parameters that determine the frequency to be used are set in the AU/BU. The SU/RB should be configured with a minimal set of parameters to ensure that it will be able to automatically detect and use the frequency/bandwidth used by the AU/BU, including possible changes in this frequency (Automatic Sub Band Select feature).

To simplify the installation process the SU/RB scans a definable frequencies subset after power-up. The defined frequencies subsets may include frequencies from more than one Sub-Band, enabling automatic detection of both frequency and bandwidth. If the Best AU/BU feature is enabled, the SU/RB will scan the defined subset and the operating frequency/bandwidth will be determined by the Best AU/BU mechanism (including the optional use of the Preferred AU/BU feature). Otherwise the SU/RB will try to associate with the first AU/BU it finds. If no AU/BU is found, the SU/RB will start another scanning cycle.

In some regions, it is important to ensure that wireless access equipment does not interfere with certain radar systems in the 5 GHz band. If radar is being detected, the wireless access network should move automatically to a frequency that does not interfere with the radar system.

The country dependent set of parameters includes also an indication whether DFS (Dynamic Frequency Selection) should be used. The DFS algorithm is designed to detect and avoid operation in channels with radar activity. If the current sub-band does not support DFS, then the DFS parameters configuration submenu is not available.

When DFS is enabled, the unit monitors the spectrum continuously, searching for signals with a specific pattern indication radar activity. Upon detecting radar activity, the unit immediately stops transmitting on this frequency and starts looking for another radar-free frequency. The subset of viable frequencies is configurable.

The unit maintains a continuously updated database of all applicable frequencies, where each frequency is marked as Radar Free, Radar Detected or Adjacent to Radar. The unit attempts to check a new frequency only if it is marked as Radar Free. If a radar activity was detected on a certain frequency, it will be marked in the database as a Radar Detected frequency. The unit will not attempt to check for radar activity in frequencies marked as Radar Detected. A certain time after detecting radar activity on a frequency, it will be removed from the list of Radar Detected frequencies and will be marked as Radar Free. If radar activity was detected on a certain frequency, adjacent channels should not be used as well,

according to the bandwidth. For instance, if the bandwidth is 20 MHz, then if radar activity was detected in 5800 MHz, frequencies 5790 MHz and 5810 MHz should not be used as well. These frequencies are marked in the database as Adjacent to Radar, and will be treated the same as Radar Detected frequencies.

Before ceasing transmission on the frequency where radar signals had been detected, the AU/BU sends a special disassociation message to its associated SUs/RB. This message includes an indication whether the SUs/RB should wait for this AU/BU. If the SUs/RB should wait, the message includes also the waiting time. During this time each SU/RB searches for the AU/BU in the defined frequencies subset. If the AU/BU was not found within the waiting time, or if a waiting request was not included in the message, the SU/RB starts searching for any AU/BU, using the Best AU/BU mechanism if applicable.

Typically, operators prefer to preserve the original frequency planning and to avoid moving to a new channel unless they are sure that there is a continuous radar activity in the original channel. It should be noted that detection of radar activity does not necessarily indicate a continuous radar activity in the channel. A channel reuse algorithm enables returning to the original channel under certain conditions that indicates low radar activity on the channel.

Starting on SW version 5.2, the DFS feature is supported (although disabled by default) for units using Country Codes 1060 and 1064 (Universal 5.4 GHz and Universal 5.8 GHz). When a unit using either one of these Country Codes is upgraded from a SW version lower than 5.2 the feature will not be automatically applicable. If the user wants to use the DFS feature he must re-apply the Country Code values. Note also that for these units, if the user changes the working sub-band the DFS Option will be automatically be set to No. For other Country Codes that support DFS when sub-band is changed the DFS Option is forced to Yes. If DFS is enabled in these units the user can select the DFS algorithm to be used (ETSI or FCC).

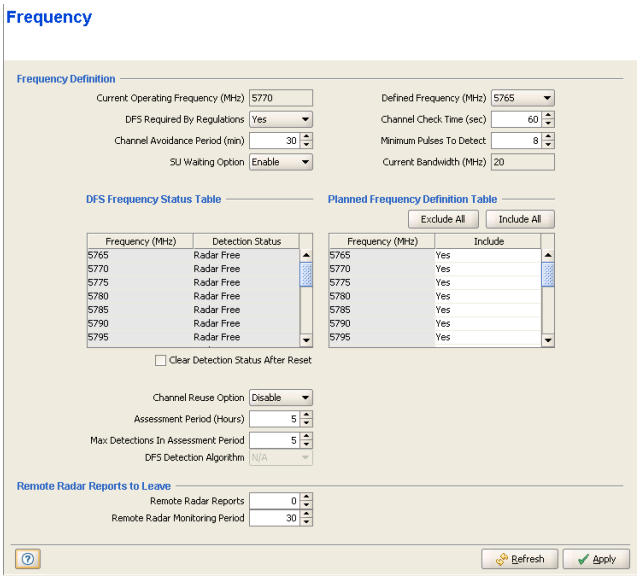


Figure 2-10: Air Interface Frequency Page - AU/BU* - DFS Supported

* The Frequency Page for a BU is identical, with a single exception: SU Waiting Option is replaced by RB Waiting Option.

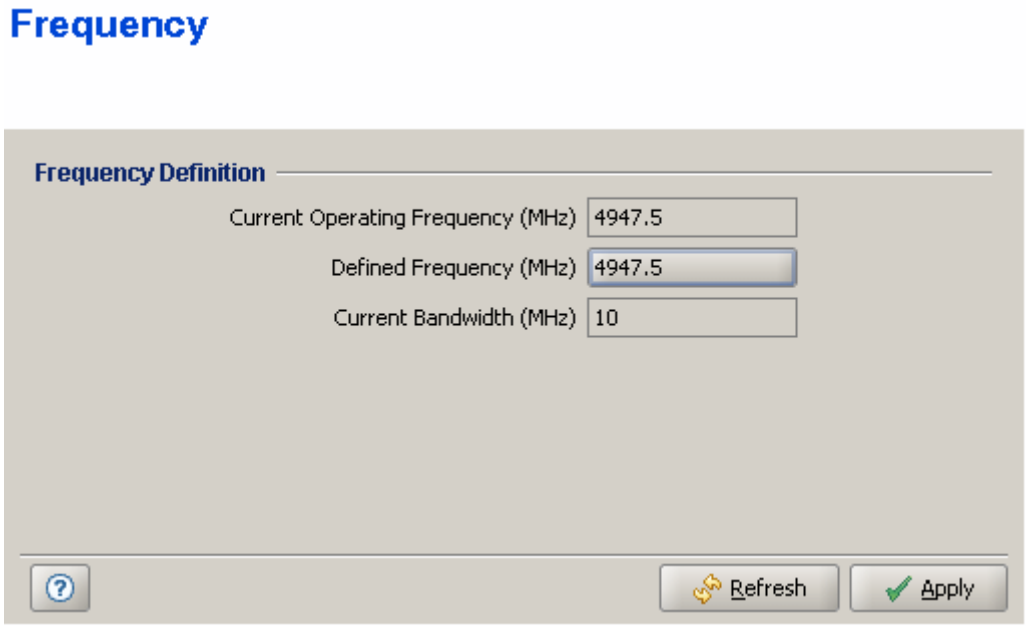


Figure 2-11: Air Interface Frequency Page - AU/BU - DFS Not Supported

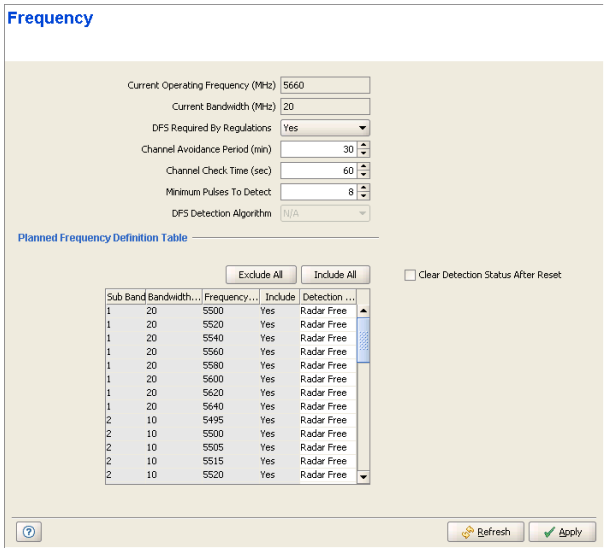


Figure 2-12: Air Interface Frequency Page - SU/RB

The Air Interface Frequency page includes the following sections:

- Frequency Definition
- DFS Frequency Status Table
- Planned Frequency Definition Table
- Channel Reuse Parameters
- DFS Detection Algorithm
- Remote Radar Reports to Leave

2.4.1 Frequency Definition

Current Operating Frequency (MHz)	A read-only display of the current operating frequency.
DFS Required By Regulations	Applicable only for units that use a Country Code supporting DFS. The DFS Required by Regulations option enables defining whether DFS should be used for compliance with applicable local regulations. The options are Yes or No. Selection of the No option will disable the radar detection and dynamic frequency selection mechanism.

Channel Avoidance Period (min)	Applicable only for units that use a Country Code supporting DFS. When DFS is enabled, this parameter defines the time that the frequency will remain marked in the database as Radar Detected or Adjacent to Radar after detecting radar activity. These frequencies will not be used when searching for a new frequency. When this time has elapsed, the unit frequency's marking will change to Radar Free. The range is from 1 to 60 minutes.
SU Waiting Option (AU) *RB Waiting Option (BU)*	Applicable only for AU/BU that uses a Country Code supporting DFS. When DFS is enable, this parameter defines whether the disassociation message sent by the AU/BU, after detecting radar activity on the current frequency, will include a message instructing the SU/RB to search only for the AU/BU before attempting to search for another AU/BU. The message includes also the time period during which the SU/RB should not search for any other AU/BU. The waiting time is the Channel Check Time plus 5 seconds.
Defined Frequency (MHz)	Applicable only for AU/BU. This parameter defines the transmit/receive frequency when DFS is not enabled. If DFS is enabled, it sets the initial operational frequency to be used upon starting the DFS mechanism for the first time. The range depends on the Country Code and selected Sub-Band.
Channel Check Time (sec)	Applicable only for units that use a Country Code supporting DFS. When DFS is enabled, this parameter defines the time allocated for checking whether there is a radar activity on a new frequency after power up or after attempting to move to a new frequency upon detecting radar activity on the previously used frequency. During this time the unit does not transmit. The range is 1 to 3600 seconds.
Minimum Pulses To Detect	Applicable only for units that use a Country Code supporting DFS. When DFS is enabled, this parameter defines the minimum number of radar pulses that should be detected before reaching a decision that radar is active on the channel. The range is from 1 to 100 pulses.
Current Bandwidth	A read-only display of the current bandwidth used by the unit.

2.4.2 DFS Frequency Status Table

This read-only table is applicable only for AU/BU supporting DFS when DFS is enabled. Each entry in the table includes the following parameters:

Frequency (MHz)	The tested frequency

Detection Status	The status of the frequency in the device's database: Radar Free, Radar Detected or Adjacent to Radar.

Check the **Clear Detection Status After Reset** check-box to set all Detection Status entries to Radar Free after the next reset of the unit.

2.4.3 Planned Frequency Definition Table

For an AU/BU, this table is available only in units using a Country Code that supports DFS. It enables defining the frequencies that will be used in the DFS mechanism when enabled. It includes all the frequencies of the selected Sub-Band.

For an SU/RB, this table enables defining for each of the available Sub-Bands the frequencies that will be used by the SU/RB when scanning for an AU/BU. For each available Sub-Band, all the available frequencies and the radar detection status are displayed.

Each entry in the table includes the following parameters:

Sub Band	Applicable only for SU and RB. The read-only number of the Sub Band.
Bandwidth (MHz)	Applicable only for SU and RB. The read-only bandwidth used by the Sub Band.
Frequency (MHz)	The read-only frequency
Include	Indicates whether the entry should be included in the list of frequencies to be used. To change, double-click on the entry: A dropdown menu opens, allowing selection between Yes (include) and No (exclude).
Detection Status	Applicable only for SU and RB. The status of the frequency in the device's database: Radar Free, Radar Detected or Adjacent to Radar.

On SU/RB you can check the **Clear Detection Status After Reset** check-box to set all Detection Status entries to Radar Free after the next reset of the unit.

Click on the **Exclude All** button to exclude all entries from the list (set all Include values to **No**).

Click on the **Include All** button to include all entries in the list (set all Include values to **Yes**).

2.4.4 Channel Reuse Parameters

Channel Reuse parameters are applicable only for AU/BU using a Country Code that supports DFS.

The Channel Reuse algorithm enables returning to the original channel under certain conditions that indicate low radar activity on the original channel. The conditions are that radar was detected in this channel not more than N times (Maximum Number of Detections in Assessment Period) during the last T hours (Radar Activity Assessment Period). When the Channel Reuse Option is enabled, then by the end of the Channel Avoidance Period the unit will attempt returning to the original frequency, provided these conditions are met.

The Channel Reuse Parameters section includes the following options:

Channel Reuse Option	This parameter allows enabling/disabling the channel reuse algorithm.
Assessment Period (Hours)	The period in hours used for assessment of radar activity in the original channel. The range is 1 to 12 hours.
Max Detections In Assessment Period	The maximum number of radar detections in the original channel during the Assessment Period that is required for reaching a decision to try again the original channel. The range is 1 to 10 radar detections.

2.4.5 DFS Detection Algorithm

The DFS Detection Algorithm option is applicable only to units using a Universal Country Code in either the 5.4 GHz or the 5.8 GHz band (Country Codes 1060 and 1064), enabling to select the DFS detection algorithm if DFS should be enabled.

The available options are ETSI and FCC.

2.4.6 Remote Radar Reports to Leave

This section is applicable only for AUs and BUs. If an AU/BU receives from the SUs a particular number of DFS notifications (Remote Radar Reports) in a specified period of time (Remote Radar Monitoring Period), it will initiate a channel shutdown on that frequency, and tag it as Radar Detected. The Remote Radar Reports to Leave section includes the following options:

Remote Radar Reports	This parameter defines this minimum number of radar reports required for the AU/BU to initiate the DFS. The range is 0 to 512 radar detections. When set to 0, the mechanism is disabled. The default is 0.
Remote Radar Monitoring Period	This parameter defines the maximal time interval in which the Remote Radar Reports must be collected for the AU/BU to initiate the DFS. The range is 1 to 30 minutes. The default is 30

2.5 Air Interface Tx Power Parameters Page

The Automatic Transmit Power Control (ATPC) algorithm simplifies the installation process and ensures optimal performance while minimizing interference to other units. This is achieved by automatically adjusting the power level transmitted by each SU/RB according to the actual level at which it is received by the AU/BU. To support proper operation of the system with optimal performance and minimum interference between neighboring sectors, the ATPC algorithm should be enabled in all units.

The algorithm is controlled by the AU/BU that calculates for each received frame the average SNR at which it receives transmissions from the specific SU/RB. The average calculation takes into account the previous calculated average, thus reducing the effect of short temporary changes in link conditions. The weight of history (the previous value) in the formula used for calculating the average SNR is determined by a configurable parameter. In addition, the higher the time that has passed since the last calculation, the lower the impact of history on the calculated average. If the average SNR is not in the configured target range, the AU/BU transmits to the SU/RB a power-up or a power-down message. The target is that each SU/RB will be received at an optimal level, or as high (or low) as possible if the optimal range cannot be reached because of specific link conditions.

Each time that the SU/RB tries to associate with the AU/BU (following either a reset or loss of synchronization), it will initiate transmissions using its Transmit Power parameters. If after a certain time the SU/RB does not succeed to synchronize with the AU/BU, it will start increasing the transmit power level.

In an AU/BU the maximum supported transmit power is typically used to provide maximum coverage. However, there may be a need to decrease the transmitted power level in order to support relatively small cells and to minimize the interference with the operation of neighboring cells, or for compliance with local regulatory requirements.

In some cases the maximum transmit power of the SU/RB should be limited to ensure compliance with applicable regulations or for other reasons.

Different power levels may be used for different modulation levels by taking into account possible HW limitations or regulatory restrictions.

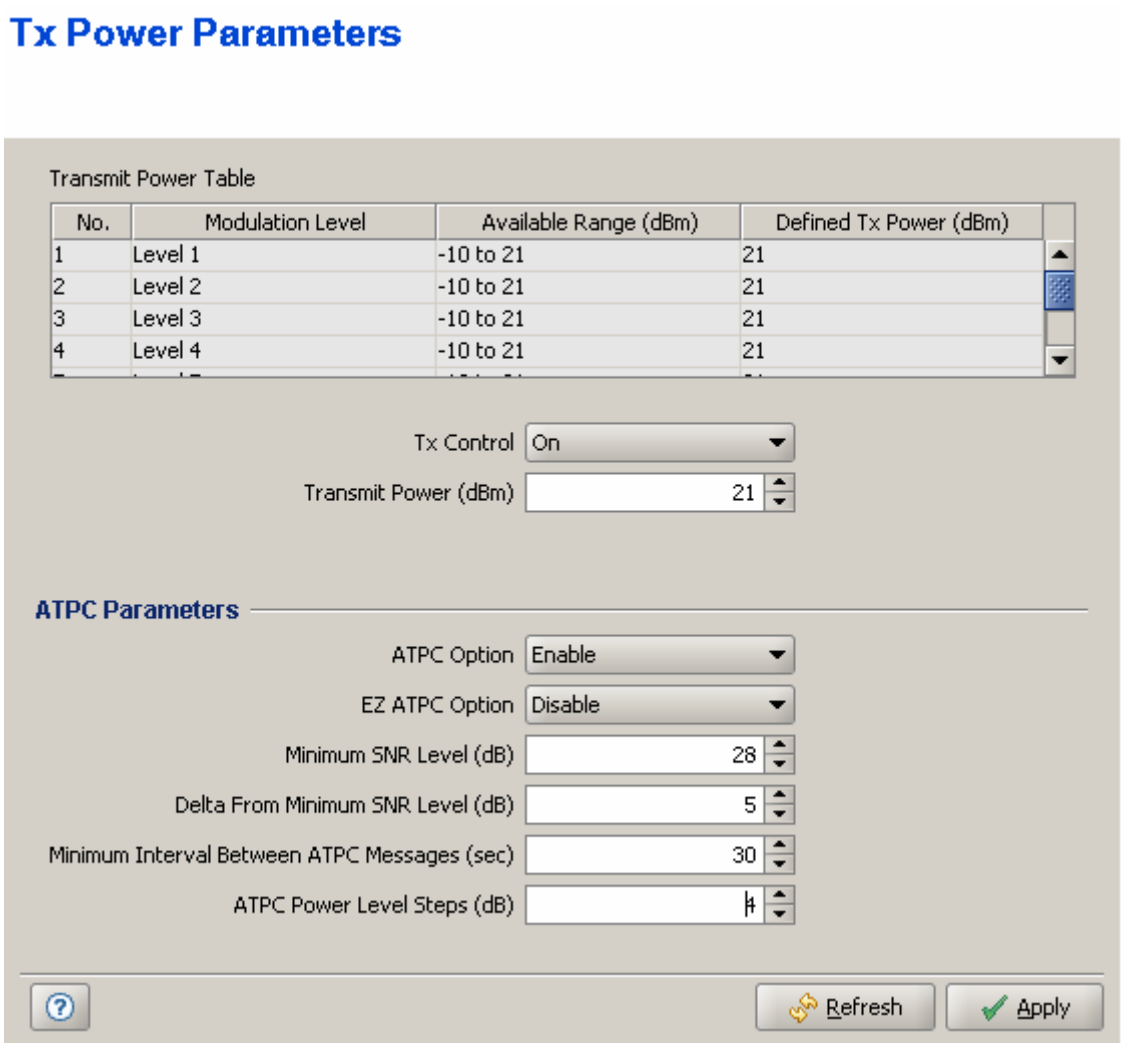


Figure 2-13: Air Interface Tx Power Parameters Page - AU/BU

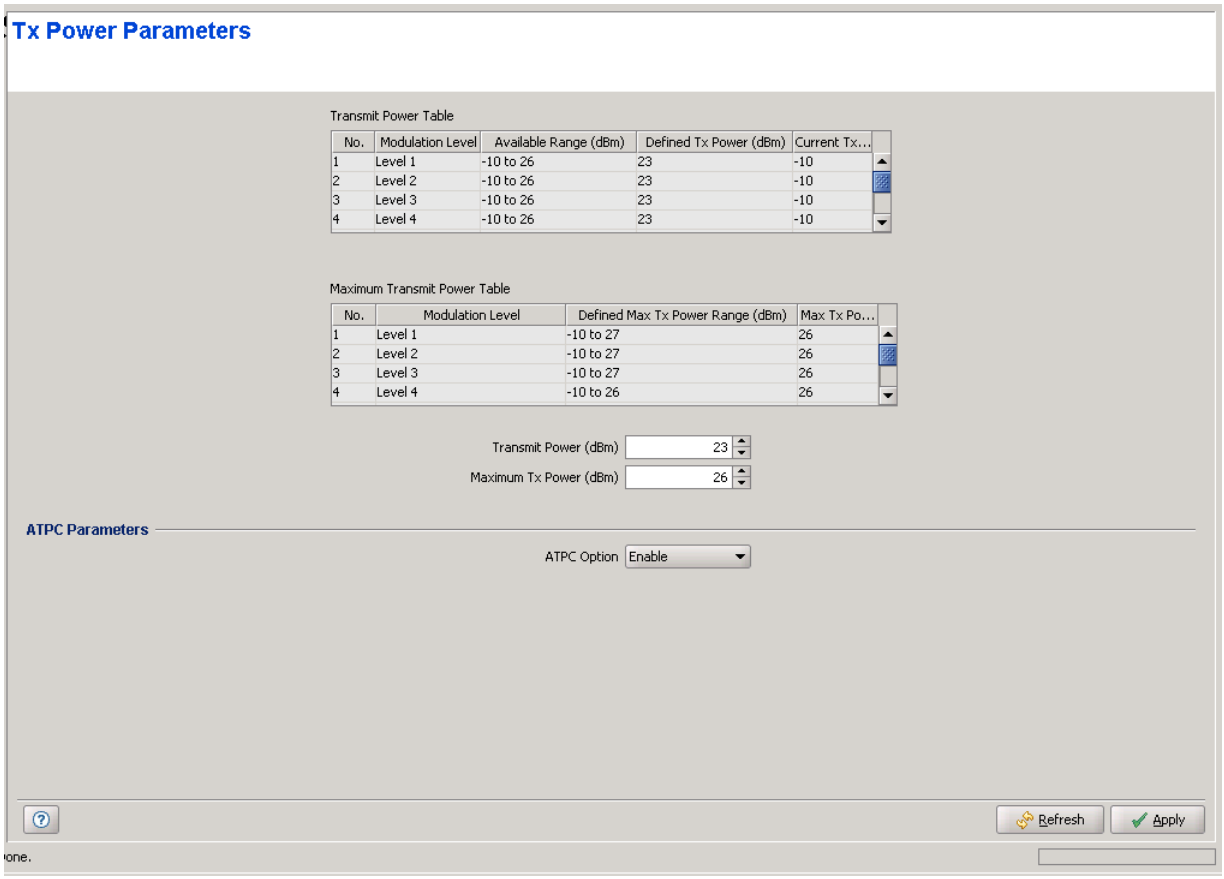


Figure 2-14: Air Interface Tx Power Parameters Page - SU/RB

The Air Interface Tx Power Parameters page includes the following sections:

- Transmit Power Table
- Maximum Transmit Power Table (SU and RB Only)
- General Tx Parameter
- ATPC Parameters

2.5.1 Transmit Power Table

Each entry in this read-only table includes the following details:

Modulation Level	The modulation level for which transmit power details are provided in the following columns.

Available Range (dBm)	The available Transmit Power range for the applicable modulation level(s). The minimum value for the Transmit Power Parameter is -10 dBm (the ATPC may reduce the actual transmit power of the SU/RB to lower values). The maximum value of the Transmit Power Parameter depends on several unit properties and parameters: ■ The HW revision of the unit ■ The Maximum Allowed Tx Power as defined for the applicable Sub-Band. ■ The Maximum EIRP as defined for the applicable Sub-Band, together with the value of the Antenna Gain. In certain countries the Maximum EIRP of some equipment types cannot exceed a certain value. In these cases the Transmit Power cannot exceed the value of (Maximum EIRP - Antenna Gain). ■ Maximum Tx Power parameter (in SU/RB only)
Defined Tx Power	For AU/BU, this is the fixed transmit power level and is not part of the ATPC algorithm. For SU/RB, this is the fixed transmit power level when the ATPC algorithm is disabled. If the ATPC Option is enabled, the value configured for this parameter serves for setting the initial value to be used by the ATPC algorithm after either power up or losing synchronization with the AU/BU. For each modulation level, the unit will use as transmit power the minimum between the configured Transmit Power parameter and the maximum Tx power allowed by the HW and the Country Code for the specific modulation level.
Current Tx Power (dBm)	Applicable only for SU and RB. Displays the current transmit power of the device. If ATPC is enabled, this value is the same as the Defined Tx Power for the applicable modulation level(s). If ATPC is enabled, the transmit power level is controlled by the ATPC mechanism.

2.5.2 Maximum Transmit Power Table (SU and RB Only)

Each entry in this read-only table includes the following details:

Modulation Level	The modulation level for which maximum transmit power details are provided in the following columns.

Defined Max Tx Power Range (dBm)	The available range for the Maximum Tx Power parameter for the applicable modulation level(s). The minimum value for the Maximum Tx Power is -10 dBm. The maximum value depends on several unit properties and parameters: ■ The HW revision of the unit ■ The Maximum Allowed Tx Power as defined for the applicable Sub-Band. ■ The Maximum EIRP as defined for the applicable Sub-Band, together with the value of the Antenna Gain. In certain countries the Maximum EIRP of some equipment types cannot exceed a certain value. In these cases the Transmit Power cannot exceed the value of (Maximum EIRP - Antenna Gain).
Max Tx Power (dBm)	The maximum transmit power for the applicable modulation level. For each modulation level, the unit will use as maximum transmit power the minimum between the configured Maximum Tx Power parameter and the maximum Tx power allowed by the HW and the Country Code for the specific modulation level.

2.5.3 General Tx Parameter

Tx Control	Applicable only for AU and BU. This option enables turning off/on the device's transmitter, or having the Tx status controlled by the status of the Ethernet port/link. If the selected option is Ethernet Status Control, then the device will transmit as long as the Ethernet link is up. If the Ethernet link is down, the transmitter will be switched off. This feature can be used during maintenance or testing to avoid transmissions using undesired parameters. The parameter is available only when managing the unit from its Ethernet port.
Transmit Power (dBm)	The transmit power of the unit when using modulation level 1 (for other modulation levels the actual transmit power may be lower due to HW limitations). For AU/BU, this is the fixed transmit power level and is not part of the ATPC algorithm. For SU/RB, this is the fixed transmit power level when the ATPC algorithm is disabled. If the ATPC Option is enabled, the value configured for this parameter serves for setting the initial value to be used by the ATPC algorithm after either power up or losing synchronization with the AU/BU. The range is according to the Available Range for Modulation Level 1 in the Transmit Power Table.

Maximum Tx Power (dBm)	Applicable only for SU and RB. The maximum transmit power of the unit when using modulation level 1 (for other modulation levels the actual maximum transmit power may be lower due to HW limitations). The range is according to the Defined Max Tx Power Range for Modulation Level 1 in the Maximum Transmit Power Table.

2.5.4 ATPC Parameters

ATPC Option	The ATPC Option enables or disables the Automatic Transmit Power Control (ATPC) algorithm.
EZ ATPC Option	Applicable only for AU and BU. ATPC option specific for SU-EZ units deployed within the sector.
Minimum SNR Level (dB)	Applicable only for AU and BU. The lowest SNR at which you want each SU/RB to be received at the AU/BU (the lower limit of the optimal reception level range). Available values: 4 to 60 (dB).
Delta From Minimum SNR Level (dB)	Applicable only for AU and BU. The Delta From Minimum SNR Level is used to define the highest SNR at which you want each SU/RB to be received at the AU/BU (the higher limit of the optimal reception level range): Max. Level=Minimum SNR Level + Delta From Minimum SNR Level. Available values: 4 to 20 (dB).
Minimum Interval Between ATPC Messages (sec)	Applicable only for AU and BU. The Minimum Interval Between ATPC Messages parameter sets the minimal time between consecutive power-up/power-down messages to a specific SU/RB. Setting a low value for this parameter may lead to higher overhead and to an excessive rate of power level changes at the SUs/RB. High values for this parameter increase the time it will take the SUs/RB to reach optimal transmit power level. Available values: 1 to 3600 seconds.
ATPC Power Level Steps (dB)	Applicable only for AU and BU. The ATPC Power Level Step parameter defines the step size to be used by the SUs/RB for incrementing/decrementing the Current Transmit Power after receiving a power-up/power-down message. If the distance between the value of the Current Transmit Power and the desired range is smaller than the step size, the power-up/power-down message will include the specific step value required for this condition. Available values: 1-20 (dB)

2.6 Air Interface Spectrum Analysis Page

The Spectrum Analysis tab enables you to define the spectrum analysis test parameters, activate a spectrum analysis test and view the spectrum analysis results.

Upon activating the spectrum analysis the unit will automatically reset. The unit will enter passive scanning mode for a definite period, during which information will be gathered. The scanned channels will be all the frequencies included in the selected sub-band.During the information-gathering period the unit will not receive nor transmit data. It also will not be able to synchronize/associate, meaning that it cannot be managed via the wireless link. During the spectrum analysis period the AU/BU security mode is changed to promiscuous to enable gathering information regarding all legal frames received by the unit. At the end of the period the unit will reset automatically regaining normal operability upon start up.

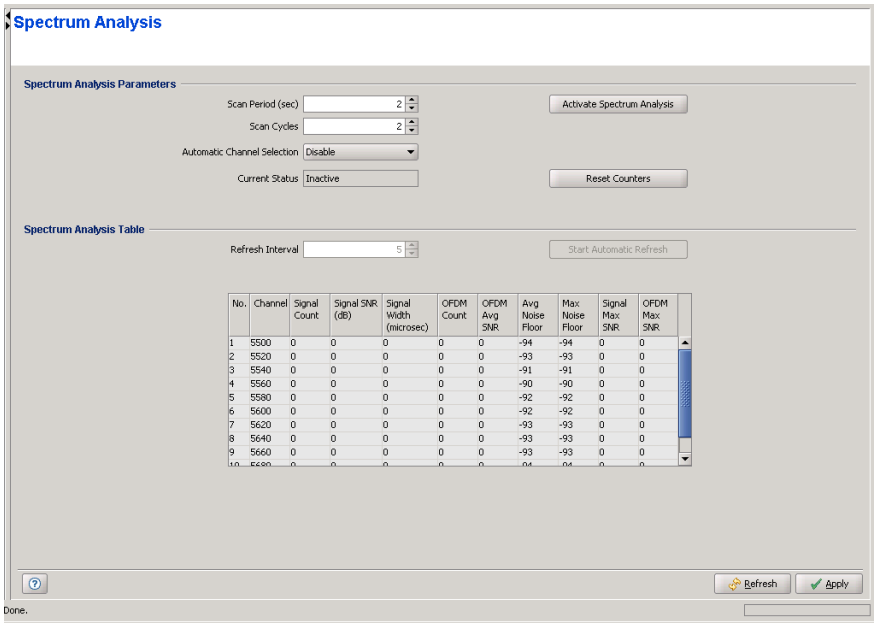


Figure 2-15: Air Interface Spectrum Analysis Page - AU/BU

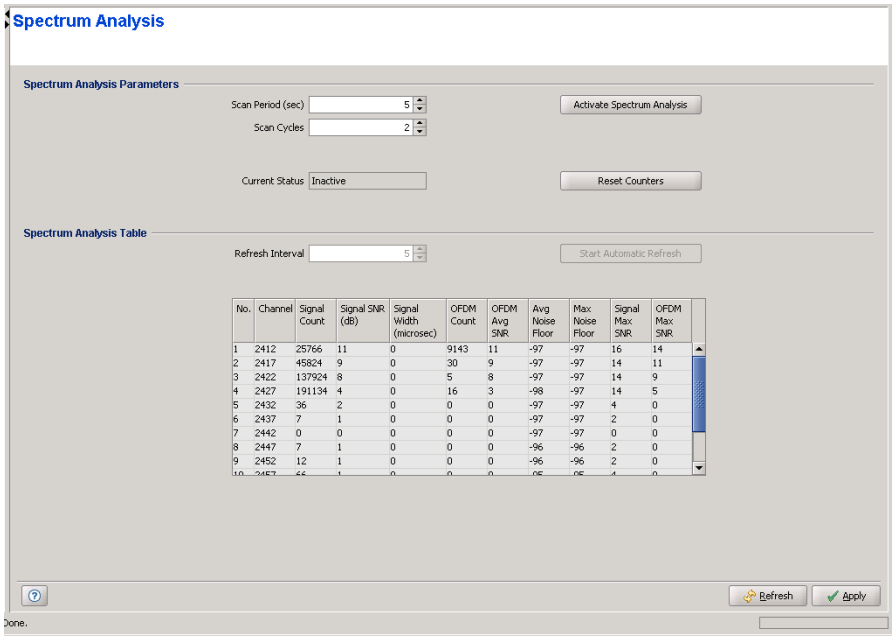


Figure 2-16: Air Interface Spectrum Analysis Page - SU/RB

The Air Interface Spectrum Analysis Page includes the following sections:

- Spectrum Analysis Parameters
- Spectrum Analysis Table

2.6.1 Spectrum Analysis Parameters

Scan Period (sec)	The period of staying on each channel during each cycle for information gathering when performing spectrum analysis. Range: 2-30 seconds.
Scan Cycles	The number of scanning cycles when performing Spectrum Analysis. Range: 1-100 cycles.
Automatic Channel Selection	Applicable only for AU and BU. This option defines weather the device will choose the best noise free channel upon startup after completion of the spectrum analysis process. The selection is per analysis: when the analysis is completed it will be disabled automatically. The option are Disable and Enable.
Current Status	A read-only display of the current status of the spectrum analysis test.

Click on the **Activate Spectrum Analysis** button to activate the spectrum analysis process. Upon activation, the unit will reset automatically and start-up in spectrum analysis mode. If there is connectivity to the unit, the **Current Status** will change to Active.

Click on the **Reset Counters** button to clear the previous analysis results (if any) from the Spectrum Analysis Table.

2.6.2 Spectrum Analysis Table

The read-only Spectrum Analysis Table displays the following results for each of the scanned frequencies:

Channel	The frequency in MHz.
Signal Count	The number of signals (excluding OFDM frames with the correct bandwidth) in the channel.
Signal SNR (dB)	The average SNR of signals (excluding OFDM frames with the correct bandwidth) in the channel.
Signal Width (microsec)	The average width in microseconds of signals (excluding OFDM frames with the correct bandwidth) in the channel.
OFDM Count	The number of OFDM frames with the correct bandwidth detected in the channel.
OFDM Avg SNR	The average SNR (in dB) of OFDM frames received in the channel.
Avg Noise Floor	The average Noise Floor (in dBm) calculated for the channel.
Max Noise Floor	The maximum Noise Floor (in dBm) calculated for the channel.
Signal Max SNR	The maximum SNR (in dB) of signals (excluding OFDM frames with the correct bandwidth) in the channel.
OFDM Max SNR	The maximum SNR (in dB) of OFDM frames received in the channel.

In addition, the Spectrum Analysis Table section includes the following components (applicable only if there is connectivity to the unit during the test):

Refresh Interval	The refresh interval for the Spectrum Analysis Table to be used in Automatic refresh mode (see Start/Stop Automatic Refresh). The range is 5 to 1000 seconds. The default is 5 seconds. The Refresh Interval parameter is available only during an active spectrum analysis test

Start/Stop Automatic Refresh button	The Start/Stop Automatic Refresh toggle button is used to control whether the Spectrum Analysis Table will be updated automatically during the spectrum analysis. Upon selecting Start automatic Refresh, the display will be updated automatically using the defined Refresh Interval. The button will toggle to Stop Automatic refresh mode. Click on the Stop automatic Refresh button to stop the automatic refresh. The Start/Stop automatic Refresh button is available only during an active spectrum analysis test.

2.7 Air Interface Interference Mitigation Parameters Page

NOTE

This feature is available only for VL 900, 2.4 GHz BU/RB and BU/RB-B10 units only

The Interference Mitigation functionality allows users to configure the unit's operating channel and noise floor level in order to meet particular requirements regarding throughput and distance. The unit will scan and analyse the 900 MHz spectrum, and, depending on the detected noise levels, it will suggest an optimal operating channel and noise floor level.

The Interference Mitigation offers a quick and efficient mechanism for setting up VL sectors or BNB links, when the operator doesn't have the time or the expertise required for a full spectrum analysis and channel optimization. For optimal results however, a thorough radio planning is always recommended.

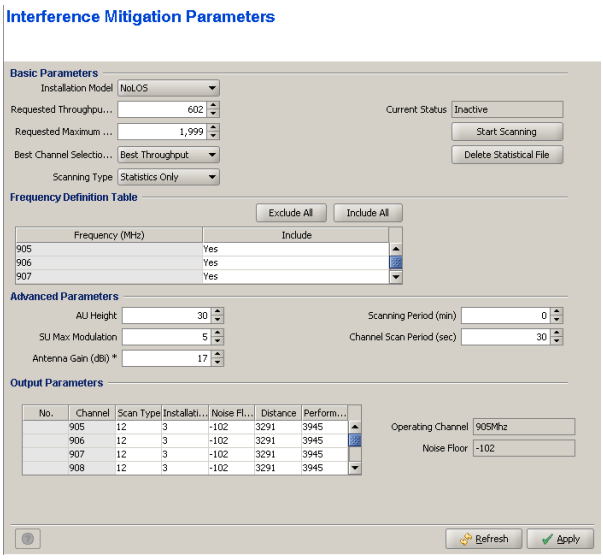


Figure 2-17: Interference Mitigation Parameters on VL 900 AUs

CAUTION

Upon activating the Interference Mitigation, the unit will automatically reset. The unit will enter passive scanning mode for a definite period of time, during which information will be gathered. During the information-gathering period, the unit will not receive nor transmit data. Also, it will not be able to synchronize/associate, meaning that it cannot be managed via the wireless link. At the end of the period the unit will reset automatically regaining normal operability upon start up.

2.7.1 Basic Parameters

The Basic Parameters section is used for collecting the primary input required for the analysis process.

Installation Model	Defines the type of topography for the sector: ■ LOS - For Line Of Sight setups ■ nLOS - For Near Line Of Sight setups ■ NoLOS - For No Line OF Sight setups
Requestet Throughput	The minimum value (in Kbps) for the achievable throughput when optimizing distance. When the Best Channel Selection optimization mechanism is set to Best Throughput, this parameter is ignored. Range: 500 - 6000 Kbps
Requested Maximum Distance	The minimum value (in meters) for the achievable distance when optimizing performance. When the Best Channel Selection optimization mechanism is set to Best Distance, this parameter is ignored. Range: 500 to 54000 m
Best Channel Selection	The optimization mechanism employed when performing Interference Mitigation: ■ Best Throughput (while preserving the Requested Maximum Distance) ■ Best Distance (while preserving the Requested Throughput)
Scanning Type	The output that the Interference Mitigation process will provide: ■ Clear Channel & Automatic Noise Floor Selection - for optimizing both the operating channel and noise floor level ■ Automatic Noise Floor Selection Only - for optimizing only the noise floor level ■ Clear Channel Selection Only - for optimizing only the operating channel ■ Statistics Only - for performing only a spectrum analysis, without suggesting any operating channel and noise floor level

Current Status	Interference Mitigation process status: ■ Inactive - between scans ■ Active - during scans
Start Scanning	Click this button to start the scanning process. Keep in mind that during the scan, the AU will lose connectivity to the associated SUs.
Delete Statistical Data	Click this button to clear the Output Parameters of the previous scan.

2.7.2 Frequency Definition Table

This section allows you to select the channels that will be scanned during the Interference Mitigation process.

Frequency (MHz)	Scanning frequency
Include	Select whether to scan the corresponding frequency: ■ Yes ■ No
Exclude All	Click this button to set all the Include values in the Frequency Definition Table to No.
Include All	Click this button to set all the Include values in the Frequency Definition Table to Yes.

2.7.3 Advanced Parameters

Use this section to provide additional parameters that will refine the analysis performed by the Interference Mitigation mechanism. You can ignore these parameters, leaving their default settings in place. However, experienced users may find some benefit from adjusting the parameters, thus optimizing the results for their specific needs.

AU Height	Indicates the height (in meters) of the AU antenna. It is useful for calculating the distance. Range: 15 - 200 meters
SU Max Modulation	The maximum modulation of the SUs in the link. Range: 1 - 8
Antenna Gain (dBi)	The SU's antenna gain (in dBi) Range: 9 - 20 dBi

Scanning Period (min)	Duration (in minutes) of the scanning. The unit may stop recording prematurely when a limit of 100 000 events is reached.
Channel Scan Period (sec)	The period of time, in seconds, to stay on each channel to gather information. The unit may stop recording prematurely when a limit of 100 000 events is reached. Range: 2 - 30 seconds

2.7.4 Output Parameters

The Output Parameters table is populated with specific scanning parameters for each channel:

Channel	Frequency in MHz
Scan Type	Scanning type: ■ 1 - For Clear Channel & Automatic Noise Floor Selection ■ 2 - For Automatic Noise Floor Selection Only ■ 3 - For Clear Channel Selection Only ■ 4 - For Statistics Only
Installation Model	Type of instalation: ■ 1 - For Line Of Sight setups ■ 2 - For Near Line Of Sight setups ■ 3 - For No Line OF Sight setups
Noise floor	Channel detected noise floor
Distance	Requested Maximum Distance (in meters)
Performance	Requestet Throughput (in Kbps)

After scanning the spectrum and analyzing the results, the unit will suggest the optimal configuration for the setup:

Operating Channel	The operating channel suggested by the unit based on the Interference Mitigation analysis
Noise Floor	The noise floor suggested by the unit based on the Interference Mitigation analysis

2.8 Air Interface Country Code Parameters Page

Each country has its own regulations regarding operation modes and parameters such as allowable frequencies and bandwidth, the need to employ a certain mechanism (DFS) for automatic detection and avoidance of frequencies used by radar systems, limits on maximum transmit power and/or EIRP at each of the supported modulation levels, and the ability to use burst transmissions. To efficiently manage these country dependent parameters, each unit is supplied with a pre-configured Country Code that includes a set of parameters, which depend on this country code. Where more than one set of parameters can be used, the available sets are defined as Sub-Bands.

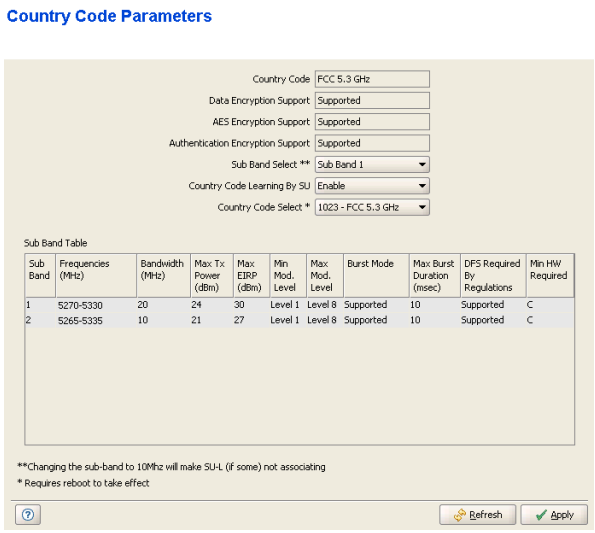


Figure 2-18: Air Interface Country Code Parameters Page - AU*

* The Country Code Learning By SU parameter is not available in the Country Code Parameters pages for SU, BU and RB.

The Air Interface Country Code Parameters page includes the following parameters:

Country Code	The read-only name of the Country Code.
Data Encryption Support	Read-only indication of whether data encryption is supported by the applicable Country Code.
AES Encryption Support	Read-only indication of whether AES-based encryption is supported by the applicable Country Code

Authentication Encryption Support	Read-only indication of whether encryption of authentication messages is supported by the applicable Country Code
Sub Band Select	Where more than one Sub Band (bandwidth) is available, this option enables selection of the Sub Band to be used by AU/BU. For SU/RB, this option defines the Sub Band to be used during Spectrum Analysis.
Country Code Learning By SU	Applicable only for AU. This feature support simplified installation and updates processes by enabling the SU to adapt the Country Code used by the AU. The AU advertises its country code in every beacon and association response message. Upon synchronization the SU will check if its country code and the country code received from the AU are the same. If they are not the same and the Country Code Learning By SU is enabled, the SU will use the AU's country code and the country code derived limitations will be forced. The SU will learn a new Country Code only if it is running from the Main version. After country code learning (adaptation) the unit is automatically reset.
Country Code Select	This option enables changing the Country Code used by the unit. In the current release this option is applicable only to units in the 5.4 and 5.8 GHz bands. The default Country Code is set in factory according to the destination country. **CAUTION**: The selected Country Code must comply with applicable local radio regulations.

