Install the SNAPTOGGLE™ Toggle Bolts

2. At the locations you marked in Step 1, drill a 1/2 inch (13mm) hole (there must be a minimum clearance behind the wall of 1 7/8 inches—48mm).

3. (Refer to Figure 35, graphic **A**) Hold the metal channel flat alongside the plastic straps and slide the channel through the hole.

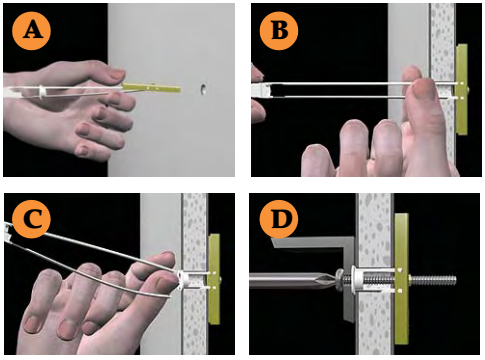


Figure 35. Installing the Toggle Bolts

4. (Refer to Figure 35, graphic **B**) Hold the strap handle between your thumb and forefinger and pull towards you until the metal channel rests flush behind the wall.

   Using your other hand, now slide the plastic cap along the straps until the flange of the cap is flush with wall.

   The straps provide a one-way ratcheting mechanism (similar to a cable tie). Ensure that the toggle bolt assembly is oriented correctly (as shown) before sliding the plastic cap along the straps.

5. (Refer to Figure 35, graphic **C**) Break the straps at the wall, flush with the flange of the cap. The straps can be broken by pushing them from side-to-side and simply snapping them off.

   Figure 35, Graphic **D** shows a cutaway example of how the toggle bolt is used to secure an item to the wall (in our case, the item is the Wall Mounting Bracket—secured to the wall with 5 toggle bolts.

   Do not attach the Wall Mounting Bracket to the wall at this time.

Attach the Mounting Plate to the Wall Mounting Bracket

6. Secure the Wi-Fi Array's mounting plate to the Wall Mounting Bracket, in 4 places. Tighten the bolts to a torque of 10–12 lbf.ft (1.38–1.66 kgf.m).

   Do not overtighten the bolts.

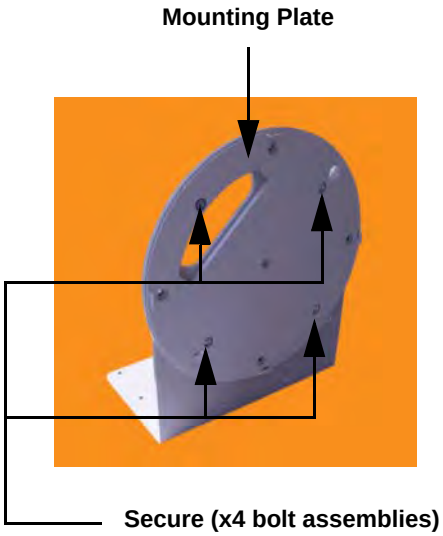


Figure 36. Attaching the Wall Mounting Plate

Attach the Wall Mounting Bracket/Plate Assembly to the Wall

7. Secure the Wall Mounting Bracket (with attached Mounting Plate) to the wall at the 5 toggle bolt anchors you created in Steps 1 through 5—using all 5 places.

Mount the Array

8. Mount the Wi-Fi Array to the Wall Mounting Bracket in the same way that you would mount the Array to a ceiling mount (the procedure is identical). See "Attaching the Array to the Mounting Plate (XN16/XN8/XN4)" on page 59.

Figure 37 shows the orientation of the Wi-Fi Array when mounted on a wall. It is not intended to show a fully installed Array.

Figure 37. Mounting the Array on a Wall

See Also

Installation Workflow
Installing Your Wi-Fi Array
Mounting the Wi-Fi Array on a Wall (XN4)
Mounting the Array on a Ceiling
Securing the Array

Mounting the Wi-Fi Array on a Wall (XN4)

This procedure is applicable to the 4 radio models of the Wi-Fi Array (XN4). If you are mounting a 16 radio model or 8 radio model, go to "Mounting the Array on a Wall (XN16/XN8)" on page 62.

The wall mounting assembly kit is used to mount the XN4 Wi-Fi Array on a wall, instead of the traditional ceiling mount—where mounting the Array on the ceiling may be impractical at your location.

Kit Contents (Wall Mount Assembly)

The wall mount assembly kit includes the following items:

- 5 x SNAPTOGGLE™ toggle bolts (for attaching the wall bracket to the wall)
- 4 x 1/4 inch bolt assemblies (for attaching the mounting plate to the wall bracket)
- Wall Mounting Bracket

Tools Required

- Power drill
- 1/2 inch (13mm) drill bit
- Cross head screwdriver
- 1/4 inch nut wrench
- Pencil
- Level

Mark the Wall Position

1. Use the Wall Mounting Bracket as a template and mark the locations on the wall for the mounting holes.

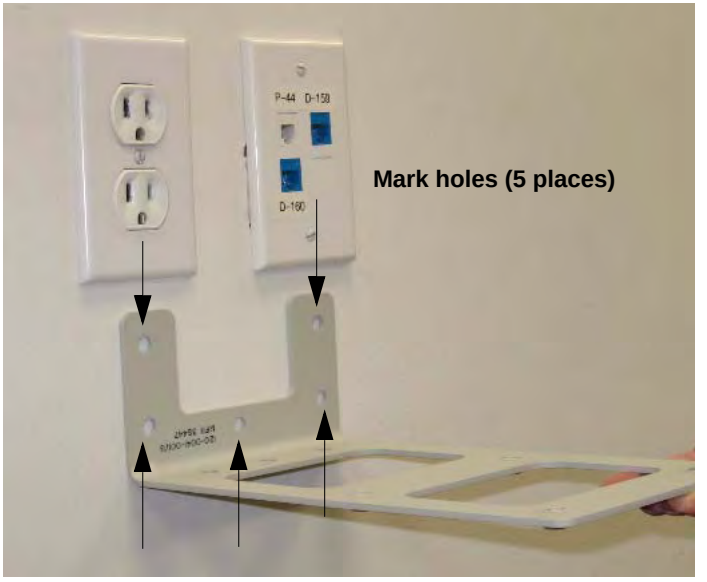


Figure 38. Wall Mount—Marking the Holes

The bracket must be secured to the wall in 5 places, using the top 2 holes and the bottom 3 holes (5 toggle bolts are provided).

When marking the holes, ensure that the mounting plate is level—you may need assistance.

Install the SNAPTOGGLE™ Toggle Bolts

2. At the locations you marked in Step 1, drill a 1/2 inch (13mm) hole (there must be a minimum clearance behind the wall of 1 7/8 inches—48mm).

3. (Refer to Figure 39, graphic **A**) Hold the metal channel flat alongside the plastic straps and slide the channel through the hole.

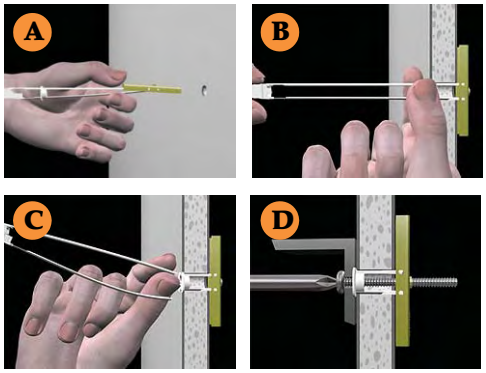


Figure 39. Installing the Toggle Bolts

4. (Refer to Figure 39, graphic **B**) Hold the strap handle between your thumb and forefinger and pull towards you until the metal channel rests flush behind the wall.

   Using your other hand, now slide the plastic cap along the straps until the flange of the cap is flush with wall.

   The straps provide a one-way ratcheting mechanism (similar to a cable tie). Ensure that the toggle bolt assembly is oriented correctly (as shown) before sliding the plastic cap along the straps.

5. (Refer to Figure 39, graphic **C**) Break the straps at the wall, flush with the flange of the cap. The straps can be broken by pushing them from side-to-side and simply snapping them off.

   Figure 39, Graphic **D** shows a cutaway example of how the toggle bolt is used to secure an item to the wall (in our case, the item is the Wall Mounting Bracket—secured to the wall with 5 toggle bolts).

   Do not attach the Wall Mounting Bracket to the wall at this time.

Attach the Mounting Plate to the Wall Mounting Bracket

6. Secure the Wi-Fi Array's mounting plate to the Wall Mounting Bracket, in 4 places.

   Tighten the bolts to a torque of 10–12 ft-lb (1.38–1.66 kg.m).

   Do not overtighten the bolts.

Figure 40. Attaching the Array Mounting Plate

Attach the Wall Mounting Bracket/Plate Assembly to the Wall

7. Secure the Wall Mounting Bracket (with attached Mounting Plate) to the wall at the 5 toggle bolt anchors you created in Steps 2 through 5—using all 5 places.

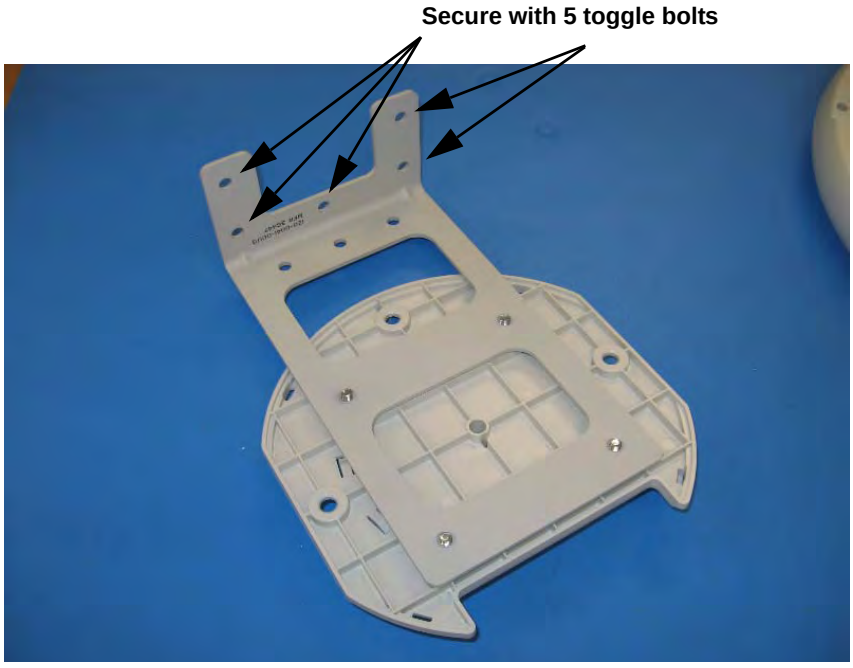


Figure 41. Attaching the Wall Mounting Bracket to the Wall

Mount the Array

8. Mount the Wi-Fi Array to the Wall Mounting Bracket by positioning the key post (on the underside of the mounting bracket) into the key receptacle on the underside of the Array.

   When the key post is properly located, gently turn the Array in a clockwise direction to secure the Array to the mounting plate.

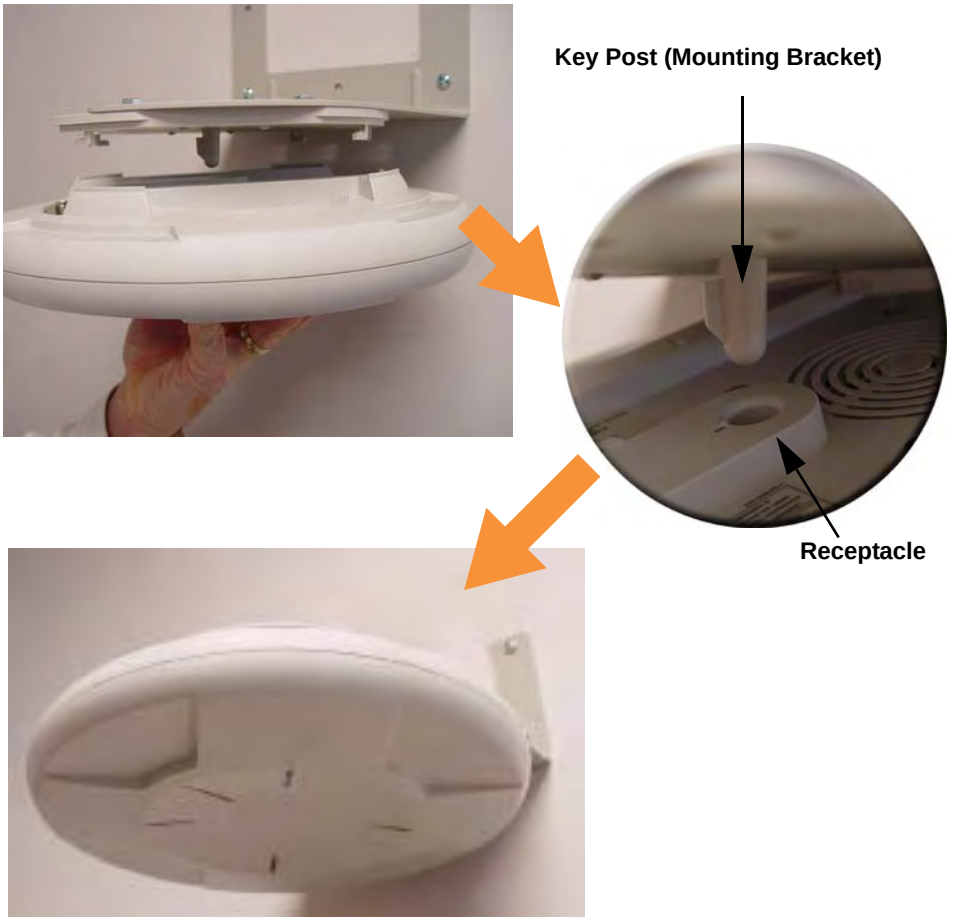


Figure 42. Mounting the Array on a Wall

Removing the Array

To remove the Array from the Wall Mount Assembly, simply apply a little upward pressure to the Array, then gently turn the Array in a counterclockwise direction to release the unit from the bracket.

See Also

Installation Workflow
Installing Your Wi-Fi Array
Mounting the Array on a Wall (XN16/XN8)
Mounting the Array on a Ceiling
Securing the Array

Powering Up the Wi-Fi Array

When powering up, the Array follows a specific sequence of LED patterns showing the boot progress, and following a successful boot will provide extensive status information.

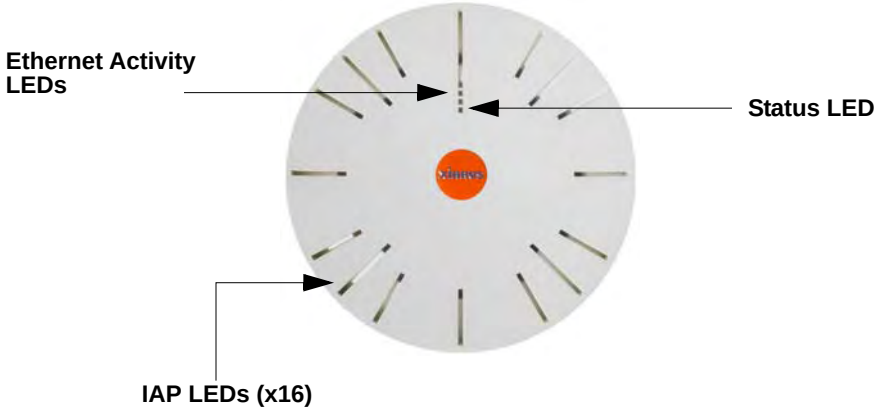


Figure 43. LED Locations (XN16)

Array LED settings may be altered or disabled entirely for diagnostic purposes or for personal preference. Changes are made via the Array's Command Line Interface or the Web Management Interface—refer to "LED Settings" on page 227.

