IxWLAN™ User Guide

Release 6.20

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1 Introduction

This chapter covers the following topics:

- *Introduction to IxWLAN* on page 1-1.
- *Packaging Checklist* on page 1-3.
- *Features* on page 1-4.
- *WPA/RSN* on page 1-6.
- *Files* on page 1-8.
- *System Needs* on page 1-10.
- *Hardware Characteristics* on page 1-10.
- *General Usage Notes* on page 1-12.
- *Feature Key Dependent Parameters* on page 1-13.

Introduction to IxWLAN

IxWLAN is a test and measurement device that emulates up to 128 wireless stations in an IEEE 802.11 wireless LAN environment. It operates in accordance with the IEEE 802.11a, IEEE 802.11b, and IEEE 802.11g specifications. IxWLAN is offered in the following configurations:

- IxWLAN SED 11a/b/g – Supports IEEE 802.11a, 802.11b, and 802.11g, depending on regulatory certifications.
- IxWLAN SED-MR+ 11a/b/g – Supports IEEE 802.11a, 802.11b, and 802.11g.

Both configurations include the IEEE 802.11i and WiFi Protected Access (WPA) security features.

IxWLAN can be used to reduce the number of PCs and station NIC cards that are needed to test and stage 802.11 products and wireless LANs in terms of packet

performance and number-of-stations capacity. It allows a user to fine-tune system parameters to maximize performance during testing.

The differences between IxWLAN and other IP load generators can be summarized as follows:

- IP-based Load Generators are per-station devices that do not reduce the number of PCs and station NIC cards. You can configure only one IP per station and then send traffic.
- IxWLAN allows all stations to be emulated on a single platform and radio chipset, thus reducing the cost and complexity of multiple PCs.

IxWLAN creates Virtual Stations (vSTAs) and generates or passes traffic that loads and stress tests Wireless LAN and 802.11 products in terms of:

- Frame performance
- Number-of-stations capacity
- Scalability
- WLAN optimization

Because a single physical 802.11a/b/g emulator emulates multiple vSTAs, it reduces the number of PC and station NIC cards that are needed to test and stage 802.11 products and wireless LANs.

As of 6.20 version, IxWLAN is supported by two chassis, the IxWLAN SED and the IxWLAN SED-MR+.

IxWLAN SED

Figure 1-1 shows the IxWLAN SED chassis.

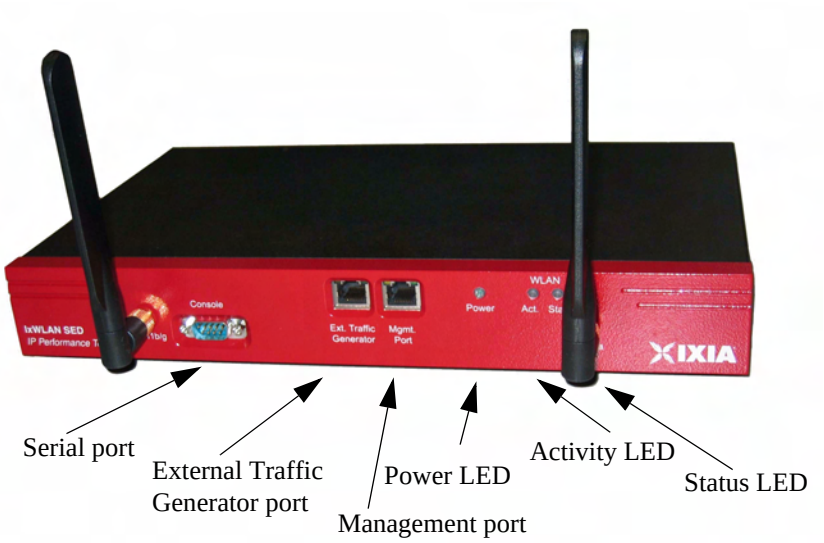


Figure 1-1. IxWLAN SED Chassis

IxWLAN SED-MR+

Figure 1-2 shows the IxWLAN SED-MR+ chassis.

Figure 1-2. IxWLAN SED-MR+ Chassis

Packaging Checklist

Your shipping container must include the following items:

- Chassis (IxWLAN SED or SED-MR+)
- Power cord for the IxWLAN SED or SED-MR+ chassis
- Crossover cable
- Serial cable
- Detachable multiband antennas (2 for the IxWLAN SED and 3 for the SED-MR+ chassis)
- Data sheet
- Specifications
- Release Notes
- Warranty card
- End User License Agreement
- Installation CD-ROM, which includes this User Guide and the IxWLAN SDK.

If any of these items is not included in your shipping container, contact Ixia Customer Support.

Features

- Supports IEEE 802.11a, 802.11b, 802.11g
- Supports 802.11h Dynamic Frequency Selection (DFS) and Transmit Power Control (TPC)
- The IxWLAN SED chassis emulates up to 64 concurrent virtual stations, while the IxWLAN SED-MR+ chassis supports up to 128 virtual stations.
- Interaction with virtual stations in real time
- Configuration and monitoring of virtual stations
- Externally forwards load from a third-party traffic generator to a System Under Test
- For the external mode, frames can be captured based on the source 802.3 MAC address (Layer 2) or the source IP address (Layer 3).
- Event Log and performance statistics data
- vSTA support: 802.11 Authentication, Association, De-authentication, Disassociation, Reassociation.
- The system supports Open-System, Shared-Key WEP, WPA, and 802.11i (RSN) security, including 802.11i Pre-Authentication.
- The system supports 802.11i PMKSA caching and re-use.
- The system supports fast RADIUS reconnection in vSTAs configured for WPA and RSN authentication types.
- The system allows for each vSTA to be configured with a unique SSID, to transmit 802.11 Probe Request frames and to receive directed 802.11 Probe Response frames. This allows users to configure vSTAs to exercise an AP's WLAN-to-VLAN code using a single IxWLAN chassis.
- Virtual stations may independently roam between APs comprising an ESS wireless network.
- ICMP Echo Request/Reply (Ping)
- Security per vSTA (Table 1-1)

Table 1-1. Authentication

Authentication	Cipher	Security Configuration	Additional Security Configuration
Open-System	WEP	Up to 4 Shared Static Keys for authentication and data	
Shared-Key	WEP	Up to 4 Shared Static Keys for authentication and data	
WPA	TKIP or AES-CCM	EAP Algorithm: TLS, TTLS, or PEAP	User ID/Client Certificate File. For TTLS/PEAP, Inner Algorithm (MS-CHAPv2, EAP-MS-CHAPv2), Outer ID, and Password.