The read-only Sub Bands Table displays the following details for each of the Sub Bands supported by the Country Code:

Sub Band ID	The Sub Band ID (number).
Frequencies (MHz)	The frequencies supported by the Sub Band.
Bandwidth (MHz)	The Bandwidth supported by the Sub Band.
Max Tx Power (dBm)	The maximum transmit power allowed at the antenna port of the unit.
Max EIRP (dBm)	The maximum allowed EIRP (Effective Isotropic Radiated Power) in dBm, or No Limit.
Min Mod. Level	The lowest allowed modulation level.
Max Mod. Level	The highest allowed modulation level.
Burst Mode	Indication of whether Burst Mode operation is allowed.

Max Burst Duration (msec)	If Burst Mode is allowed, this is the upper limit for the Maximum Burst Duration.
DFS Required by Regulations	Indication of whether DFS mechanism is supported.
Min HW Required	The minimum HW Revision required to support the Sub-Band.

2.9 Air Interface Noise Floor Parameters Page

The Calibration of Noise Floor Indication feature has been introduced to overcome possible inaccuracies in the Noise Floor Calculation mechanism. The calibrated Noise Floor Indication is used for correcting the displayed Noise Floor values versus the values that are calculated/used by the internal noise floor calculation mechanism.

A Field calibration should typically be performed for a new unit when Factory calibration is not available, whenever the bandwidth (sub-band) is being changed, or if the previous Field calibration process has failed.

Calibration can be performed only under the following conditions:

- The Spectrum Analyzer is not in progress
- There is no active TFTP or FTP session
- In an SU/RB, only if it is associated

If the calibration has started the unit will reset itself, will perform the calibration and after that it will reset again and return to normal mode of operation.

If the calibration is running the user will not be able to start a spectrum analysis or a TFTP/FTP session.

If the calibration failed the results of the previous successful calibration will be kept. If the calibration passed, the new results will be used for Noise Floor Indication.

The user can select to use one of the following calibration options: None, Field or Factory.

If Factory option is available, indicating that the unit was calibrated in the factory, this is the option that should be used (Factory calibration is not available in current release).

If Factory option is not available, a Field calibration should be performed, and the Field option should be selected.

The None option should be used only if the Field Calibration is repeatedly failing, or if the RSSI displayed when using the Field option (following a “successful” Field calibration) is clearly inaccurate, indicating erroneous results.

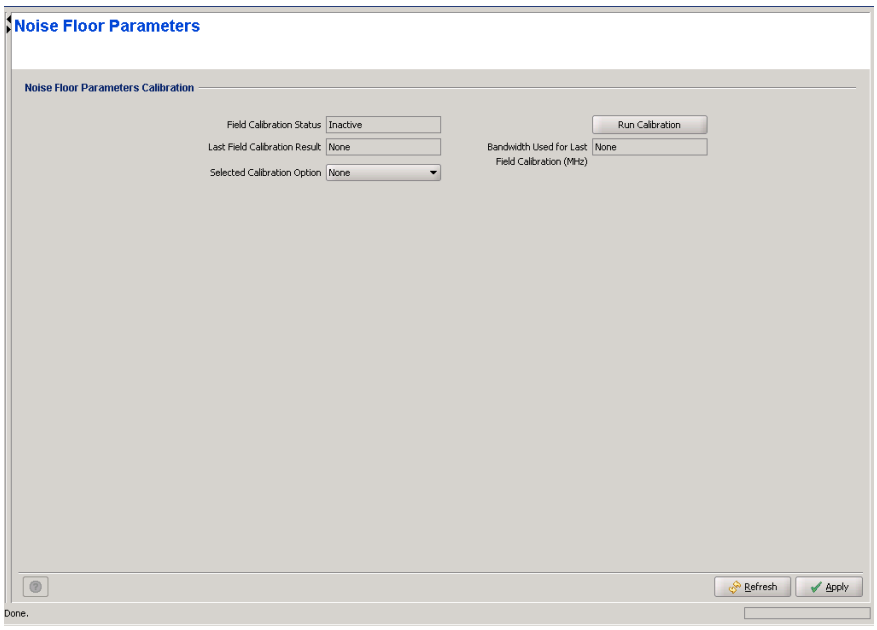


Figure 2-19: Noise Floor Parameters Page

The Noise Floor Parameters page includes the following components:

Field Calibration Status	Indicating whether a Field Calibration is being performed currently (Active or Inactive)
Last Field Calibration Result	Indicating the result of the last Field calibration process (Passed, Failed or None if no Field calibration has been done).
Selected Calibration Option	The drop-down menu includes only the available options: None is available always. Factory is available only if the unit was calibrated in factory (not available in current release). Field is available only if a successful Field calibration has been performed.
Run Calibration	Click on the button to perform a Field calibration.
Bandwidth Used for Last Field Calibration (MHz)	The bandwidth used for last Field calibration. A new Field calibration should be performed after changing the bandwidth (sub-band) used by the device.

2.10 SUs Information Page (AU only)

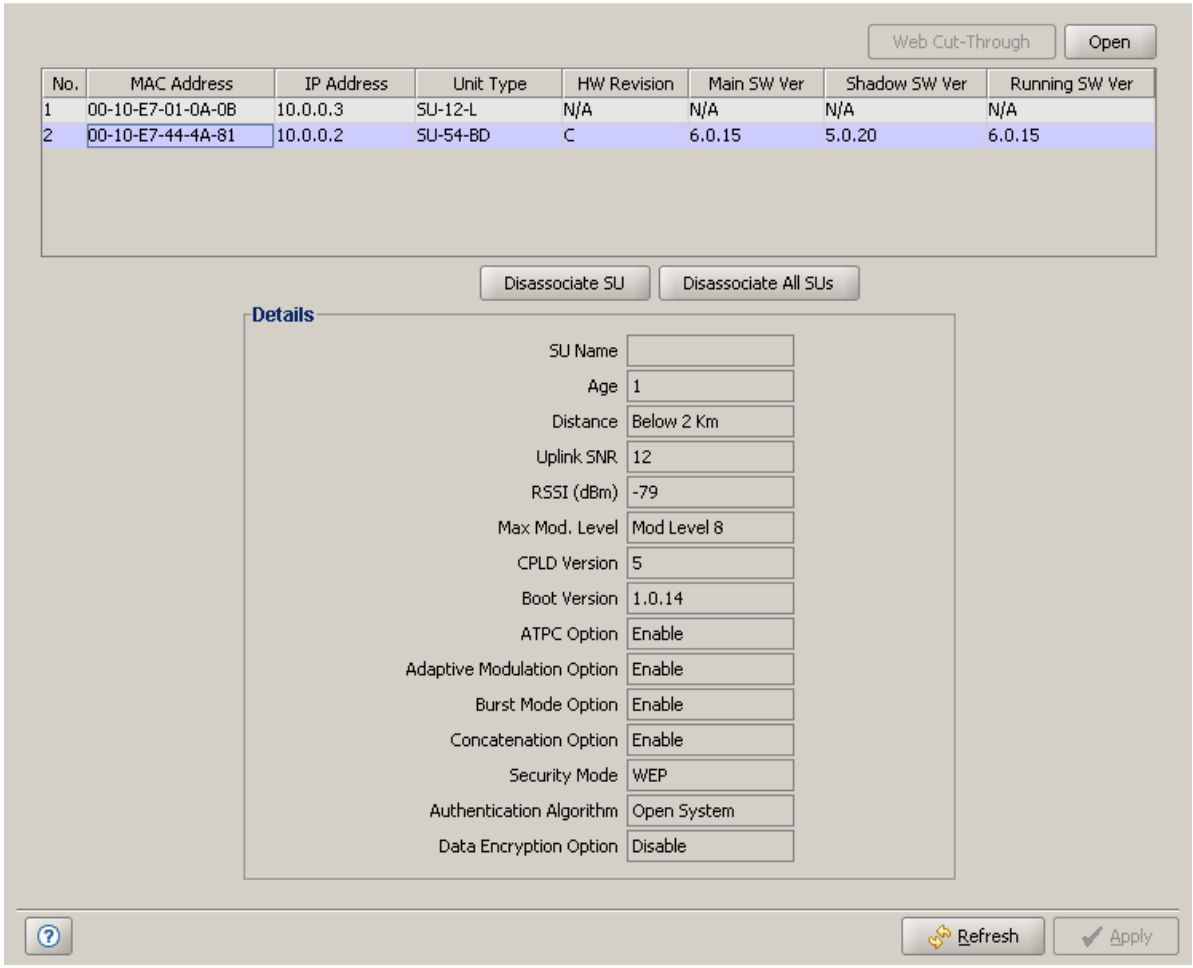


Figure 2-20: SUs Information Page

The SUs Information page includes the following sections:

- SUs Table and Control Buttons
- Details

2.10.1 SUs Table and Control Buttons

The SUs Table includes the following details for each of the SUs in the Association Database of the AU:

NOTE

An SU is removed from the list of associated SUs only under one of the following conditions:

- A SNAP frame is received from another AU indicating that the SU is now associated with the other AU.
- The SU failed to respond to 100 consecutive data frames transmitted by the AU and is considered to have "aged out".
- During the last 6 minutes (or more) the SU did not transmit any data frame, and failed to respond to certain frames that typically are transmitted by the AU every 10 seconds. Since the sampling interval for this state is about 10 minutes, it means that the decision to remove the SU from the Associations Database will take place between 6 to 16 minutes from the time the SU ceased sending data or responding to these "keep-alive" frames (for AUS the sampling interval is 1 minute, meaning decision time of 6 to 7 minutes).

MAC Address	The SU's MAC Address.
IP Address	The SU's IP Address.
Unit Type	The SU's Unit Type.
HW Revision	The SU's HW Revision (N/A for SU-EZ).
Main SW Ver	The Main SW Version of the SU (N/A for SU-EZ).
Shadow SW Ver	The Shadow SW Version of the SU (N/A for SU-EZ).
Running SW Ver	The Running SW Version of the SU (N/A for SU-EZ).

Select an entry and click on the **Open** button to open the Device Manager window for the selected SU (not available for SU-EZ units).

If you select an SU-EZ unit, you can use the **Web Cut-Through** button to open the default browser and connect to its web management interface.

Select one or more entries and click on the **Disassociate SU** button to disassociate the selected SU(s). Click on the **Disassociate All SUs** to disassociate all SUs. This feature is useful during configuration changes, enabling to force the SU(s) to re-initiate the association process, including the search for the best AU (or a preferred AU) using the Best AU process, without performing a full reset.

2.10.2 Details

The Details section displays the following read-only information for a selected SU:

SU Name	The Unit Name configured in the SU (N/A for SU-EZ).
Age	The elapsed time in seconds since receiving the last packet from the SU (N/A for SU-EZ).
Distance	The measured distance from the AU (N/A for SU-EZ).
Uplink SNR	The SNR (in dB) of the signal received by the AU from the SU.
RSSI (dBm)	The RSSI (in dBm) of the signal received by the AU from the SU (N/A for SU-EZ).
Max Mod. Level	The Maximum Modulation Level configured in the SU (N/A for SU-EZ).
CPLD Version	The version of the Complex Programmable Logic Device (CPLD) used in the SU (N/A for SU-EZ).
Boot Version	The Boot version of the SU (N/A for SU-EZ).
ATPC Option	The setting of the ATPC Option in the SU: Enable or Disable (N/A for SU-EZ).
Adaptive Modulation Option	The setting of the Adaptive Modulation Option in the SU: Enable or Disable (N/A for SU-EZ).
Burst Mode Option	The setting of the Burst Mode Option in the SU: Enable or Disable (N/A for SU-EZ).
Concatenation Option	The setting of the Concatenation Option in the SU: Enable or Disable (N/A for SU-EZ).
Security Mode	The setting of the Security Mode in the SU: WEP, AES or FIPS 197 (N/A for SU-EZ).
Authentication Algorithm	The setting of the Authentication Algorithm in the SU: Shared Key or Open System (N/A for SU-EZ).
Data Encryption Option	The setting of the Data Encryption Option in the SU: Enable or Disable (N/A for SU-EZ).

2.11 Gateways Page (AU Only)

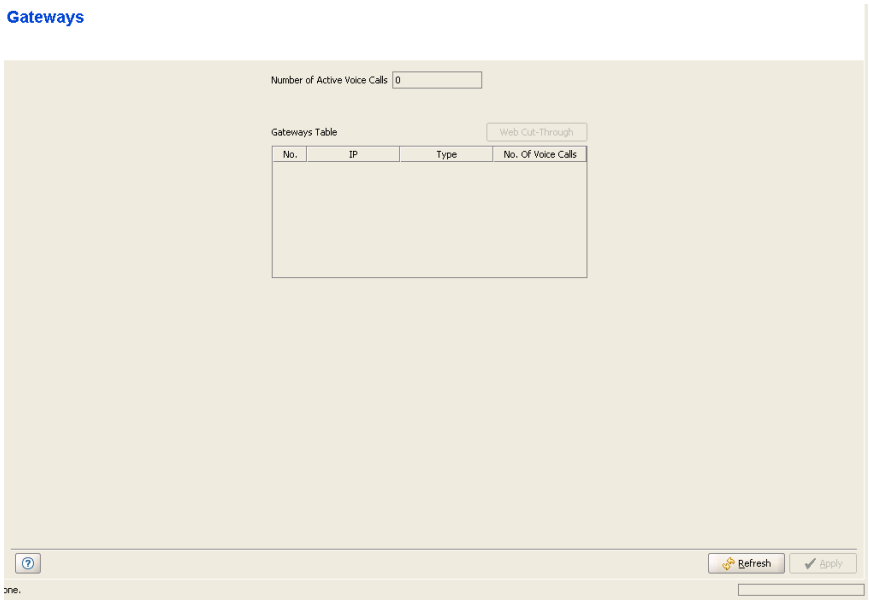


Figure 2-21: Gateways Page

When the DRAP option is enabled in the AU, the Gateways Table provides details on the Gateways connected to any of the SUs served by the AU. The read-only details provided for each Gateway are:

IP	The IP address of the Gateway.
Type	The Gateway type.
No. Of Voice Calls	The number of currently active voice calls (applicable only to Voice Gateways)

The **Number Of Active Voice Calls** at the top of the page displays the total number of currently active voice calls in the AU.

Select an entry and click on the on the **Web Cut-Through** button to open an HTTP session with the selected Gateway.

2.12 Wi² APs (AU)/Wi² AP (BU)

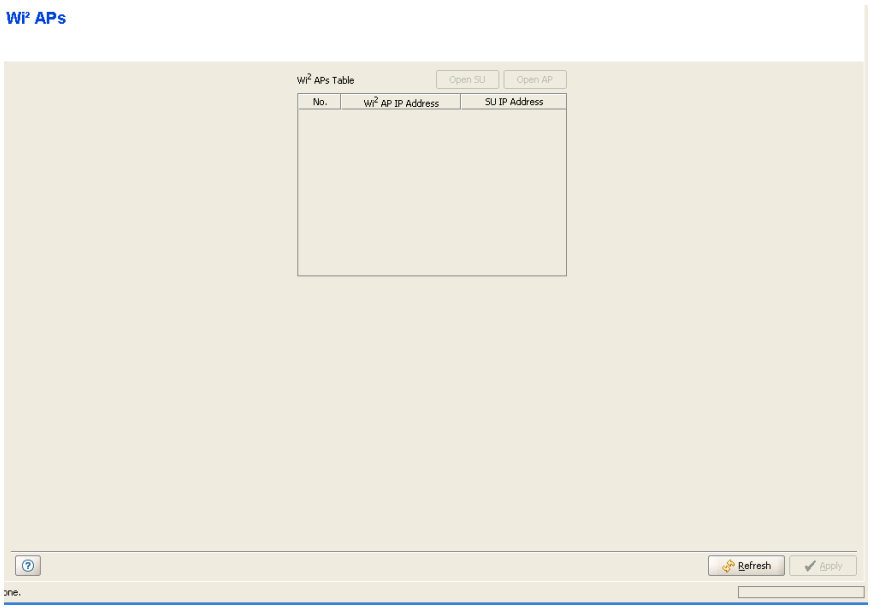


Figure 2-22: Wi² APs Page-AU

In an AU, the Wi² APs Table provides the following read-only details for each Wi² AP configured in an associated SU:

Wi² AP IP Address	The IP address of the Wi² AP as configured in the SU.
SU IP Address	The IP address of the connected SU.

Select an entry and click on the **Open SU** button to open the Device Manager window for the selected SU.

Select an entry and click on the **Open AP** button to open an HTTP session with the selected Wi² AP.

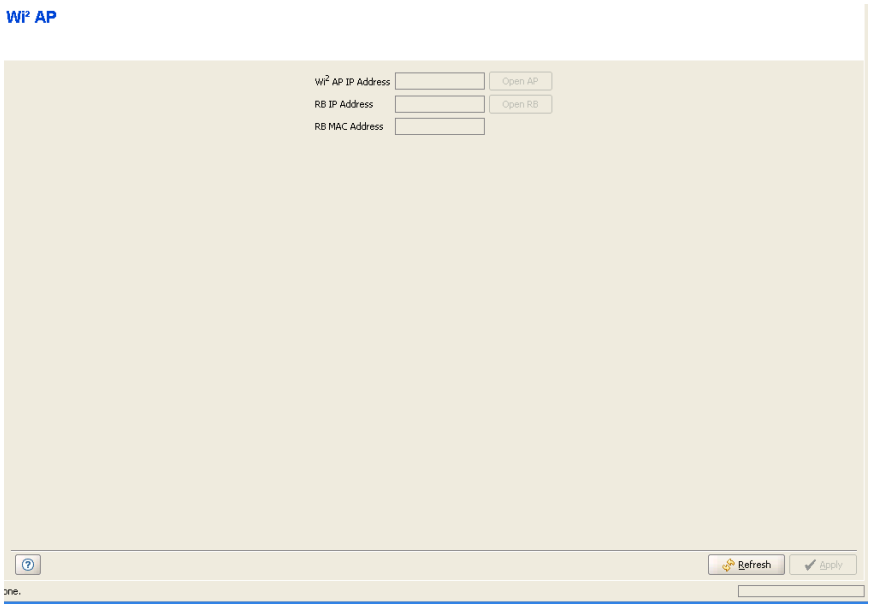


Figure 2-23: Wi^2 AP Page-BU

In a BU, the Wi^2 AP page provides the following read-only details for a Wi^2 AP configured in an associated RB:

Wi^2 AP IP Address	The IP address of the Wi^2 AP as configured in the SU.
RB IP Address	The IP address of the RB.
RB MAC Address	The MAC address of the RB.

Click on the **Open AP** button to open an HTTP session with the Wi^2 AP.

Click on the **Open RB** button to open the Device Manager window for the RB.

2.13 Best AU Page (SU Only)/Best BU Page (RB Only)

The Best AU/Best BU feature is designed to enable an SU/RB to connect to the best AU/BU in its neighborhood. When the Best AU/BU feature is used, each of the AUs/BUs is given a quality mark based on the level at which it is received by the SU/RB. The SU/RB scans for a configured number of cycles, gathering information from all the AUs/BUs with which it can communicate. At the end of the scanning period, the SU/RB reaches a best AU/BU decision according to the information gathered. The AU/BU with the highest quality mark is selected as the best AU/BU, and the SU/RB will immediately try to associate with it. The quality mark given to each AU/BU depends on the level at which it is received by the SU/RB.

Note that although the SU/RB selects the best AU/BU based on long-term conditions prior to the decision time, it may not always be connected to the instantaneous best AU/BU at any given time. The decision is made only once during the scanning interval. The decision may not remain the optimal one for ever. If there are significant changes in deployment of neighboring AUs and the SUs served by them, overall performance may be improved if the applicable SUs are reset or disassociated intentionally so as to re-initiate the Best AU decision process.

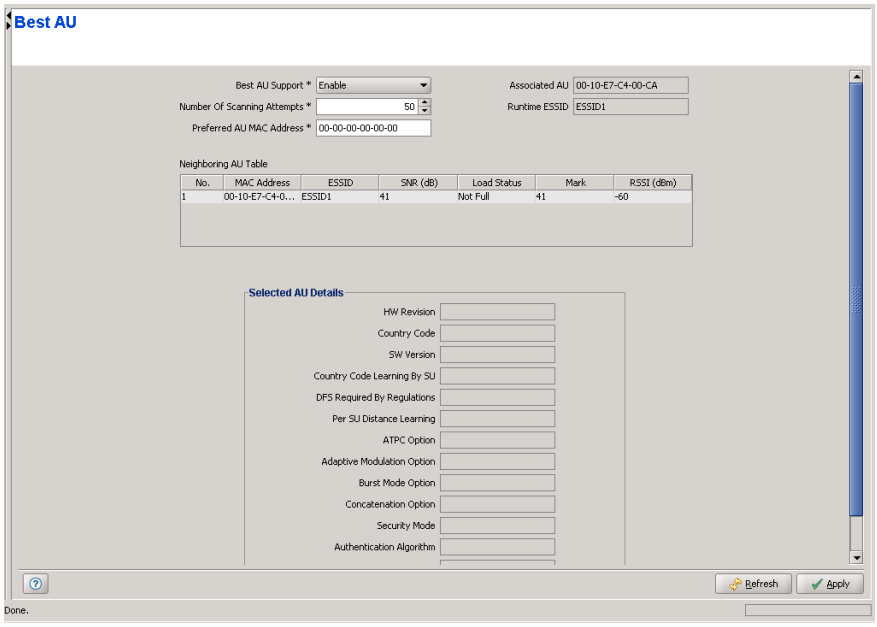


Figure 2-24: Best AU Page - SU

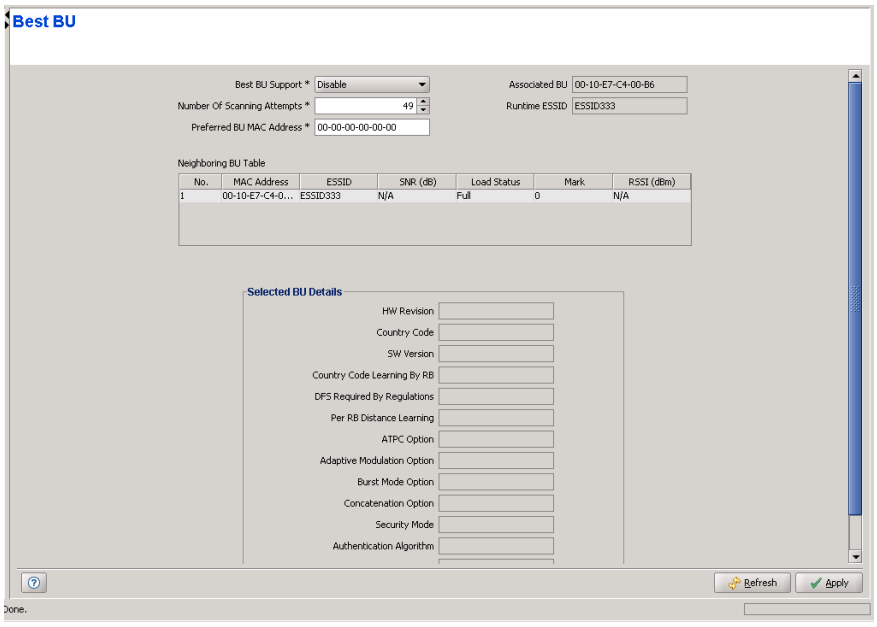


Figure 2-25: Best BU Page - RB

The Best AU/Best BU Page includes the following sections:

- Best AU/Best BU Parameters

- Neighboring AU/Neighboring BU Table
- Selected AU/Selected BU Details

2.13.1 Best AU/Best BU Parameters

The Best AU/Best BU Parameters section includes the following parameters:

Best AU/Best BU Support	The Best AU/Best BU Support option enables or disables the best AU/BU selection feature. Note that if the feature is not enabled, the SU/RB associates with the first AU/BU it finds whose ESSID or Operator ESSID is identical to its own ESSID.
Number Of Scanning Attempts	When the Best AU/Best BU Support is enabled, the SU/RB gathers information on neighboring AUsBUs for approximately 2 seconds on each of the scanned frequencies. The Number of Scanning Attempts parameter defines the number of times that the process will be repeated for all relevant frequencies. A higher number may result in a better decision at the cost of an increased scanning time during which the SU/RB is not operational. Valid values: 1 - 255.
Preferred AU/Preferred BU MAC Address	The Preferred AU/Preferred BU MAC Address parameter defines a specific AU/BU with which the SU/RB should associate. Gaining control of the SUs/RB association is a powerful tool in network management. The Preferred AU/BU MAC Address parameter is intended for applications where there is a need to dictate the preferred AU/BU with which the SU/RB should associate. To prevent the SU/RB from associating with the first viable AU/BU it finds, the Best AU/Best BU Support mechanism should be enabled. Once the SU/RB has identified the preferred AU/BU based on its MAC address, it will associate with it and terminate the scanning process. If the preferred AU/BU is not found, the SU/RB will search for AU/BU according to the decision reached using the best AU/BU algorithm. Valid values: A MAC address string (xx-xx-xx-xx-xx-xx). The default value is 00-00-00-00-00-00 (12 zeros), meaning that there is no preferred AU/BU.
Associated AU/Associated BU	A read-only display of the associated AU/BU MAC address.
Runtime ESSID	A read-only display of the Runtime ESSID (the ESSID of the associated AU/BU).

2.13.2 Neighboring AU/Neighboring BU Table

The read-only Neighboring AU/Neighboring BU Table includes the following details for each of the AUs/BUs with which the SU/RB can associate:

MAC Address	The MAC address of the AU/BU.
ESSID	The ESSID of the AU/BU.
SNR (dB)	The SNR of the signal received from the AU/BU.
Load Status	The association load status of the AU/BU. For an AU, it is defined as Full if the number of SUs associated with the AU has reached the maximum allowed according to the value of the Maximum Number Of Associations parameter. For a BU it is full when the BU is already associated with another RB. An AU/BU whose associations load status is Full cannot be selected as the Best AU/BU, even if its computed mark is the highest.
Mark	The quality mark given to the AU/BU.
RSSI (dBm)	The RSSI (in dBm) of the signal received from the AU/BU.

2.13.3 Selected AU/Selected BU Details

The Selected AU/Selected BU Details display the following read-only information for the AU/BU selected in the Neighboring AU/Neighboring BU Table:

HW Revision	The HW Revision.
Country Code	The Country Code used by the AU/BU.
SW Version	The running SW Version of the AU/BU.
Country Code Learning By SU	Applicable only for SU. The setting of the Country Code Learning By SU option in the AU: Enable or Disable.
DFS Required by Regulations	The setting in the AU/BU: Yes or No.
Per SU Distance Learning	Applicable only for SU. The setting of the Per SU Distance Learning option in the AU: Enable or Disable.
ATPC Option	The setting of the ATPC Option in the AU/BU: Enable or Disable.
Adaptive Modulation Option	The setting of the Adaptive Modulation Option in the AU/BU: Enable or Disable.
Burst Mode Option	The setting of the Burst Mode Option in the AU/BU: Enable or Disable.
Concatenation Option	The setting of the Concatenation Option in the AU/BU: Enable or Disable.
Security Mode	The setting of the Security Mode in the AU/BU: WEP, AES or FIPS 197.
Authentication Algorithm	The setting of the Authentication Algorithm in the AU/BU: Shared Key or Open System.
Data Encryption Option	The setting of the Data Encryption Option in the AU/BU: Enable or Disable.

2.14 Site Survey Ethernet Statistics Page

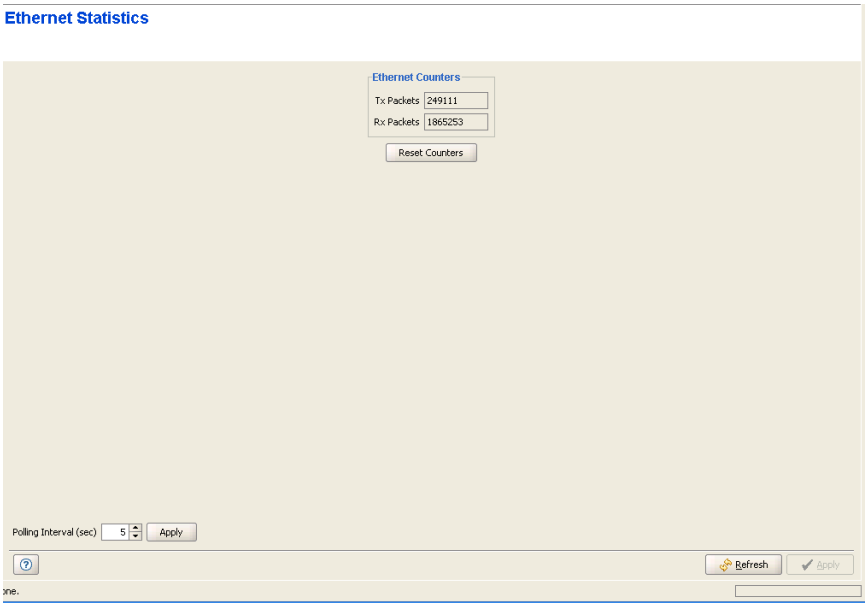


Figure 2-26: Site Survey Ethernet Statistics Page

The Site Survey Ethernet Statistics page includes the following Ethernet counters:

Tx Packets	The total number of packets received from the Ethernet port. This counter includes both valid packets and non-valid packets (packets with errors).
Rx Packets	The total number of packets transmitted by the device to the Ethernet port.

The page includes also the following components:

Polling Interval (sec) and Apply button	The refresh interval for the displayed counters. Enter the required polling interval and click on the Apply button to update it. The range is 5 to 3600 seconds. The default is 5 seconds.
Reset Counters button	Click on the button to reset all Ethernet counters. All Rx/Tx Counters will also be reset.

2.15 Site Survey Rx/Tx Counters Page

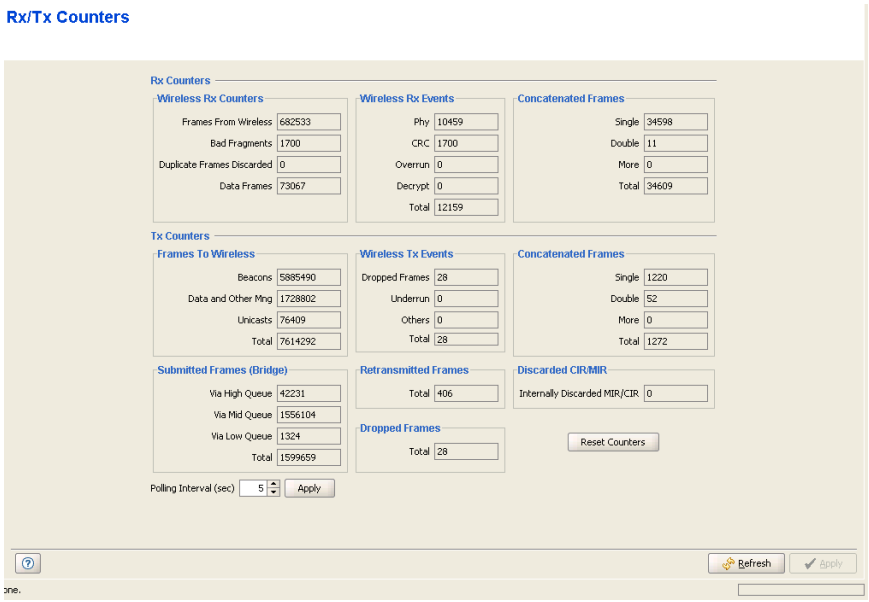


Figure 2-27: Site Survey Rx/Tx Counters Page - AU/BU

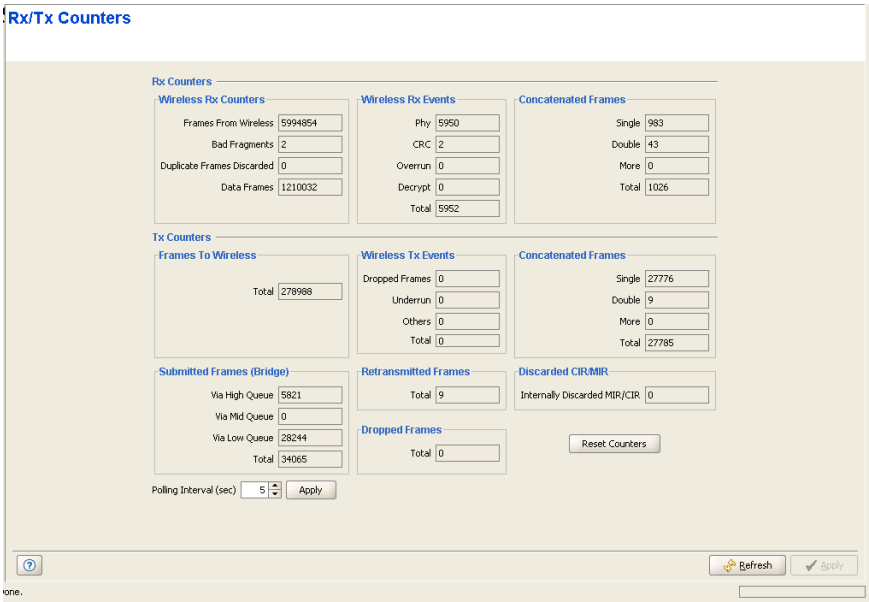


Figure 2-28: Site Survey Rx/Tx Counters Page - SU/RB

The Site Survey Rx/Tx Counters page includes the following sections:

2.15.1 Rx Counters-Wireless Rx Counters

Frames From wireless	The total number of frames received from the wireless link. The count includes data frames as well as control and wireless management frames. The count does not include bad frames and duplicate frames.
Bad Fragments	The number of fragments received from the wireless link containing CRC errors.
Duplicate Frames Discarded	The number of data frames discarded because multiple copies were received. If an acknowledgement message is not received by the originating unit, the same data frame can be received more than once. Although duplicate frames are included in all counters that include data frames, only the first copy is forwarded to the Ethernet port.
Data Frames	The total number of data frames received from the wireless link, including duplicate frames.

2.15.2 Rx Counters-Wireless Rx Events

Phy	The total number of frames that were not received properly due to Phy errors (unidentified signals).
CRC	The number of frames received from the wireless medium containing CRC errors.

Overrun	The number of frames that were discarded because the receive rate exceeded the processing capability or the capacity of the Ethernet port.
Decrypt	The number of frames that were not received properly due to a problem in the data decryption mechanism.
Total	The total number of frames that were not received properly due to the reasons listed above or other reasons.

2.15.3 Rx Counters-Concatenated Frames

Single	The total number of concatenated frames that contain a single frame received from the wireless link, excluding retransmissions.
Double	The total number of concatenated frames that contain two frames received from the wireless link, excluding retransmissions.
More	The total number of concatenated frames that contain more thean two frames received from the wireless link, excluding retransmissions.
Total	he total number of concatenated frames of all types received from the wireless link, excluding retransmissions.

2.15.4 Tx Counters-Frames To Wireless

Beacons	Applicable only for AU and BU. The number of Beacons transmitted to the wireless link.
Data and Other Mng	Applicable only for AU and BU. Management and data frames, including successfully transmitted unicast frames and multicast/broadcast data frames (excluding retransmissions, excluding Beacons)
Unicasts	Applicable only for AU and BU. The number of unicast frames successfully transmitted to the wireless link, excluding retransmissions.
Total	The number of frames transmitted to the wireless link. The total includes one count for each successfully transmitted unicast frame (excluding retransmissions), and the number of transmitted multicast and broadcast frames, including control and wireless management frames.

2.15.5 Tx Counters-Wireless Tx Events

Dropped Frames	The number of dropped frames, which were unsuccessfully retransmitted without being acknowledged until the maximum permitted number of retransmissions.
Underrun	The number of times that transmission of a frame was aborted because the rate of submitting frames for transmission exceeds the available transmission capability.
Others	The number of frames whose transmission was not completed or delayed due to a problem other than those represented by the other counters listed above.
Total	The total number of transmit events. Includes all the counters listed above.

2.15.6 Tx Counters-Concatenated Frames

Single	The total number of concatenated frames that contain a single frame transmitted successfully to the wireless link, excluding retransmissions.
Double	The total number of concatenated frames that contain two frames transmitted successfully to the wireless link, excluding retransmissions.
More	The total number of concatenated frames that contain more thean two frames transmitted successfully to the wireless link, excluding retransmissions.
Total	he total number of concatenated frames of all types transmitted successfully to the wireless link, excluding retransmissions.

2.15.7 Tx Counters-Submitted Frames (Bridge)

Via High Queue	The total number of data frames submitted to the High queue of the internal bridge for transmission to the wireless link. The count does not include control and wireless management frames, or retransmissions.

Via Mid Queue	The total number of data frames submitted to the Mid queue of the internal bridge for transmission to the wireless link. The count does not include control and wireless management frames, or retransmissions.
Via Low Queue	The total number of data frames submitted to the Low queue of the internal bridge for transmission to the wireless link. The count does not include control and wireless management frames, or retransmissions.
Total	The total number of data frames submitted to the all queues of the internal bridge for transmission to the wireless link. The count does not include control and wireless management frames, or retransmissions.

2.15.8 Tx Counters-Retransmitted Frames

Total	The total number of retransmissions, including all unsuccessful transmissions and retransmissions.

2.15.9 Tx Counters-Dropped Frames

Total	The number of dropped frames, which are unsuccessfully retransmitted without being acknowledged until the maximum permitted number of retransmissions. This count includes dropped data frames as well as dropped control and wireless management frames.

2.15.10 Tx Counters-Discarded CIR/MIR

Internally Discarded MIR/CIR	The number of data frames received from the Ethernet port that were discarded by the MIR/CIR mechanism to avoid exceeding the maximum permitted information rate.

2.15.11 General Controls

The page includes also the following components:

Polling Interval (sec) and Apply button	The refresh interval for the displayed counters. Enter the required polling interval and click on the Apply button to update it. The range is 5 to 3600 seconds. The default is 5 seconds.
Reset Counters button	Click on the button to reset all Rx/Tx counters. Ethernet counters will also be reset.

2.16 Site Survey Per SU Counters Page (AU) / Per RB Counters Page (BU)

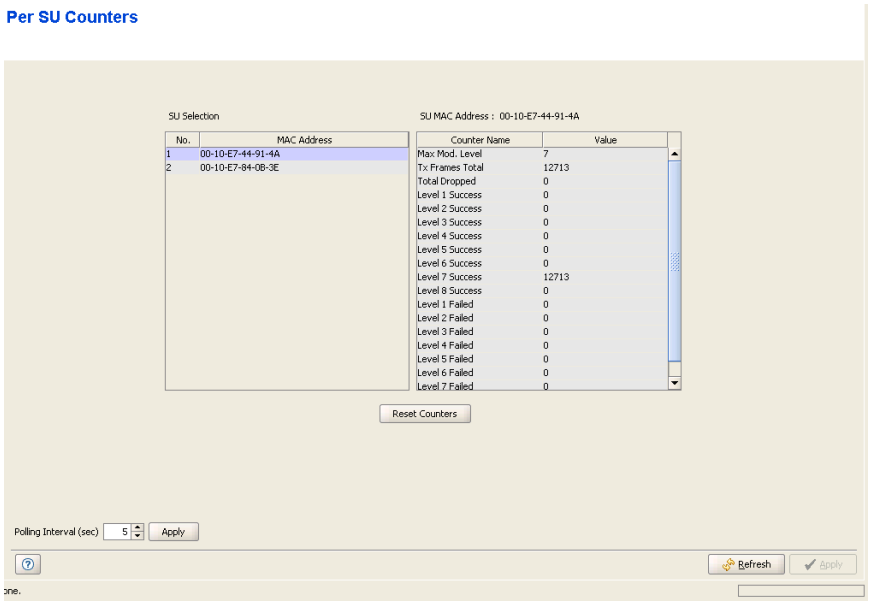


Figure 2-29: Site Survey Per SU Counters Page (AU)

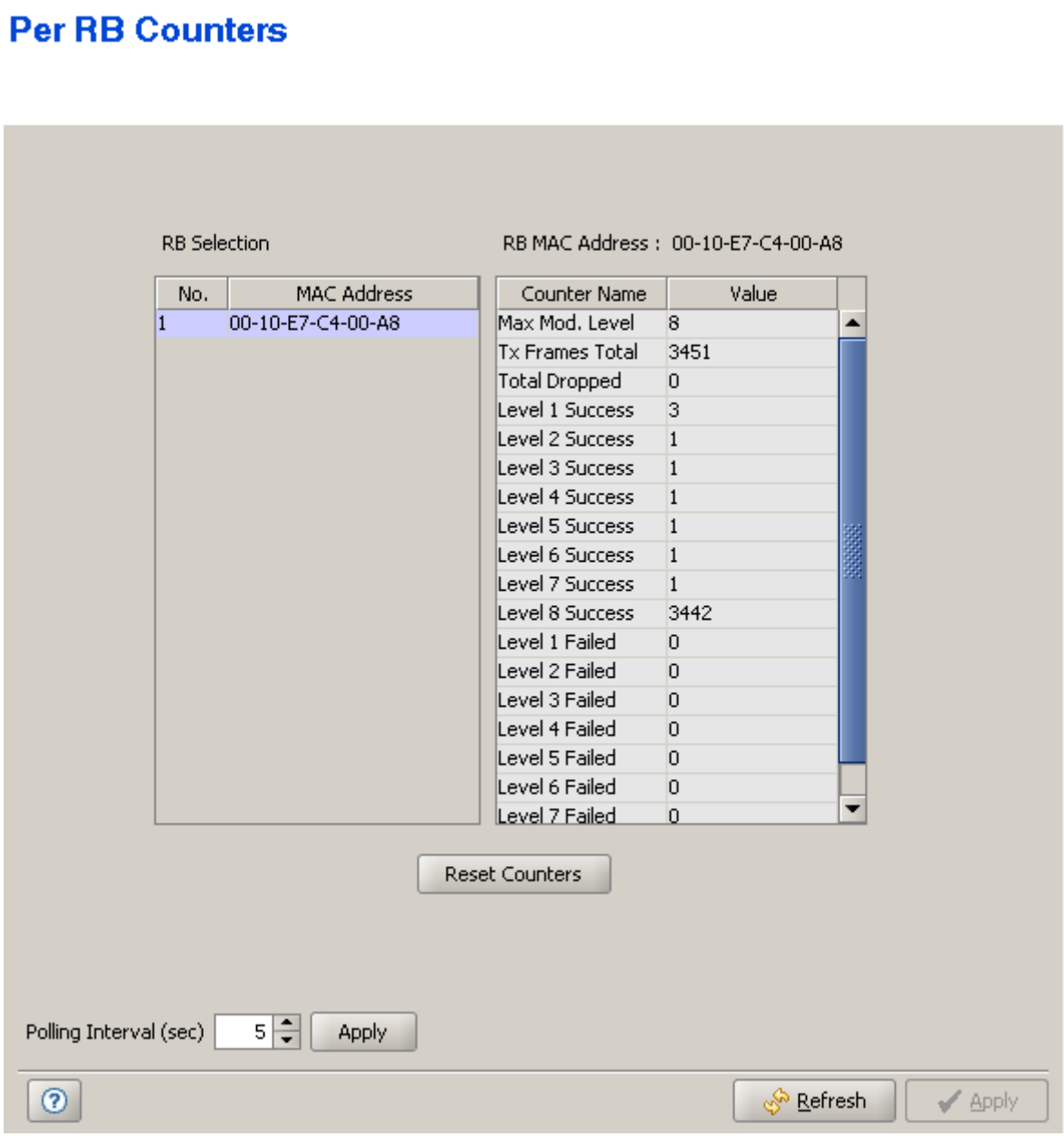


Figure 2-30: Site Survey Per RB Counters Page (BU)

The Per SU/RB Counters page display statistics relating to performance of the downlink wireless link to a selected SU (in AU) or to the connected RB (in BU) at different radio modulation levels.

In an AU, the SU Selection table displays a list of all associated SUs, identified by their MAC Address. Select an entry to view the counters. In a BU, the RB Selection list includes a single entry identifying the connected RB (if any). Select the RB entry to view the counters.

The selected unit's MAC Address is displayed above the counters table.