Array LED Operating Sequences

Use the following tables to review the operating sequences of the Array's LEDs.

LED Boot Sequence

The normal boot LED sequence is as follows:

Array Activity	Status LED	IAP LEDs
Power ON	Blinking GREEN	All OFF
Boot loader power ON self-test	Blinking GREEN	All ON
Image load from compact FLASH	Blinking GREEN	Spinning pattern (rotate all to ON, then all to OFF)
Image load failure	Blinking RED	All OFF
Hand off to ArrayOS	Solid GREEN	All OFF
System software initialization	Solid GREEN	Walking pattern (LED rotating one position per second)
Up and running	Solid GREEN	ON for IAPs that are up, and OFF for IAPs that are down

LED Operation when Array is Running

The normal LED operation when the Array is running is as follows:

LED Status	Reason
IAP LED is OFF	IAP is down
IAP LED is solid ON	IAP is up, but no associations and no traffic
IAP LED heartbeat	IAP is up, with stations associated but no traffic
IAP LED flashing Flashing at 10 Hz Flashing at 5 Hz Flashing at 2.5 Hz	IAP is up, passing traffic Traffic > 1500 packets/sec Traffic > 150 packets/sec Traffic > 1 packet/sec
IAP LED is GREEN	IAP is operating in the 2.4 GHz band
IAP LED is ORANGE	IAP is operating in the 5 GHz band
IAP LED flashing ORANGE to GREEN at 1 Hz	IAP **abg2** is in monitor mode (standard intrude detect)
Ethernet LEDs are dual color **Ethernet LED is ORANGE** **Ethernet LED is GREEN**	 Transferring data at 1 Gbps Transferring data at 10/100 Mbps

See Also

Installation Prerequisites
Installation Workflow
Installing Your Wi-Fi Array

Establishing Communication with the Array

The Array can be configured through the Command Line Interface (CLI) or the graphical Web Management Interface (WMI). You can use the CLI via the serial management port, the Fast Ethernet port, or either of the Gigabit Ethernet ports. You can use the WMI via any of the Array's Ethernet ports.

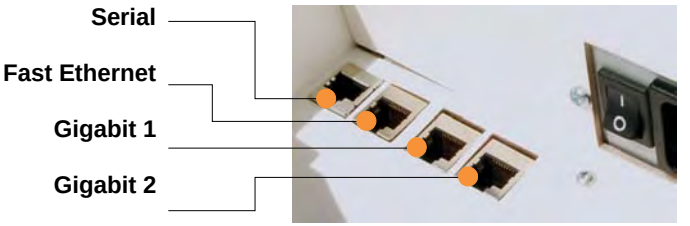


Figure 44. Network Interface Ports

Using the Serial Port

If using the serial port to make your connection, use serial settings of 8 bits, no parity, no flow control, 1 stop bit (8N1) and a speed setting of 115200 baud. Use the communication package of your choice.

Using the Ethernet Ports

By default, the Array's Ethernet interfaces use DHCP to obtain an IP address. If the Array is booted and does not receive DHCP addresses on either the Fast Ethernet or Gigabit Ethernet ports, the Fast Ethernet port will default to an IP address of 10.0.1.1 and both Gigabit Ethernet ports will default to 10.0.2.1. If the Array is connected to a network that provides DHCP addresses, the IP address can be determined by the following two methods:

1. Examine the DHCP tables on the server and find the addresses assigned to the Array (Xirrus MAC addresses begin with 000F7D).
2. Query the Array using the CLI via the serial port. Use the **show ethernet** command to view the IP addresses assigned to each port.

Logging In

When logging in to the Array, use the default user name and password—the default user name is **admin**, and the default password is **admin**.

See Also

Installation Workflow
Performing the Express Setup Procedure
Powering Up the Wi-Fi Array

Performing the Express Setup Procedure

The Express Setup procedure allows you to establish global configuration settings that will enable basic Array functionality. Any changes you make in this window will affect all radios. When finished, click on the **Apply** button to apply the new settings to this session, or click **Save** to apply and save your changes.

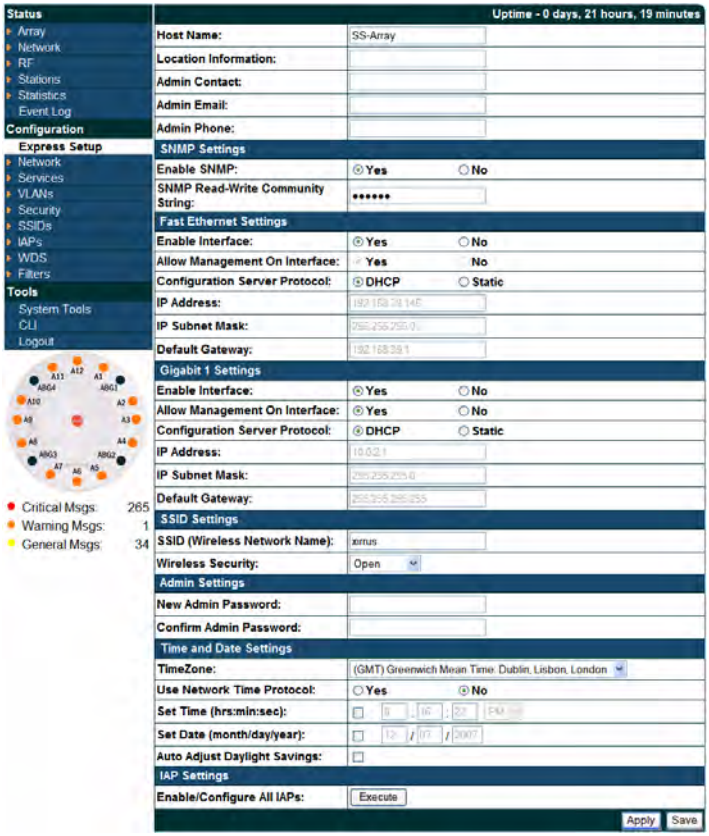


Figure 45. Express Setup

Procedure for Performing an Express Setup

1. **Host Name**: Specify a unique host name for this Array. The host name is used to identify the Array on the network. Use a name that will be meaningful within your network environment, up to 64 alphanumeric characters. The default is **Xirrus-WiFi-Array**.
2. **Location Information**: Enter a brief but meaningful description that accurately defines the physical location of the Array. In an environment where multiple units are installed, clear definitions for their locations are important if you want to identify a specific unit.
3. **Admin Contact**: Enter the name and contact information of the person who is responsible for administering the Array at the designated location.
4. **Admin Email**: Enter the email address of the admin contact you entered in Step 3.
5. **Admin Phone**: Enter the telephone number of the admin contact you entered in Step 3.
6. Configure **SNMP**: Select whether to **Enable** SNMP on the Array, and set the **SNMP Read-Write Community String**. The factory default value for this is **xirrus**. If you are using the Xirrus Management System (XMS), this string must match the string used by XMS.
7. Configure the **Fast Ethernet** (10/100 Megabit), **Gigabit 1** and **Gigabit 2** network interfaces. The fields for each of these interfaces are the same, and include:
    a. **Enable Interface**: Choose **Yes** to enable this network interface, or choose **No** to disable the interface.
    b. **Allow Management on Interface**: Choose **Yes** to allow management of the Array via this network interface, or choose **No** to deny all management privileges for this interface.
    c. **Configuration Server Protocol**: Choose **DHCP** to instruct the Array to use DHCP to assign IP addresses to the Array's Ethernet interfaces, or choose **Static** if you intend to enter IP addresses manually. If you choose the Static IP option, you must enter the following information:

- **IP Address**: Enter a valid IP address for this Array. To use any of the remote connections (Web, SNMP, or SSH), a valid IP address must be used.
- **IP Subnet Mask**: Enter a valid IP address for the subnet mask (the default is 255.255.255.0). The subnet mask defines the number of IP addresses that are available on the routed subnet where the Array is located.
- **Default Gateway**: Enter a valid IP address for the default gateway. This is the IP address of the router that the Array uses to forward data to other networks.

8. **SSID Settings**: This section specifies the wireless network name and security settings.
   a. **SSID (Wireless Network Name)**: The SSID (Service Set Identifier) is a unique name that identifies a wireless network. All devices attempting to connect to a specific WLAN must use the same SSID. The default for this field is "**xirrus**."

      For additional information about SSIDs, go to the Multiple SSIDs section of "Frequently Asked Questions" on page 334.

   b. **Wireless Security**: Select the desired wireless security scheme (Open, WEP, WPA, WPA2, or WPA-Both). WPA2 is recommended for the best Wi-Fi security.

      - **Open**—This option offers no data encryption and is not recommended, though you might choose this option if clients are required to use a VPN connection through a secure SSH utility, like PuTTy.
      - **WEP** (Wired Equivalent Privacy)—An optional IEEE 802.11 function that offers frame transmission privacy similar to a wired network. WEP generates secret shared encryption keys that both source and destination stations can use to alter frame bits to avoid disclosure to eavesdroppers.

- **WPA** (Wi-Fi Protected Access)—A Wi-Fi Alliance standard that contains a subset of the IEEE 802.11i standard, using TKIP or AES as an encryption method and 802.1x for authentication.
- **WPA2** (Wi-Fi Protected Access 2)—WPA2 is the follow-on security method to WPA for wireless networks and provides stronger data protection and network access control. It offers Enterprise and consumer Wi-Fi users with a high level of assurance that only authorized users can access their wireless networks. Like WPA, WPA2 is designed to secure all versions of 802.11 devices, including 802.11a, 802.11b, 802.11g, and 802.11n, multi-band and multi-mode.
- **WPA-Both** (WPA and WPA2)—This option makes use of both WPA and WPA2.

For more information about security, including a full review of all security options and settings, go to "Understanding Security" on page 165.

c. **Wireless Key/Passphrase**: Depending on the wireless security scheme you selected, enter a unique WEP key or WPA passphrase.

d. **Confirm Key/Passphrase**: If you entered a WEP key or WPA passphrase, confirm it here.

9. **Admin Settings:** This section allows you to change the default password for the Array.

a. **New Admin Password**: If desired, enter a new administration password for managing this Array. Choose a password that is not obvious, and one that you can remember. If you forget your password, you must reset the Array to its factory defaults so that the password is reset to **admin** (its default setting).

b. **Confirm Admin Password**: If you entered a new administration password, confirm the new password here.

10. **Time and Date Settings:** This section specifies an optional time (NTP - Network Time Protocol) server or modifies the system time if you're not using a server.

    a. **Time Zone**: Select your time zone from the choices available in the pull-down list.

    b. **Use Network Time Protocol**: Check this box if you want to use an NTP server to synchronize the Array's clock. This ensures that syslog time-stamping is maintained across all units. Without an NTP server assigned (no universal clock), each Array will use its own internal clock and stamp times accordingly, which may result in discrepancies. If you check **Yes**, the NTP server fields are displayed. If you don't want to use an NTP server, leave this box unchecked (default) and set the system time on the Array manually.

    c. **NTP Primary Server**: If you are using NTP, enter the IP address or domain name of the NTP server.

    d. **NTP Secondary Server**: Enter the IP address or domain name of an optional secondary NTP server to be used in case the Array is unable to contact the primary server.

    e. **Set Time (hrs:min:sec)**: If you are not using NTP, check this box if you want to adjust the current system time. When the box is checked, the time fields become active. Enter the revised time (hours, minutes, seconds, am/pm) in the corresponding fields. If you don't want to adjust the current time, this box should be left unchecked (default).

    f. **Set Date (month/day/year)**: If you are not using NTP, check this box if you want to adjust the current system date. When the box is checked, the date fields become active. Enter the revised date (month, day and year) in the corresponding fields. If you don't want to adjust the current date, this box should be left unchecked (default).

    g. **Auto Adjust Daylight Savings**: If you are not using NTP, check this box if you want the system to adjust for daylight savings automatically, otherwise leave this box unchecked (default).

11. **IAP Settings:**

    Enable/Configure All IAPs: Click on the **Execute** button to enable and auto configure all IAPs (a message displays the countdown time—in seconds—to complete the auto-configuration task). When an IAP is enabled, its LED is switched on.

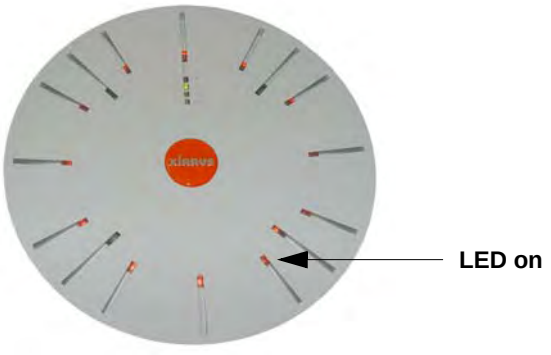


Figure 46. LEDs are Switched On

12. Click on the **Apply** button to apply the new settings to this session
13. Click on the **Save** button to save your changes (otherwise your new settings will not take effect).

    This ends the Express Setup procedure.

See Also

Establishing Communication with the Array
Installation Prerequisites
Installation Workflow
Logging In
Multiple SSIDs
Security

The Web Management Interface

This topic provides an overview of the Xirrus Wi-Fi Array's embedded Web Management Interface (WMI), used for establishing your network's configuration settings and wireless operating parameters. It also includes login instructions. The following topics are discussed:

- An Overview
- Structure of the WMI
- User Interface
- Logging In
- Applying Configuration Changes

An Overview

The WMI is an easy-to-use graphical interface to your Wi-Fi Array. It allows you to configure the product to suit your individual requirements and ensure that the unit functions efficiently and effectively.

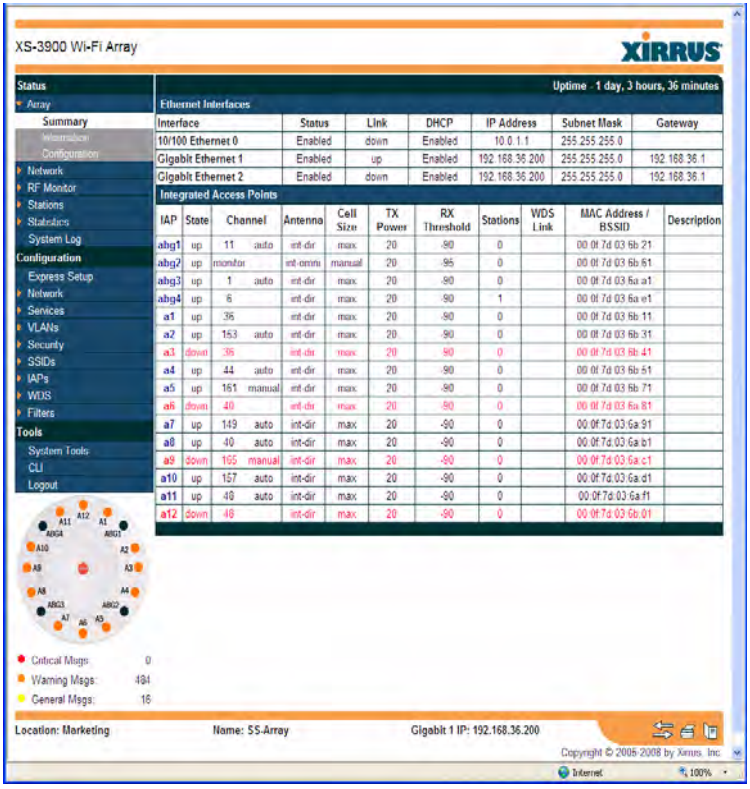


Figure 47. Web Management Interface

Structure of the WMI

The content of the WMI has been organized by function and hierarchy, shown in the following table in list form. Click on any item below to jump to the referenced destination.