Preliminary

Table 1-1. Authentication (Continued)

Authentication	Cipher	Security Configuration	Additional Security Configuration
WPA	TKIP or AES-CCM	EAP Algorithm: TLS, TTLS, or PEAP	User ID/Client Certificate File. For TTLS/PEAP, Inner Algorithm (MS-CHAPv2, EAP-MS-CHAPv2), Outer ID, and Password.
WPA-PSK	TKIP or AES-CCM	Pre-Shared Key or Passphrase	
RSN	TKIP or AES-CCM	EAP Algorithm: TLS, TTLS, or PEAP	User ID/Client Certificate File. For TTLS/PEAP, Inner Algorithm (MS-CHAPv2, EAP-MS-CHAPv2), Outer ID, and Password.
RSN-PSK	TKIP or AES-CCM	Pre-Shared Key or Passphrase	

- Persistent connection to the System Under Test
- DHCP Client: vSTAs can have IP addresses dynamically assigned from a DHCP server on the network rather than a fixed, configured IP address.
- Command Line Interface and Web-Based User Interface
- Telnet and Serial Port access to the CLI
- Automatically configure and run multiple virtual stations using the CLI
- The Web-Based User Interface supports the following:
  - Real-time graphs of test results for each virtual station, and for the system as a whole
  - Export of event log and statistics data
  - Scenario scheduling to bring vSTAs online in a time-appointed manner
  - User-defined virtual station groups based on end user needs
  - Multiple types of reports
  - The ability to save test scenario files in order to repeat a test
  - Configuration and monitoring of virtual stations include: copy, paste, print, add, and delete virtual stations
  - The ability to select a System Under Test
  - The ability to set up groups and select individual virtual stations to run through the 802.11 state machine

WPA/RSN

This section covers the following topics:

- *Introduction to WPA/RSN* on page 1-6.
- *EAP Algorithms* on page 1-7.
- *Certificate Files* on page 1-7.
- *Key Hierarchy and Configuration* on page 1-7.
- *Protocol Conformance Testing* on page 1-8.

Introduction to WPA/RSN

Individual virtual stations can be configured with WPA or RSN authentication. A vSTA can be configured to use either PSK or full 802.1X/EAP authentication. RSN does the strong security of IEEE 802.11i.

The strength of WPA/RSN comes from an integrated sequence of operations that encompass 802.1X/EAP authentication and sophisticated key management and encryption techniques.

The IxWLAN implementation of WPA/RSN provides the following major operations:

- Network security capability determination – This occurs at the 802.11 level and it is communicated through the WPA/RSN information elements in Beacon, Probe Response, and (Re) Association Requests. The information in these elements includes the authentication method (802.1X or PSK) and the preferred cipher suite (WEP, TKIP, or AES-CCM).
- Authentication – For full implementation of WPA/RSN, EAP over 802.1X is used for authentication. Mutual authentication is gained by choosing an EAP type supporting this feature. 802.1X port access control prevents full access to the network until authentication completes. In the case of WPA-PSK or RSN-PSK, mutual authentication between peers (that is, a virtual station and the System Under Test) is achieved through the 4-Way AKMP handshake during which possession and liveness of the correct PSK is confirmed.
- Pre-Authentication – IxWLAN also supports pre-authentication, defined in the 802.11i specification as a means of speeding up the roaming process by authenticating with the server before the roam. The pre-authentication is independent of the roam and may be performed with multiple APs.
- PMKSA Catching – IxWLAN supports PMKSA catching, defined in the 802.11i specification. PMKSA is the context resulting from a successful IEEE 802.1X authentication exchange between a given vSTA and the Authentication Server.
- Key management – The WPA and RSN feature gives a robust key generation/management system that integrates the authentication and data privacy functions. The keys are generated after successful authentication and through a subsequent 4-way handshake between the station and System Under Test.

802.1X EAPOL-Key packets are used by WPA and RSN to negotiate and derive pairwise keys used to protect unicast traffic. Group key handshake is used to deliver the group key to each virtual station for protecting multicast and broadcast class 3 data frames.

- Data Privacy (Encryption) – TKIP or AES-CCM (that is, CCMP) is used to replace WEP with more sophisticated cryptographic and security techniques.
- Data integrity – TKIP adds a MIC at the end of each plain-text message (MSDU) to ensure that the messages are not being spoofed or replayed. With AES-CCM, the MIC is added to each transmitted MPDU.

EAP Algorithms

Virtual stations that are configured for WPA or RSN authentication can be configured to use the TLS, TTLS, or PEAP EAP algorithms. For TLS, a certificate file and user ID must be specified. The certificate file and user ID are optional for TTLS and PEAP. Additional parameters that may be configured for TTLS and PEAP include: inner algorithm, outer identify, and password. For TTLS and PEAP, authentication proceeds in two stages: Phase 1 (outer) and Phase 2 (inner). The outer identity is used in Phase 1 authentication. The password and inner algorithm are used in Phase 2 authentication. The inner algorithm is normally MS-CHAPv2 for TTLS and EAP-MS-CHAPv2 for PEAP.

Certificate Files

When using full WPA or RSN (802.1X), valid certificates must be imported into IxWLAN using either the CLI **import** command or the Available Certificates dialog in the web-based user interface.