The information displayed for the selected unit includes the following:

Max Mod. Level	The Maximum Modulation Level configured in the unit.
Tx Frames Total	The total number of unicast frames (excluding retransmissions) successfully transmitted to the unit.
Total Dropped	The number of dropped frames intended for the unit, which were unsuccessfully retransmitted without being acknowledged until the maximum permitted number of retransmissions.
Level N Success (N=1-8)	The total number of unicasts successfully transmitted to the unit at the applicable modulation level.
Level N Failed (N=1-8)	The total number of failures to successfully transmit unicast frame to the unit during a HW Retry cycle at the applicable modulation level.

The page includes also the following components:

Polling Interval (sec) and Apply button	The refresh interval for the displayed counters. Enter the required polling interval and click on the Apply button to update it. The range is 5 to 3600 seconds. The default is 5 seconds.
Reset Counters button	Click on the button to reset all Per SU/RB counters.

2.17 Site Survey Per Modulation Level Counters Page (SU and RB Only)

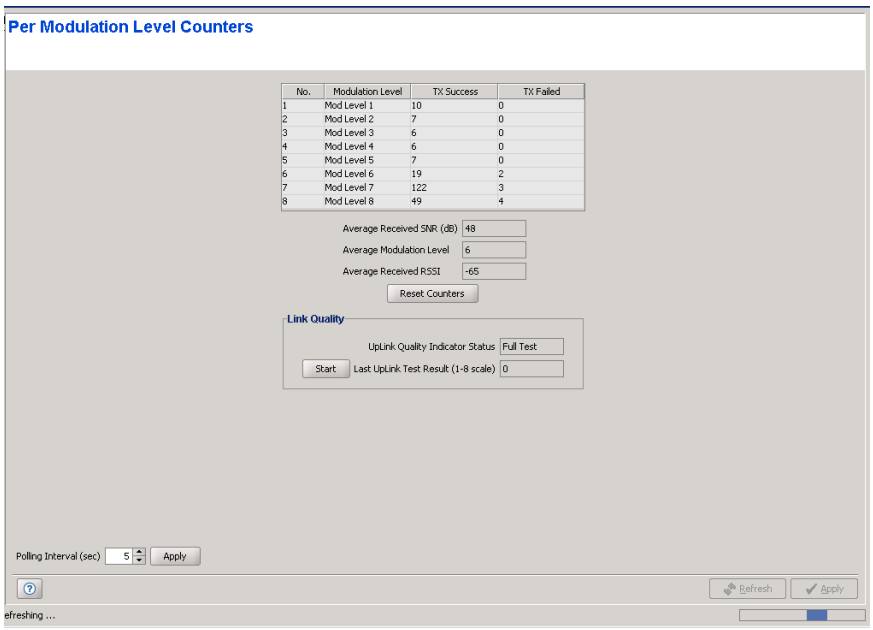


Figure 2-31: Site Survey Per Modulation Level Counters Page

The Per Modulation Level Counters page displays statistics related to performance of the wireless link from the SU/RB (uplink) at different radio modulation levels.

The per modulation level counters table includes the following For each of the possible modulation levels (Modulation Level 1 - 8):

Tx Success	The total number of unicasts successfully transmitted by the device at the applicable modulation level.
Tx Failed	The total number of failures of the device to successfully transmit unicast frame during a HW Retry cycle at the applicable modulation level.

In addition, the following information on average link quality is also displayed:

Average Received SNR (dB)	The average Signal to Noise Ratio of received frames.

Average Modulation Level	This is the average modulation level (rounded to the nearest integer) since the last time the Per Modulation Level counters were reset. The average is calculated using the Tx Success count at each modulation level as weights.
Average Received RSSI	The average RSSI (in dBm) of received frames.

The **Link Quality** section enables to display the average quality of the wireless link to the AU, using the dynamically updated average modulation level measurements. The Link Quality Indicator (LQI) calculation is performed using the following formula:
LQI = (0.9 x "Previous LQI") + (0.1 x "Last Successful Modulation Level").

Each successful transmission will be included in this average, by using the modulation level at which the frame was successfully transmitted as the "Last Successful Modulation Level".

In order to receive quick and reliable LQI measurements, there should be sufficient traffic between the SU and the AU. It is recommended to have traffic of at least 100 packets per second.

To activate a new Uplink Quality test, click on the **Start** button. The **Last Uplink Test Results** displays the last results, rounded to the nearest integer. If **Limited Test** is indicated in the **Uplink Quality Indicator Status**, it means that the results may not indicate the true quality, as not all modulation levels from 1 to 8 are available. The limitation may be due to the HW of the unit (HW Revision A), or the applicable parameters in the country code, or the configured Maximum Modulation Level parameter.

The page includes also the following components:

Polling Interval (sec) and Apply button	The refresh interval for the displayed counters. Enter the required polling interval and click on the Apply button to update it. The range is 5 to 3600 seconds. The default is 5 seconds.
Reset Counters button	Click on the button to reset all Per Modulation Level counters, the Average Received SNR counter and the Average Modulation Level counter.

2.18 Site Survey Hidden ESSID Page (SU and RB Only)

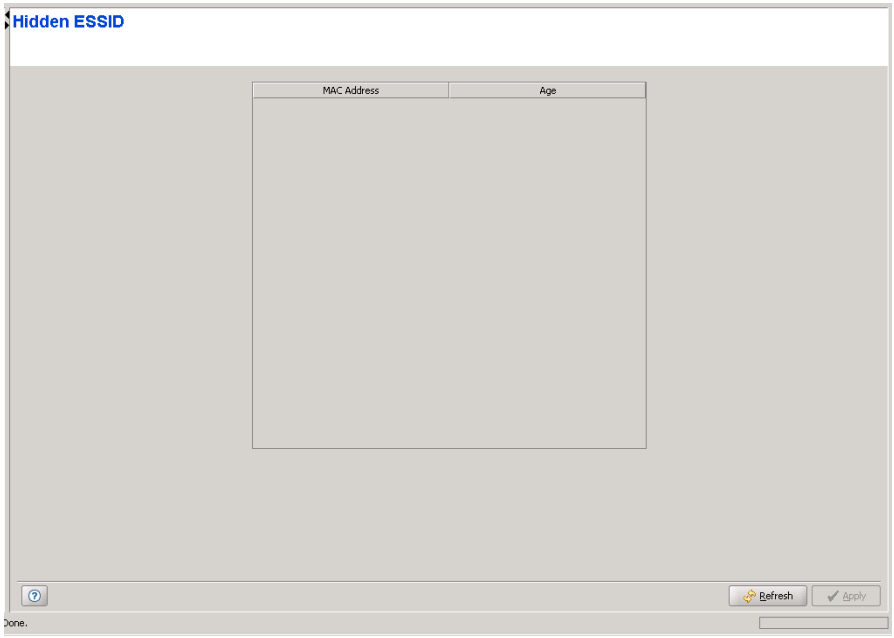


Figure 2-32: Site Survey Hidden ESSID Page

An SU/RB with Hidden ESSID Support enabled that maintains a list of AUs/BUs. that rejected association requests from the SU/RB because of a wrong ESSID. An AU/BU will be kept in this list until the Hidden ESSID Time-out expires for it or if the list is full and another AU/BU that is not in the list rejects the SU/RB because of wrong ESSID.

The Hidden ESSID Table displays for each AU/BU included in the list its MAC Address and Age (elapsed time in minutes since it was added to the table).

2.19 Bridging Page

The Bridging Page comprises the following tabs:

- The Bridging Page General Tab
- The Bridging Page VLAN Tab
- The Bridging Page Allow/Deny MAC Address List Tab (AU Only)

2.19.1 The Bridging Page General Tab

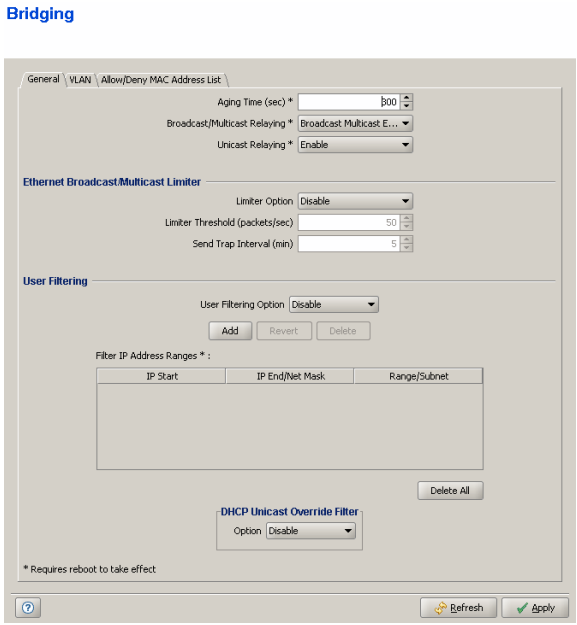


Figure 2-33: Bridging Page General Tab - AU

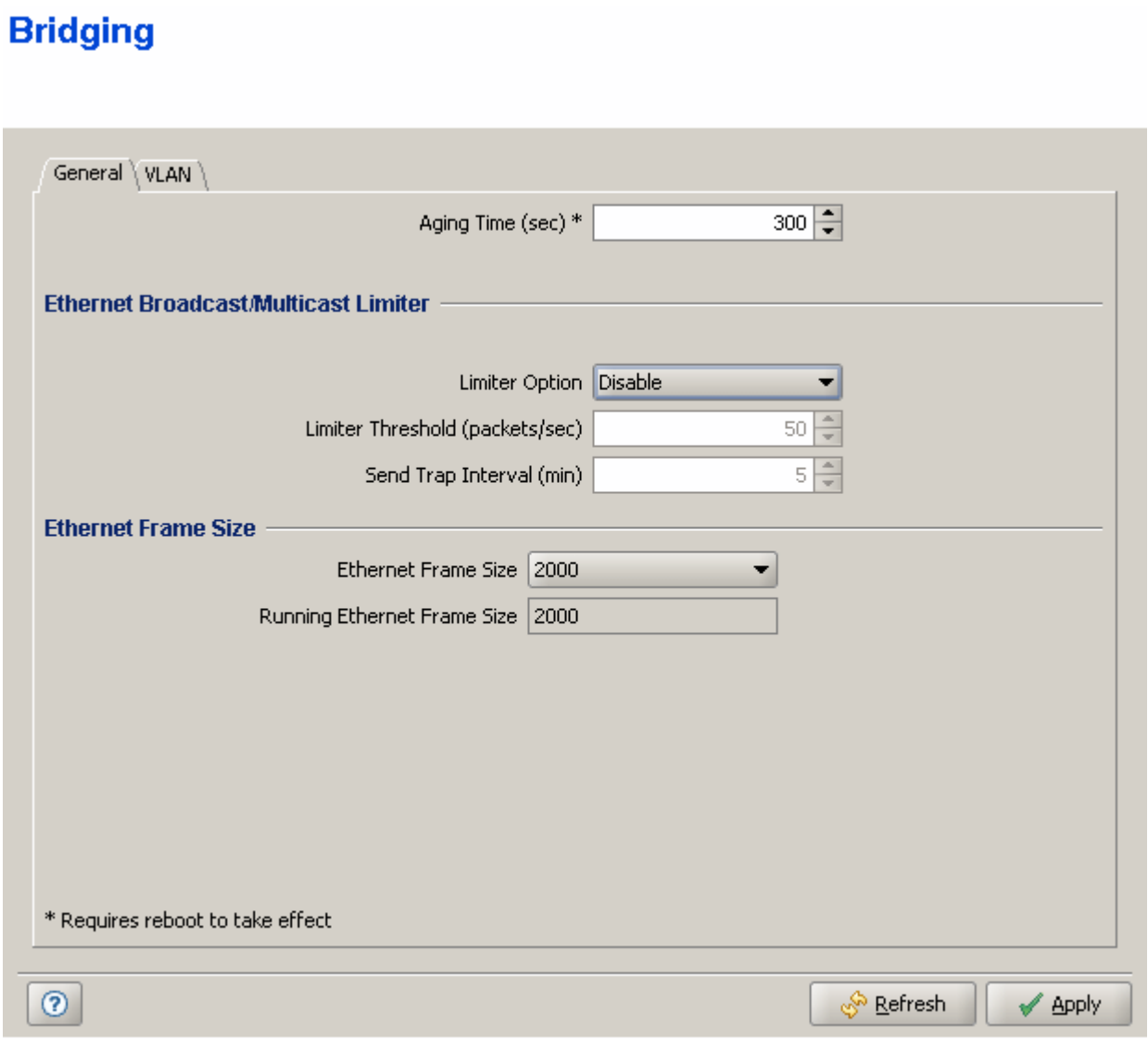


Figure 2-34: Bridging Page General Tab - BU

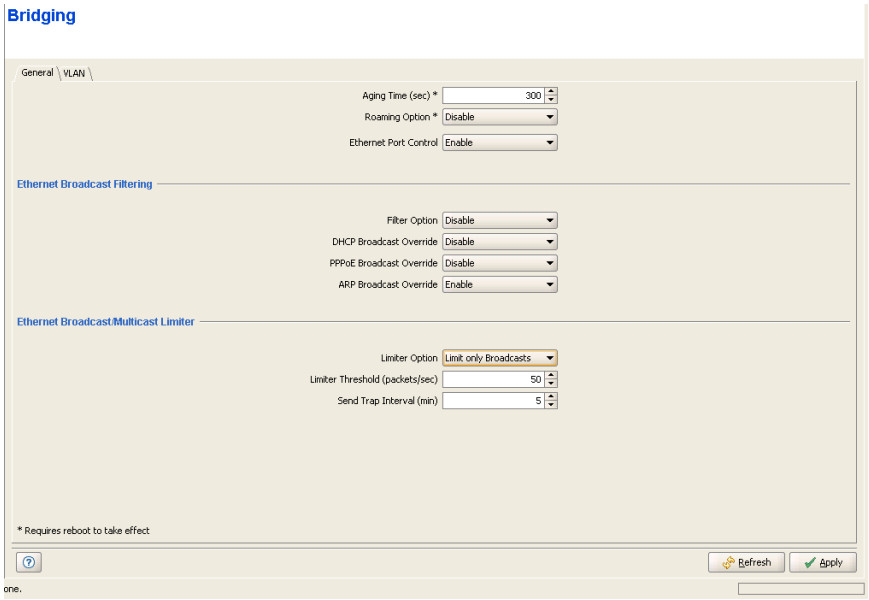


Figure 2-35: Bridging Page General Tab - SU

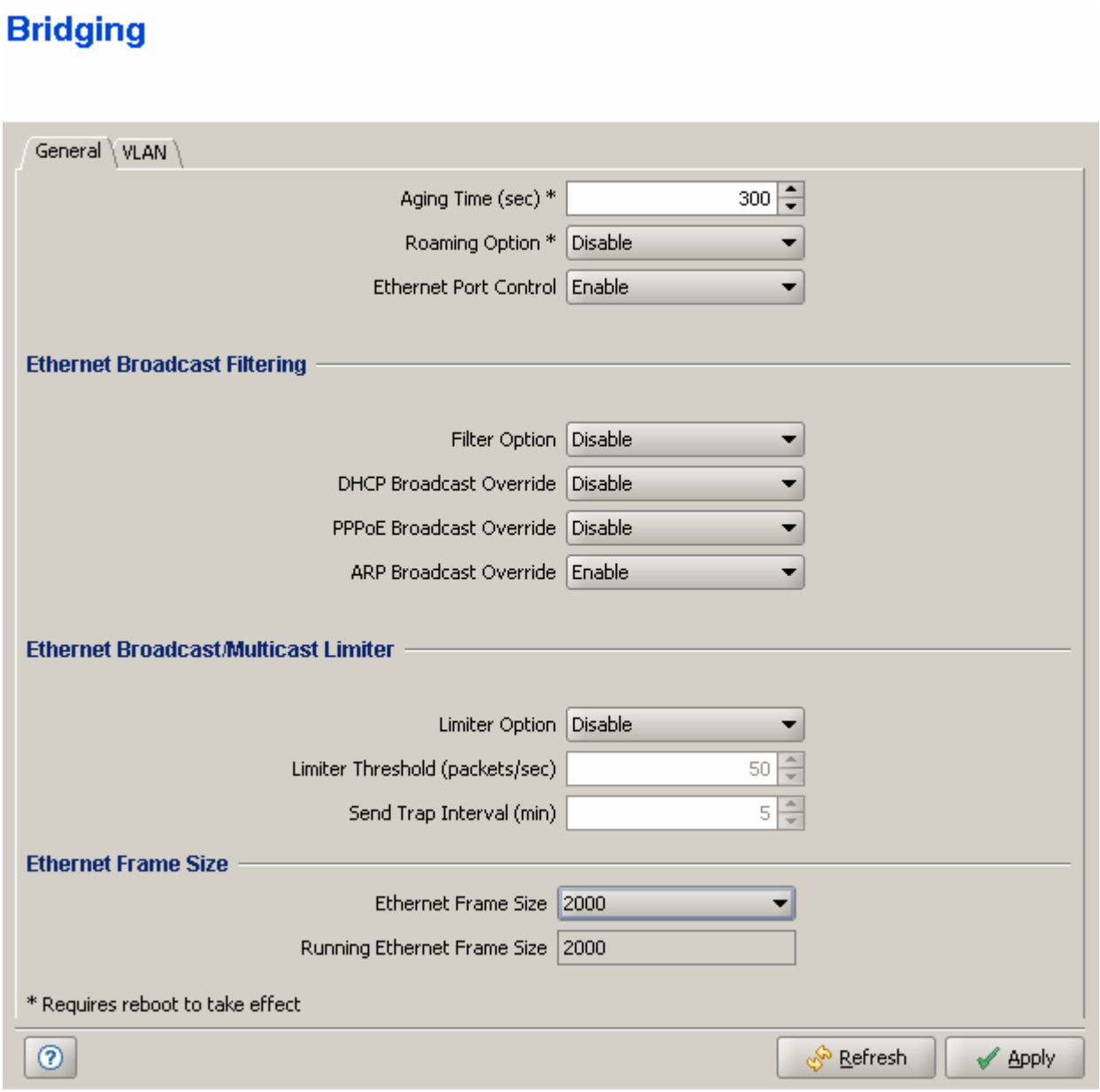


Figure 2-36: Bridging Page General Tab - RB

The Bridging Page General Tab includes the following sections:

- General Parameters
- Ethernet Broadcast Filtering (SU and RB Only)
- Ethernet Broadcast/Multicast Limiter
- User Filtering (AU Only)

- Ethernet Frame Size (BNB 10)

2.19.1.1 General Parameters

Aging Time (sec)	This parameter enables selecting the bridge aging time for learned addresses of devices on both the wired and wireless sides. The available range is 20 to 2000 seconds.
Broadcast/Multicast Relaying	Applicable only for AU. This parameter enables selecting whether the unit performs relaying of broadcasts and/or multicasts. The available options are: ■ Disable ■ Broadcast Multicast Enable ■ Broadcast Enable ■ Multicast Enable If broadcast/multicast relaying if disabled, these packets are sent only to the local wired LAN and are not sent back to the wireless link. When broadcast and or multicast relaying is enabled, the relevant packets (broadcasts only, multicasts only or both broadcasts and multicasts) originating from devices on the wireless link are transmitted by the AU back to the wireless link devices, as well as to the wired LAN.
Unicast Relaying	Applicable only for AU. This parameter enables selecting whether the unit performs unicast relaying. When the Unicast Relaying parameter is enabled, unicast packets originating from devices on the wireless link can be transmitted back to the wireless link devices. If disabled, these packets are not sent to the wireless link even if they are intended for devices on the wireless link. Disable the Unicast Relaying parameter only if all unicast messages from the wireless link are certain to be directed to the local wired LAN.

Roaming Option	Applicable only for SU and RB. This parameter defines the roaming support of the unit. When roaming is not expected, it is preferable to set this parameter to Disable. This will cause the unit to start scanning for another AU/BU after losing connectivity with the current AU/BU only after 7 seconds during which no beacons were received from the current AU/BU. This will prevent scanning for another AU/BU in cases where no beacons were received due to a short temporary problem. When set to Enable, the SU/RB will wait only one second before it starts scanning for another AU/BU. In addition, when the Roaming Option is enabled, the SU/RB will send Roaming SNAP messages upon associating with a new AU/BU. This enables fast distribution of the new location for all clients that are behind the SU/RB. In this case, the SU/RB will send multicast SNAP messages via the wireless link each time it associates with a new AU/BU, except for the first association after reset. The SU/RB will send one SNAP message for each client learned on its Ethernet port, based on its bridging table. In the SNAP message the clients' MAC address is used as the source address. The AU/BU that receives this SNAP message learns from it the new location of the clients. It forwards the SNAP to other AUs/BUs and Layer-2 networking equipment via its Ethernet port, to facilitate uninterrupted connectivity and correct routing of transmissions to these clients. The new AU/BU as well as the previous AU/BU with which the device was associated, will forward the SNAP messages also to all other SUs/RBs associated with them.
Ethernet Port Control	Applicable only for SU and RB. This parameter allows enabling or disabling non-management traffic to/from the Ethernet port. When changed to Disable, all current data sessions will be terminated. The unit is still manageable via the Ethernet port even if it is disabled for data traffic.

2.19.1.2 Ethernet Broadcast Filtering (SU and RB Only)

The Ethernet Broadcast Filtering feature enables defining the layer 2 (Ethernet) broadcast and multicast filtering capabilities of the device. Filtering the Ethernet broadcasts enhances the security of the system and saves bandwidth on the wireless medium by blocking protocols that are typically used in the customer's LAN but are not relevant for other customers, such as NetBios, which is used by the Microsoft Network Neighborhood. Enabling this feature blocks Ethernet broadcasts and multicasts by setting the I/G bit at the destination address to 1. This feature should not be enabled when there is a router behind the SU/RB.

The Ethernet Broadcast Filtering section includes the following parameters:

Filter Option	The Filter Options enables defining the Ethernet Broadcast filtering functionality of the unit. The following options are available: ■ Disable - no Ethernet Broadcast Filtering. ■ On Ethernet Only - filters broadcast messages received from the Ethernet port. ■ On Wireless Only - filters broadcast messages received from the wireless link port. ■ On Both Ethernet and Wireless - filters broadcast messages received from both the Ethernet and wireless link ports.
DHCP Broadcast Override	This parameter enables or disables the broadcasting of DHCP messages. Even if according to the selected option in the Filter Option parameter, broadcast messages should be filtered, DHCP broadcasts are transmitted if this parameter is set to Enable. The following options are available: ■ Disable - DHCP Broadcast messages are filtered or transmitted according to the general filtering criteria in the Filter Option parameter. ■ Enable - DHCP Broadcast messages are transmitted regardless of the selected value of the Filter Option parameter.
PPPoE Broadcast Override	This parameter enables or disables the broadcasting of PPPoE messages. Even if according to the selected option in the Filter Option parameter, broadcast messages should be filtered, PPPoE broadcasts are transmitted if this parameter is set to Enable. The following options are available: ■ Disable - PPPoE Broadcast messages are filtered or transmitted according to the general filtering criteria in the Filter Option parameter. ■ Enable - PPPoE Broadcast messages are transmitted regardless of the selected value of the Filter Option parameter.
ARP Broadcast Override	This parameter enables or disables the broadcasting of ARP messages. Even if according to the selected option in the Filter Option parameter, broadcast messages should be filtered, ARP broadcasts are transmitted if this parameter is set to Enable. The following options are available: ■ Disable - ARP Broadcast messages are filtered or transmitted according to the general filtering criteria in the Filter Option parameter. ■ Enable - ARP Broadcast messages are transmitted regardless of the selected value of the Filter Option parameter.

2.19.1.3 Ethernet Broadcast/Multicast Limiter

The Ethernet Broadcast/Multicast Limiter feature enable to limit the number of broadcast and/or multicast packets that can be transmitted per second, in order to prevent the potential flooding of the wireless medium by certain ARP attacks.

In SUs, the limiter is placed after the Ethernet Broadcast Filters. For this reason, the limiter will receive only the packets that pass through these filters. If the Ethernet filters of the SU are disabled, the limiter will be applied to all relevant packets received.

When the Ethernet Broadcast/Multicast Limiter is enabled and the specified limit is reached, the unit will send a trap. The trap will be sent periodically till the number of broadcast/multicast packets will be less than the maximum. The trap will inform the user how many packets were discarded in the last period.

The Ethernet Broadcast/Multicast Limiter section includes the following parameters:

Limiter Option	This parameter defines the limiter's functionality. The available options are: ■ Disable: No limiter ■ Limit only Broadcasts ■ Limit Multicasts except Broadcasts ■ Limit all Multicasts (including broadcast)
Limiter Threshold (packets/sec)	This parameter defines the maximum number of packets per second that may pass the limiter when it is enabled. The range is from 0 to 204800 (packets/second).
Send Trap Interval (min)	This parameter defines the minimum time in minutes between two consecutive transmissions of the trap indicating the number of packets that were dropped by the limiter since the previous trap (or since the time that the limit has been exceeded). The range is from 1 to 60 minutes.

2.19.1.4 User Filtering (AU Only)

User Filtering Option	The User Filtering Option disables or enables the User Filtering feature. The following options are available: ■ Disable: No filtering. ■ IP Protocol Only: Only IP Protocol packets pass. ■ User Defined Addresses Only: Only IP frames from/to IP addresses included in the User Filter Addresses list pass. ■ PPPoE Protocol Only: only PPPoE messages pass (Ethernet type 0x8863 and 0x8864).
Filter IP Address Ranges	The Filter IP Address Ranges table enables defining/updating up to 8 IP address ranges to/from which IP frames are to pass if the User Defined Addresses Only option is selected in the User Filtering Option parameter. IP filtering can be defined using a range that includes either a start and end address (example: 192.168.1.1 to 192.168.1.255), or a subnet using base address and a mask (example: 192.168.1.1 mask 255.255.255.0). The table contains the following columns: ■ IP Start: The start IP address for the specified range or the base IP address for the subnet ■ IP End/Net Mask: The end IP address for the specified range or the net mask for the subnet ■ Range/Subnet: Specifies the type of definition Use the following buttons to edit the table: ■ Add: Adds a new filter IP address range ■ Revert: Removes a newly added filter IP address range ■ Delete: Deletes a preexisting filter IP address range ■ Delete All: Deletes all filter IP address ranges
DHCP Unicast Override Filter	When user filtering is activated, unicast DHCP messages are filtered out; therefore the unit cannot communicate with the DHCP server. The DHCP Unicast Override Filter option enables users to overcome this problem. When enabled, unicast DHCP messages pass, overriding the user filtering mechanism.

2.19.1.5 Ethernet Frame Size (BNB 10)

This option configures the maximum Ethernet fame size to either 1600 or 2000 bytes. The 2000 bytes maximal frame size will be enabled only if it is set as such at both ends of the link. If one of the units (BU or RB) uses 1600 bytes frames, the link will use 1600 bytes frames as well.

Ethernet Frame Size	■ 2000 - Sets the Ethernet frame size to 2000 bytes ■ 1600 - Sets the Ethernet frame size to 1600 bytes The default value is 1600.
Running Ethernet Frame Size	Displays the Ethernet frame size that is currently in use.

2.19.2 The Bridging Page VLAN Tab

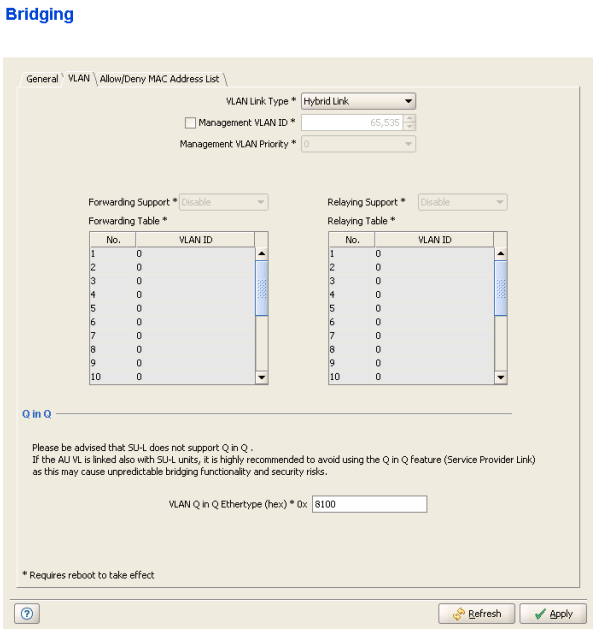


Figure 2-37: Bridging Page VLAN Tab - AU

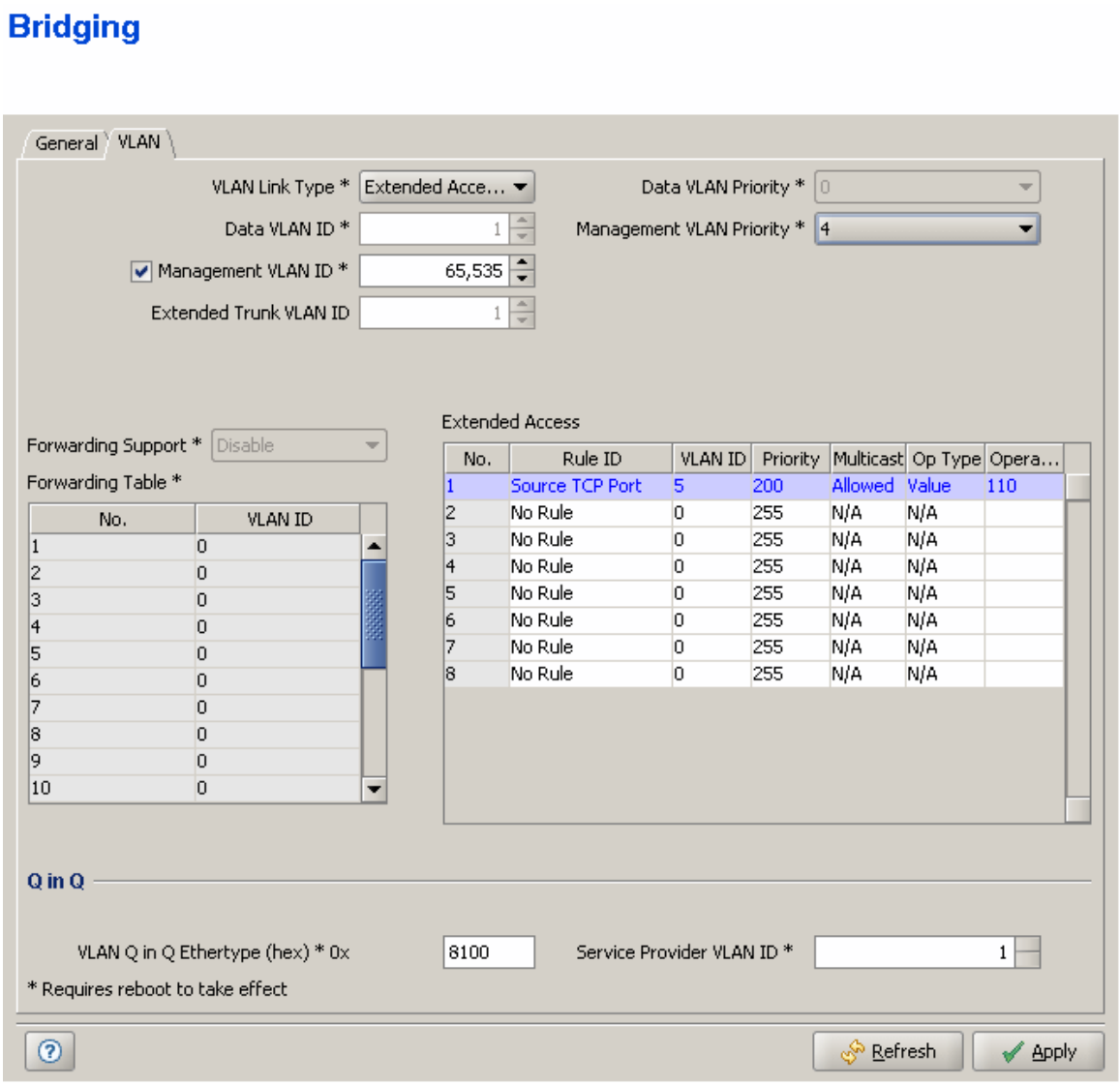


Figure 2-38: Bridging Page VLAN Tab - SU

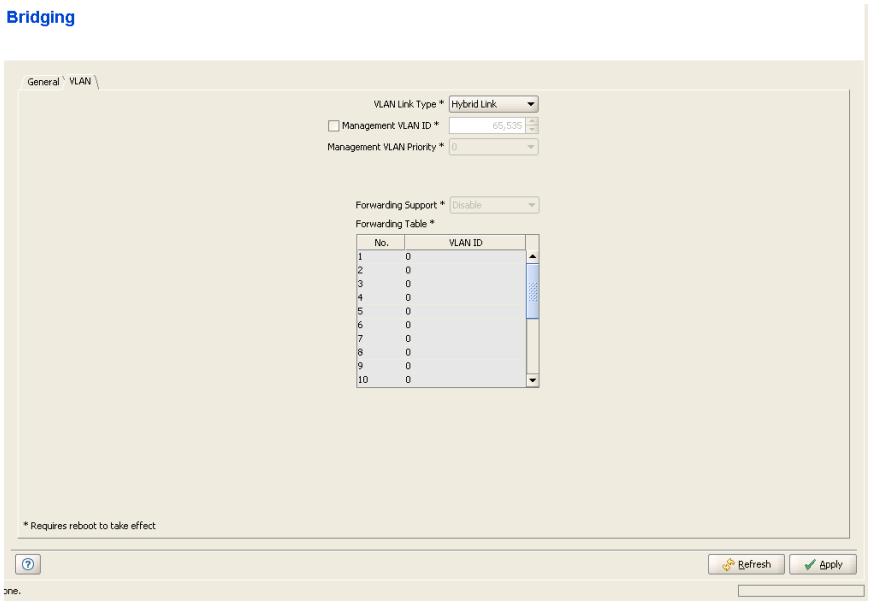


Figure 2-39: Bridging Page VLAN Tab - BU

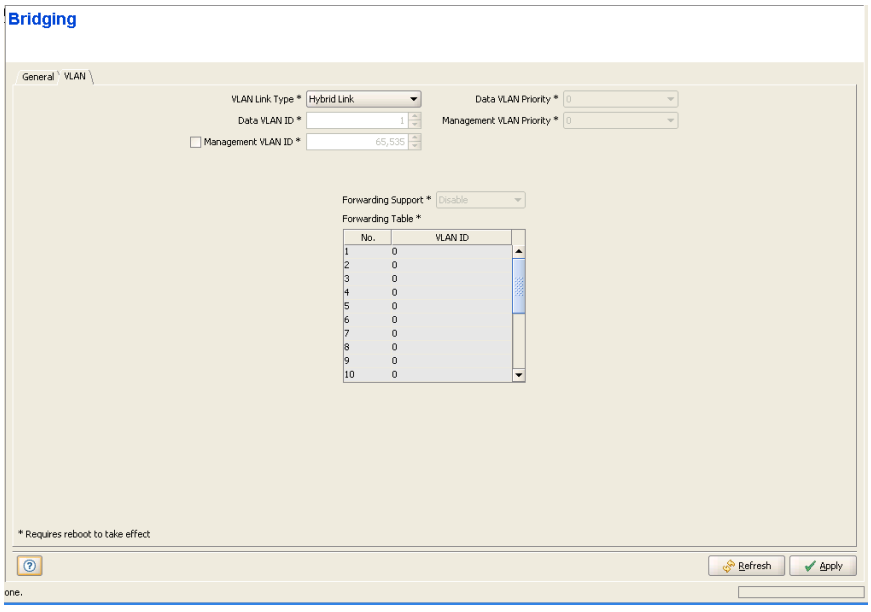


Figure 2-40: Bridging Page VLAN Tab - RB

The Bridging Page VLAN tab includes the following components:

VLAN Link Type	This parameter enables defining the functionality of the VLAN aware capability of the unit. The available options are: ■ Hybrid Link ■ Trunk Link ■ Access Link (SU and RB Only) ■ Service Provider Link (AU and SU Only) ■ Extended Access Link (SU only) ■ Extended Trunk Link (SU only)
Data VLAN ID	Applicable only for SU and RB. The Data VLAN ID is applicable only when the VLAN Link Type parameter is set to Access Link. It enables defining the VLAN ID for data frames, which identifies the VLAN to which the unit belongs. Valid values range from 1 to 4094.
Management VLAN ID	This parameter enables defining the VLAN ID for management frames, which identifies remote stations for management purposes. This applies to all management applications using protocols such as SNMP, TFTP, ICMP (ping), DHCP and Telnet. All servers/stations using these protocols must tag the management frames sent to the unit with the value of the VLAN ID-Management parameter. Valid values: 1 to 4094 or 65,535 (no VLAN). Check the checkbox to enable configuring a value other than 65,535. Uncheck it to force the value 65,535 (no VLAN).
Extended Trunk VLAN ID	Applicable only for SU. This link type extends the Trunk mode's functionality by allowing it to also work with VLAN untagged frames instead of dropping them. All untagged frames received via Ethernet will be tagged with a predefined VLAN ID and routed to WLAN. Consequently, tagged frames received over WLAN that match this VLAN ID will be untagged before being routed to Ethernet. The exact behavior is shown in Table 2-1
Data VLAN Priority	Applicable only for SU and RB. The Data VLAN Priority is applicable for Access Links only. It enables configuring the value of the VLAN Priority field for data frames transmitted to the wireless link. This parameter only impacts the way other VLAN aware devices handle the packet. Valid values range from 0 to 7.

Management VLAN Priority	The Management VLAN Priority enables defining the value of the VLAN Priority field for management frames in units with Management VLAN ID that is other than 65,535 (none). This parameter only impacts the way other VLAN aware devices handle the packet. Valid values range from 0 to 7.
Forwarding Support	The VLAN Forwarding Support feature is applicable only for Trunk Links and Service Provider Links. If the Link Type is defined as either a Trunk Link or a Service Provider Link and the VLAN Forwarding Support is enabled, a data frame received with a VLAN ID (or a Service Provider VLAN ID) that is not included in the unit's VLAN Forwarding Table is discarded.
Forwarding Table	A table that can include up to 20 VLAN IDs. To add a VLAN ID, double-click on a VLAN ID cell with a zero (0) value, and enter the required value (1-4094). To remove a VLAN ID from the table, double click on the relevant cell and delete its contents (or enter 0). To replace a VLAN ID, double-click on the relevant cell and enter the new value. If the VLAN Forwarding Table is empty and the VLAN Forwarding Support is set to Enable, then all data frames are discarded. In an AU, If VLAN Relaying Support and VLAN Forwarding Support are both enabled, then all VLAN IDs in the Relaying Table must also be included in the Forwarding Table.
Extended Access Table	Applicable only for SU. The table allows users to define up to 8 different rules for applying VLAN and priority tags on Ethernet to WLAN traffic. Different rules may apply the same VLAN ID.

Rule ID (Inside Extended Access Table - SU only)	Defines the type of rule that is going to be applied: ■ **No Rule** - No rule is applied. Use this option to deactivate a rule that is currently in use. ■ **Source MAC Address** - The rule will be applied on frames with matching source MAC addresses. ■ **Destination MAC Address** - The rule will be applied on frames with matching destination MAC addresses. ■ **Source IP Address** - The rule will be applied on frames with matching source IP addresses. ■ **Destination IP Address** - The rule will be applied on frames with matching destination IP address. ■ **Source UDP Port** - The rule will be applied on UDP frames with matching source UDP ports. ■ **Destination UDP Port** - The rule will be applied on UDP frames with matching destination UDP ports. ■ **Source TCP Port** - The rule will be applied on TCP frames with matching source TCP ports. ■ **Destination TCP Port** - The rule will be applied on TCP frames with matching destination TCP ports. ■ **IP Protocol** - The rule will be applied on frames with matching IP protocols. ■ **Default** - This rule will be applied on frames that don't match any of the remaining rules. By default, each rule is populated with the **No Rule** setting. When a frame matches multiple rule types, the rule type that is highest in the list above (except for the No Rule type) will have precedence and any other matching rule will be ignored. For instance, a Source MAC Address rule will have precedence over a Destination MAC Address rule, which in turn will have precedence over a srcIp rule, etc. If there are multiple rules of the same type, the lower the rule number, the higher the precedence. For instance, Rule 1 will have precedence over Rule 2, which will have precedence over Rule 3, if rules 1, 2 and 3 have the same type.

VLAN ID (Inside Extended Access Table - SU only)	Defines the VLAN ID tag that is going to be applied to untagged frames in the Ethernet to WLAN traffic. Also, any incoming WLAN traffic tagged with this ID will be routed to Ethernet untagged. This parameter must be configured in order to save the rule. Valid values range from 1 to 4094. If no value is defined for this entry, 0 is returned.
Priority (Inside Extended Access Table - SU only)	Defines the priority tag that is going to be applied to untagged frames in the Ethernet to WLAN traffic. This parameter impacts the way other VLAN aware devices handle the frame. This parameter must be configured in order to save the rule. Valid values range from 0 to 7. If no value is defined for this entry, 255 is returned.
Multicast (Inside Extended Access Table - SU only)	Defines whether multicast frames are filtered when applying the rule. The available options are: ■ **Not Allowed** - Multicast frames not allowed ■ **Allowed** - Multicast frames allowed This setting applies only to Layer 2 multicast frames. It does not apply to Layer 2 broadcast frames or to Layer 3 broadcast or multicast frames. For more information on this topic, see Table 2-2.
Op Type (Inside Extended Access Table - SU only)	Defines the type of data that is defined in the VLAN Rule Data field. The available options are: ■ **Value** - A single value is entered ■ **Range** - A range of consecutive values is entered by typing the first and the last value in the range separated by a space or by a minus symbol (-). ■ **Mask** - An address - mask pair of entries is typed separated by a space or comma symbol (,). The subnet defined in this manner will be the applicable domain for the rule. ■ **Enumeration** - A set of values is typed separated by comma symbols (,). The default setting is Value.

Operands (Inside Extended Access Table - SU only)	Defines the actual value(s) of the parameters defined in the Rule Id and Op Type columns. Depending on the type of parameter, the following rules apply: ■ **MAC addresses** - The following types of inputs are supported: Value, Range, Mask MAC addresses must be typed in hexadecimal format. All symbols must be adjacent to each other. No separators are allowed inside the address representation. The default setting is 00-00-00-00-00-00. ■ **IP addresses** - The following types of inputs are supported: Value, Range, Mask The default setting is 0.0.0.0. ■ **Port numbers** - The following types of inputs are supported: Value, Range, Enumeration The default setting is 0. ■ **IP protocols** - The following types of inputs are supported: Value, Enumeration Each IP protocol is indicated by its protocol number assigned in accordance with the IANA Allocation Guidelines for the Protocol Field (RFC 5237)
Relaying Support	Applicable only for AU. The VLAN Relaying Support feature is applicable only for Trunk Links and Service Provider Links. If the Link Type is defined as either a Trunk Link or a Service Provider Link and the VLAN Relaying Support option is enabled, a frame relayed from the wireless link, which is a frame received from the wireless link that should be transmitted back through the wireless link, with a VLAN ID (or a Service Provider VLAN ID) that is not included in the unit's VLAN Relaying Table, is discarded. If VLAN Forwarding Support is also enabled, it is necessary to configure all the VLAN IDs in the Relaying Table also in the Forwarding Table to enable the relaying operation.
Relaying Table	Applicable only for AU. A table that can include up to 20 VLAN IDs. To add a VLAN ID, double-click on a VLAN ID cell with a zero (0) value, and enter the required value (1-4094). To remove a VLAN ID from the table, double click on the relevant cell and delete its contents (or enter 0). To replace a VLAN ID, double-click on the relevant cell and enter the new value. If the VLAN Relaying Table is empty and the VLAN Relaying Support is set to Enable, then all data frames are discarded. If VLAN Relaying Support and VLAN Forwarding Support are both enabled, then all VLAN IDs in the Relaying Table must also be included in the Forwarding Table.

VLAN Q in Q Ethertype (Hex)	Applicably only for AU and SU. This parameter sets the Ethertype of the Service Provider tag, and is applicable only for Service Provider Links. The valid values are from 8100 to 9000, 9100 and 9200 (Hex).
Service Provider VLAN ID.	Applicable only for SU. The Service Provider VLAN ID is applicable only when the VLAN Link Type parameter is set to Service Provider Link. It enables defining the Service Provider VLAN ID for data frames, which identifies the Service Provider VLAN to which the unit belongs. The range is 1 to 4094.

Table 2-1: Extended Trunk Frame Routing

Incoming Frame Type	Wireless to Ethernet Traffic	Ethernet to Wireless Traffic
Untagged	Drop	Pass with native VLAN ID
Tagged with native VLAN ID	Pass as untagged	Drop
Tagged with other VLAN ID	Pass	Pass

Table 2-2 describes how Layer 2 broadcast and multicast frames are handled and how the VLAN Multicast Allowed setting affects this behavior.