- **Status Windows**
  - Array Status Windows
    - Array Summary
    - Array Information
    - Array Configuration
  - Network Status Windows
    - Network Map
    - Spanning Tree Status
    - Routing Table
    - DHCP Leases
    - Connection Tracking/NAT
    - CDP Neighbors
  - RF Monitor Windows
    - IAPs
    - Spectrum Analyzer
    - Intrusion Detection
  - Station Status Windows
    - Stations
    - Location Map
    - RSSI
    - Signal-to-Noise Ratio (SNR)
    - Noise Floor
- **Statistics Windows**
  - IAP Statistics
    - IAP Statistics Summary
    - Per-IAP Statistics
  - Network Statistics
  - VLAN Statistics
  - WDS Statistics
  - Filter Statistics
  - Station Statistics
- **System Log Window**
- **Tool Windows**
  - System Tools
  - CLI
  - Logout

- **Configuration Windows**
  - Express Setup
  - Network
    - Network Interfaces
    - DNS Settings
    - CDP Settings
  - Services
    - Time Settings (NTP)
    - System Log
    - SNMP
    - DHCP Server
  - VLANs
    - VLAN Management
  - Security
    - Admin Management
    - Management Control
    - Access Control List
    - Global Settings
    - External Radius
    - Internal Radius
    - Rogue Control List
  - SSIDs
    - SSID Management
  - Groups
    - Group Management
  - IAPs
    - IAP Settings
    - Global Settings (IAP)
    - Global Settings .11an
    - Global Settings .11bgn
    - Advanced RF Settings
    - LED Settings
  - WDS
    - WDS Client Links
  - Filters
    - Filter Lists
    - Filter Management

User Interface

The WMI has been designed with simplicity in mind, making navigation quick and easy. In the following example, you'll see that windows are divided into left and right frames. The left frame contains configuration elements organized by function (for example, radio interfaces, security, etc.), and where these functions are sub-divided there is an associated pull-down menu. Also included in the left frame are three counters that provide a running total of messages generated by the ArrayOS syslog subsystem during your session—organized into **Critical**, **Warning** and **General** messages.

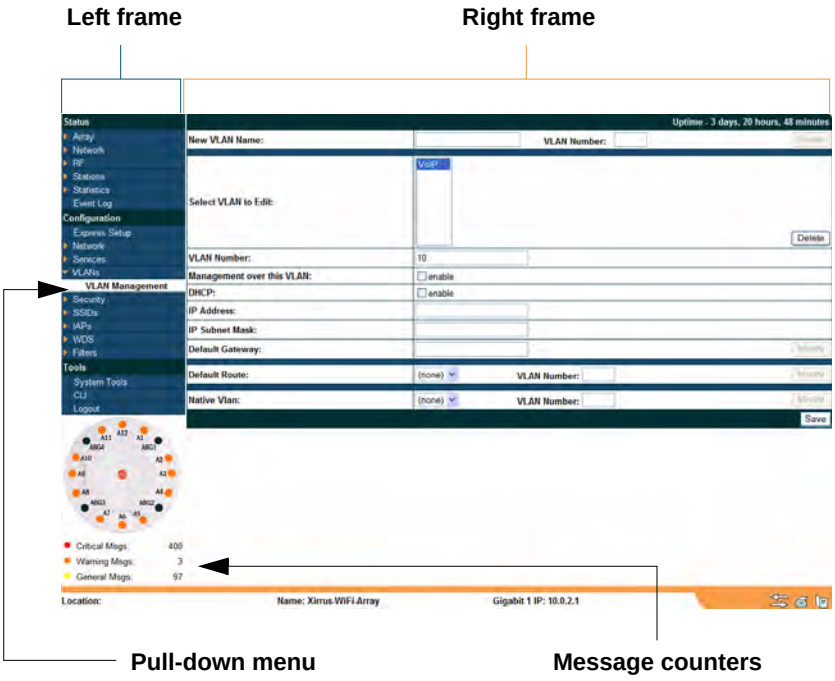


Figure 48. WMI: Frames

The right frame contains the status information or configuration parameters for the Wi-Fi Array. This is where you review the Array's current status and activity or input data (if you want to make changes).

Status Bar

At the bottom of each window you will find a status bar containing information about the Wi-Fi Array, including:

- Location—displays the location information assigned to the unit.
- Host name—the host name assigned to this unit.
- Network interface IP address—the IP address of the network interface that is currently being used.

Also included in the status bar is a **Feedback** button, a **Print** button and a **Help** button.

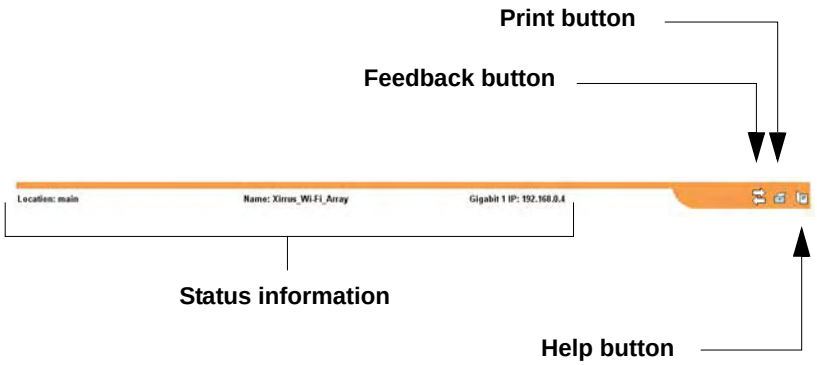


Figure 49. WMI: Status Bar

- Click on the **Feedback** button to generate a Web page that allows you to submit your comments to Xirrus, Inc. You can also access the feedback page at http://www.xirrus.com/public/feedback/. Refer to Figure 50 on page 88 to see a sample of the feedback form.
- Click on the **Print** button to send a print file of the active window to your local printer.
- Click on the **Help** button to access the Array's online help system.

Submitting Your Comments

When submitting comments via the Feedback button, ensure that you provide as much detail as possible, including your contact information, the product model

number that the comment relates to, and the ArrayOS software version (if known). When finished, click on the **Submit** button to submit your comment.

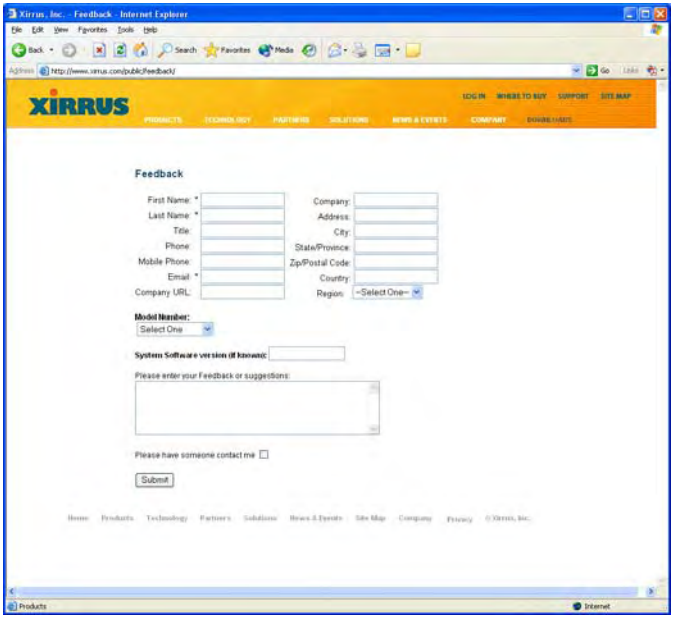


Figure 50. Feedback Form

Logging In

Use this procedure to log in to the WMI via your Web browser.

1. Establish a network connection and open your Web browser.
2. Connect to the Wi-Fi Array via its default IP address (10.0.2.1 for both Gigabit 1 and Gigabit 2 Ethernet ports) or via a DHCP assigned IP address.
3. To log in to the Array's Web Management Interface, enter **admin** when prompted for a user name and password.

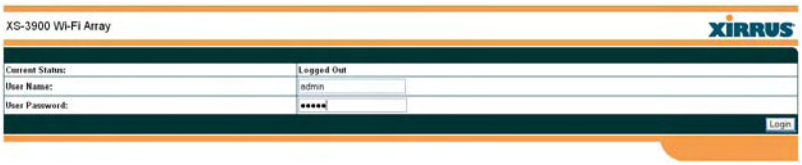


Figure 51. Logging In to the Wi-Fi Array

Applying Configuration Changes

When you have defined all your settings in any WMI configuration window, you must click on the **Apply** button for the changes to take effect in the current session, or click on the **Save** button to apply changes to this session and write your changes, so they will be preserved after a reboot.

Character Restrictions

When inputting strings in the WMI (for example, assigning SSIDs, host name, password, etc.), use only common alphanumeric characters. Do not use any of the following characters:

& < > ' " / \

See Also

Key Features and Benefits
Wi-Fi Array Product Overview

Viewing Status on the Wi-Fi Array

These windows provide status information and statistics for your Array using the product's embedded Web Management Interface (WMI). You cannot make configuration changes to your Array from these windows. The following topics have been organized into functional areas that reflect the flow and content of the Status section of the navigation tree in the left frame of the WMI.

- **"Array Status Windows" on page 91**
- **"Network Status Windows" on page 98**
- **"RF Monitor Windows" on page 104**
- **"Station Status Windows" on page 111**
- **"Statistics Windows" on page 124**
- **"System Log Window" on page 132**

Configuration and Tools windows are not discussed here. For information on these windows, please see:

- **"Configuring the Wi-Fi Array" on page 133**
- **"Using Tools on the Wi-Fi Array" on page 239**

Array Status Windows

The following Array Status windows are available:

- **Array Summary**—displays information on the configuration of all Array interfaces, including IAPs.
- **Array Information**—provides version/serial number information for all Array components.
- **Array Configuration**—shows all configuration information for the Array in text format.

Array Summary

This is a status only window that provides a snapshot of the global configuration settings for all Wi-Fi Array network interfaces and IAPs. You must go to the appropriate configuration window to make changes to any of the settings displayed here—configuration changes cannot be made from this window. Clicking on an interface or IAP will take you to the proper window for making configuration changes.

Figure 52. Array Summary

Content of the Array Summary Window

The Array Summary window is sub-divided into the **Ethernet Interfaces** section and the **Integrated Access Points** (radio) section, providing you with the following information:

- **Ethernet Interfaces Section**
  This section provides information about network interface devices. To make configuration changes to these devices, go to "Network Interfaces" on page 141.
  - **Interface**: Lists the network interfaces that are available on the Array (10/100 Ethernet 0, Gigabit Ethernet 1 and Gigabit Ethernet 2).
  - **Status**: Shows the current state of each interface, either enabled or disabled.
  - **Link**: Shows whether the link on this interface is up or down.
  - **DHCP**: Shows whether DHCP on this port is enabled or disabled.
  - **IP Address**: Shows the current IP address assigned to each network interface device.
  - **Subnet Mask**: Shows the subnet mask, which defines the number of IP addresses that are available on the routed subnet where the Array is located.
  - **Gateway**: Shows the IP address of the router that the Array uses to transmit data to other networks.
- **Integrated Access Points Section**
  This section provides information about the Integrated Access Points (IAPs) that are contained within the Array. How many IAPs are listed depends on which product model you are using (16 IAPs for the XN16, 8 IAPs for the XN8, and 4 IAPs for the XN4). To make configuration changes to these IAPs, go to "IAP Settings" on page 204.
  - **IAP**: Lists the IAPs that are available on the Array.
  - **State**: Shows the current state of each IAP, either up or down. IAPs that are down are shown in RED. Figure 53 shows an example where IAP **a3** is down.

Integrated Access Points										
IAP	State	Channel	Antenna	Cell Size	TX Power	RX Threshold	Stations	WDS Link	MAC Address / BSSID	Description
abg1	up	11 auto	int-dir	max	20	-90	1		00:0f:7d:03:6b:21	
abg2	up	monitor	int-omni	manual	20	-95	0		00:0f:7d:03:6b:61	
abg3	up	1 auto	int-dir	max	20	-90	0		00:0f:7d:03:6a:a1	
abg4	up	6	int-dir	max	20	-90	0		00:0f:7d:03:6a:e1	
a1	up	36	int-dir	max	20	-90	0		00:0f:7d:03:6b:11	
a2	up	153 auto	int-dir	max	20	-90	0		00:0f:7d:03:6b:31	
a3	down	36	int-dir	max	20	-90	0		00:0f:7d:03:6b:41	
a4	up	44 auto	int-dir	max	20	-90	0		00:0f:7d:03:6b:51	
a5	up	161 manual	int-dir	max	20	-90	0		00:0f:7d:03:6b:71	
a6	down	40	int-dir	max	20	-90	0		00:0f:7d:03:6a:81	
a7	up	149 auto	int-dir	max	20	-90	0		00:0f:7d:03:6a:91	
a8	up	40 auto	int-dir	max	20	-90	0		00:0f:7d:03:6a:b1	

Figure 53. Disabled IAP (Partial View)

- **Channel**: Shows which channel each IAP is using, and the channel setting. To avoid co-channel interference, adjacent radios should not be using adjacent channels. To make channel selections for a specific IAP, go to "IAP Settings" on page 204.
- **Antenna**: Shows which antenna is being used by each IAP.
- **Cell Size**: Indicates which cell size setting is currently active for each IAP—small, medium, large, max, automatic, or manually defined by you. The cell size of an IAP is a function of its transmit power and determines the IAP's overall coverage. To define cell sizes, go to "IAP Settings" on page 204. For additional information about cell sizes and the importance of planning for and defining the optimum cell sizes for your Array, go to "Coverage and Capacity Planning" on page 32.

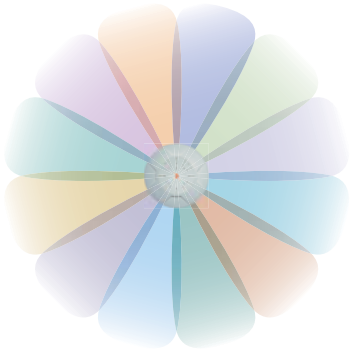


Figure 54. IAP Cells

- **Tx Power**: Shows the transit power for each IAP.
- **Rx Threshold**: Shows the receive threshold for each IAP.
- **Stations**: Informs you how many client stations are currently associated with each IAP. The high-capacity XN16 can handle up to 64 concurrent users per individual IAP (1024 users per Array, or 960 when the monitor **abg2** is enabled).
- **WDS Link**: The WDS Link on this radio (if any). See "WDS" on page 229.
- **MAC Address/BSSID**: Shows the MAC address for each IAP.
- **Description**: The description (if any) that you set for this IAP.

Array Information

This is a status only window that shows you the current firmware versions utilized by the Array, the serial numbers assigned to each module, and MAC addresses.

You cannot make configuration changes in this window, but if you are experiencing issues with network services, you may want to print the content of this window for your records.

