BreezeACCESS® VL and BreezeNET® B Device Driver

AlvariSTAR™ User Manual

Software Version 3.0
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About This Manual

This manual describes Release 3.0 of the BreezeACCESS VL and BreezeNET B Device Driver for AlvariSTAR and how to use it.

This manual is intended for personnel that are responsible for managing the BreezeACCESS VL Broadband Wireless Access system and/or BreezeNET B Broadband Wireless Bridge systems, using the AlvariSTAR Network Management System. It is assumed that the reader is familiar with the operation and use of AlvariSTAR and with the operation of BreezeACCESS VL and/or BreezeNET B system components.

This manual includes the following chapters:

- **Chapter 1 –** "Discovery and Resync Processes with BreezeACCESS VL and BreezeNET B Devices": Describes the functionality of the Discovery and Resync processes with BreezeACCESS VL and BreezeNET B Devices.
- **Chapter 2 -** "Using the Equipment Manager with BreezeACCESS VL and BreezeNET B Devices": Describes the functionality of the Equipment Manager with BreezeACCESS VL and BreezeNET B Devices, which is affected by the system's architecture.
- **Chapter 3 -** "Using the Software Upgrade Session Editor with BreezeACCESS VL and BreezeNET B Devices": Describes the functionality of the Software Upgrade Session Editor with BreezeACCESS VL and BreezeNET B devices, which is affected by the system's architecture.
- **Chapter 4 –** "Using The Device Manager": Describes how to use the Device Editor workspace for managing single or multiple devices.
- **Chapter 5 –** "Managing Devices": Describes the various options and parameters that are available for configuration and management of devices.
- **Chapter 6 –** "Performance Monitoring and BWA PM Data Collection Counters": Describes the counters available in the Performance Monitoring option of the Site Survey menu for a single device, and in AlvariSTAR PM Data Collection sessions.

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Chapter 6 - Performance Monitoring and BWA PM Data Collection Counters

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Chapter 1 - Discovery and Resync Processes with BreezeACCESS VL and BreezeNET B Devices

In This Chapter:

The functionality of the Discovery and Resync processes of AlvariSTAR depend on the device family. This chapter describes the functionality of these processes with BreezeACCESS devices.

1.1 The Discovery Process

The discovery process can start only after one or more IP address ranges have been defined. Each defined IP address range may be associated with a specific pair of SNMP Read and Write communities. Alternatively, a list of global SNMP Read and Write communities can be defined. These global pairs will be used with all IP address ranges for whom a specific pair of Read and Write communities was not defined. In addition, for each IP address range a location can be defined.

The discovery process is comprised of two phases. In the first phase, the system accesses the defined addresses one by one, using Get SysOID SNMP requests with the SNMP Read community defined for the applicable range. If no specific SNMP community is defined, the system will try to access these addresses using the defined global SNMP Read communities one after the other. If a device responded to the Get SysOID request with a SysOID of a licensed device, the system will get a few basic parameters from the device and will add it to the database using the SysName. If the SysName is not defined, the device's IP address will be used as its name.

If the discovered device is not licensed (the number of discovered devices of its type reached the maximum limit according to the license conditions), the Number of Non Licensed Discovered Devices will be incremented by one and an alarm will be generated. Devices with a non-licensed SysOID will be ignored.

In the second phase, the system gets some additional key parameters from the discovered device, defines the device's location and identifies wireless links to other devices. The use of a different process for these tasks, that runs in parallel to the actual discovery process, ensures that the discovery process will run at maximum speed. The process activated in this phase is actually identical to the Resync process.

Once the search parameters for the discovery process have been defined, it can be configured to run periodically, accessing at each cycle, only devices that do not exist in the database. For each of the defined IP address ranges, the cyclic discovery process can be enabled/disabled separately. A discovery cycle may also be initiated and/or terminated manually.

NOTE

Discovery/Resync parameters cannot be configured while the discovery process is running.

1.2 The Resync Process

The Resync process can only start once there is at least one discovered device in the database. The Resync application is responsible for accessing devices that exist in the database, obtaining key parameters from each device and updating the database accordingly. Upon identifying certain changes, special actions may be taken, such as updating the database, initiating rediscovery or generating an alarm. The Resync process is also responsible for identifying wireless links between devices. This includes links to non-discovered devices, such as devices that are not included in the defined IP address ranges, devices that have not been discovered yet and devices that did not respond (currently not active).

The resync process can be configured to run periodically, accessing at each cycle the devices that exist in the database.

NOTE

It is recommended to schedule the Resync process to run at non-busy hours. Intervals between resync clycles should be in accordance with expected rate of changes in the system. Typically the resync process should run every two weeks.

For each of the IP address ranges, the resync process can be enabled/disabled separately. A Resync cycle may also be initiated and/or terminated manually.

NOTE

Discovery/Resync parameters cannot be configured while the Resync process is running.

A Resync process is also automatically activated as the second phase of the discovery process following discovery of new devices. This “post-discovery” process is independent of the regular cyclic or manually initiated process.

Each discovered device is associated with a location. A location can be defined for each IP address range using the Location Manager. This location will be the parent location for the discovered devices in this range. Otherwise, the IP address range will be used as the default parent location. For an AU or a BU, a new location is created under this parent location. The default name of the AU’s/BU’s location is its System Name, or its IP address if a System Name does not exist. For Non-Discovered AUs/BUs a new location is not generated, and they are moved to the parent location as described above.

It is also possible to use location definition functionality based on the CPE Follow Base algorithm. When this feature is enabled, all the SUs associated with the AU,

or the RB associated with the BU, are also moved to the location of the AU/BU, including Non-Discovered SUs/RBs. If the CPE Follow Base feature is not enabled, the SUs/RBs will be moved to the parent location.

In addition to the scheduled Resync described above, the system may initiate non-scheduled (background) resync processes. A background resync process is initiated whenever the system identifies an event that necessitates a database update process for certain devices. Such events include completion of a SW upgrade session and discovery of a new device (post-discovery Resync). Unlike the scheduled resync that is being executed for one device at a time, several background resync processes may run in parallel. A background resync process is controlled by the system, and the users cannot stop or start it.

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Chapter 2 - Using the Equipment Manager with BreezeACCESS VL and BreezeNET B Devices

In This Chapter:

The functionality of the Equipment Manager with BreezeACCESS devices is affected by the system's architecture. This affects the device types, which are displayed in the Returned Equipment list and in the Selected Items list, and the method of selecting equipment for various sessions.

2.1 Using the Equipment Manager

The Returned Equipment list includes all devices that meet the selected Criteria Scheme parameters. This includes the following device types:

- BreezeACCESS_VL_AU (Access Unit)
- BreezeACCESS_VL_SU (Subscriber Unit)
- BreezeNetB_BU (Base Unit
- BreezeNetB_RB (Remote Bridge)

The background color of the icon on the left side of each device indicates the alarm status of the device.

To move devices to the Selected Items List:

Select one or more items (use the **Shift** and **Ctrl** keys to select multiple devices) in the Returned Equipment list to move them to the Selected Items list.

To select BreezeACCESS devices either in the *Equipment Manager* window or when accessing the *Select Equipment* window from another window:

1. Define the required Criteria Scheme and click on **Go**.
2. From the Returned Equipment list, select the required devices. The selected items are displayed in the Selected items list.
3. To select multiple devices for the session, use the **Shift** and **Ctrl** keys. The selected devices will be added to the session.

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Chapter 3 - Using the Software Upgrade Session Editor with BreezeACCESS VL and BreezeNET B Devices

In This Chapter:

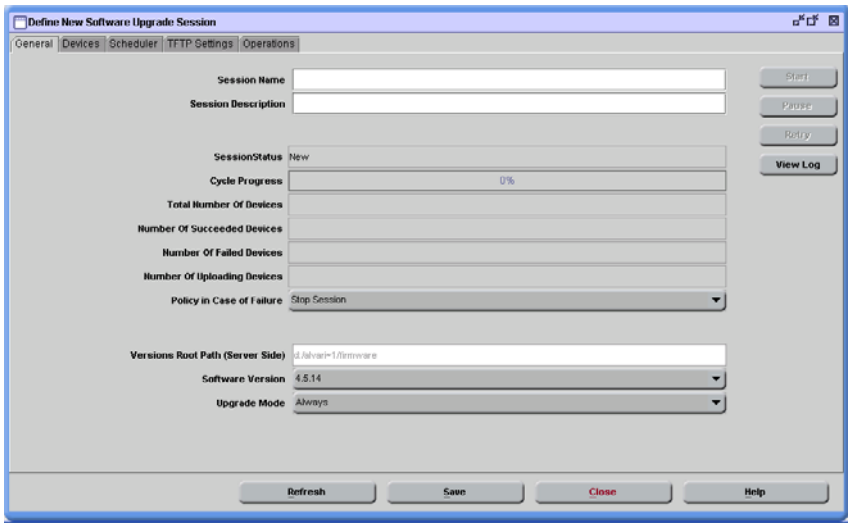
3.1 Adding and Editing Software Upgrade Sessions

The New/Edit Software Upgrade Session window lets you define new software upgrade sessions and edit existing sessions.

To create/edit a software upgrade session:

From the Software Upgrade Manager window, click *New* to create a new session, or *Edit* to modify the current session. The following window is displayed:

Figure 3-1: New/Edit Software Upgrade Session Window



The *New/Edit Software Upgrade Session* window includes the following tabs:

- General (see "The General Tab" on page 3-10) - for defining general session parameters and software files to be loaded, viewing details on sessions status and managing selected sessions.
- Devices (see "The Devices Tab" on page 3-13) - for adding or removing devices to be upgraded in the applicable session and viewing relevant details related to these devices.
- Scheduler (see "The Scheduler Tab" on page 3-15) - for defining session's start date and time and optionally the maximum length of each session.

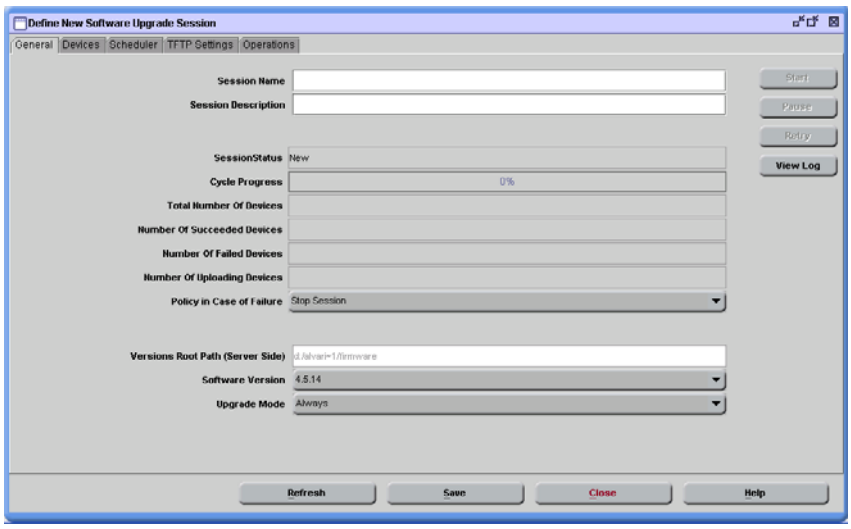
- TFTP Settings (see “The TFTP Settings Tab” on page 3-16) - for defining TFTP parameters for the session.

- Operations (see “The Operations Tab” on page 3-17) - for defining software versions management of the upgraded devices.

3.2 The General Tab

The General tab of the *New/Edit Software Upgrade Session* window lets you define general session parameters, view details on the progress of existing sessions and manage selected sessions.

Figure 3-2: New/Edit Software Upgrade Session - General Tab



The fields displayed in the General tab are described below:

Field	Description
Session Name	Enter the name for the new session. This is a read-only field when editing an existing session. The session name can include up to 20 characters and must be unique in the server database.
Session Description	Enter a description for the new session or edit the description of an existing session. The session description can include up to 60 characters.
Session Status	Read-only field that displays the status of the session: New, Aborted, Failed, Finished, Paused, Running or Scheduled.
Cycle Progress	Read-only field that displays the progress in % of the current session's cycle.
Total Number Of Devices	Read-only field that displays the total number of devices participating in the upgrade session.

Field	Description
Number Of Succeeded Devices	Read-only field that displays the number of devices for which the upgrade operation has been completed successfully.
Number Of Failed Devices	Read-only field that displays the number of devices for which the upgrade operation has failed.
Number Of Uploading Devices	Read-only field that displays the number of devices which are currently being uploaded.
Policy In case Of Failure	Select from the drop-down list, the policy to be adopted when a failure occurs (*Stop Session* or *Continue Session).* The Stop/Continue Session refers to the next step (if any) according to the software versions control process as defined in the Operations tab. If the *Continue Session* option is selected, the second step (if defined) will be carried on only for devices for which the first step was completed successfully . If the *Stop Session* is selected, the application will carry out the next step in the process only if the current step operations are successful on all the devices in the session.
Version Root Path	Read-only field that displays the path to the software files in the Application Server.
Software Version	From the drop-down list, select the software version to be loaded.

Field	Description
Upgrade Mode	From the drop-down list select the policy for loading software versions that already exist in the target device: ■ *Always* - Upload without checking the software versions in the target device. ■ *Different From Current Version* - Upload only if the loaded version differs from the current version in the target device. ■ *Different From Shadow Version* - Upload only if the loaded version differs from the shadow version in the target device. ■ *Different From Current and Shadow Version* - Upload only if the loaded version differs from both the current and the shadow versions in the target device. The selected option should take into account the software versions management policy in the target devices.

Use the buttons on the right side of the window for managing sessions:

NOTE

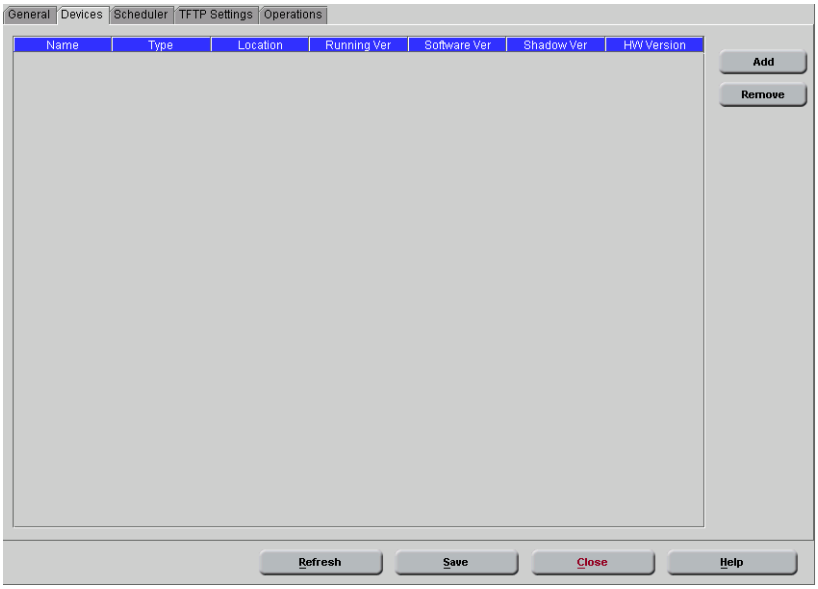
Failed devices for the Retry option are defined as devices for whom at least one requested operation failed (either upload or a software version control operation). See Operations tab for more details.

Button	Description
View Log	Click to open the Log Report manager.

3.3 The Devices Tab

The Device tab of the *New/Edit Software Upgrade Session* window lets you view relevant details related to devices participating in an existing session, add or remove devices to the list of devices participating in the session and create a list of devices for a new session.

Figure 3-3: New/Edit Software Upgrade - Devices Tab



The read-only devices table displays the following details for each of the devices defined in the session:

Field	Description
Name	The device's name.
Type	The device's type.
Location	The device's location.
Running Ver	The devices's current running software version
Software Ver	The device's current main software version.
Shadow Ver	The device's shadow software version.
HW Version	The device's hardware version.

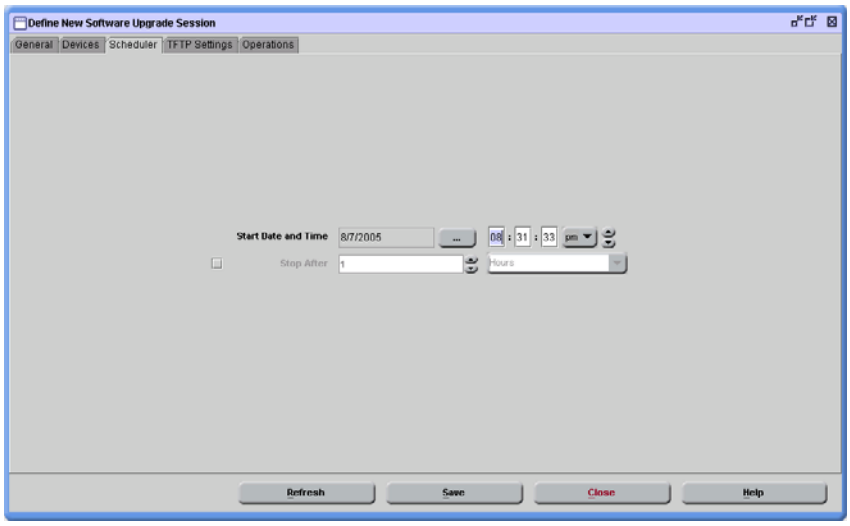
Use the buttons on the right side of the window for adding or removing devices to/from the list:

Button	Description
Add	Click to open the Select Equipment window for adding devices to the list.
Remove	Select one or several devices from the table and click *Remove* to delete the selected device(s) from the session.

3.4 The Scheduler Tab

The Scheduler tab of the *New/Edit Software Upgrade Session* window lets you define the start date and time for the session. It optionally enables limiting the length of the session. A session that was not completed because the maximum length of time defined for it has been reached, will be rescheduled automatically for the same start time on the next day.

Figure 3-4: New/Edit Software Upgrade Session - Scheduler Tab



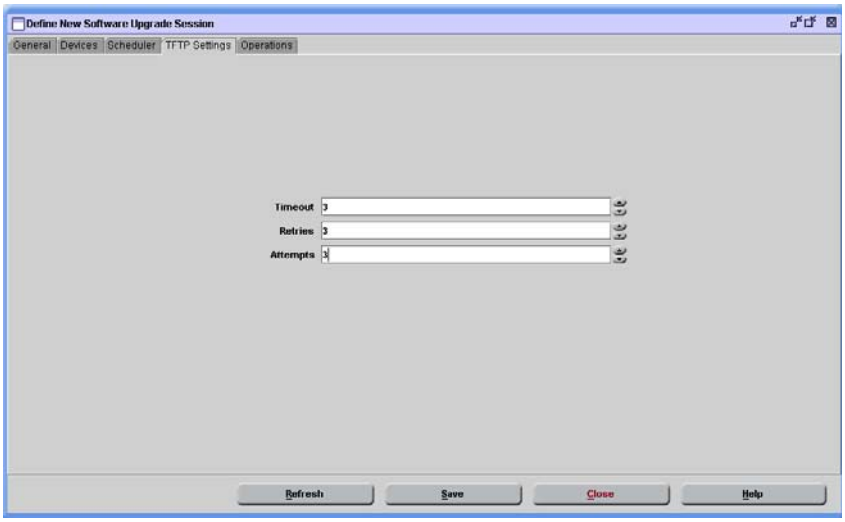
The fields displayed in the Scheduler tab are described below:

Field	Description
Start Date and Time	Enter the required start date or click on the Browse button to open the *Select a Date Calendar* window. Enter the start time using a 12-hours clock format (or use the up/down arrows) and select am or pm from the drop-down list.
Stop After	Check to enable defining the maximum length of the session. When checked, you can select *Hour/s* or *Minute/s* from the drop-down list and enter the session length (or use the up/down arrows). Available values for maximum session length are 1 to 9999 (Hours or Minutes).

3.5 The TFTP Settings Tab

The TFTP Settings tab of the *New/Edit Software Upgrade Session* window lets you define TFTP parameters for the session.

Figure 3-5: New/Edit Software Upgrade Session - TFTP Settings Tab



The fields displayed in the TFTP Settings tab are described below:

Field	Description
Timeout	Defines the time, in seconds, that the TFTP process waits for an acknowledgement message for each packet. The range is 1 to 120 seconds.
Retries	Defines the maximum number of retries, which is the number of times a packet is retransmitted when an acknowledgement is not received within the defined timeout period. The range is 0 to 10.
Attempts	Defines the number of times the TFTP session is retried before determining that the upgrade procedure has failed. The range is 0 to 10.

3.6 The Operations Tab

In BreezeACCESS VL and BreezeNET B systems, the SU/RB units are upgraded first, followed by the AU/BU units. If an AU-SU or BU-RB pair is defined as a Repeater (SU/RB connected back-to-back with an AU/BU), then all SU/RB units served by the repeater are upgraded first, followed by the repeater AU/BU units. Finally, the repeater's SU/RB and the AU/BU that serves the repeater's SU/RB are upgraded.

The Operations Tab of the New/Edit Software Upgrade Session window enables the management of software versions in the devices participating in the session. Software versions management can be defined as steps in the upgrade process (what to do once a new software version has been successfully loaded), or as an independent session that does not include the actual loading process (separating the software loading process from the software versions control process).

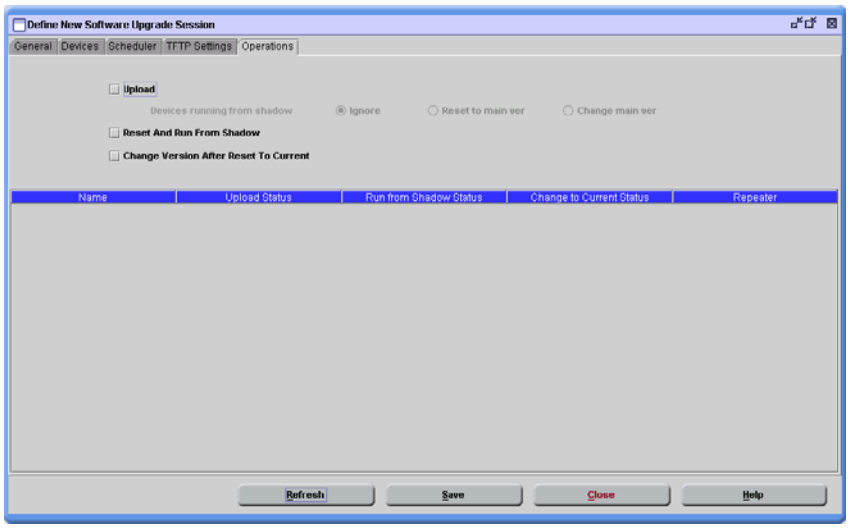


Figure 3-6: New/Edit Software Upgrade Session - Operations Tab

The Operations tab is comprised of the following fields:

Field	Description
Upload	Check to upload a new software version to devices, according to the policy defined by Upgrade Mode in the *General* tab. If the Upload option is checked, the options for **Devices running from shadow** become available. Since a new version cannot be loaded to a device that is running from the shadow version, the required option must be selected: ■ **Ignore**: The device will not participate in the session. ■ **Reset to main ver**: Before loading a new software version, a reset operation is performed in order to get the device to run from the main software version. ■ **Change main ver**: Before loading a new software version, a Change Version After Reset To Current operation is performed. The software version that the device is running becomes the main version. No reset is performed.
Reset and Run From Shadow	Check to reset the device and reboot it from its shadow version. If Upload is checked, this will be performed only after the new software version has been successfully loaded.
Change Version After Reset To Current	Check to use the running version as the main version after reset.

If two or more of these optional steps are selected, then the system completes the first step for all devices participating in the session before proceeding to the next step. If a step was not completed successfully for one or more devices, the system executes the next step(s) only if the *Continue Session* option has been selected in the Policy In Case Of Failure field in the *General* tab.

The Devices Status Table includes the following details for each of the devices participating in the session:

Field	Description
Name	The device's name.
Upload Status	The status of the Upload process (if Upload option is checked).
Run from Shadow Status	The status of the *Run From Shadow* status (if the Reset And Run From shadow option is checked).
Change to Current Status	The status of the *Change to Current Version* process (if the Change Version after Reset To Current option is checked). The possible options for the Status entries are: ■ Succeed: Operation was completed successfully ■ Failed: Operation failed ■ Ignored: Operation was requested but not executed. For upload operation-if the upload to the device was skipped because of selected Upgrade Mode rules. For software version control operations - if the previous step failed.
Repeater	Indicates if the device is defined in the database as a part of a repeater. This functionality determines the order of the upgrade and multiple configuration processes for different equipment types has no effect on the database.

4

Chapter 4 - Using The Device Manager

In This Chapter:

The *Device Manager* enables you to manage, monitor and configure BreezeACCESS VL and/or BreezeNET B devices.

The *Device Manager* has two modes of operation:

- **Single Device Manager** - for managing, monitoring and configuring one selected device.
- **Multiple Devices Manager** - for simultaneously managing and configuring multiple devices.

This chapter describes how to access the *Device Manager* and provides a brief description of each workspace component.

This chapter is comprised of the following sections:

4.1 Introducing the Single Device Manager

The *Device Manager* enables you to manage a selected device using a wide array of controlling, monitoring and configuration options.

4.1.1 Accessing the Single Device Manager

To access the Single Device Manager:

1 From the *File>Open>AlvariSTAR menu*, or from the Navigation Pane, select *Inventory*, and then *Equipment Manager*. Select the appropriate filtering criteria and click **GO**.

The *Equipment Manager* displays a list of all the equipment in the database that match the selected criteria.

2 From the list of found devices, select the device you want to configure, and click the **Open** button on the right side of the window - The *Device Manager* is opened, and the *Device Status* window (*Properties* tab) is displayed in the workspace.

NOTE

The title bar of the AlvariSTAR window displays information about the managed device: Type (AU, SU, BU or RB), Model (e.g. SU-6-BD, AU-BS, RB-B28), Name and IP Address.

To configure devices, see "Managing Devices" on page 5-41.

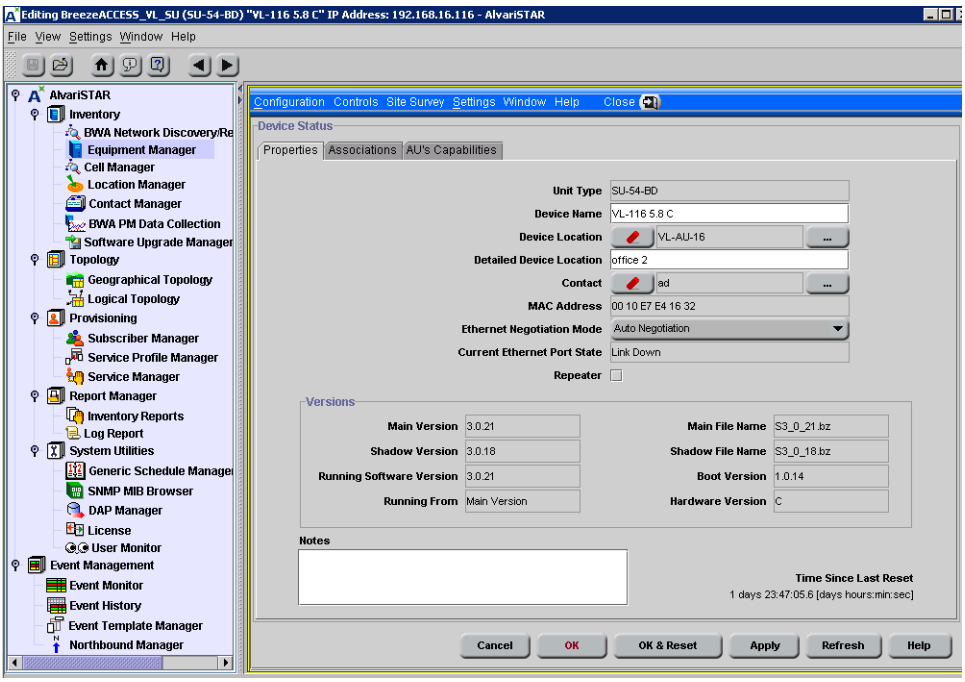


Figure 4-1: Device Status Window (for the selected device)

4.2 Introducing the Multiple Devices Manager

4.2.1 Overview

The *Multiple Devices Manager* enables you to download configuration parameters to multiple units simultaneously, including different unit types, such as Subscriber Units, Access units, Base Units and Remote bridges. The options are described in the following Chapter.