Table 2-2: Layer 2 Broadcast/Multicast Frames' Behavior

Rule Match		Broadcast Frames	Multicast Frames
The frame matches at least one rule		Frame is handled according to the rule with the highest precedence	
No match	Multicast Enabled	Frame is multiplied and tagged with each distinct VLAN ID that was specified in the rules.	Frame is multiplied and tagged with each distinct VLAN ID that was specified in the rules.
	Multicast Disabled		Frame is dropped

NOTE

An Ethernet frame is considered multicast if the LSB (Least Significant Bit) of the first byte of its MAC address has the value 1.

2.19.3 The Bridging Page Allow/Deny MAC Address List Tab (AU Only)

The Allow/Deny MAC Address List feature enables defining a list of up to 100 MAC addresses as belonging to devices that are either granted or denied service.

When the list is defined as a Deny List, the AU will not provide services to a unit whose MAC address is included in the list, enabling to disconnect units in cases such as when the user had fraudulently succeeded to configure the unit to values different from the subscription plan. When the list is defined as an Allow List, the AU will provide services only to units with a MAC address that is included in the list.

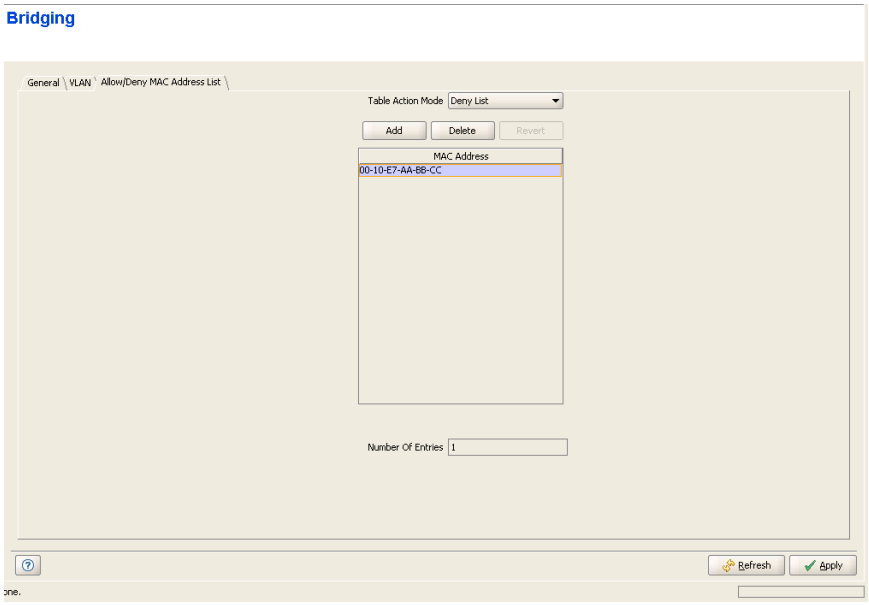


Figure 2-41: Bridging Page Allow/Deny MAC Address List Tab

The Allow/Deny MAC Address tab includes the following components:

Table Action Mode	This parameters enables selection between Deny List and Allow List.

MAC Address Entries	A table that can include up to 100 MAC addresses. To add a MAC address to the list, click on the **Add** button: a new line is added to the table, colored light blue. Mark the line with the cursor and enter the MAC address, using the format xx-xx-xx-xx-xx-xx (the color of the line will change to white). To add another MAC address, repeat the process. The color of previously entered addresses will turn green. If you regret, select the relevant entries and click on the **Revert** button. To remove one or more addresses from the list, select the relevant entries and click on the **Delete** button. The color of the entries to be deleted will change to red. If you regret, select the relevant entries and click on the **Revert** button. Actual changes in the device will take place only after clicking on the **Apply** button.
Number Of Entries	A read-only the display of the current number of MAC Addresses in the table. This is the actual number entries in the device.

2.20 Service Parameters Page

The Service Parameters Page comprises the following tabs:

- The Service Parameters Page General Tab
- The Service Parameters Page Traffic Priority Tab
- The Service Parameters Page DRAP Parameters Tab (AU Only)
- The Service Parameters Page WLP (Wireless Link Prioritization) Tab (AU and BU-B100 Only)

2.20.1 The Service Parameters Page General Tab

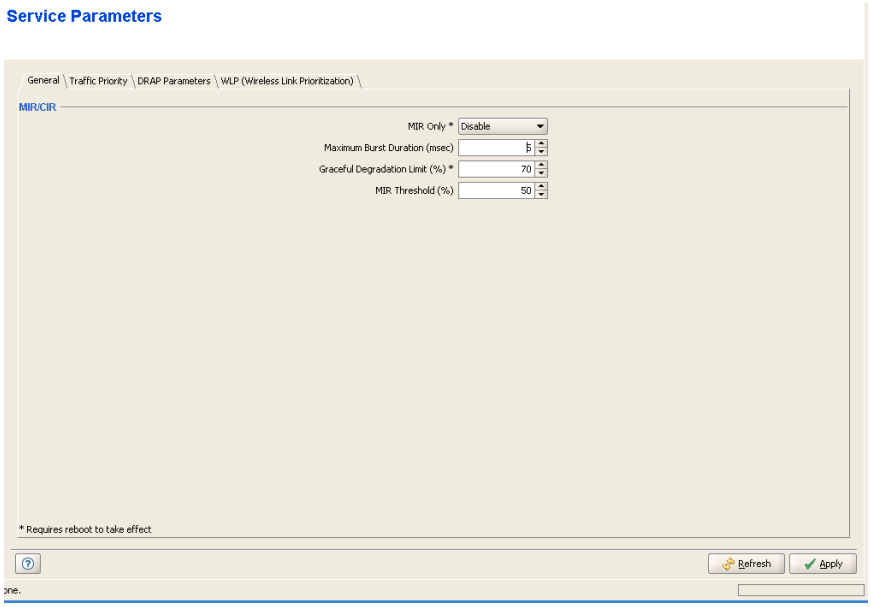


Figure 2-42: Service Parameters Page General Tab - AU

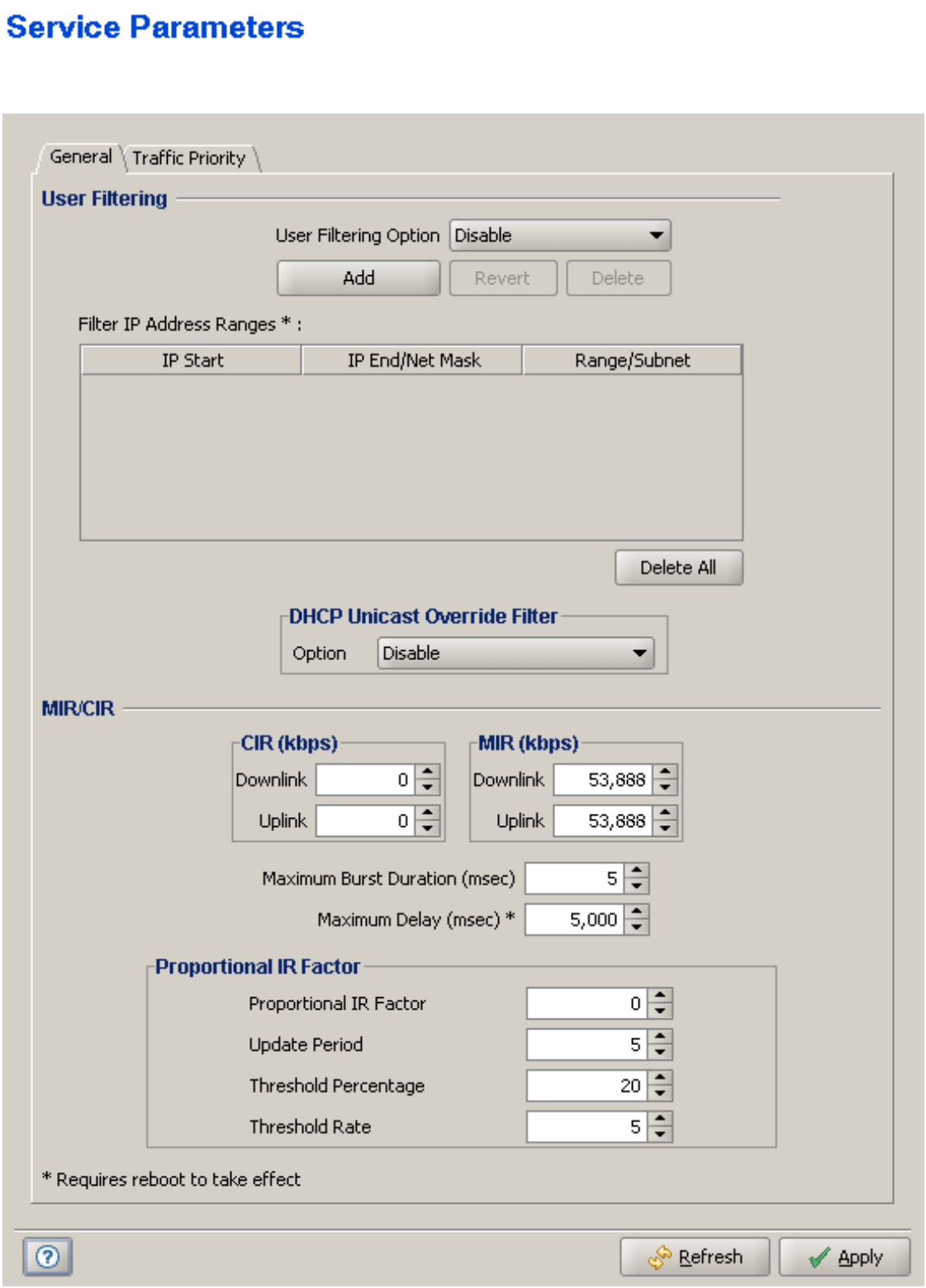


Figure 2-43: Service Parameters Page General Tab - SU

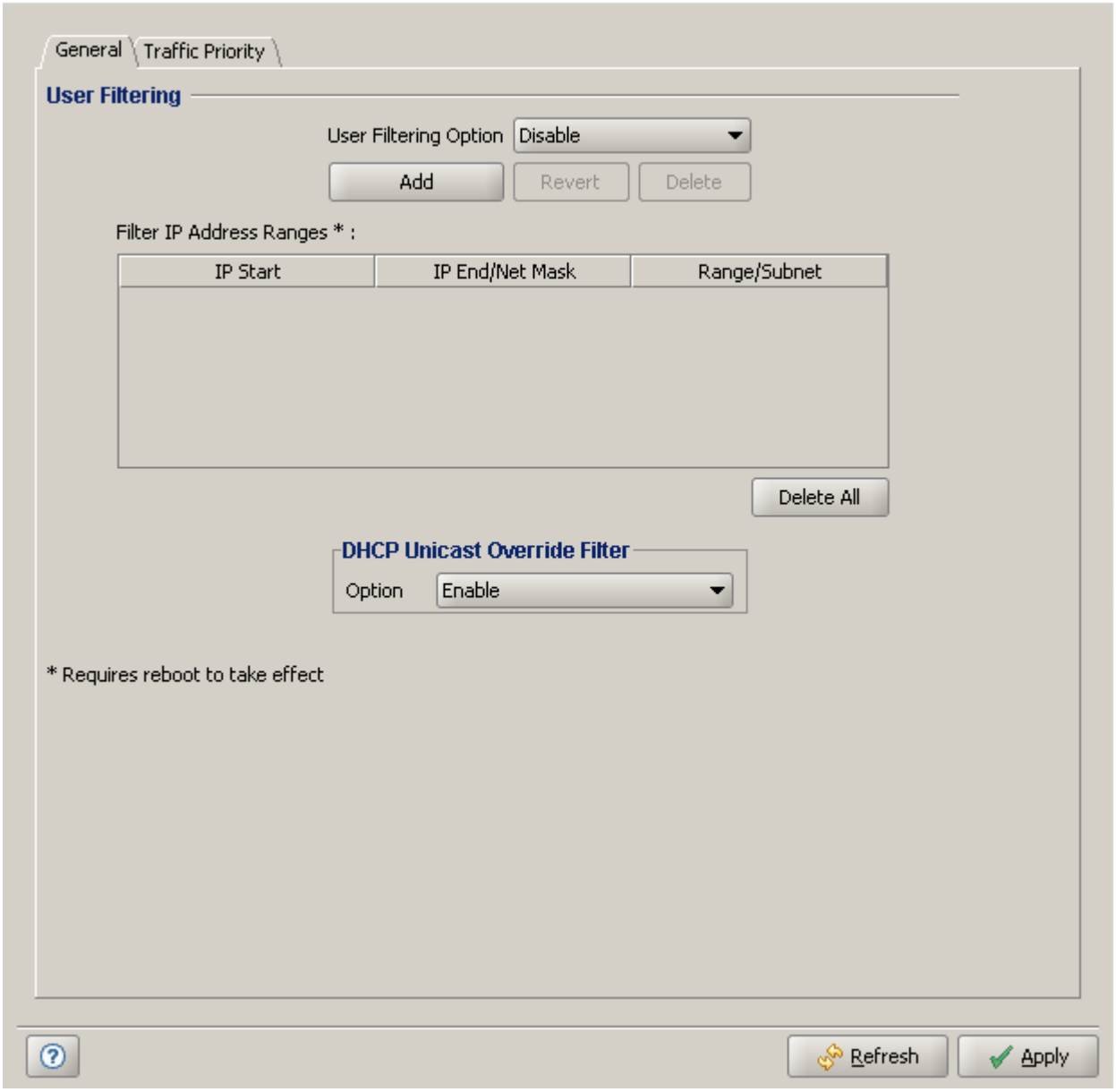


Figure 2-44: Service Parameters Page General Tab - RB

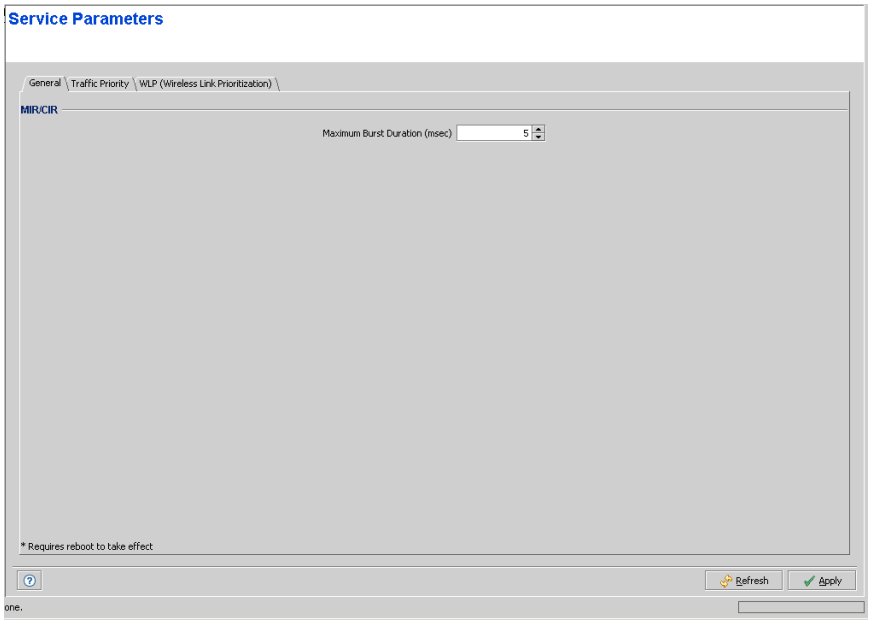


Figure 2-45: Service Parameters Page General Tab - BU

The Service Parameters Page General tab includes the following sections:

- User Filtering (SU and RB Only)
- MIR/CIR in BreezeACCESS
- MIR/CIR in BreezeNET B

2.20.1.1 User Filtering (SU and RB Only)

The User Filtering section includes the following components:

User Filtering Option	The User Filtering Option disables or enables the User Filtering feature. The following options are available: ■ Disable - no filtering. ■ IP Only - only IP Protocol packets pass. ■ User Defined Address Only - only IP frames from/to IP addresses included in the Filter IP Address Ranges table pass. ■ PPPoE Only - only PPPoE messages pass (Ethernet type 0x8863 and 0x8864).

Filter IP Address Ranges	A table of up to 8 IP address ranges. These are the addresses to/from which IP frames are to pass if the User Defined Address Only option is selected in the User Filtering Option parameter. The Range/Subnet column enables selecting whether the entry is defined as a Range (Start and End Addresses) or as a Subnet (Start Address and Net Mask). Double-click on a Range/Subnet cell to open a drop-doen menu that enables selection between the two options. To add a range/subnet to the list, click on the **Add** button: a new line is added to the table, colored light blue. Define the desired Range/Subnet option, enter the Start IP and the End IP /Net Mask (the color of the line will change to white). To add another range, repeat the process. The color of previously entered addresses will turn green. If you regret, select the relevant entries and click on the **Revert** button. To remove one or more addresses from the list, select the relevant entries and click on the **Delete** button. The color of the entries to be deleted will change to red. If you regret, select the relevant entries and click on the **Revert** button. To delete all entries, click on the **Delete All** button. To change an entry, select the necessary cell(s) and edit its contents. Actual changes in the device will take place only after clicking on the **Apply** button.
DHCP Unicast Override Filter	When the User Filtering Option is activated (other than Disable), unicast DHCP messages are filtered out; therefore the unit cannot communicate with the DHCP server. The DHCP Unicast Override Filter option enables to overcome this problem. When enabled, unicast DHCP messages pass, overriding the user filtering mechanism.

2.20.1.2 MIR/CIR in BreezeACCESS

The CIR (Committed Information Rate) specifies the minimum data rate guaranteed to the relevant subscriber. The MIR (Maximum Information Rate) value specifies the maximum data rate available for burst transmissions, provided such bandwidth is available.

Under normal conditions, the actual Information Rate (IR) is between the applicable CIR and MIR values, based on the formula IR=CIR+k(MIR - CIR).

In this formula k is between 0 and 1 and is determined dynamically by the AU according to overall demand in the cell and the prevailing conditions that influence the performance of the wireless link. In some situations the minimum

rate (CIR) cannot be provided. This may result from high demand and poor wireless link conditions and/or high demand in over-subscribed cells. When this occurs, the actual information rate is lower than the CIR, and IR = (1+k)*CIR, where k < 0. The k value to be used in the cell is advertised by the AU in every beacon, and it is changed every second based on comparison of the traffic during the last one second interval with the traffic during the previous one second interval. The advertised k value is used by each SU to calculate the amount of data that can be transmitted. This algorithm ensures fair resource distribution among SUs, based on their configured CIR/MIR values.

The MIR Threshold Percent parameter determines the level of wireless link utilization above which the MIR/CIR mechanism is activated. A Threshold of 0% allows CIR only. A threshold of 100% means MIR only. For other values, if the actual wireless link utilization is below the threshold, k is set to 1. As the link utilization increases above the threshold, k is decreased as described above.

The simple solution for managing the information rate in such cases can result in an unfair allocation of resources, as subscribers with a higher CIR actually receive an IR lower than the CIR designated for subscribers in a lower CIR bracket.

A special algorithm for graceful degradation is incorporated into the AU, ensuring that the degradation of performance for each individual Subscriber Unit is proportional to its CIR.

The MIR/CIR algorithm uses buffers to control the flow of data. To balance the performance over time, a special Burst Duration algorithm is employed to enable higher transmission rates after a period of inactivity. If no data intended for a certain SU is received from the Ethernet port during the last N seconds, the unit is allowed to transmit to this destination N times its allowed IR value without any delay. For example, if the Burst Duration is set to 0.5 second (or more), then after a period of inactivity of 0.5 seconds up to 2048 Kbits x 0.5 = 1024 Kbits may be transmitted to a unit whose applicable MIR value is 2048 Kbps, without any delay (provided overall conditions in the wireless link allow this burst).

The MIR/CIR section includes the following parameters:

MIR Only	Applicable only for AU. When the MIR Only Option is enabled, it forces the MIR/CIR algorithm to use MIR values only. The MIR/CIR algorithm determines the actual information rate for each of the supported SUs under changing conditions of demand, based on the configured CIR and MIR values. When the MIR Only Option is enabled, the MIR/CIR algorithm is overridden and forced to operate with MIR values only. For example, the AU attempts to enable all SUs to transmit/receive information at the specified MIR value. When enabled, the graceful degradation algorithm, which is a part of the CIR/MIR algorithm, is also disabled.
Maximum Burst Duration (msec)	Sets the maximum time for accumulating burst transmission rights according to the Burst Duration algorithm. Available values range from 0 to 2000 (milliseconds).
Graceful Degradation Limit (%)	Applicable only for AU. Sets the limit on using the graceful degradation algorithm. In cases of over demand, the performance of all SUs is degraded proportionally to their CIR (IR=(100%-k%) x CIR). The graceful degradation algorithm is used as long as k is not higher than K, where K is the Graceful Degradation Limit. Beyond this point the simple "brute force" algorithm is used. The Graceful Degradation Limit should be raised in proportion to the demand in the cell. The higher the expected demand in a cell, the higher the value of the Graceful Degradation Limit. Higher demand can be expected in cases of significant over-subscription and/or in deployments where a high number of subscribers are in locations without proper communication with the AU at the highest data rate. The available values range from 0 to 70 (%).
MIR Threshold (%)	Applicable only for AU. Sets the threshold of wireless link utilization above which the MIR/CIR algorithm is activated. The range is from 0 to 100 (%).
CIR Downlink (Kbps)	Applicable only for SU. The Committed Information Rate of the downlink from the AU to the SU. The CIR value cannot be higher than the corresponding MIR value. Available values are shown below. Valid values are multiples of 128 (N*128).
CIR Uplink (Kbps)	Applicable only for SU. The Committed Information Rate of the uplink from the SU to the AU. The CIR value cannot be higher than the corresponding MIR value. Available values are shown below. Valid values are multiples of 128 (N*128).

MIR Downlink (Kbps)	Applicable only for SU. The Maximum Information Rate of the downlink from the AU to the SU. The MIR value cannot be lower than the corresponding CIR value. Available values are shown below. Valid values are multiples of 128 (N*128).
MIR Uplink (Kbps)	Applicable only for SU. The Maximum Information Rate of the uplink from the SU to the AU. The MIR value cannot be lower than the corresponding CIR value. Available values are shown below. Valid values are multiples of 128 (N*128).
Maximum Delay (msec)	Applicable only for SU. Sets the maximum permitted delay in the buffers system. As certain applications are very sensitive to delay, if relatively high delays are permitted, these applications may suffer from poor performance due to data accumulation in the buffers from other applications, such as FTP. The Maximum Delay parameter limits the number of available buffers. Data that is delayed more than the permitted maximum delay is discarded. If the SU supports applications that are very sensitive to delay, the value of the Maximum Delay should be decreased. Valid values range from 300 to 10000 (milliseconds).

MIR and CIR Ranges:

Unit Type	MIR (Kbps)		CIR (Kbps)	
	Uplink	**Downlink**	**Uplink**	**Downlink**
SU-3	128-2,048	128-3,072	0-2,048	0-2,048
SU-6	128-4,096	128-6,016	0-4,096	0-6,016
SU-8	128-13,440	128-13,440	0-11,264	0-11,264
SU-54	128-53,888	128-53,888	0-45,056	0-45,056
SU-I	128-4,096	128-6,016	0-4,096	0-6,016
SU-V	128-8,064	128-2,048	0-8,064	0-2,048

2.20.1.3 MIR/CIR in BreezeNET B

The Maximum Information Rate (MIR) value specifies the maximum data rate available for burst transmissions, enabling to limit it to a value lower than the maximum supported by the unit. The MIR values indicate the achievable net throughput for FTP applications.

The MIR algorithm uses buffers to control the flow of data. To balance the performance over time, a special Burst Duration algorithm is employed to enable higher transmission rates after a period of inactivity. If no data is received from

the Ethernet port during the last N seconds, the unit is allowed to transmit N times its allowed IR value without any delay. For example, if the Burst Duration is set to 0.5 second (or more), then after a period of inactivity of 0.5 seconds up to 2048 Kbits x 0.5 = 1024 Kbits may be transmitted to a unit whose applicable MIR value is 2048 Kbps, without any delay (provided overall conditions in the wireless link allow this burst).

The MIR/CIR section includes the following parameters:

MIR Downlink (Kbps)	Applicable only for RB. The Maximum Information Rate of the downlink from the BU to the RB. The MIR value cannot be lower than the corresponding CIR value. Available values are shown below. Valid values are multiples of 128 (N*128).
MIR Uplink (Kbps)	Applicable only for RB. The Maximum Information Rate of the uplink from the RB to the BU. The MIR value cannot be lower than the corresponding CIR value. Available values are shown below. Valid values are multiples of 128 (N*128).
Maximum Burst Duration (msec)	Sets the maximum time for accumulating burst transmission rights according to the Burst Duration algorithm. Available values range from 0 to 2000 (milliseconds).

MIR Ranges:

Unit Type	MIR Downlink/Uplink (Kbps)
RB-B10	128-4,092
RB-B14	128-6,912
RB-B28	128-22,016
RB-B100	128-107,904

2.20.1.4 Proportional IR Factor (SU Only)

When an SU operates at low modulations, the MIR values may become irrelevant. A device that, due to environment limitations, always transmits at lower modulations needs more time to reach the MIR values than devices that transmit at high modulations. In this situations, the MIR/CIR algorithm is not able to deliver an adequate level of fairness. The Proportional IR Factor (PIF) addresses this issue.

Using this factor, the MIR/CIR values used by the device will be adjusted. Depending on the average rate (modulation) used and the Proportional IR Factor,

the MIR/CIR values employed by the MIR algorithm will be calculated as an average.

The average rates (for uplink and downlink) are calculated periodically. If the difference between the current average rate and the previous average rate exceeds a predefined percentage (Threshold Percentage) from the configured rate and the current average rate is lower than a specific threshold (Threshold Rate), then the respective MIR/CIR values for uplink or downlink will be recalculated.

Since the used MIR/CIR values must be calculated for both uplink and downlink, there will be two values for MIR (Used Uplink MIR and Used Downlink MIR) and two values for CIR (Used Uplink CIR and Used Downlink CIR). If at least one of these four MIR/CIR values is updated, a reassociation is required in order to inform the AU about the new MIR/CIR values. After reassociation, both units (AU and SU) will work with synchronized values for MIR/CIR.

The following formula is used for calculating the applicable rates:

$$UsedRate = \frac{PIF \times AvgRate + (100 - IFF) \times ThrRate}{ThrRate \times 100} \times ConfiguredRate$$

Where:

UsedRate = Applicable uplink/downlink MIR or CIR

PIF = Proportional IR Factor

AvgRate = Average Rate

ConfiguredRate = Configured uplink/downlink MIR or CIR

ThrRate = Threshold Rate

The formula for the average rate is:

$$AvgRate = \frac{\sum_{i=1}^{8} F_i \times R_i}{\sum_{i=1}^{8} F_i}$$

Where

F_i = *Number of frames sent on modulation i*

R_i = *Rate in Mbps for modulation i*

Examples:

Table 2-3: Used Uplink MIR for Various PIF Values (Configured Uplink MIR = 54 Mbps)

Modulation	Average Rate (Mbps)	Uplink MIR (Mbps)	Used Uplink MIR (Mbps)				
			PIF=0	PIF=20	PIF=50	PIF=70	PIF=100
1	6	54	54	44.4	30	20.4	6
2	9	54	54	45	31.5	22.5	9
3	12	54	54	45.6	33	24.6	12
4	18	54	54	46.8	36	28.8	18
5	24	54	54	48	39	33	24
6	36	54	54	50.4	45	41.4	36
7	48	54	54	52.8	51	49.8	48
8	54	54	54	54	54	54	54

The following parameters are available for configuration:

Proportional IR Factor	Sets up the percentage for the Proportional IR Factor mechanism usage. The higher the value, the more weigth the PIF algorithm has in setting up the rates. Valid values range from 0 to 100 (%). The default value is 0 (%) (PIF is disabled).
Update Period	Sets up the duration (in minutes) between the periodical computation of MIR/CIR values used for uplink/downlink. Valid values range from 1 to 30 (minutes). The default value is 5 (minutes).
Threshold Percentage	The percentage of the average rate variation compared to the configured rate that, when exceeded, triggers (along with the Proportional IR Threshold Rate) the used rate adjustment. Valid values range from 0 to 100 (%). The default value is 20 (%).
Threshold Rate	If the transmission modulation falls below this level, and the Proportional IR Threshold Percentage conditions are met (see above), the rate adjustment is triggered. Valid values range from 1 to 8 (modulation). The default value is 5.

2.20.2 The Service Parameters Page Traffic Priority Tab

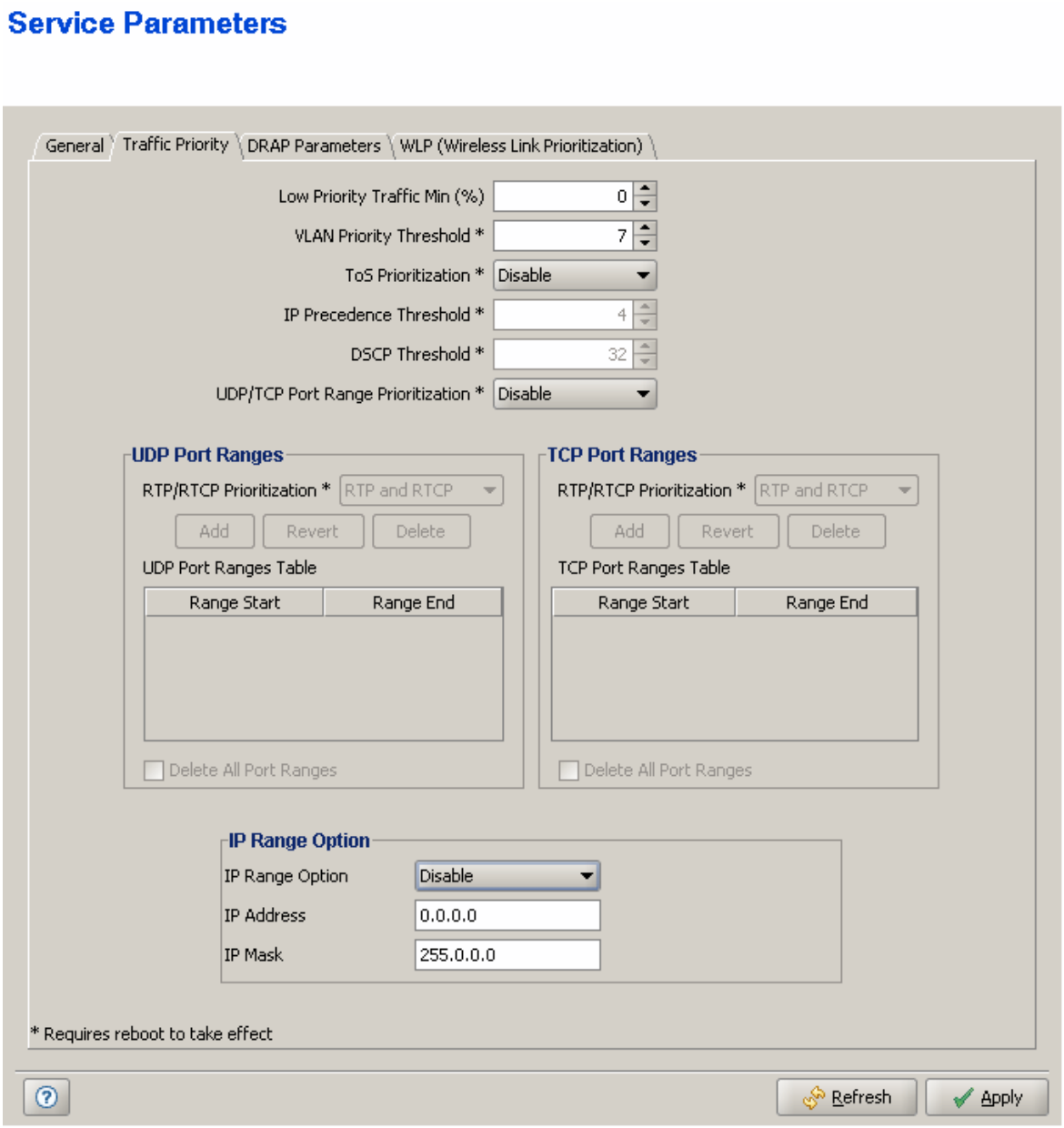


Figure 2-46: Service Parameters Page Traffic Priority Tab

Each packet that is received from the Ethernet port is placed in either the High or Low queue, according to the Traffic Priority parameters. When the MIR/CIR mechanism decides that a packet must be sent, the High priority queue will be checked first. If the High priority queue is not empty, the first element in the

queue is forwarded to the MIR/CIR mechanism. Packets from the Low priority queue will be forwarded only if the High queue is empty.

The prioritization of the packets is done using different classifiers:

- VLAN Priority
- ToS Priority: IP Precedence or DSCP
- UDP and/or TCP ports
- Source/destination IP address

Each one of these classifiers can be activated/deactivated. If more than one classifier is activated, the priority of each packet will be determined by the highest priority given to it by the active classifiers.

The Traffic Priority parameters enables activating/deactivating each of these classifiers, and configuring the applicable parameters for each classifier.

The Low Priority Traffic Min (%) parameter can be used to prevent starvation of low priority traffic by ensuring that a certain number of low priority packets is transmitted even at the expense of high priority traffic.

The Service Parameters Page Traffic Priority tab includes the following sections

- Traffic Priority Parameters
- UDP Port Ranges/TCP Port Ranges
- IP Range Option

2.20.2.1 Traffic Priority Parameters

The Traffic Priority Parameters section includes the following parameters:

Low Priority Traffic Min (%)	This parameter can be used to ensure that a a certain amount of low priority packets is transmitted even at the expense of high priority traffic. The mechanism guarantees a low priority traffic with a rate of (Low Priority Traffic Min) * RT /100, where RT symbolizes the allowed traffic rate. The high priority traffic will thus not be able to exceed (100-Low Priority Traffic Min) * RT/100. If the system receives high priority traffic at a rate higher than this figure, some high priority packets will be discarded. The range is between 0 and 100 (%).
VLAN Priority Threshold	The VLAN Priority Threshold is applicable for Trunk and Hybrid Links only. It enables defining the value of the VLAN Priority Threshold. If the VLAN Priority field in a tagged frame is higher than the value of the VLAN Priority Threshold parameter, the packet will be routed to the High queue. If the VLAN Priority field is lower than or equal to this value, the packet will be transferred to the Low queue (unless it is assigned a High priority by another classifier). Valid values range from 0 to 7. 7 (the default) means that all packets get a low priority (equivalent to disabling the VLAN-based classifier).
ToS Prioritization	The ToS Prioritization defines whether ToS-based prioritization is enabled or disabled. The following options are available: ■ Disable. ■ IP Precedence (prioritization based on the 3 IP Precedence bits in the IP header in accordance with RFC 791). ■ DSCP (prioritization based on the 6 Differentiated Services Code Point bits in accordance with RFC RFC2474).
IP Precedence Threshold	The IP Precedence Threshold parameter is applicable when the ToS Prioritization is set to IP Precedence. If the value of the 3 IP Precedence bits in the IP header is higher than this threshold, the packet is routed to the High queue. If the value is lower than or equal to this threshold, the packet will be transferred to the Low queue (unless it is assigned a High priority by another classifier). Valid values range from 0 to 7.
DSCP Threshold	The DSCP Threshold parameter is applicable when the ToS Prioritization is set to DSCP. If the value of the 6 DSCP bits in the IP header is higher than this threshold, the packet is routed to the High queue. If the value is lower than or equal to this threshold, the packet will be routed to the Low queue (unless it is assigned a High priority by another classifier). Valid values range from 0 to 63.

UDP/TCP Port Range Prioritization	The UDP/TCP Port Ranges Prioritization defines whether port ranges based prioritization is enabled or disabled. The following options are available: ■ Disable ■ UDP only ■ TCP Only ■ UDP and TCP

2.20.2.2 UDP Port Ranges/TCP Port Ranges

The UDP/TCP Port Ranges sections enables managing port ranges to be used as priority classifiers when the UDP/TCP Port Ranges Prioritization Option is set to enable prioritization based on the applicable port type. All packets whose destination is included in the list will be routed to the High queue. All other packets will be routed to the Low queue (unless they were assigned a High priority by another classifier).

The UDP/TCP Port Ranges sections include the following components:

RTP/RTPC Prioritization	Voice over IP is transported using Real Time Protocol (RTP). The Real Time Control Protocol (RTCP) is used to control the RTP. When an application uses RTP/RTCP, it chooses for destination ports consecutive numbers: RTP port is always an even number, and the port with the odd number following it will be assigned to RTCP. The available options are: ■ RTP and RTCP ■ RTP Only If the administrator selects to prioritize only the RTP packets, then all the packets with an odd numbered destination port will always have Low priority. The packets with an even number for destination port will receive High priority, if the port number is included in the specified ranges. If the administrator selects to prioritize both RTP and RTCP packets, then all packets whose destination port number is included is in the specified ranges will receive High priority.

UDP/TCP Port Ranges Tables	Each table can include up to 64 entries. To add a range to the list, click on the **Add** button: a new line is added to the table, colored light blue. Enter the start and end port numbers in the applicable cells (to enter a discrete port number, enter it a a Range Start). To add another range, repeat the process. The color of previously entered addresses will turn green. If you regret, select the relevant entries and click on the **Revert** button. To remove one or more ranges from the list, select the relevant entries and click on the **Delete** button. The color of the entries to be deleted will change to red. If you regret, select the relevant entries and click on the **Revert** button. To change an entry, select the necessary cell(s) and edit its contents. To delete all entries, check the **Delete All Port Range** checkbox. Actual changes in the device will take place only after clicking on the **Apply** button.

2.20.2.3 IP Range Option

The IP Range Option allows prioritization based on the frame's source and/or destination IP address. Frames with matching IPs are allocated to the High Priority queue, while the rest of the frames are allocated to the Low Priority queue.

IP Range Option	This option sets up the type of IP prioritization employed: ■ **Disable**: The IP prioritization is disabled. ■ **IP Source**: Frames with matching source IP addresses will be allocated to the High Priority queue. ■ **IP Destination**: Frames with matching destination IP addresses will be allocated to the High Priority queue. ■ **IP Source or Destination**: Frames with either source or destination IP addresses within the IP range will be allocated to the High Priority queue.
IP Address	This option defines the base IP address which, in conjunction with the range mask, defines the IP range used for prioritization. The default value is 0.0.0.0.
IP Mask	This option defines the range mask which, in conjunction with the base IP address, defines the IP range used for prioritization. The default value is 255.0.0.0.

2.20.3 The Service Parameters Page DRAP Parameters Tab (AU Only)

DRAP (Dynamic Resources Allocation Protocol is a protocol that can be used by the AU to communicate with Voice and Networking Gateways connected to SUs served by it, enabling identification of these Gateways. It also enables managing voice calls made by Voice Gateways (VG).

The AU keeps track of all current voice calls and, upon receiving from a Voice Gateway a request for a new call, compares the current number of calls to the maximum allowed number. If the maximum allowed number has been reached, the AU will not confirm the request.

The DRAP feature is applicable only for gateways that support DRAP.

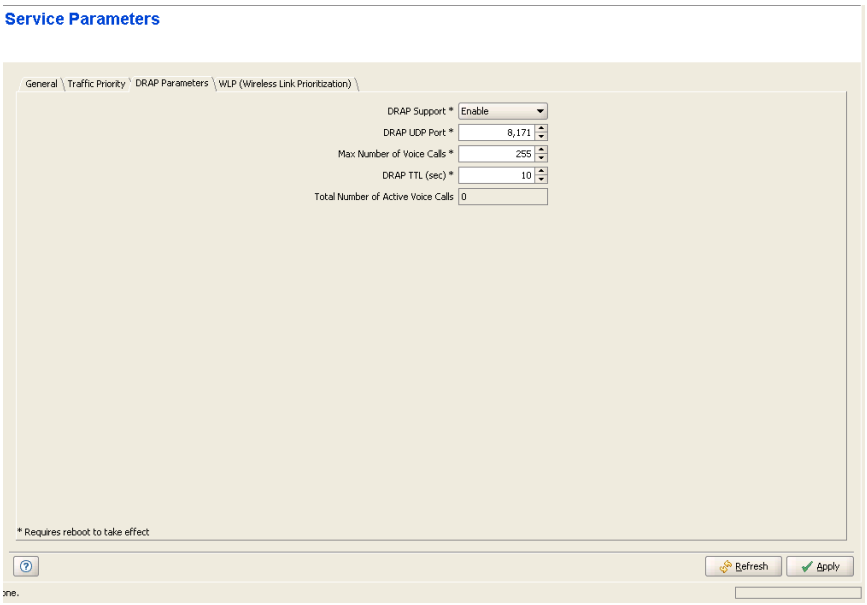


Figure 2-47: Service Parameters Page DRAP Tab

The Service Parameters Page DRAP tab includes the following parameters:

DRAP Support	The DRAP Support option enables or disables the DRAP feature.
DRAP UDP Port	The UDP Port parameter defines the UDP port used by the DRAP protocol. The range is from 8000 to 8200.

Max Number of Voice Calls	The Max Number of Voice Calls parameter sets the maximum number of active calls that may be supported by the AU. The range is between 0 and 255.
DRAP TTL (sec)	The DRAP TTL parameter sets the time between two consecutive Allocation Requests from the Gateways. The Allocation requests are used to identify the existence of an active Gateway. In Voice Gateways they also include information about the current number of voice calls and requests for new calls. The range is between 1 and 255 (seconds).
Total Number of Active Voice Calls	A read-only display of the current total number of active voice calls in the AU.

2.20.4 The Service Parameters Page WLP (Wireless Link Prioritization) Tab (AU and BU-B100 Only)

NOTE

The Wireless Link Prioritization feature is a licensed feature and is available in BU-B100 units. It is also available in AUs with the suitable Feature License (not applicable for AUS).

To better support delay-sensitive and other high-priority traffic, a set of Wireless Link Prioritization parameters enables configuring parameters that affect the processes of gaining access to the wireless media and of transmitting high/low priority packets.

Under regular conditions, AIFS is configured to two time slots. To support prioritization in the wireless link, we can configure a higher AIFS for low priority traffic (AIFS of two time slots will always be used for high priority traffic as well as AU's transmissions of broadcasts/multicasts and beacons). This will give advantage to units that need to transmit high priority traffic (depending also on the configured values for the Contention Window parameters).

Other parameters related to transmission to the wireless media that can be configured separately for high/low priority packets are the Number of Hardware Retries and Burst Interval.

Typically, a lower value of Number of Hardware Retries should be configured for traffic such as VoIP, which on the one hand is sensitive to delays and on the other hand is less sensitive to missing packets than data traffic.

The Burst Interval, which defines the maximum duration of a burst, should be set to a lower value for delay sensitive traffic. Typically the Burst Interval of the AU should be set to higher value than that of the SUs, because of the higher number of packets that should be transmitted by the AU.

When the Wireless Link Prioritization feature is enabled, the following Performance parameters are not applicable:

- AIFS
- Number of Hardware Retries
- Burst Mode Option
- Burst Interval

When an SU with a SW version below 4.0 tries to associate with an AU that has the Wireless Link Prioritization feature enable, the AU will generate a trap that will include information about this SU. In this way the system administrator can be alerted that the SU should be upgraded. This is necessary because otherwise an SU that does not support the Wireless Link Prioritization feature will send all the traffic as high priority.

NOTE

Verify that all SUs served by an AU with the Wireless Link Prioritization Option enabled use a SW version that supports this feature (SW version 4.0 and higher). Otherwise, overall performance and quality of service in the cell may be reduced since all data from an SU with SW version below 4.0 will be sent with high priority.