NOTE: IxWLAN imports only certificate files that are in the PKCS#12 format and have been exported with their private key, without strong private key encryption.

Key Hierarchy and Configuration

WPA and RSN use a PMK that is used in derivation of transient keys for encryption and HMAC functions. The IxWLAN WPA/RSN feature supports two core key hierarchies that are defined by the standard:

- Pairwise key hierarchy – The pairwise keys used to protect unicast traffic. PTK derived from the PMK.
- Group key hierarchy – To protect multicast traffic. GTK derived from the GMK.

For full WPA or RSN mode, the PMK is negotiated between the vSTA and an authentication server in a sequence of EAPOL exchanges through the System Under Test. For WPA-PSK or RSN-PSK mode, the PSK (if defined) is used as the PMK. The PSK is manually configured in the vSTA and the System Under Test.

IxWLAN 5.0 Limitation – The WPA Specification needs a PSK for each SSID. IxWLAN now supports a single (global) SSID.

- IxWLAN supports a PSK per vSTA.
- The PSK can be defined using hex notation (64 hex digits) or an ASCII passphrase. The ASCII passphrase is converted to a valid 256 bit key.

The 4-way handshake (obtain/install PTK) is processed as follows:

- EAPOL-Key Message exchange (four messages)
- Verify that a live peer holds the PMK.
- Verify that the PMK is current.
- Obtain a fresh PTK from the PMK.
- Install the Pairwise encryption and integrity keys into IEEE 802.11.
- Confirm the installation of the keys.

The Group Key Handshake (obtain/install Group Transient Key) is processed using an EAPOL-Key Message exchange (two messages).

Protocol Conformance Testing

When configured with WPA/RSN, IxWLAN tests the following:

- 802.1X Authentication when configured for full WPA/RSN
- 802.11i Pre-authentication when configured for full RSN
- PMKSA catching results from a successful IEEE 802.1X authentication exchange between a given vSTA and Authentication Server
- 802.1X Key Management: vSTA/System Under Test 4-way handshake (EAPOL-Key messages), Group Key Handshake (EAPOL-Key messages)
- TKIP or AES-CCM (CCMP): Data encryption (unicast and multicast)
- WPA or RSN Information Element Conformity: presence in beacons, probe responses; correct AKM suite selector encoding and correct cipher suite selector encoding

Files

The IxWLAN SED and the IxWLAN SED-MR+ chassis have a 256MB “disk-on-a-chip” flash. Excluding boot and firmware images, this allows for 225 MB of file system space to be used for event logging, certificate files, and scenario files.

Table 1-2 lists the directories and files that are maintained in the IxWLAN flash file system.

Table 1-2. Directories and Files Maintained in the Flash File System

Directory	Files	Description
/ (root)	IxWLAN Configuration (config), ixwlan.sys, keyfile	• **config file**: The IxWLAN configuration file (**config**) stores information settings that can be defined using the CLI or the web-based user interface. A backup version (.bak) of this file is also maintained in the unlikely event that the original might become corrupted. IxWLAN loads from this file at power-up/initialization time. It contains basic configuration information. • **ixwlan.sys:** The **ixwlan.sys** file is the IxWLAN software image file.

Table 1-2. Directories and Files Maintained in the Flash File System (Continued)

Directory	Files	Description
		• **keyfile:** The **keyfile** is a reserved file that contains the IxWLAN authorization code. It is a hidden file and is shown only in the directory list in the CLI administrative mode. Do not delete this file or try to access or modify it. The system needs it.
/Cache	Encapsulated certificate file passwords	When a certificate file is imported into IxWLAN, a password is needed. This password is encrypted and stored in IxWLAN in the /Cache directory. Note that this directory is visible only in the CLI administrative mode.
/Certificates	Available Certificate files	Contains available certificate files that have been imported from the command PC. This directory is available only if the keyfile enables WPA/RSN.
/Logs	Log Files	When event logging to a file is enabled, the log files in this directory store records of all IxWLAN activities, with a timestamp indicating when the activity occurred.
/Scenarios	Scenario files	After IxWLAN is configured, you may create test scenarios that contain virtual station definitions that are organized into groups. This information is stored in scenario files. The scenario files are created and used by the web-based user interface. The CLI does not create or use scenario files. These files are created when you select **Save Scenario to Flash** in the web-based user interface.
/Statistics	Virtual Station Statistics Files (for example, Vsta#Stats.dat, VstaMasterStats.dat, VstaAllSumm.dat)	Statistics files contain statistics of a test (scenario) run. When a test is complete, a statistics file can be written in the flash file system for each virtual station involved in the test. The Reports section of the web-based user interface can be used to show the contents of these files.

System Needs

- A PC with an available serial port or 10/100 Ethernet port that can be used to send commands to IxWLAN
- If the web-based user interface is used, the command PC must be equipped with:
  - Microsoft Windows 2000/XP
  - Microsoft Internet Explorer Version 6.0 or higher
  - Recommended Memory: 256 MB
  - Recommended Virtual Memory: 300 MB
  - Recommended Processor Speed: PIII 700 MHz.
  - One of the following ActiveX objects: Msxml2.XMLHTTP or Microsoft.XMLHTTP. If either of these objects is not found, an alert message displays: “FATAL ERROR: Error creating ActiveX object XMLHTTP”.

Hardware Characteristics

This subsection provides specific information about the ports, LEDs, connectors, and antennas of the two available chassis, IxWLAN SED, and IxWLAN SED-MR+.

Ports and Connectors

Both chassis have an Ethernet connector, a serial connector, and a power connector.

- Ethernet Connectors:

  The IxWLAN SED and IxWLAN SED-MR+ chassis have two Ethernet ports, a 10/100 Gigbit port and a 10/100/1000 Gigbit port, as described in Table 1-3.