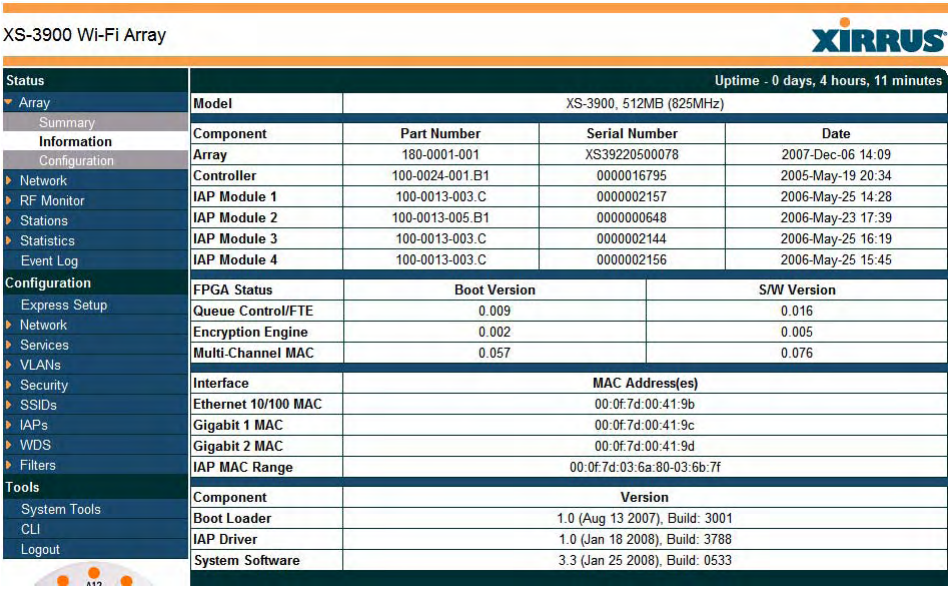


Figure 55. Array Information

Array Configuration

This is a status only window that allows you to display the configuration settings assigned to the Array, based on the following filter options:

- **Running**—displays the current configuration (the one running now).
- **Saved**—displays the saved configuration from this session.
- **Lastboot**—displays the configuration as it was after the last reboot.

- **Factory**—displays the configuration established at the factory.

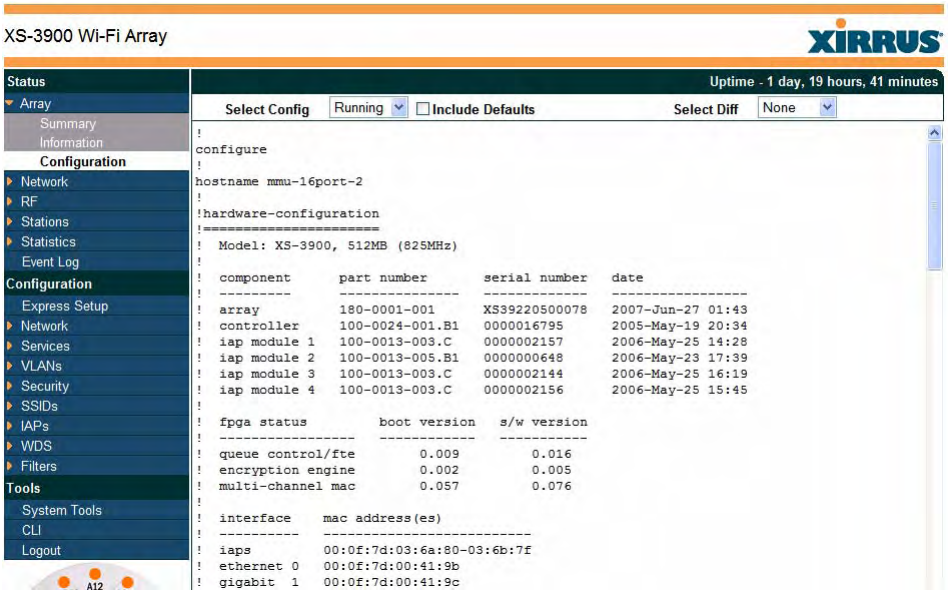


Figure 56. Show Configuration

If you want to see just the differences between the Running, Saved, Lastboot, and Factory configurations, you can do this by choosing a configuration option from the **Select Config** pull-down menu then selecting an alternative configuration option from the **Select Diff** pull-down menu.

You also have the option of including the default configuration settings in the output. To do this, choose your configuration then click in the **Include Defaults** check box. If **Include Defaults** is disabled, then only the changes from the default configuration are shown.

Network Status Windows

The following Network Status windows are available:

- **Network Map**—displays information about this Array and neighboring Arrays that have been detected.
- **Spanning Tree Status**—displays the spanning tree status of network links on this Array.
- **Routing Table**—displays information about routing on this Array.
- **DHCP Leases**—displays information about IP addresses (leases) that the Array has allocated to client stations.
- **Connection Tracking/NAT**—lists connections that have been established for client stations.
- **CDP Neighbors**—lists neighboring network devices using Cisco Discovery Protocol.

Network Map

This window offers detailed information about this Array and all neighboring Arrays, including how the Arrays have been set up within your network.

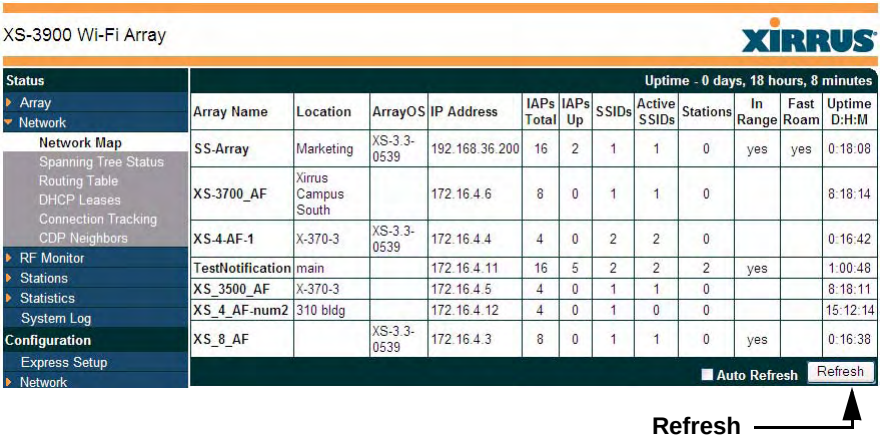


Figure 57. Network Map

You may sort the rows based on any column that has an active column header, indicated when the mouse pointer changes to the hand icon. Click **Refresh** to update the information at any time. Click **Auto Refresh** to instruct the Array to refresh this window automatically.

Content of the Network Map Window

The network map includes the following status information for each Array:

- **Array Name**: The host name assigned to the Array. To establish the host name, go to "Express Setup" on page 134.
- **Location**: The location assigned to the Array. To establish the location information, go to "Express Setup" on page 134.
- **Array OS**: The software version running on the Array.
- **IP Address**: The Array's IP address. If DHCP is enabled, the Array's IP address is assigned by the DHCP server. If DHCP is disabled, you must assign a static IP address. To enable DHCP or to assign a static IP address for the Array, go to "Express Setup" on page 134.
- **IAPs Total**: The number of IAPs on the Array.
- **IAPs Up**: Informs you how many IAPs are currently up and running. To enable or disable all IAPs, go to "Express Setup" on page 134. To enable or disable individual IAPs, go to "IAP Settings" on page 204.
- **SSIDs**: Informs you how many SSIDs have been assigned for the Array. To assign an SSID, go to "SSID Management" on page 189.
- **Active SSIDs**: Informs you how many SSIDs are enabled. To enable or disable SSIDs, go to "SSID Management" on page 189.
- **Stations**: Informs you how many stations are associated to the Array. To associate (or disassociate) a station, go to "Stations" on page 112.
- **In Range**: Informs you whether the Array is within wireless range of another Wi-Fi Array.
- **Fast Roam**: Informs you whether or not the Xirrus fast roaming feature is enabled. This feature utilizes the Xirrus Roaming Protocol (XRP) ensuring fast and seamless roaming capabilities between IAPs or Arrays at both

Layer 2 and Layer 3. To enable or disable fast roaming, go to "Global Settings (IAP)" on page 209.

- **Uptime (D:H:M)**: Informs you how long the Array has been up and running (in Days, Hours and Minutes).

Spanning Tree Status

Multiple active paths between stations can cause loops in the network. If a loop exists in the network topology, the potential exists for the duplication of messages. The spanning tree protocol is a link management protocol that provides path redundancy while preventing undesirable loops. For a wireless network to function properly, only one active path can exist between two stations.

To facilitate path redundancy, the spanning tree protocol defines a tree that spans all stations in the network and forces certain redundant data paths into a standby (blocked) state. If one segment in the spanning tree becomes unreachable, the spanning tree algorithm reconfigures the network topology and reestablishes the link by activating the standby path. The spanning tree function is transparent to client stations.

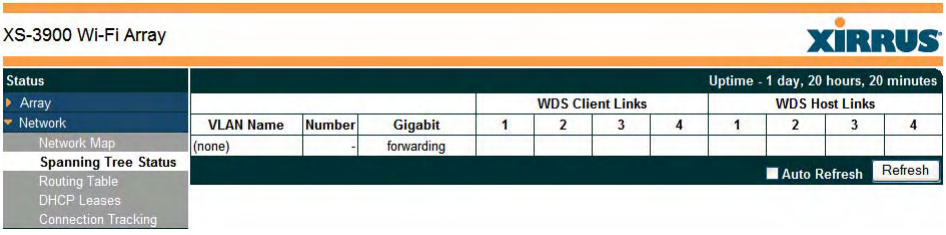


Figure 58. Spanning Tree Status

This window shows the spanning tree status (forwarding or blocked) for path segments that terminate on this Array. You may sort the rows based on the **VLAN Name** or **Number** columns by clicking the column header. Click **Refresh** to update the information at any time. Click **Auto Refresh** to instruct the Array to refresh this window automatically.

See Also

DNS Settings

Network
Network Interfaces
Network Statistics
Network Status Windows

Routing Table

This status-only window lists the entries in the Array's routing table. The table provides the Array with instructions for sending each packet to its next hop on its route across the network.

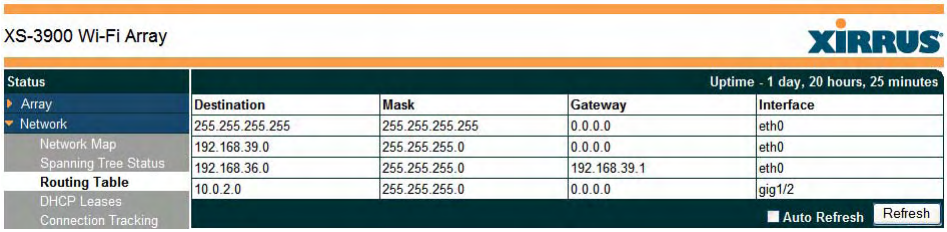


Figure 59. Routing Table

See Also

VLANs
Configuring VLANs on an Open SSID

DHCP Leases

This status-only window lists the IP addresses (leases) that the Array has allocated to client stations. For each, it shows the IP address assigned from one of the defined DHCP pools, and the MAC address and host name of the client station. The start and end time of the lease show how long the allocation is valid. The same IP address is normally renewed at the expiration of the current lease.

Figure 60. DHCP Leases

See Also

DHCP Server

Connection Tracking/NAT

This status-only window lists the session connections that have been created on behalf of clients. This table may also be used to view information about current NAT sessions.

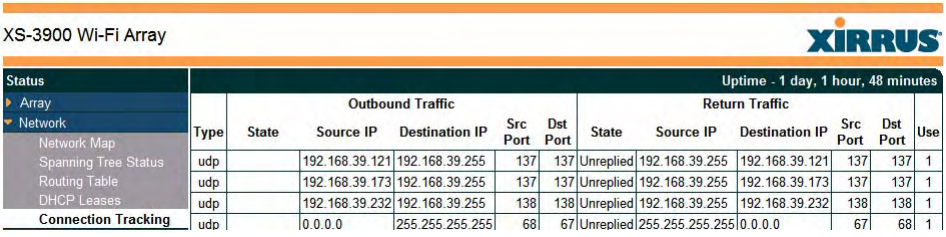


Figure 61. Connection Tracking

You may sort the rows based on any column that has an active column header, indicated when the mouse pointer changes to the hand icon. Click **Refresh** to

update the information at any time. Click **Auto Refresh** to instruct the Array to refresh this window automatically.

See Also

Filters

CDP Neighbors

This status-only window lists devices on the Array's network that support the Cisco Discovery Protocol (CDP). The Array performs discovery on the network on an ongoing basis. This list shows the devices that have been discovered—Cisco devices and other devices on the network that have CDP running. For each, it shows the device's host name, IP address, manufacturer and model name, the device interface that is connected to the network (i.e., the port that was discovered), and the network capabilities of the device (switch, router, supported protocols, etc.).

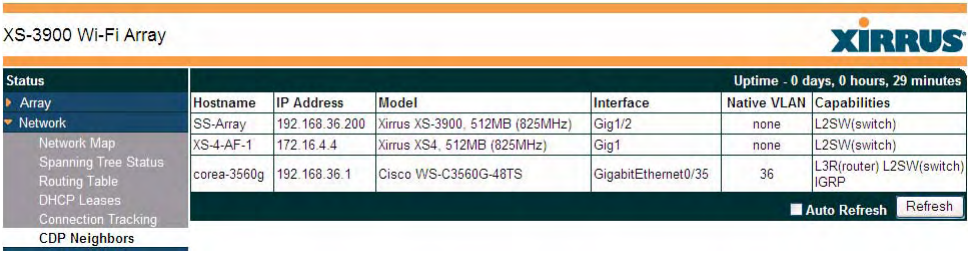


Figure 62. CDP Neighbors

CDP must be enabled on the Array in order to gather and display this information. See "CDP Settings" on page 149.

RF Monitor Windows

Every Wi-Fi Array includes an integrated RF spectrum analyzer as a standard feature. The spectrum analyzer allows you to characterize the RF environment by monitoring throughput, signal, noise, errors, and interference levels continually per channel. This capability uses the built-in threat-sensor radio **abg2**. The associated software is part of the ArrayOS.

The following RF Status windows are available:

- **IAPs**—displays current statistics and RF measurements for each of the Array's IAPs.
- **Spectrum Analyzer**—displays current statistics and RF measurements for each of the Array's channels.
- **Intrusion Detection**—displays rogue APs that have been detected by the Array.

IAPs

The RF Monitor—IAPs window displays traffic statistics and RF readings observed by each Array IAP (radio). Note that the data is an instantaneous snapshot for the IAP—it is not an average or a cumulative total.

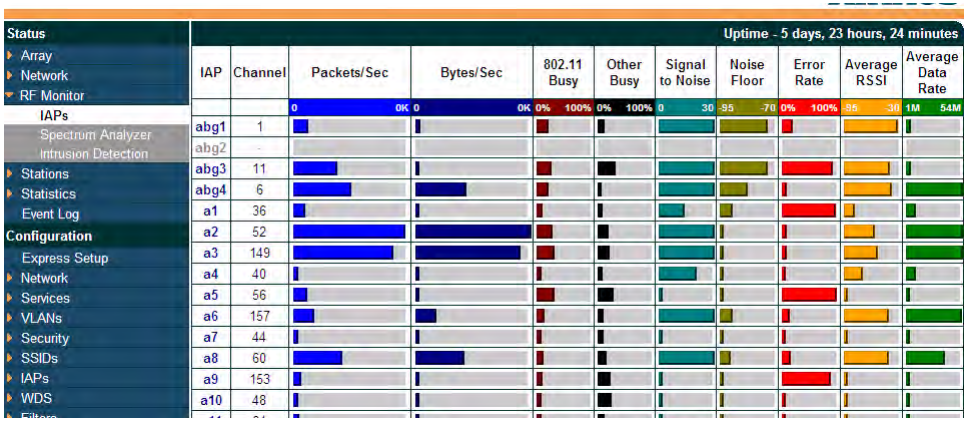


Figure 63. RF Monitor—IAPs

Figure 63 presents the data as a graphical display, enabled by selecting the **Graph** checkbox on the lower left. If this option is not selected, data is presented as a numerical table. You may sort the rows based on any column that has an active column header, indicated when the mouse pointer changes to the hand icon. Click **Refresh** to update the information at any time. Click **Auto Refresh** to instruct the Array to refresh this window automatically.