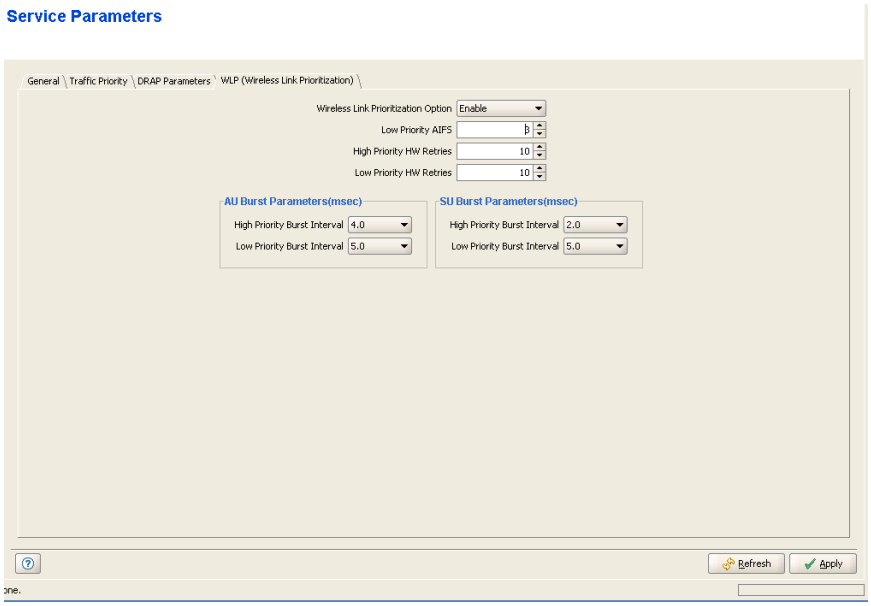


Figure 2-48: Service Parameters Page WLP Tab

The Service Parameters Page WLP (Wireless Link Prioritization) tab includes the following sections:

- General WLP Parameters
- AU Burst Parameters/BU Burst Parameters
- SU Burst Parameters/RB Burst Parameters

2.20.4.1 General WLP Parameters

Wireless Link Prioritization Option	This parameter enables or disables the Wireless Link Prioritization feature.
Low Priority AIFS	The Low Priority AIFS defines the AIFS number of time slots that will be used by the AU/BU and the SUs/RB served by it for low priority traffic. The range is from 3 to 50 (time slots).
High Priority HW Retries	This parameter defines the maximum number of times that an unacknowledged high priority unicast packet can be retransmitted. This is the value that will be used by the AU/BU and by the SUs/RB served with it. The range is from 1 to 14 times.

Low Priority HW Retries	This parameter defines the maximum number of times that an unacknowledged low priority unicast packet can be retransmitted. This is the value that will be used by the AU/BU and by the SUs/RB served with it. The range is from 1 to 14 times.

2.20.4.2 AU Burst Parameters/BU Burst Parameters

High Priority Burst Interval	This parameterdefines the maximum duration of a burst that can be made by the AU/BU for high priority packets. The range is from 0.25 to 10 milliseconds in steps of 0.25 milliseconds, or 0 to disable bursts for high priority packets.
Low Priority Burst Interval	This parameterdefines the maximum duration of a burst that can be made by the AU/BU for low priority packets. The range is from 0.25 to 10 milliseconds in steps of 0.25 milliseconds, or 0 to disable bursts for high priority packets.

2.20.4.3 SU Burst Parameters/RB Burst Parameters

High Priority Burst Interval	This parameterdefines the maximum duration of a burst that can be made by an SU/RB for high priority packets. The range is from 0.25 to 10 milliseconds in steps of 0.25 milliseconds, or 0 to disable bursts for high priority packets.
Low Priority Burst Interval	This parameterdefines the maximum duration of a burst that can be made by an SU/RB for low priority packets. The range is from 0.25 to 10 milliseconds in steps of 0.25 milliseconds, or 0 to disable bursts for high priority packets.

2.21 MAC Pin-Point Page (AU and BU Only)

The MAC Pin-Point feature enables to identify the unit through which a specified Ethernet station is connected to the wireless link.

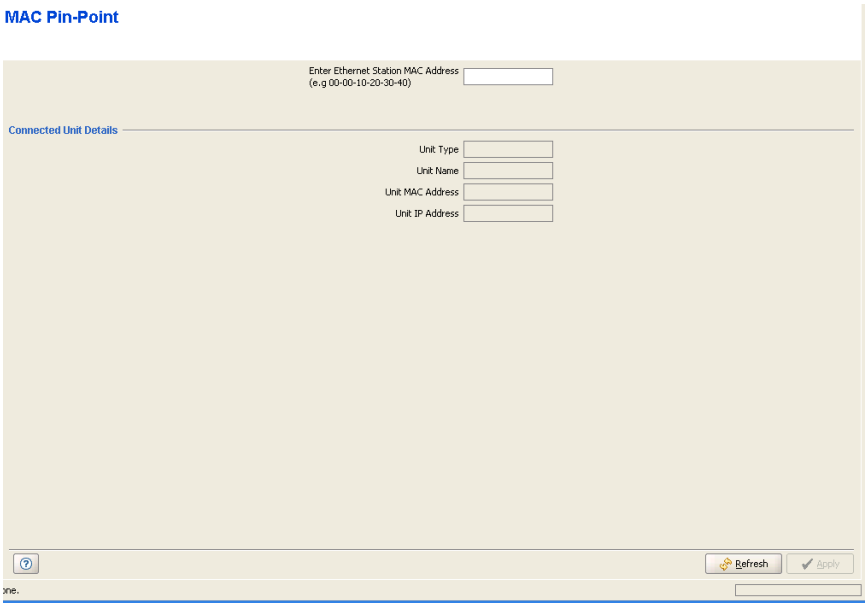


Figure 2-49: MAC Pin-Point Page

To identify the unit to which a station is connected, enter the MAC address of the station using the format xx-xx-xx-xx-xx-xx.

The Connected Unit Details (Unit Type, Unit Name, Unit IP address and Unit MAC Address) of the unit through which the station is connected to the wireless link will be displayed.

2.22 Security Parameters Page

NOTE

The Security feature is not supported by certain Country Codes.

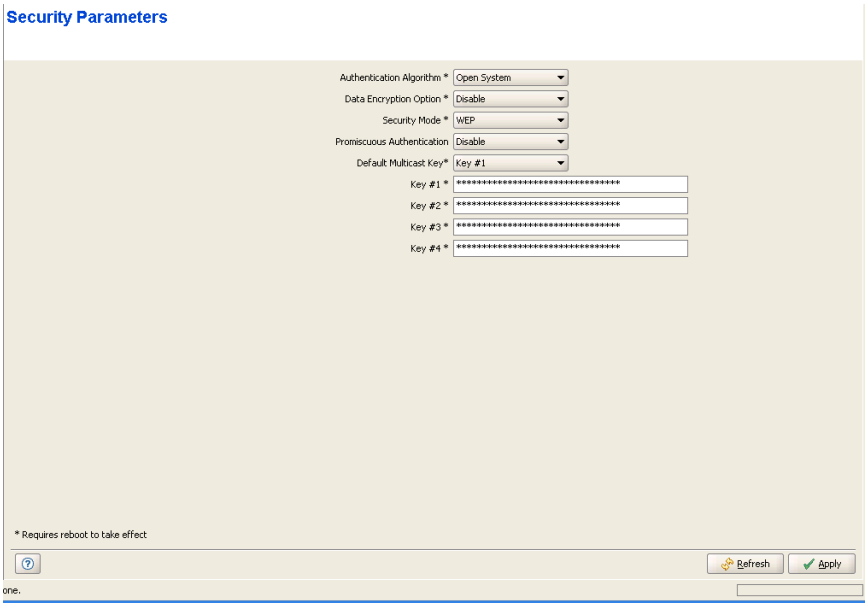


Figure 2-50: Security Parameters Page - AU/BU

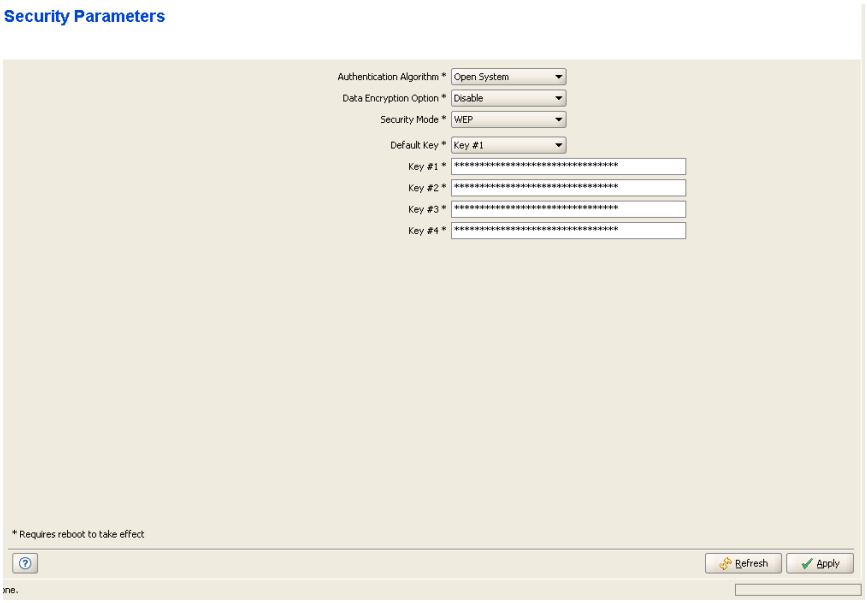


Figure 2-51: Security Parameters Page - SU/RB

The Security Page includes the following parameters:

Authentication Algorithm	The Authentication Algorithm option determines the operation mode of the selected unit. The following two options are available: ■ Open System: An SU/RB configured to Open System can only associate with an AU/BU also configured to Open System. In this case, the authentication encryption algorithm is not used. ■ Shared Key: The authentication messages are encrypted. An SU/RB configured to use a Shared Key can only be authenticated by an AU/BU configured to use a Shared Key, provided the applicable Key (which means both the key number and its content) in the AU/BU is identical to the key selected as the Default Key in the SU/RB. The AU/BU and all the SUs/RB it serves should be configured to the same Authentication Algorithm option. Mixed operation is not supported.

Data Encryption Option	The Data Encryption Option allows enabling or disabling data encryption. When enabled, all data frames, including frames using management protocols such as Telnet, FTP, TFTP, SNMP, DHCP and ICMP, are encrypted. The AU/BU and all the SUs/RB it serves should be configured to the same Data Encryption Option. Mixed operation is not supported. A unit with Data Encryption Option enabled can accept non-encrypted data frames In an AU (except to AUS), the Maximum Number of Associations must be set to a value of 124 or lower to enable Data Encryption. As long as Data Encryption is enabled, the Maximum Number of Associations cannot be set to a value higher than 124.The Maximum Number of Associations Limit (512 when Data Encryption is disabled, 124 when Data Encryption is enabled) is indicated in the “Air Interface General Page” on page 31.
Security Mode	The Security Mode option enables selecting the algorithm to be used for encrypting the authentication messages and/or data frames. The following encryption algorithm are available: ■ WEP (Wireless Equivalent Privacy). WEP is defined in the IEEE 802.11 Wireless LAN standard and is based on the RSA's RC4 encryption algorithm. ■ AES OCB (Advanced Encryption Standard). AES is defined by the National Institute of Standards and Technology (NIST) and is based on Rijndael block cipher. AES OCB (Offset Code Book) is a mode that operates by augmenting the normal encryption process by incorporating an offset value. ■ FIPS 197 is certified for compliance with Federal Information Processing Standards. It provides encryption and message integrity in one solution and implements the Advanced Encryption Standard using Rijndael block cipher. The FIPS 197 encryption algorithm is a licensed feature, and is available only in AUs/BUs with the required license. FIPS 197 can be supported only in units with HW revision C or higher. FIPS 197 feature license is not available for AUS unit.

Promiscuous Authentication	Applicable only for AU and BU. The Promiscuous Authentication mode enables a new SU/RB to join an active cell where Shared Key operation and/or Data Encryption are used, even if this SU/RB does not have the correct security parameters. In promiscuous mode, all downlink transmissions (from AU/BU to SU/RB) are not encrypted, allowing remote configuration of security parameters, regardless of the current settings in the SU/RB of the parameters related to data encryption. After a new SU/RB joins the cell it should be remotely configured with the proper parameters (or upgraded). When the SU/RB is configured properly, the Promiscuous Mode should be disabled. Note: Do not leave the AU/BU in the enabled Promiscuous Authentication mode for prolonged periods. Use it only when absolutely necessary, perform the required actions as quickly as possible and disable it. The unit will return automatically to Promiscuous Authentication disabled mode after reset.
Multicast Default Key	Applicable only for AU and BU. The Multicast Default Key defines the Key to be used for encrypting/decrypting multicasts and broadcasts when Data Encryption is enabled. Available values range from Key #1 to Key #4.
Default Key	Applicable only for SU and RB. The Default Key defines the Key to be used for encrypting/decrypting the authentication messages (Shared Key mode) and/or data frames (Data Encryption enabled). The AU/BU learns the Default Key from the SU/RB provided it is one of the Keys defined in the AU/BU. An AU may use different keys when authenticating and/or communicating with different SUs. Available values range from Key #1 to Key #4.
Key #1 to Key #4	Key #1 to Key #4 options enable defining the encryption key to be used for initializing the pseudo-random number generator that forms part of the encryption/decryption process. The Keys must be set before the Shared Key authentication algorithm or Data Encryption can be used. To support proper operation, both the Key # and the content must be identical at both sides of a wireless link. Each Key is a string of 32 hexadecimal numbers. For security reasons, it is a "write only" parameter, displayed as a string of asterisks ("*"). The key 000…0 (a string of 32 zeros, which is the default), means no key.

2.23 Performance Parameters Page

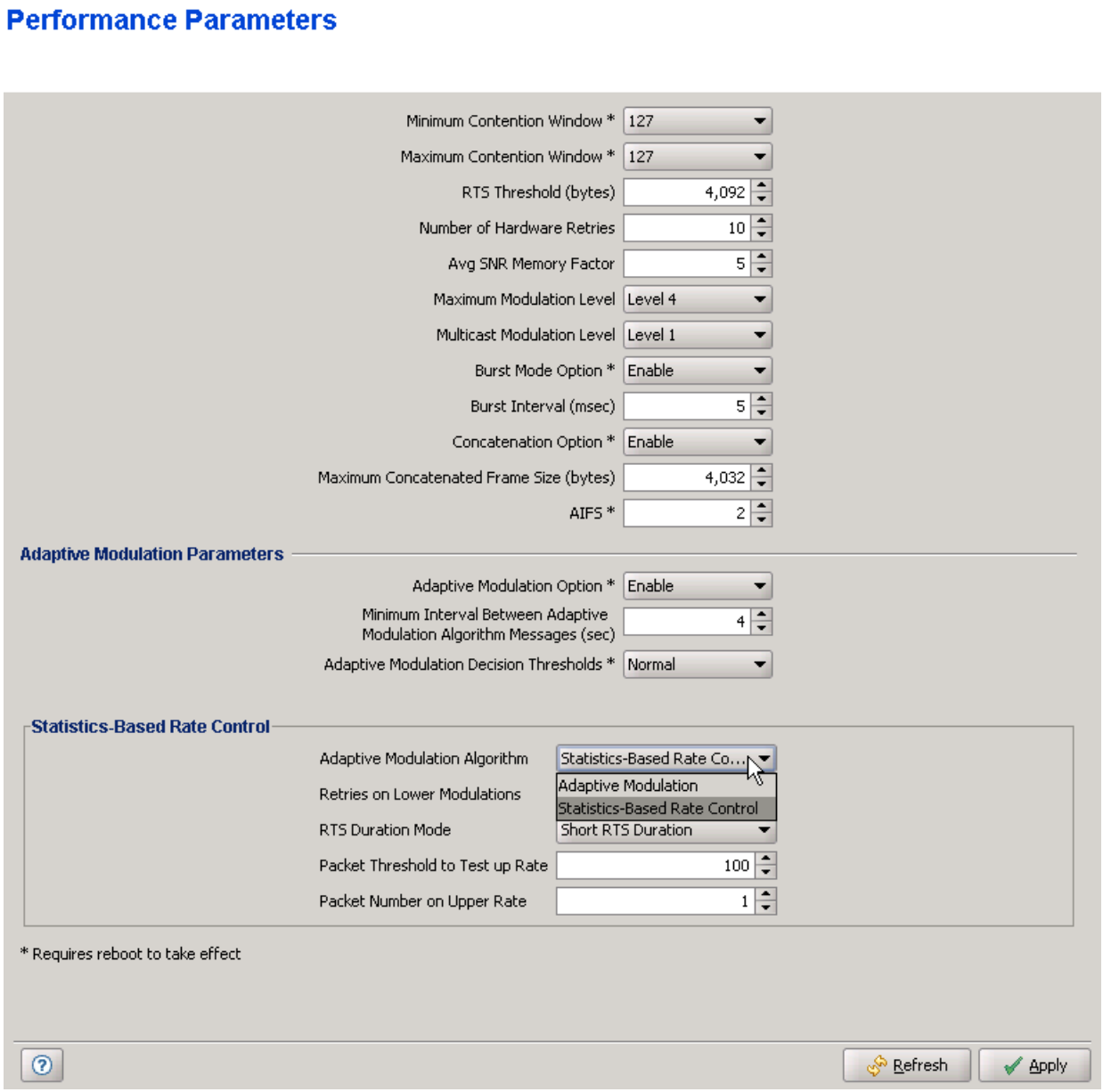


Figure 2-52: Performance Parameters Page

The Performance Parameters page includes the following parameters:

- Contention Window Parameters

- RTS Threshold (bytes)
- Number of Hardware Retries
- AVG SNR Memory Factor
- Maximum Modulation Level
- Multicast Modulation Level (AU and BU Only)
- Burst Mode Parameters
- Concatenation Parameters
- AIFS (AU and SU Only)
- Adaptive Modulation Parameters

2.23.1 Contention Window Parameters

The system uses an exponential Back-off algorithm to resolve contention between several units that want to access the wireless medium. The method requires each station to choose a random number N between 0 and a given number C each time it wants to access the medium. The unit will attempt to access the medium only after a time equal to DIFS plus N time slots, always checking if a different unit has accessed the medium before. Each time the unit tries to transmit and a collision occurs; the maximum number C used for the random number selection will be increased to the next available value. The available values are 7, 15, 31, 63, 127, 255, 511 and 1023.

Minimum Contention Window	The Minimum Contention Window parameter is the first maximum number C used in the back-off algorithm. The higher the number of SUs served by the same AU, the higher the Minimum Contention Window for each SU should be. In addition, when the Wireless Link Prioritization Option is enabled, the Minimum and Maximum Contention Window parameters can be configured to provide certain units with an advantage over other units. The available values are 0, 7, 15, 31, 63, 127, 255, 511 and 1023. A value of 0 means that the contention window algorithm is not used and that the unit will attempt to access the medium immediately after a time equal to DIFS. It should only be used in point-to-point applications.

Maximum Contention Window	The Maximum Contention Window parameter defines the upper limit for the maximum number C used in the back-off algorithm as described in Minimum Contention Window above. The available values are 7, 15, 31, 63, 127, 255, 511 and 1023.

2.23.2 RTS Threshold (bytes)

The RTS Threshold parameter defines the minimum frame size that requires an RTS/CTS (Request To Send/Clear To Send) handshake. Frames whose size is smaller than the RTS Threshold value are transmitted directly to the wireless link without being preceded with RTS frames. Setting this parameter to a value larger than the maximum frame size eliminates the RTS/CTS handshake for frames transmitted by this unit.

The available values range from 20 to 4092 bytes for all unit types except to BreezeACCESS units with HW Revision A or B where the values range is from 20 to 2200 bytes.

In an AU, it is recommended that the default values (the highest value supported by the unit's hardware) be used to ensure that RTS/CTS is never used by the AU. For AUs in the 900 MHz band the default is 60. When Tx power is bellow 22 dBm The RTS Threshold can be changed to 4092 to improve overall performance. If the Tx power is higher then 22 dBm it is strongly recommended not to change the RTS Threshold from its default value of 60 since it may result in an excessive number of CRC errors on the received side.

2.23.3 Number of Hardware Retries

The Number of Hardware Retries parameter defines the maximum number of times that an unacknowledged packet is retransmitted. When the Adaptive Modulation Algorithm is disabled, a frame will be dropped when the number of unsuccessful retransmissions reaches this value. For details on the effect of this parameter when the Adaptive Modulation Algorithm is enabled, refer to the description of this feature in Section 2.23.10.

The Number of Hardware Retries parameter is not applicable when the Wireless Link Prioritization Option is enabled.

The available values range is from 1 to 14.

2.23.4 AVG SNR Memory Factor

The Average SNR Memory Factor defines the weight of history (value of last calculated average SNR) in the formula used for calculating the current average SNR for received data frames. This average SNR is used by the ATPC algorithm in

the AU/BU and is also included in the Adaptive Modulation Algorithm information messages transmitted by the AU/BU and the SU/RB. The higher the value of this parameter, the higher is the weight of history in the formula.

Available values: -1 to 32. -1 is for no weight for history, meaning that average SNR equals the last measured SNR.

2.23.5 Maximum Modulation Level

When the Adaptive Modulation Algorithm is enabled, it changes the modulation level dynamically according to link conditions. The purpose is to increase the probability of using the maximum possible modulation level at any given moment. Although the algorithm will avoid using modulation levels that are too high for the prevailing link conditions, it might be better under certain conditions to limit the use of higher modulation levels. If the link quality is not sufficient, it is recommended that the maximum modulation level be decreased, as higher modulation levels increase the error rate. In such conditions, a higher Maximum Modulation Level increases the number or retransmissions before the modulation level is being reduced by the Adaptive Modulation Algorithm. A high number of retransmissions reduces the overall throughput.

The link quality can be estimated based on the SNR measurement:

For an SU, the uplink SNR can be viewed in the Details section for the applicable SU in the SUs Information page of the AU (“SUs Information Page (AU only)” on page 73). If the measured SNR is less than a certain threshold, it is recommended that the maximum modulation level of the SU/RB be decreased in accordance with the recommendations provided in Section 2.23.12 below, using the values of typical sensitivity. It is recommended to add a 2 dB safety margin to compensate for possible measurement inaccuracy or variance in the link quality. Note that the SNR measurement at the AU is accurate only when receiving transmissions from the applicable SU.
For the AU, the Maximum Modulation Level should be set to a value that is proper for all the SUs it serves. This means a value that is at least the same as the highest Maximum Modulation Level in configured in the SUs.

For a BreezeNET B link, the SNR can be viewed in the “Site Survey Per Modulation Level Counters Page (SU and RB Only)” on page 94

When the Adaptive Modulation Algorithm is disabled, this parameter defines the fixed Modulation Level used for transmissions.

The minimum and maximum values for the Maximum Modulation Level are defined by the Sub-Band in use. Currently, all Sub Bands support the entire range of modulation levels, from 1 to 8, except to BreezeNET B units using a 40

MHz bandwidth (Turbo mode) that support modulation levels from 1 to 5. However, the highest modulation level supported by units with HW revision A is modulation level 7.

2.23.6 Multicast Modulation Level (AU and BU Only)

The Multicast Modulation Level parameter defines the modulation level used for transmitting multicast and broadcast data frames. Multicast and broadcast transmissions are not acknowledged; therefore if a multicast or broadcast transmission is not properly received there is no possibility of retransmitting. It is recommended that you set a lower modulation level for broadcast and multicast frame transmissions to increase the probability that they are received without errors.

The Multicast Modulation Level parameter is applicable only to data frames. Beacons and other wireless management and control frames are always transmitted at the lowest modulation level according to the Sub-Band.

The minimum and maximum values for the Multicast Modulation Level are defined by the Sub-Band in use. Currently, all Sub Bands support the entire range of modulation levels, from 1 to 8, except to BreezeNET B units using a 40 MHz bandwidth (Turbo mode) that support modulation levels from 1 to 5. However, the highest modulation level supported by units with HW revision A is modulation level 7.

2.23.7 Burst Mode Parameters

Burst mode provides an increased throughput by reducing the overhead associated with transmissions in the wireless medium. In a burst transmission the inter-frame spacing is reduced and unicast data frames are transmitted without any contention period (burst mode is not activated on broadcasts/multicasts).

The Burst Mode is available only if Burst Mode is supported by the Sub-Band in use. Currently Burst Mode is supported by all Country Codes.

In AUs and BUs with HW Revision B or lower, Burst Mode cannot be activated when DFS is used. In AUs with HW Revision B or lower, the Burst Mode option will be "blocked" upon trying to enable Burst Mode when DFS is enabled. This limitation does not apply to AUs with HW Revision C.

In all units with HW Revision B or lower, Burst Mode cannot be activated when using WEP for data encryption. In units with HW Revision B or lower, the Burst Mode option will be "blocked" upon trying to enable it when using WEP for data encryption. This limitation does not apply to units with HW Revision C.

Burst Mode parameters are is not applicable when the Wireless Link Prioritization Option is enabled.

Burst Mode Option	The Burst Mode Option enables or disables the Burst Mode operation
Burst Interval (msec)	The Interval defines the burst size, which is the time in which data frames are sent immediately without contending for the wireless medium. The range is 1 to the value of the Maximum Burst Duration defined for the Sub-Band.

2.23.8 Concatenation Parameters

The Concatenation mechanism enables bundling several data frames into a single frame for transmission to the wireless link. This feature improves throughput and reduces the overhead in the wireless medium, by requiring only one CRC for each concatenated frame, one RTS/CTS cycle if applicable, and a single waiting period according to the contention window mechanism before transmission. When concatenation is enabled, data packets in the queue of the internal bridge can be accumulated before the concatenated frame is transmitted to the wireless medium. Data frames can be accumulated up to a maximum frame size of 2200 bytes for all BreezeACCESS units with HW revision A or B and BreezeNET B-14/28 units, or 4032 bytes for BreezeACCESS units with HW revision C or higher and BreezeNET B B-100 units. In an AU, the concatenation process is performed separately for each destination SU.

Using the Link Capability exchange mechanism, each unit learns the HW Revision and the SW Version of the unit(s) associated with it. A concatenated frame with a length exceeding 2200 bytes may be generated and transmitted only if both the source and destination units support concatenated frames with a higher size. If either the source or destination unit uses SW Version 3.0 or 3.1, then the maximum size of the concatenated frame is 3400 bytes, and the maximum number of data frames that can be bundled into a concatenated frame is 2 for units with SW version 3.0 and 8 for units with SW version 3.1.

A frame is a candidate for bundling into a concatenated frame if all the following conditions are met:

- The frame is a data frame
- The destination is an entity behind the destination AU/SU.
- The destination unit can support the feature (uses SW version 3.0 or higher).

When a frame is identified as an eligible candidate for concatenation, it is marked accordingly and will be processed according to the following:

- If there is no concatenated frame designated to the same destination unit in the queue:
  - » If the hardware queue is empty - the frame is transmitted immediately.
  - » Otherwise (the queue is not empty) - the frame is inserted to the queue as a concatenated frame.
- If a concatenated frame designated to the same destination unit exists in the queue:
  - » If the combined size of both frames is above the maximum allowed concatenated frame size - both frames are transmitted as two separate frames.
  - » Otherwise (the combined frames size is below the maximum size) - the new frame is added to the concatenated frame. If the number of data frames in the concatenated frame has reached the maximum allowed (applicable only if the destination unit uses SW version 3.0 or 3.1) - the concatenated frame will be transmitted to the wireless medium. Otherwise - the concatenated frame remains in the queue (until the hardware queue becomes free).

When a frame is marked as a candidate for concatenation, it will be transmitted as a concatenated frame. If it is not bundled with another data frame before transmission, it will be a concatenated frame with a single data frame (Concatenated Frame Single). If it is bundled with two or more data frames, it will be a concatenated frame with either double data frames (Concatenated Frame Double) or more data frames (Concatenated Frame More).

Concatenation Option	The Concatenation Option enables or disables the concatenation mechanism.
Maximum Concatenated Frame Size (bytes)	The Maximum Concatenated Frame Size parameter defines the maximum size (in bytes) for a concatenated frame. The range is: ■ 256 to 2200 bytes for BreezeACCESS units with HW revision A or B and BreezeNET B B-14/28 units ■ 256 to 4032 bytes for BreezeACCESS units with HW revision C or higher and BreezeNET B B-10/100 units

2.23.9 AIFS (AU and SU Only)

The time interval between two consecutive transmissions of frames is called Inter-Frame Spacing (IFS). This is the time during which the unit determines whether the medium is idle using the carrier sense mechanism. The IFS depends on the type of the next frame to be transmitted, as follows:

- SIFS (Short Inter-Frame Spacing) is used for certain frames that should be transmitted immediately, such as ACK and CTS frames. The value of SIFS is 16 microseconds.

- DIFS (Distributed coordination function Inter-Frame Spacing) is typically used for other frame types when the medium is free. If the unit decides that the medium is not free, it will defer transmission by DIFS plus a number of time slots as determined by the Contention Window back-off algorithm (see Section 2.23.1) after reaching a decision that the medium has become free.

DIFS equal SIFS plus AIFS, where AIFS can be configured to a value from 1 to 50 time slots. A unit with a lower AIFS has an advantage over units with a higher AIFS, since it has a better chance to gain access to limited wireless link resources. Typically, AIFS should be configured to two time slots. A value of 1 should only be used in one of the two units in a point-to-point link, where in the other unit the AIFS remains configured to two time slots. This ensures that the unit with AIFS configured to one has an advantage over the other unit, provided that the Minimum Contention Window (See Section 2.23.1) parameter in both units is configured to 0 to disable the contention window back-off algorithm.

The AIFS parameter is not applicable when the Wireless Link Prioritization Option is enabled.

The available options are 1to 50 (time slots).

2.23.10 Adaptive Modulation Parameters

The Adaptive Modulation Algorithm enables adapting the modulation level of transmitted data to the prevailing conditions of the applicable radio link. The algorithm provides Access Units with simultaneous, adaptive support for multiple Subscriber Units at different modulation levels, as transmission's modulation level decisions are made separately for each associated SU.

Link quality fluctuates due to various environmental conditions. Dynamically switching between the possible modulation levels increases the probability of using the maximum modulation level suitable for the current radio link quality at any given moment.

The decisions made by the Adaptive Modulation Algorithm for the modulation level to be used are based on multiple parameters, including information on received signal quality (SNR) that is received periodically from the destination unit, the time that has passed since last transmission to the relevant unit, and the recent history of successful and unsuccessful transmissions/retransmissions. In the AU the decision algorithm is performed separately for each SU.

The transmission/retransmission mechanism operates as follows:

1. Each new frame (first transmission attempt) will be transmitted at a modulation level selected by the Adaptive Modulation algorithm.
2. If first transmission trial has failed, the frame will be retransmitted at the same modulation level up to the maximum number of retransmission attempts defined by the Number of HW Retries parameter.

Adaptive Modulation Option	The Adaptive Modulation Option enables or disables the Adaptive Modulation decision algorithm. When enabled, the algorithm supports decrease/increase of transmission's modulation levels between the lowest possible level to the value configured for the Maximum Modulation Level parameter. If the Maximum Modulation Level is set at the lowest possible level, the Adaptive Modulation algorithm has no effect.
Minimum Interval Between Adaptive Modulation Algorithm Messages (sec)	The Minimum Interval Between Adaptive Modulation Messages sets the minimum interval between two consecutive adaptive modulation messages, carrying information on the SNR of received signals. The messages in the AU include SNR information on all the SUs associated with it. The available range is from 1 to 3600 seconds.
Adaptive Modulation Decision Threshold	This parameter enables selection between Normal and High decision thresholds for the Adaptive Modulation algorithm. Typically “Normal” threshold should be used. In links with a low SNR (below 13), the Adaptive Modulation algorithm may not stabilize on the correct modulation level when using the standard decision thresholds. In this case the algorithm may try to use a modulation level that is too high, resulting in a relatively large number of dropped frames. The "High" option solves this limitation and ensures good performance also in links with a low SNR.

2.23.11 Statistics-Based Rate Control

NOTE

Statistics-Based Rate Control is only supported in units with HW Revision C or higher.

When enabled, the Statistics-Based Rate Control algorithm, constantly evaluates the achievable throughput for a particular modulation by counting the number of packets that are successfully transmitted and the packets that are not received and that need to be retransmitted. Based on these statistics, and on each modulation's specific data rate, it will calculate the real throughput that the unit can support in the current conditions for a particular modulation.

When choosing between modulations, up to a limit, a small number of retransmissions on a higher modulation is compensated by the overall better performance ensured by that modulation. When a critical retransmissions percentage is reached however, it is necessary to decrease the modulation to achieve better throughputs as shown in Table 2-4.

Table 2-4: Retransmission Percentage Equivalence

Modulation Level	PHY Rate (Mbps)	PHY Rate Difference Compared to Previous Modulation (Mbps)	Retransmission Percentage Equivalent to PHY Rate Difference
8	54	54-48=6	6/54=11%
7	48	48-36=12	12/48=25%
6	36	36-24=12	12/36=33%
5	24	24-18=6	6/24=25%
4	18	18-12=6	6/18=33%
3	12	12-9=3	3/12=25%
2	9	9-6=3	3/9=33%
1	6		

When the above mentioned retransmission percentages are reached, the Statistics-Based Rate Control algorithm will lower the modulation.

If the connection is stable on a particular modulation, the unit will periodically check whether it can further increase the modulation (except on modulation 8), by sending a number of test packets using this higher modulation and checking the retransmission rate.

The user can configure a Packet Threshold to Test Up Rate parameter to define the number of successfully transmitted frames after which the unit will test the higher modulation. The number of frames used for this test can also be configured by the user via the Packet No On Upper Rate parameter.

When a frame needs to be retransmitted, the Statistics-Based Rate Control algorithm may gradually decrease the modulation used for retransmitting that particular frame. Based on the Number of HW retries parameter, the unit will try to perform the three final retransmission attempts at progressively lower modulations.

The retransmission mechanism described above does not apply for test frames sent for evaluating link quality on higher modulations. If the number of HW retries is lower than 3 or if the initial modulation is lower than 4, the number of modulations used for retransmission will be limited as shown in Table 2-5

Table 2-5: Examples of Retransmissions on Different Modulation Levels

Scenario	Transmission Attempts	
	Modulation	**Tries**
Initial Modulation: 8 Number of HW Retries: 10 Total Number of Tries: 1+10 = 11	8	8
	7	1
	6	1
	5	1
Initial Modulation: 6 Number of HW Retries: 5 Total Number of Tries: 1+5 = 6	6	3
	5	1
	4	1
	3	1
Initial Modulation: 7 Number of HW Retries: 2 Total Number of Tries: 1+2 = 3	7	1
	6	1
	5	1
Initial Modulation: 3 Number of HW Retries: 12 Total Number of Tries: 1+12 = 13	3	11
	2	1
	1	1

Adaptive Modulation Algorithm	This option switches between the basic Adaptive Modulation and the Statistics Based Rate Control algorithm.

Retries on Lower Modulations	This option enables/disables the retransmissions on lower modulations mechanism described above. The default value is Disable
RTS Duration Mode	If the RTS mechanism is enabled, when attempting to retransmit frames on lower modulations, the RTS employed may be adjusted so that it pertains to either the initial transmission modulation or the lower retransmission modulation. The available options are: ■ **Short RTS Duration**: Retransmission attempts on lower modulations use the RTS duration that applies to the initial transmission modulation. ■ **Long RTS Duration**: Retransmission attempts on lower modulations use the RTS duration that applies to the corresponding lower retransmission modulation.
Adaptive Modulation History Size	This parameter is applicable only to VL 900 units. It indicates the number of entries used by the Adaptive Modulation algorithm to compute the transmission time. The available range is from 15 to 25.
Packet Threshold to Test Upper Rate	This parameter is applicable only to VL 900 units. When the number of frames transmitted on the current modulation reaches this number, the Adaptive Modulation algorithm will test the upper modulation. The available range is from 10 to 10000
Packet Number on Upper Rate	This parameter is applicable only to VL 900 units. It indicates the number of frames used by the Adaptive Modulation algorithm to test upper modulations. The available range is from 1 to 3.

2.23.12 Recommended Maximum Modulation Levels

SNR	***Maximum Modulation Level***
SNR > 23 dB	8
21 dB < SNR < 23 dB	7
16 dB < SNR < 21 dB	6
13 dB < SNR < 16 dB	5
10 dB < SNR < 13 dB	4
8 dB < SNR < 10 dB	3
7 dB < SNR < 8 dB	2
SNR < 7 dB	1

2.24 IP Parameters Page

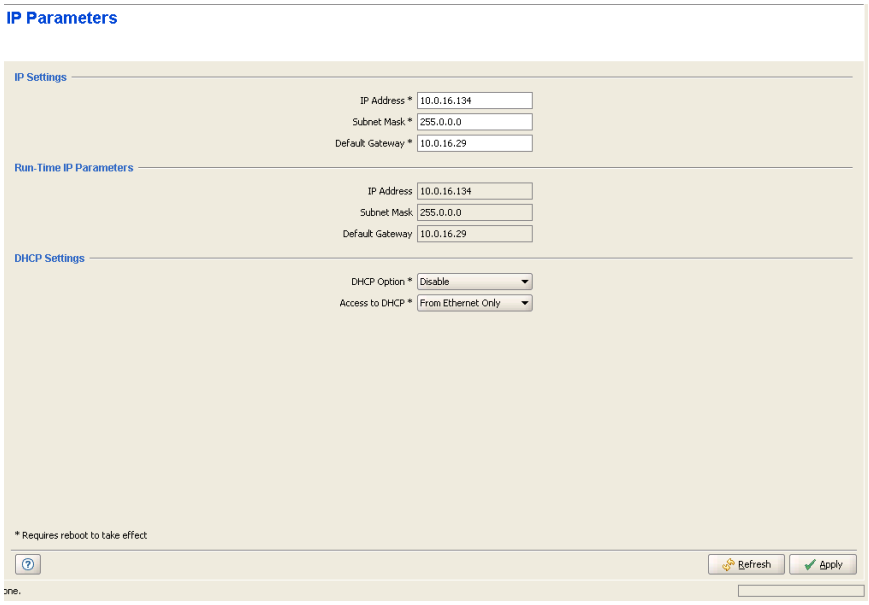


Figure 2-53: IP Parameters Page

The IP Parameters page includes the following sections:

- IP settings
- Run-Time IP Parameters
- DHCP Settings

2.24.1 IP settings

The IP Setting section enables manually configuring the IP parameters (IP Address, Subnet Mask, Default Gateway) of the unit. These settings are not applicable when the unit is configured to acquire its IP parameters from a DHCP server (see Section 2.24.3)

2.24.2 Run-Time IP Parameters

The Run-Time IP Parameters display (read-only) the actual IP parameters (IP Address, Subnet Mask, Default Gateway) of the unit. When these parameters are acquired from a DHCP server, they may differ from the manually configured parameters in the IP Settings section.

2.24.3 DHCP Settings

DHCP Option	The DHCP Option displays the current status of the DHCP support, and allows selecting a new operation mode. The following options are available: Disable: To configure the IP parameters manually. If this option is selected, configure the static IP parameters as described above. DHCP Only: The unit will search for and acquire its IP parameters, including the IP address, subnet mask and default gateway, from a DHCP (Dynamic Host Configuration Protocol) server only. If this option is selected, you must select the port(s) through which the unit searches for and communicates with the DHCP server, as described below. You do not have to configure static IP parameters for the unit. DHCP messages are handled by the units as management frames. Automatic: The unit will search for a DHCP server and acquire its IP parameters from the server. If a DCHP server is not located within approximately 40 seconds, the currently configured parameters are used. If this option is selected, you must configure the static IP parameters as described above. In addition, you must select the port(s) through which the unit searches for and communicates with the DHCP server, as described below.
Access to DHCP	The Access to DHCP option enables defining the port through which the unit searches for and communicates with a DHCP server. Select from the following options: ■ From Wireless Only ■ From Ethernet Only ■ From Both Ethernet And Wireless

2.25 Network Management Parameters Page

For an AU/BU, the Network Management Parameters page comprises two tabs:

- Network Management Parameters Page General Tab
- Network Management Parameters Page Send Traps Tab (AU and BU Only)

For an SU/RB, the Send Traps tab is not available (In units running SW Version 5.0 and higher, SU/RB related events are reported as traps by the associated AU/BU).

2.25.1 Network Management Parameters Page General Tab

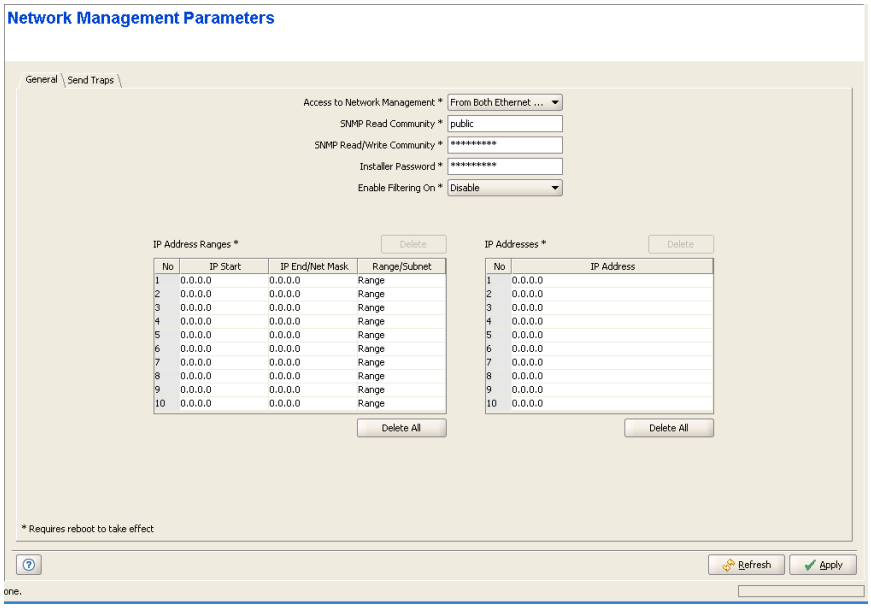


Figure 2-54: Network Management Parameters Page General Tab - AU/BU

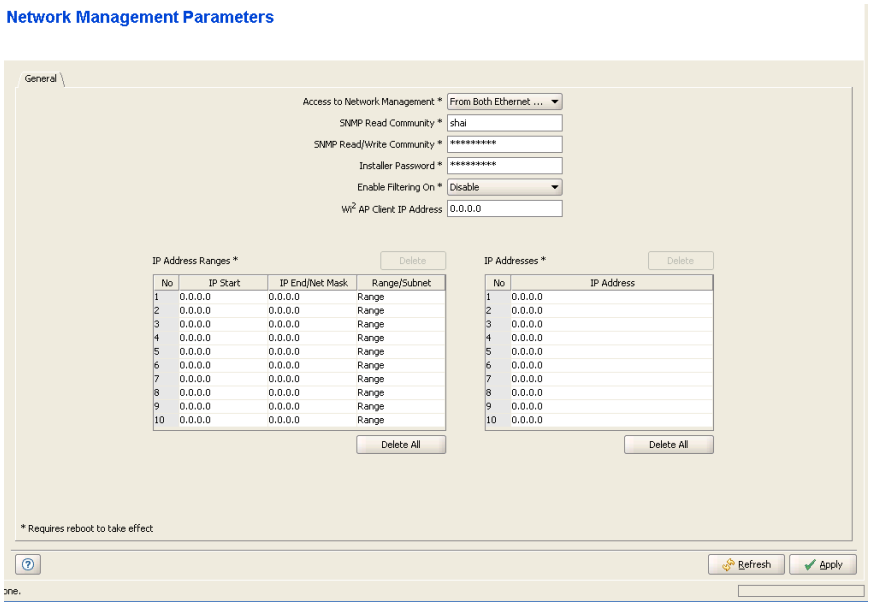


Figure 2-55: Network Management Parameters Page General Tab - SU/RB

The Network Management Parameters page General tab includes the following sections:

Network Management General Parameters

IP Addresses Ranges Table

IP Addresses Table

2.25.1.1 Network Management General Parameters

Access To Network Management	The Access to Network Management option defines the port through which the unit can be managed. The following options are available: ■ From Wireless Link Only ■ From Ethernet Only ■ From Both Ethernet and Wireless Link Be careful not to block your access to the unit. For example, if you manage an SU or an RB via the wireless link, setting the Access to Network Management parameter to From Ethernet Only completely blocks your management access to the unit. In this case, a technician may be required to change the settings at the user's site.

SNMP Read Community	The SNMP Read Community of the unit. This serves also as the User Password in Telnet. Valid values: A string of up to 8 printable characters.
SNMP Read/Write Community	The SNMP Read/Write Community of the unit. This serves also as the Administrator Password in Telnet. Valid values: A string of up to 8 printable characters.
Installer Password	The Installer Password in Telnet. Valid values: A string of up to 8 printable characters.
Enable Filtering On	This option enables or disables the IP address based management filtering. If management filtering is enabled, the unit can only be managed by stations with IP addresses matching one of the entries in either the Addresses Ranges or IP Addresses tables, and that are connected to the unit via the defined port(s). The following options are available: ■ Disable: No IP address based filtering is configured. ■ Ethernet Port: Applicable only if the Access to Network Management parameter is configured to either From Ethernet Only or From Both Ethernet and Wireless Link. The unit can be managed from the Ethernet port only by stations with IP addresses matching one of the entries in the tables. If the Access to Network Management parameter is configured to From Both Ethernet and Wireless Link then no IP address based filtering is configured for the wireless port. ■ Wireless Port: Applicable only if the Access to Network Management parameter is configured to either From Wireless Link Only or From Both Ethernet and Wireless Link. The unit can be managed from the wireless port only by stations with IP addresses matching one of the entries in tables. If the Access to Network Management parameter is configured to From Both Ethernet and Wireless Link then no IP address based filtering is configured for the Ethernet port. ■ Both Ethernet and Wireless Ports: Applicable to all options of the Access to Network Management parameter. The unit can be managed from the port(s) defined by the Access to Network Management parameter only by stations with IP addresses matching one of the entries in the tables.
Wi^2 AP Client IP Address	Applicable only for SU and RB. The IP address of a WiFi AP connected to the SU. The address 0.0.0.0 means none.