Table 1-3. IxWLAN SED/SED-MR+ Ethernet Ports

Front Panel Label	System DeviceName:unit	Speed
Mgmt. Port	fei:0	10/100
Ext. Traffic Generator	gei:0	10/100/1000

The Mgmt. Port (Management Port) is used for managing IxWLAN via the GUI, Telnet, or SDK (running over Telnet) or for downloading the *ixwlan.sys* image. All IxWLAN IP address commands (**get/set ipaddr, get/set ipmask, get/set gateway**) apply only to the Management Port.

The Ext. Traffic Generator port (External Traffic Generator port) is used exclusively for the attachment of traffic generators (IxChariot, IxLoad, and so on) and has no associated IP stack/address.

- Serial Connector – This connector is used to connect a command PC to IxWLAN. The configuration of the serial port is: 115,200 b/s, 8 data bits, no parity, 1 stop bit, and no flow control.
- Power Connector – The IxWLAN SED/SED-MR+ chassis uses a standard 3-prong, 110 VAC power cable.

IxWLAN SED/SED-MR+ can attach directly to 10BASE-T/100BASE-TX (twisted-pair) Ethernet LAN hubs or segments or a PC. All this must conform to the IEEE 802.3 specification.

LEDs

On each of the two chassis, the LEDs are laid out differently, also working differently depending on the chassis.

IxWLAN SED

The IxWLAN SED chassis has two LEDs associated with the WLAN or Radio, a separate power LED, and two LEDs for each Ethernet port (that is, four in all).

One WLAN LED indicates WLAN traffic (send/receive), while the others indicate network status — solid on — radio is on, slow blink — IxWLAN is scanning, fast blink (per received beacon) — IxWLAN is joined with an AP.

Each Ethernet port has two LEDs: a yellow LED to indicate Link State/Link Activity, and a green LED to indicate speed, as described in Table 1-4.

Table 1-4. IxWLAN SED LEDs

Front Panel Label	Yellow LED	Green LED	Description
Mgmt Port	Steady ON		Link established
	Flashing		Active Data Transfer
		Steady OFF	10BaseT
		Steady ON	100BaseT
External Traffic Generator	Steady ON		Link established
	Flashing		Active Data Transfer
		Steady OFF	1000BaseT
		Steady ON	10/100BaseT

IXWLAN SED-MR+

The IxWLAN SED-MR+ chassis has two LEDs associated with each WLAN port (wport) or Radio (that is, six LEDs in all).

During power-up, the left LED blinks briefly, while the right LED goes off solid. After booting, the left LED turns on solid, while the right LED turns off solid.

In the idle state (in which no wports are joined and there is no activity), the left LED turns solid on, while the right one goes off solid.

In the joined state (in which the wport has joined with an AP), both LEDs blink briefly, yet faster than while power-up. To show network activity (from a joined state), both LEDs blink proportional with the tx/rx bit rates.

Radio Characteristics

IxWLAN conforms to the IEEE 802.11a, 802.11b and 802.11g specifications. In the 802.11a mode, it operates in the 5GHz UNII band. Data is transmitted over a half-duplex radio channel, operating at up to 54 Mb/s using OFDM. In the 802.11b mode, IxWLAN operates in the 2.4 GHz band and sends data at up to 11 Mb/s. In the 802.11g mode, IxWLAN operates in the 2.4 GHz band, using OFDM at rates of up to 54 Mb/s.

Antennas

The IxWLAN SED chassis provides two antennas, one each for the 802.11 b/g mode and 802.11a mode. On the IxWLAN SED-MR+ chassis, there is a single antenna for each of the 3 independent wports, each handling 802.11b/g, as well as 802.11a mode.The antennas can be swiveled 180 degrees and angled up or down to optimize signal gain.

Please note that the antennas are shipped separately and need to be attached to the chassis. For more details about the installation, please refer to Chapter 2, *Installation*.

General Usage Notes

1. Intermixing of CLI, Web-Based User Interface, and SDK operations is not supported.
2. You can access IxWLAN using the serial port or an Ethernet connection. For a serial port connection, the serial port must be configured as follows: 115200 baud, 8 data bits, no parity, 1 stop bit, no flow control. For an Ethernet connection, the IxWLAN default IP address is **192.168.0.50**. To establish first communications between the command PC and IxWLAN using an Ethernet connection, you must set your PC's IP address and network mask to match this default address (for example, IP address: 192.168.0.2, Netmask: 255.255.255.0). After you establish communications using the default IP address, you can change the IxWLAN and your command PC address to match the addressing scheme used in your network.
3. IxWLAN can operate in the 802.11a, 802.11b, or 802.11g wireless mode. The IxWLAN wireless mode affects the devices that you can select as a System Under Test. For example, an IxWLAN that is operating in the 802.11a wire-

less mode does not discover an 802.11b or 802.11g device. Make sure that the wireless mode that you select for IxWLAN is compatible with the device that you want to test. See *IxWLAN->Configure IxWLAN* on page 4-44 and *Virtual Station Setup and Control Commands* on page 5-14.

4. The IxWLAN Wireless LAN MAC address defaults to a specific address (typically in the 00:0b:16:xx:xx:xx range). It is a globally unique MAC address that is programmed in to the IxWLAN SED/SED-MR+ chassis. The WLAN base MAC address for each wport (typically in the 00:0b:6b:xx:xx:xx range) and mask (ff:ff:ff:ff:00:00) define the range of MAC addresses that can be assigned to virtual stations configured for that wport. When you specify a starting MAC address for virtual stations, make sure that the address is in the range defined by the WLAN base MAC address and mask for the specified port. See *vSTA->Add New vSTA to Group* on page 4-39 and *IxWLAN->Configure IxWLAN* on page 4-44, *auth* on page 5-17, *set wlanmac* on page 5-86, *get wlanmask* on page 5-75 and *set wlanmask* on page 5-86.