Spectrum Analyzer

*The RF measurements for this feature are obtained by IAP **abg2**, which **must** be set to **monitor** mode for any data to be available. See "IAP Settings" on page 204.*

Spectrum analysis on Wi-Fi Arrays is a distributed capability that automatically covers the entire Wi-Fi network, since a sensor is present in every unit. Arrays monitor the network 24/7 and analyze interference anywhere in the network from your desk. There's no need to walk around with a device as with traditional spectrum analyzers, thus you don't have to be in the right place to find outside sources that may cause network problems or pose a security threat. The Array monitors all 802.11 radio bands (a/b/g), not just those currently used for data transmission.

The RF Spectrum Analyzer window displays instantaneous traffic statistics and RF readings for all channels, as measured by the Array's **abg2** radio. This differs from the RF Monitor-IAPs window, which displays values measured by each IAP radio for its current assigned channel. For the spectrum analyzer, the abg2 radio is in a listen-only mode, scanning across all Wi-Fi channels. Each channel is scanned in sequence, for a 250 millisecond interval per channel. The spectrum analyzer window presents the data as a graphical display of vertical bar graphs for each statistic as shown in Figure 64 (the default presentation), or horizontally as bar graphs or numerical RF measurements. The measurements displayed are explained in "Spectrum Analyzer Measurements" on page 108.

To display horizontal bar graphs, click the **Rotate** checkbox at the bottom of the data window. In this rotated view, if you wish to view data as a numerical table, click the **Text** checkbox. The text option is only available in the rotated view. You may sort the rows based on any column that has an active column header, indicated when the mouse pointer changes to the hand icon. Sorting is only available in the rotated view.

At the bottom left of the frame, you may select whether to display only 802.11bgn channels, 802.11an channels as shown, or both (both is the default). Note that the data is an instantaneous snapshot—it is not an average or a cumulative total.

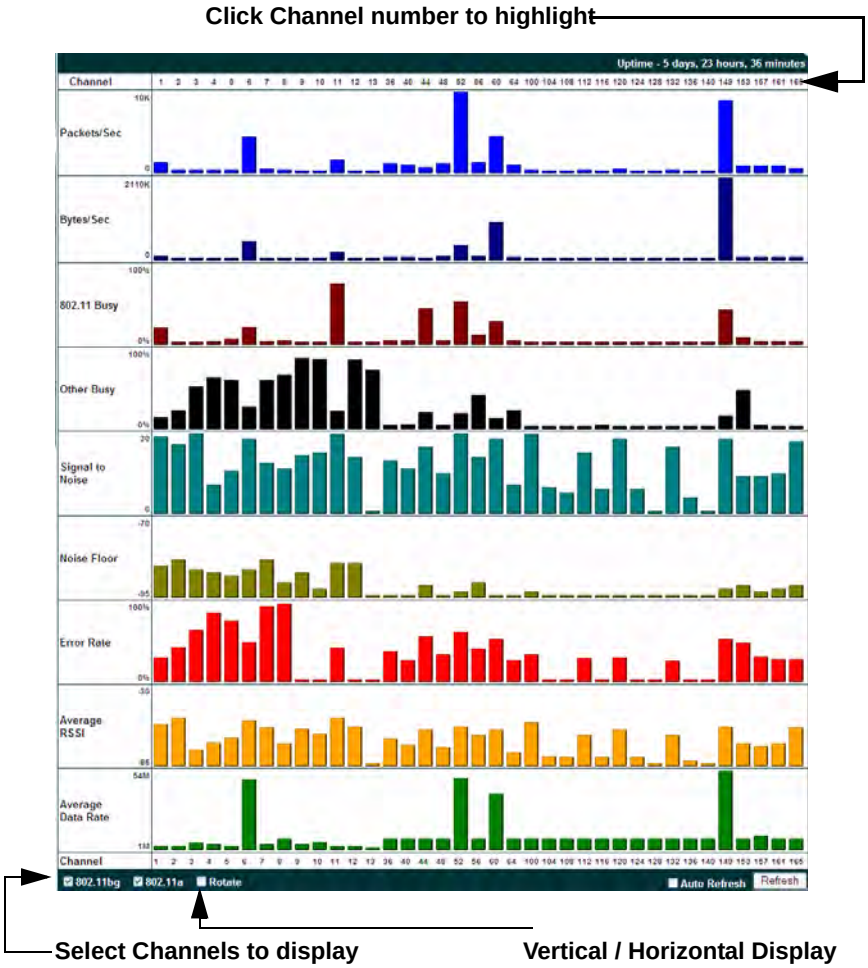


Figure 64. RF Spectrum Analyzer

As an aid to viewing data for a particular channel, click the channel number. The channel will be highlighted down the page (or across the page for a rotated view, in both text and graph modes). Click additional channels to highlight them for easy comparison. To remove the highlighting from a channel, click the channel number again. Click **Refresh** to update the information at any time. Click **Auto Refresh** to instruct the Array to refresh this window automatically.

Spectrum Analyzer Measurements

The spectrum analyzer displays the following information:

- **Packets/Sec:** Total number of Wi-Fi packets per second on the channel, both valid and errored packets.
- **Bytes/Sec:** Total number of Wi-Fi bytes per second on the channel, valid packets only.
- **802.11 Busy:** Percentage of time that 802.11 activity is seen on the channel.
- **Other Busy:** Percentage of time that the channel is unavailable due to non-802.11 activity.

  The total busy time (802.11 Busy plus Other Busy) will never total more than 100%. The remaining time (100% minus total busy time) is quiet time—the time that no activity was seen on the channel.
- **Signal to Noise:** Average SNR (signal to noise ratio) seen on the channel, calculated from the signal seen on valid 802.11 packets less the noise floor level. A dash value "-" means no SNR data was available for the interval.
- **Noise Floor:** Average noise floor reading seen on the channel (ambient noise). A dash value "-" means no noise data was available for the interval.
- **Error Rate:** Percentage of the total number of Wi-Fi packets seen on the channel that have CRC errors. The Error rate percentage may be high on some channels since the monitor radio is set to receive at a very sensitive level, enabling it to hear packets from devices at far distances.
- **Average RSSI:** Average RSSI level seen on 802.11 packets received on the channel. A dash value "-" means no RSSI data was available for the interval.
- **Average Data Rate:** Average data rate over time (per byte, not per packet) seen on 802.11 packets received on the channel. A dash value "-" means no data rate information was available for the interval. A higher date rate (above 6 Mbps) typically indicates user data traffic on the channel. Otherwise, the data rate reflects control packets at the lower basic rates.

Intrusion Detection

This window displays all detected access points, according to the category you select from the drop-down list at the top—either Unknown, Known or Approved. This includes ad hoc access points (station-to-station connections). You can sort the results based on the following parameters by clicking the desired column header:

- SSID
- BSSID
- Manufacturer
- Channel
- RSSI
- Security
- Type
- Discovered
- Last Active

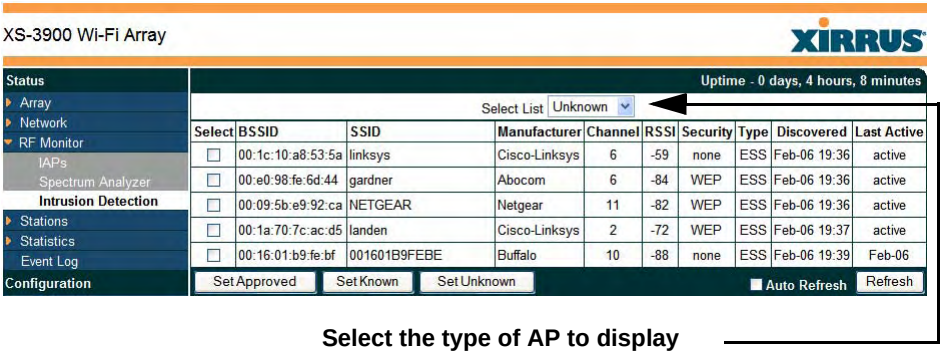


Figure 65. Intrusion Detection/Rogue AP List

The Intrusion Detection window provides the easiest method for designating rogue APs as Known. Approved, or Unknown. Choose one or more APs using the checkbox in the **Select** column, then set whether they are Approved, Known, or Unknown using the buttons on the lower left. (Figure 66)

☑	dbr	00:0f:7d:64:20:00	Xirrus	104	-88	none	ESS	Dec-11	01:50
☑	11n_eng_proto	00:0f:7d:25:20:00	Xirrus	104	-81	none	ESS	Dec-11	02:04
☑	11n_eng_proto	00:0f:7d:25:20:10	Xirrus	112	-85	none	ESS	Dec-11	02:04
☑	11n_eng_proto	00:0f:7d:25:20:30	Xirrus	128	-87	none	ESS	Dec-11	02:04
☐	bsc-dot11n	00:0f:7d:00:20:00	Xirrus	104	-90	none	ESS	Dec-11	02:12
☑	dbr	00:0f:7d:82:20:00	Xirrus	104	-87	none	ESS	Dec-11	02:23
☐	(empty)	00:0f:7d:04:a2:c0	Xirrus	11	-84	AES+TKIP+PSK	ESS	Dec-11	02:24
☐	(empty)	00:0f:7d:04:a2:c1	Xirrus	11	-83	none	ESS	Dec-11	02:24
☐	test	00:09:5b:68:61:12	Netgear	3	-82	none	ESS	Dec-11	02:27
☑	dbr	00:0f:7d:c5:20:00	Xirrus	104	-88	none	ESS	Dec-11	02:33
☐	dbr	00:0f:7d:0f:20:00	Xirrus	104	-88	none	ESS	Dec-11	02:43

Set Approved | Set Known | Set Unknown | Auto Refresh | Refresh

Figure 66. Categorizing APs

You can refresh the list at any time by clicking on the **Refresh** button, or click in the **Auto Refresh** check box to instruct the Array to refresh the list automatically.

See Also

Network Map
Rogue Control List
SSIDs
SSID Management

Station Status Windows

The following Station Status windows are available:

- **Stations**—this list describes all stations associated to the Array.
- **Location Map**—displays a map showing the approximate locations of all stations associated to the array.
- **RSSI**—for each associated station, this displays the Received Signal Strength Indicator at each of the Array's IAPs.
- **Signal-to-Noise Ratio (SNR)**—for each associated station, this displays the SNR at each of the Array's IAPs.
- **Noise Floor**—for each associated station, this displays the ambient noise (silence) value at each of the Array's IAPs.

Stations

This status-only window shows client stations currently visible to the Array. You may choose to view only stations that have associated to the Array, or only stations that are not associated, or both, by selecting the appropriate checkboxes above the list. The list shows the MAC address of each station, its manufacturer, its IP address, its NetBIOS name, its VLAN, the IAP that the station is associated with, the SSID used for the association, transmit and receive rates, the RSSI for each station, and how long each association has been active (up time).

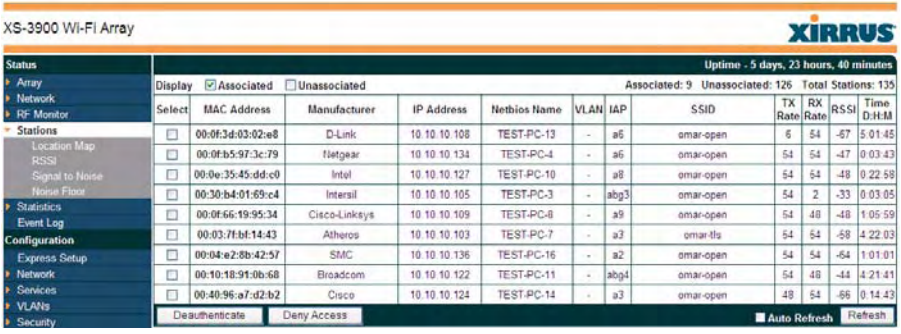


Figure 67. Stations

You may sort the rows based on any column that has an active column header, indicated when the mouse pointer changes to the hand icon. Click again to reverse the sort order. You may select a specific station and perform one of the following actions by clicking the associated button:

- **Deny Access:** Sends a de-authentication frame to the selected station and explicitly denies it access by adding its MAC address to the Deny List in the Access Control List window. To permit access again, go to "Access Control List" on page 172 and delete the station from the **Deny** list.
- **Deauthenticate:** Sends a de-authentication frame to the selected station. The station may re-authenticate.

Click on the **Refresh** button to refresh the station list, or click in the **Auto Refresh** check box to instruct the Array to refresh this window automatically.

See Also

Access Control List
Station Status Windows

Location Map

The Location Map shows the approximate locations of stations relative to this Array. You may display stations associated to this Array, unassociated stations (shown in gray), or both. The station count is shown on the left, above the map. You may also choose to display 802.11an stations (shown in orange) or 802.11bgn stations (shown in green), or both.

The map and Array are shown as if you were looking down on the Array from above, say from a skylight on the roof. Thus the positions of the radios **abg1** to **abg4** are a mirror image of the way they are typically drawn when looking at the face of the Array. Radios **abg1** to **abg4** are marked (**1** to **4**) on the map to show the orientation of the Array.

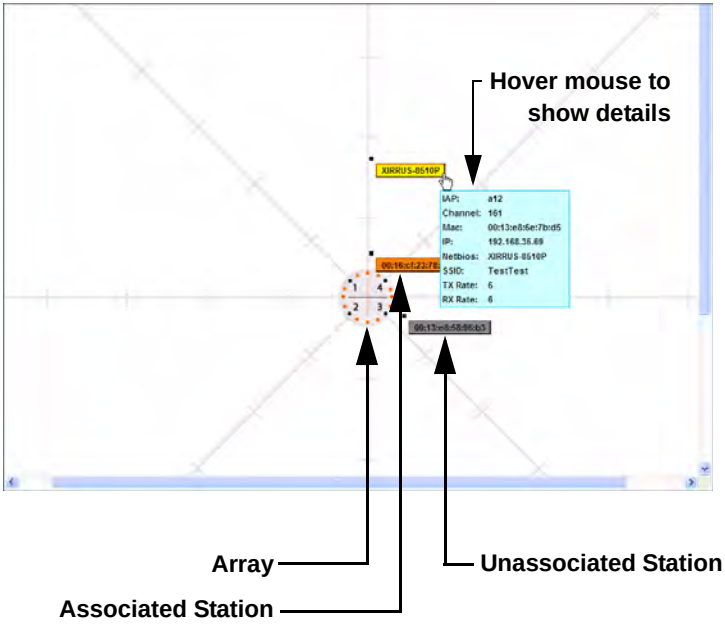


Figure 68. Location Map

A station is identified by its NetBIOS name if known, or else by its IP or MAC address. Hover the mouse over a station to show detailed information. If multiple stations are near each other, they will be displayed slightly offset so that one station does not completely obscure another. You may minimize a station that is not of interest by clicking it. Click it again for normal display. There is also a **Minimize All** button.

You may replace the range-finder background image above with your own custom image of the floorplan of the area served by the Array.