2.25.1.2 IP Addresses Ranges Table

A table of up to 10 IP address ranges. These are the addresses of devices that can manage the unit if the Filtering option is enabled (in addition to addresses defined in the IP Addresses table).

The Range/Subnet column enables selecting whether the entry is defined as a Range (Start and End Addresses) or as a Subnet (Start Address and Net Mask). Double-click on a Range/Subnet cell to open a drop-down menu that enables selection between the two options.

To modify a range/subnet, define the desired Range/Subnet option, double-click on the required cell and enter the new Start IP and/or the End IP /Net Mask. To modify another range, repeat the process. The color of previously modified entries will turn blue.

To delete one or more ranges from the list, select the relevant entries and click on the **Delete** button. A deleted entry is displayed with IP Start and IP End of 0.0.0.0 (the default).

To delete all entries, click on the **Delete All** button.

The Delete and Delete All operations are applied immediately. Other modifications will be implemented in the managed device only after clicking on the **Apply** button.

2.25.1.3 IP Addresses Table

A table of up to 10 discrete IP addresses. These are addresses of devices that can manage the unit if the Filtering option is enabled (in addition to addresses defined in the IP Addresses Ranges table).

To modify an address, double-click on the required cell and enter the new IP Address. To modify another entry, repeat the process. The color of previously modified addresses will turn blue.

To delete one or more addresses from the list, select the relevant entries and click on the **Delete** button. A deleted entry is displayed with IP Address of 0.0.0.0 (the default).

To delete all entries, click on the **Delete All** button.

The Delete and Delete All operations are applied immediately. Other modifications will be implemented in the managed device only after clicking on the **Apply** button.

2.25.2 Network Management Parameters Page Send Traps Tab (AU and BU Only)

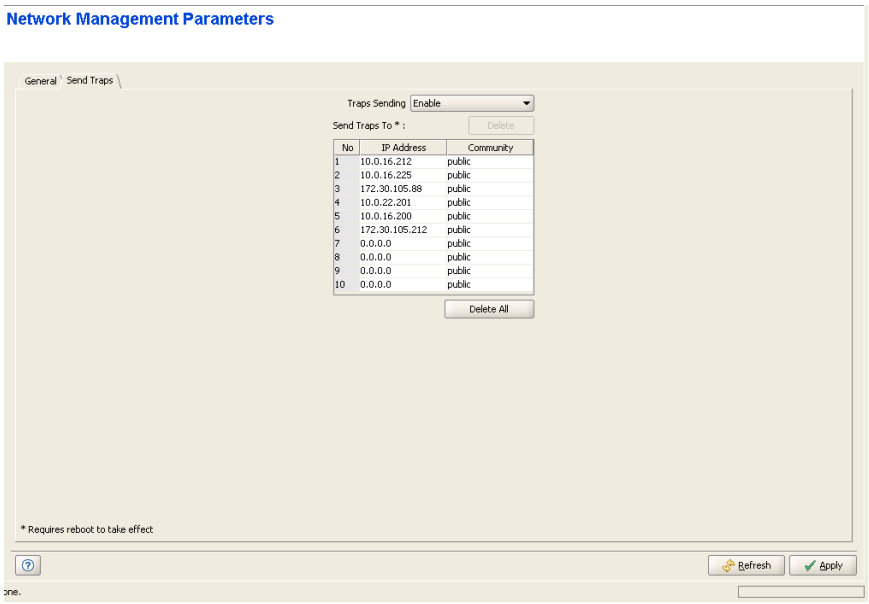


Figure 2-56: Network Management Parameters Page Send Traps Tab

The **Traps Sending** option enables or disables the sending of SNMP traps. When enabled, traps will be sent only to destinations that are included in the **Send Traps To** Table.

The Send Traps To table includes 10 entries. Each entry include the destination address and the Read SNMP community to be used by this destination.

To modify an entry, double-click on the required cell and enter the new **IP Address** and/or **Community**. A Community string comprises up to 8 printable characters. To modify another entry, repeat the process. The color of previously modified entries will turn blue.

To delete one or more entries from the list, select the relevant entries and click on the **Delete** button. A deleted entry is displayed with IP Address 0.0.0.0 and Community Public (the default).

To delete all entries, click on the **Delete All** button.

The Delete and Delete All operations are applied immediately. Other modifications will be implemented in the managed device only after clicking on the Apply button.

2.26 Unit Control Page

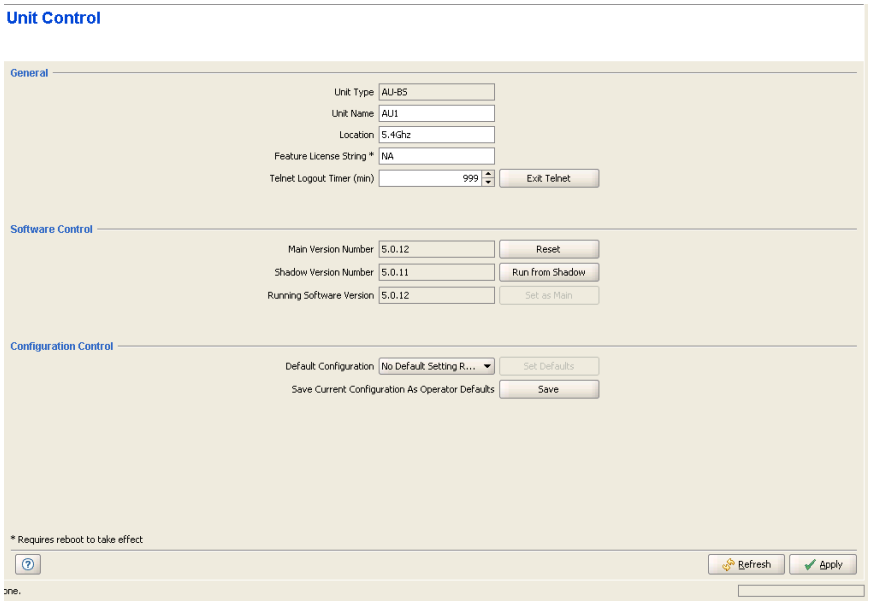


Figure 2-57: Unit Control Page-AU

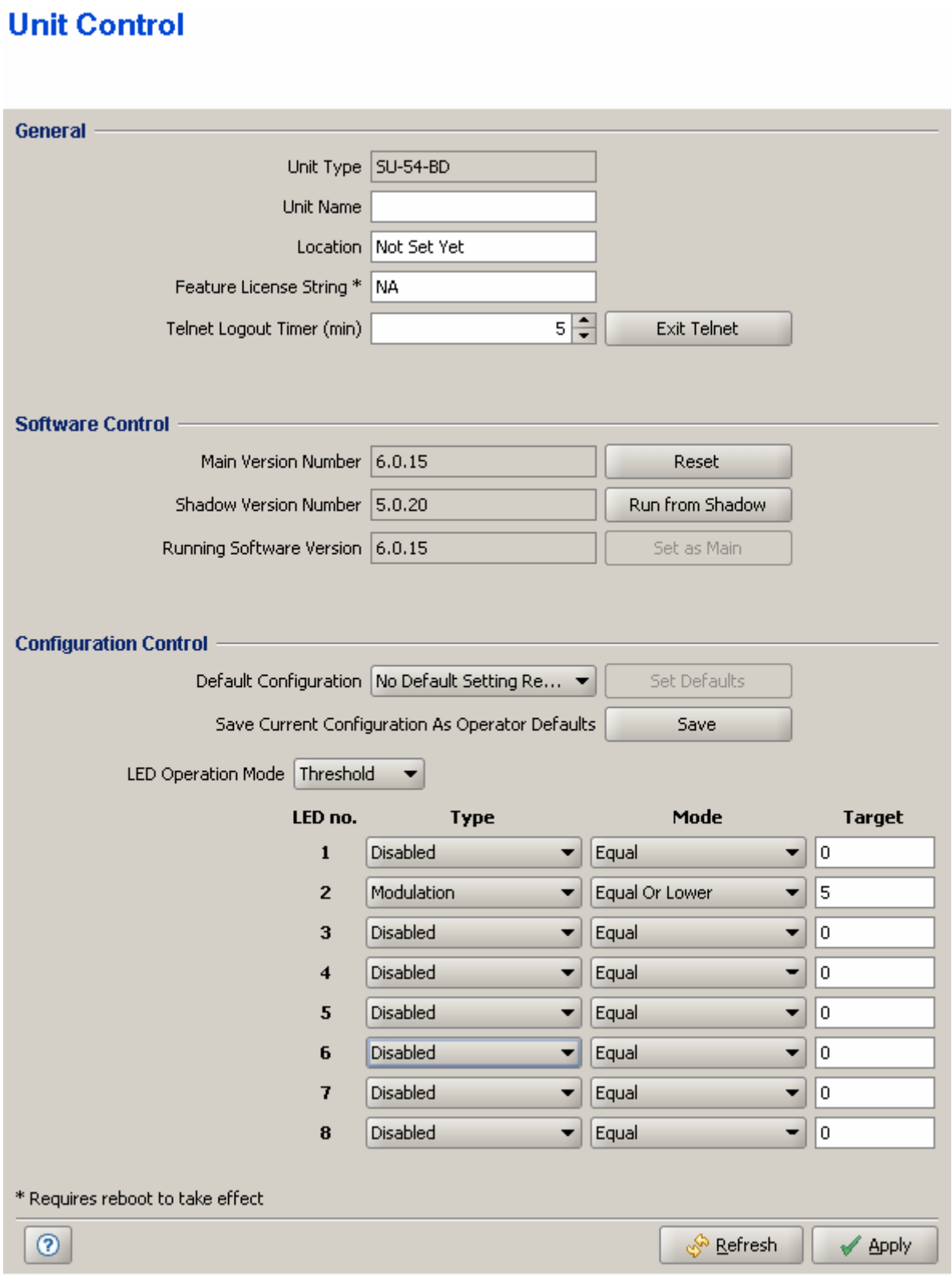


Figure 2-58: Unit Control Page SU, BU, RB

The Unit Control page includes the following sections:

- General
- Software Control
- Configuration Control

2.26.1 General

Unit Type	A read-only display of the unit's type. For a BU/RB, you can change the unit type from BU to RB or vice versa by clicking on the **Change Unit to RB/BU** button.
Unit Name	The name of the unit, which is also the system's name in the MIB2. The name of the unit is also used as the prompt at the bottom of each Monitor menu. Valid values: A string of up to 32 printable characters.
Location	The system location of the unit, which is also the sys location in MIB2. The location is also displayed as a part of the Monitor menu's header. Valid values: A string of up to 35 printable characters.
Feature License String	This option enables entering a license string for upgrading the unit to support new features and/or options.Each license string is associated with a unique MAC Address and one feature/option. If the encrypted MAC Address in the license string does not match the unit's MAC Address, the string will be rejected. After applying the license string, the unit must be reset for the change to take effect.
Telnet Logout Timer (min)	The maximum period of inactivity time following which the unit automatically exits the Monitor program. The time out duration can range from 1 to 999 minutes.
Exit Telnet	Click the button to disconnect any active Telnet session with the unit.

2.26.2 Software Control

The Software Control section includes the following read-only parameters.

Main Version Number	The software version that is defined as Main Version. This is the version to be used after next reset.

Shadow Version Number	A new software version loaded into the unit is defined as Shadow Version.
Running Software Version	The currently running software version.

The Software Control section includes also the following buttons, enabling management of the software versions:

Reset	Click the button to reset the unit. After reset, the unit will run from its main SW version. All changes to parameters that require reset that were done prior to the reset operation are applied.
Run from Shadow	Click the button to reset the unit and run from the shadow (backup) software version. Following the next reset the unit will run again from the main version.
Set as Main	Applicable only when the unit is running from its shadow version. Click to swap the versions: the currently running version will become the main version, and the other one (previously the main version) will become the shadow version.

2.26.3 Configuration Control

Default Configuration	The Default Configuration parameter enables reverting the system parameters to a predefined set of defaults. There are two sets of default configurations: ■ Factory Defaults: This is the standard default configuration. ■ Operator Defaults: As defined by the administrator (see below). For each Defaults type, you can choose to set either Partial or Full Defaults. ■ Full Defaults set default values to all parameters excluding a few parameters listed in Section 2.26.4 ■ Partial Defaults set default values to all parameters excluding the parameters that are required to maintain connectivity and management access to the unit. The parameters that do not change after Set Partial Factory Defaults are listed in Section 2.26.5. The actual change of settings will take place after the next reset. The following options are available: ■ No Default Setting Required ■ Complete Factory ■ Partial Factory ■ Complete Operator ■ Partial Operator ■ Cancel Pending Request: To cancel a previous Default Configuration change request that were not applied yet.
Save Current Configuration As Operator Defaults	Click on the **Save** button to save the current configuration of the unit as the Operator Defaults configuration The default Operator Defaults configuration is the Factory Defaults configuration..

2.26.3.1 LED Operation Mode (SU, BU and RB)

The LED Operation Mode option controls the SNR bar and LED indicators' behavior. By default, the LEDs indicate the SNR level, which facilitates SU antenna's alignment. However, it is also possible to customize the SNR bar to indicate when specific thresholds for RSSI, SNR, CRC percentage and average modulation are reached. You can switch between two operation modes:

- **Normal**: This is the default operation mode. The green LEDs on the bar indicate the SNR level while the LED indicators show the unit's status, ethernet and wireless activity.

- **Threshold**: This mode allows users to define a custom behavior for each of the 8 SNR LEDs, based on the RSSI, SNR, CRC ratio or average modulation. When in Threshold mode, the following options are available for each LED:

Type	Defines the parameter that is monitored and that the threshold is set for: ■ **Disabled**: There is no threshold defined for the LED. The LED is always off, unless all threshold conditions that were defined for the remaining LEDs are met. ■ **RSSI**: Sets up a threshold for the Received Signal Strength Indication ■ **CRC**: Sets up a threshold for the Cyclical Redundancy Check percentage. ■ **SNR**: Sets up a threshold for the Signal-to-Noise Ratio. ■ **Modulation**: Sets up a threshold for the average modulation.
Mode	Defines how the Type parameter (above) relates to the Target value (below). The available operators are: ■ **Equal or lower**: The threshold parameter must be lower than or equal to the threshold target value for the LED to light up. ■ **Equal or higher**: The threshold parameter must be higher than or equal to the threshold target value for the LED to light up. ■ **Equal**: The threshold parameter must be equal to the threshold target value for the LED to light up.
Target	This option defines the threshold target value. Depending on the threshold type, the following value ranges apply: ■ **RSSI**: -108...0 ■ **CRC**: 0...100 ■ **SNR**: 0...80 ■ **Modulation**: 1...8

If all the thresholds that were set up are reached, the entire SNR bar will light up. For instance, if LEDs 2, 5 and 6 have thresholds set for them (the rest of the SNR

LEDs are disabled) and all these thresholds are reached, instead of having only LEDs 2, 5 and 6 light up, all the SNR LEDs will light up.

2.26.4 Parameters Not Changed After Set Complete Factory/Operator Default Configuration

Page	Parameter
Network Management Parameters	SNMP Read Community
	SNMP Read/Write Community
	Installer Password
Device Page General Tab	Ethernet Negotiation Mode
Air Interface Page General Tab	Antenna Gain
Air Interface Page Frequency Tab	Defined Frequency (AU/BU)
	Frequency Definition Table (AU/BU)
	DFS Required By Regulations (AU/BU)
Air Interface Page Country Code Parameters	Sub Band Select
	Country Code Select

NOTE

The FTP parameters (FTP Server IP address, FTP Gateway IP address, FTP User Name and FTP Password), that are available for configuration only via Telnet, are not set to their default values after Set Complete Operator Defaults. However, they are set to their default value after Set Complete Factory Defaults. Note that in this case they are set to the default values immediately upon applying the Set Complete Factory Default option (even before the next reset)..

2.26.5 Parameters Not Changed After Set Partial Factory/Operator Default Configuration

Page	Parameter
Network Management Parameters	SNMP Read Community
	SNMP Read/Write Community
	Installer Password
	Wi^2 AP Client IP Address (SU/RB)
Device Page General Tab	Ethernet Negotiation Mode

Air Interface Page General Tab	Antenna Gain
	Cell Distance Option (AU)/Link Distance Option (BU)
	Max. Cell Distance (AU)/Max Link Distance (BU)
	Per SU Distance Learning (AU)
	ESSID
	Operator ESSID Option (AU/BU)
	Operator ESSID
	Hidden ESSID Option (AU/BU)
	Hidden ESSID Support (SU/RB)
	Hidden ESSID Timeout (SU/RB)
	All Noise Immunity Parameters
	All Noise Floor Calculation Parameters
Air Interface Page Frequency Tab	Defined Frequency (AU/BU)
	Frequency Definition Table (AU/BU)
	DFS Required By Regulations (AU/BU)
	SU Waiting Option (AU)
	Channel Reuse Option (AU/BU)
	Assessment Period (AU/BU)
	Max Detections in Assessment Period (AU/BU)
Air Interface Page Tx Power Parameters Tab	Tx Control (AU/BU)
	Transmit Power
	Maximum Tx Power (SU/RB)
	ATPC Option (AU/BU)
Best AU Page (SU)/Best BU Page (RB)	Best AU/BU Support
	Preferred AU/BU MAC Address
Air Interface Page Country Code Parameters	Sub Band Select (AU/BU)
	Country Code Select
IP parameters Page	IP Address
	Subnet Mask
	Default Gateway
	DHCP Option
	Access to DHCP

Security Page	Authentication Algorithm
	Data Encryption Option
	Security Mode
	Default Key (SU/RB)
	Default Multicast Key (AU/BU)
	Key # 1 to Key # 4
Performance Parameters Page	Adaptive Modulation Decision Thresholds
Bridging Page VLAN Tab	Management VLAN ID
	VLAN Q in Q Ethertype (AU and SU)
	Service Provider VLAN ID (SU)
Bridging Page Allow/Deny MAC Address List Tab (AU)	Table Action Mode
	All MAC Addresses in Table
Service Parameters Page DRAP Tab (AU)	All DRAP Parameters
Service Parameters Page WLP Tab (AU and BU-B100)	All Wireless Link Prioritization Parameters
Service Parameters Page Traffic Priority Tab	Low Priority Traffic Min (%)

NOTE

The FTP parameters (FTP Server IP address, FTP Gateway IP address, FTP User Name and FTP Password), that are available for configuration only via Telnet, are not set to their default values after Set Partial Operator Defaults. However, they are set to their default value after Set Partial Factory Defaults. Note that in this case they are set to the default values immediately upon applying the Set Partial Factory Default option (even before the next reset)..

2.27 Configuration Backup Page

The Configuration Backup Configuration page enables loading to the PC running the AlvariCRAFT application backup files of the managed device's configuration or loading backup files from the PC to the device.

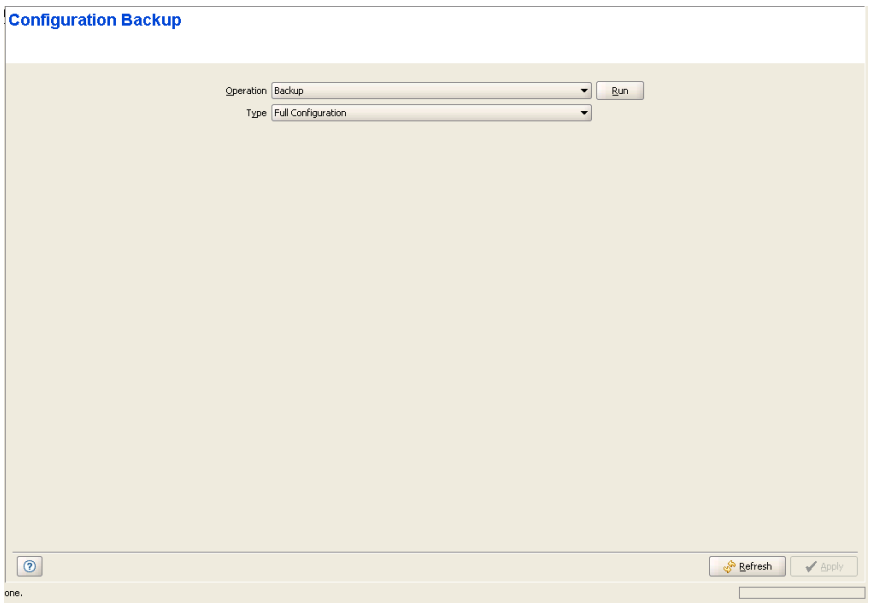


Figure 2-59: Configuration Backup Page - Backup Operation

To load to the PC a Configuration Backup file of the device:

1 In the Operations drop-down menu, select Backup.

2 Select the required type in the Type drop-down menu.

The following backup file types can be created:

- **Full Configuration**: The current configuration of the device.
- **Operator Configuration**: The Operator Defaults configuration.

3 Click on the **Run** button. A **Save** window will be opened, enabling you to select name and path for the file to be saved. The default name is <Device Name> <File Type> <date in the format yyyymmdd> <time in the format hhmm>.res.

4 Select location and name and click **Save**.

To load from the PC a Configuration Backup file to the device:

1 In the Operations drop-down menu, select Restore.

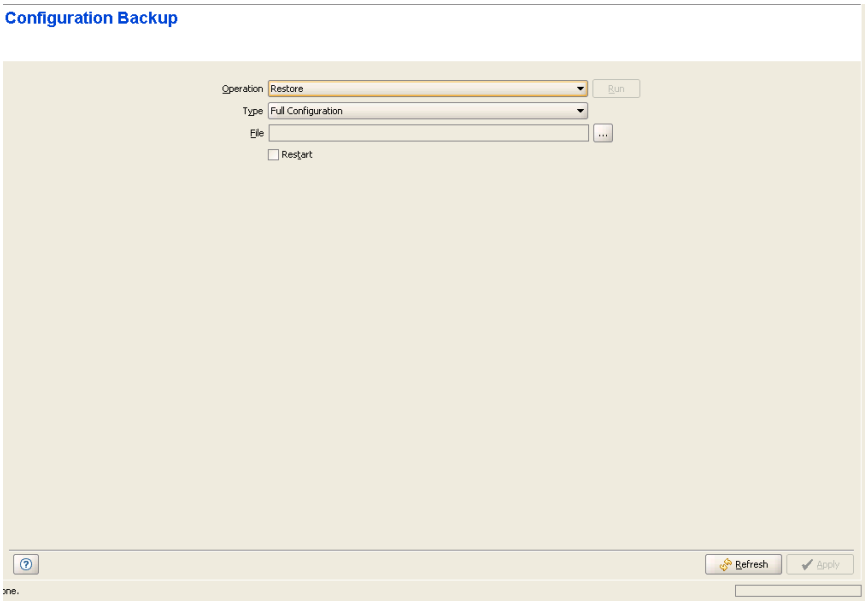


Figure 2-60: Configuration Backup Page - Restore Operation

2 Select the required type in the Type drop-down menu.

3 Click on the browser button next to the File text box to open the **Choose** window, enabling you to select the required Configuration Backup file that must be available on the PC running the AlvariCRAFT application.

4 After selecting the file, the read-only File text box will display the path to the selected file.

5 If you wish to restart the device after loading the file, mark the **Restart** check-box. Otherwise make sure that it is not marked.

6 Click on the **Upload** button. The operation's results will be displayed.

2.28 Software Upgrade Page

The Software Upgrade page for SU, BU or RB enables upgrading the SW version of the managed device. For an AU, the Software Upgrade page enables upgrading the SW version of the entire or part of the cell (the AU and/or all or selected SUs).

The SW version(s) to be loaded to the device(s) must be available in the PC running the application.

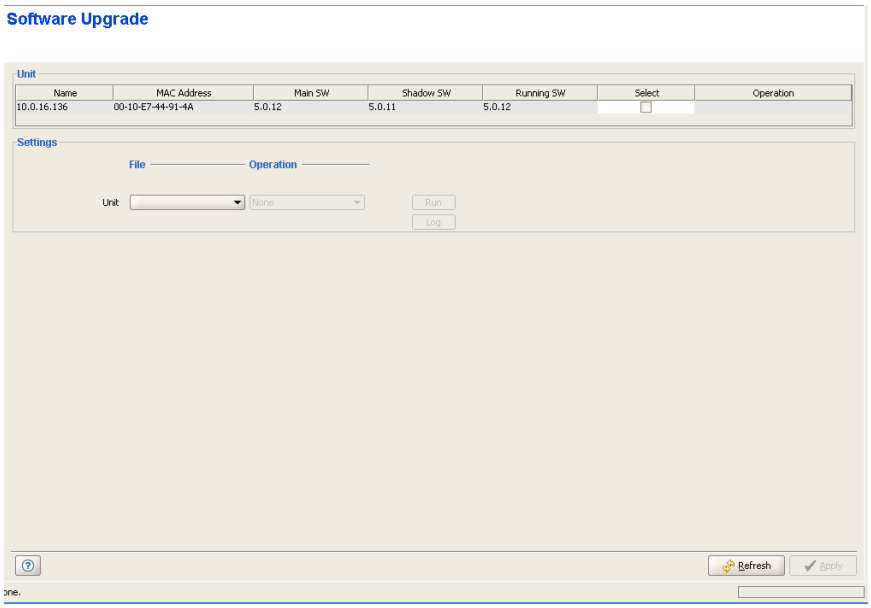


Figure 2-61: Software Upgrade Page - SU/BU/RB

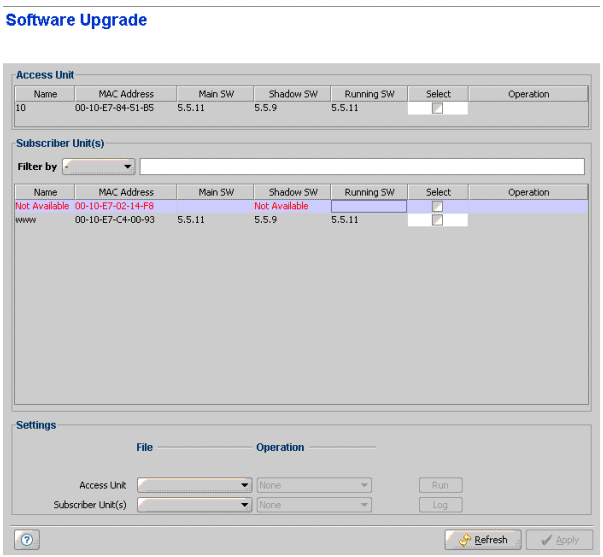


Figure 2-62: Software Upgrade Page - AU

The **Unit** section in the Software Upgrade page for SU/BU/RB includes the details of the unit: Name (if defined), MAC Address, Main SW, Shadow SW and Running SW.

In the Software Upgrade page for an AU, the unit details are provided for the AU (in the **Access Unit** section) and for each of the associated SUs (in the **Subscriber Unit(s)** section). SU-EZ units are displayed in red and cannot be selected. You can Filter the list of displayed SUs busing the **Filter by** drop down menu and, if needed, the text field next to it. The filtering criteria include Name, MAC Address, Main SW, Shadow SW and Running SW.

To upgrade the SW version of the unit (SU/BU/RB) or of selected units (AU):

1. For SU/BU/RB: Check the check-box in the **Unit** section.
   For AU: In the **Access Unit** and **Subscriber Unit(s)** sections, check the check boxes of the AU and/or SUs you want to upgrade. If necessary, narrow down the list of displayed SUs using the **Filter by** option.
2. In the **Settings** section, click on the **File** dropdown box and select the **From Disk** option. Click on th broswer icon to open the **Open** window. Select the required SW upgrade file and click **Open**. In the Software Upgrade page for AU, separate files should be specified for the AU and for SUs.
3. In the **Operation** dropdown menu, select the required operation:

None	No operation
Load to Shadow	Load the specified Sw file to the shadow memory of the device.
Run from Shadow	Load the specified Sw file to the shadow memory of the device Reset the device and run from the shadow software version. Following the next reset the unit will run again from the main version (previous version).
Set as Main	Load the specified Sw file to the shadow memory of the device Reset the device and run from the shadow software version. Swap the versions so that the new version will become the main version. Following the next reset the unit will run from the new version.

In Software Upgrade for AU, different operations may be defined for the AU and for SUs.

4 Click **Run**. A Run dialog box will open, enabling you to save a log of the process, run the process without saving a log, or cancel the Run request. If you selected to save a log, a **Save** dialog box will open, enabling you to select the location and file name for the log. The default log file name includes the the device's IP address and the current Date and Time, with the extension ".log". After confirmation, the operation's Run log will be displayed. The **Abort** button enables you to cancel an operation before completion. Close the Run log window to resume normal operation of AlvariCRAFT.

To view a log of a previously executed process:

5 Click on the **Log** button to open the Log window for the last executed process. To view a previous log, click on the **Open** button in the Log window and select the required log. Close the Log window to resume normal operation of AlvariCRAFT.

2.29 Software Upgrade SU-L Page

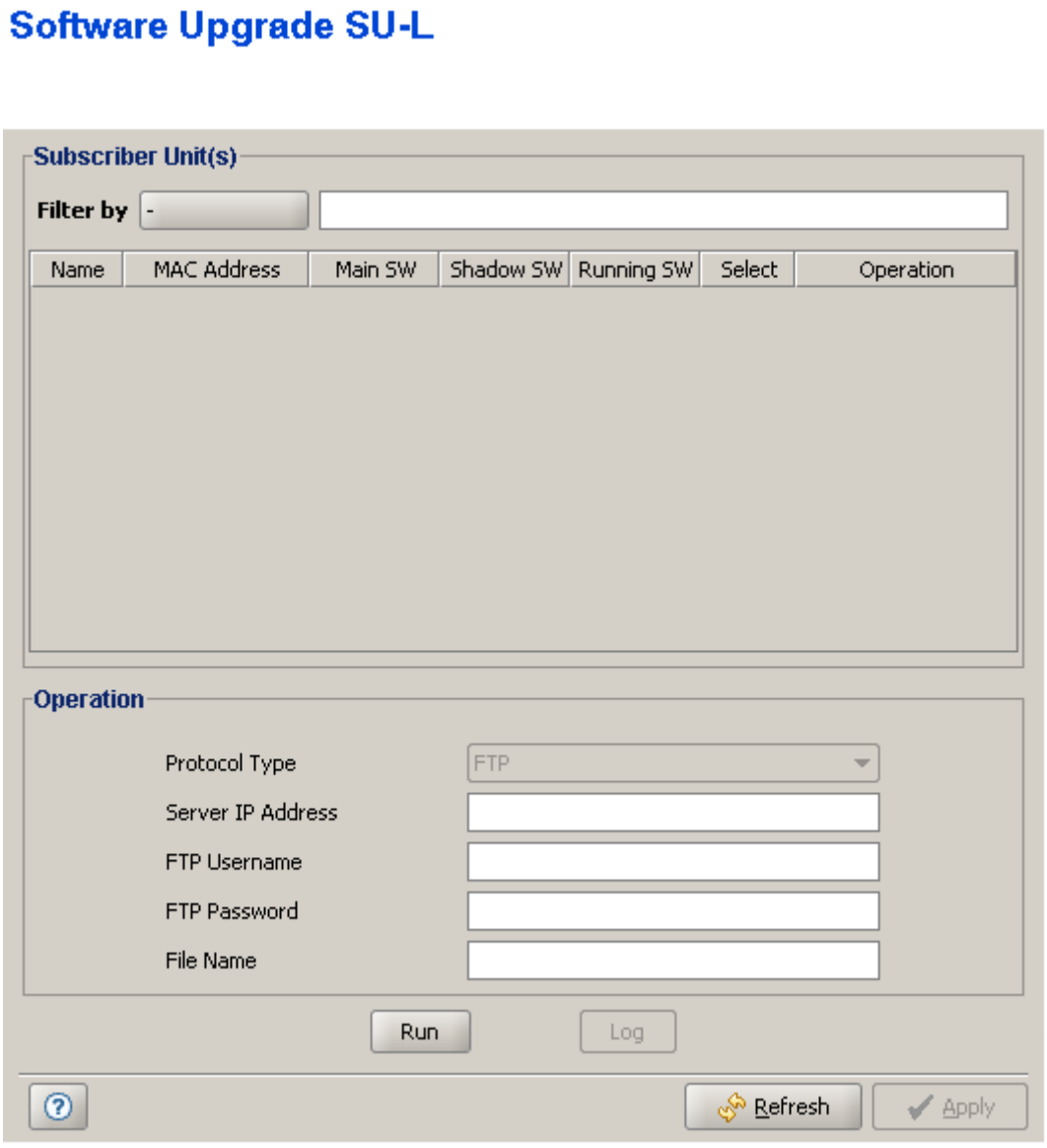


Figure 2-63: Software Upgrade SU-L Page - AU

2.30 Multiple Configuration Page (AU Only)

The Multiple Configuration page enables simultaneous configuration changes in all or selected SUs associated with the AU.

- Using Multiple Configuration Screens
- Multiple Configuration Screens
- Performing Multiple Configuration

2.30.1 Using Multiple Configuration Screens

Note that Multiple Configuration is a “write-only” operation.

Drop-down menus in Multiple Configuration screens include an empty (none) option to enable a “No Change” selection.

Tables in Multiple Configuration screens enables either adding or removing entries from the relevant tables in the managed devices:

Click on the **Add** button to add a line to the table, and click on the added line (colored light blue) to define the value(s) of the entry. Click again on the **Add** button to add another entry to the table. Select an entry and click on the **Delete** button to remove it from the table.

Use the **Action Table** option to select between **Insert** (adding the values included in the table on the screen to the tables in the managed devices) or **Remove** (removing the values included in the table on the screen from the tables in the managed devices).

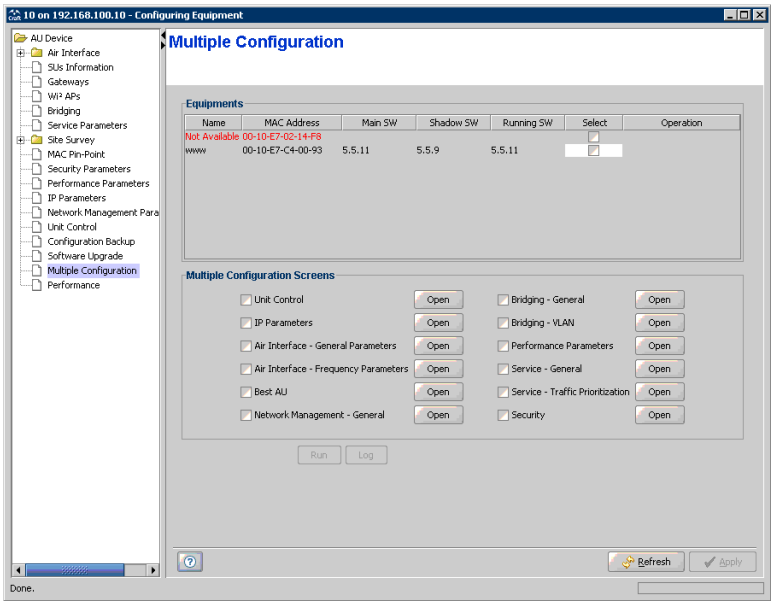


Figure 2-64: Multiple Configuration Page - Main Screen

The **Equipment** section displays the main details (Name, MAC Address, Main SW, Shadow SW, Running SW) for each of the associated SUs. SU-EZ units are displayed in red and cannot be selected.

In the **Multiple Configuration Screens** section, click on the **Open** button next to an item to open the Multiple Configuration screen for the applicable parameters group.

2.30.2 Multiple Configuration Screens

- Unit Control Screen
- IP Parameters Screen
- Air Interface - General Parameters Screen
- Air Interface - Frequency Parameters Screen
- Best AU Screen
- Network Management - General Screen
- Bridging - General Screen
- Bridging - VLAN Screen

- Performance Parameters Screen
- Service - General Screen
- Service - Traffic Prioritization Screen
- Security Screen

2.30.2.1 Unit Control Screen

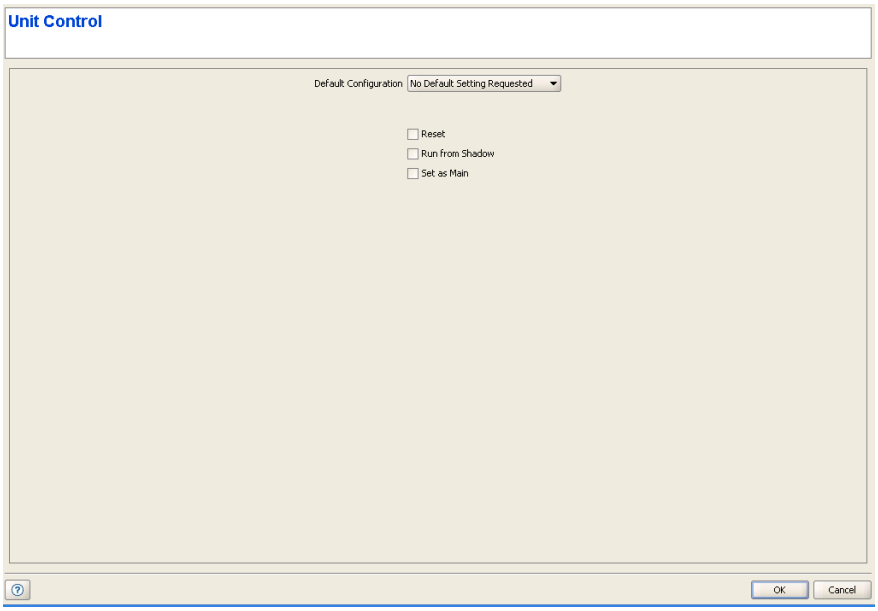


Figure 2-65: Multiple Configuration Page - Unit Control Screen

The Unit Control screen includes the following options:

- Default Configuration
- Reset
- Run from Shadow
- Set as Main

Refer to the “Unit Control Page” on page 162 for more details on these options.

2.30.2.2 IP Parameters Screen

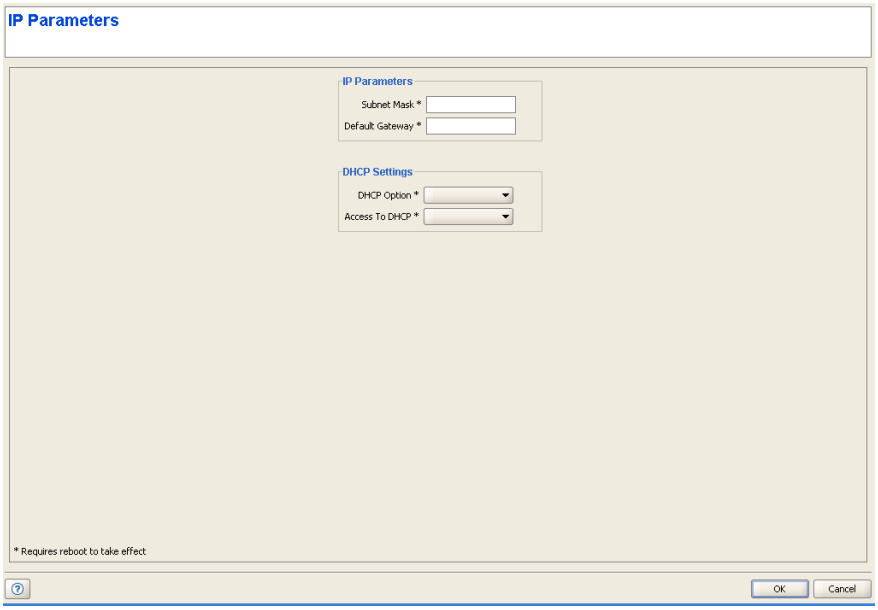


Figure 2-66: Multiple Configuration Page - IP Parameters Screen

The IP Parameters screen includes the following parameters:

- Subnet Mask
- Default Gateway
- DHCP Option
- Access To DHCP

Refer to the "IP Parameters Page" on page 155 for more details on these parameters.

2.30.2.3 Air Interface - General Parameters Screen

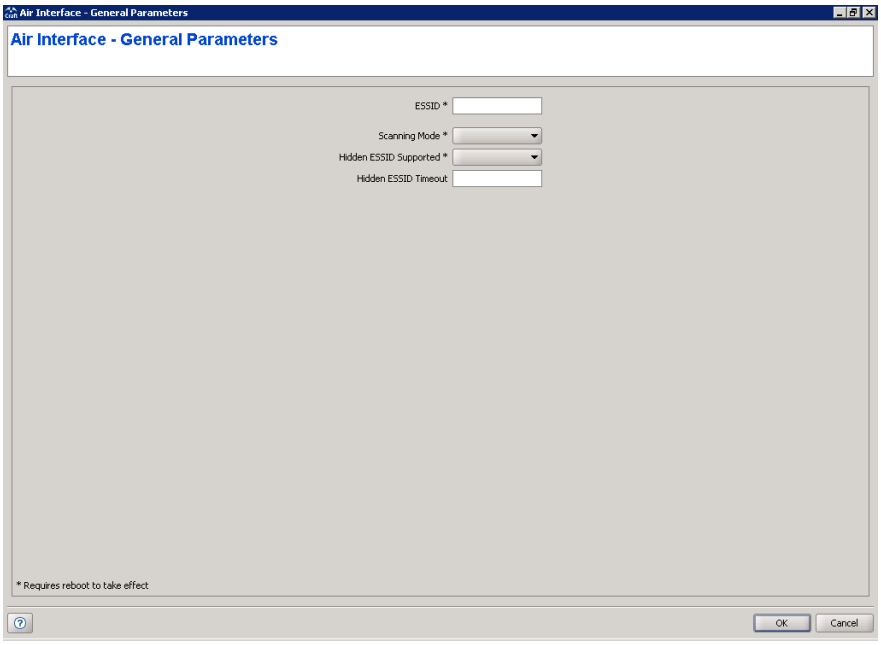


Figure 2-67: Multiple Configuration Page - Air Interface - General Parameters Screen

The Air Interface - General Parameters screen includes the following options:

- ESSID
- Scanning Mode
- Hidden ESSID Support
- Hidden ESSID Time-out

Refer to the "Air Interface General Page" on page 31 for more details on these options.

2.30.2.4 Air Interface - Frequency Parameters Screen

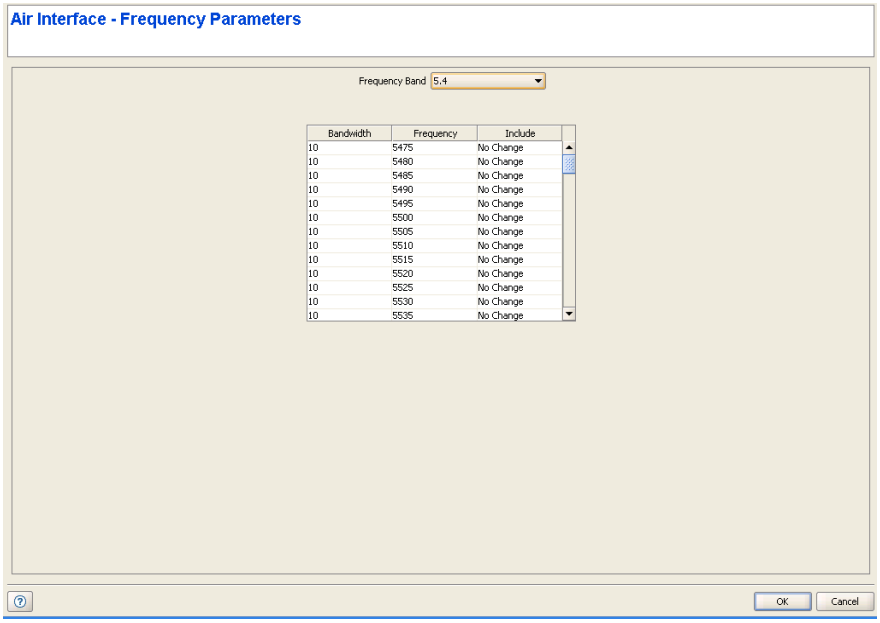


Figure 2-68: Multiple Configuration Page - Air Interface - Frequency Parameters Screen

The Air Interface - Frequency Parameters screen includes the following parameters:

- Frequency Band
- Frequencies Selection Table

In the **Frequency Band** drop down menu, select the required radio band. All frequencies applicable to the selected radio band will be displayed in the table, starting with the frequencies for the 10 MHz Sub Band and followed by the frequencies for the 20 MHz Sub Band.