5. The default WLAN base MAC address for a given wport can be overridden to prevent conflict with other wireless devices. If you use multiple IxWLANs at your facility, each should have a WLAN MAC with a unique prefix. For example, on the first IxWLAN, use WLAN MAC Address **04:0d:e0:62:23:57** and on the second IxWLAN, use WLAN MAC Address **06:0f:14:62:32:a0**.

6. Starting with version 6.10 SP2, the requirement that the IP Mask of the IxWLAN and virtual stations must match the IP subnet addressing scheme for internal mode testing (used for the external mode) has been removed. The IP address and subnet mask are now per-virtual station attributes and have no interaction with the IP protocol stack used for IxWLAN management.

Feature Key Dependent Parameters

Your license key is a code sequence that represents your license to use your IxWLAN. The license key indicates a set of features that are authorized for a specific IxWLAN. Some IxWLAN features are separately licensed. Depending on the license you purchased from Ixia, some IxWLAN features may not be available. Some portions of the user interface may be disabled or enabled, and the appearance of dialogs may vary according to your license.

Table 1-5 identifies these feature key dependent parameters.

Table 1-5. Feature Key Dependent Parameters

Web-Based User Interface Fields	CLI Commands	Feature Key Dependent Parameters	Needed Feature Key
IxWLAN->Configure IxWLAN-> Radio tab: Wireless Mode	set wireless mode	802.11a	11A
IxWLAN->Configure IxWLAN-> Radio tab: Wireless Mode	set wireless mode	802.11b	11B

Table 1-5. Feature Key Dependent Parameters (Continued)

Web-Based User Interface Fields	CLI Commands	Feature Key Dependent Parameters	Needed Feature Key
IxWLAN->Configure IxWLAN-> Radio tab: Wireless Mode	set wireless mode	802.11g	11G
IxWLAN->Configure IxWLAN-> Other tab: MIC	set mic	Enable, Disable, Spot	WPA/RSN
vSTA->New Group-> Security: Authentication	autoconf, set group, or set vsta authentication	RSN, RSN-PSK, WPA, WPA-PSK	WPA/RSN
vSTA->New Group-> Security: Cipher	autoconf, set group, or set vsta cipher	TKIP, AES-CCM	WPA/RSN
vSTA->New Group-> Security->PSK Tab: Pre-Shared Key	autoconf, set group, or set vsta psk	Pre-Shared Key	WPA/RSN
vSTA->New Group-> Security->PSK Tab: Passphrase	autoconf, set group, or set vsta passphrase	Passphrase	WPA/RSN
vSTA->New Group-> Security->EAP Tab: EAP Algorithm	autoconf, set group, or set vsta eapalgorithm	TLS, TTLS, or PEAP	WPA/RSN
vSTA->New Group-> Security-> EAP Tab: User ID	autoconf, set group, or set vsta userid	User ID	WPA/RSN
vSTA->New Group-> Security-> EAP Tab: Client Certfile	autoconf, set group, or set vsta certfile	Certificate File	WPA/RSN
vSTA->New Group-> Security-> EAP Tab: Inner Algorithm	autoconf, set group, or set vsta inneralgorithm	MS-CHAPv2, EAP-MS-CHAPv2	WPA/RSN
vSTA->New Group-> Security-> EAP Tab: Outer ID	autoconf, set group, or set vsta outeridentity	Outer Identity	WPA/RSN
vSTA->New Group-> Security-> EAP Tab: Password	autoconf, set group, or set vsta password	Password	WPA/RSN
Configuration-> Security: Authentication	No equivalent	RSN, RSN-PSK, WPA, WPA-PSK	WPA/RSN
Configuration->Security: Cipher	No equivalent	TKIP, AES-CCM	WPA/RSN
Configuration-> Security->PSK Tab: Pre-Shared Key	No equivalent	Pre-Shared Key	WPA/RSN
Configuration-> Security->PSK Tab: Passphrase	No equivalent	Passphrase	WPA/RSN
Configuration-> Security->EAP Tab: EAP Algorithm	No equivalent	TLS, TTLS, or PEAP	WPA/RSN
Configuration-> Security->EAP Tab: User ID	No equivalent	User ID	WPA/RSN
Configuration-> Security->EAP Tab: Client Certfile	No equivalent	Certificate File	WPA/RSN

Table 1-5. Feature Key Dependent Parameters (Continued)

Web-Based User Interface Fields	CLI Commands	Feature Key Dependent Parameters	Needed Feature Key
Configuration-> Security->EAP Tab: Inner Algorithm	No equivalent	MS-CHAPv2, EAP-MS-CHAPv2	WPA/RSN
Configuration-> Security->EAP Tab: Outer ID	No equivalent	Outer Identity	WPA/RSN
Configuration-> Security->EAP Tab: Password	No equivalent	Password	WPA/RSN
Event Log-> Configure Log->Modules Log	set evlog modules	WPA/RSN	WPA/RSN
No equivalent	get cryptocap	show crypto hardware capabilities	WPA/RSN
No equivalent	cryptotest	test crypto hardware capabilities	WPA/RSN
Scenario menu-> Roam button->Roam	roam, auth, sendprobe	ID	WPA/RSN
Group menu-> Roam button->Roam	roam, auth, sendprobe	ID	WPA/RSN
vSTA menu-> Roam button->Roam	roam, auth, sendprobe	ID	RSN
vSTA menu-> Pre-authenticate... button->802.11i Pre-Authentication	preauth	BSSID	RSN
Scenario menu-> Pre-authenticate... button->802.11i Pre-Authentication	preauth	BSSID	RSN
Group menu-> Pre-authenticate... button->802.11i Pre-Authentication	preauth	BSSID	WPA/RSN
New IxWLAN Group> Runtime tab->Roam Type	autoconf [roamtype]	Disassociation/ Reassociation	WPA/RSN
Edit IxWLAN Group> Runtime tab->Roam Type	autoconf [roamtype]	Disassociation/ Reassociation	WPA/RSN
Add vSTA to Group> Runtime tab->Roam Type	autoconf [roamtype]	Disassociation/ Reassociation	WPA/RSN
Config IxWLAN> IxWLAN->Radio ->Scan at Boot Mode	get bootscan, setbootscan	Enabled/ Disabled/All Modes	802.11 a/ b/ g
Config IxWLAN> IxWLAN->Radio ->Background Join	get bkjoin, set bkjoin	Enabled/ Disabled	802.11 a/ b/ g

Table 1-5. Feature Key Dependent Parameters (Continued)

Web-Based User Interface Fields	CLI Commands	Feature Key Dependent Parameters	Needed Feature Key
Config > Security->Fast RADIUS	autoconf, get group, get vsta, set group, set vsta	fastreconnect	WPA/RSN
Config > Security->PMKSA	autoconf, get group, get vsta, set group, set vsta	pmkcache	WPA/RSN

Table 1-6 describes the IxWLAN License Options.