When this option is selected in the *Equipment Manager (*after selecting the required devices), the system verifies that all selected devices belong to the BreezeACCESS VL and/or BreezeNET B family. If the list of selected devices includes devices that are not discovered yet (the system identified their existence but actual discovery was not performed yet), a message notifying that these devices do not participate in the Multiple Configuration is displayed. The list of devices that will eventually participate in the multiple configuration process can be further refined by editing the Device List in the *Multiple Configuration* window.

The available windows include all the configuration windows that are available for any one or some of the relevant devices (AU, SU, BU and RB) in the single unit Device Editor. Each window includes all parameters that are configurable (write) for at least one device type. The Multiple Configuration loading mechanism loads each unit only with the parameters that are applicable to the unit, taking into account the Unit Type and its Software Version. To ensure a smooth process while minimizing the risk of losing connectivity to devices, the SUs/RBs are modified before the AUs/BUs. If an AU-SU or a BU-RB pair is defined as a Repeater (SU/RB connected back to back with an AU/BU), then the all the SUs or the RB served by the repeater are upgraded first, followed by the AU/BU of the repeater, and then the SU/RB of the repeater. Finally, the AU/BU that serves the repeater's SU/RB is upgraded.

If the loading process to one or more devices failed, a notification message is displayed, and the failed devices in the Device List are marked in red. The log report includes the reason of the failure:

- Error – The unit rejected the parameters set.
- Time Out – The unit did not respond timely.

4.2.2 Accessing the Multiple Devices Manager

To access the Multiple Devices Manager

1 From the *File>Open>AlvariSTAR menu*, or from the Navigation Pane, select *Inventory*, and then *Equipment Manager*. Select the appropriate filtering criteria and then click **GO**.

The *Equipment Manager* displays a list of all the equipment in the database that match the selected criteria.

2 From the list of found devices, select the two or more devices that you want to configure, and click the **Multiple Configuration** button on the right side of the window.

The *Multiple Configuration* Window is shown below.

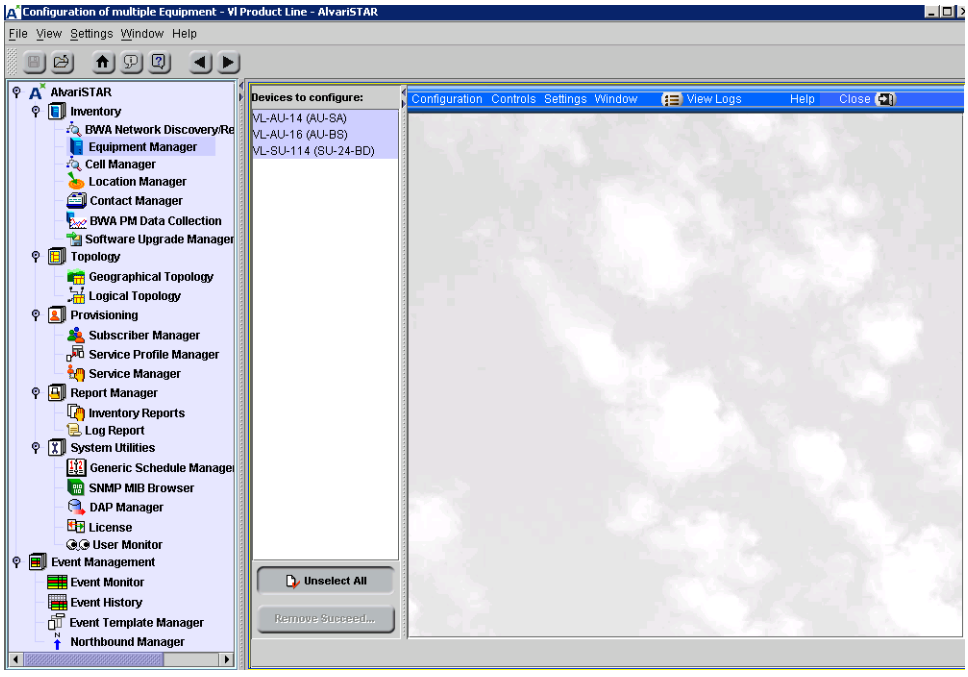


Figure 4-2: Multiple Configuration Window

4.3 The Device Manager Workspace Components

In this section, the *Device Manager* workspace components are listed, and shown in the following example window.

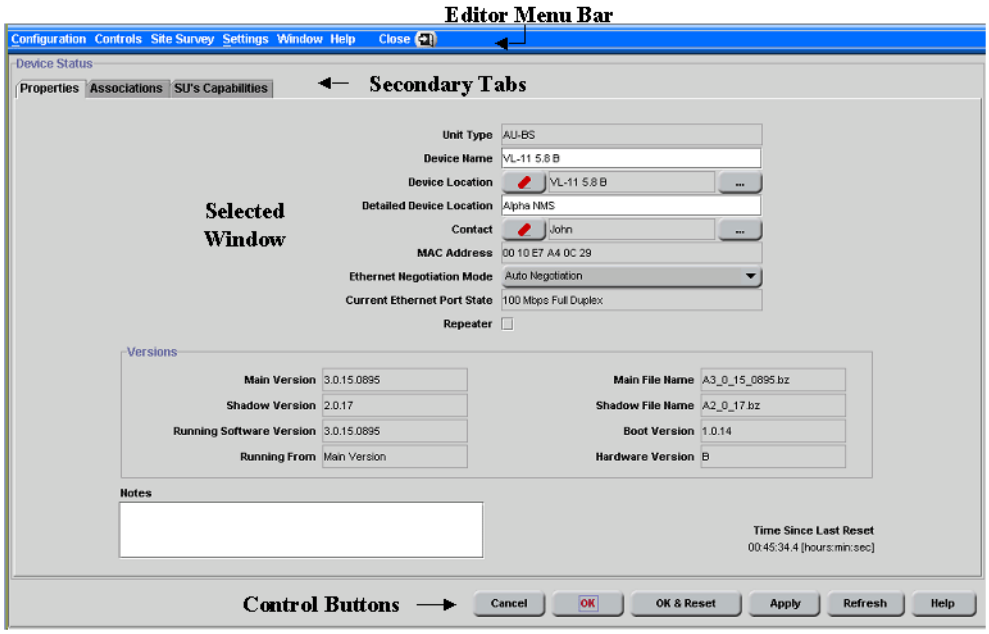


Figure 4-3: The Device Manager Workspace Components

The *Device Manager* workspace is comprised of the following components:

Menu Bar: Enables you to access multiple options and application functionality. For more information, see "Menu Options" on page 4-34

Selected Window: The Selected window depends on the option selected on the Menu Bar. It displays, for the applicable parameters, the correct configuration loaded from the device, and enables the setting of new values for configuration parameters.

Control Buttons: All windows contain the same Control Buttons. For more information see "Control Buttons" on page 4-29.

Secondary Tabs: Certain windows are divided into multiple workspaces, to provide all required parameters in the selected category. In these cases, the window contains a Secondary Tabs area.

Device List: In the Multiple Configuration window, the Device List area enables you to edit the list of devices that will participate in the multiple configuration process. For more information, see "The Device List (Multiple Configuration)" on page 4-30.

4.4 Using the Device Manager Workspace

This section describes how to use the Device Manager Workspace. This includes the *Control Buttons* common to all windows and the *Window Navigation Buttons (*opened from the *Window menu)* and all other Menus. In addition, common table sort, workspace resize, *Device List* and parameter selection functions are described. The Driver Manager Workspace window is displayed below.

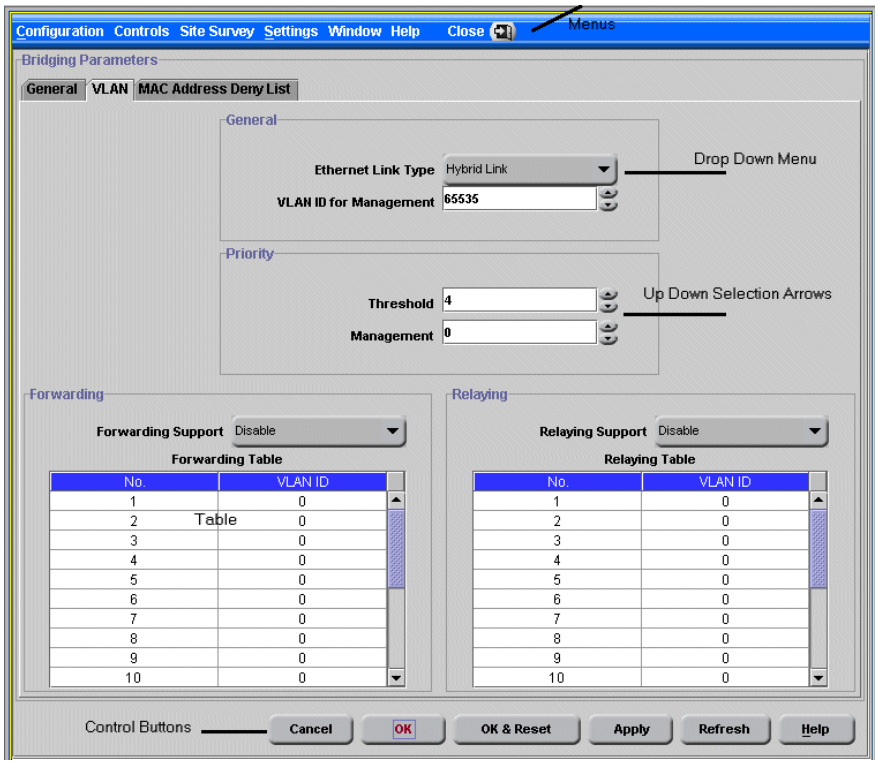


Figure 4-4: The Device Editor Workspace Window

This section includes:

- "Selecting Parameter Values" on page 4-33
- "Tool-tips" on page 4-33
- "Grayed-out Fields" on page 4-33

4.4.1 Control Buttons

The buttons that appear at the bottom of the Device Manager window are as follows:

Cancel	Closes the current window without implementing any modifications.
OK	Applies the current modifications and closes the window. Note that some modifications may come into effect only after the next reset
OK & Reset	Applies the current modifications, closes the window and resets the device. All modifications come into effect after the reset.
Apply	Implements the current modifications without closing the window. Some modifications may come into effect only after the next reset.
Clear	**Multiple Devices only:** - Clears the window fields.
Refresh	**Single Devices only:** - Updates the information displayed in the window using current values acquired from the device. The displayed information reflects recently made modifications, which for some parameters may differ from the actual values currently used by the unit (because they come into effect only after the next reset).
Help	Opens the Help Topic window for the selected window.

NOTE

The Control Buttons function exclusively in the current window. This means that clicking *Apply* saves only the configuration from the current window and does not apply the changes made in previous windows.

4.4.2 The Device List (Multiple Configuration)

The left side of the *Multiple Configuration* window includes the device list. The window opens with all the already discovered devices selected in the *Equipment Manager*.

This section includes:

4.4.2.1 Editing the Device List

You can edit the Device List by selecting one or more devices and using the mouse right-click to remove the devices that are not required for multiple configuration operation.

4.4.2.2 The Remove Succeeded Devices Button

Following a multiple configuration process where one or more devices failed, the failed devices are marked in red, and the *Remove Succeeded Devices* button at the bottom of the window becomes active.

Click the **Remove Succeeded Devices** button to remove all succeeded devices from the list (the failed devices remain listed). To retry loading the updated configuration to the failed devices, press **Apply** or **OK**.

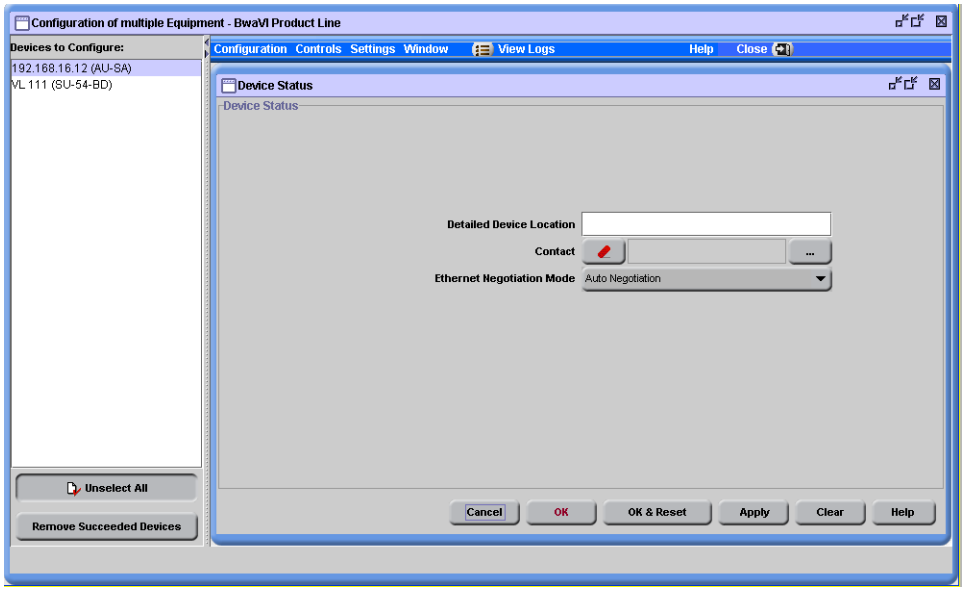
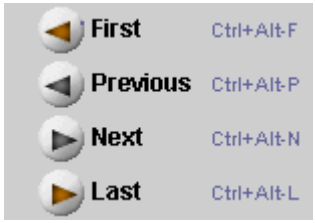


Figure 4-5: Multiple Configuration - Removing Successfully Configured Devices

4.4.3 Navigating the Windows in the Current Session



The window navigation buttons accessed from the *Windows* menu enable you to navigate the windows previously accessed during the current session, as follows:

Opens the first window accessed during the current session.

Opens the most recently accessed window during the current session.

Opens the window accessed following the current window during the previous chain of navigation

Opens the window accessed last during the current session.

4.4.4 Resizing the Workspace

AlvariSTAR enables you to resize the workspace, as required. Hold the cursor over the edge of the workspace until it is displayed as a double-headed arrow. Click and drag to resize the window, as needed.

4.4.5 Manipulating Tables

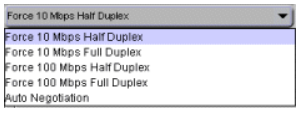
AlvariSTAR enables you to sort, reorder and resize all tables displayed in the workspace. For many tables, it also enables you to delete multiple entries.

Sort:	To sort a table by any of the table headings, click the required table heading. The table is sorted alphabetically in ascending order, according to the selected parameter. Click again to sort in descending order.
Reorder:	To reorder the columns displayed in any table, click and drag the required column to the required location in the table.
Resize:	To resize the columns displayed in any table, hold the cursor over the edge of the column heading until it is displayed as a double-headed arrow. Click and drag to resize the column, as needed. All other columns are resized automatically. The overall width of the table, however, does not change.
Entering new values:	To enter a new value, click in the required row. The current value must be deleted prior to entering a new value. Alternatively, you may either double-click the current value or drag the cursor across the existing value to highlight it. Enter the required value. The previous value is automatically deleted.
Deleting Entries (Multiple Devices only)	To delete one or more entries, mark the selected entries and then right-click the mouse. Click on the **Delete Selected Entries** pop-up menu to delete the entries. The deleted entries are marked in red.
Clearing Selected Rows	To clear unwanted displayed entries before applying changes to required entries, mark the selected entries, and then right-click the mouse. Click on the **Clear Selected Rows** pop-up menu to clear the selected fields in the display.

4.4.6 Selecting Parameter 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, 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.

4.4.7 Tool-tips

Tool-tips are common to all configuration windows in the *Device Manager*. These are displayed whenever you move the mouse over buttons and tabs. Apart from displaying the functionality of the object, tooltips also display parameter ranges in up/down combo boxes.

4.4.8 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.

4.5 Menu Options

This section describes all the menus and options available in the Main Menu of the configuration windows:

4.5.1 Configuration Menu

The Device Configuration menu enables you to access the main configuration parameters for the selected device. The selectable items in the *Configuration* menu may vary to reflect the parameter groups that are applicable for the selected device.

The Multiple Devices Configuration menu enables you to access the main configuration parameters for the selected device. The available configuration windows include all the configuration windows that are available in the Single Device Configuration for any of the relevant device types. Each window displays all parameters that are configurable (write) for at least one device type; informational parameters that are read-only for all device types are not displayed. All relevant fields become write-only.

In multiple device configuration, the application does not perform any read operation.

The Configuration menu includes the following options:

- **Device Status**: Displays status information for the selected unit and enables you to configure general parameters such as the device name and location. For more information, refer to “Device Status Parameters” on page 5-43.

- **IP Parameters**: Enables you to configure IP parameters for the device and control the device's method for IP parameter acquisition. For more information, refer to “IP Parameters” on page 5-58.

- **Bridging Parameters**: Enables you to configure bridge, VLAN support and ToS parameters. For more information, refer to “Bridging Parameters” on page 5-62.

- **Air Interface Parameters**: Enables you to configure parameters that control the wireless communication between the Subscriber and Access Units. For more information, refer to “Air Interface Parameters” on page 5-74.

- **Performance Parameters**: Enables you to configure parameters that affect the performance of the wireless link. For more information, refer to “Performance Parameters” on page 5-98.

- **Service Parameters**: Enables you to configure parameters related to filtering options. It also enables configuration of Quality of Service parameters. For more information, refer to “Service Parameters (AU, SU and RB)” on page 5-103.

- **Security Parameters**: Enables you to configure data and authentication encryption parameters. For more information, refer to “Security Parameters” on page 5-107.

- **Best AU Parameters (SU/RB only)**: Enables you to configure AU/BU association preferences for SUs/RBs. For more information, refer “Best AU/BU Parameters (SU/RB only)” on page 5-110.

4.5.2 Controls Menu

The Controls menu enables you to reset the device and manage the device’s software versions and configuration files.

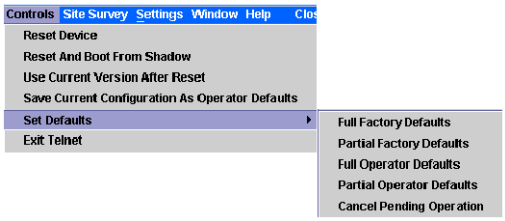


Figure 4-6: Controls Menu

The Controls Menu includes the following options:

- "Reset Device" on page 4-36
- "Reset and Boot From Shadow" on page 4-36
- "Use Current Version After Reset" on page 4-37
- "Save Current Configuration As Operator Default" on page 4-37
- "Set Defaults" on page 4-37
- "Exit Telnet" on page 4-38

4.5.2.1 Reset Device

Resets the device and applies any configuration modifications introduced since the last reset.

4.5.2.2 Reset and Boot From Shadow

Activates the shadow software version. The device's flash memory can store two software versions – one active and another inactive shadow version. This option enables you to test the inactive software version by running it without replacing the current active version, since resetting the device again restores the active version.

NOTE

To replace the current version with the shadow version, you must first select Reset and Boot from Shadow Version and then select *Use Current Version After Reset*. If not, the unit reverts to the original current version after the next reset and the shadow version remains inactive.

4.5.2.3 Use Current Version After Reset

Defines the currently running version as the version to be activated and used after the next reset.

4.5.2.4 Save Current Configuration As Operator Default

Enables you to save the current configuration as a configuration file to be used as the Operator defaults. To activate the Operator defaults configuration, refer to Set Operator Defaults below.

4.5.2.5 Set Defaults

There are two sets of default parameters, as follows:

Factory Defaults: Revert the system parameters to the original factory defaults (see *Full Factory* and *Partial Factory Defaults* below).

Operator Defaults: Revert the system parameters to the configuration defined as the Operator's defaults. The Operator can define a configuration file as the Operator's default (see *Full Operator* and *Partial Operator* Defaults below).

The actual operation will be executed after the next reset.

Set Defaults enables you to reset the system parameters to the factory and operator default values as follows:

- **Full Factory Defaults**: Reverts all parameters, except for the AU Frequency and the Passwords, to the factory default values. Note that you may lose connectivity to the unit.
- **Partial Factory Defaults**: Reverts all parameters to the factory default values except for those parameters that are necessary to ensure connectivity and management access.
- **Full Operator Defaults**: Reverts all parameters, except for the AU Frequency and the Passwords, to the Operator default values. Note that you may lose connectivity to the unit.
- **Partial Operator Defaults**: Reverts all parameters to the Operator default values except for the parameters necessary to ensure connectivity and management access.
- **Cancel Pending Operation**: Select this option to cancel a pending Set Defaults request (Set Defaults operation is executed only after reset).

4.5.2.6 Exit Telnet

The Exit Telnet option is applicable to **Single Device** Configuration only. It enables you to terminate a current Telnet session to the unit.

4.5.3 Site Survey Menu (Single Device)

NOTE

The *Site Survey* Menu is available only in Single Device configuration.

The Site Survey menu enables you to view traffic and performance statistics for the selected device.

The *Site Survey* menu is used to display the results of various tests and counters for verifying the quality of the wireless link. This information can be used to help determine where to position the units for optimal coverage, antenna alignment and to assist in troubleshooting.

The Site Survey menu includes the following options:

- **Performance Monitoring**: Enables viewing the real-time graphs of the rates (frames/second) of selected counters. For more details refer to "Performance Monitoring" on page 5-121
- **Traffic Counters**: Displays general Ethernet traffic statistics for the selected unit. For more information, refer to "Traffic Counters" on page 5-124.
- **Tx Counters**: Displays statistics regarding the traffic transmitted from the selected unit. For more information, refer to "Tx Counters" on page 5-126.
- **Rx Counters**: Displays statistics regarding the traffic received by the selected unit. For more information, refer to "Rx Counters" on page 5-130.
- **Per Modulation Level Counters (SU/RB only)**: Displays information on traffic transmitted by the SU/RB for each of the applicable modulation levels. Refer to "Per Modulation Level Counters (SU/RB)" on page 5-132.
- **Per SU Counters (AU)/BU Tx Statistics (BU)**: For each of the associated SUs, or the RB, displays information on the traffic transmitted to the SU/RB at each of the applicable modulation levels. Refer to "Per SU Counters (AU)/BU Tx Statistics (BU)" on page 5-134.

- **Link Quality (SU/RB only)**: Enables to view the quality of the uplink to the AU/BU using the Average Modulation Level of transmitted frames as the link quality indicator. For more details refer to “Link Quality (SU/RB)” on page 5-136.

4.5.4 Settings Menu

The Setting menu enables access to Network Management parameters and to the Feature Upgrade window.

- **Network Management Parameters**: Enables you to configure filtering parameters to limit access to the unit for management purposes and parameters related to traps. It also enables you to define the Telnet time-out. For more information, refer to “Network Management Parameters” on page 5-114.

- **Feature Upgrade**: The Feature Upgrade window enables you to upload Feature License or Country Code strings to one or several devices. For more information, refer to “Feature Upgrade” on page 5-119.

4.5.5 Window Menu

Enables you to browse the windows previously accessed. For more information, refer to “Navigating the Windows in the Current Session” on page 4-31.

4.5.6 View Logs

NOTE

View Logs is enabled for **Multiple Device** Configuration only.

Select to open the *AlvariSTAR Log* for the **Multiple Configuration** Process.

4.5.7 Help Menu

Selecting Device Configuration Help from the *Help* Menu opens the Help Navigator and Help Topic window for the current Device Driver.

4.5.8 Close

Closes the *Device Manager* for the current device.

5

Chapter 5 - Managing Devices

In This Chapter:

Many management options provided by the Device Manager depend on the type of device being configured.

When managing a single unit, the parameters and options displayed in the Device Manager Window depend on the selected unit type.

In multiple devices configuration, the workspace includes parameters relevant to any of the relevant device types (AU, SU, BU or RB). In addition, only configurable parameters are available in multiple devices configuration.

NOTE

This Section presents the windows as they appear when configuring a single AU or SU device. Some of the parameters may not be applicable to BU or RB devices. These parameters are marked accordingly in the text. If you are working in multiple devices configuration, refer to the window according to the type of device.

For detailed information on each of the parameters refer to the relevant System Manual.

Managing Devices includes the following options:

Configuration Menu Options

Settings Menu Options

Site Survey Options (Single Configuration Only)

5.1 Device Status Parameters

The *Device Status* window enables you to define general device parameters such as the name and location of the selected unit. In addition, the Device Status window displays details regarding the unit's firmware and hardware versions. For an SU/RB, information regarding its associated AU/BU is displayed, and for an AU/BU, information regarding its associated SUs/RB is displayed.

Single (Device) Configuration: The *Device Status* window is divided into three tabs:

- The *Properties* tab includes the device's Status parameters.
- The *Associations Tab* in the AU/BU includes additional details about the associated SUs/RB. In an SU/RB, the *Associations Tab* includes information about the associated AU/BU.
- The *Capabilities* tabs provide information on HW and SW capabilities of relevant units. In an AU/BU, the information provided in the tab is for all associated SUs or RB. In an SU/RB, the tab includes information on all AUs/RBs in the neighboring AUs/BUs table (all AUs/BUs with whom the SU/RB can communicate).

Multiple (Device) Configuration: In multiple device configurations, a single *Device Status* tab includes only a small subset of the parameters available in single device configuration.

The *Device Status* window is accessed from the *Configuration* Menu.

This section includes:

5.1.1 Device Status Properties Tab

The *Device Status Properties Tab* is displayed below.

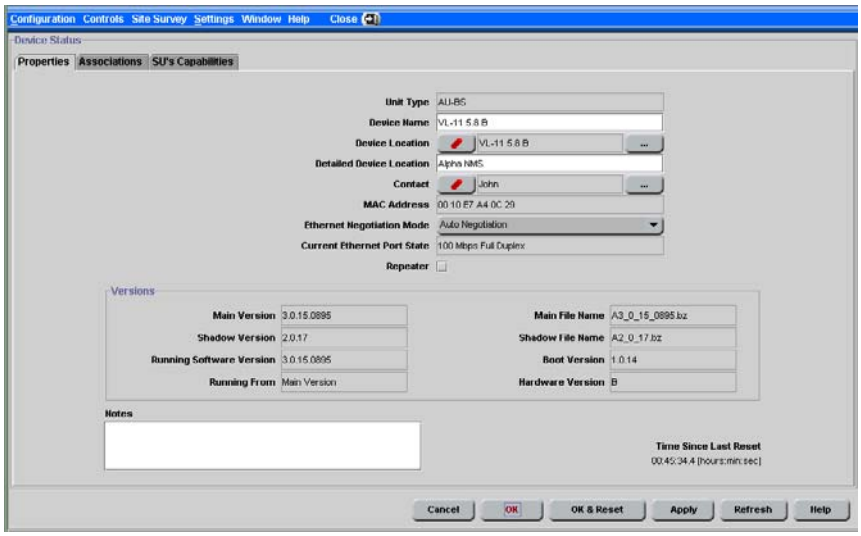


Figure 5-1: Device Status Properties Tab

The *Device Status Properties* tab is comprised of the following components:

- Unit Type
- Device Name
- Device Location
- Detailed Device Location
- Contact
- MAC Address
- Ethernet Negotiation Mode
- Current Ethernet Port State
- Notes
- Repeater

- Time since Last Reset
- Versions

5.1.1.1 Unit Type

Identifies the unit's function.

NOTE

The *Unit Type* read-only parameter is not applicable to multiple device configuration.

5.1.1.2 Device Name

The device's name.

NOTE

Device Name is not applicable to multiple device configuration.

5.1.1.3 Device Location

The device's location in the AlvariSTAR database. Use the browser command button to select a contact from the AlvariSTAR Location Manager.

NOTE

Device Location is not applicable to multiple device configuration.

5.1.1.4 Detailed Device Location

The device location in the device's database (MIB II).