Note that the displayed frequencies may include frequencies that are not supported by the specific Country Code used by the devices.

The default option for all **Include** entries is No Change. If you want to change the setting for one or more frequencies, click on the Include entry for a selected frequency and select the required option (No Change, Yes or No).

Refer to the “Air Interface Frequency Page” on page 46 for more details on these parameters.

2.30.2.5 Best AU Screen

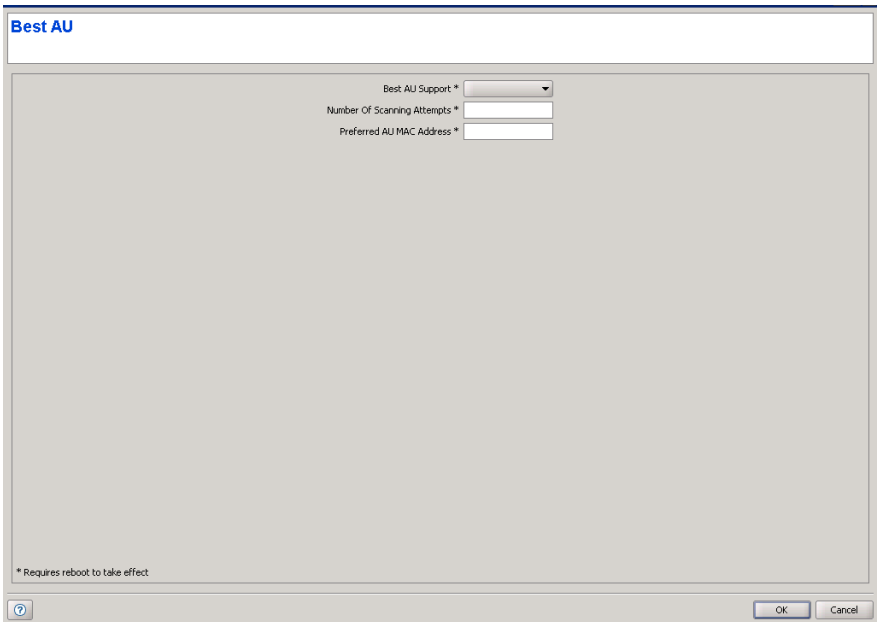


Figure 2-69: Multiple Configuration Page - Best AU Screen

The Best AU screen includes the following parameters:

- Best AU Support
- Number Of Scanning Attempts
- Preferred AU MAC Address

Refer to the "Best AU Page (SU Only)/Best BU Page (RB Only)" on page 79 for more details on these parameters.

2.30.2.6 Network Management - General Screen

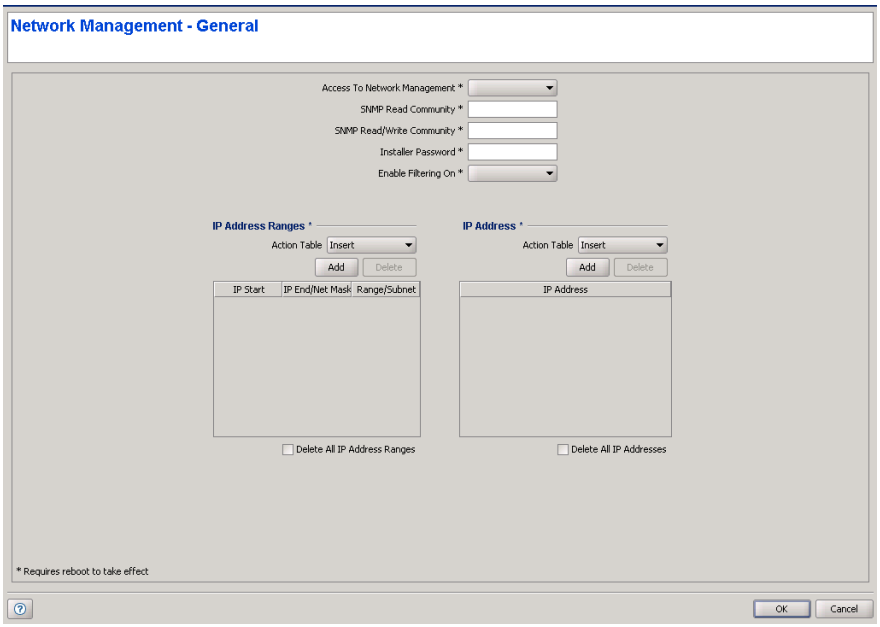


Figure 2-70: Multiple Configuration Page - Network Management - General Screen

The Network Management-General screen includes the following parameters:

- Access To Network Management
- SNMP Read Community
- SNMP Read/Write Community
- Installer Password
- Enable Filtering On
- IP Address Ranges table
- IP Address table

Refer to the "Network Management Parameters Page General Tab" on page 157 for more details on these parameters.

2.30.2.7 Bridging - General Screen

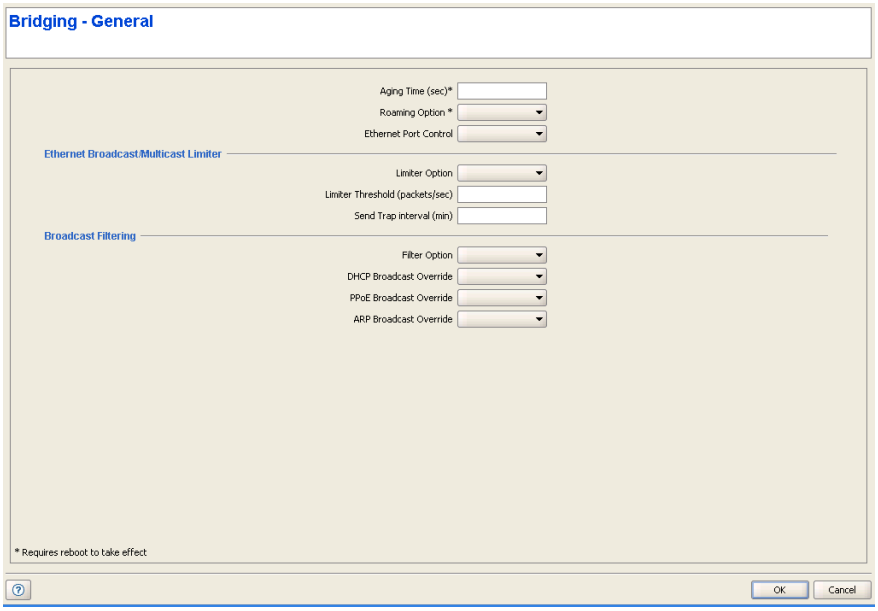


Figure 2-71: Multiple Configuration Page - Bridging - General Screen

The Bridging - General screen includes the following parameters:

- Aging Time
- Roaming Option
- Ethernet Port Control
- Limiter Option
- Limiter Threshold
- Send Traps Interval
- Filter Option
- DHCP Broadcast Override
- PPPoE Broadcast Override
- ARP Broadcast Override

Refer to “The Bridging Page General Tab” on page 97 for more details on these parameters.

2.30.2.8 Bridging - VLAN Screen

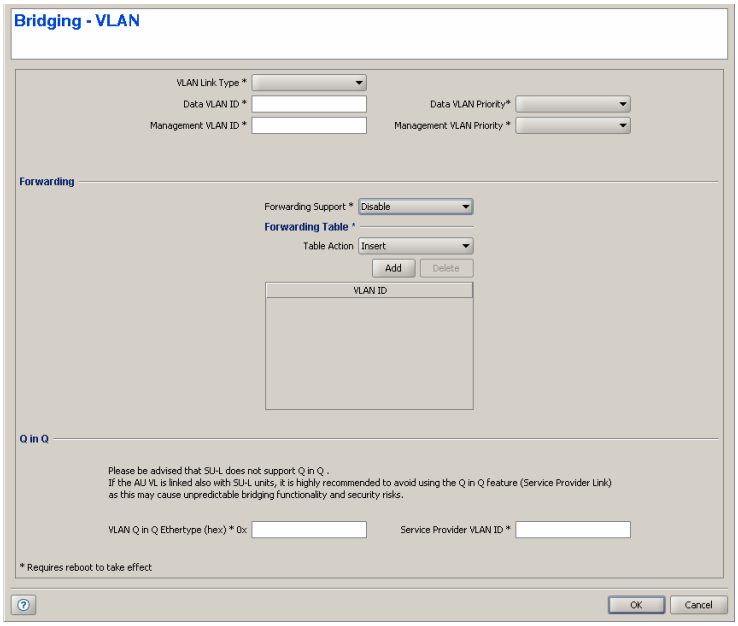


Figure 2-72: Multiple Configuration Page - Bridging - VLAN Screen

The Bridging - VLAN screen includes the following parameters:

- VLAN Link Type
- Data VLAN ID
- Management VLAN ID
- Data VLAN Priority
- Management VLAN Priority
- Forwarding Support and Forwarding Table
- VLAN Q in Q Ethertype
- Service Provider VLAN ID

Refer to “The Bridging Page VLAN Tab” on page 106 for more details on these parameters.

2.30.2.9 Performance Parameters Screen

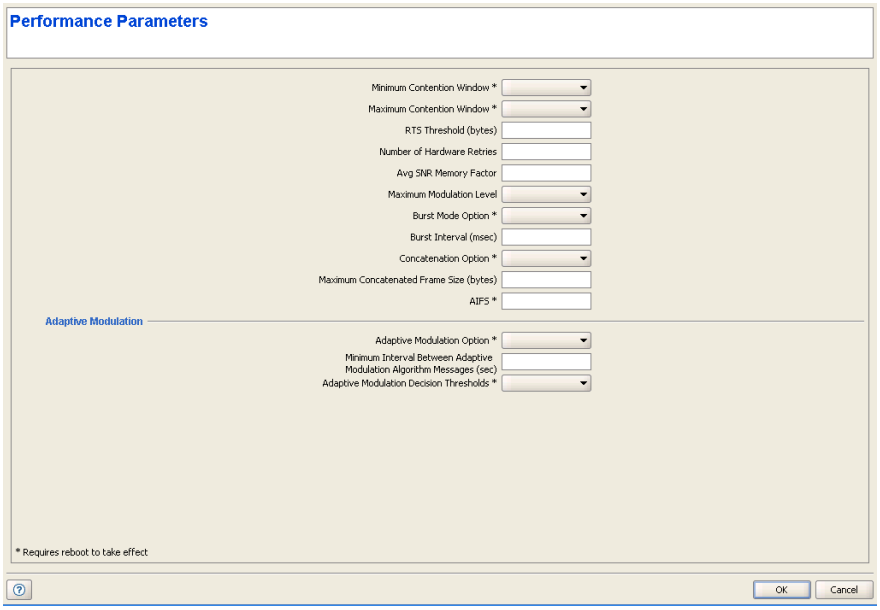


Figure 2-73: Multiple Configuration Page - Performance Parameters Screen

The Performance Parameters screen includes the following parameters:

- Minimum Contention Window
- Maximum Contention Window
- RTS Threshold
- Number of Hardware Retries
- AVG SNR Memory Factor
- Maximum Modulation Level
- Burst Mode Option
- Burst Interval
- Concatenation Option

- Maximum Concatenated Frame Size
- AIFS
- Adaptive Modulation Option
- Minimum Interval Between Adaptive Modulation Algorithm Messages
- Adaptive Modulation Decision Thresholds

Refer to the "Performance Page" on page 205 for more details on these parameters.

2.30.2.10 Service - General Screen

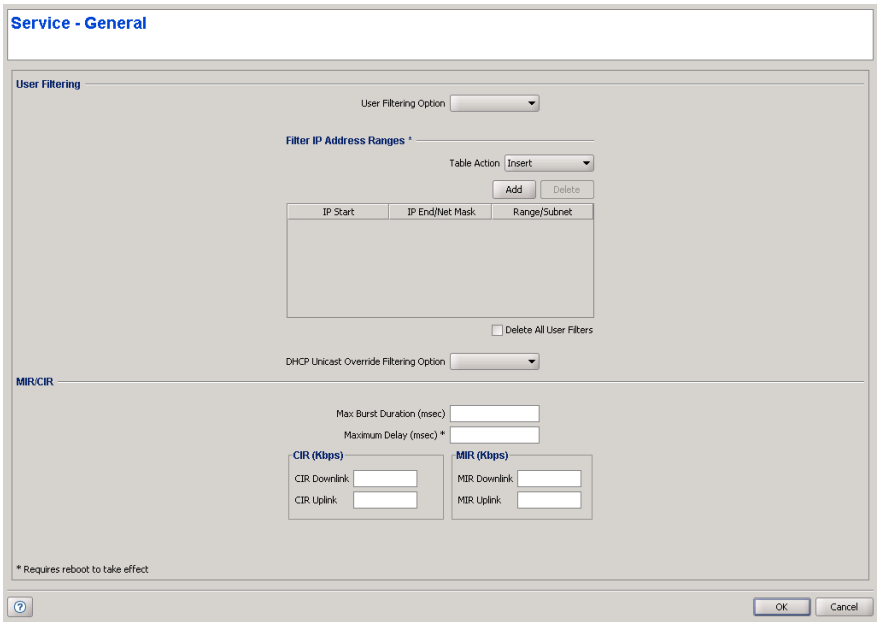


Figure 2-74: Multiple Configuration Page - Service - General Screen

The Service - General screen includes the following parameters:

- User Filtering Option
- Filter IP Address Ranges
- DHCP Unicast Override Filtering Option
- Max Burst Duration

- Maximum Delay
- CIR Downlink
- CIR Uplink
- MIR Downlink
- MIR Uplink

Refer to "The Service Parameters Page General Tab" on page 117 for more details on these parameters.

2.30.2.11 Service - Traffic Prioritization Screen

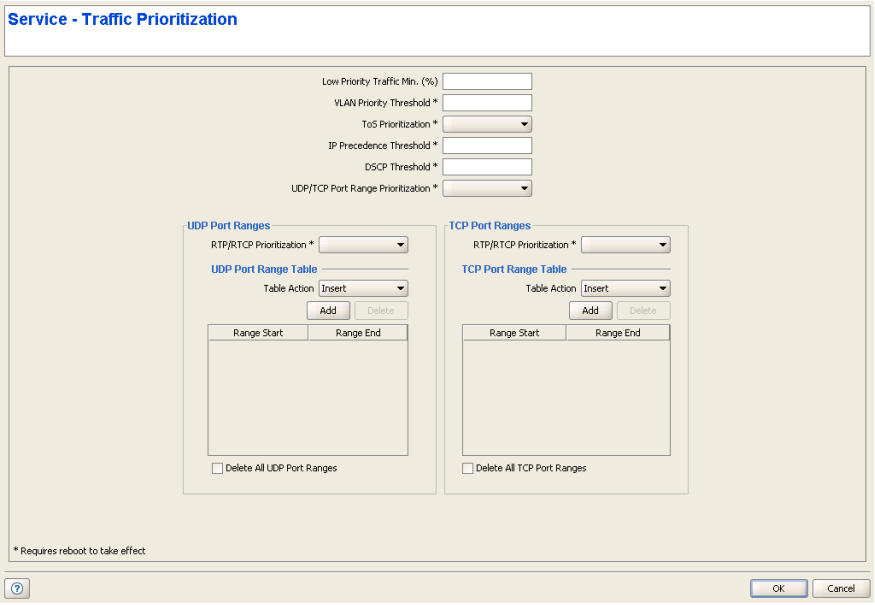


Figure 2-75: Multiple Configuration Page - Service - Traffic Prioritization Screen

The Service - Traffic Prioritization screen includes the following parameters:

- Low Priority Traffic Min.(%)
- VLAN Priority Threshold
- ToS Prioritization
- IP Precedence Threshold

- DSCP Threshold
- UDP/TCP Port Range Prioritization
- UDP Port Ranges
  - » RTP/RTCP Prioritization
  - » UDP Port Range Table
  - » Delete All UDP Port Ranges
- TCP Port Ranges
  - » RTP/RTCP Prioritization
  - » TCP Port Range Table
  - » Delete All TCP Port Ranges

Refer to "The Service Parameters Page Traffic Priority Tab" on page 128 for more details on these parameters.

2.30.2.12 Security Screen

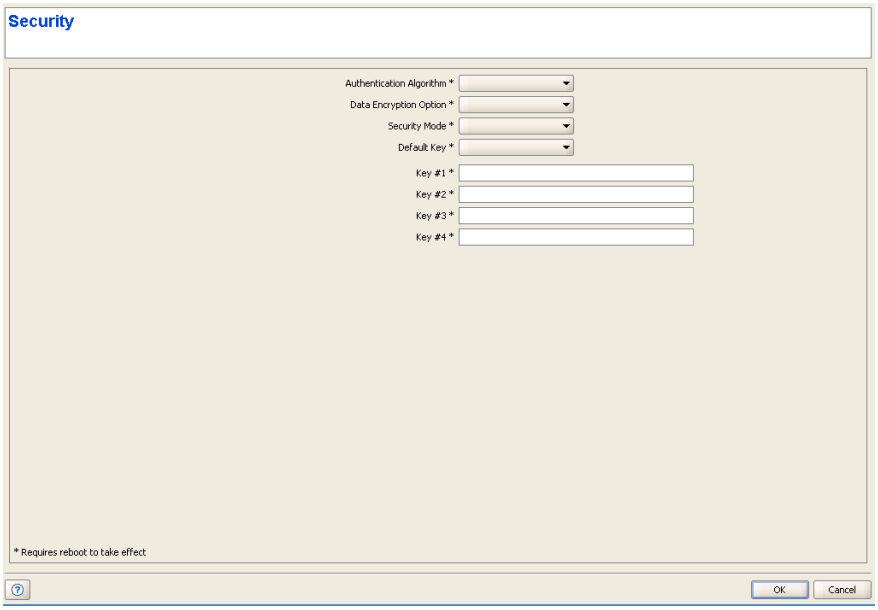


Figure 2-76: Multiple Configuration Page - Security Screen

The Security screen includes the following parameters:

- Authentication Algorithm
- Data Encryption Option
- Security Mode
- Default Key
- Key # 1 to Key # 4

Refer to the "Security Parameters Page" on page 139 for more details on these parameters.

2.30.3 Performing Multiple Configuration

1. Select the required screens (using the Open buttons) and make the required configuration changes. After completing the configuration changes in each screen, click OK to save the changes and return to the main screen. The check box next to the name of a screen with configuration changes will be checked automatically.
2. After completing all configuration changes verify that the check boxes next to the required screens names are checked.
3. In the Equipment section, check the Select check boxes of all SUs that should participate in the Multiple Configuration process.
4. Click **Run**. A Run dialog box will open, enabling you to save a log of the process, run the process without saving a log, or cancel the Run request. If you selected to save a log, a **Save** dialog box will open, enabling you to select the location and file name for the log. The default log file name includes the the current Date and Time, with the extension ".log". After confirmation, the operation's Run log will be displayed. The **Abort** button enables you to cancel an operation before completion. Close the Run log window to resume normal operation of AlvariCRAFT.:

To view a log of a previously executed process:

5. Click on the **Log** button to open the Log window for the last executed process. To view a previous log, click on the **Open** button in the Log window and select the required log. Close the Log window to resume normal operation of AlvariCRAFT.

2.31 Multiple Configuration SU-L Page

2.31.1 Using Multiple Configuration Screens for SU-L

Multiple configurations screens for SU-L are handled identically to multiple configuration screens for regular SUs. For more information see "Using Multiple Configuration Screens" on page 177.

2.31.2 Multiple Configuration Screens for SU-L

- Unit Control
- IP Parameters
- Air Interface - Frequency Parameters
- Best AU
- Bridging - VLAN
- Performance Parameters
- Service - General
- Service - Traffic Prioritization
- Security

2.31.2.1 Unit Control

This screen allows resetting the units and setting up the LED operation mode.

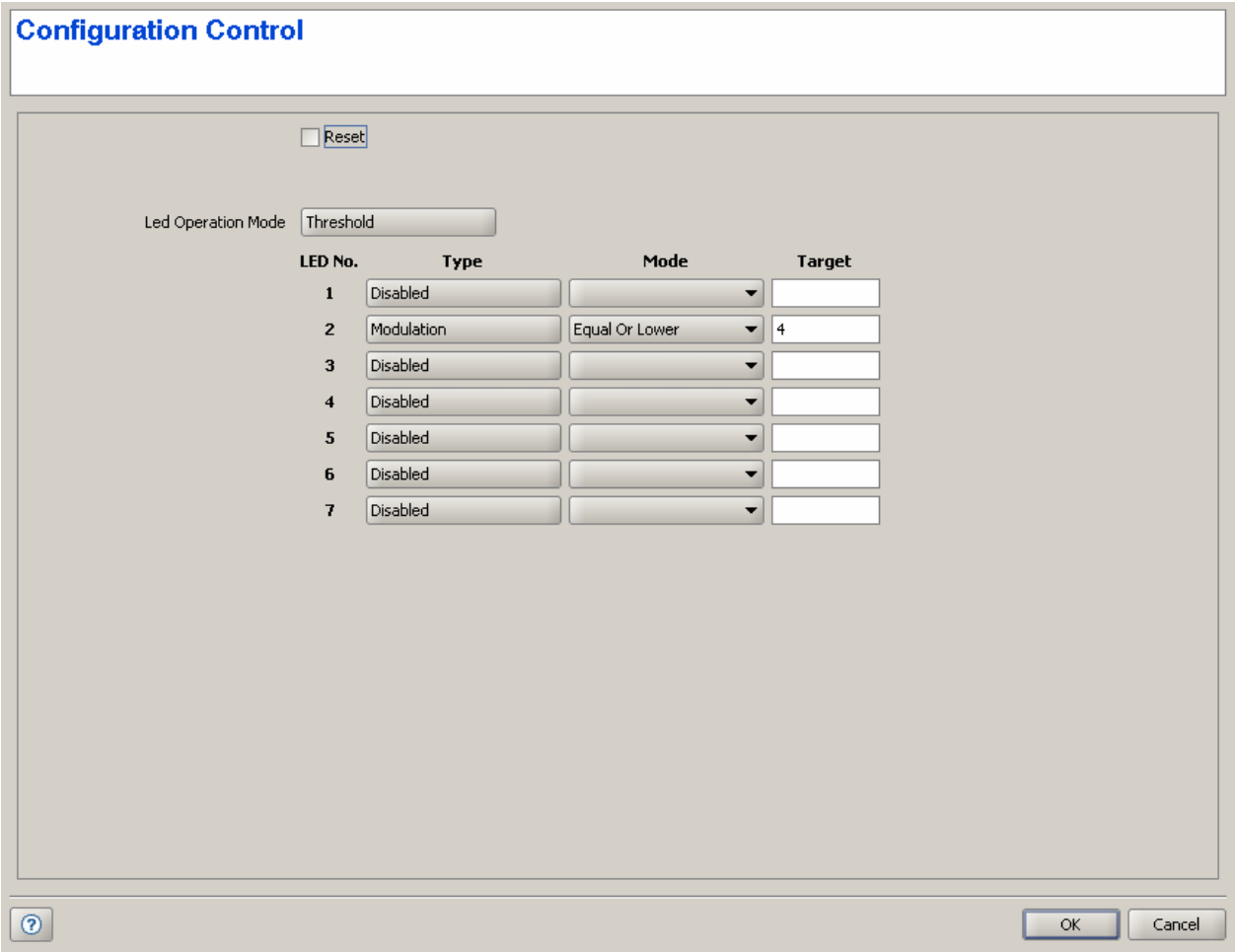


Figure 2-77: Multiple Configuration Page SU-L - Unit Control

Check the Reset checkmark to reset the units. After reset, the units will run from their main SW version. All changes to parameters that require reset that were done prior to the reset operation are applied.

The LED Operation Mode option controls the SNR bar and LED indicators' behavior. By default, the LEDs indicate the SNR level, which facilitates SUs antennas' alignment. However, the SNR bar can be customized to indicate when specific thresholds for RSSI, SNR, CRC percentage and average modulation are reached. You can switch between two operation modes:

- **Normal**: This is the default operation mode. The green LEDs on the bar indicate the SNR level while the LED indicators show the unit's status, ethernet and wireless activity.

- **Threshold**: This mode allows users to define a custom behavior for each of the 8 SNR LEDs, based on the RSSI, SNR, CRC ratio or average modulation. When in Threshold mode, the following options are available for each LED:

Type	Defines the parameter that is monitored and that the threshold is set for: ■ **Disabled**: There is no threshold defined for the LED. The LED is always off, unless all threshold conditions that were defined for the remaining LEDs are met. ■ **RSSI**: Sets up a threshold for the Received Signal Strength Indication ■ **CRC**: Sets up a threshold for the Cyclical Redundancy Check percentage. ■ **SNR**: Sets up a threshold for the Signal-to-Noise Ratio. ■ **Modulation**: Sets up a threshold for the average modulation.
Mode	Defines how the Type parameter (above) relates to the Target value (below). The available operators are: ■ **Equal or lower**: The threshold parameter must be lower than or equal to the threshold target value for the LED to light up. ■ **Equal or higher**: The threshold parameter must be higher than or equal to the threshold target value for the LED to light up. ■ **Equal**: The threshold parameter must be equal to the threshold target value for the LED to light up.
Target	This option defines the threshold target value. Depending on the threshold type, the following value ranges apply: ■ **RSSI**: -108...0 ■ **CRC**: 0...100 ■ **SNR**: 0...80 ■ **Modulation**: 1...8

If all the thresholds that were set up are reached, the entire SNR bar will light up. For instance, if LEDs 2, 5 and 6 have thresholds set for them (the rest of the SNR LEDs are disabled) and all these thresholds are reached, instead of having only LEDs 2, 5 and 6 light up, all the SNR LEDs will light up.

2.31.2.2 IP Parameters

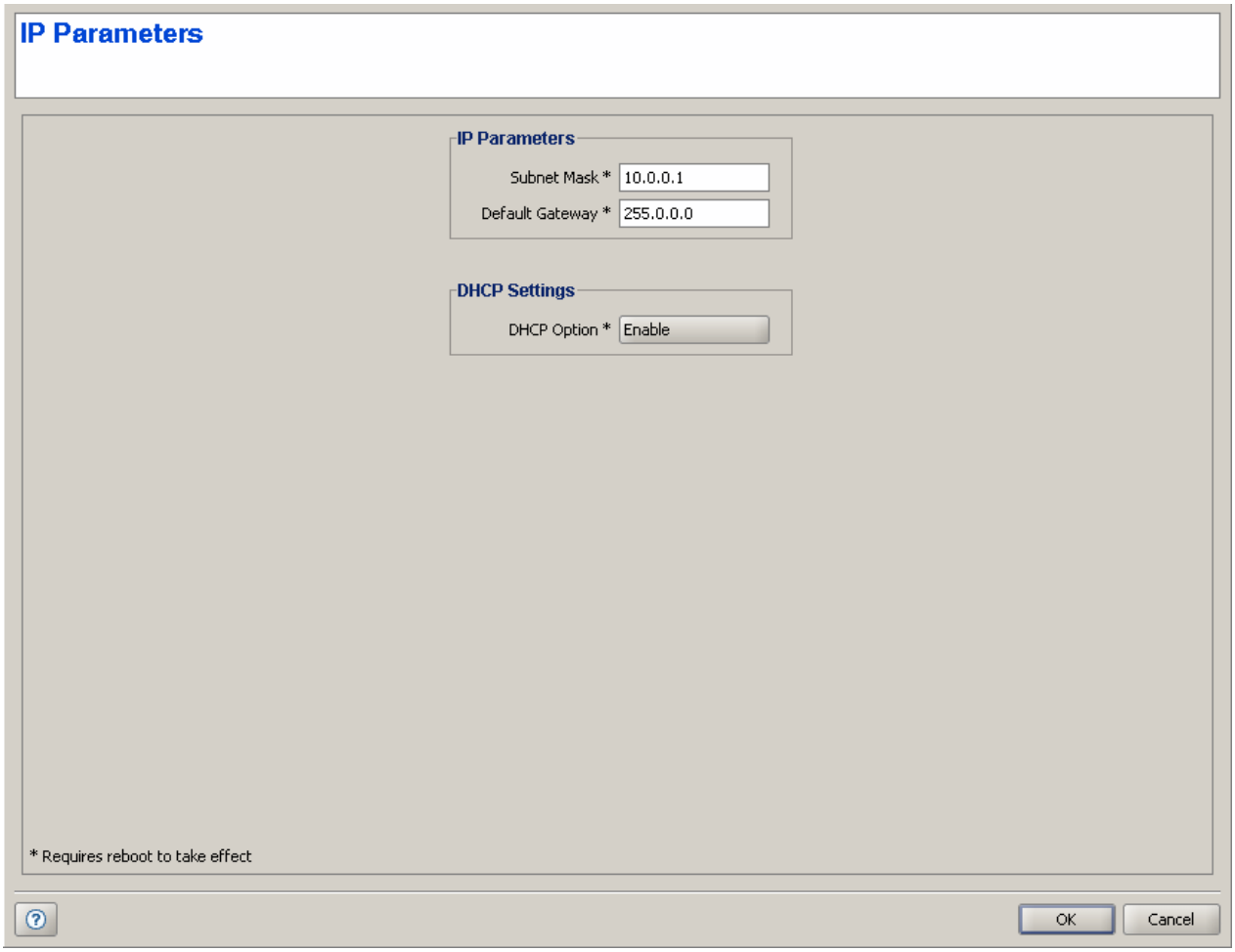


Figure 2-78: Multiple Configuration Page SU-L - IP Parameters

The IP Parameters screen includes the following parameters:

- Subnet Mask
- Default Gateway
- DHCP Option

Refer to the "IP Parameters Page" on page 155 for more details on these parameters.

2.31.2.3 Air Interface - Frequency Parameters

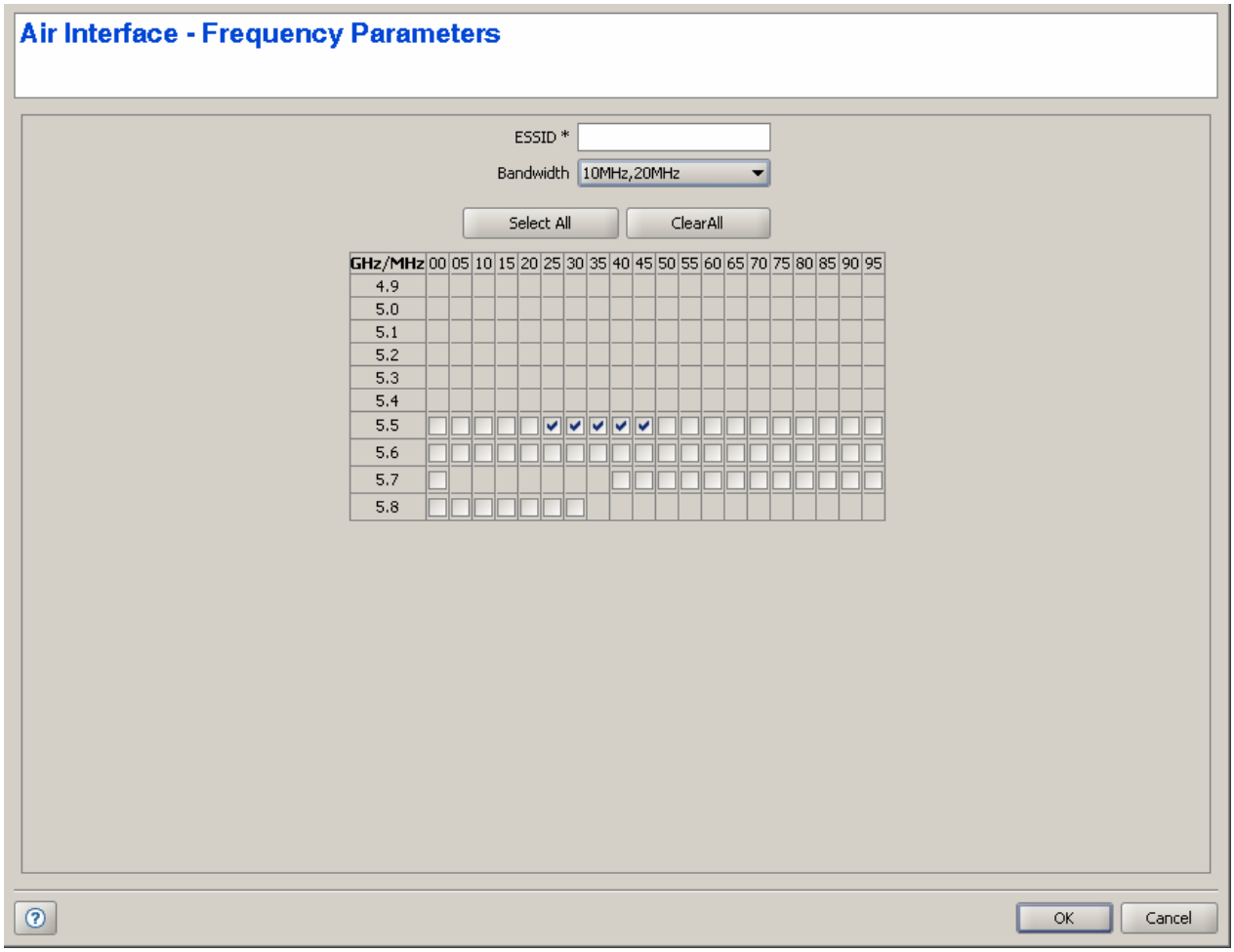


Figure 2-79: Multiple Configuration Page SU-L - Air Interface - Frequency Parameters

This screen configures the channels that the units may use to associate to an AU. The following options are available:

ESSID	The ESSID, or wireless network name, of the network you want to connect to. All wireless clients and Access Units in the same network must use the same ESSID to associate. The ESSID is case sensitive and can consist of up to 31 alphanumeric characters.

Bandwidth	This option sets the channel banwidth(s) that the units may use for association: ■ 10MHz - Units may associate on 10 MHz channels ■ 20MHz - Units may associate on 20 MHz channels ■ 10MHz,20MHz - Units may associate on either 10 MHz or 20 MHz channels
Select All	Selects all available frequencies in the regulatory domain.
Clear All	De-selects all available frequencies in the regulatory domain
Frequency Channels	Allows you to select individual frequencies that may be used for association.

2.31.2.4 Best AU

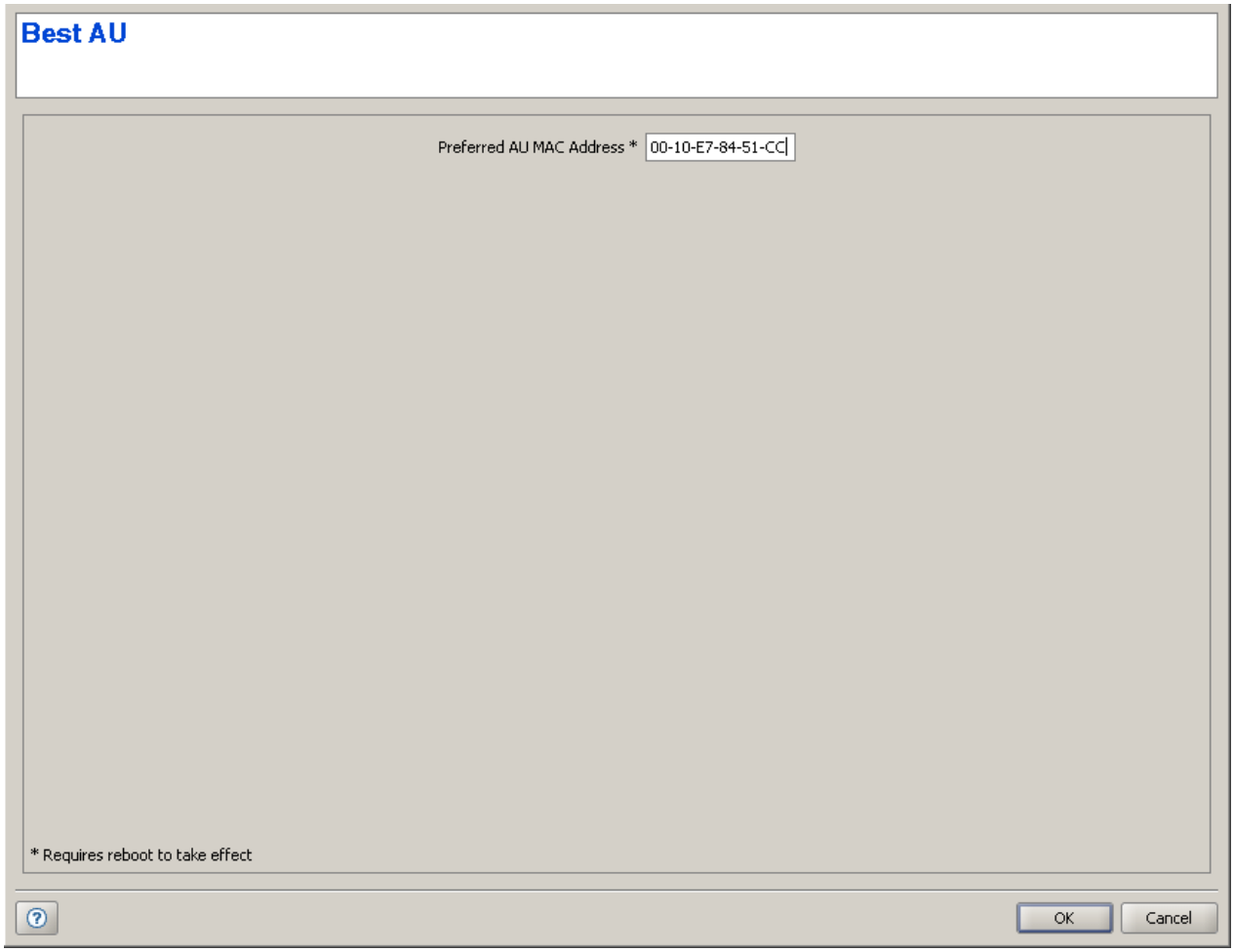


Figure 2-80: Multiple Configuration Page SU-L - Best AU

The Best AU screen includes the Preferred AU MAC Address parameter. This command sets the MAC address for a specific AU the SUs will attempt to connect to on startup. Setting this value to 00:00:00:00:00:00 disables the feature and sets the SUs to choose their AU based on the Best AU selection process.

2.31.2.5 Bridging - VLAN

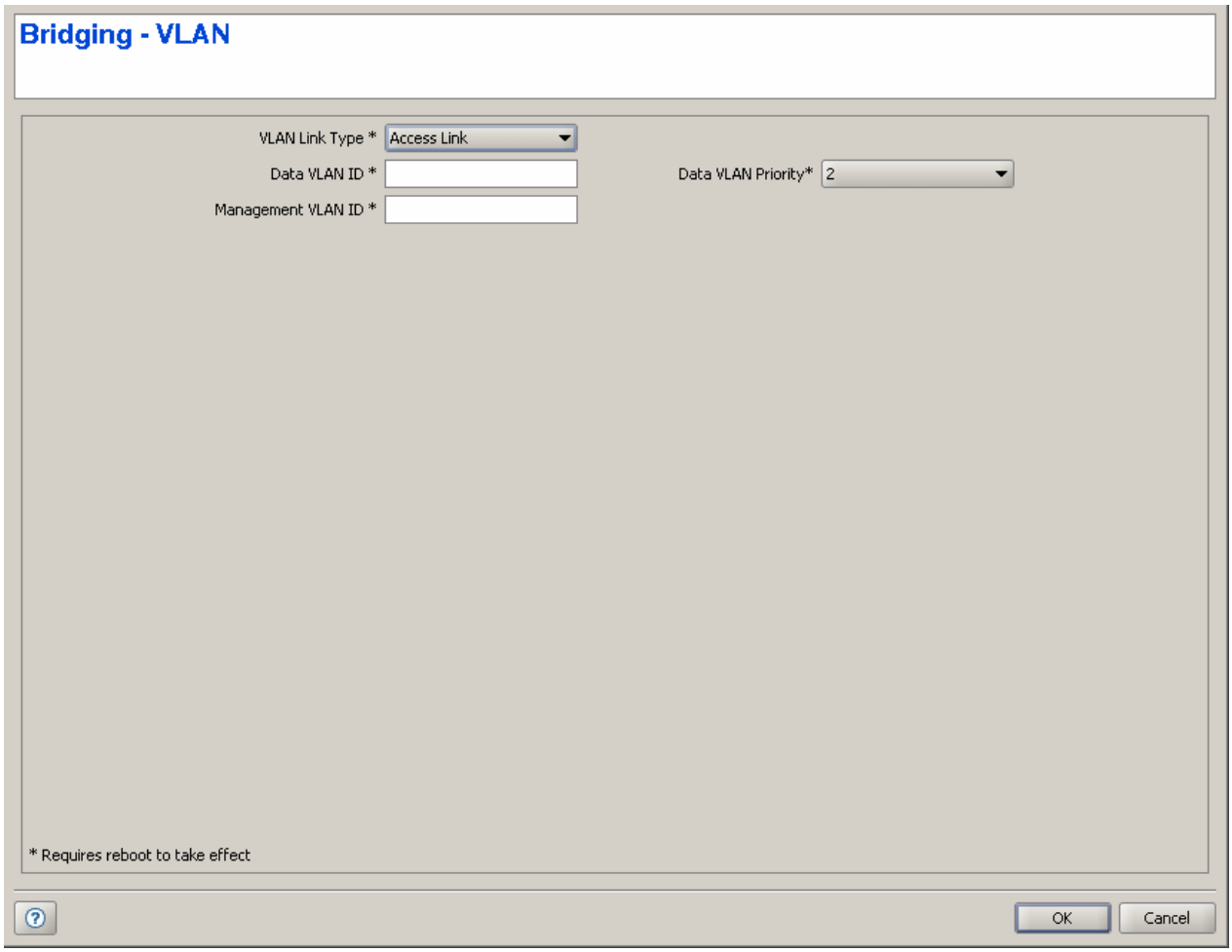


Figure 2-81: Multiple Configuration Page SU-L - Bridging - VLAN

The Bridging - VLAN screen includes the following parameters:

- VLAN Link Type
- Data VLAN ID
- Management VLAN ID

- Data VLAN Priority

Refer to "The Bridging Page VLAN Tab" on page 106 for more details on these parameters.

2.31.2.6 Performance Parameters

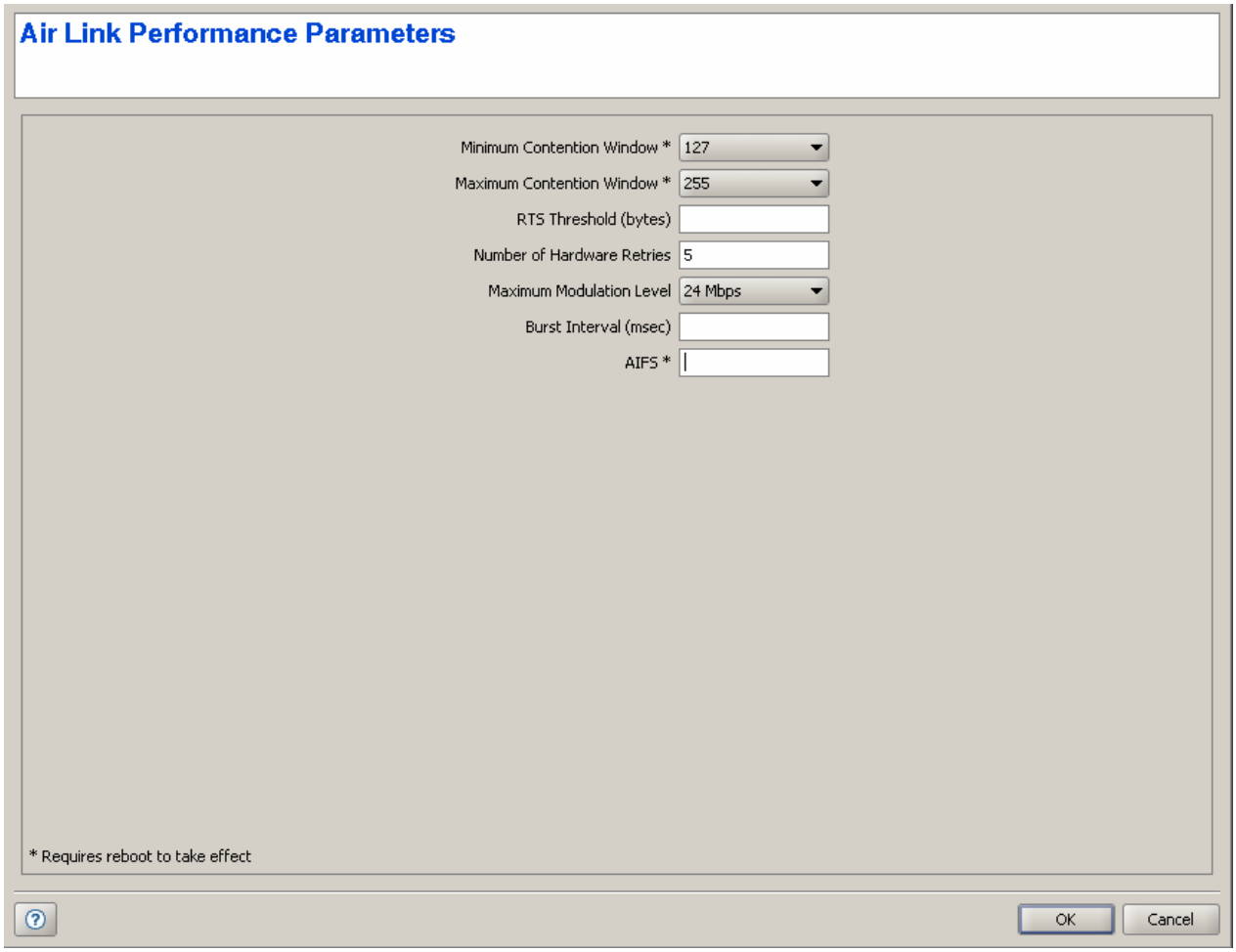


Figure 2-82: Multiple Configuration Page SU-L - Performance Parameters

The Performance Parameters screen includes the following parameters:

- Minimum Contention Window
- Maximum Contention Window
- RTS Threshold

- Number of Hardware Retries
- Maximum Modulation Level
- Burst Interval (msec)
- AIFS

Refer to the "Performance Page" on page 205 for more details on these parameters.