Table 1-6. IxWLAN License Options

License Option	Included Features/Keys
11BG-WPA/RSN	11B, 11G, WPA/RSN
11ABG-WPA/RSN	11A, 11B, 11G, WPA/RSN

You can purchase an upgraded license from Ixia to add new features. You can enter your new license key in the Update IxWLAN dialog or use the **set features** CLI command.

2 Installation

This chapter covers the following topics:

- *Attaching the Antennas* on page 2-1.
- *Connecting Directly to a Command PC* on page 2-2.
- *Connecting Through an Ethernet Hub or Switch* on page 2-3.
- *Connecting to the Serial Port* on page 2-3.

Attaching the Antennas

To be able to use the IxWLAN SED/IxWLAN SED-MR+ chassis, the antennas **must** be attached.

IxWLAN SED Chassis

Twist the multiband antennas into the two antennas ports labeled 802.11bg and 802.11a. Either antenna can be connected to either port. Hand-tighten only.

IxWLAN SED-MR+ Chassis

Twist the multiband antennas into the three antennas ports labeled wport1, wport2, and wport3. Either antenna can be connected to either port. Hand-tighten only.

Connecting Directly to a Command PC

To connect the IxWLAN SED/IXWLAN SED-MR+ chassis to a command PC:

1. Connect one end of the supplied Ethernet crossover cable to the Ethernet port on the command PC.
2. Connect the other end of the crossover cable to the Mgmt. Port on the chassis, as shown in Figure 2-1.

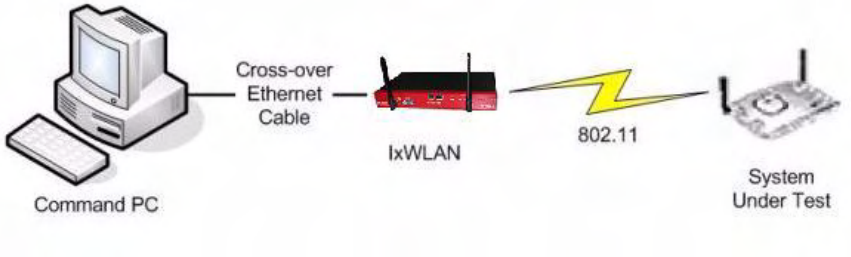


Figure 2-1. Connecting the IxWLAN SED/SED-MR+ Chassis to a Command PC

Connecting Through an Ethernet Hub or Switch

To connect the IxWLAN SED/IXWLAN SED-MR+ chassis through an Ethernet hub or switch:

1. Connect one end of a standard Ethernet cable (not included) to the Ethernet port on the command PC. Connect the other end of the cable to the Ethernet Connector on the Ethernet hub or switch.
2. Connect one end of a standard Ethernet cable to a port on the hub or switch. Connect the other end of the cable to the Mgmt. Port on the chassis, as shown in Figure 2-2.

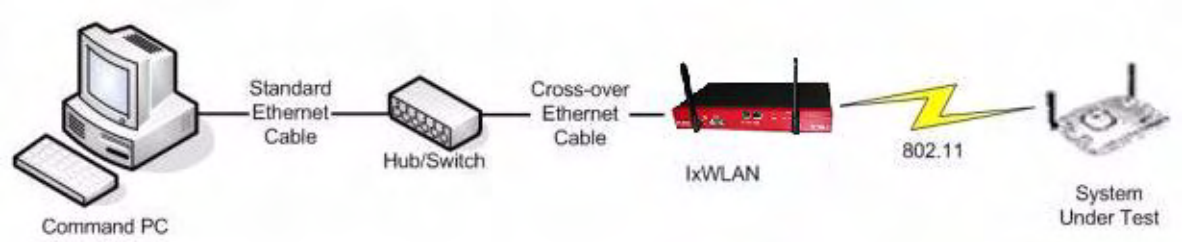


Figure 2-2. Connecting the IxWLAN SED/SED-MR+ Chassis Through an Ethernet Hub or Switch

The IxWLAN SED/SED-MR+ chassis has a separate data port —Ext. Traffic Generator—which is used exclusively for the attachment of traffic generators and has no associated IP stack/address.

Connecting to the Serial Port

A standard straight serial cable is provided with the IxWLAN SED/IXWLAN SED-MR+ chassis.

To connect to the Serial Port (Figure 2-3):

- Connect the female connector end of the cable to a serial port on the command PC.

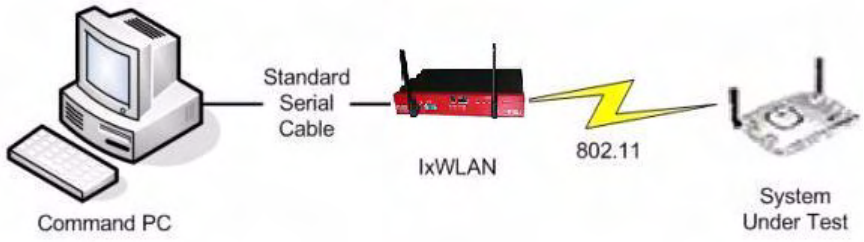


Figure 2-3. Connecting the IxWLAN SED/SED-MR+ Chassis to the Serial Port

3 First Setup

This chapter covers the following topics:

- *Using the Ethernet Ports* on page 3-1.
- *Using the Serial Port* on page 3-5.