5.1.1.5 Contact

The Contact for the device. Use the browser command button to select a contact from the AlvariSTAR Contact Manager. This contact is not configured in the device. It is used to support functionality of the AlvariSTAR Contact Manager, and it affects only the AlvariSTAR database (not the device).

5.1.1.6 MAC Address

Displays the unit's MAC address.

NOTE

The *MAC Address* read-only parameter is not applicable to multiple device configuration.

5.1.1.7 Ethernet Negotiation Mode

The Ethernet port negotiation mode. The available options are:

- Auto Negotiation
- Force 10 Mbps and Half-Duplex
- Force 10 Mbps and Full-Duplex
- Force 100 Mbps and Half-Duplex
- Force 100 Mbps and Full-Duplex

5.1.1.8 Current Ethernet Port State

Displays the actual state of the Ethernet port.

NOTE

The *Current Ethernet Port State* read-only parameter is not applicable for multiple device configuration.

5.1.1.9 Notes

An optional field enabling the addition of notes related to the managed device. The notes are stored only in the AlvariSTAR database.

NOTE

The *Notes* field is not applicable for multiple device configuration.

5.1.1.10 Repeater

Check the *Repeater* option if the unit serves as part of a Repeater. This is not configured in the unit - it serves to indicate the Repeater functionality in the AlvariSTAR database, for use during software upgrade and multiple configuration processes.

NOTE

The *Repeater* option is not applicable to multiple device configuration.

5.1.1.11 Time since Last Reset

The time (days: hours: min: sec:) since the last reset.

NOTE

The read-only *Time since Last Reset* parameter is not applicable to multiple device configuration.

5.1.1.12 Versions

NOTE

The *Versions* control parameters are not applicable to multiple device configuration.

Versions parameters include:

- **Main Version**: Displays the version number of the unit's current main software version (the version to be used after next reset).
- **Shadow Version**: Displays the version number of the unit's shadow software.
- **Running Software Version**: Displays the version number of the current running software version.
- **Running From**: Displays the source (Main or Shadow) of the current running version.
- **Main File Name**: Displays the name of the compressed file containing the Main Version.
- **Shadow File Name**: Displays the name of the compressed file containing the Shadow Version.
- **Boot Version**: Displays the version number of the Boot software.
- **Hardware Version**: Displays the model identification of the unit hardware.

5.1.2 Associations Tab for an AU

The *Associations tab* in the *Device Status* Window for an AU provides association and additional information regarding the SUs associated with the specific AU. It also enables disassociating one, several, or all SUs.

NOTE

The *SUs Associations Tab* is not applicable for multiple device configuration.

The *Associations Tab* for an AU is displayed below.

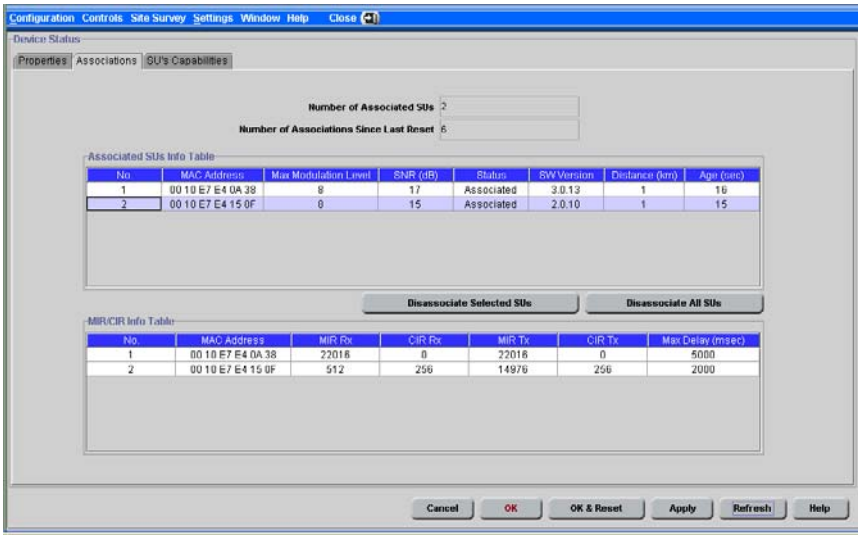


Figure 5-2: Device Status Window - Associations Tab for an AU

The *Associations tab* in AU is comprised of the following components:

- Number of Associated SUs
- Number of Associations Since Last Reset
- Associated SUs Info Table
- Disassociate Selected SUs/Disassociate All SUs
- MIR/CIR Info Table

5.1.2.1 Number of Associated SUs

Displays the number of Subscriber Units that are currently associated with the Access Unit.

5.1.2.2 Number of Associations Since Last Reset

Displays the number of associations with Subscriber Units since the last reset, including re-associations.

5.1.2.3 Associated SUs Info Table

A table that provides the following information for each SU currently associated with the selected Access Unit.

- **MAC Address**: The MAC address of the associated Subscriber Unit.
- **Max Modulation Level**: The value configured in the SU for the Maximum Modulation Level parameter. See also "Performance Parameters" on page 5-98.
- **SNR**: The quality (Signal to Noise Ratio) in dB at which the AU receives the SU.
- **Status**: The current association status of the relevant SU. The value can be Associated, Authenticated or Not Authenticated.
- **SW Version:** The version of the software that is currently in use by the SU.
- **Distance**: The distance of the unit from the AU as measured by the automatic cell distance mechanism.
- **Age**: The time in seconds since receiving the last packet from the SU.

5.1.2.4 Disassociate Selected SUs/Disassociate All SUs

These buttons enable disassociating selected SUs or 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. To disassociate one or more SUs, select the SU(s) in the Associated SUs Info Table and click on the Disassociate Selected SUs button. To disassociate all SUs, click on the Disassociate All SUs button.

5.1.2.5 MIR/CIR Info Table

The MIR/CIR Table provides the following information for each SU in the associated SUs database:

- **MAC Address**: The MAC Address of the associated Subscriber Unit.
- **MIR Rx**: The value configured in the SU for the *MIR Downlink* (AU to SU) parameter.
- **CIR Rx**: The value configured in the SU for the *CIR Downlink* (AU to SU) parameter.
- **MIR Tx**: The value configured in the SU for the *MIR Uplink* (SU to AU) parameter.
- **CIR Tx**: The value configured in the SU for the *MIR Uplink* (SU to AU) parameter.
- **Max Delay (msec)**: The value configured in the SU for the *Maximum Delay* parameter.

5.1.3 Associations Tab for a BU

The *Associations tab* in the *Device Status* Window for a BU provides association and additional information regarding the RB associated with the specific BU.

NOTE

The *SUs Associations Tab* is not applicable for multiple device configuration.

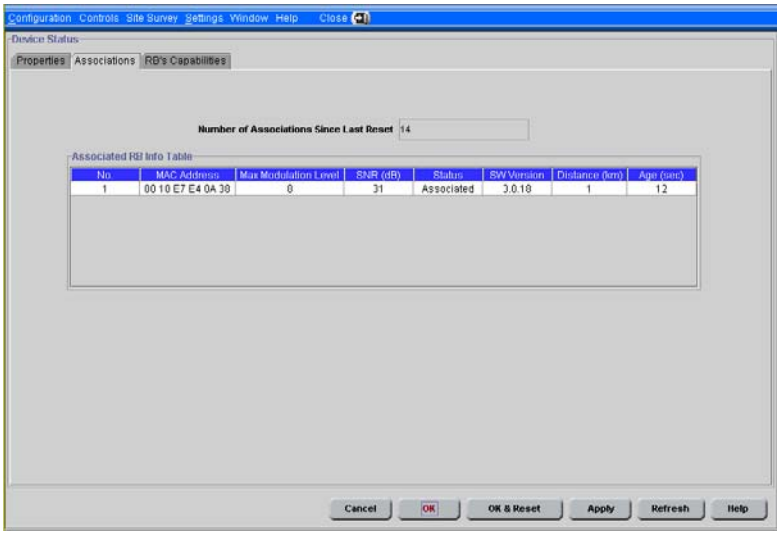


Figure 5-3: Device Status Window - Associations Tab for BU

The *Associations tab* in AU is comprised of the following components:

- Number of Associations Since Last Reset
- Associated SUs Info Table

5.1.3.1 Number of Associations Since Last Reset

Displays the number of associations with an RB since the last reset, including re-associations.

5.1.3.2 Associated RB Info Table

A table that provides the following information for the RB currently associated with the selected Access Unit.

- **MAC Address**: The MAC address of the associated RB.

- **Max Modulation Level**: The value configured in the RB for the Maximum Modulation Level parameter. See also "Performance Parameters" on page 5-98.
- **SNR**: The quality (Signal to Noise Ratio) in dB at which the BU receives the RB.
- **Status**: The current association status of the relevant RB. The value can be Associated, Authenticated or Not Authenticated.
- **SW Version:** The version of the software that is currently in use by the RB.
- **Distance**: The distance of the unit from the BU as measured by the automatic cell distance mechanism.
- **Age**: The time in seconds since receiving the last packet from the RB.
- **Max Delay (msec)**: The value configured in the RB for the *Maximum Delay* parameter.

5.1.4 Associations Tab for an SU/RB

NOTE

The *Associations Tab* for an SU/RB is not applicable for multiple device configuration.

The *Associations Tab* for an SU is displayed below.

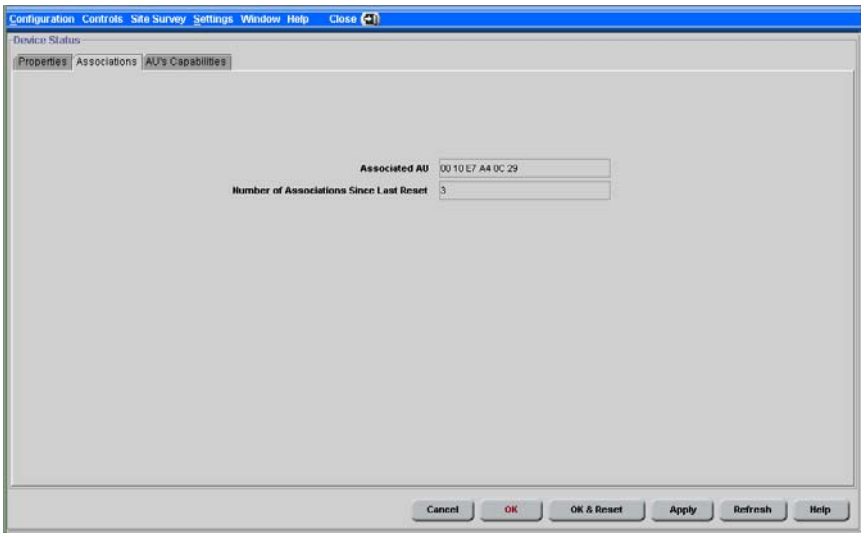


Figure 5-4: Device Status Window -Associations Tab for an SU

The Associations tab for an SU/RB includes the following:

- **Associated AU/BU**: Displays the MAC address of the AU/BU with which the device is currently associated.

- **Number of Associations Since Last Reset**: Displays the number of associations with any AU/BU since the last reset, including re-associations.

5.1.5 Capabilities Tab

The Capabilities tabs provide information on HW and SW capabilities of relevant units. In an AU, the information provided in the tab is for all associated SUs. In a BU, the information is for the associated RB. In an SU/RB, the tab includes information on all AUs/BUs in the neighboring AUs/BUs table (all AUs/BUs with whom the SU/RB can communicate).

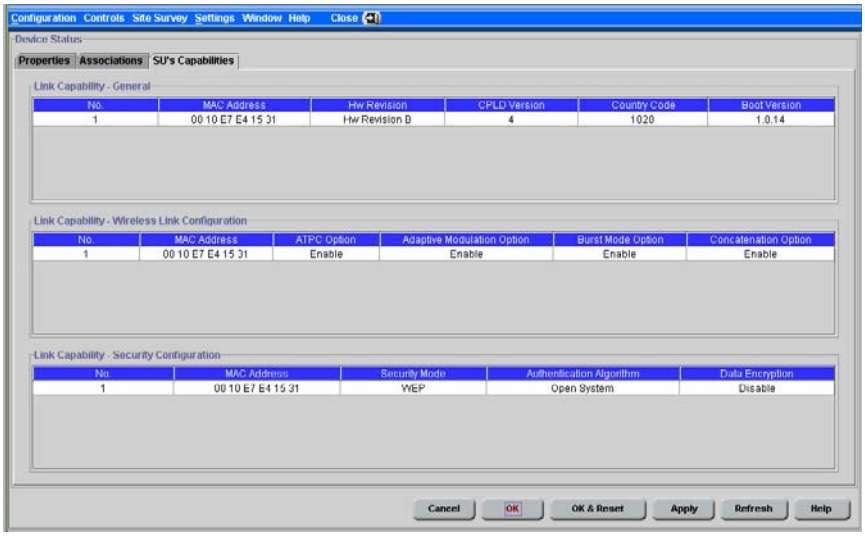


Figure 5-5: Device Status Window - SUs Capabilities (AU)

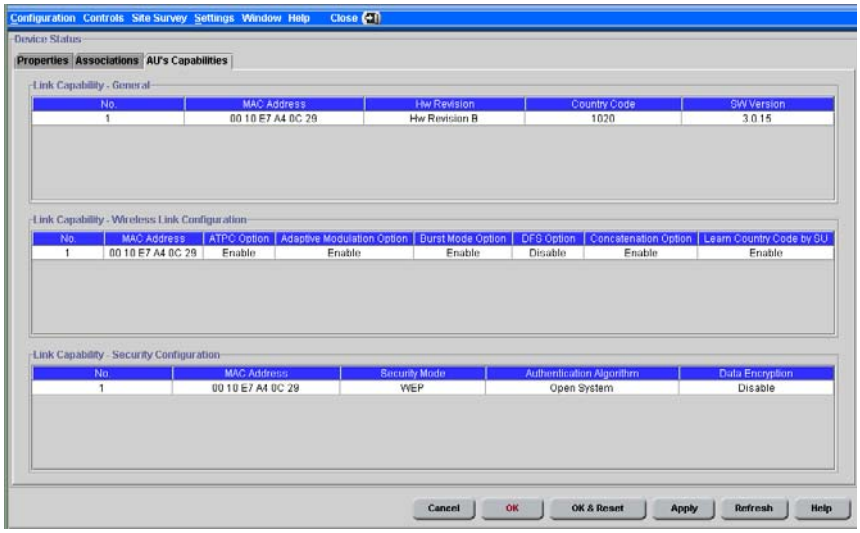


Figure 5-6: Device Status Window - AUs Capabilities (SU)

The Capabilities tabs include the following components:

- Link Capability-General
- Link Capability-Wireless Link Configuration
- Link Capability-Security Configuration

5.1.5.1 Link Capability-General

The Link Capability - General table provides information on general parameters of relevant units. For each relevant unit, identified by its MAC address, the following details are displayed:

- **HW Revision**: the hardware revision of the unit.
- **CPLD Version (AU/BU)**: The version of the Complex Programmable Logic Device (CPLD) used in the unit. This parameter is available only in AUs/BUs, displaying the CPLD version in the relevant SU/RB.
- **Country Code**: The 3 or 4 digits country code supported by the unit.
- **SW Version (SU/RB)**: The SW version used by the unit. This parameter is available only in SUs/RBs, displaying the SW version in the relevant AU/BU.

- **Boot Version (AU/BU)**: The Boot Version of the unit. This parameter is available only in AUs/BUs, displaying the Boot version in the relevant SU/RB.

5.1.5.2 Link Capability-Wireless Link Configuration

The Link Capability-Wireless Link Configuration table provides information on current wireless link parameters of relevant units. For each relevant unit, identified by its MAC address, the following details are displayed:

- **ATPC Option**: The status of the ATPC Option. Enable or Disable.
- **Adaptive Modulation Option**: The status of the Adaptive Modulation Option. Enable or Disable.
- **Burst Mode Option**: The status of the Burst Mode Option. Enable or Disable.
- **DFS Option (SU/RB)**: The status of the DFS Option. Enable or Disable. This parameter is available only in SUs/RBs, displaying the current option in the relevant AU/BU.
- **Concatenation Option**: The status of the Concatenation Option. Enable or Disable.
- **Learn Country Code by SU (SU/RB)**: The status of the Country Code Learning By SU/RB option. Enable or Disable. This parameter is available only in SUs/RBs, displaying the current option in the relevant AU/BU.

5.1.5.3 Link Capability-Security Configuration

The Link Capability-Security Configuration table provides information on current security related parameters of relevant units. For each relevant unit, identified by its MAC address, the following details are displayed:

- **Security Mode**: WEP or AES.
- **Authentication Algorithm**: Shared Key or Open System.
- **Data Encryption**: Enable or Disable.

5.1.6 Device Status for Multiple Device Configuration

In multiple device configuration, a single *Device Status* tab includes only a small subset of the parameters available in single device configuration, as shown below.

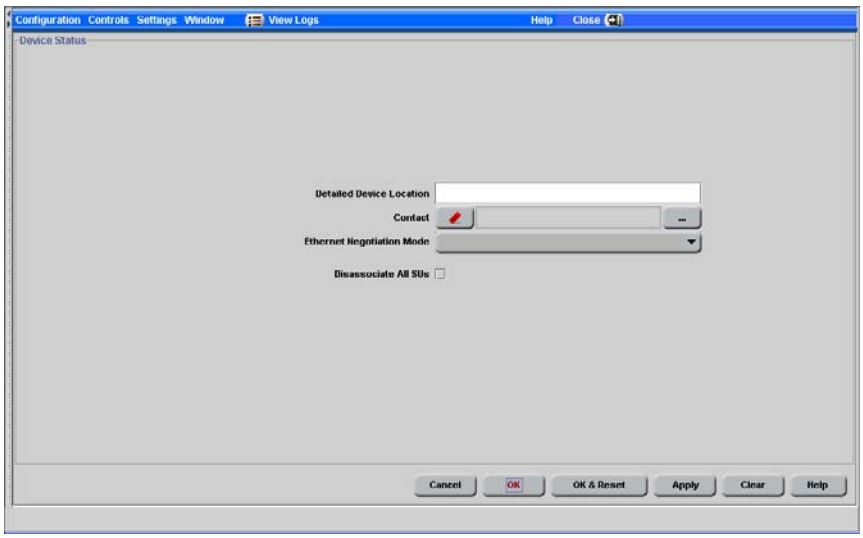


Figure 5-7: Device Status Window - Multiple Device Configuration

The Device status window for multiple device configuration includes the following components:

- Detailed Device Location
- Contact
- Ethernet Negotiation Mode
- Disassociate All SUs (AUs only)

5.1.6.1 Detailed Device Location

The device location in the devices' database (MIB II).

5.1.6.2 Contact

The Contact for the devices. Use the browser command button to select a contact from the AlvariSTAR Contact Manager. This contact is not configured in the

devices. It is used to support functionality of the Contact Manager, and it affects only the AlvariSTAR database (not the devices).

5.1.6.3 Ethernet Negotiation Mode

The Ethernet port negotiation mode. The available options are:

- Auto Negotiation
- Force 10 Mbps and Half-Duplex
- Force 10 Mbps and Full-Duplex
- Force 100 Mbps and Half-Duplex
- Force 100 Mbps and Full-Duplex

5.1.6.4 Disassociate All SUs (AUs only)

To disassociate all SUs associated will all AUs that participate in the multiple configuration session, mark the Disassociate All SUs check-box.

5.2 IP Parameters

The *IP Parameters* window enables you to define IP parameters for the selected device and determine its method for IP parameter acquisition.

The *IP Parameters* window is accessed from the *Configuration* Menu.

The following figures show the *IP Parameters* window for single device and multiple device configuration respectively.

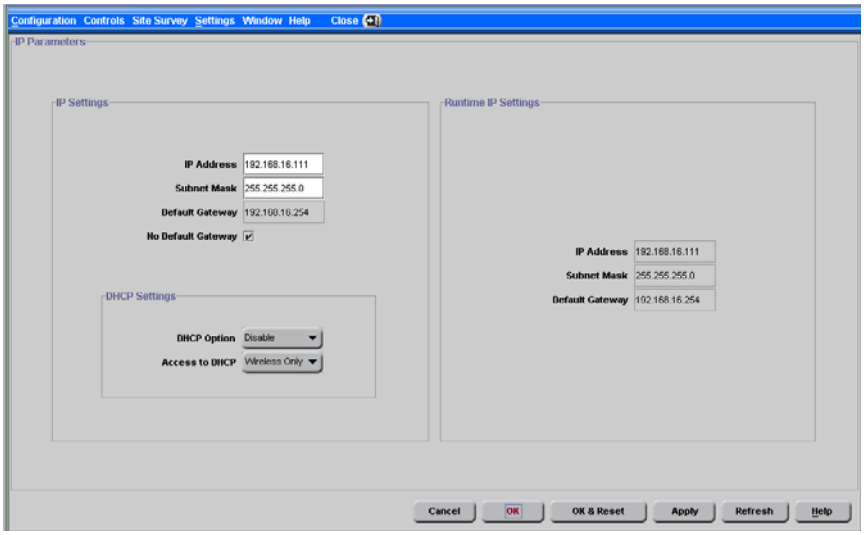


Figure 5-8: IP Parameters Window - Single Device Configuration

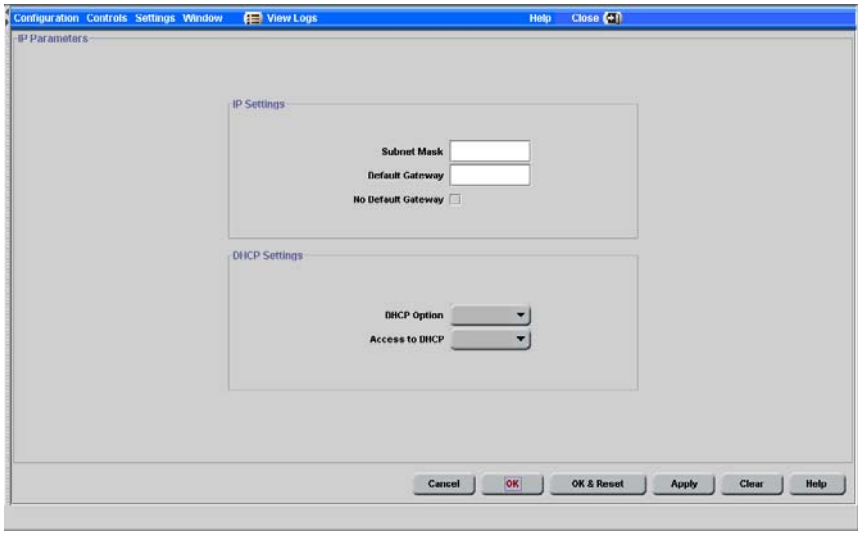


Figure 5-9: IP Parameters Window - Multiple Devices Configuration

The *IP Parameters* window is comprised of the following components:

- "IP Settings" on page 5-59
- "DHCP Settings" on page 5-60
- "Runtime IP Settings" on page 5-60

5.2.1 IP Settings

- **IP Address**: The static IP address of the selected unit.

NOTE

The *IP Address* parameter is not applicable to multiple device configuration.

- **Subnet Mask**: The static subnet mask of the selected unit.
- **Default Gateway**: The address of the unit's default gateway.
- **No Default Gateway**: This option sets the Default Gateway address to 0.0.0.0.

5.2.2 DHCP Settings

The DHCP Settings parameters include:

- DHCP Option
- Access to DHCP

5.2.2.1 DHCP Option

The operational mode for the DHCP mechanism. The available options are:

- Select **Disable** to configure the IP parameters manually. The unit then operates using the defined static IP parameters.
- Select **DHCP Only** to enable the unit to search for and acquire its IP parameters, including the IP address, subnet mask and default gateway, from a DHCP server. If this option is selected, configuring the static IP parameters is not required.
- Select **Automatic** to enable the unit to search for a DHCP server and acquire its IP parameters from the server. If a DHCP server is not located within approximately 40 seconds, the currently configured static parameters are used.

5.2.2.2 Access to DHCP

The port through which the unit searches for and communicates with a DHCP server. The available options are:

- Wireless Only
- Ethernet Only
- Both

5.2.3 Runtime IP Settings

NOTE

Runtime IP Settings are read-only and not applicable for multiple device management.

- **IP Address**: Displays the unit's current IP address.
- **Subnet Mask**: Displays the unit's current subnet mask.
- **Default Gateway**: Displays the unit's current default gateway.

5.3 Bridging Parameters

The *Bridging Parameters* window enables you to configure multiple system parameters, including control and filtering options for bridge and broadcast transmissions, VLAN support and Type of Service prioritization. In AUs, it also enables defining the Deny List, disabling services to specific SUs.

The *Bridging Parameters* window in SUs, RBs and BUs is divided into two secondary tabs, *General* and *VLAN*. AUs have the same two tabs with some differences in available parameters. In addition, AUs have a third tab – MAC Address *Deny List*.

The *Bridging Parameters* window is accessed from the *Configuration* Menu.

This section includes:

- "Bridging Parameters General Tab" on page 5-62
- "Bridging Parameters VLAN Tab" on page 5-66
- "MAC Address Deny List Tab (AU only)" on page 5-69

5.3.1 Bridging Parameters General Tab

The Bridging Parameters window *General* tab enables you to define control mechanisms and filtering options for various types of transmissions. The figures below show the Bridging Parameters *General* tab for an AU, for an SU/RB, and for *multiple device configuration*.

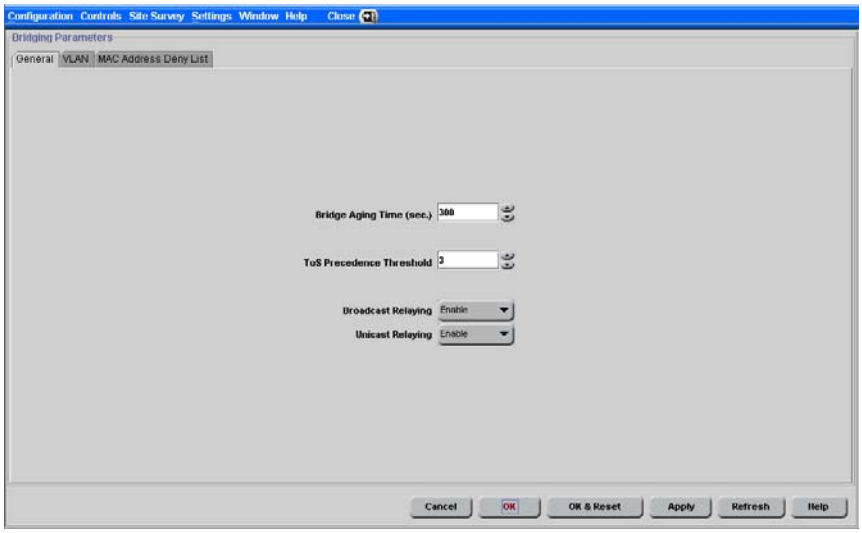


Figure 5-10: Bridging Parameters Window - General Tab - AU

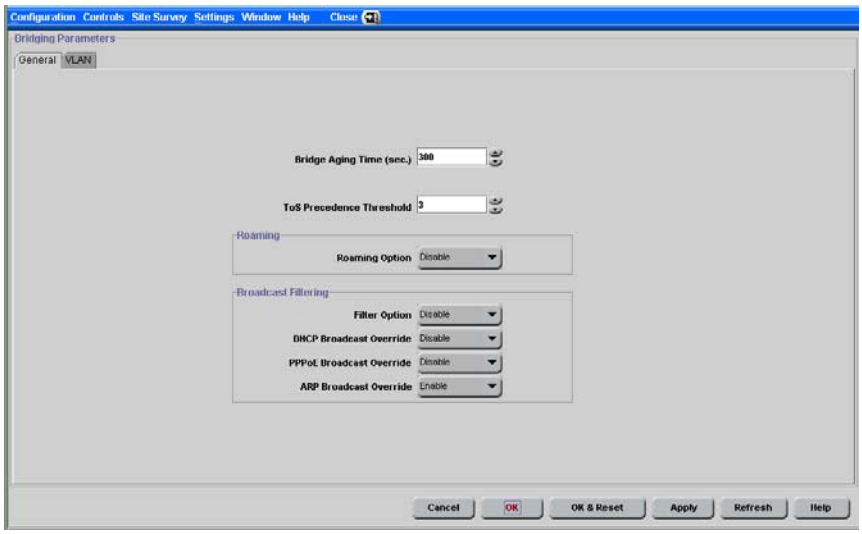


Figure 5-11: Bridging Parameters Window - General Tab - SU/RB

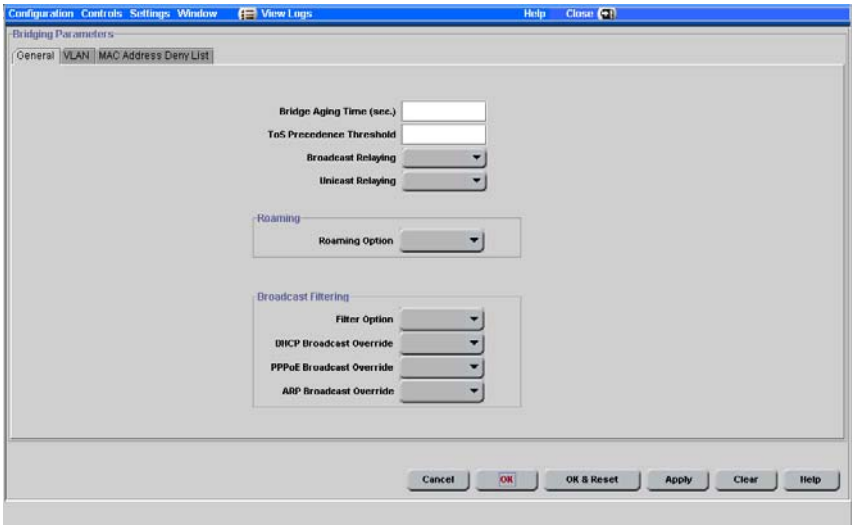


Figure 5-12: Bridging Parameters Window - General Tab - Multiple Device

The *General* tab includes the following components:

- Bridge Aging Time (sec)
- ToS Precedence Threshold
- Broadcast Relaying (AU only)
- Unicast Relaying (AU only)
- Roaming Option (SU/RB only)
- Broadcast Filtering (SU/RB only)

5.3.1.1 Bridge Aging Time (sec)

The bridge aging time for addresses of devices on both the wired and wireless sides. This does not include BreezeACCESS VL and BreezeNET B units. The available range is 20 to 2000 seconds.