Controls and items displayed on the Location Map window

The controls for the Location Map are all at the bottom of the window and take up a fair amount of width. If some of the controls shown in Figure 69 are not visible, resize your browser window to be wider until all of the controls appear.

Also, the Location Map has its own scroll bars in addition to the browser's scroll bars. If you narrow the browser window, the map's scroll bar may be hidden. Use the browser's bottom scroll bar if you need to move it into view.

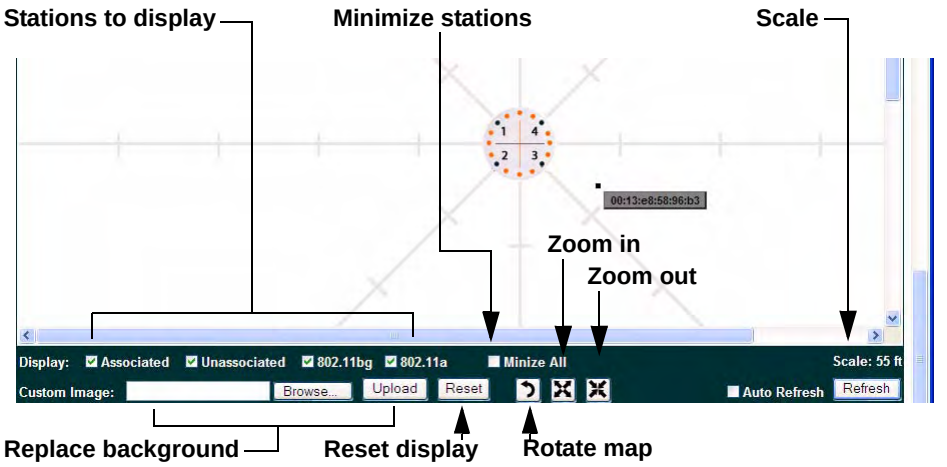


Figure 69. Controls for Location Map

- **Display Associated/Unassociated**: Select whether to display stations that are associated to the Array, stations that are not associated, or both.
- **Display 802.11bgn/802.11an**: Select whether to display 802.11bgn stations, or 802.11an stations, or both.
- **Minimize All**: All stations are shown by default with their NetBIOS name or IP or MAC address. If the map is too cluttered, you can reduce the display for each station to a small rectangle. You may still display detailed information for the station by hovering over it. To enlarge all rectangles, clear the Minimize All checkbox.

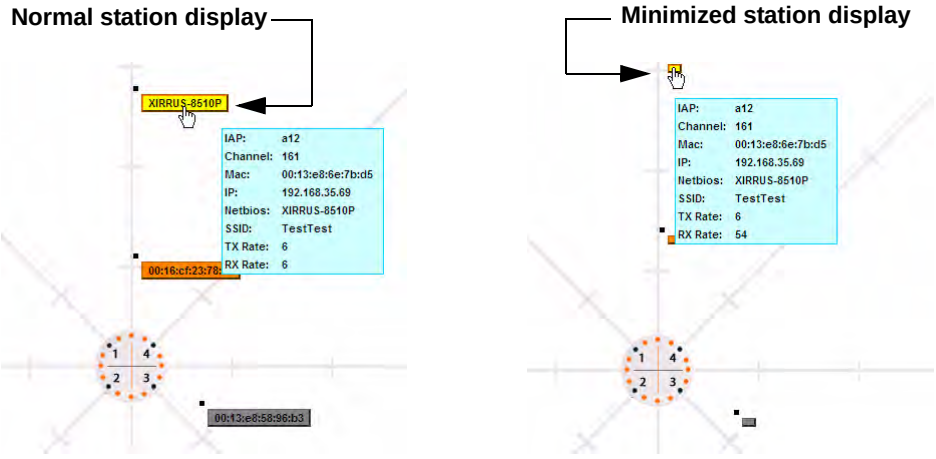


Figure 70. Minimizing stations

- **Scale**: This view-only value shows the approximate distance represented by each hashmark on the default map background. Scale is the rightmost of the items displayed in the control area - you may need to scroll to the right edge to see it.
- **Custom Image**: Use this feature to replace the default background image with your own image of the floor plan of your location. Click the **Browse** button and browse to the desired file on your computer. This may be a .gif, .jpg, .jpeg., .png, .htm, or .html file. The scale of the file should be 100 feet per inch. Then click **Upload** (see below). For more information on

using the custom, image, see "Working with the Custom Image" on page 116.

- **Upload**: After browsing to the desired custom image, click the **Upload** button to install it. The map will be redisplayed with your new background. No hash marks are added to the image display.
- **Reset**: Click this button to restore the map display to the factory settings. All attributes are restored—including the stations selected for display, the scale, the rotation, and the background map.

- **Rotate**: Click this button to rotate the orientation of the entire map. It rotates the map 45° counter-clockwise.

- **Enlarge**: Click this button to enlarge (zoom in on) the map. The displayed **Scale** on the bottom right is updated with the new scale for the map.

- **Reduce**: Click this button to reduce (zoom out on) the map. The displayed **Scale** on the bottom right is updated with the new scale for the map
- **Auto Refresh:** Instructs the Array to refresh this window automatically.
- **Refresh:** Updates the stations displayed.

See Also

Access Control List
Station Status Windows

Working with the Custom Image

After you have uploaded a custom image (see **Custom Image** and **Upload** in "Controls and items displayed on the Location Map window" on page 114), you should move the display of the Array on your map to correspond with its actual location at your site. The Location Map window provides a special set of controls for moving the location of the Array. These controls are displayed on the upper right corner of the map (Figure 71). The location controls only appear when you are using a custom image for you background. You will not see them if you are using the default map background.

To move the Array on the map in a particular direction, click an arrow for the desired direction on the location controls. The inner arrows move the Array by

small steps; the outer arrows move it by larger steps. The arrows only work when you position the mouse directly over them—make sure you see the hand icon. If you need to return the Array to the center of the map, click the center of the location controls. When you are done, click the **Apply** button to save the new Array location, as well as the enlarge/reduce/rotate settings. These location settings will persist for the duration of the current WMI session, but not after a reboot (but the custom image will still be used after rebooting—whether or not you click **Apply**).

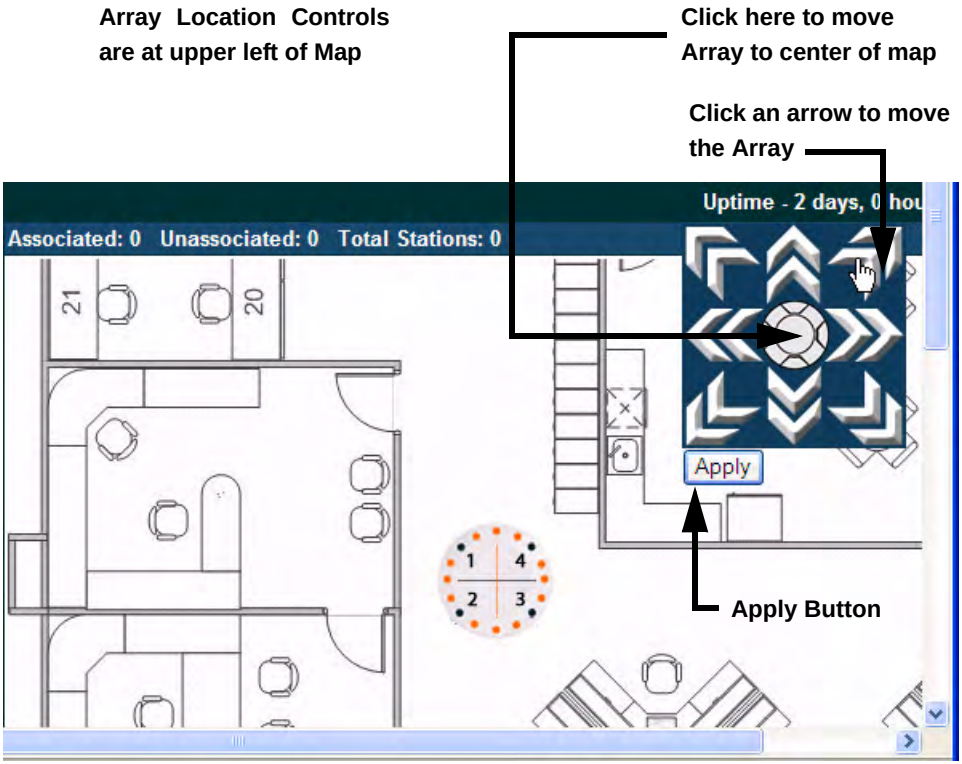


Figure 71. Setting Array location on a Custom Image

RSSI

For each station that is associated to the Array, the RSSI (Received Signal Strength Indicator) window shows the station's RSSI value as measured by each IAP. In other words, the window shows the strength of the station's signal at each radio. You may choose to display **Unassociated Stations** as well with a checkbox at the bottom of the window.

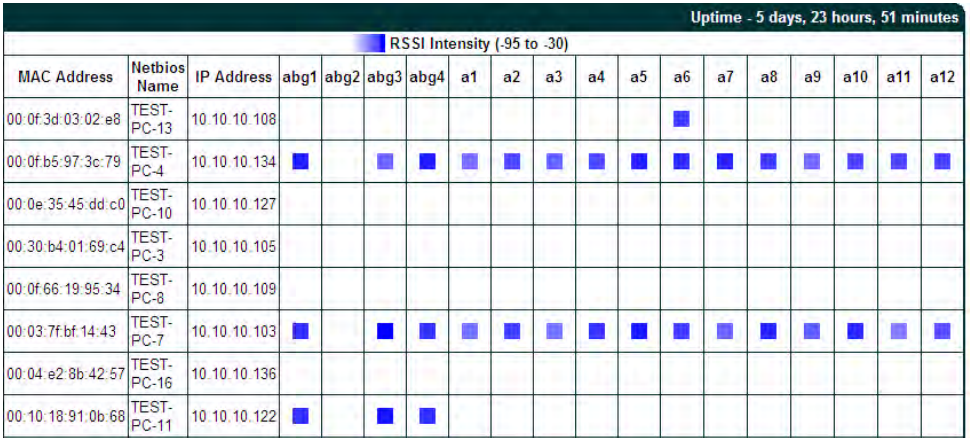


Figure 72. Station RSSI Values

By default, the RSSI is displayed numerically. You may display the relative strength using color if you select **Colorize Intensity**, with the strongest signals indicated by the most intense color. (Figure 72) If you select **Graph**, then the RSSI is shown on a representation of the Array, either colorized or numerically based on your selection. (Figure 73) The stations are listed to the left of the Array—click on a station to show its RSSI values on the Array.

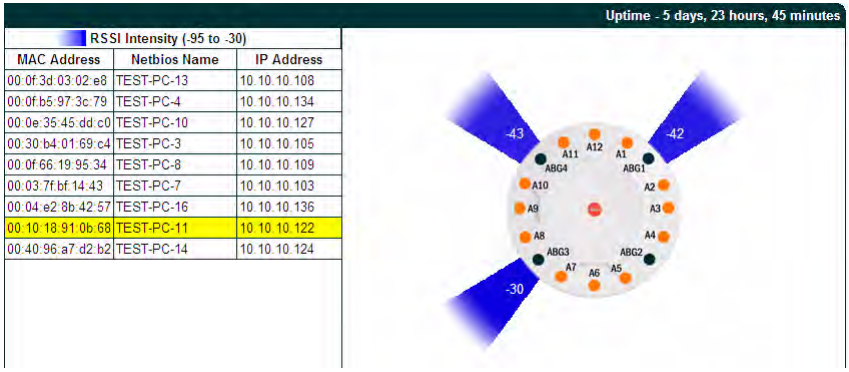


Figure 73. Station RSSI Values—Colorized Graphical View

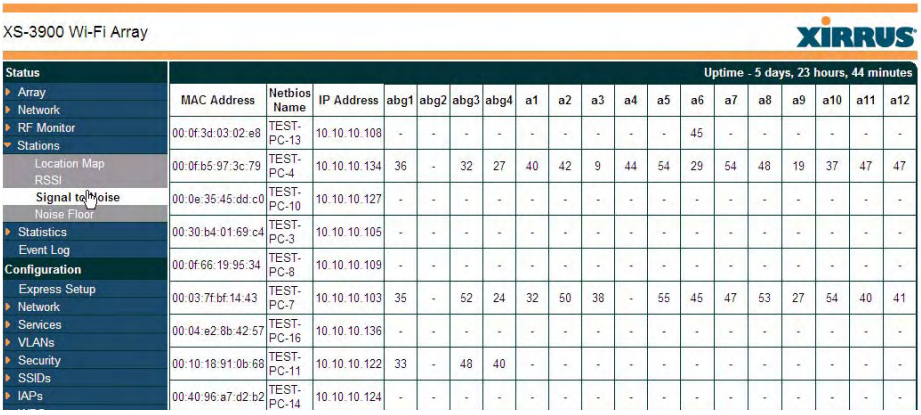
In either graphical or tabular view, you may sort the rows based on any column that has an active column header, indicated when the mouse pointer changes to the hand icon. Click on the **Refresh** button to refresh the station list, or click in the **Auto Refresh** check box to instruct the Array to refresh this window automatically.

See Also

Station Status Windows
RF Monitor Windows

Signal-to-Noise Ratio (SNR)

For each station that is associated to the Array, the Signal-to-Noise Ratio (SNR) window shows the station's SNR value as measured by each IAP. In other words, the window shows the SNR of the station's signal at each IAP radio. The signal-to-noise ratio can be very useful for determining the cause of poor performance at a station. A low value means that action may need to be taken to reduce sources of noise in the environment and/or improve the signal from the station.



MAC Address	Netbios Name	IP Address	abg1	abg2	abg3	abg4	a1	a2	a3	a4	a5	a6	a7	a8	a9	a10	a11	a12
00:0f:3d:03:02:e8	TEST-PC-13	10.10.10.108	-	-	-	-	-	-	-	-	-	45	-	-	-	-	-	-
00:0f:b5:97:3c:79	TEST-PC-4	10.10.10.134	36	-	32	27	40	42	9	44	54	29	54	48	19	37	47	47
00:0e:35:45:dd:c0	TEST-PC-10	10.10.10.127	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
00:30:b4:01:69:c4	TEST-PC-3	10.10.10.105	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
00:0f:66:19:95:34	TEST-PC-8	10.10.10.109	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
00:03:7f:bf:14:43	TEST-PC-7	10.10.10.103	35	-	52	24	32	50	38	-	55	45	47	53	27	54	40	41
00:04:e2:8b:42:57	TEST-PC-16	10.10.10.136	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
00:10:18:91:0b:68	TEST-PC-11	10.10.10.122	33	-	48	40	-	-	-	-	-	-	-	-	-	-	-	-
00:40:96:a7:d2:b2	TEST-PC-14	10.10.10.124	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Figure 74. Station Signal-to-Noise Ratio Values

You may choose to display **Unassociated Stations** as well with a checkbox at the bottom of the window.

By default, the SNR is displayed numerically. (Figure 74) You may display the relative value using color if you select **Colorize Intensity**, with the highest SNR indicated by the most intense color. (Figure 75) If you select **Graph**, then the SNR is shown on a representation of the Array, either colorized or numerically based on your selection. The stations are listed to the left of the Array—click on a station to show its SNR values on the Array.