Using the Ethernet Ports

This section covers the following topics:

- *Command PC Attached to Port on IxWLAN SED* on page 3-1.
- *Web-Based User Interface* on page 3-3.
- *Command Line Interface* on page 3-4.

Command PC Attached to Port on IxWLAN SED

To configure the Command PC and then access the web-based user interface or CLI, when the Command PC is attached to the Mgmt Port on the IxWLAN SED:

1. Click **Control Panel** from the **Start** menu on the PC.
2. Double-click **Network Connections**.
3. Right-click **Local Area Connection** for the Ethernet controller that is connected to the IxWLAN SED chassis. Select **Properties** from the right-click menu and the Local Area Connection Properties dialog opens, as shown in Figure 3-1 on page 3-2.

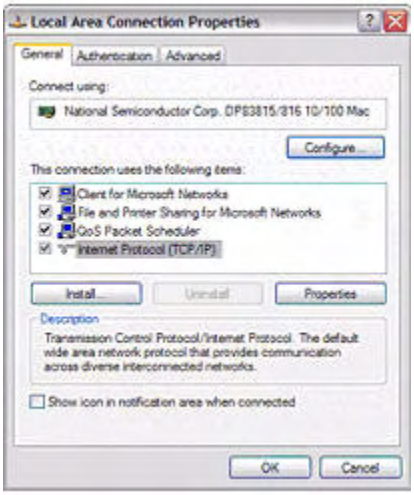


Figure 3-1. Local Area Connection Properties

4. Click **Internet Protocol (TCP/IP)**.
5. Click the **Properties** button and the Internet Protocol (TCP/IP) Properties dialog opens, as shown in Figure 3-2.

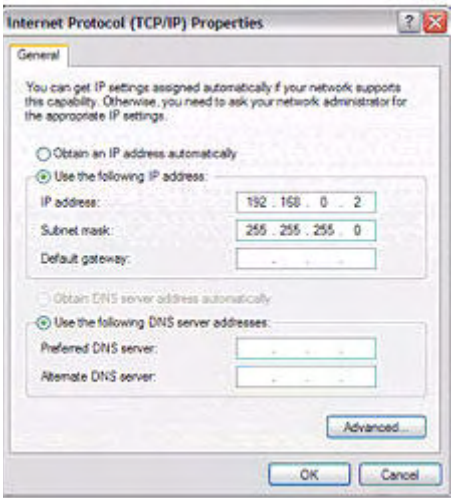


Figure 3-2. TCP / IP Properties Dialog

6. Click the **Use the following IP address** radio button and type the IP address for the Ethernet connection. Use an IP Address that resides on the same IP subnet as IxWLAN. For example, use **192.168.0.2** if you are using IxWLAN's default IP address **192.168.0.50**.
7. Click **OK** to close the Internet Protocol (TCP/IP) Properties dialog.
8. Click **Close** to close the Local Area Connection Properties dialog.

You can access IxWLAN using one of the following methods.

Web-Based User Interface

The command PC must be equipped with:

- Microsoft Windows 2000/XP
- Microsoft Internet Explorer version 6.0 or higher
- Recommended Memory: 256 MB
- Recommended Virtual Memory: 300 MB
- Recommended Processor Speed: PIII 700 MHz
- One of the following ActiveX objects: Msxml2.XMLHTTP or Microsoft.XMLHTTP. If either of these objects is not found, an alert message displays: “FATAL ERROR: Error creating ActiveX object XMLHTTP”.

To access the web-based user interface:

1. Start Internet Explorer on the command PC.
2. Select **Internet Options** from the **Tools** menu. Click the **Settings** button and make sure that the **Every Visit to Page** radio button is clicked in the Settings dialog. This step is needed only the first time you use the web-based user interface.
3. Add the IxWLAN IP Address to your list of Trusted Sites and set the security level to **Low** for trusted sites.
   - Select the Security tab in the Internet Options dialog.
   - Select the Trusted sites icon (Figure 3-3).
   - Set the Security level for this zone to **Low**. If the security level for the zone is not **Low**, set the default level to **Low**.

Figure 3-3. Internet Options

- Click the **Sites…** button.
- In the Trusted sites dialog, type the IxWLAN IP address in the *Add this Web site to the zone* field and click the **Add** button.

NOTE: Make sure that the Require server verification (https:) checkbox for all sites in this zone is **not** clicked.

- Click **OK** in the Trusted sites dialog.
- Click **OK** in the Internet Options dialog.

Use the IxWLAN default IP address 192.168.0.50 for the first setup, as shown in Figure 3-4.

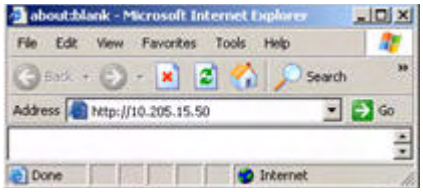


Figure 3-4. First Setup Example

For further information about how to use the web-based user interface, please refer to Chapter 4, *The Web-Based User Interface*.

NOTE: If pop-up blocker software is installed on your system, the splash page opens an error message. Please refer to Chapter 8, *Troubleshooting* for further information.

Command Line Interface

You can use a PC that is connected via Telnet to access the CLI. To establish a Telnet connection, use the IxWLAN default IP address 192.168.0.50 for the first setup.

```
C:\>telnet 192.168.0.50
```

For more information about how to use the CLI, please refer to Chapter 5, *The Command Line Interface (CLI)*.

Using the Serial Port

If the command PC is connected to the IxWLAN chassis via the serial port, the web-based user interface is not available.