5.3.1.2 ToS Precedence Threshold

The precedence threshold for ToS based prioritization. The available range is 0 to 7.

5.3.1.3 Broadcast Relaying (AU only)

The functionality of the broadcast relaying mechanism. If enabled, broadcast packets 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. If disabled, these packets are sent only to the local wired LAN and not back to the wireless link.

5.3.1.4 Unicast Relaying (AU only)

The functionality of the unicast relaying mechanism. If enabled, unicast packets originating from devices on the wireless link can be transmitted by the AU back to the wireless link devices. If disabled, these packets are not sent back to the wireless link even if they are intended for devices on the wireless link side.

5.3.1.5 Roaming Option (SU/RB only)

The Roaming Option parameter defines the roaming support of the unit. When set to *Enable*, the SU/RB waits only one second (rather than approximately 7 seconds) for beacons from the previous AU/BU after losing communication with it before scanning for another AU/BU. In addition, when the Roaming Option is enabled, the SU/RB sends Roaming SNAP messages upon associating with a new AU/BU.

5.3.1.6 Broadcast Filtering (SU/RB only)

The Broadcast Filtering parameters include:

- Filter Option
- DHCP Broadcast Override
- PPPoE Broadcast Override
- ARP Broadcast Override

5.3.1.6.1 Filter Option

The Ethernet broadcast filtering functionality for the selected device. The available options are:

- **Disable**: default and means no Ethernet broadcast filtering.
- **Ethernet only**: filters broadcast messages from the Ethernet port only.
- **Wireless only**: filters broadcast messages from the wireless link only.

- **Both**: filters broadcast messages from both the Ethernet and wireless link ports.

5.3.1.6.2 DHCP Broadcast Override

The functionality of the override mechanism for DHCP broadcasts. If enabled, DHCP messages are broadcast, even if the *Filter Options* parameter is set to filter broadcast messages.

5.3.1.6.3 PPPoE Broadcast Override

The functionality of the override mechanism for broadcasting PPPoE messages. If enabled, PPPoE messages are broadcast, even if the *Filter Options* parameter is set to filter broadcast messages.

5.3.1.6.4 ARP Broadcast Override

The functionality of the override mechanism for broadcasting ARP messages. If enabled, ARP messages are broadcast, even if the *Filter Options* parameter is set to filter broadcast messages.

5.3.2 Bridging Parameters VLAN Tab

The *Bridging Parameters* window *VLAN* tab enables you to define the parameters that control the VLAN support mechanisms of the devices.

In the *VLAN* tab, the parameters for AU, SU, BU and RB differ significantly.

The figures below show the VLAN tab for an AU, an SU, and for *multiple devices configuration*.

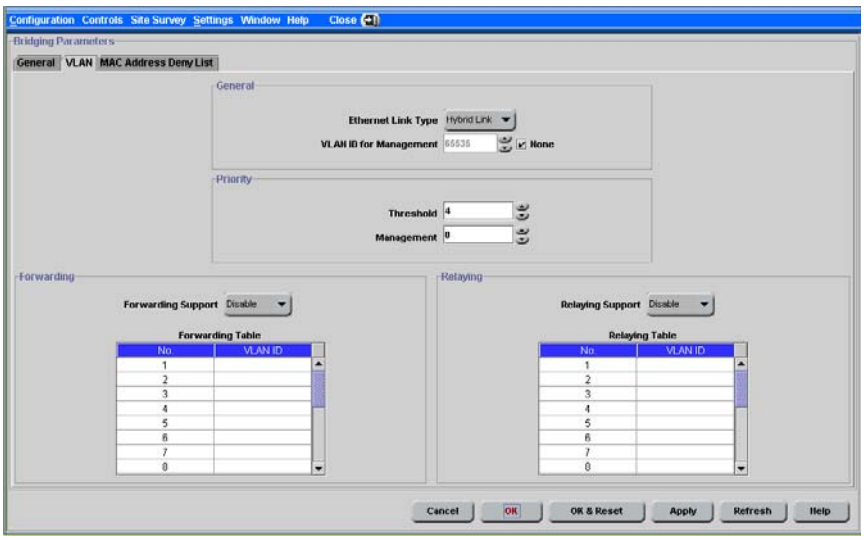


Figure 5-13: Bridging Parameters Window - VLAN Tab - AU

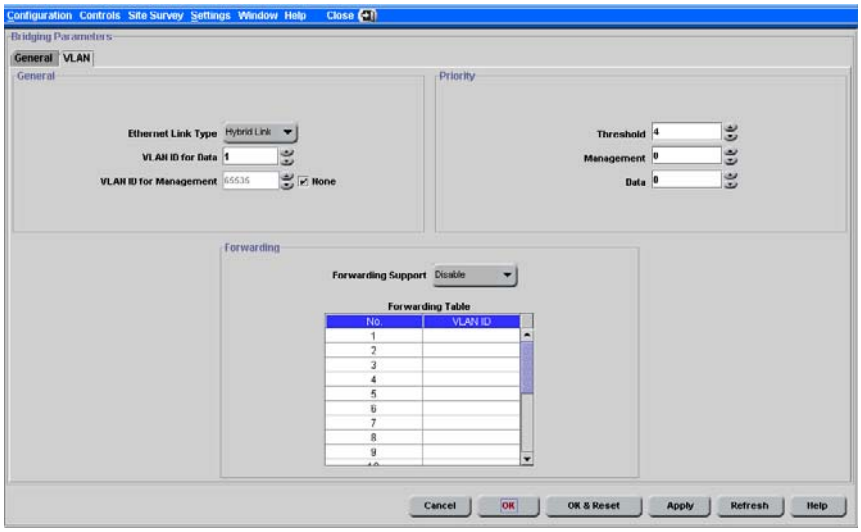


Figure 5-14: Bridging Parameters Window - VLAN Tab - SU

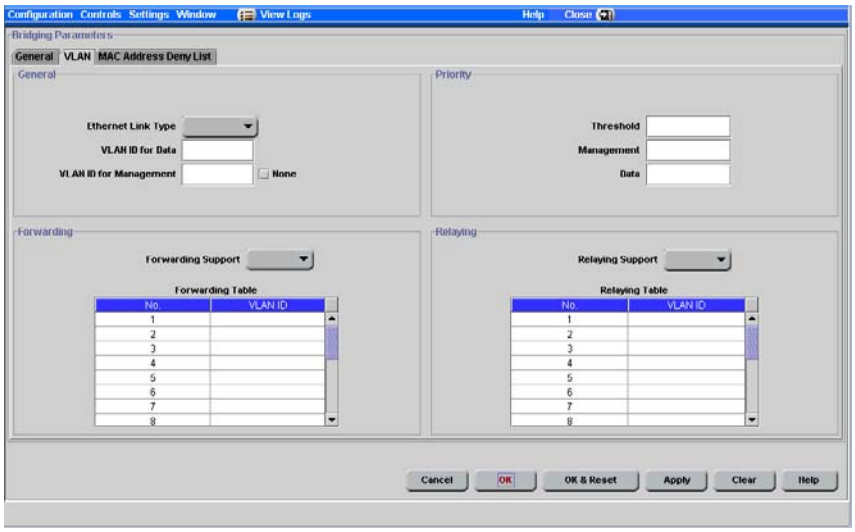


Figure 5-15: Bridging Parameters Window -VLAN Tab - Multiple Devices

The VLAN tab is comprised of the following components:

- General VLAN Parameters
- Priority
- Forwarding
- Relaying (AU only)

5.3.2.1 General VLAN Parameters

The General VLAN Parameters include:

- Ethernet Link Type
- VLAN ID for Data (SU/RB only)
- VLAN ID for Management

5.3.2.1.1 Ethernet Link Type

The functionality of the unit's VLAN-aware capability. The following options are available:

- **Access Link**: Applicable on to SUs/RBs only, and transfers frames while tagging/untagging them because all the devices connected to it are VLAN-unaware. The unit cannot transfer tagged frames.
- **Trunk Link**: the unit only transfers tagged frames, since all the devices connected to it are VLAN-aware.
- **Hybrid Link**: the device transfers both tagged and untagged frames because the devices connected to it can be either VLAN-aware or VLAN-unaware.

5.3.2.1.2 VLAN ID for Data (SU/RB only)

Applicable for Access Links only. The VLAN ID for data frames, that identifies the VLAN to which the SU/RB belongs. The available values range from 1 to 4094.

5.3.2.1.3 VLAN ID for Management

The VLAN ID that identifies remote stations for management purposes. This applies to all applications using management protocols such as SNMP, TFTP, DHCP, ICMP (ping) and Telnet. All stations must tag the management frames with the defined ID number. The available values range from 1 to 4094. Select the **None** check-box for no VLAN (VLAN ID = 65535).

5.3.2.2 Priority

The Priority parameters include:

- Threshold
- Management

- Data (SU/RB only)

5.3.2.2.1 Threshold

Applicable to Trunk and Hybrid Links only. The VLAN priority threshold for tagged packets received from the Ethernet port. The available values range from 0 to 7.

5.3.2.2.2 Management

The value of the user priority field for management frames in units where the *VLAN ID for Management* is not set to None (65535). The available values range from 0 to 7.

5.3.2.2.3 Data (SU/RB only)

Applicable to Access Links only. From the drop-down list, select the value of the user priority field for data frames transmitted to the wireless link.

The available values range from 0 to 7.

5.3.2.3 Forwarding

- **Forwarding Support**: Applicable to Trunk Links only. The functionality of the Forwarding Support feature. If enabled, the unit discards any data frame received with a VLAN ID that is not a member of the unit's VLAN Forwarding list, as defined in the Forwarding Table.

- **Forwarding Table**: A table of up to 20 forwarding VLAN IDs.

5.3.2.4 Relaying (AU only)

- **Relaying Support**: The functionality of the *Relaying Support* feature. If enabled, the unit discards any data frame relayed from the wireless link (received from and marked for transmission back through the wireless link), and that is not a member of unit's VLAN Relaying list, as defined in the Relaying Table.

- **Relaying Table**: A table of up to 20 relaying VLAN IDs.

5.3.3 MAC Address Deny List Tab (AU only)

The *Bridging Parameters* window *MAC Address Deny List* tab enables you to specify the SUs that are denied services from the AU. This feature enables you to disconnect units from the services in question. For example, if a user fraudulently configures a unit to values that differ from the subscription plan, you can deny

services to that unit. The figures below show the *MAC Address Deny List* tab for a single device and for multiple devices.

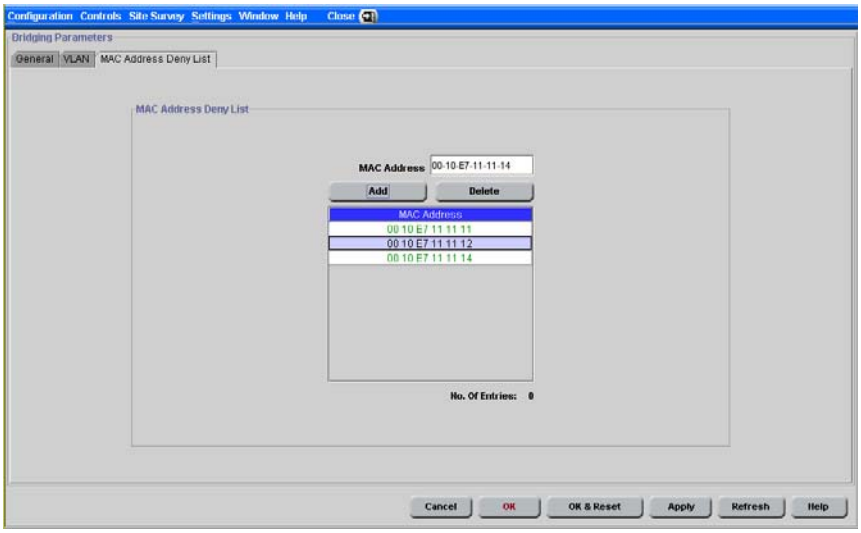


Figure 5-16: Bridging Parameters - MAC Address Deny List - Single Device

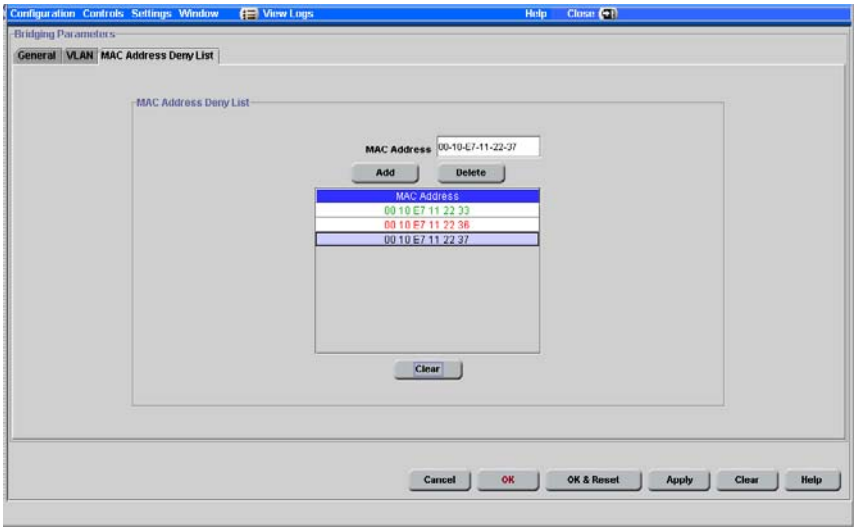


Figure 5-17: Bridging Parameters - MAC Address Deny List Tab- Multiple Devices

The *MAC Address Deny List* tab is comprised of the following components:

- MAC Address Deny List Table
- Add

- Delete
- Clear

5.3.3.1 MAC Address Deny List Table

A list of up to 100 SUs (specified by the MAC Address) that are not authorized to receive services from the AU.

The MAC Addresses are colored either green, red or black, to indicate their status as follows:

- **Green:** Single device -The MAC Address is not currently stored in the device. It will be added to the device Deny List table when the changes in the window are applied (via the Apply, OK and Refresh buttons).
- **Green:** Multiple devices - The MAC Address will be added to the device Deny List table when the changes in the window are applied.
- **Red:** Single device - The MAC Address is currently stored in the device but was marked for deletion. It will be deleted from the device when the changes are applied (via the Apply, OK and Refresh buttons).
- **Red:** Multiple devices - The MAC Address will be deleted from all the devices that have it in their Deny List table.
- **Black:** Single device only - The MAC Address is currently stored in the device.

5.3.3.2 Add

Enables you to add SU MAC Addresses to the AU Deny List table.

To add a new MAC Address to the Deny List table:

1 In the *MAC Address Deny List* Tab, type the new MAC Address in the *MAC Address* field .Use either spaces or dashes between the numbers: for example, xx xx xx xx xx xx, or xx-xx-xx-xx-xx-xx.

The new MAC Address, colored green, appears in the window Deny List table. The SU MAC Address is not yet stored in the actual AU Deny List table.

2 To apply the change to the device, click on either the **Apply** button or the **OK** button and then click on the Refresh button to view the change.

NOTE

You can add more than one MAC Address before applying the changes to the device SUs (by clicking on the **Apply** or **OK** button.

The SU MAC Address is stored in the actual AU Deny List table. Note that for single device configuration, the MAC Address color turns to black. For multiple device configuration, the MAC Address color remains green.

5.3.3.3 Delete

Enables you to delete SU MAC Addresses from the AU Deny List table.

To delete a MAC Address from the Deny List table:

1 In the MAC Address Deny List Tab, type the MAC Address in the *MAC Address* field, and then click on the **Delete** button.

NOTE

For single device configuration, you can alternatively select a MAC Address (colored black) in the window MAC Deny List, and then click on the **Delete** button.

2 Click on the **Apply** or the **OK** button to apply the change, and then click on the **Refresh** button to view the change.

The MAC Address, now colored red in the table, indicates that the SU MAC Address is deleted from the actual AU Deny List table.

5.3.3.4 Clear

NOTE

The Clear button is applicable to multiple device configuration only.

Enables you to clear entries from the window Deny List table (multiple device configuration only).

To clear MAC Address entries from the Deny List table (multiple device configuration only):

1. In the *MAC Address Deny List* Tab, select one or more MAC Address entries from the table.
2. Click on the **Clear** button to remove the entry from the table.
3. Click on the **Apply** or the **OK** button to apply the change, and then click on the **Refresh** button.

5.4 Air Interface Parameters

The *Air Interface Parameters* window enables you to define parameters relating to the communication between AUs and SUs or BUs and RBs.

The *Air Interface Parameters* window for SUs/RBs is divided into five secondary tabs: *General, Frequency, Transmit Power, Country Parameters,* and *Spectrum Analysis Parameters*. For AUs/BUs the same five tabs are displayed (with some differences in available parameters), plus an additional *DFS* tabs that is available only when DFS is supported by the applicable Country Code (Sub Band). In multiple device configuration, there are four tabs: *General, Frequency*, *Transmit Power*, and *Spectrum Analysis Parameters*. The *Frequency* tab in multiple device configuration includes also parameters that for a single device configuration appear in the *Country Parameters* and *DFS* tabs.

The *Air Interface Parameters* window is accessed from the *Configuration* Menu.

This section includes:

5.4.1 Air Interface General Tab

The *Air Interface* window *General* tab enable you to define ESSID, ATPC and other parameters. The figures below show the *Air Interface General Parameters* for an AU, an SU, and for multiple device configuration.

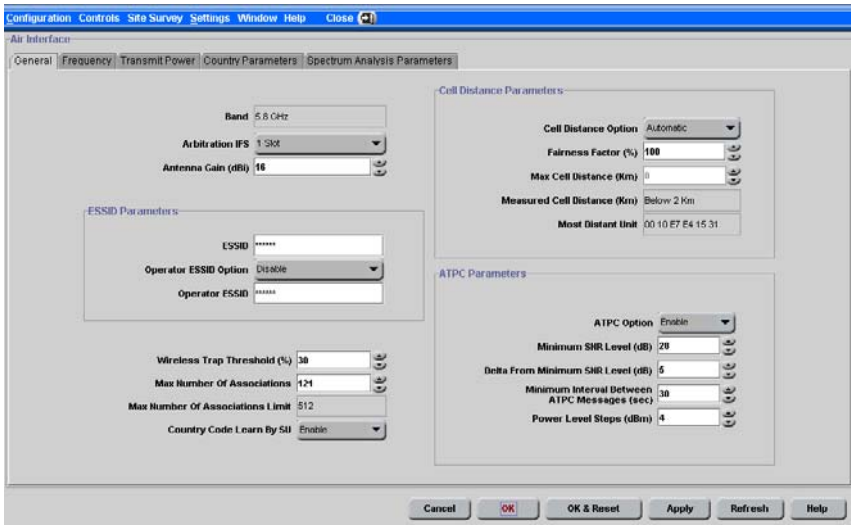


Figure 5-18: Air Interface Parameters Window - General Tab - AU

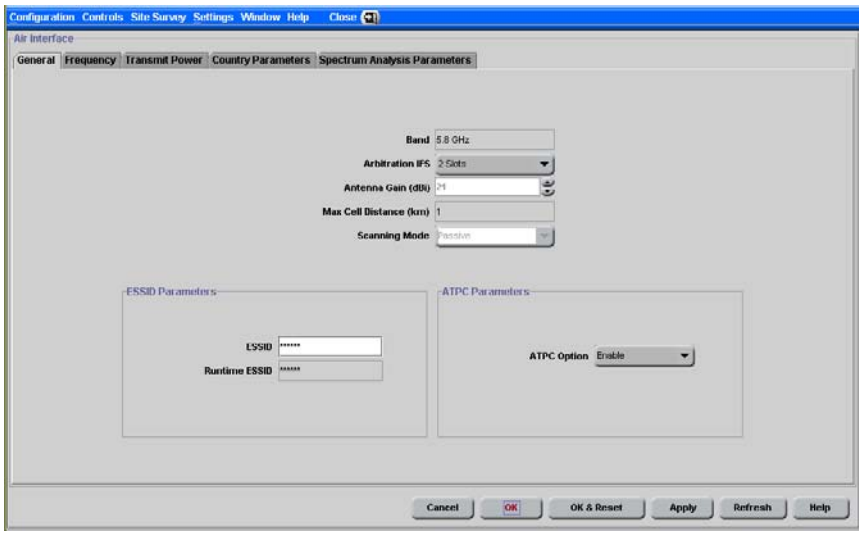


Figure 5-19: Air Interface Parameters Window - General Tab - SU

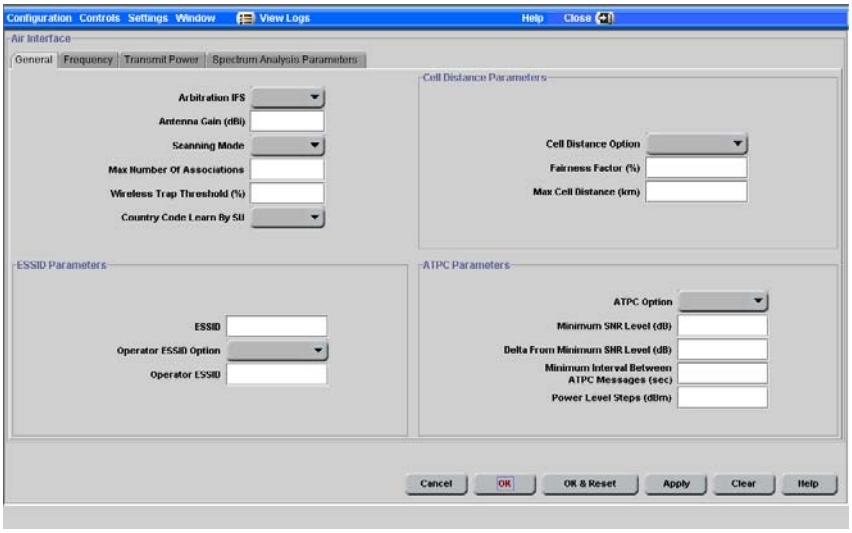


Figure 5-20: Air Interface Parameters Window - General Tab - Multiple Devices

The *General* tab *of the* Air Interface Parameters window includes the following components:

- General Air Interface Parameters
- Cell Distance Parameters
- ESSID Parameters
- ATPC Parameters

5.4.1.1 General Air Interface Parameters

The General Air Interface Parameters include:

- Band
- Arbitration IFS (AU and SU only)
- Antenna Gain
- Wireless Trap Threshold (AU and BU only)
- Max Number Of Associations (AU only)
- Maximum Num of Associations Limit (AU only)

- Scanning Mode (SU/RB only)

5.4.1.1.1 Band

A read-only field that displays the frequency band of the selected unit.

NOTE

The *Band* parameter is read-only and not applicable to multiple device configuration.

5.4.1.1.2 Arbitration IFS (AU and SU only)

The Arbitration Inter-Frame Spacing. Defines the typical minimum time (DIFS) between consecutive transmissions. The available options are:

- 1 Slot
- 2 Slots

A value of 1 Slot should be used only in point-to-point applications. A unit with a value of 1 Slot has an advantage in accessing the wireless link over a unit with a value of 2 Slots.

5.4.1.1.3 Antenna Gain

The Antenna Gain parameter defines the net gain of the antenna, including attenuation of the RF cable. This value is used for calculating the maximum permitted transmit power, where there are limitations set by local regulations. In certain units with an integral antenna, the value is pre-configured at the factory and cannot be changed. A value of **Not Set Yet** indicates that the actual value must be entered (as long as the value remains Not Set Yet the unit will not transmit). A value of **Don't Care** means that there are no transmit power limitations.

The configurable range is 0 to 50 dBi.

5.4.1.1.4 Wireless Trap Threshold (AU and BU only)

The Wireless Trap Threshold parameters defines the threshold for sending the AU/BU Wireless Quality Trap, that indicates that the quality of the wireless link has dropped below or has risen above the specified threshold. The Wireless Trap Threshold is in percentage of retransmissions compared to total transmissions. The range is from 0% to 100%.

5.4.1.1.5 Max Number Of Associations (AU only)

The maximum number of Subscriber Units that can associate with the selected Access Unit. The available values range from 0 to 512.

5.4.1.1.6 Maximum Num of Associations Limit (AU only)

When data encryption is enabled, the maximum number of SUs that can be served by the AU is 124. The value of this read-only parameter is either 512 (when data encryption is disabled) or 124 (when data encryption is enabled).

5.4.1.1.7 Scanning Mode (SU/RB only)

The *Scanning Mode* parameter defines whether the SU/RB uses **Passive** or **Active** scanning when searching for an AU/BU. When the *DFS Option* is enabled, the Scanning Mode is forced to **Passive**.

5.4.1.2 Cell Distance Parameters

The Cell Distance Parameters include:

- Cell Distance Option (AU/BU only)
- Max Cell Distance
- Fairness Factor (AU only)
- Measured Max Cell Distance (AU/BU only)
- Most Distant Unit (AU only)

5.4.1.2.1 Cell Distance Option (AU/BU only)

The *Cell Distance Option* defines whether the maximum distance of the AU/BU from any of the SUs or the RB it serves is determined manually (using the *Maximum Cell Distance* parameter) or automatically.

5.4.1.2.2 Max Cell Distance

Max Cell Distance is the distance from the AU/BU of the farthest SU or RB served by tit. *Max Cell Distance* is configurable only in AU/BU, and only if the *Cell Distance Option* is set to **Manual**; otherwise it is read-only. The *Max Cell Distance* affects the maximum time that the AU/BU and all units served by it wait for a response message (including acknowledgements of unicasts and response messages during the authentication and association process). This parameter also affects the size of time slots, to ensure fairness in the contention back-off algorithm between SUs located at different distances from the AU.

The available values are **1** to **54** (kilometers) or **0** for no compensation (minimum slot size, maximum time-out when expecting a response message).