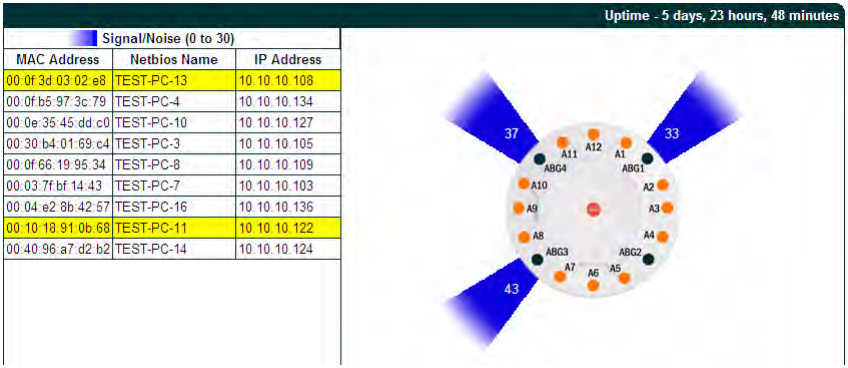


Figure 75. Station SNR Values—Colorized Graphical View

In either graphical or tabular view, you may sort the rows based on any column that has an active column header, indicated when the mouse pointer changes to the hand icon. Click on the **Refresh** button to refresh the station list, or click in the **Auto Refresh** check box to instruct the Array to refresh this window automatically.

See Also

Station Status Windows
RF Monitor Windows

Noise Floor

For each station that is associated to the Array, the Noise Floor window shows the ambient noise affecting a station's signal as measured by each IAP. The noise floor is the RSSI value when the station is not transmitting, sometimes called a Silence value. In other words, the window shows the noise floor of the station's signal at each IAP radio. The noise floor value can be very useful for characterizing the environment of a station to determine the cause of poor performance. A relatively high value means that action may need to be taken to reduce sources of noise in the environment.

Figure 76. Station Noise Floor Values

You may choose to display **Unassociated Stations** as well with a checkbox at the bottom of the window.

By default, the noise floor is displayed numerically. (Figure 76) You may display the relative value using color if you select **Colorize Intensity**, with the highest noise indicated by the most intense color. If you select **Graph**, then the ambient noise is shown on a representation of the Array, either colorized or numerically based on your selection.(Figure 77) The stations are listed to the left of the Array—click on a station to show its values on the Array.

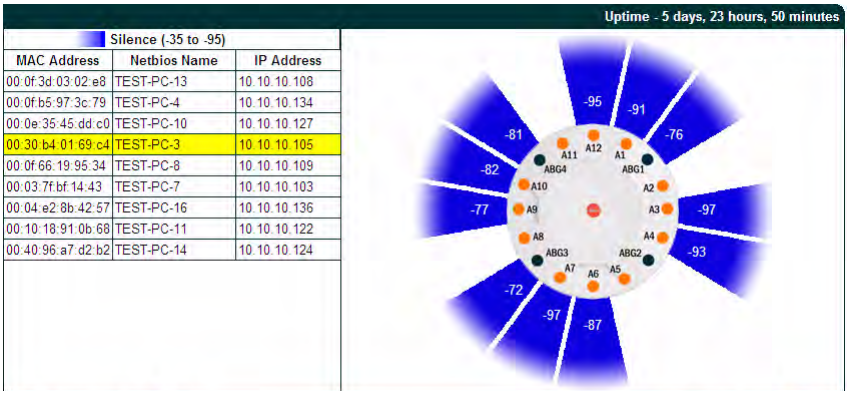


Figure 77. Station Noise Floor Values—Colorized Graphical View

In either graphical or tabular view, you may sort the rows based on any column that has an active column header, indicated when the mouse pointer changes to the hand icon. Click on the **Refresh** button to refresh the station list, or click in the **Auto Refresh** check box to instruct the Array to refresh this window automatically.

See Also

Station Status Windows
RF Monitor Windows

Statistics Windows

The following Array Statistics windows are available:

- **IAP Statistics Summary**—provides an overview of the statistical data associated with all IAPs. Expands to show links for displaying detailed statistics for individual IAPs.
- **Per-IAP Statistics**—provides detailed statistics for an individual IAP.
- **Network Statistics**—displays statistical data associated with each network (Ethernet) interface.
- **VLAN Statistics**—provides statistical data associated with your assigned VLANs.
- **WDS Statistics**—provides statistical data for all WDS client and host links.
- **Filter Statistics**—provides statistical data for all configured filters.
- **Station Statistics**—provides statistical data associated with each station.

IAP Statistics Summary

This is a status only window that provides an overview of the statistical data associated with all IAPs. It also shows the channel used by each IAP. For detailed statistics for a specific IAP, see "Per-IAP Statistics" on page 125. Click the **Unicast Stats Only** checkbox above the statistics to filter the results, or clear the checkbox to show statistics for all wireless traffic.

You can **Refresh** the data (update the window with the latest information) or **Clear** the data (reset all content to zero and begin counting again) at any time by clicking on the appropriate button. You can also click in the **Auto Refresh** check box to instruct the Array to refresh this window automatically.

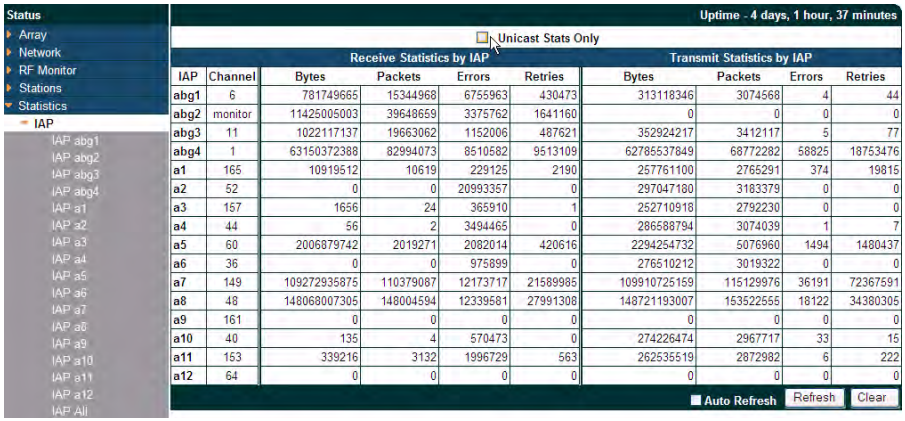


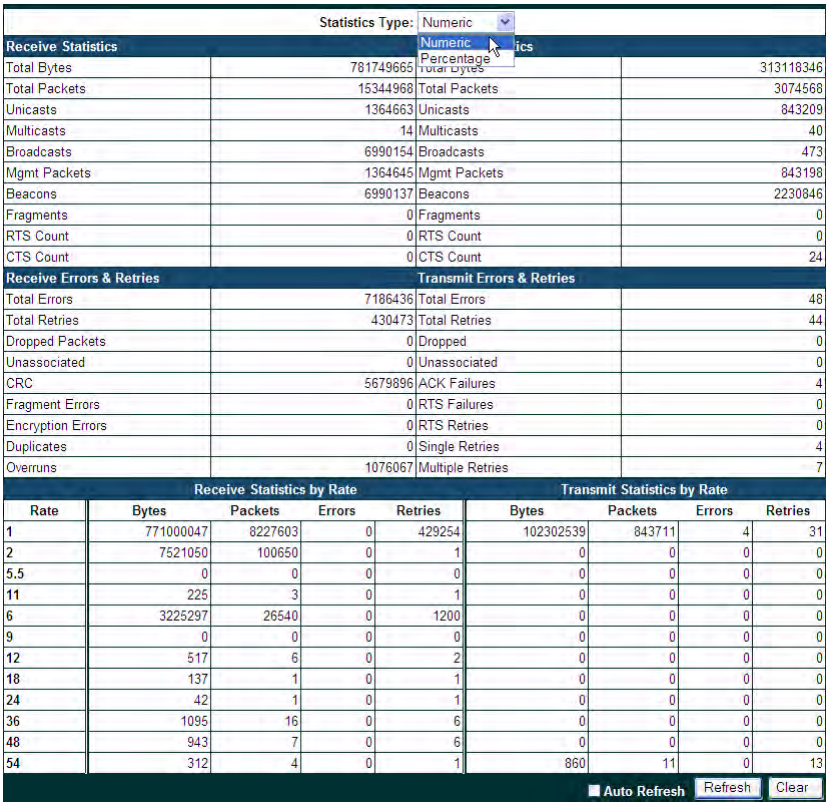
Figure 78. IAP Statistics Summary Page

See Also

System Log Window
Global Settings (IAP)
Global Settings .11an
Global Settings .11bgn
IAPs

Per-IAP Statistics

This is a status only window that provides detailed statistics for the selected IAP. If you click the link for **IAP All** in the left frame, each detailed statistic field will show the sum of that statistic for all IAPs. For a summary of statistics for all IAPs, see "IAP Statistics Summary" on page 124. Use the **Statistics Type** drop-down field above the statistics to select the output format - **Numeric** for raw numbers, or **Percentage** to express each statistic as a percentage of the total at the top of the column.



Statistics Type: Numeric (Numeric / Percentage)

Receive Statistics		Transmit Statistics	
Total Bytes	781749665	Total Bytes	313118346
Total Packets	15344968	Total Packets	3074568
Unicasts	1364663	Unicasts	843209
Multicasts	14	Multicasts	40
Broadcasts	6990154	Broadcasts	473
Mgmt Packets	1364645	Mgmt Packets	843198
Beacons	6990137	Beacons	2230846
Fragments	0	Fragments	0
RTS Count	0	RTS Count	0
CTS Count	0	CTS Count	24
Receive Errors & Retries		**Transmit Errors & Retries**	
Total Errors	7186436	Total Errors	48
Total Retries	430473	Total Retries	44
Dropped Packets	0	Dropped	0
Unassociated	0	Unassociated	0
CRC	5679896	ACK Failures	4
Fragment Errors	0	RTS Failures	0
Encryption Errors	0	RTS Retries	0
Duplicates	0	Single Retries	4
Overruns	1076067	Multiple Retries	7

Receive Statistics by Rate					Transmit Statistics by Rate			
Rate	Bytes	Packets	Errors	Retries	Bytes	Packets	Errors	Retries
1	771000047	8227603	0	429254	102302539	843711	4	31
2	7521050	100650	0	1	0	0	0	0
5.5	0	0	0	0	0	0	0	0
11	225	3	0	1	0	0	0	0
6	3225297	26540	0	1200	0	0	0	0
9	0	0	0	0	0	0	0	0
12	517	6	0	2	0	0	0	0
18	137	1	0	1	0	0	0	0
24	42	1	0	1	0	0	0	0
36	1095	16	0	6	0	0	0	0
48	943	7	0	6	0	0	0	0
54	312	4	0	1	860	11	0	13

Auto Refresh | Refresh | Clear

Figure 79. Individual IAP Statistics Page (for IAP abg1)

You can **Refresh** the data (update the window with the latest information) or **Clear** the data (reset all content to zero and begin counting again) at any time by clicking on the appropriate button. You can also click in the **Auto Refresh** check box to instruct the Array to refresh this window automatically.

See Also

System Log Window
Global Settings (IAP)
Global Settings .11an
Global Settings .11bgn

Network Statistics

This is a status only window that allows you to review statistical data associated with each network (Ethernet) interface and its activity. You can **Refresh** the data (update the window with the latest information) or **Clear** the data (reset all content to zero and begin counting again) at any time by clicking on the appropriate button. You can also click in the **Auto Refresh** check box to instruct the Array to refresh this window automatically. If you are experiencing problems on the Array, you may also want to print this window for your records.

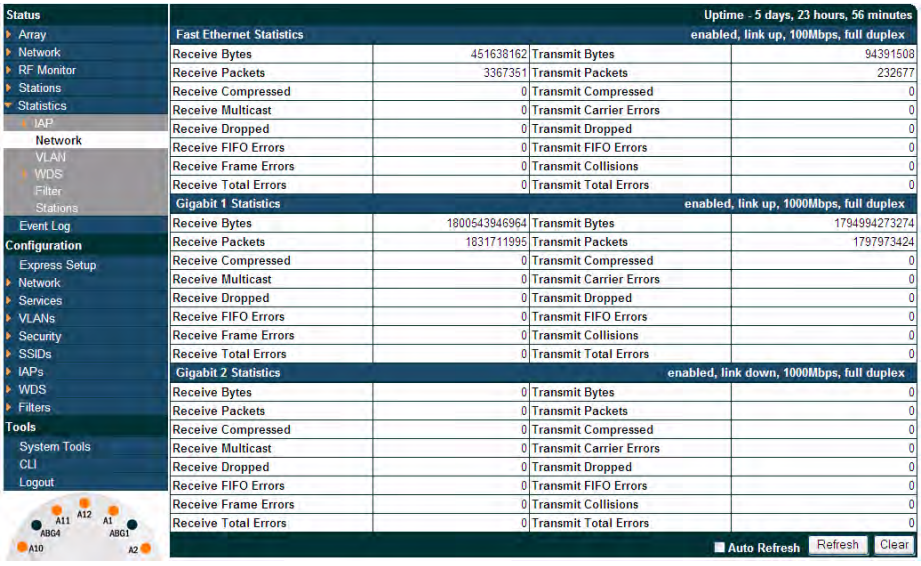


Figure 80. Network Statistics

See Also

DHCP Server
DNS Settings
Network
Network Interfaces

VLAN Statistics

This is a status only window that allows you to review statistical data associated with your assigned VLANs. You can refresh the information that is displayed on this page at any time by clicking on the **Refresh** button, or select the **Auto Refresh** option for this window to refresh automatically. The **Clear All** button at the lower left allows you to clear (zero out) all VLAN statistics.

Figure 81. VLAN Statistics

See Also

VLAN Management
VLANs

WDS Statistics

The main WDS Statistics window provides statistical data for all WDS client and host links. To access data about a specific WDS client or host link, simply click on the desired link in the left frame to access the appropriate window. You can also select to view a sum of the statistics for all client links, all host links, or all links (both client and host links).

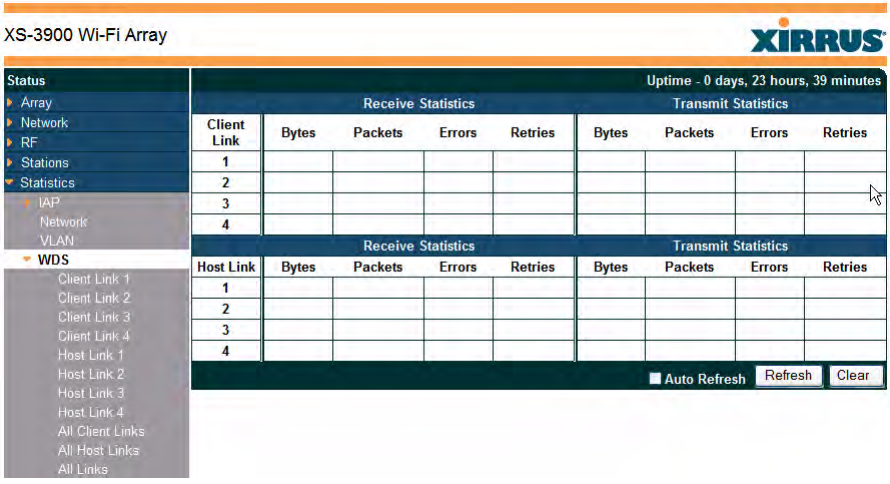


Figure 82. WDS Statistics

See Also

SSID Management
WDS

Filter Statistics

The Filter Statistics window provides statistical data for all configured filters. The name, state (enabled—on or off), and type (allow or deny) of each filter is shown. For enabled filters, this window shows the number of packets and bytes that met the filter criteria. Click on a column header to sort the rows based on that column. Click on a filter name to edit the filter settings.