2.31.2.7 Service - General

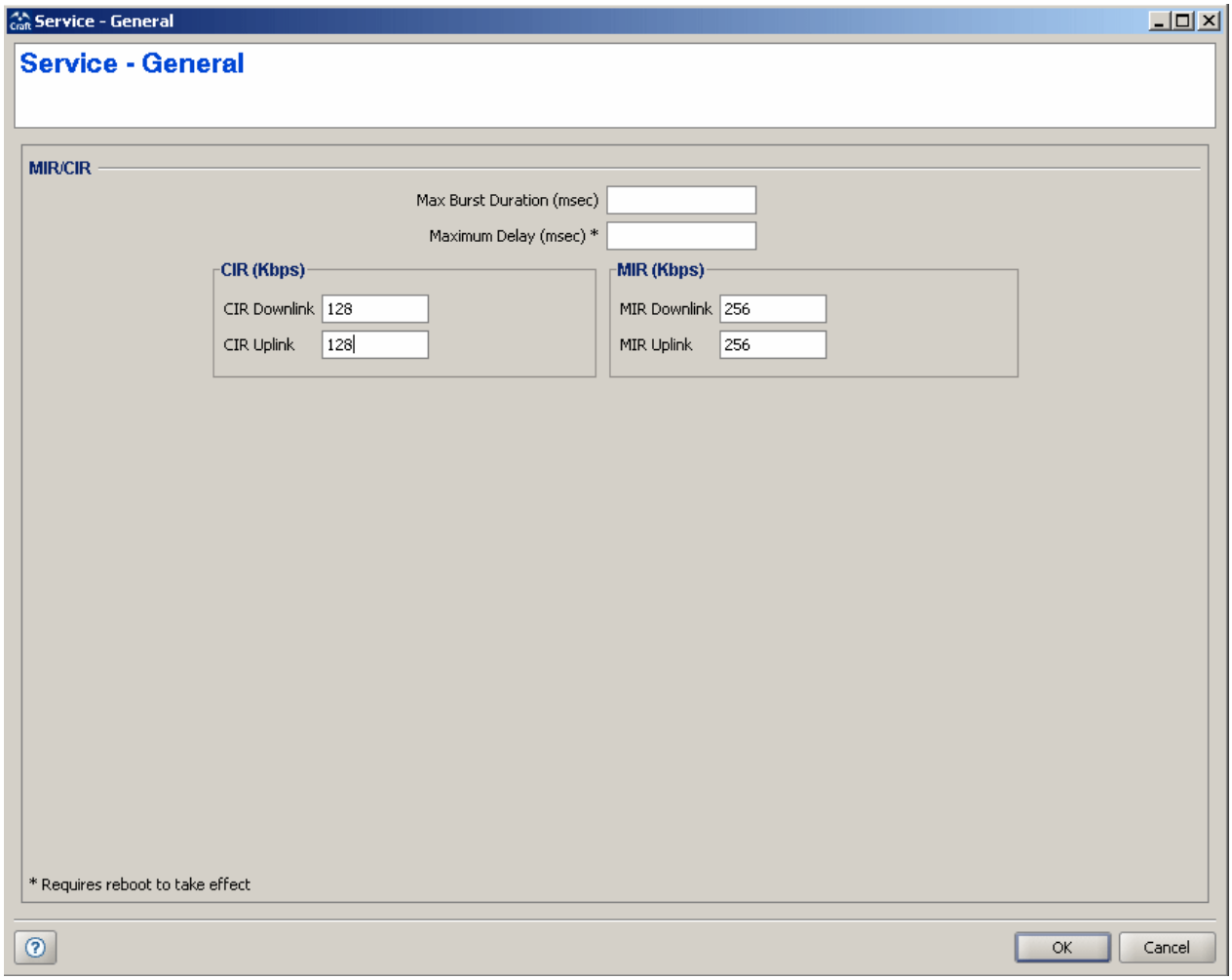


Figure 2-83: Multiple Configuration Page SU-L - Service - General

The Service - General screen includes the following parameters:

- Max Burst Duration (msec)

- Maximum Delay (msec)
- CIR Downlink
- CIR Uplink
- MIR Downlink
- MIR Uplink

Refer to "The Service Parameters Page General Tab" on page 117 for more details on these parameters.

2.31.2.8 Service - Traffic Prioritization

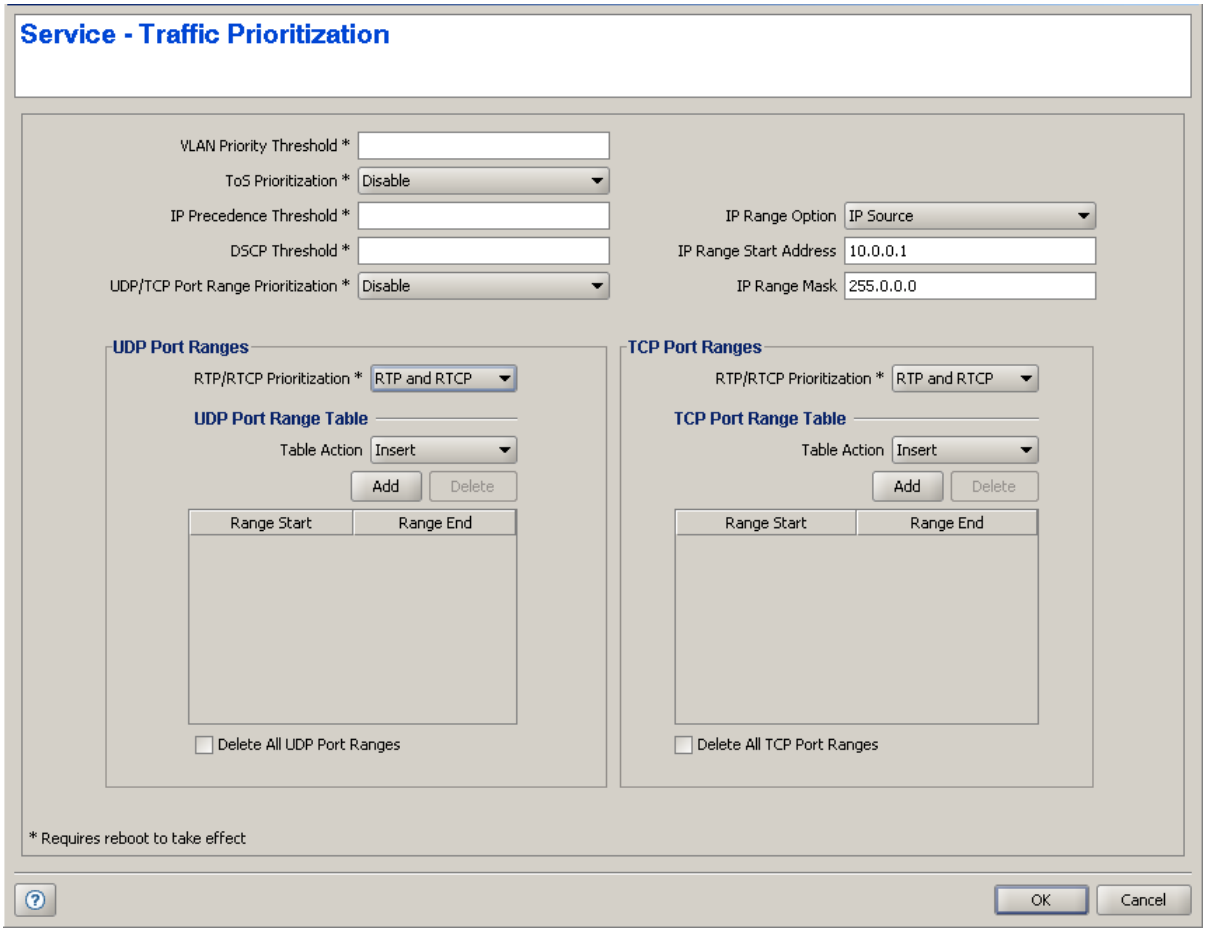


Figure 2-84: Multiple Configuration Page SU-L - Service - Traffic Prioritization

The Service - Traffic Prioritization screen includes the following parameters:

- VLAN Priority Threshold
- ToS Prioritization
- IP Precedence Threshold
- DSCP Threshold
- UDP/TCP Port Range Prioritization
- IP Range Option
- IP Range Start Address
- IP Range Mask
- UDP Port Ranges
  - » RTP/RTCP Prioritization
  - » UDP Port Range Table
  - » Delete All UDP Port Ranges
- TCP Port Ranges
  - » RTP/RTCP Prioritization
  - » TCP Port Range Table
  - » Delete All TCP Port Ranges

Refer to "The Service Parameters Page Traffic Priority Tab" on page 128 for more details on these parameters.

2.31.2.9 Security

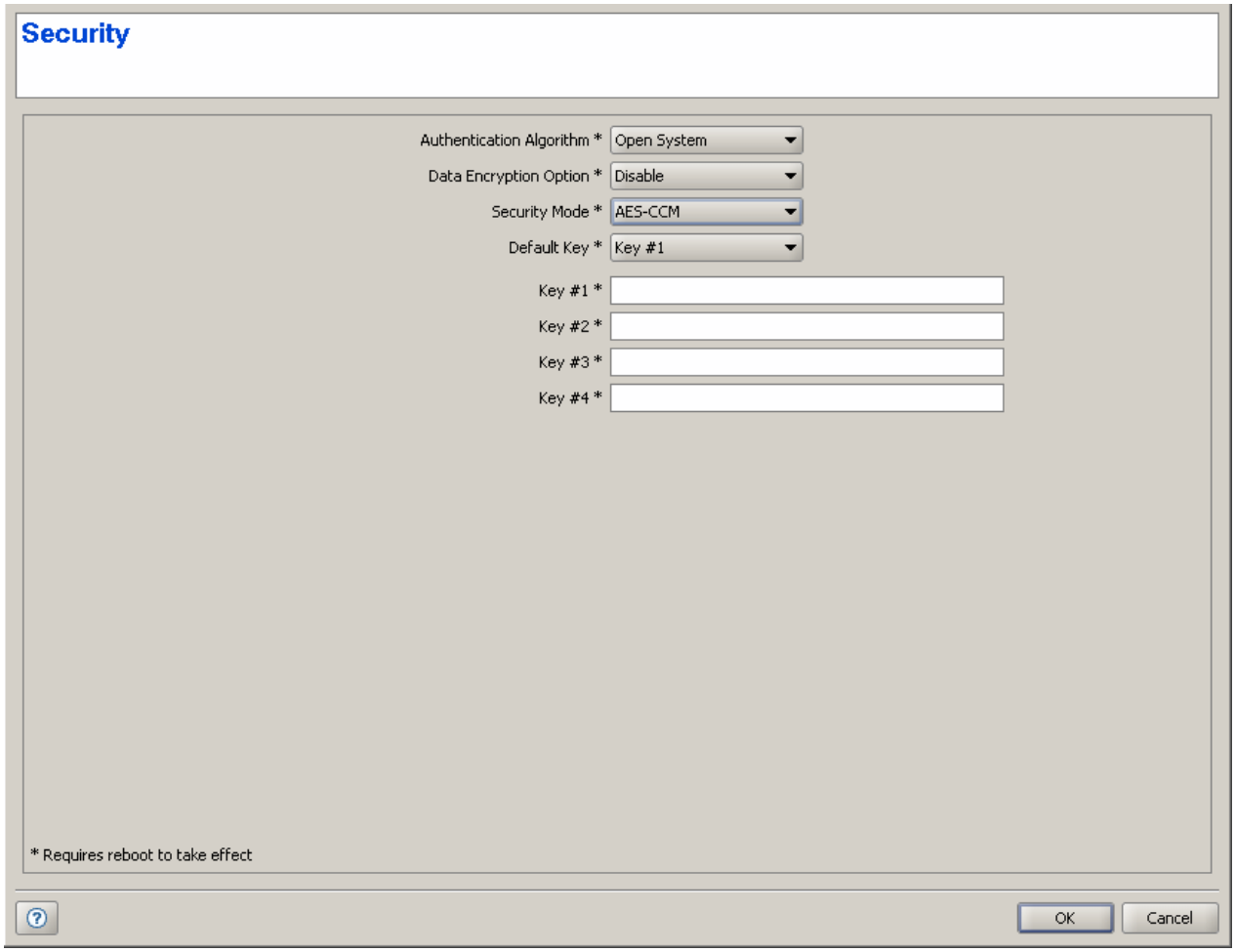


Figure 2-85: Multiple Configuration Page SU-L - Security

The Security screen includes the following parameters:

- Authentication Algorithm
- Data Encryption Option
- Security Mode
- Default Key
- Key # 1 to Key # 4

Refer to the “Security Parameters Page” on page 139 for more details on these parameters.

2.32 Performance Page

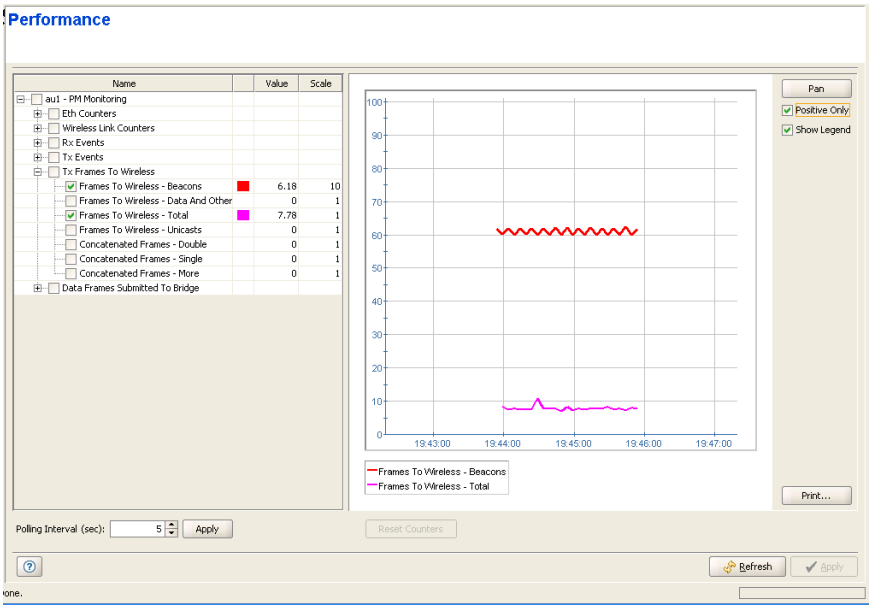


Figure 2-86: Performance Page

The Performance page enables on-line monitoring of graph(s) for selected counters. The graph for each accumulating counter displays the counter rate, defined as: (Current Value-Previous Value)/Polling Interval (seconds).

The Performance pages include two sections: the counters selection section and the graph and control buttons section. For convenient viewing of the required information, you can change the relative sizes of the two sections, by dragging the line separating them.

- "The Counters Selection Section" on page 205
- "The Graph and Controls Section" on page 207

2.32.1 The Counters Selection Section

The counters selection section enables to select specific counters, to define the polling interval for the on-line display and to define the graph's values scale for each of the selected counters.

The counters selection section, on the left side of the window, displays all the counters groups applicable to the relevant device.

You can perform the following operations in the Counters Selection section:

To expand/collapse the list of counters:

1. Use the Expand/Collapse (+/-) check-box on the left side of the device's name to view/hide all counters groups available for the device.
2. Use the Expand/Collapse (+/-) check-box on the left side of the counters group name, to view/hide all counters available in the group.

For details on the available counters, refer to "Site Survey Ethernet Statistics Page" on page 84 and "Site Survey Rx/Tx Counters Page" on page 85.

To the right of each counter, the following details are available:

- The color of the graph for this counter (available only for a selected counter)
- The current graph's value of the counter
- The scale value for the graph (see details below)

To view the graph of a counter:

Select the check box to the left of a counter to add it to the graph and view its details. The color to be used in the graph for the selected counters is displayed to the right of the counter.

To change the color of a counter's graph:

Click on the color display (on the right side of the selected counter). The **Pick a Color** window opens, allowing you to change the color's properties.

Deselect the check box to terminate the on-line display of the counter. Select again to continue the display.

NOTE

You can also select/deslect all the counters in a group or all counters in the relevant device by using the relevant check box(s).

To optimize the value (vertical) axis of a counter:

The values scale (vertical axis) is fixed, between -100 to +100 (or between 0 to 100 for a Positive Only graph). Some counters may have values that either exceed this range or are too small. The value scale of each counter is displayed to the right of the counter's name (the default is 1.0). To change the value scale of a counter, select it and choose the desired scale from the scale drop-down list that will be displayed on the right side of the counter. You can use the current graph's value (displayed in the Value column next to the Counter's name) to identify the required value scale. The values displayed for this counter on the graph are the actual counter values multiplied by the scale factor.

To change the polling interval:

The Polling Interval range is from 1 to 3600 seconds. Enter the required polling interval and click on the **Apply** button next to it.

The **Reset Counters** button is not applicable in the current release. You can reset specific counter groups by clicking on the Reset Counters button in the applicable Site Survey page.

2.32.2 The Graph and Controls Section

The graph and controls section contains the graph area, used for displaying the selected counters over time.

The names and details of the counters that were selected are displayed below or to the left of the graph area.

The following graph controls are available:

- **Pan/Zoom** Button**:** Toggles between the **Pan** and **Zoom** modes.
- **Positive Only** Check Box**:** Select to set the boundaries of the values (vertical) axis between 0 and +100. Deselect (the default) to set the boundaries between -100 to +100.
- **Show Legend** Check Box: Select (the default) to display the selected counters' legend. Deselect to hide the legend.
- **Print...:** Enables to setup the page, print the graph or display a print preview.

You can use the **Pan/Zoom** toggle button to either shift the time axis or change its resolution:

To shift the time axis:

1 Make sure that *Pan* mode is selected. If *Zoom* mode is selected, click the button to toggle to *Pan* mode.

2 Drag the graph surface left or right to shift the displayed section of the Time axis.

To change the resolution of the time axis:

1 Make sure that *Zoom* mode is selected. If *Pan* mode is selected, click on the button to toggle to *Zoom* mode.

2 Drag the graph surface left or right to change the resolution of the Time axis.

To print or preview a graph:

Click on **Print...**. A pop-up menu opens with three options:

- **Print...:** To open the Print dialog box for selecting a printer, setting up the printing properties and printing the graph.
- **Print Preview...:** Displays a preview of the graph before printing.

Page Setup...: To open the Page Setup dialog box

Chapter 3

Parameters Summary

The following tables provide an at a glance summary of the configurable parameters, value ranges, and default values. In addition, each parameter entry also includes an indication as to whether the parameter is updated in run-time or whether the unit must be reset before the modification takes effect ("No" in the Run-Time column indicates that a change to the parameter will take effect only after reset).

3.1 AU/SU Device General Page

Parameter	Unit	Range	Default	Run-Time
Ethernet Negotiation Mode	*AU, SU, BU, RB*	■ Force 10 Mbps and Half-Duplex ■ Force 10 Mbps and Full-Duplex ■ Force 100 Mbps and Half-Duplex ■ Force 100 Mbps and Full-Duplex ■ Auto Negotiation Mode	Auto Negotiation Mode	No

3.2 Air Interface General Page

Parameter	Unit	Range	Default	Run-Time
Maximum Number Of Associations	*AU*	0 to 512 for a regular AU (0 to 124 when data encription is enabled), 0 to 8 for AUS	AU: 512 AUS: 8	Yes
Antenna Gain (dB)	*AU, SU, BU, RB without integral antenna*	0-40 (dB)	According to unit type	No
Lost Beacon Wathdog Threshold	*AU, BU*	100 - 1000 or 0 (0 means Not Used)	218	Yes
Wireless Trap Threshold (%)	*AU, BU*	1-100 (%)	30 (%)	No
Scanning Mode	*SU, RB*	■ Passive ■ Active	Passive	No

Parameter	Unit	Range	Default	Run-Time
Cell/Link Distance Option	*AU, BU*	■ Automatic ■ Manual	Automatic	No
Fairness Factor (%)	*AU, BU*	0-100 (%)	100 (%)	No
Max Cell Distance (Km)	*AU, BU*	0-54 (Km). 0 means no compensation	0	Yes
Per SU Distance Learning	*AU*	■ Disable ■ Enable	Disable	Yes
ESSID	*AU, SU, BU, RB*	Up to 31 printable ASCII characters	ESSID1	No
Operator ESSID Option	*AU, BU*	■ Disable ■ Enable	Enable	No
Operator ESSID	*AU, BU*	Up to 31 printable ASCII characters	ESSID1	No
Hidden ESSID Option	*AU, BU*	■ Disable ■ Enable	Disable	No
Hidden ESSID Support	*SU, RB*	■ Disable ■ Enable	Disable	No
Hidden ESSID Timeout	*SU, RB*	1 - 60 (minutes)	10	Yes
Noise Immunity State Control	*AU, SU, BU, RB*	■ Automatic ■ Manual	Automatic	Yes
Noise Immunity Level	*AU, SU, BU, RB*	0 - 4. Use only 0 or 4	0	Yes
Spur Immunity Level	*AU, SU, BU, RB*	0-7	0	Yes
OFDM Weak Signal	*AU, SU, BU, RB*	■ Disable ■ Enable	Disable	Yes
Pulse Detection Sensitivity	*AU, SU, BU, RB*	■ Low ■ High	Low	Yes

Parameter	Unit	Range	Default	Run-Time
Noise Floor Calculation Mode	*AU, SU, BU, RB*	■ Fully Automatic ■ Forced ■ Automatic with Minimum Value	Fully Automatic	Yes
Noise Floor Forced Value	*AU, SU, BU, RB*	-107 to -55 (dBm)	5 MHz bandwidth: -102 10 MHz bandwidth: -99 20 MHz bandwidth: -96	Yes

3.3 Air Interface Frequency Page

Parameter	Unit	Range	Default	Run-Time
DFS Required By Regulations	*AU, BU*	■ Yes ■ No	Yes for Country Codes where required by regulations, No for Universal Country Codes in the 5.4 and 5.8 GHz bands.	Yes
Channel Avoidance Period (min)	*AU, BU*	1-60 (minutes)	30 (minutes)	Yes
SU/RB Waiting Option	*AU, BU*	■ Disable ■ Enable	Enable	Yes
Defined Frequency (MHz)	*AU, BU*	According to selected Sub Band	The lowest frequency in the Sub Band	Yes
Channel Check Time (sec)	*AU, BU*	1-3600 (seconds)	60 (seconds)	Yes
Minimum Pulses To Detect	*AU, BU*	1-100	4 for FCC 8 for other (ETSI)	Yes
Planned Frequency Definition Table-Include (per entry)	*AU, SU, BU, RB*	■ Yes ■ No	Yes (for all entries)	Yes

Parameter	Unit	Range	Default	Run-Time
Channel Reuse Option	*AU, BU*	■ Disable ■ Enable	Disable	Yes
Assessment Period (Hours)	*AU, BU*	1-12 (hours)	5 (hours)	Yes
Max Detections In Assessment Period	*AU, BU*	1-10	5	Yes
DFS Detection Algorithm	*AU, BU*	Applicable only for Universal Country Code in 5.4/5.8 GHz: ■ ETSI ■ DFS	ETSI	Yes

3.4 Air Interface Tx Power Parameters Page

Parameter	Unit	Range	Default	Run-Time
Tx Control	*AU, BU*	■ On ■ Off ■ Ethernet Status Control	On	Yes
Transmit Power (dBm)	*AU, SU, BU, RB*	-10 dBm to a value that depends on HW revision , Country Code / Antenna Gain and (in SU) the Max Tx Power parameter	The highest allowed value	Yes
Maximum Tx Power (dBm)	*SU, RB*	-10 dBm to a value that depends on HW revision and Country Code / Antenna Gain	The highest allowed value	Yes
ATPC Option	*AU, SU, BU, RB*	■ Disable ■ Enable	Enable	Yes
EZ ATPC Option	*AU*	■ Disable ■ Enable	Disable	Yes
Minimum SNR Level (dB)	*AU, BU*	4-60 (dB)	28 (dB)	Yes

Parameter	Unit	Range	Default	Run-Time
Delta From Minimum SNR Level (dB)	*AU, BU*	4-20 (dB)	Units in 0.9, 5.4, 5.8 GHz bands: 5 (dB) Units in the 4.9, 5.2 and 5.3 GHz bands: 8 (dB)	Yes
Minimum Interval Between ATPC Messages (sec)	*AU, BU*	1-3600 (seconds)	30 (seconds)	Yes
ATPC Power Level Steps (dB)	*AU, BU*	1-20 (dB)	4 (dB)	Yes

3.5 Air Interface Spectrum Analysis Page

Parameter	Unit	Range	Default	Run-Time
Scan Period (sec)	*AU, SU, BU, RB*	2-30 (seconds)	5 (seconds)	Yes (per test)
Scan Cycles	*AU, SU, BU, RB*	1-100	2	Yes (per test)
Automatic Channel Selection	*AU, BU*	■ Disable ■ Enable	Disable	Yes

3.6 Air Interface Country Code Parameters Page

Parameter	Unit	Range	Default	Run-Time
Sub Band Select	*AU, SU, BU, RB*	Depends on Country Code	1	Yes
Country Code Learning By SU	*AU*	■ Disable ■ Enable	Enable	Yes
Country Code Select	*AU, SU, BU, RB*	Depends on radio band	Configured in factory according to destination	No

3.7 Air Interface Noise Floor Parameters Page

Parameter	Unit	Range	Default	Run-Time
Selected Calibration Option	*AU, SU, BU, RB*	■ None ■ Factory (not available in current release). ■ Field (available only if a successful Field calibration has been performed).	None	Yes

3.8 Best AU/BU Page

Parameter	Unit	Range	Default	Run-Time
Best AU/BU Support	*SU, RB*	■ Disable ■ Enable	Enable	No
Number Of Scanning Attempts	*SU, RB*	1-255	4	No
Preferred AU/BU MAC Address	*SU, RB*	MAC address (xx-xx-xx-xx-xx-xx)	00-00-00-00-00-00 (no preferred AU)	No

3.9 Bridging Page

Parameter	Unit	Range	Default	Run-Time
General Tab				
Aging Time (sec)	*AU, SU, BU, RB*	20-2000 (seconds)	300 (seconds)	No
Broadcast/Multicast Relaying	*AU*	■ Disable ■ Broadcast Multicast Enable ■ Broadcast Enable ■ Multicast Enable	Broadcast Multicast Enablele	No

Parameter	Unit	Range	Default	Run-Time
Unicast Relaying	*AU*	■ Disable ■ Enable	Enable	No
Roaming Option	*SU, RB*	■ Disable ■ Enable	Disable	No
Ethernet Port Control	*SU, RB*	■ Disable ■ Enable	Enable	Yes
Filter Option	*SU, RB*	Disable On Ethernet Only On Wireless Only On Both Wireless and Ethernet	Disable	Yes
DHCP Broadcast Override	*SU, RB*	■ Disable ■ Enable	Disable	Yes
PPPoE Broadcast Override	*SU, RB*	■ Disable ■ Enable	Disable	Yes
ARP Broadcast Override	*SU, RB*	■ Disable ■ Enable	Ebable	Yes
Limiter Option	*AU, SU, BU, RB*	■ Disable ■ Limit only Broadcasts ■ Limit Multicasts except Broadcasts ■ Limit all Multicasts	Disable	Yes
Limiter Threshold (packets/sec)	*AU, SU, BU, RB*	0-204800 (packets)	50	Yes
Send Trap Interval (min)	*AU, SU, BU, RB*	1-60 (minutes)	5 (minutes)	Yes
Ethernet Frame Size	*BU 10, RB 10*	■ 2000 (bytes) ■ 1600 (bytes)	1600 (bytes)	Yes

Parameter	Unit	Range	Default	Run-Time
User Filtering Option	*AU*	■ Disable ■ IP Only ■ User Defined Address Only ■ PPPoE Only	Disable	Yes
DHCP Unicast Override Filter	*AU*	■ Enable ■ Disable	Enable	Yes
VLAN Tab				
VLAN Link Type	*AU, SU, BU, RB*	■ Hybrid Link ■ Trunk Link ■ Access Link (SU Only) ■ Service Provider Link (AU/SU Only)	Hybrid Link	No
Data VLAN ID	*SU, RB*	1-4094	1	No
Management VLAN ID	*AU, SU, BU, RB*	1-4094 or 65,535 for No VLAN	65,535 (No VLAN)	No
Data VLAN Priority	*SU, RB*	0-7	0	No
Management VLAN Priority	*AU, SU, BU, RB*	0-7	0	No
Forwarding Support	*AU, SU, BU, RB*	■ Disable ■ Enable	Disable	No
Forwarding Table	*AU, SU, BU, RB*	1-4094 or 0 for none (20 entries)	0 (all 20 entries)	No
Relaying Support	*AU*	■ Disable ■ Enable	Disable	No
Relaying Table	*AU*	1-4094 or 0 for none (20 entries)	0 (all 20 entries)	No
VLAN Q in Q Ethertype (Hex)	*AU, SU*	8100 - 9000, 9100, 9200 (hex)	8100	No
Service Provider VLAN ID.	*SU*	1-4094	1	No
Allow/Deny MAC Address List Tab				

Parameter	Unit	Range	Default	Run-Time
Table Action Mode	*AU*	■ Deny List ■ Allow List	Deny List	Yes
MAC Address Table	*AU*	Up to 100 MAC addresses (xx-xx-xx-xx-xx-xx)	Empty	Yes

3.10 Service Parameters Page

Parameter	Unit	Range	Default	Run-Time
General Tab				
User Filtering Option	*SU, RB*	■ Disable ■ IP Only ■ User Defined Address Only ■ PPPoE Only	Disable	Yes
Filter IP Address Ranges	*SU, RB*	IP Start, IP End (Range) or IP Start, Net Nask (Subnet). 8 entries.	0.0.0.0, 0.0.0.0 (empty range for all 8 entries)	No
DHCP Unicast Override Filter	*SU, RB*	■ Disable ■ Enable	Disable	Yes
MIR Only	*AU*	■ Disable ■ Enable	Enable	No
Maximum Burst Duration (msec)	*AU, SU*	0-2000 (msec)	5 (msec)	Yes
Graceful Degradation Limit (%)	*AU*	0-70 (%)	70 (%)	No
MIR Threshold (%)	*AU*	0-100 (%)	50 (%)	Yes
CIR Downlink (Kbps)	*SU*	SU-3: 0-2048 (Kbps) SU-6: 0-6016 (Kbps) SU-8: 0-11264 (Kbps) SU-54: 0-45056 (Kbps) SU-I: 0-6016 (Kbps) SU-V: 0-2048 (Kbps)	0 (Kbps	Yes

Parameter	Unit	Range	Default	Run-Time
CIR Uplink (Kbps)	*SU*	SU-3: 0-2048 (Kbps) SU-6: 0-4096 (Kbps) SU-8: 0-11264 (Kbps) SU-54: 0-45056 (Kbps) SU-I: 0-4096 (Kbps) SU-V: 0-8064 (Kbps)	0 (Kbps	Yes
MIR Downlink (Kbps)	*SU, RB*	SU-3: 128-3072 SU-6: 128-6016 SU-8: 128-13440 SU-54: 128-53888 SU-I: 128-6016 SU-V: 128-2048 RB-B10: 128-4992 RB-B14: 128-6912 RB-B28: 128-22016 RB-B100: 128-107904	SU-3: 3072 SU-6: 6016 SU-54:53888 SU-8: 13440 SU-I: 6016 SU-V: 2048 RB-B10: 4992 RB-B14: 6912 RB-B28: 22016 RB-B100: 107904	Yes
MIR Uplink (Kbps)	*SU, RB*	SU-3: 128-2048 SU-6: 128-4096 SU-8: 128-13440 SU-54: 128-53888 SU-I: 128-4096 SU-V: 128-8064 RB-B10: 128-4992 RB-B14: 128-6912 RB-B28: 128-22016 RB-B100: 128-107904	SU-3: 2048 SU-6: 4096 SU-8: 13440 SU-54: 53888 SU-I: 4096 SU-V: 8064 RB-B10: 4992 RB-B14: 6912 RB-B28: 22016 RB-B100: 107904	Yes
Maximum Delay (msec)	*SU*	300-10000 (msec)	5000 (msec)	No
Proportional IR Factor	*SU*	0-100 (%)	0 (disabled)	Yes
Update Period	*SU*	1-30 (minutes)	5	Yes
Threshold Percentage	*SU*	0-100 (%)	20	Yes

Parameter	Unit	Range	Default	Run-Time
Threshold Rate	*SU*	1-8 (modulation)	5	Yes
Traffic Priority Tab				
Low Priority Traffic Min (%)	*AU, SU, BU, RB*	0-100 (%)	0 (%)	Yes
VLAN Priority Threshold	*AU, SU, BU, RB*	0-7	7	No
ToS Prioritization	*AU, SU, BU, RB*	■ Disable ■ IP Precedence ■ DSCP	Disable	No
IP Precedence Threshold	*AU, SU, BU, RB*	0-7	4	No
DSCP Threshold	*AU, SU, BU, RB*	0-63	32	No
UDP/TCP Port Range Prioritization	*AU, SU, BU, RB*	■ Disable ■ UDP Only ■ TCP Only ■ UDP and TCP	Disable	No
UDP Port Ranges-RTP/RTCP Prioritization	*AU, SU, BU, RB*	■ RTP and RTCP ■ RTP Only	RTP and RTCP	No
UDP Port Ranges Table	*AU, SU, BU, RB*	Up to 64 ranges	none	Yes
TCP Port Ranges-RTP/RTCP Prioritization	*AU, SU, BU, RB*	■ RTP and RTCP ■ RTP Only	RTP and RTCP	No
TCP Port Ranges Table	*AU, SU, BU, RB*	Up to 64 ranges	none	Yes
IP Range Option	*AU, SU, BU, RB*	■ Disable ■ IP Source ■ IP Destination ■ IP Source or Destination	Disable	Yes
IP Address	*AU, SU, BU, RB*	IP address	0.0.0.0	Yes

Parameter	Unit	Range	Default	Run-Time
IP Mask	*AU, SU, BU, RB*	IP address	0.0.0.0	Yes
DRAP Parameters Page				
DRAP Support	*AU*	■ Disable ■ Enable	Enable	No
DRAP UDP Port	*AU*	8000-8200	8171	No
Max Number of Voice Calls	*AU*	1-255	40	No
DRAP TTL (sec)	*AU*	1-255 (seconds)	10 (seconds)	No
WLP (Wireless Link Prioritization) Tab (in AU-only if licensed)				
Wireless Link Prioritization Option	*AU, BU-B100*	■ Disable ■ Enable	Disable	Yes
Low Priority AIFS	*AU, BU-B100*	3-50	3	Yes
High Priority HW Retries	*AU, BU-B100*	1-14	10	Yes
Low Priority HW Retries	*AU, BU-B100*	1-14	10	Yes
AU/BU Burst Parameters-High Priority Burst Interval	*AU, BU-B100*	0-10 msec, using steps of 0.25 msec	4 msec	Yes
AU/BU Burst Parameters-Low Priority Burst Interval	*AU, BU-B100*	0-10 msec, using steps of 0.25 msec	5 msec	Yes
SU/RB Burst Parameters-High Priority Burst Interval	*AU, BU-B100*	0-10 msec, using steps of 0.25 msec	2 msec	Yes
SU/RB Burst Parameters-Low Priority Burst Interval	*AU, BU-B100*	0-10 msec, using steps of 0.25 msec	5 msec	Yes

3.11 Security Parameters Page

Parameter	Unit	Range	Default	Run-Time
Authentication Algorithm	*AU, SU, BU, RB*	■ Open System ■ Shared Key	Open System	No
Data Encryption Option	*AU, SU, BU, RB*	■ Disable ■ Enable	Disable	No
Security Mode	*AU, SU, BU, RB*	■ WEP ■ AES OCB ■ FIPS 197 (if licensed)	WEP	No
Promiscuous Authentication	*AU, BU*	■ Disable ■ Enable	Disable	Yes (Disable after reset)
Multicast Default Key	*AU, BU*	KEY #1 to Key #4	Key # 1	No
Default Key	*SU, RB*	KEY #1 to Key #4	Key # 1	No
Key #1 to Key #4	*AU, SU, BU, RB*	32 hexadecimal digits	000...0 (32 zeros, meaning No Key)	No

3.12 Performance Parameters Page

Parameter	Unit	Range	Default	Run-Time
Minimum Contention Window	*AU, SU, BU, RB*	0 (no contention algorithm), 7, 15, 31, 63, 127, 255, 511, 1023	15	No
Maximum Contention Window	*AU, SU, BU, RB*	7, 15, 31, 63, 127, 255, 511, 1023	1023	No

Parameter	Unit	Range	Default	Run-Time
RTS Thrshold (bytes)	*AU, SU, BU, RB*	BreezeACCESS units: ■ HW Revision C or higher: 20-4092 (bytes). ■ HW Revision A, B: 20-2200. BreezeNET B units: 20-4092	AU (except in the 900 MHz band): 4092 (2200 for HW Revision A or B) AU in the 900 MHz band: 60 SU: 60 BU/RB-B14/28: 2200 BU/RB-B10/100: 4092	Yes
Number of Hardware Retries	*AU, SU, BU, RB*	1-14	10	Yes
AVG SNR Memory Factor	*AU, SU, BU, RB*	-1(disable) to 32	5	Yes
Maximum Modulation Level	*AU, SU, BU, RB*	According to values supported by Country Code. Currently all Country Codes support values from 1 to 8.	The highest supported value (8)	Yes
Multicast Modulation Level	*AU, BU*	According to values supported by Country Code. Currently all Country Codes support values from 1 to 8.	The lowest supported value (1)	Yes
Burst Mode Option *(if supported by Country Code)*	*AU, SU, BU, RB*	■ Disable ■ Enable	Enable	No
Burst Interval (msec)	*AU, SU, BU, RB*	1 to the value defined in the Sub-Band for Maximum Burst Duration (milliseconds)	5 milliseconds or the value of Maximum Burst Duration defined for the Sub-Band (the lower of the two values).	Yes
Concatenation Option	*AU, SU, BU, RB*	■ Disable ■ Enable	Enable	No

Parameter	Unit	Range	Default	Run-Time
Maximum Concatenated Frame Size (bytes)	*AU, SU, BU, RB*	BreezeACCESS units: ■ 256 to 2200 bytes for units with HW revision A or B ■ 256 to 4032 bytes for units with HW revision C or higher BreezeNET B units: ■ 256 to 2200 bytes for B14/28 units. ■ 256 to 4032 bytes for B10/100 units	2200 for AU/SU units with HW revision A or B 4032 for AU/SU units with HW revision C or higher 2200 for B14/28 units. 4032 for B10/100 units.	Yes
AIFS	*AU, SU*	1-50 (time slots)	2	No
Adaptive Modulation Option	*AU, SU, BU, RB*	■ Disable ■ Enable	Enable	No
Minimum Interval Between Adaptive Modulation Algorithm Messages (sec)	*AU, SU, BU, RB*	1-3600 (seconds)	4 (seconds)	Yes
Adaptive Modulation Decision Threshold	*AU, SU, BU, RB*	■ Normal ■ High	Normal	No
Retries on Lower Modulations	*AU, SU, BU, RB*	■ Disable ■ Enable	Enable	Yes
RTS Duration Mode	*AU, SU, BU, RB*	■ Short RTS Duration ■ Long RTS Duration	Short RTS Duration	Yes
Packet Threshold to Test Up Rate	*AU, SU, BU, RB*	10-10000	30	Yes
Packet Number on Upper Rate	*AU, SU, BU, RB*	1-3	3	Yes

3.13 IP Parameters Page

Parameter	Unit	Range	Default	Run-Time
IP Address	*AU, SU, BU, RB*	IP address	10.0.0.1	No
Subnet Mask	*AU, SU, BU, RB*	subnet mask	255.0.0.0	No
Default Gateway	*AU, SU, BU, RB*	IP address	0.0.0.0 (none)	No
DHCP Option	*AU, SU, BU, RB*	■ Disable ■ DHCP Only ■ Automatic	Disable	No
Access to DHCP	*AU, SU, BU, RB*	■ From Wireless Only ■ From Ethernet Only ■ From Both Wireless And Ethernet	AU: From Ethernet Only SU: From Wireless Only	No

3.14 Network Management Parameters Page

Parameter	Unit	Range	Default	Run-Time
General Tab				
Access To Network Management	*AU, SU, BU, RB*	■ From Wireless Link Only ■ From Ethernet Link Only ■ From Both Wireless And Ethernet Links	From Both Wireless And Ethernet Links	No
SNMP Read Community	*AU, SU, BU, RB*	Up to 8 printable characters	public	No
SNMP Read/Write Community	*AU, SU, BU, RB*	Up to 8 printable characters	private	No
Installer Password	*AU, SU, BU, RB*	Up to 8 printable characters	user	No
Enable Filtering On	*AU, SU, BU, RB*	■ Disable ■ Ethernet Port ■ Wireless Port ■ Both Ethernet and Wireless Ports	Disable	No
Wi^2 AP Client IP Address	*SU, RB*	IP address	0.0.0.0 (none)	Yes
IP Addresses Ranges Table	*AU, SU, BU, RB*	IP Start, IP End (Range) or IP Start, Net Nask (Subnet). 10 entries.	0.0.0.0, 0.0.0.0 (empty range for all 10 entries)	No
IP Addresses Table	*AU, SU, BU, RB*	IP address (10 entries)	0.0.0.0 (none) for all 10 entries	No
Send Traps Tab				
Traps Sending	*AU, BU*	■ Disable ■ Enable	Disable	Yes
Send Traps To table	*AU, BU*	10 entries: IP Address: IP address. Community: Up to 14 printable characters	For all 10 entries: IP Address: 0.0.0.0 (none). Community: public	No

3.15 Unit Control Page

Parameter	Unit	Range	Default	Run-Time
Unit Name	*AU, SU, BU, RB*	Up to 32 printable characters	empty (none)	Yes
Location	*AU, SU, BU, RB*	Up to 34 printable characters	empty (none)	Yes
Feature License String	*AU, SU, BU, RB*	Up to 64 hexadecimal digits	NA	No
Telnet Logout Timer (min)	*AU, SU, BU, RB*	1-999 (minutes)	5 (minutes)	Yes
Default Configuration	*AU, SU, BU, RB*	■ No Default Setting Required ■ Complete Factory ■ Partial Factory ■ Complete Operator ■ Partial Operator ■ Cancel Pending Request	No Default setting Required	No (except Cancel Pending Request)
LED Operation Mode	*SU, BU, RB*	■ Normal ■ Threshold	Normal	Yes
Type	*SU, BU, RB*	■ Disabled ■ RSSI ■ CRC ■ SNR ■ Modulation	Disabled	Yes
Mode	*SU, BU, RB*	■ Equal or lower ■ Equal or higher ■ Equal	Equal	Yes