5.4.1.2.3 Fairness Factor (AU only)

The *Fairness Factor* parameter defines the level of fairness in providing services to different SUs. When set to **100%**, all SUs have the same probability of receiving services when competing for bandwidth. If set to **X%**, then SUs located up to **X%** of the maximum distance from the AU have the advantage in receiving services over SUs located farther than this distance.

The range is **0** to **100 (%)**.

5.4.1.2.4 Measured Max Cell Distance (AU/BU only)

A read-only field displaying the distance of the farthest SU or the RB served by the AU/BU, as measured by the Automatic Cell Distance mechanism.

5.4.1.2.5 Most Distant Unit (AU only)

A read-only field displaying the MAC Address of the unit that the Automatic Cell Distance algorithm identified as being the farthest from the AU.

5.4.1.3 ESSID Parameters

The ESSID Parameters include:

- ESSID
- RunTime ESSID (SU/RB only)
- Operator ESSID Option (AU/BU only)
- Operator ESSID (AU/BU only)

5.4.1.3.1 ESSID

The Extended Service Set ID for the selected unit. The ESSID identifies the wireless network, that prevents the undesired merging of two collocated wireless networks, because an SU can only associate with an AU that has the identical ESSID. The ESSID can be a string of up to 31 case-sensitive printable ASCII characters.

5.4.1.3.2 RunTime ESSID (SU/RB only)

A read-only field that displays the ESSID currently used by the selected device to associate with an AU/BU.

5.4.1.3.3 Operator ESSID Option (AU/BU only)

The Operator ESSID Option defines whether the AU/BU supports the use of the Operator ESSID. The Operator ESSID is a secondary ESSID to be used when adding SUs/RBs to existing deployments, where the primary ESSID can differ

among neighboring AUs/BUs. It is also used to support the *Best AU/BU* feature. The available options are **Enable** and **Disable**.

5.4.1.3.4 Operator ESSID (AU/BU only)

The secondary Extended Service Set ID for the selected AU/BU for use if the Operator ESSID Option is enabled. The ESSID can be a string of up to 31 case-sensitive printable ASCII characters.

5.4.1.4 ATPC Parameters

The ATPC Parameters include:

- ATPC Option
- Minimum SNR Level (AU/BU only)
- Delta From Minimum SNR Level (AU/BU only)
- Min Interval Between ATPC Messages (AU/BU only)
- Power Level Steps (AU/BU only)

5.4.1.4.1 ATPC Option

Defines whether to **Enable** or **Disable** the Automatic Transmit Power Control algorithm.

5.4.1.4.2 Minimum SNR Level (AU/BU only)

The minimum required level in dB of the average SNR at the AU/BU for each SU/RB. This value reflects the lower limit of the optimal reception level range.

Available values range from 4 to 60 dB.

5.4.1.4.3 Delta From Minimum SNR Level (AU/BU only)

The Minimum SNR Level plus the value of this parameter define the maximum required level of the average SNR at the AU/BU. This value reflects the upper limit of the optimal reception level range. Available values range from 4 to 20 dB.

5.4.1.4.4 Min Interval Between ATPC Messages (AU/BU only)

The minimum permitted time, in seconds, between consecutive power-up/power-down messages. Available values range from 1 to 3600 seconds.

5.4.1.4.5 Power Level Steps (AU/BU only)

The step size in dB that the SU/RB uses when receiving an ATPC Power-Up/Power-Down message. The available values range from 1 to 20 dB.

5.4.2 Air Interface Frequency Tab (Single Device)

The *Air Interface Parameters* window *Frequency* tab enables you to configure frequency parameters. The figures below show the *Air Frequency Parameters window - Frequency Tab* for an AU/BU and for an SU/RB. The Frequency tab for multiple device configuration is described in "Air Interface Frequency Tab for Multiple Device Configuration" on page 5-83.

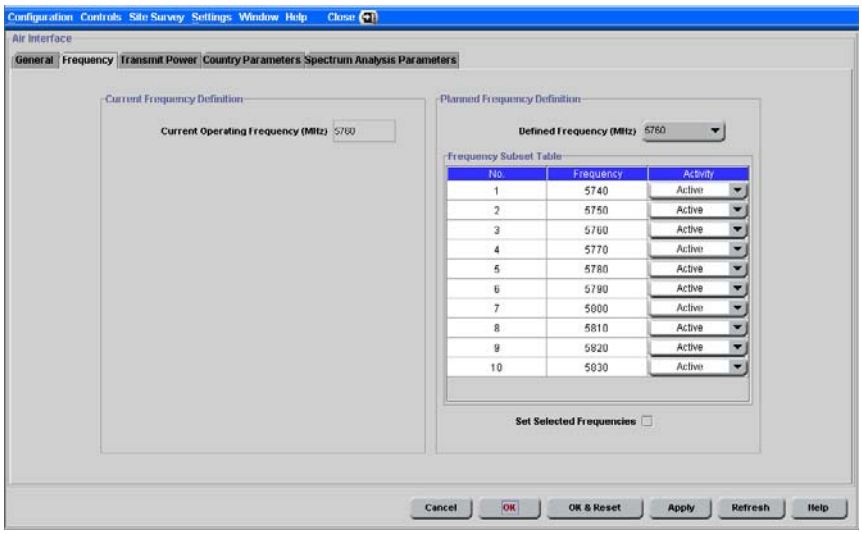


Figure 5-21: Air Interface Parameters Window - Frequency Tab - AU/BU

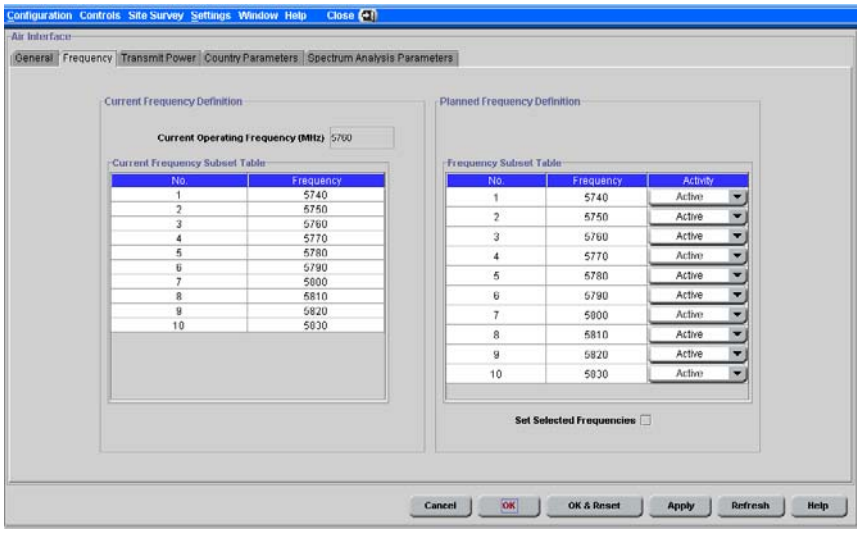


Figure 5-22: Air Interface Parameters Window - Frequency Tab - SU/RB

The *Frequency* tab is comprised of the following components:

- Current Frequency Definition
- Planned Frequency Definition

5.4.2.1 Current Frequency Definition

NOTE

The *Current Frequency Definition* parameters are not applicable to *multiple device configuration*.

- **Current Operating Frequency**: A read-only field that displays the current operating frequency in MHz.
- **Current Frequency Subset Table (SU/RB only)**: A read-only table that displays the current subset of frequencies used during scanning.

5.4.2.2 Planned Frequency Definition

- **Defined Frequency (AU/BU only)**: The *Defined Frequency* is the fixed operating frequency used if the DFS option is disabled. This is also the first frequency used by the DFS mechanism the first time it starts functioning. The available values depend on the selected Sub Band.
- **Frequency Subset Table**: Displays the available frequencies and enables defining the planned frequencies subset by selecting either *Active* (default) or *Inactive* for each entry in the table.
- **Set Selected Frequencies**: Check the *Set Selected Frequencies* check box to use the selected frequencies as the subset that becomes effective after the next reset. In SUs, these are the frequencies that will be included in the Current Frequency Subset Table after the next reset. In AUs/BUs, these are the frequencies that can be used by the DFS mechanism when the DFS option is enabled.

5.4.3 Air Interface Frequency Tab for Multiple Device Configuration

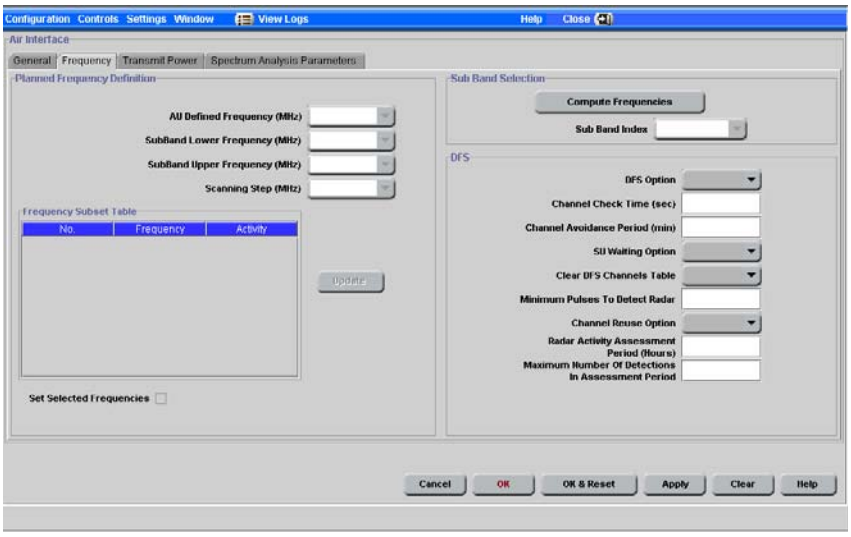


Figure 5-23: Air Interface Parameters WIndow - Frequency Tab - Multiple Devices

The Frequency tab for multiple device configuration includes the following components:

- Sub Band Selection section
- Planned Frequency Definition section
- DFS parameters section (applicable only to AUs/BUs that support the DFS option)

For details on DFS parameters refer to “Air Interface DFS Tab (AU/BU only)” on page 5-85.

The functionality of the Sub Band Selection parameters and the Planned Frequency Definition parameters depend on the devices being managed.

The **Sub Band Selection** parameters are applicable only if all the following conditions are met:

- All the devices that participate in the session use SW version 2.0 or higher.
- All the devices that participate in the session use the same Country Code.

The **SubBand Lower/Higher Frequency** and the **Scanning Step** parameters, as well as the **Update** button, are applicable only if all the devices that participate in the session use SW version 1.2 or lower.

To define frequencies for devices running SW version 2.0 or higher:

1. Click on the **Compute Frequencies** button. If all the devices that participate in the session use the same Country Code, the system will collect from the devices the available Sub Bands' details. Otherwise, a note indicationg that multiple configuration of frequencies is not feasible will be displayed.
2. Use the **Sub Band Index** parameter to select the Sub Band to be used by all devices in the session. The frequencies available in the selected Sub Band will be displayed in the Frequency subset table.
3. For each of the entries in the **Frequency Subset Table**, select whether to include it in the Planned Frequencies Subset to be used after the next reset. To include a frequency in the Planned Frequencies Subset, set the Activity entry to Active. Otherwise, set it to Inactive.
4. Check the **Set Selected Frequencies** checkbox to use the selected frequencies as the subset that becomes effective after the next reset.
5. To configure the AU's/BU's frequency, use the **Defined Frequency** parameter.

To define frequencies for devices running SW version lower than 2.0:

1. Define the lowest frequency that should be available, using the **SubBand Lower Frequency** parameter.
2. Define the highest frequency that should be available, using the **SubBand Upper Frequency** parameter.
3. Define the scanning step (the distance in MHz between two consecutive frequencies) using the **Scanning Step** parameter.
4. Click on the **Update** button. The frequencies defined by the SubBand Lower/Higher Frequency and the Scanning Step parameters will be displayed in the Frequency subset table.
5. For each of the entries in the **Frequency Subset Table**, select whether to include it in the Planned Frequencies Subset to be used after the next reset. To include a frequency in the Planned Frequencies Subset, set the Activity entry to Active. Otherwise, set it to Inactive.

6 Check the **Set Selected Frequencies** checkbox to use the selected frequencies as the subset that becomes effective after the next reset.

7 To configure the AU's frequency, use the **AU Defined Frequency** parameter.

5.4.4 Air Interface DFS Tab (AU/BU only)

The DFS tab is available only for units where DFS is supported by the country dependent parameters of the selected Sub Band.

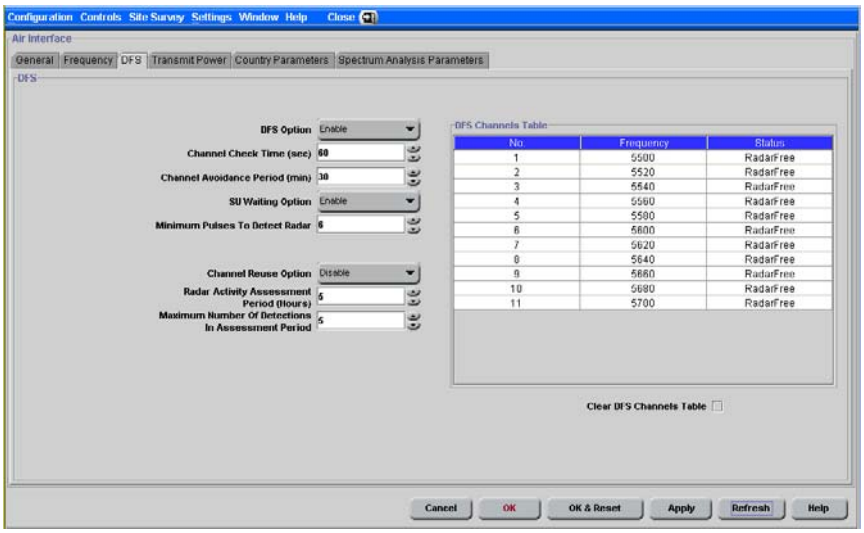


Figure 5-24: Air Interface Parameters WIndow - DFS Tab

The DFS tab includes the following components:

- DFS Option
- Channel Check Time
- Channel Avoidance Period
- SU/RB Waiting Option
- Minimum Pulses to Detect Radar
- Channel Reuse Option
- Radar Activity Assessment Period
- Maximum Number of Detections in Assessment Period

- DFS Channels Table
- Clear DFS Channels Table

5.4.4.1 DFS Option

The *DFS Option* enables or disables the radar detection and dynamic frequency selection mechanism.

5.4.4.2 Channel Check Time

The *Channel Check Time* defines the time allocated for checking whether there is radar activity on a new frequency after power up, or after trying to move to a new frequency upon detecting radar activity on the previously used frequency. During this period, the AU does not transmit.

The range is **1** to **3600** seconds.

5.4.4.3 Channel Avoidance Period

The *Channel Avoidance Period* defines the time that the frequency remains marked in the database as **Radar Detected** or **Adjacent to Radar** after detecting radar activity. These frequencies are not used when searching for a new frequency. Once this time has elapsed, the unit frequency's marking changes to **Radar Free**.

The range is from **1** to **60** minutes.

5.4.4.4 SU/RB Waiting Option

The *SU/RB Waiting Option* defines whether the disassociation message sent by the AU/BU (after detecting radar activity on the current frequency) includes a message instructing the SU/RB to search only for that specific AU/BU, before attempting to search for another AU/BU. The message includes also the time period during which the SU/RB does not search for any other AU/BU. The waiting time is the *Channel Check Time* plus 5 seconds.

5.4.4.5 Minimum Pulses to Detect Radar

The minimum number of detected radar pulses before reaching a decision that an active radar is using the channel.

The range is from **1** to **100** pulses.

5.4.4.6 Channel Reuse Option

Enabling/disabling the Channel Reuse algorithm.

5.4.4.7 Radar Activity Assessment Period

The period in hours used for assessment of radar activity in the original channel.

The range is 1 to 12 hours.

5.4.4.8 Maximum Number of Detections in Assessment Period

The maximum number of radar detection in the original channel during the Radar Activity Assessment Period that is required for reaching a decision to try again the original channel.

The range is 1 to 10 radar detections.

5.4.4.9 DFS Channels Table

The read-only DFS Channels Table displays all the applicable frequencies together with their status in the database (Radar Free, Radar Detected or Adjacent to Radar).

5.4.4.10 Clear DFS Channels Table

If checked, all viable frequencies will be marked in the database as Radar Free after the next reset. This includes frequencies previously marked as either Radar Detected or Adjacent to Radar. In addition, the AU starts operation using its default frequency.

5.4.5 Air Interface Transmit Power Tab

The Transmit Power tab enables you to configure transmit power parameters. The figures below show the *Air Interface Parameters window - Transmit Power Tab* for an AU/BU, an SU/RB, and for *multiple devices configuration*.

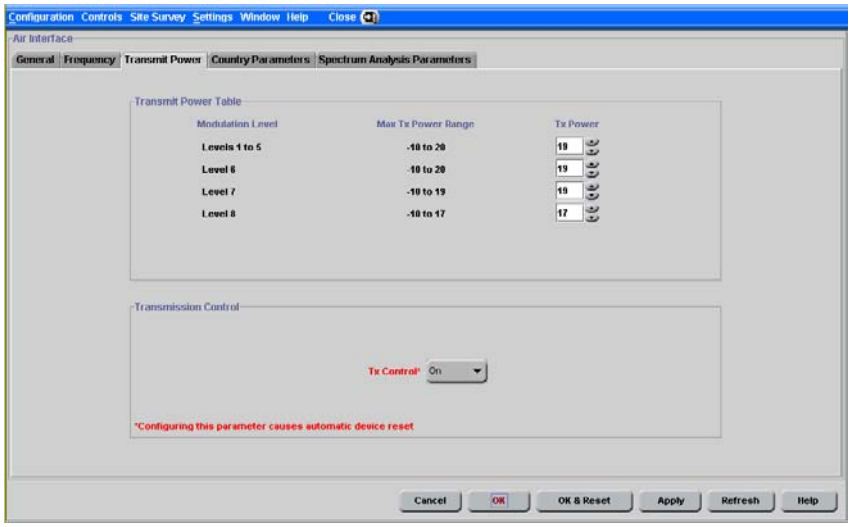


Figure 5-25: Air Interface Parameters Window - Transmit Power Tab - AU/BU

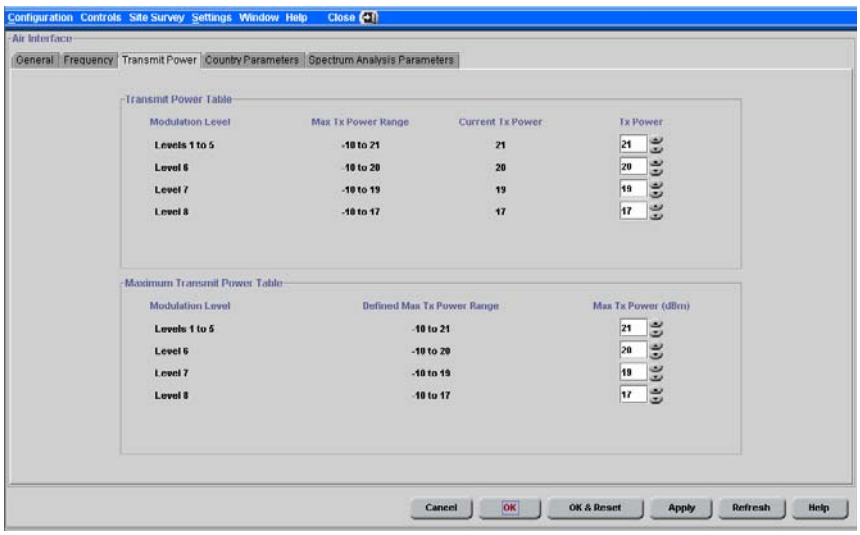


Figure 5-26: Air Interface Parameters Window - Transmit Power Tab - SU/RB

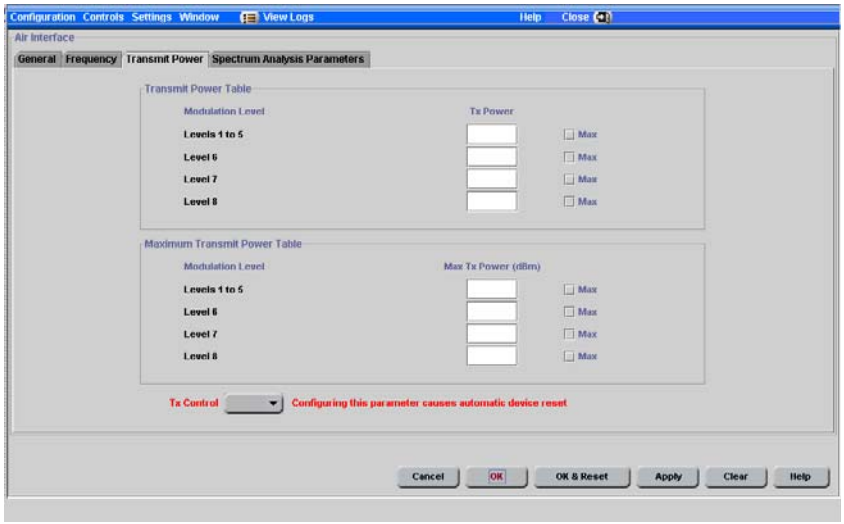


Figure 5-27: Air Interface Parameters Window - Transmit Power Tab - Multiple Devices

The Transmit Power tab includes the following components:

- Transmit Power Table
- Maximum Transmit Power Table (SU/RB only)
- Tx Control (AU/BU only)

5.4.5.1 Transmit Power Table

The Transmit Power Table includes the following components for each of the applicable modulation levels:

- Max Tx Power Range
- Tx Power
- Current Tx Power (SU/RB only)

5.4.5.1.1 Max Tx Power Range

A read-only field that displays the range available for the applicable Tx Power parameter. In an AU/BU, the range is defined by the hardware of the unit. In some cases the upper bound may be limited by the Maximum Tx Power as defined in the Sub Band, and/or by the Max EIRP as defined in the Sub Band together with the Antenna Gain parameter.

In an SU/RB, the range is defined by the unit hardware and the value of the applicable Max Tx Power entry in the Maximum Transmit Power Table.

NOTE

The *Max Tx Power Range* is not available for *multiple device configuration*.

5.4.5.1.2 Tx Power

In SUs/RBs, if ATPC is disabled, this is the transmit power in dBm defined for the applicable modulation level. If ATPC is enabled, it serves as the initial transmit power in dBm for the ATPC algorithm. In AUs/BUs, it sets the *Transmit Power* in dBm for the applicable modulation level.

In multiple device configuration where the *Max Tx Power Range* is not available, you can select the applicable **Max** check-box to set the *Tx Power* to the maximum available in each unit.

5.4.5.1.3 Current Tx Power (SU/RB only)

A read-only field that displays the actual transmit power in dBm for the applicable Modulation Level.

NOTE

The *Current Tx Power* is not available for *multiple device configuration*.

5.4.5.2 Maximum Transmit Power Table (SU/RB only)

The Maximum Transmit Power Table includes the following components for each of the applicable modulation levels:

- Defined Max Tx Power Range
- Max Tx Power

5.4.5.2.1 Defined Max Tx Power Range

A read-only field that displays the range available for the applicable Max Tx Power parameter. The range is defined by the unit's hardware. In some cases, the upper limit may be limited by the Maximum Tx Power as defined in the Sub Band (Country Parameters), and/or by the Max EIRP as defined in the Sub Band together with the Antenna Gain parameter.

NOTE

The defined *Max Tx Power Range* is not available for *multiple device configuration*.

5.4.5.2.2 Max Tx Power

The maximum Tx power level. It sets the upper limit for the applicable *Max Tx Power Range* entry in the *Transmit Power Table*. It also sets the maximum level for the ATPC algorithm. The *Max Tx Power* value cannot be higher than the current value of the applicable *Tx Power* entry in the *Transmit Power Table*.

In multiple device configuration where the *Defined Max Tx Power Range* is not available, you can select the applicable **Max** check-box to set the *Max Tx Power* to the maximum available in each unit.

5.4.5.3 Tx Control (AU/BU only)

The Tx Control option enables turning Off/On the AU's/BU's transmitter. 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.

NOTE

The unit is reset immediately upon configuring the Tx Control parameter to either On or Off (even if it is set to its current option).

5.4.6 Air Interface Country Parameters Tab

NOTE

The unit is reset immediately upon configuring the Tx Control parameter to either On or Off (even if it is set to its current option).

The *Country Parameters tab* displays the country dependent parameters of the available Sub Band(s). If more than one Sub Band is available, it enables Sub Band selection.

The figure below show the *Air Interface Parameters window - Country Parameters Tab*.

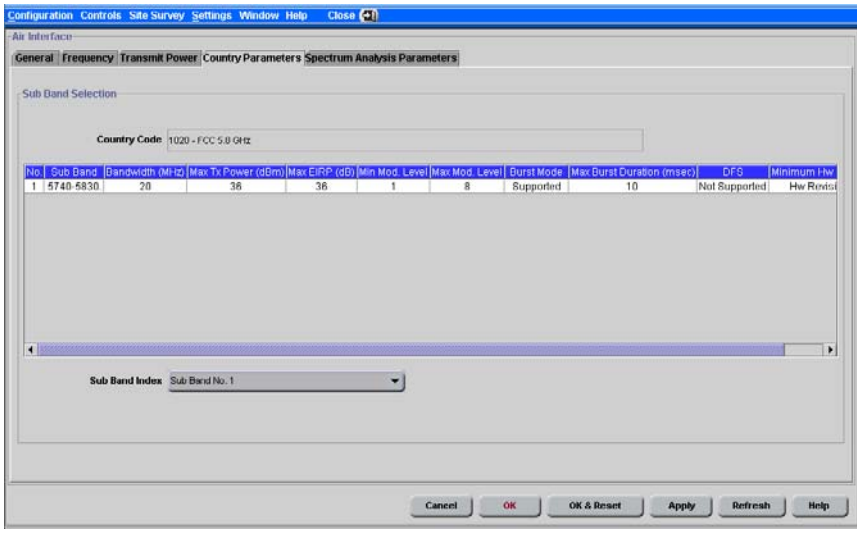


Figure 5-28: Air Interface Country Parameters Tab

The *Country Parameters tab* is comprised of the following components:

- Country Code
- Sub Band(s) Table
- Sub Band Index

5.4.6.1 Country Code

The up to 3 digits country code (according to ISO 3166) and the country name. Some regulatory requirements apply to more than one country. In these cases the Country Code includes a 4 digits proprietary group code and the Country Group name (for example FCC).

5.4.6.2 Sub Band(s) Table

A country dependent parameters table that displays the following parameters for each of the available Sub Bands:

- **No.**: The Sub Band Index
- **Sub Band**: The frequencies available when using the Sub Band.

- **Bandwidth**: The bandwidth when using the Sub Band. If more than one bandwidth is allowed, than each bandwidth is associated with a different Sub Band, because the bandwidth may affect the available frequencies.
- **Max Tx Power**: The maximum transmit power allowed at the antenna port of the unit.
- **Max EIRP**: The maximum allowed EIRP (Effective Isotropic Radiated Power).
- **Min Mod Level**: The lowest permitted modulation level.
- **Max Mod Level**: The highest permitted modulation level.
- **Burst Mode**: Indicates whether Burst Mode operation is supported.
- **Max Burst Duration**: If Burst Mode is supported, this parameter displays the upper limit for the Maximum Burst Duration parameters.
- **DFS**: Indicates whether the DFS (Dynamic Frequency Selection) mechanism for identification and avoidance of channels with radar activity is supported.
- **Minimum HW Required**: The lowest HW version that supports the Sub Band.

5.4.6.3 Sub Band Index

Available if more than one Sub Band is available, enabling you to select the Sub Band to be used.

5.5 Spectrum Analysis Parameters Tab

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. 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. At the end of the period the unit will reset automatically regaining normal operability upon start up.