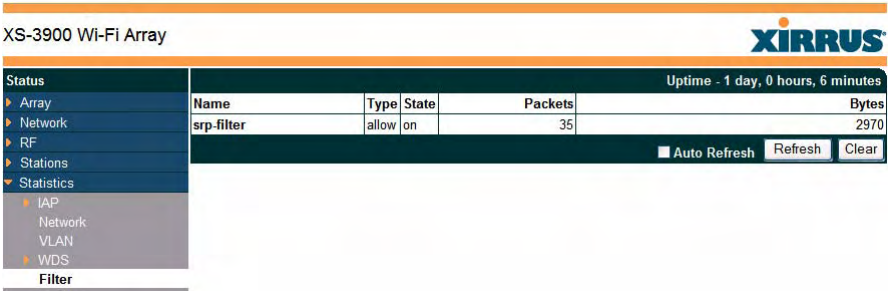


Figure 83. Filter Statistics

See Also

Filters

Station Statistics

This status-only window provides an overview of statistical data for all stations. Stations are listed by MAC address, and Receive and Transmit statistics are summarized for each. For detailed statistics for a specific station, click the desired MAC address in the **Station** column and see "Per-Station Statistics" on page 131.

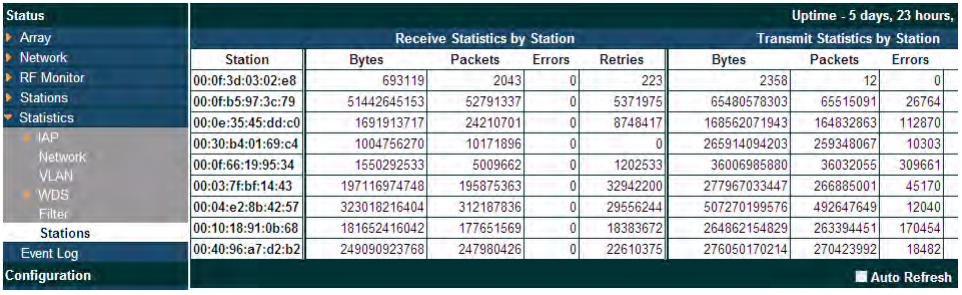


Figure 84. Station Statistics

You can **Refresh** the data (update the window with the latest information) at any time by clicking on the appropriate button. You can also click in the **Auto Refresh** check box to instruct the Array to refresh this window automatically.

Note that you can clear the data for an individual station (see below), but you cannot clear the data for all stations using this window.

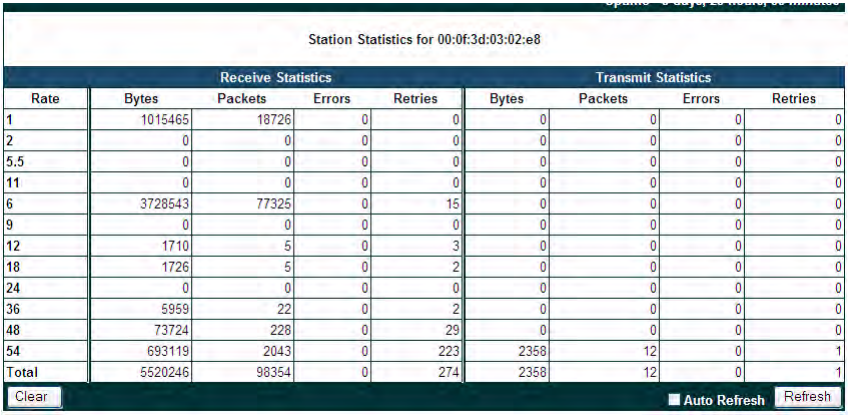
See Also

Per-Station Statistics

Per-Station Statistics

This window provides detailed statistics for the selected station. Receive and Transmit statistics are listed by **Rate**—this is the data rate in Mbps. For a summary of statistics for all stations, see "Station Statistics" on page 130.

You can **Refresh** the data (update the window with the latest information) or **Clear** the data (reset all content to zero and begin counting again) at any time by clicking on the appropriate button. You can also click in the **Auto Refresh** check box to instruct the Array to refresh this window automatically.



Station Statistics for 00:0f:3d:03:02:e8

	Receive Statistics				Transmit Statistics			
Rate	Bytes	Packets	Errors	Retries	Bytes	Packets	Errors	Retries
1	1015465	18726	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0
5.5	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0
6	3728543	77325	0	15	0	0	0	0
9	0	0	0	0	0	0	0	0
12	1710	5	0	3	0	0	0	0
18	1726	5	0	2	0	0	0	0
24	0	0	0	0	0	0	0	0
36	5959	22	0	2	0	0	0	0
48	73724	228	0	29	0	0	0	0
54	693119	2043	0	223	2358	12	0	1
Total	5520246	98354	0	274	2358	12	0	1

Figure 85. Individual Station Statistics Page

See Also

Station Statistics

System Log Window

This is a status only window that allows you to review the system log, where system alerts and messages are displayed. Although there are no configuration options available in this window, you do have the usual choice of deciding how the event messages are sorted by clicking in the column header for the desired field (Time Stamp, Priority, or Message).

- **Time Stamp**—sorts the list based on the time the event occurred.
- **Priority**—sorts the list based on the priority assigned to the message.
- **Message**—sorts the list based on the message category

The displayed messages may be filtered by using the **Filter Priority** option, which allows control of the minimum priority level displayed. For example, you may choose (under **Services >System Log**) to log messages at or above the Debug level but use **Filter Priority** to display only messages at the Information level and above.

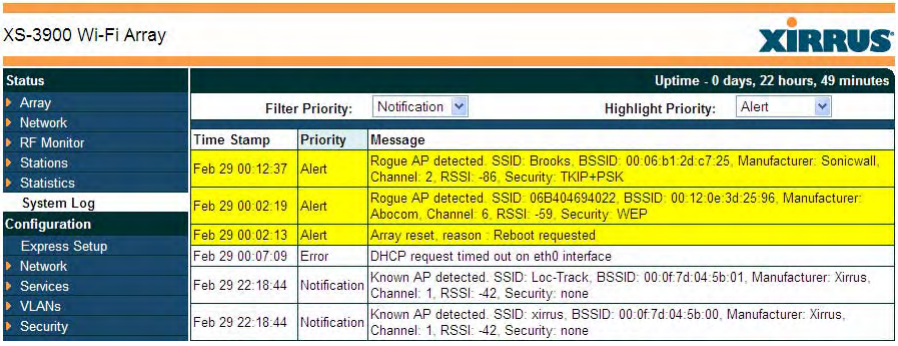


Figure 86. System Log (modified for clarity)

Use the **Highlight Priority** field if you wish to highlight messages at the selected priority level. Click on the **Refresh** button to refresh the message list, or click on the **Clear Log** button to delete all messages. You can also click in the **Auto Refresh** check box to instruct the Array to refresh this window automatically.

Configuring the Wi-Fi Array

The following topics include procedures for configuring the Array using the product's embedded Web Management Interface (WMI). Procedures have been organized into functional areas that reflect the flow and content of the WMI.

The following WMI windows allow you to establish configuration parameters for your Array, and include:

- **"Express Setup" on page 134**
- **"Network" on page 140**
- **"Services" on page 151**
- **"VLANs" on page 161**
- **"Security" on page 164**
- **"SSIDs" on page 184**
- **"Groups" on page 196**
- **"IAPs" on page 202**
- **"WDS" on page 229**
- **"Filters" on page 233**

After making changes to the configuration settings of an Array you must click on the **Save** button at the bottom of the configuration window, otherwise the changes you make will not be applied the next time the Array is rebooted. Click the **Apply** button if you want the changes applied to the current configuration, without making them permanent.

This chapter only discusses using the configuration windows on the Array. To view status or use system tools on the Array, please see:

- **"Viewing Status on the Wi-Fi Array" on page 91**
- **"Using Tools on the Wi-Fi Array" on page 239**

Express Setup

The Express Setup procedure allows you to establish global configuration settings that will enable basic Array functionality. Any changes you make in this window will affect all radios. When finished, click on the **Apply** button to apply the new settings to this session, or click **Save** to apply your changes and make them permanent.

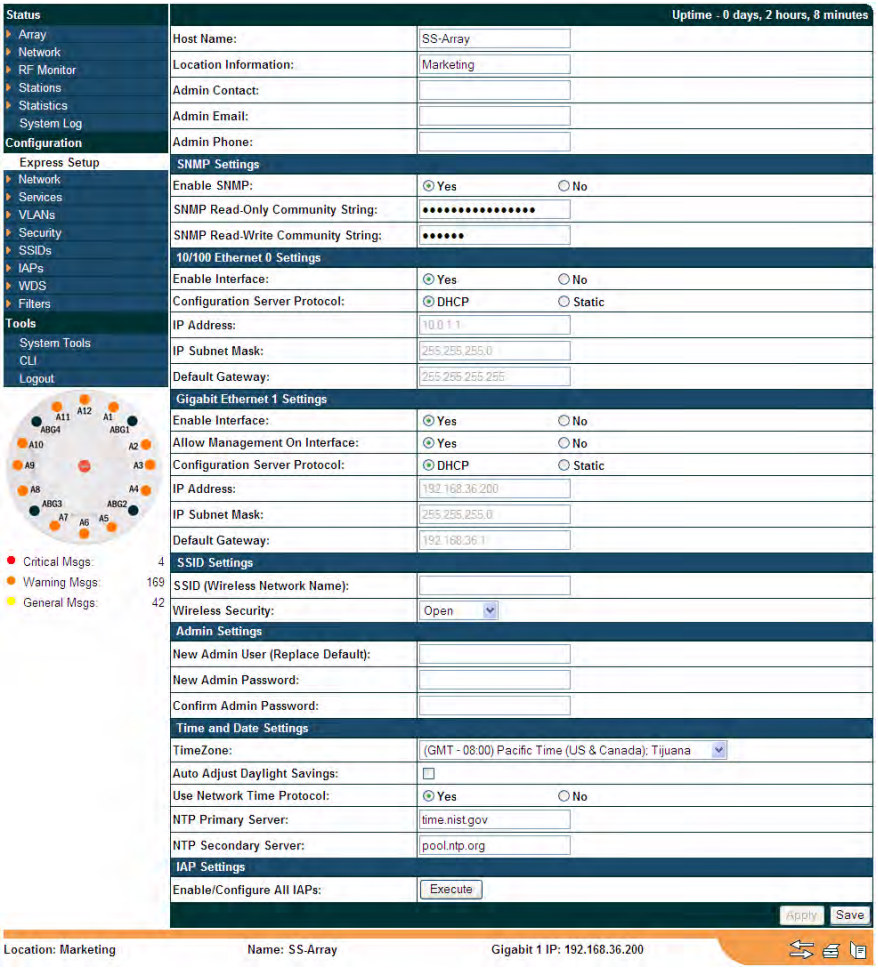


Figure 87. WMI: Express Setup

Procedure for Performing an Express Setup

1. **Host Name**: Specify a unique host name for this Array. The host name is used to identify the Array on the network. Use a name that will be meaningful within your network environment, up to 64 alphanumeric characters. The default is **Xirrus-WiFi-Array**.

2. **Location Information**: Enter a brief but meaningful description that accurately defines the physical location of the Array. In an environment where multiple units are installed, clear definitions for their locations are important if you want to identify a specific unit.

3. **Admin Contact**: Enter the name and contact information of the person who is responsible for administering the Array at the designated location.

4. **Admin Email**: Enter the email address of the admin contact you entered in Step 3.

5. **Admin Phone**: Enter the telephone number of the admin contact you entered in Step 3.

6. Configure **SNMP**: Select whether to **Enable** SNMP on the Array, and set the SNMP community strings. The factory default value for the **SNMP Read-Only Community String** is **xirrus_read_only**. The factory default value for the **SNMP Read-Write Community String** is **xirrus**. If you are using the Xirrus Management System (XMS), the read-write string must match the string used by XMS. XMS also uses the default value **xirrus**.

7. Configure the **10/100 Ethernet 0** (10/100 Mb) and **Gigabit Ethernet 1** network interface settings. Note that the and Gigabit Ethernet 2 port is not configured on this page. If you need to make changes to Gigabit 2, please see "Network Interfaces" on page 141.

   The fields for each of these interfaces are similar, and include:

   a. **Enable Interface**: Choose **Yes** to enable this network interface, or choose **No** to disable the interface.

   b. **Allow Management on Interface**: This option is available only on the Gigabit 1 and Gigabit 2 interfaces—the 10/100 Ethernet port is also known as the Management Port, and management is **always** enabled

on this port. Choose **Yes** to allow management of the Array via this Gigabit interface, or choose **No** to deny all management privileges for this interface.

c. **Configuration Server Protocol**: Choose **DHCP** to instruct the Array to use DHCP to assign IP addresses to the Array's Ethernet interfaces, or choose **Static** if you intend to enter IP addresses manually. If you choose the Static IP option, you must enter the following information:

- **IP Address**: Enter a valid IP address for this Array. To use a remote connection (Web, SNMP, or SSH), a valid IP address must be used.
- **IP Subnet Mask**: Enter a valid IP address for the subnet mask (the default is 255.255.255.0). The subnet mask defines the number of IP addresses that are available on the routed subnet where the Array is located.
- **Default Gateway**: Enter a valid IP address for the default gateway. This is the IP address of the router that the Array uses to forward data to other networks.

8. **SSID Settings**: This section specifies the wireless network name and security settings.

a. The **SSID (Wireless Network Name)** is a unique name that identifies a wireless network (SSID stands for Service Set Identifier). All devices attempting to connect to a specific WLAN must use the same SSID. The default SSID is **xirrus**. Entering a value in this field will replace the default SSID with the new name.

For additional information about SSIDs, go to the Multiple SSIDs section of "Frequently Asked Questions" on page 334.

b. **Wireless Security**: Select the desired wireless security scheme (Open, WEP or WPA). Make your selection from the choices available in the pull-down list.

- **Open**—This option offers no data encryption and is not recommended, though you might choose this option if clients are

required to use a VPN connection through a secure SSH utility, like PuTTy.

- **WEP** (Wired Equivalent Privacy)—An optional IEEE 802.11 function that offers frame transmission privacy similar to a wired network. WEP generates secret shared encryption keys that both source and destination stations can use to alter frame bits to avoid disclosure to eavesdroppers.
- **WPA** (Wi-Fi Protected Access)—A Wi-Fi Alliance standard that contains a subset of the IEEE 802.11i standard, using TKIP or AES as an encryption method and 802.1x for authentication. WPA is the stronger of the two wireless security schemes.
- **WPA2** (Wi-Fi Protected Access 2)—WPA2 is the follow-on security method to WPA for wireless networks and provides stronger data protection and network access control. It offers Enterprise and consumer Wi-Fi users with a high level of assurance that only authorized users can access their wireless networks. Like WPA, WPA2 is designed to secure all versions of 802.11 devices, including 802.11a, 802.11b, 802.11g, and 802.11n, multi-band and multi-mode.
- **WPA-Both** (WPA and WPA2)—This option makes use of both WPA and WPA2.

For more information about security, including a full review of all security options and settings, go to "Understanding Security" on page 165.

c. **Wireless Key/Passphrase**: Depending on the wireless security scheme you selected, enter a unique WEP key or WPA passphrase.

d. **Confirm Key/Passphrase**: If you entered a WEP key or WPA passphrase, confirm it here.

9. **Admin Settings:** This section allows you to change the default admin username and password for the Array.

a. **New Admin User (Replace Default)**: Enter the name of a new administrator user account. The new administrator will have read/