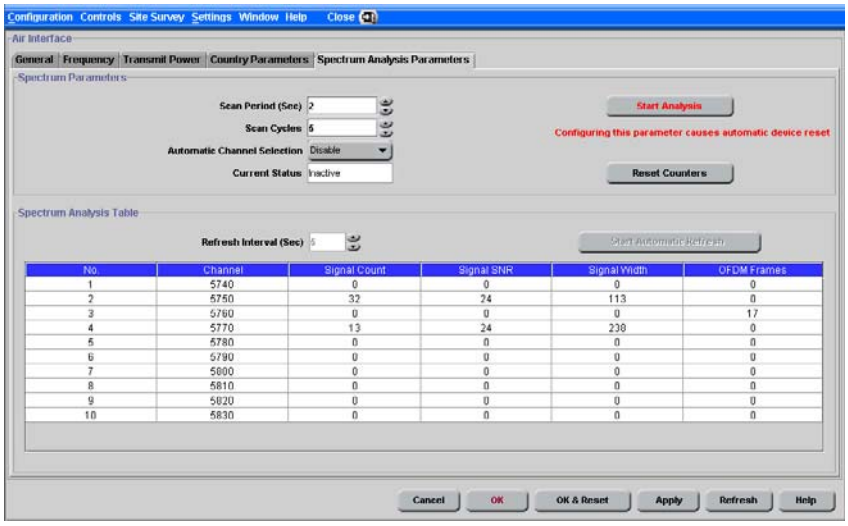


Figure 5-29: Air Interface Spectrum Analysis Parameters Tab - AU/BU

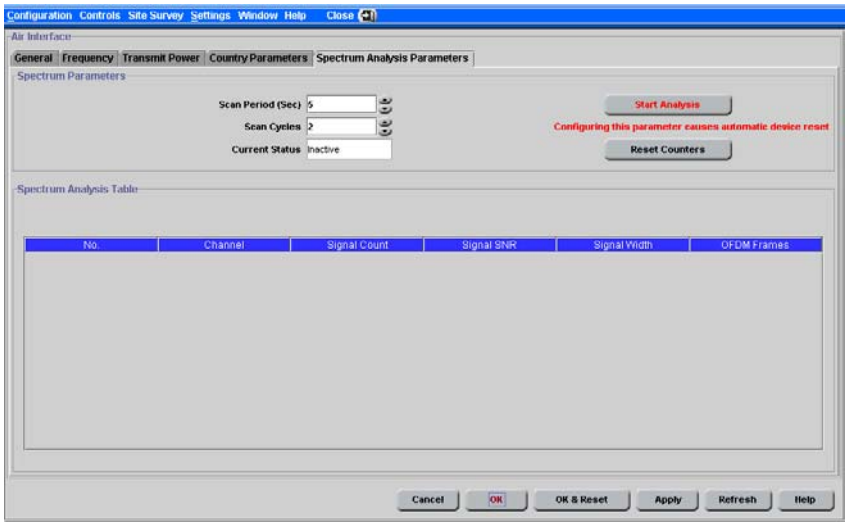


Figure 5-30: Air Interface Spectrum analysis Parameters Tab - SU/RB

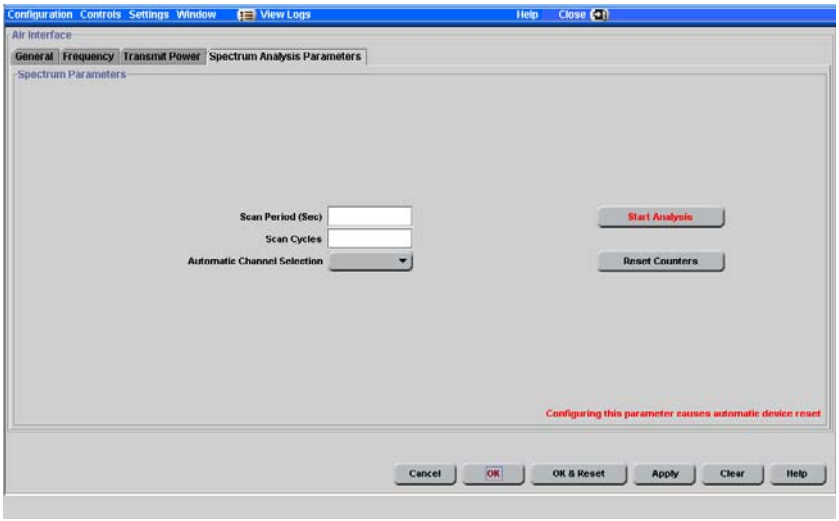


Figure 5-31: Air Interface Spectrum analysis Parameters Tab - Multiple Devices

The Spectrum Analysis tab includes the following components:

- Scan Period
- Scan Cycles
- Automatic Channel Selection (AU/BU only)
- Current Status

- Reset Counters
- Start Analysis
- Refresh Interval (sec)
- Start/Stop Automatic Refresh
- Spectrum Analysis Table

5.5.1 Scan Period

The Spectrum Analysis Channel Scan Period is the period of staying on each channel during each cycle for information gathering when performing spectrum analysis.

Range: 2-30 seconds.

5.5.2 Scan Cycles

The Spectrum Analysis Scan Cycle is the number of scanning cycles when performing Spectrum Analysis.

Range: 1-100 cycles.

5.5.3 Automatic Channel Selection (AU/BU only)

The Automatic Channel selection option defines weather the AU/BU will choose the best noise free channel upon startup after completion of the spectrum analysis process. The selection is per analysis: once the analysis is completed it will be disabled automatically.

5.5.4 Current Status

A read-only display of the current status of the spectrum analysis test.

5.5.5 Reset Counters

Click on the Rest Counters button to clear the spectrum analysis counters.

5.5.6 Start Analysis

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.

5.5.7 Refresh Interval (sec)

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.

NOTE

The Refresh Interval parameter is available only during an active spectrum analysis test

5.5.8 Start/Stop Automatic Refresh

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.

NOTE

The Start/Stop automatic Refresh button is available only during an active spectrum analysis test.

5.5.9 Spectrum Analysis Table

The Spectrum Analysis Table displays the results of the last analysis process. The displayed information includes the following details for each channel:

- **Frequency** in MHz
- **Signal Count**: The number of signals (excluding OFDM frames with the correct bandwidth) in the channel.
- **Signal SNR**: The approximate SNR of signals (excluding OFDM frames with the correct bandwidth) in the channel.
- **Signal Width**: 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.

5.6 Performance Parameters

The *Performance Parameters* window enables you to control the method by which traffic is transmitted through the wireless network. The *Performance Parameters* window differs slightly between AUs, SUs, BUs and RBs, and the differences are clearly indicated for the relevant parameters.

The figures below show the *Performance Parameters* window for an AU, an SU, and for *multiple device configuration*.

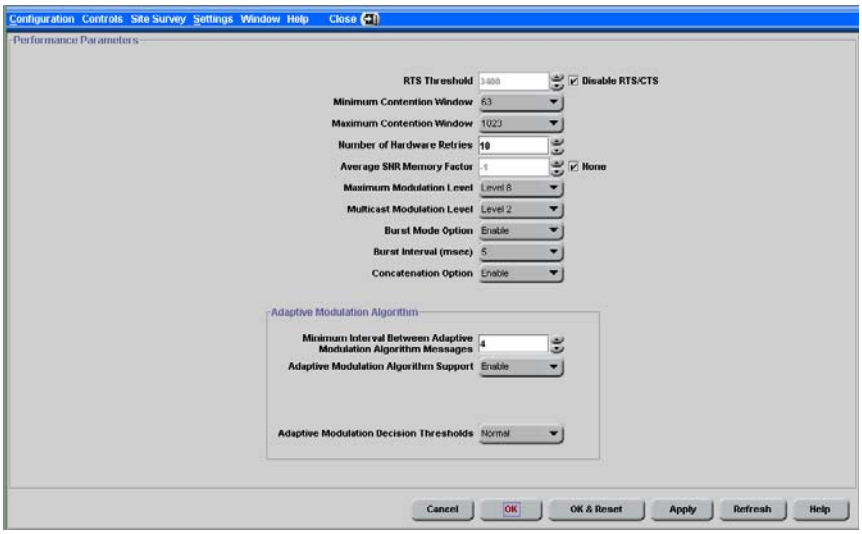


Figure 5-32: Performance Parameters Window - AU

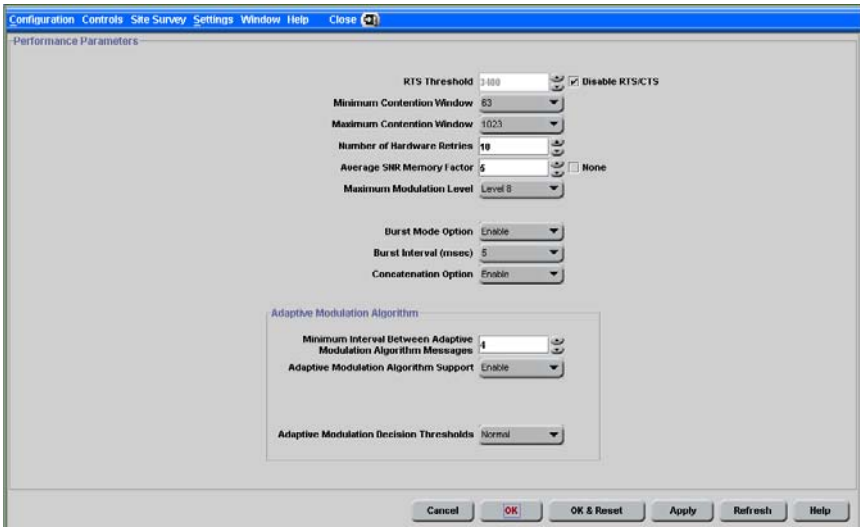


Figure 5-33: Performance Parameters Window - SU

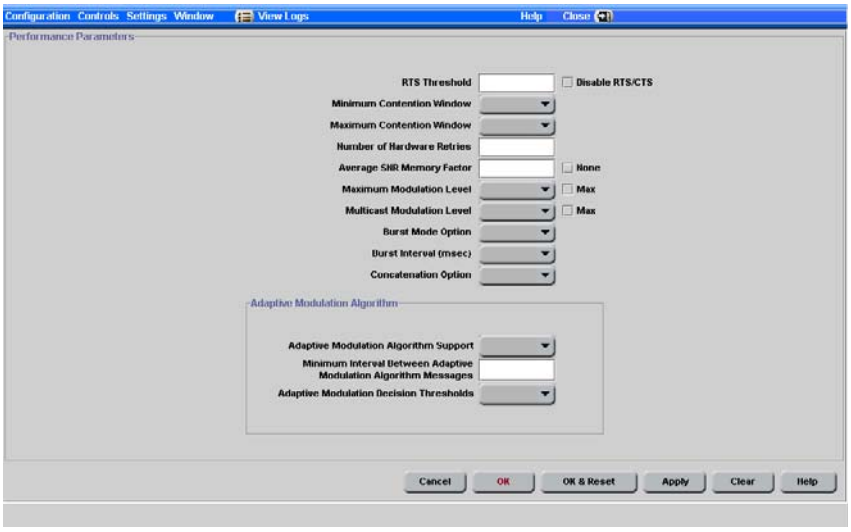


Figure 5-34: Performance Parameters Window - Multiple Devices

The *Performance Parameters* window is comprised of the following components:

- RTS Threshold (AU and SU only)
- Minimum Contention Window (AU and SU only)
- Maximum Contention Window (AU and SU only)
- Number of Hardware Retries

- Average SNR Memory Factor
- Maximum Modulation Level
- Multicast Modulation Level (AU/BU only)
- Burst Mode Option
- Burst Interval
- Concatenation Option
- Adaptive Modulation Algorithm

5.6.1 RTS Threshold (AU and SU only)

The minimum frame size that requires an RTS/CTS (Request To Send/Clear To Send) handshake. Frames smaller than the defined value are transmitted directly to the wireless link without the preceding RTS frames. The available values range from 20 to 3399 bytes. A value of 3400 means that the RTS/CTS mechanism is never used. To disable the RTS/CTS mechanism (a value of 3400), mark the **Disable RTS/CTS** check-box. (For devices that use SW version 2.0 and lower, a value of 1600 means no RTS/CTS).

5.6.2 Minimum Contention Window (AU and SU only)

The initial value for use by the contention window calculation algorithm. The available values are 0, 7, 15, 31, 63, 127, 255, 511 and 1023. 0 disables the contention window back-off algorithm and must be used only in point-to-point applications.

5.6.3 Maximum Contention Window (AU and SU only)

The maximum value to be used by the contention window calculation algorithm. The available values are 7, 15, 31, 63, 127, 255, 511 and 1023.

5.6.4 Number of Hardware Retries

The maximum number of tries to transmit an unacknowledged frame in each Hardware Retrials phase. The available values range from 1 to 15.

5.6.5 Average SNR Memory Factor

The SNR Memory Factor defines the previous value weighting (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 and is also included in the Adaptive Modulation information messages transmitted by the AU and the SU. The higher the value of this parameter, the higher is the previous value weighting in the formula.

Available values: -1 to 32. -1 is for no previous value weighting, signifying that average SNR equals the last measured SNR. Alternatively, you can select the **None** check-box for no history.

5.6.6 Maximum Modulation Level

If the Adaptive Modulation algorithm is enabled, it sets the Maximum Modulation Level for use. If The Adaptive Modulation algorithm is disabled, it sets the Fixed Modulation Level to be used. In multiple device configuration, you can select the **Max** check-box to set the parameter to the maximum supported by each unit (depending on the HW and on the selected Sub Band).

5.6.7 Multicast Modulation Level (AU/BU only)

The modulation level for transmission of multicast and broadcast data frames. Since multicast and broadcast transmissions are not acknowledged, it is recommended that you set a low modulation level to ensure transmission without error. In multiple device configuration, you can select the **Max** check-box to set the parameter to the maximum supported by each unit (depending on the HW and on the selected Sub Band).

5.6.8 Burst Mode Option

From the drop-down menu, select whether to Enable or Disable the Burst Mode operation. Burst mode provides an increased throughput by reducing the overhead associated with transmissions in the wireless media.

NOTE

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.

5.6.9 Burst Interval

The Burst Interval defines the burst size, that is, the time in which data frames are sent immediately without contention for the wireless medium. The available values range from **1** to **10** milliseconds.

5.6.10 Concatenation Option

The Concatenation Option enables or disables the packet concatenation mechanism. The Concatenation mechanism enables bundling two data frames into a single frame for transmission to the wireless link. This feature reduces the overhead in the wireless media and improves throughput.

5.6.11 Adaptive Modulation Algorithm

The Adaptive Modulation Algorithm parameters include the following:

- **Adaptive Modulation Algorithm Support**: The functionality of the adaptive modulation algorithm.

- **Minimum Interval Between Adaptive Modulation Messages**: The minimum permitted time, in seconds, between consecutive messages carrying information regarding the quality (SNR) of received signals. Available values range from 1 to 3600 seconds.

- **Adaptive Modulation Decision Thresholds**: Enables selection between Normal and High decision thresholds for the Adaptive Modulation algorithm. 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.

5.7 Service Parameters (AU, SU and RB)

The *Service Parameters* window (accessed from the *Configuration* Menu), enables the definition of user filtering options and QoS (Quality of Service) parameters.

The figures below show the *Service Parameters* window for an AU, an SU, and for *multiple device configuration*.

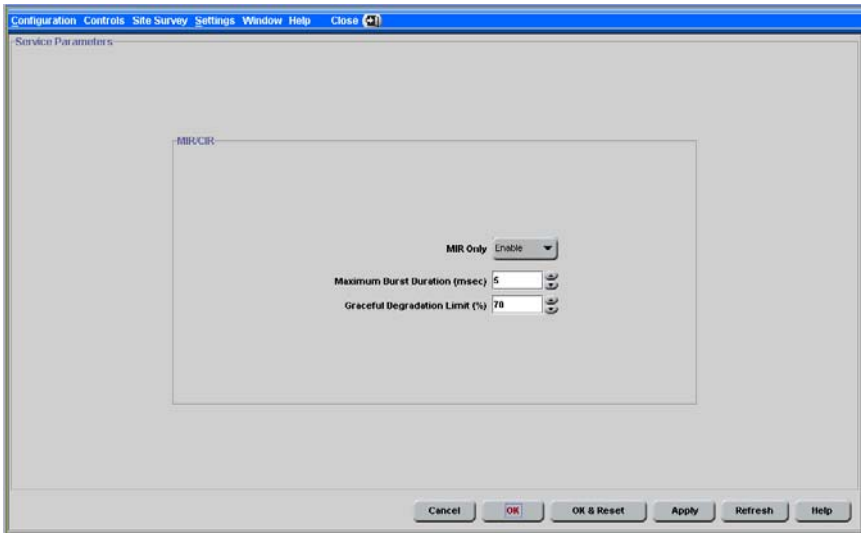


Figure 5-35: Service Parameters Window - AU

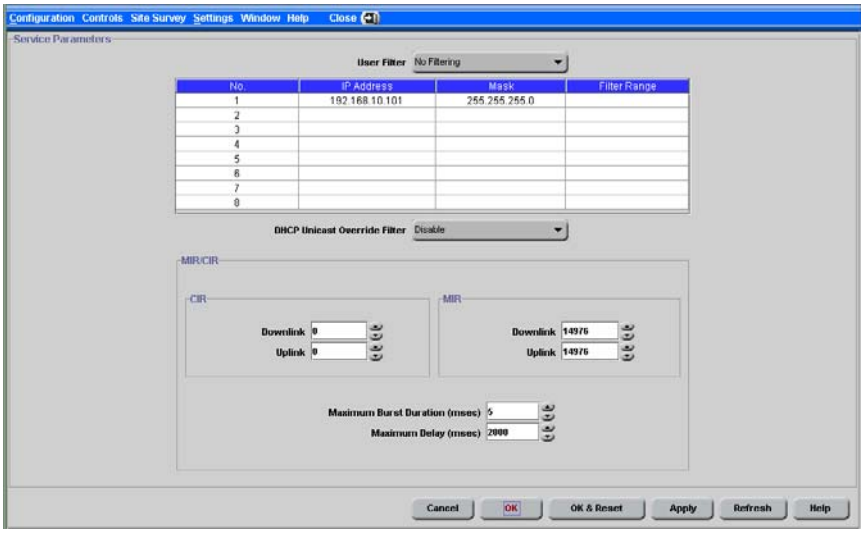


Figure 5-36: Service Parameters Window - SU

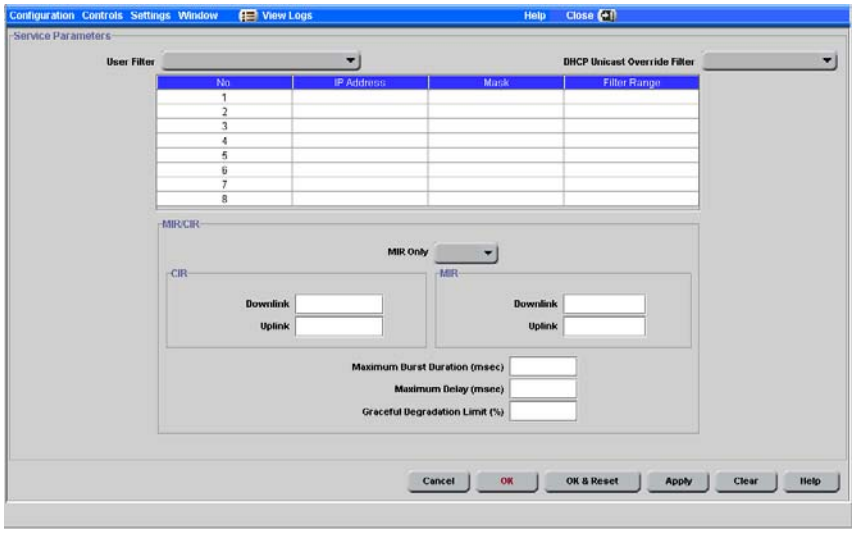


Figure 5-37: Service Parameters Window - Multiple Devices

The *Service Parameters* window is comprised of the following components:

- User Filtering Parameters (SU/RB only)
- MIR/CIR

5.7.1 User Filtering Parameters (SU/RB only)

The User Filtering Parameters include:

- User Filter
- User Filter Table
- DHCP Unicast Override Filter

5.7.1.1 User Filter

The functionality of the user filtering feature. The following options are available:

- **No Filtering**, for no filtering.
- **IP only**, only IP packets pass.
- **User Defined IP Addresses only**, only messages from IP addresses defined in the User Filter table pass.

- **PPPoE Only**, only PPPoE messages pass.

5.7.1.2 User Filter Table

A table of up to eight addresses for use when the User Filter is set to the User Defined IP Addresses only option.

NOTE

You should configure either the *Mask* or *Filter Range*. If the *Range* is other than 0, the *Mask* entry is ignored.

5.7.1.3 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 to overcome this problem. When enabled, unicast DHCP messages pass, overriding the user filtering mechanism.

5.7.2 MIR/CIR

The MIR/CIR parameters include:

- CIR Downlink and Uplink (SU only)
- MIR Downlink and Uplink (SU and RB only)
- Maximum Burst Duration (AU and SU only)
- Maximum Delay (SU only)
- Graceful Degradation Limit (AU only)
- MIR Only (AU only)

5.7.2.1 CIR Downlink and Uplink (SU only)

Defines the Committed Information Rate in the Downlink (AU to SU) and in the Uplink (SU to AU). The range depends on the unit type. The actual value is the entered value rounded to the nearest multiple of 128(N*128).

5.7.2.2 MIR Downlink and Uplink (SU and RB only)

Defines the Maximum Information Rate in the Downlink (AU/BU to SU/RB) and in the Uplink (SU/RB to AU/BU). The range depends on the unit type. The actual value is the entered value rounded to the nearest multiple of 128 (N*128).

5.7.2.3 Maximum Burst Duration (AU and SU only)

Defines the maximum time during which inactivity bonus time can be accumulated for future burst transmissions. Range: 0 - 2000 (milliseconds).

5.7.2.4 Maximum Delay (SU only)

Defines the maximal time packets that may be delayed by the CIR/MIR mechanism. Above the configured maximal period, the packets are discarded. Range: 300 - 10000 (milliseconds).

5.7.2.5 Graceful Degradation Limit (AU only)

Defines the maximum limit for activating the graceful degradation limit.

Range: 0 - 70 (%).

5.7.2.6 MIR Only (AU only)

When the MIR Only option is enabled, it overrides the CIR/MIR algorithm for determining actual information rate, and forces the algorithm to operate with MIR parameter settings only. When enabled, the *Graceful Degradation algorithm* is disabled.

5.8 Security Parameters

The *Security Parameters* window enables you to define security options and parameters. The *Security Parameters* window varies slightly between Access and Subscriber Units. The applicable parameters are clearly indicated.

The *Security Parameters* window is accessed from the *Configuration* Menu.

The figures below show the *Security Parameters* window for an AU/BU, an SU/RB, and for *multiple device configuration*.

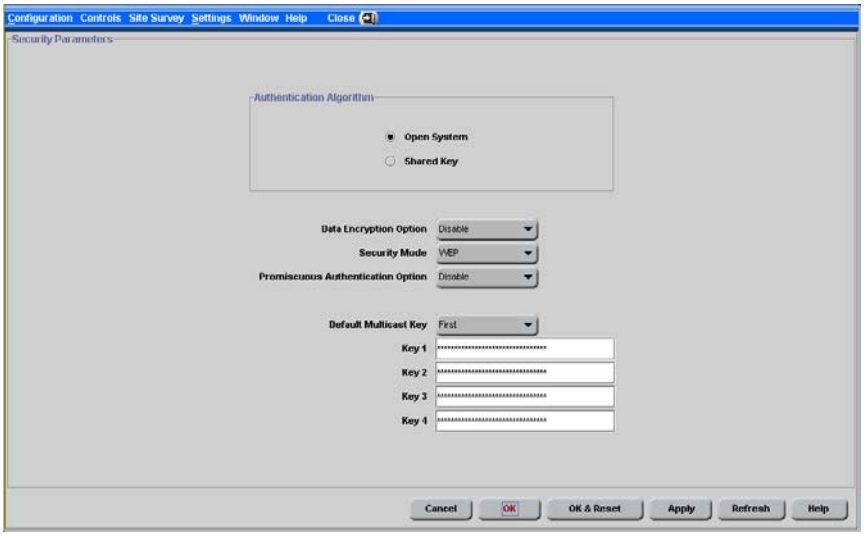


Figure 5-38: Security Parameters Window - AU/BU

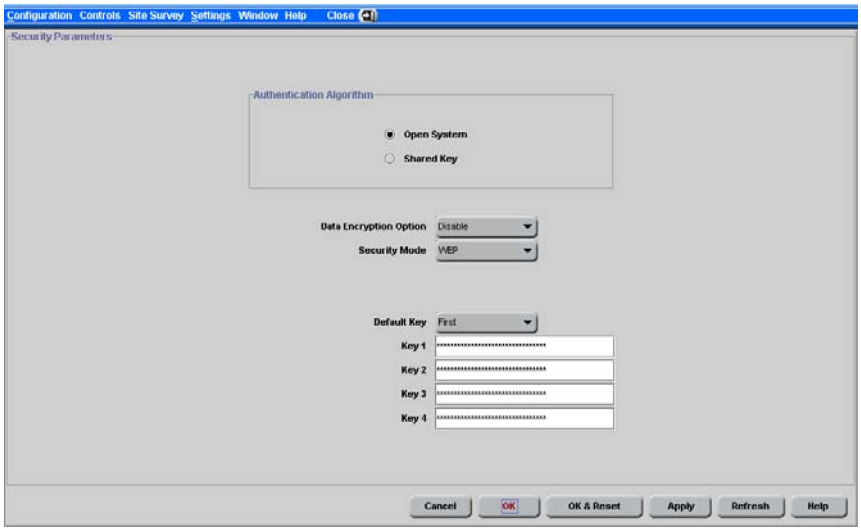


Figure 5-39: Security Parameters Window - SU/RB

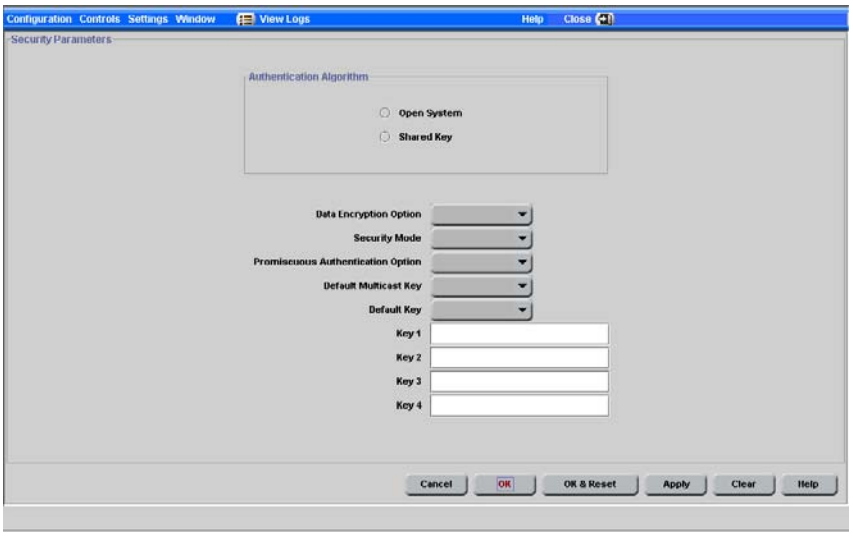


Figure 5-40: Security Parameters Window - Multiple Devices

The Security *Parameters* window is comprised of the following components:

- Authentication Algorithm
- Data Encryption Option
- Security Mode
- Promiscuous Authentication Option (AU/BU only)

- Default Multicast Key (AU/BU only)
- Default Key (SU/RB only)
- Key 1 through Key 4

5.8.1 Authentication Algorithm

Enables selection between *Open System* (no encryption) and *Shared Key* (encryption) authentication modes.

5.8.2 Data Encryption Option

The functionality of the data encryption option.

5.8.3 Security Mode

The encryption standard for use. The available options are WEP and AES.

5.8.4 Promiscuous Authentication Option (AU/BU only)

The functionality of the Promiscuous Authentication option. When enabled, any SU/RB can be authenticated by the AU/BU, regardless of its security settings.

NOTE

Do not leave the AU/BU in the *Promiscuous Authentication* mode enabled for prolonged periods. Use it only when absolutely necessary. Perform the required actions (SW upgrade and or setting Security parameters in a new SU/RB) as quickly as possible and then disable the option. The unit will return automatically to Promiscuous Authentication disabled mode after reset.

5.8.5 Default Multicast Key (AU/BU only)

The key (First, Second, Third or Fourth) that should be used for encrypting multicasts.

5.8.6 Default Key (SU/RB only)

The key (First, Second, Third or Fourth) that should be used for authentication privacy and/or data encryption.

5.8.7 Key 1 through Key 4

Keys to be used for authentication and/or data encryption.

Each key comprises 32 hexadecimal digits.

5.9 Best AU/BU Parameters (SU/RB only)

The *Best AU/BU* window is applicable to SUs/RBs only. It enables you to configure parameters related to the *Best AU/BU* selection algorithm and the preferred AU/BU (with which the SU/RB should associate). If the *Best AU/BU* feature is activated, the SU/RB assigns a grade based on performance level to each AU/BU with which it can associate. The SU/RB then attempts to connect with the best AU/BU, as required.

The figures below show the *Best AU/BU* window for an SU, and for *multiple device configuration*.

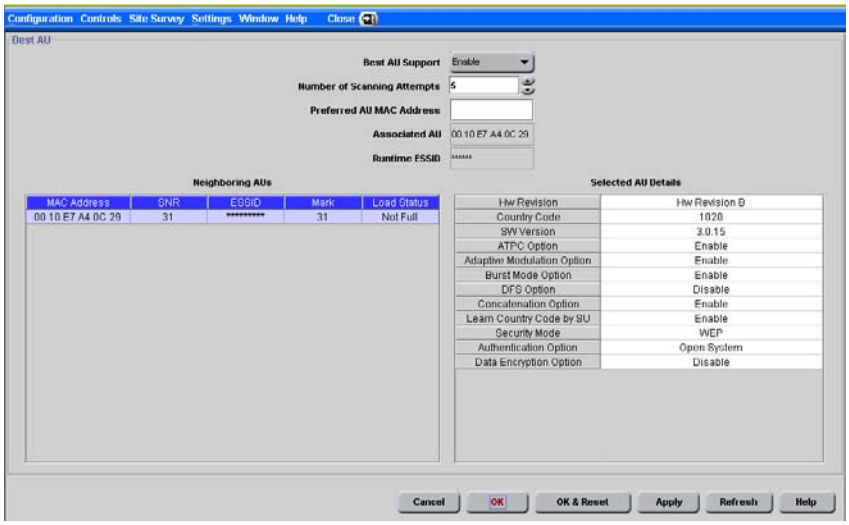


Figure 5-41: Best AU Window - SU

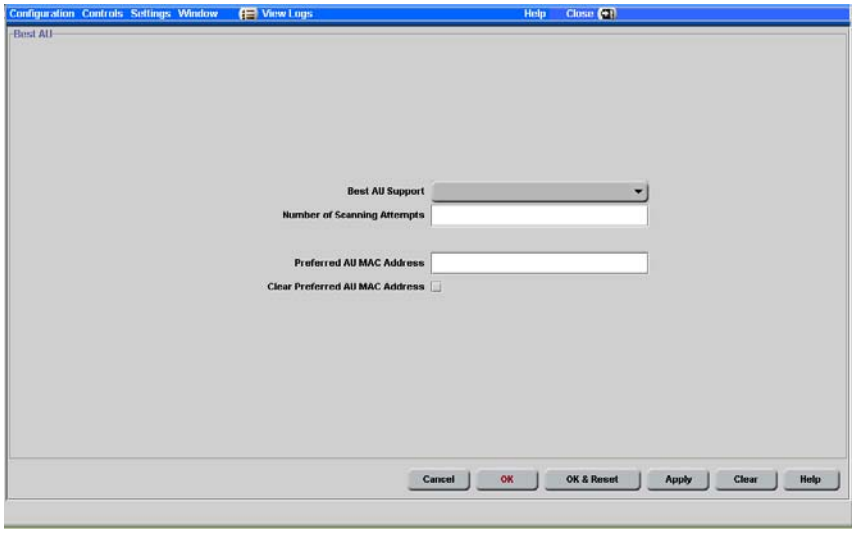


Figure 5-42: Best AU Window - Multiple Devices

The *Best AU* window is comprised of the following components:

- Best AU/BU Support
- Number of Scanning Attempts
- Preferred AU/BU MAC Address
- Clear Preferred AU MAC Address
- Associated AU
- Runtime ESSID
- Neighboring AUs/BUs Table
- Selected AU/BU Details

5.9.1 Best AU/BU Support

Defines whether the Best AU/BU feature is enabled or disabled. If disabled, the SU/RB associates with the first AU/BU that it locates with an identical ESSID or Operator ESSID.

5.9.2 Number of Scanning Attempts

The number of scanning cycles that the SU/RB uses to gather information regarding the neighboring AUs/BUs. The available values range from 1 to 255.

5.9.3 Preferred AU/BU MAC Address

The MAC address of a specific AU/BU with which the SU/RB should associate. The default value is 00-00-00-00-00-00, that signifies no preferred AU/BU. Enter the required MAC address as 6 groups of two hexadecimal numbers each, separated by either dashes (“-“) or spaces (“ “). For example, 00-11-22-33-44-55 or 00 11 22 33 44 55.

5.9.4 Clear Preferred AU MAC Address

In *multiple device configuration* mode, this option sets the *Preferred AU MAC Address* to "all zeros", signifying that no AU/BU is preferred.

NOTE

The *Clear Preferred AU MAC Address* is applicable only to multiple device configuration.

5.9.5 Associated AU

A read-only field that displays the MAC address of the AU/BU with which the SU/RB is currently associated.

5.9.6 Runtime ESSID

A read-only field that displays the ESSID currently used by the SU/RB to associate with the AU/BU.

5.9.7 Neighboring AUs/BUs Table

A read-only display, the *Neighboring AUs/BUs* Table displays the information gathered by the SU/RB during the last scanning cycle, as follows:

- **MAC Address**: The MAC Address of the AU/BU.
- **SNR**: The reception quality of the AU/BU.
- **Mark**: The quality mark given to the AU/BU.

- **Load Status**: The load status of the AU/BU.For an AU, *Full* status means that the AU is already associated with the maximum allowed number of SUs. For a BU, it means that the BU is already associated with an RB. The SU/RB cannot associate with an AU/BU with a *Full* status, even if it was given the highest mark.

- **ESSID**: The ESSID of the AU/BU.

5.9.8 Selected AU/BU Details

The Selected AU/BU Details table displays the Link Capabilities for the selected AU. For more details refer to “Capabilities Tab” on page 5-53.

5.10 Network Management Parameters

The *Network Management Parameters* window enables you to protect a unit from unauthorized access by defining a set of IP addresses from which the unit can be managed using protocols such as Telnet, TFTP, SNMP, DHCP or ICMP. This excludes messages generated in the unit, such as SNMP traps or Ping test frames. In addition, you can select from which direction management access is permitted, from the wireless media, the wired Ethernet, or both.

The *Network Management Parameters* window also enables you to define the management stations to which trap messages are to be sent, and to define the inactivity time-out for Telnet sessions. The *Network Management Parameters* window is divided into three secondary tabs, *General, Traps* and *Telnet*. The *Network Management Parameters* window is accessed from the *Settings* Menu.

This section includes:

- "Network Management General Parameters Tab" on page 5-114
- "Network Management Traps Tab" on page 5-117
- "Network Management Telnet Tab" on page 5-117

5.10.1 Network Management General Parameters Tab

The *General* tab of the *Network Management Parameters* window enables you to define management-filtering options.

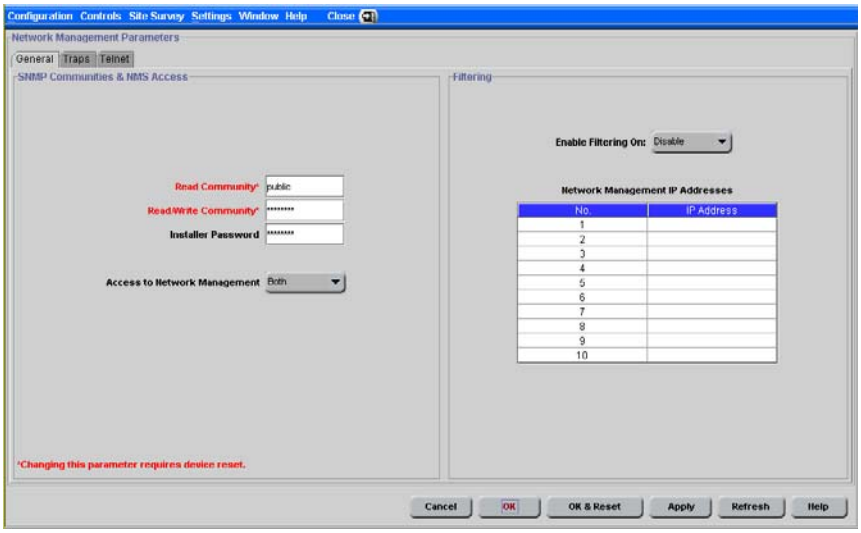


Figure 5-43: Network Management Parameters Window - General Tab

The *General* tab is comprised of the following components:

- SNMP Communities & NMS Access
- Filtering

5.10.1.1 SNMP Communities & NMS Access

The SNMP Communities & NMS Access parameters include:

- Read Community
- Read/Write Community
- Installer Password
- Access to Network Management

5.10.1.1.1 Read Community

The read-only community string, which serves also as the read-only password for the monitor program.

5.10.1.1.2 Read/Write Community

The read/write community string, which serves also as the Administrator password. Changing this parameter requires device reset.

5.10.1.1.3 Installer Password

The Installer password, for use with the Monitor program.

5.10.1.1.4 Access to Network Management

The port through which the unit can be managed. The available options are:

- Wireless Only
- Ethernet Only
- Both

CAUTION

Be careful not to block your access to the unit. For example, if you manage an SU 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.

5.10.1.2 Filtering

The Filtering parameters include:

- Enable Filtering on
- Network Management IP Addresses Table

5.10.1.2.1 Enable Filtering on

The IP address-based management filtering option. If enabled, stations can only manage the unit with IP addresses matching one of the entries in the *Network Management IP Address* table. When enabling the option, select the port to which the filtering is to be applied, from the following options:

- Disable
- Ethernet Only
- Wireless Only
- Both

5.10.1.2.2 Network Management IP Addresses Table

A table of up to ten IP Addresses for stations that can manage the unit when management filtering is enabled.

5.10.2 Network Management Traps Tab

The *Traps* tab in the *Network Management Parameters* window enables you to define the stations that are to receive SNMP trap messages from the device.

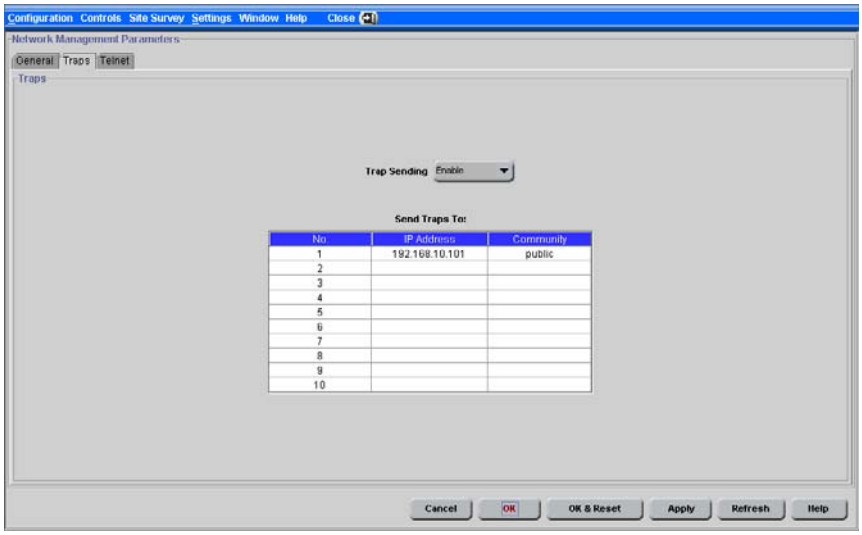


Figure 5-44: Network Management Parameters Window - Traps Tab

The *Traps* tab is comprised of the following components:

- **Trap Sending**: Defines whether *Traps Sending* is enabled or disabled.
- **Send Traps To: (table)**: A table of IP Addresses and associated communities of stations to which SNMP traps are sent when *Trap Sending* is enabled.

5.10.3 Network Management Telnet Tab

The *Telnet* tab in the *Network Management Parameters* window enables you to define the time-out settings for use when accessing units through Telnet.

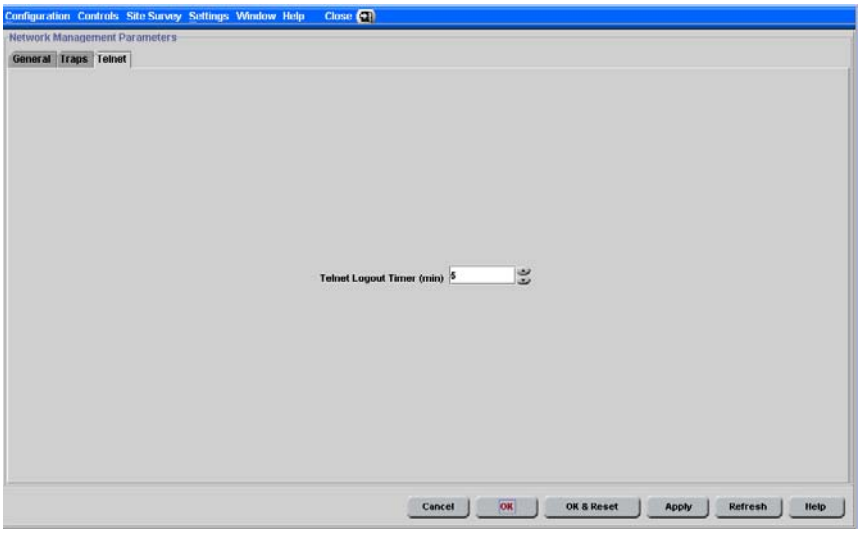


Figure 5-45: Network Management Parameters Window - Telnet Tab

The Telnet tab includes a single parameter:

- **Telnet Logout Timer (min)**: Defines the number of minutes that the Monitor program remains inactive before the unit automatically exits from the program. The time-out value ranges from 1 to 999 minutes.

5.11 Feature Upgrade

The *Feature Upgrade* window enables you to enter a license string for upgrading the unit to support new features and/or options. The change takes effect only after reset.

The license string is unique for each unit and it depends on the MAC address of the unit.

This section includes:

- Feature Upgrade - Single Device Configuration
- Feature Upgrade - Multiple Devices

5.11.1 Feature Upgrade - Single Device Configuration

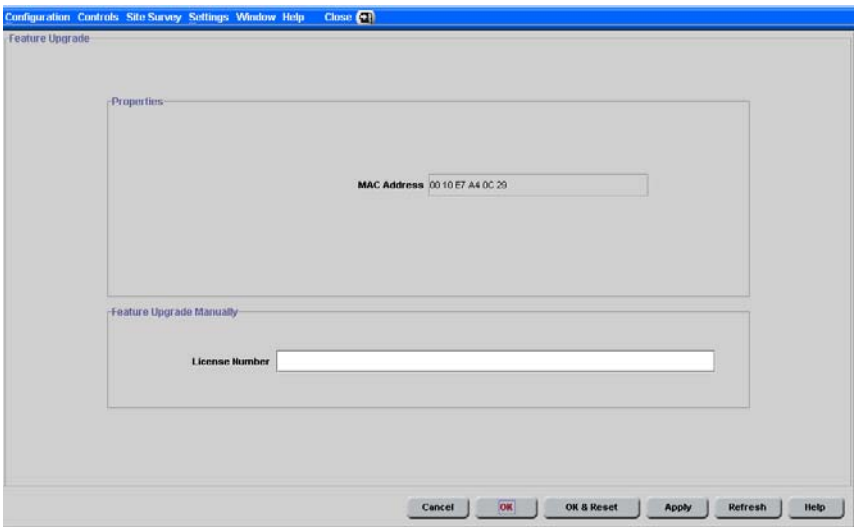


Figure 5-46: Feature Upgrade Window - Single Device

The *Feature Upgrade* window for a single device configuration includes the following components:

- **MAC Address**: Displays the MAC address of the unit.
- **License Number**: The MAC address dependent license string.

5.11.2 Feature Upgrade - Multiple Devices

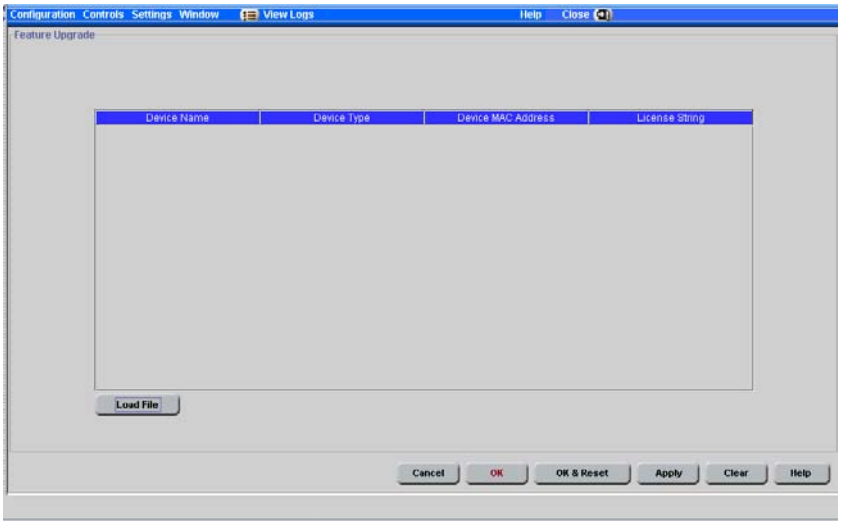


Figure 5-47: Feature Upgrade Window - Multiple Devices

The Feature Upgrade window for multiple devices configuration enables loading an existing file that includes license strings for multiple devices (each license string is associated with a specific MAC Address). To load a file, click on the Load File button to open the Select License File dialog box. The loaded strings and the relevant units' details will be displayed in the table.

5.12 Performance Monitoring

The Performance Monitoring window enables viewing the real-time graphs for multiple counters. The graphs display the rate (e.g. frames per second) for each selected counter.

The Performance Monitoring window is accessed from the *Site Survey* Menu.

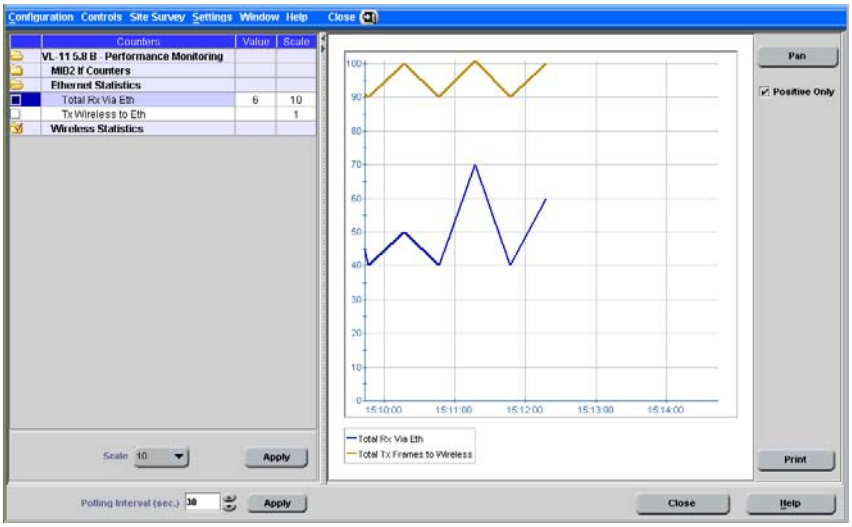


Figure 5-48: Performance Monitoring Window

The counters selection table, on the left side of the window, displays all the devices/services belonging to the selected session.

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

To expand/collapse the list of counters:

1 Double click on the device name to view the available counter groups. Counter groups are identified by the folder icon on their left side. Double click on any counter group name to expand it and see its contents. For sub-groups, continuew double-clicking on selected items until the required counters are displayed.

For details on available counters, refer to "Performance Monitoring and BWA PM Data Collection Counters" on page 6-137

2 Double-click again to collapse the view and hide all counters/groups.

The icon to the left of an item indicates the status as follows:

Collapsed view of a file, none of the items in the file is displayed for viewing.

Expanded view of a file, all of the items in the file are displayed for viewing.

Collapsed view, at least on of the counters in the file is selected for viewing.

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 check box becomes colored and marked, as follows:

The counter is selected. The color indicates the color of the graph for the applicable counter.

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

To define the polling interval:

The Polling Interval defines the refresh time for the displayed information. The default Polling Interval is 5 seconds. The available range is from 5 to 120 seconds. To change the polling interval, select a new value and click on the Apply button.

To change the values scale 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 exceed this range. To change the value scale of a counter, select it and choose the desired scale from the **Scale** drop-down list. Click **Apply**. The scale factor is displayed next to the counter. The displayed values for this counter are the actual counter values

multiplied by the scale factor. The Scale factor is also displayed next to the counter.

NOTE

The Scale drop-down menu and the Apply button become available only when a counter is selected.

The following graph controls are available at the right of the window:

- **Pan/Zoom:** Toggles between the following modes:
  - **Pan** mode: Shifts the time axis of the graph.
  - **Zoom** mode: Changes the resolution of the time axis.
- **Positive Only:** 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.
- **Print:** Enables to print the graph or display a print preview.

You can use the **Pan/Zoom** toggle button to either shift an 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.

5.13 Traffic Counters

The *Traffic* window displays general Ethernet traffic statistics for the selected device.

The Traffic window is accessed from the *Site Survey* Menu.

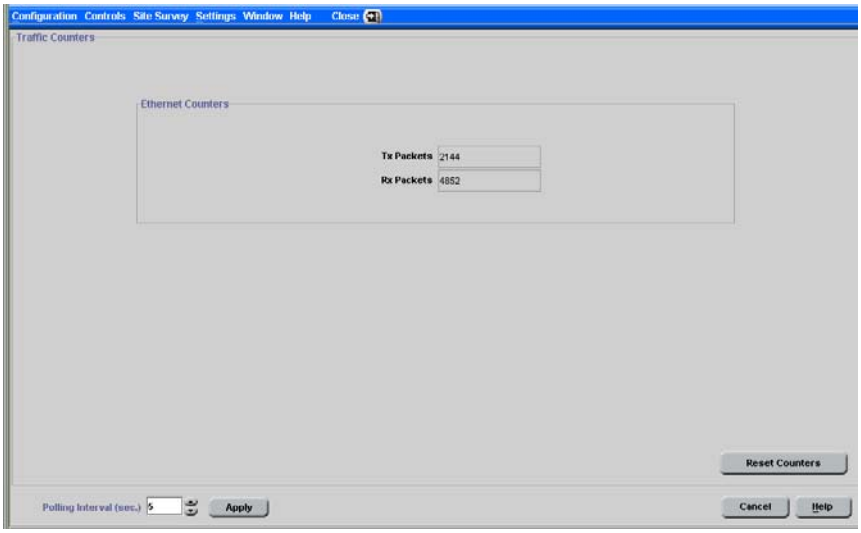


Figure 5-49: Traffic Window

The *Traffic* window is comprised of the following components:

- Ethernet Counters
- Reset Counters
- Polling Interval

5.13.1 Ethernet Counters

- **Tx Packets:** Displays the total number of packets received from the Ethernet port.
- **Rx Packets**: Displays the number of packets transmitted by the unit to the Ethernet port. These include packets received from the wireless media and packets generated by the unit itself.

5.13.2 Reset Counters

Click the *Reset Counters* button to reset the Ethernet counters to zero. This also resets the Tx Counters and the Rx Counters.

5.13.3 Polling Interval

The Polling Interval defines the refresh time for the displayed information. The default Polling Interval is 5 seconds. The available range is from 5 to 120 seconds. To change the polling interval, select a new value and click on the Apply button.

5.14 Tx Counters

The *Wireless Tx* window displays information regarding data transmitted from the selected device.

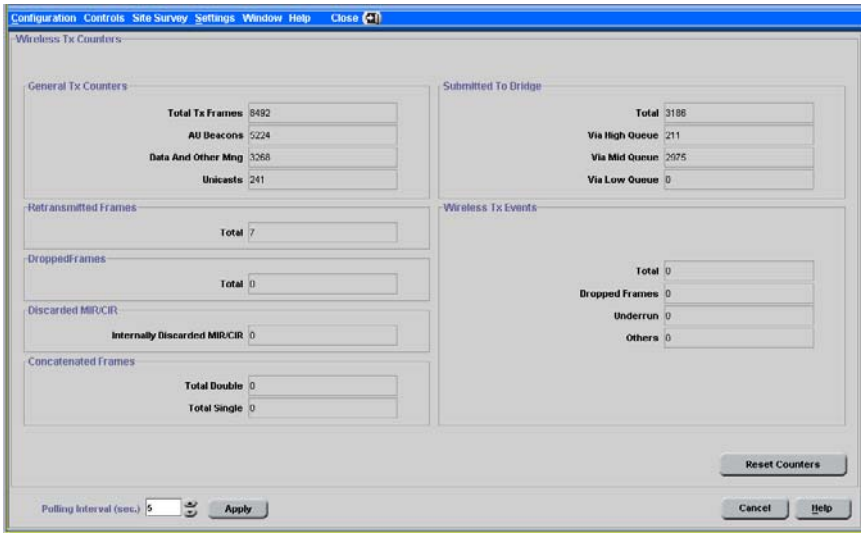


Figure 5-50: Wireless Tx Window - AU/BU

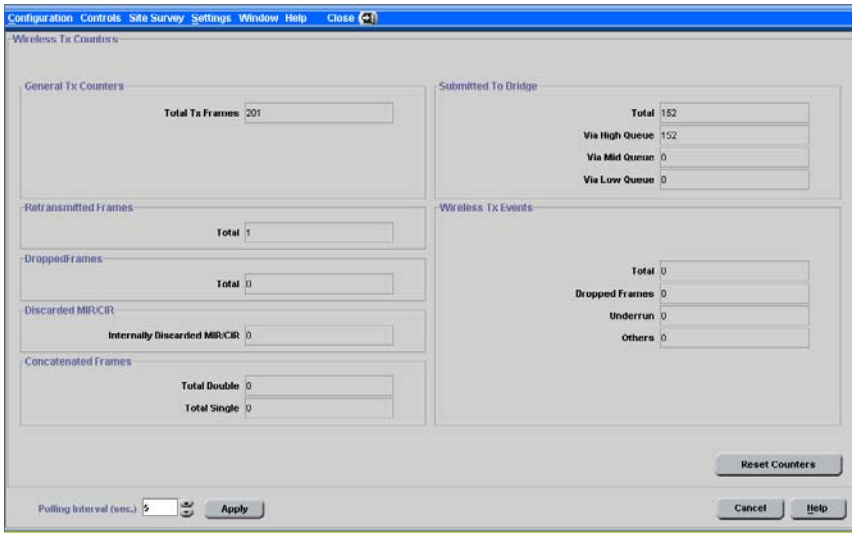


Figure 5-51: Wireless Tx Window - SU/RB

The *Wireless Tx* window is comprised of the following components:

- General Tx Counters
- Submitted To Bridge
- Wireless Tx Events
- Retransmitted Frames
- Dropped Frames
- Discarded MIR/CIR
- Concatenated Frames
- Reset Counters
- Polling Interval

5.14.1 General Tx Counters

- **Total Tx Frames**: The number of frames transmitted to the wireless media. The count includes one count for each data frame transmitted successfully (excluding retransmissions), and the number of transmitted control and wireless management frames.
- **AU Beacons (AU/BU only)**: The number of Beacon frames transmitted to the wireless media.
- **Data and Other Mng (AU/BU only)**: The number of data and other management frames (excluding beacons) transmitted to the wireless media. The count includes multicasts/broadcasts and one count for each unicast frame transmitted successfully (excluding retransmissions).
- **Unicasts (AU/BU only)**: The number of unicast frames successfully transmitted to the wireless media, excluding retransmissions.

5.14.2 Submitted To Bridge

- **Total**: Displays the total number of data frames submitted to the bridge for transmission to the wireless media. This statistic does not include internally generated control or wireless management frames or retransmissions.
- **Via High Queue**: Displays the number of frames sent to the bridge and routed to the highest priority queue for transmission to the wireless media.
- **Via Mid Queue**: Displays the number of frames sent to the bridge and routed to the medium priority queue for transmission to the wireless media.
- **Via Low Queue**: Displays the number of frames sent to the bridge and routed to the lowest priority queue for transmission to the wireless media.

5.14.3 Wireless Tx Events

- **Total**: The total number of Tx events.
- **Dropped Frames**: The number of frames that were dropped, because they were retransmitted the maximum permitted number of times without being acknowledged.
- **Underrun**: The number of times that a transmission was aborted because the rate of submitting frames for transmission exceeds the available transmission capability.
- **Others**: The number of Tx events due to reasons other than Dropped Frames, or Underrun.

5.14.4 Retransmitted Frames

- **Total**: The total number of retransmissions of data frames (counts all unsuccessful transmissions/retransmissions).

5.14.5 Dropped Frames

- **Total**: Displays the total number of frames that were dropped after being retransmitted the maximum permitted number of times.

5.14.6 Discarded MIR/CIR

- **Internally Discarded MIR/CIR**: Displays the number of data frames received from the Ethernet port that were discarded by the MIR/CIR mechanism to avoid exceeding the MIR.

5.14.7 Concatenated Frames

- **Total Double**: The total number of concatenated data frames with two packets transmitted to the wireless media.

- **Total Single**: The total number of concatenated data frames with a single packet transmitted to the wireless media.

5.14.8 Reset Counters

Click the Reset Counters button to reset the Wireless Tx Counters to zero. This also resets the Wireless Rx Counters and the Ethernet Counters.

5.14.9 Polling Interval

The Polling Interval defines the refresh time for the displayed information. The default Polling Interval is 5 seconds. The available range is from 5 to 120 seconds. To change the polling interval, select a new value and click on the Apply button.

5.15 Rx Counters

The Wireless *Rx* window displays information regarding the traffic received by the selected device.

The Wireless *Rx* window is accessed from the *Site Survey* Menu.

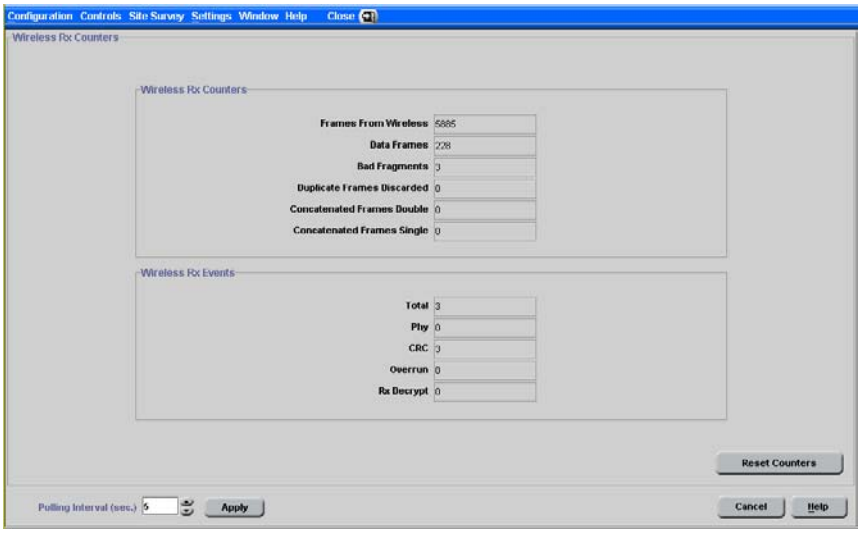


Figure 5-52: Wireless Rx Window

The *Wireless Rx* window is comprised of the following components:

- Wireless Rx Counters
- Wireless Rx Events
- Reset Counters
- Polling Interval

5.15.1 Wireless Rx Counters

- **Frames from Wireless**: Displays the total number of frames received from the wireless media, including data, control and wireless management frames and beacons received from the AU. The count does not include frames discarded internally, bad frames and duplicate frames.

- **Data Frames**: The total number of data frames received from the wireless media, including duplicate frames.
- **Bad Fragments**: Displays the total number of frames received from the wireless media that contain CRC errors.
- **Duplicate Frames Discarded**: Displays the number of frames discarded because multiple copies are received.
- **Concatenated Frames Double**: The total number of concatenated data frames with two packets received from the wireless media.
- **Concatenated Frames Single**: The total number of concatenated data frames with a single packet received from the wireless media.

5.15.2 Wireless Rx Events

- **Total**: The total number of Rx events.
- **Hardware**: The number of frames that were not received properly due to a hardware problem.
- **CRC**: The number of frames received from the wireless media 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.
- **Rx Decrypt**: The number of frames that were not received properly due to a problem in the data decrypting mechanism.

5.15.3 Reset Counters

Click the Reset Counters button to reset the Wireless Rx Counters to zero. This also resets the Wireless Tx Counters and the Ethernet Counters.

5.15.4 Polling Interval

The Polling Interval defines the refresh time for the displayed information. The default Polling Interval is 5 seconds. The available range is from 5 to 120 seconds. To change the polling interval, select a new value and click on the Apply button.

5.16 Per Modulation Level Counters (SU/RB)

The *Per Modulation Level Counters* window (for SU/RB only) displays information related to the transmissions at each modulation level supported by the selected unit.

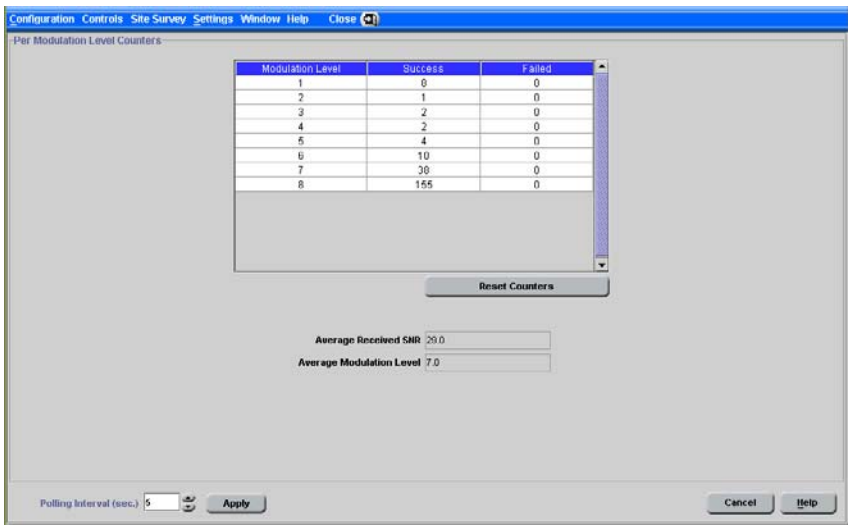


Figure 5-53: Per Modulation Level Counters Window

The *Per Modulation Level Counters* window is comprised of the following components:

- Per Modulation Level Counters Table
- Average Received SNR
- Average Modulation Level
- Reset Counters
- Polling Interval

5.16.1 Per Modulation Level Counters Table

The Per Modulation Level Counters table provides the following information for each of the applicable modulation levels:

- **Success**: The total number of unicast frames successfully transmitted by the selected unit at the applicable modulation level (excluding retransmissions).

- **Failed**: The total number of failures to successfully transmit unicast frames at the applicable modulation level.

5.16.2 Average Received SNR

The average quality (Signal to Noise Ratio) at which the SU/RB is received at the AU/BU.

5.16.3 Average Modulation Level

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 SUCCESS count at each modulation level as weights.

5.16.4 Reset Counters

Click the *Reset Counters* button to reset the *Per Modulation Level Counters* to zero.

5.16.5 Polling Interval

The Polling Interval defines the refresh time for the displayed information. The default Polling Interval is 5 seconds. The available range is from 5 to 120 seconds. To change the polling interval, select a new value and click on the Apply button.

5.17 Per SU Counters (AU)/BU Tx Statistics (BU)

The *Per SU Counters* window displays information related to transmission to each of the associated SUs, at each of the applicable modulation levels. In the BU, the *BU Tx Statistics* window displays information related to transmission to the RB, at each of the applicable modulation levels.

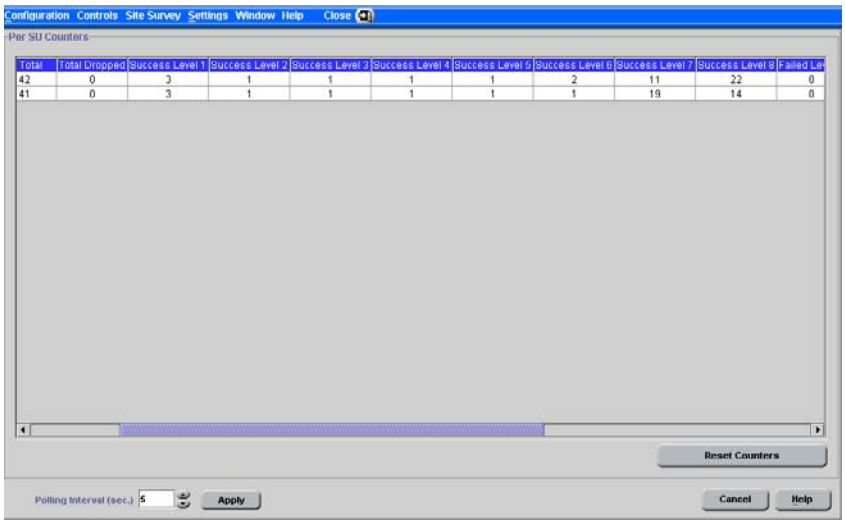


Figure 5-54: Per SU Counters Window (AU)

The Per SU Counters/BU Tx Statistics window is comprised of the following components:

- Per SU Counters (AU)/BU Tx Statistics (BU)
- Reset Counters
- Polling Interval

5.17.1 Per SU Counters/BU Tx Statistics Table

The Per SU Counters/BU Tx Statistics table includes the following information for each associated Subscriber Unit(AU) or for the RB (BU).

NOTE

Use the vertical scroll bar to review additional units. Use the horizontal scroll bar to review additional parameters.

- **MAC Address**: The MAC address of the SU/RB.
- **SNR**: The average Signal to Noise ratio at which the SU/RB is received at the AU/BU.
- **Max Mod. Level**: The value configured in the SU/RB for the Maximum Modulation Level parameter.
- **Tx Total**: The total number of unicast frames (excluding retransmissions) that were successfully transmitted to the SU/RB
- **Total Dropped**: The total number of frames intended to the SU/RB that were dropped because they were retransmitted the maximum permitted number of times without being acknowledged.
- **Success Level 1** to **Success Level 8**: The number of unicast frames (excluding retransmissions) that were successfully transmitted to the SU/RB, at each of the applicable modulation levels.
- **Failed Level 1** to **Failed Level 8**: The number of failures to successfully transmit unicast frames destined for the SU/RB, at each of the applicable modulation levels.

NOTE

Units with Hardware Version A support only modulation levels 1-7.

5.17.2 Reset Counters

Click on the *Reset Counters* button to reset the *Per SU Counters* to zero.

5.17.3 Polling Interval

The Polling Interval defines the refresh time for the displayed information. The default Polling Interval is 5 seconds. The available range is from 5 to 120 seconds. To change the polling interval, select a new value and click on the Apply button.

5.18 Link Quality (SU/RB)

The Link Quality window provides information on the quality of the uplink for the SU/RB.

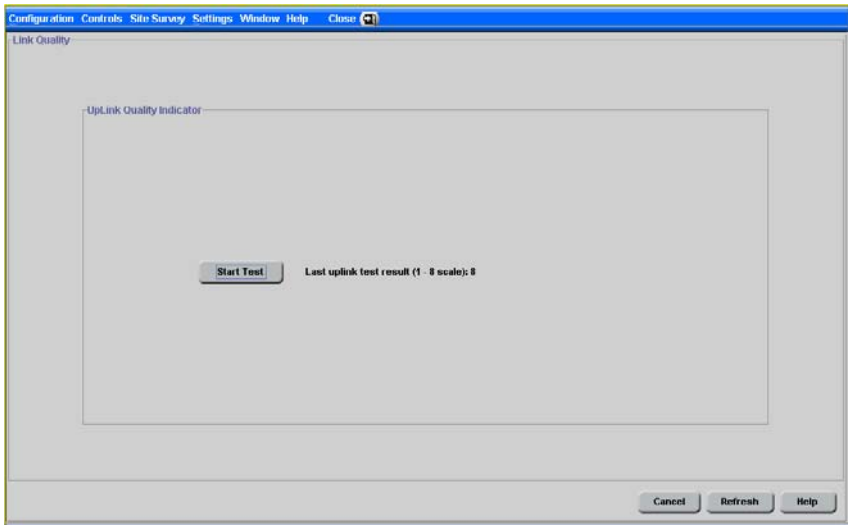


Figure 5-55: Link Quality Window

Click on the **Start Test** button to begin gathering of information on the average quality of the wireless link to the AU/BU, using the dynamically updated average modulation level measurements. After a short period the last test results for the Uplink Quality Indicator will be displayed.

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

If Limited Test is indicated next to the test results, it means that the results may not indicate the true quality since not all modulation levels from1 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 configurable Maximum Modulation Level parameter.

6

Chapter 6 - Performance Monitoring and BWA PM Data Collection Counters

In This Chapter:

6.1 Performance Monitoring and BWA PM Data Collection Counters

This section describes the counters that are available in the Performance Monitoring option and in the BWA PM Data Collection Manager.

The Counters tab of the BWA PM Data Collection Manager in AlvariSTAR include several counters groups that can be selected for data collection. Some of these groups can be expanded to display several selectable sub-groups. A very similar list of counters groups is available also in the Performance Monitoring window for a selected unit.

Each of the selectable groups/sub-groups includes several objects. These objects represent data sources that can have different characteristics. There are two data source types:

- **Gauge**: A data source with finite measurements (limited range). The graphs for these data sources use the absolute values.
- **Counter**: A continuous, incrementing counter. The graphs for these data sources use the rates (e.g. frames/second) rather than the absolute values.

The counters groups are:

6.1.1 Ethernet Statistics

The Ethernet Statistics counters are:

- **Total Rx Via Eth**

  Applicable for: All units

  Type: Counter

  Description: Total number of frames received from the Ethernet port.

- **Tx Wireless To Eth**

  Applicable for: All units

  Type: Counter

  Description: Total number of frames transmitted to the Ethernet port.

6.1.2 Wireless Counters

The Wireless Counters group includes the following sub-groups:

- "Wireless Tx" on page 6-140
- "Wireless Rx" on page 6-143
- "Wireless Tx Events" on page 6-144
- "Wireless Rx Events" on page 6-145

6.1.2.1 Wireless Tx

The Wireless Tx counters are:

- **Total Tx Frames To Wireless**

  Applicable for: All units

  Type: Counter

  Description: The number of frames transmitted to the wireless media. The count includes one count for each data frame transmitted successfully (excluding retransmissions), and the number of transmitted control and wireless management frames.

- **Total Retransmitted Frames**

  Applicable for: All units

  Type: Counter

  Description: The total number of retransmissions of data frames (counts all unsuccessful transmissions/retransmissions).

- **Frames Dropped**

  Applicable for: All units

  Type: Counter

  Description: The number of dropped frames. The frames retransmitted to the maximum allowed number of retransmissions without being acknowledged.

- **Total Tx Concatenated Double**

  Applicable for: All units

  Type: Counter

  Description: The number of concatenated frames with two data frames that were transmitted to the wireless media.

- **Total Tx Concatenated Single**

  Applicable for: All units

  Type: Counter

  Description: The number of concatenated frames with a single data frames that were transmitted to the wireless media.

- **AU Beacons To Wireless**

  Applicable for: AU/BU

  Type: Counter

  Description: The number of Beacon frames transmitted to the wireless media.

- **Data And Other Mng To Wireless**

  Applicable for: AU/BU

  Type: Counter

  Description: The number of data and other management frames (excluding beacons) transmitted to the wireless media. The count includes multi-casts/broadcasts and one count for each unicast frame transmitted success-fully (excluding retransmissions).

- **Total Transmitted Unicasts**

  Applicable for: AU/BU

  Type: Counter

  Description: The total number of unicast frames successfully transmitted to the wireless media, excluding retransmissions.

- **MIR/CIR Internally Discarded**

  Applicable for: All units

  Type: Counter

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

- **Total Data Frames Submitted**

  Applicable for: All units

  Type: Counter

  Description: The total number of data frames submitted to the internal bridge for transmission to the wireless media.

- **Frames Submitted Via High Queue**

  Applicable for: All units

  Type: Counter

  Description: The number of data frames submitted to the internal bridge via the high priority queue for transmission to the wireless media.

- **Frames Submitted Via Mid Queue**

  Applicable for: All units

  Type: Counter

  Description: The number of data frames submitted to the internal bridge via the mid priority queue for transmission to the wireless media.

- **Frames Submitted Via Low Queue**

  Applicable for: All units

  Type: Counter

  Description: The number of data frames submitted to the internal bridge via the low priority queue for transmission to the wireless media.

6.1.2.2 Wireless Rx

The Wireless Rx counters are:

- **Total Rx Frames From Wireless**

  Applicable for: All units

  Type: Counter

  Description: The total number of frames received from the wireless media. The count includes data and control and wireless management frames, including beacons received from the AU. The count does not include frames discarded internally, bad frames and duplicate frames.

- **Total Rx Data Frames**

  Applicable for: All units

  Type: Counter

  Description: The total number of data frames received from the wireless media, including duplicate frames.

- **Rx Bad Frames**

  Applicable for: All units

  Type: Counter

  Description: The number of frames received from the wireless media with errors (CRC errors).

- **Duplicate Frames Discarded**

  Applicable for: All units

  Type: Counter

  Description: The number of frames discarded due to receiving multiple copies.

- **Total Rx Concatenated Double**

  Applicable for: All units

  Type: Counter

  Description: The number of concatenated frames with two data frames that were received from the wireless media.

- **Total Rx Concatenated Single**

  Applicable for: All units

  Type: Counter

  Description: The number of concatenated frames with a single data frames that were received from the wireless media.

6.1.2.3 Wireless Tx Events

The Wireless Tx Events counters are:

- **Total Tx Events**

  Applicable for: All units

  Type: Counter

  Description: The total number of Tx events.

- **Dropped Frame Events**

  Applicable for: All units

  Type: Counter

  Description: The number frames that were dropped because they were retransmitted to the maximum allowed number of retransmissions without being acknowledged.

- **Underrun Events**

Applicable for: All units

Type: Counter

Description: The number of frames whose transmission was aborted because the rate of submitting frames for transmission exceeds the available transmission capability.

- **Other Tx Events**

Applicable for: All units

Type: Counter

Description: The number of Tx events due to problems other than those represented by the other Tx Events counters.

6.1.2.4 Wireless Rx Events

- **Total Rx Events**

Applicable for: All units

Type: Counter

Description: The total number of Rx events.

- **Phy Events**

Applicable for: All units

Type: Counter

Description: Applicable only when DFS is enabled. The number of unidentified signals.

- **CRC Errors**

Applicable for: All units

Type: Counter

Description: The number of frames received from the wireless media containing CRC errors.

- **Overrun Events**

Applicable for: All units

Type: Counter

Description: The number of frames that were discarded because the receive rate exceeded the processing capability or the capacity of the Ethernet port.

- **Rx Decrypt Events**

Applicable for: All units

Type: Counter

Description: The number of frames that were not received properly due to a problem in the data decryption mechanism.

6.1.3 Per SU Statistics (BWA PM Data Collection only)

The Per SU Statistics is applicable only for AUs and includes the following counters for each of the SUs associated with the applicable AU:

NOTE

The Per SU Statistics counters are available only in the BWA PM Data Collection Manager.

- **SNR**

Applicable for: AU

Type: Gauge

Description: The average Signal to Noise Ratio in dB of frames received by the AU from the relevant SU.

- **Tx Total**

Applicable for: AU

Type: Counter

Description: The total number of frames (excluding retransmissions) that were transmitted by the AU to the relevant SU.

- **Total Dropped**

Applicable for: AU

Type: Counter

Description: The total number of intended to the relevant SU that were dropped because they were retransmitted by the AU to the extent of the maximum allowed number of retransmissions without being acknowledged.

- **Success Level 1**

Applicable for: AU

Type: Counter

Description: The total number of unicast frames (excluding retransmissions) that were successfully transmitted to the SU over the wireless link using modulation level 1.

- **Success Level 2**

Applicable for: AU

Type: Counter

Description: The total number of unicast frames (excluding retransmissions) that were successfully transmitted to the SU over the wireless link using modulation level 2.

- **Success Level 3**

Applicable for: AU

Type: Counter

Description: The total number of unicast frames (excluding retransmissions) that were successfully transmitted to the SU over the wireless link using modulation level 3.

- **Success Level 4**

  Applicable for: AU

  Type: Counter

  Description: The total number of unicast frames (excluding retransmissions) that were successfully transmitted to the SU over the wireless link using modulation level 4.

- **Success Level 5**

  Applicable for: AU

  Type: Counter

  Description: The total number of unicast frames (excluding retransmissions) that were successfully transmitted to the SU over the wireless link using modulation level 5.

- **Success Level 6**

  Applicable for: AU

  Type: Counter

  Description: The total number of unicast frames (excluding retransmissions) that were successfully transmitted to the SU over the wireless link using modulation level 6.

- **Success Level 7**

  Applicable for: AU

  Type: Counter

Description: The total number of unicast frames (excluding retransmissions) that were successfully transmitted to the SU over the wireless link using modulation level 7.

- **Success Level 8**

  Applicable for: AU

  Type: Counter

  Description: The total number of unicast frames (excluding retransmissions) that were successfully transmitted to the SU over the wireless link using modulation level 8.

- **Failed Level 1**

  Applicable for: AU

  Type: Counter

  Description: The total number of failures to successfully transmit a unicast frame intended to the SU during a HW Retry cycle using modulation level 1.

- **Failed Level 2**

  Applicable for: AU

  Type: Counter

  Description: The total number of failures to successfully transmit a unicast frame intended to the SU during a HW Retry cycle using modulation level 2.

- **Failed Level 3**

  Applicable for: AU

  Type: Counter

  Description: The total number of failures to successfully transmit a unicast frame intended to the SU during a HW Retry cycle using modulation level 3.

- **Failed Level 4**

Applicable for: AU

Type: Counter

Description: The total number of failures to successfully transmit a unicast frame intended to the SU during a HW Retry cycle using modulation level 4.

- **Failed Level 5**

Applicable for: AU

Type: Counter

Description: The total number of failures to successfully transmit a unicast frame intended to the SU during a HW Retry cycle using modulation level 5.

- **Failed Level 6**

Applicable for: AU

Type: Counter

Description: The total number of failures to successfully transmit a unicast frame intended to the SU during a HW Retry cycle using modulation level 6.

- **Failed Level 7**

Applicable for: AU

Type: Counter

Description: The total number of failures to successfully transmit a unicast frame intended to the SU during a HW Retry cycle using modulation level 7.

- **Failed Level 8**

Applicable for: AU

Type: Counter

Description: The total number of failures to successfully transmit a unicast frame intended to the SU during a HW Retry cycle using modulation level 8.

6.1.4 Per Mod Level Statistics (BWA PM Data Collection only)

The Per Modulation Level Statistics is applicable only for SUs/RBs and includes the following counters:

- **Avg Receive SNR**

  Applicable for: SU

  Type: Gauge

  Description: The average Signal to Noise Ratio of received frames.

- **Avg Mod Level**

  Applicable for: SU

  Type: Gauge

  Description: The average modulation level of received frames.

- **Success Level 1**

  Applicable for: SU

  Type: Counter

  Description: The total number of unicast frames (excluding retransmissions) that were successfully transmitted by the SU over the wireless link using modulation level 1.

- **Success Level 2**

  Applicable for: SU

  Type: Counter

  Description: The total number of unicast frames (excluding retransmissions) that were successfully transmitted by the SU over the wireless link using modulation level 2.

- **Success Level 3**

  Applicable for: SU

  Type: Counter

  Description: The total number of unicast frames (excluding retransmissions) that were successfully transmitted by the SU over the wireless link using modulation level 3.

- **Success Level 4**

  Applicable for: SU

  Type: Counter

  Description: The total number of unicast frames (excluding retransmissions) that were successfully transmitted by the SU over the wireless link using modulation level 4.

- **Success Level 5**

  Applicable for: SU

  Type: Counter

  Description: The total number of unicast frames (excluding retransmissions) that were successfully transmitted by the SU over the wireless link using modulation level 5.

- **Success Level 6**

  Applicable for: SU

  Type: Counter

  Description: The total number of unicast frames (excluding retransmissions) that were successfully transmitted by the SU over the wireless link using modulation level 6.

- **Success Level 7**

Applicable for: SU

Type: Counter

Description: The total number of unicast frames (excluding retransmissions) that were successfully transmitted by the SU over the wireless link using modulation level 7.

- **Success Level 8**

  Applicable for: SU

  Type: Counter

  Description: The total number of unicast frames (excluding retransmissions) that were successfully transmitted by the SU over the wireless link using modulation level 8.

- **Failed Level 1**

  Applicable for: SU

  Type: Counter

  Description: The total number of failures to successfully transmit a unicast frame during a HW Retry cycle using modulation level 1.

- **Failed Level 2**

  Applicable for: SU

  Type: Counter

  Description: The total number of failures to successfully transmit a unicast frame during a HW Retry cycle using modulation level 2.

- **Failed Level 3**

  Applicable for: SU

  Type: Counter

Description: The total number of failures to successfully transmit a unicast frame during a HW Retry cycle using modulation level 3.

- **Failed Level 4**

  Applicable for: SU

  Type: Counter

  Description: The total number of failures to successfully transmit a unicast frame during a HW Retry cycle using modulation level 4.

- **Failed Level 5**

  Applicable for: SU

  Type: Counter

  Description: The total number of failures to successfully transmit a unicast frame during a HW Retry cycle using modulation level 5.

- **Failed Level 6**

  Applicable for: SU

  Type: Counter

  Description: The total number of failures to successfully transmit a unicast frame during a HW Retry cycle using modulation level 6.

- **Failed Level 7**

  Applicable for: SU

  Type: Counter

  Description: The total number of failures to successfully transmit a unicast frame during a HW Retry cycle using modulation level 7.

- **Failed Level 8**

  Applicable for: SU

Type: Counter

Description: The total number of failures to successfully transmit a unicast frame during a HW Retry cycle using modulation level 8.

6.1.5 Modulation Level Statistics (Performance Monitoring only)

The Per Modulation Level Statistics is applicable only for SUs and includes the following counters:

- **Avg Receive SNR**

  Applicable for: SU

  Type: Gauge

  Description: The average Signal to Noise Ratio of received frames.

- **Avg Mod Level**

  Applicable for: SU

  Type: Gauge

  Description: The average modulation level of received frames.

6.1.6 Transmit Power Parameters (SU/RB only)

The Transmit Power Parameters group includes the following for each of the applicable modulation levels:

- **Current Tx Power Level 1 to 5**

  Applicable for: SU, RB

  Type: Gauge

  Description: The actual transmit power in dBm at the modulation levels 1 to 5.

- **Current Tx Power Level 6**

  Applicable for: SU, RB

  Type: Gauge

  Description: The actual transmit power in dBm at modulation level 6.

- **Current Tx Power Level 7**

  Applicable for: SU, RB

  Type: Gauge

  Description: The actual transmit power in dBm at modulation level 7.

- **Current Tx Power Level 8**

  Applicable for: SU, RB

  Type: Gauge

  Description: The actual transmit power in dBm at modulation level 8.

6.1.7 MIB II If Counters

The MIB II Counters group includes standard interface counters defined by MIB II. These counters are applicable for all units.

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