To configure the Command PC and then access the CLI:

1. On the Command PC, start a terminal-emulation program such as HyperTerminal.
2. In the Connection Description dialog, type a name for the connection in the *Name* field (for example, IxWLAN).
3. Choose an icon for the connection, then click **OK** and the Connect To dialog opens, as shown in Figure 3-5.

Figure 3-5. Connect To Dialog

4. From the Connect Using list box, select the COM port that is connected to IxWLAN; then click **OK** and the COM Properties dialog opens, as shown in Figure 3-6.

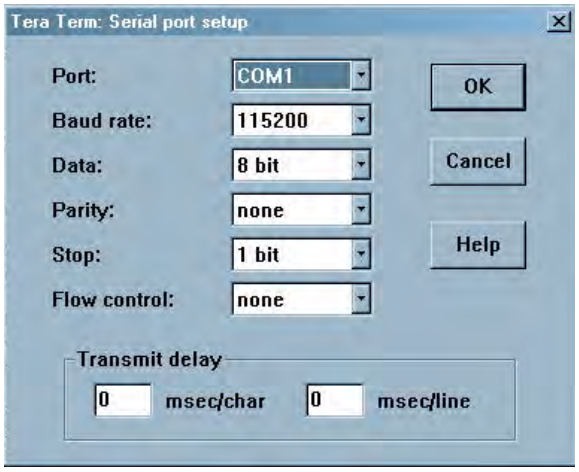


Figure 3-6. COM Properties Dialog

5. Set the COM port settings as shown in Figure 3-6 on page 3-5:
   - Bits per second: **115200** for IxWLAN SED
   - Data bits: **8**
   - Parity: **None**
   - Stop bits: **1**
   - Flow control: **None**
6. Click **OK** to close the COM properties dialog.

The POST messages appear on the HyperTerminal screen a few seconds after IxWLAN is connected to the power source.

```
Attached TCP/IP interface to fei0
Attaching network interface lo0...done.
Loading... 11443040
Starting at 0x308000...

Reading Configuration File "/ata0a/config".
Configuration file checksum: 23596 is good
fei0 loaded
Base address = f0200000, irq 37
Attach AR5212 0x13 0x1dbb5728
wlan0 revisions: mac 5.6 phy 4.1 analog 1.7 eeprom 3.4
ar0 loaded
Attaching interface lo0...done

                VxWorks

Copyright 1984-2002 Wind River Systems, Inc.

            CPU: Ampro RB 800
   Runtime Name: VxWorks
Runtime Version: 5.5.1
    BSP version: 1.0/3
        Created: Apr 7 2006, 11:51:55
            WDB: Ready.

IxWLAN Init:Mgmt LAN MAC 00:08:9B:80:2A:1A
IxWLAN Init:Data LAN MAC 00:08:9B:80:2B:1B

   cn505: b0 d3 f0, B0 b8810001 B2 b8810101

   Starting WLAN ...
   Starting quick passive scan ...

   Passive scanning 5 GHz 54Mbps (802.11a) channels for 7
   seconds...

   Ixia IxWLAN Ready
```

To open the IxWLAN logon prompt, press the ENTER key:

```
IxWLAN login:
```

When the IxWLAN logon prompt opens, use the information in Chapter 5, *The Command Line Interface (CLI)* to log on and access the CLI.

4 The Web-Based User Interface

This chapter covers the following topics:

- *Startup and Login* on page 4-1.
- *Choosing and Creating a Scenario* on page 4-3.
- *Using the Main Page* on page 4-14.
- *vSTA Side Bar* on page 4-25.
- *IxWLAN Side Bar* on page 4-40.
- *Monitors Side Bar* on page 4-55.
- *Event Log Side Bar* on page 4-63.
- *Reports Side Bar* on page 4-66.
- *Configuration Side Bar* on page 4-71.
- *Menus and Tool Bars* on page 4-78.

Startup and Login

Some of the dialogs shown in this chapter are feature key dependent. For more information, please refer to *Feature Key Dependent Parameters* on page 1-13.

NOTE: If WPA/RSN features are enabled, IxWLAN checks for encryption hardware on startup. If no encryption hardware is found, a dialog with the following message opens: “WPA Features have been disabled! IxWLAN is licensed for WPA, but no encryption hardware was found.”

Please contact the Ixia Customer Support when this dialog opens.

To start the IxWLAN software and log on:

1. Start Internet Explorer.
2. Type the IP address of the IxWLAN chassis in the URL address field of the browser (for example, http://10.205.15.50).
3. Type your user name and password, as shown in Figure 4-1.

NOTES:

- The default user name is **Admin**.
- The default password is **IxWLAN**.

The user name and password are case-sensitive.

Figure 4-1. Startup and Login

4. Click **OK** to access the IxWLAN web server.
5. After successful logon, a splash page opens for a few seconds.

NOTE: If pop-up blocker software is installed on your system, this splash page opens an error message. For details, see Chapter 8, *Troubleshooting*.

Choosing and Creating a Scenario

This section covers the following topics:

- *Choosing How to Begin* on page 4-3.
- *Creating an Internal Mode/Ping Test* on page 4-6.
- *Creating an External Mode Test* on page 4-7.
- *Running a Test* on page 4-9.

Choosing How to Begin

When IxWLAN already contains virtual station definitions, the dialog shown in Figure 4-2 opens.

Figure 4-2. Choosing How to Begin

- Click **Yes** to build a scenario in the user interface that is based on the virtual stations that are already defined in IxWLAN.
- Click **No** to delete the virtual station definitions and create a new, empty scenario.
- Click **Cancel** to retain the virtual stations in IxWLAN but not create a new, empty scenario.

When the main page opens, you can view the Scenario Summary Report, Group Summary Report, and Event Log for these existing virtual stations.

Figure 4-3 on page 4-4 opens when there are no virtual station definitions in IxWLAN and the welcome screen has not been disabled in the UI Configuration (For more information, please refer to *Configuration->Preferences* on page 4-77).

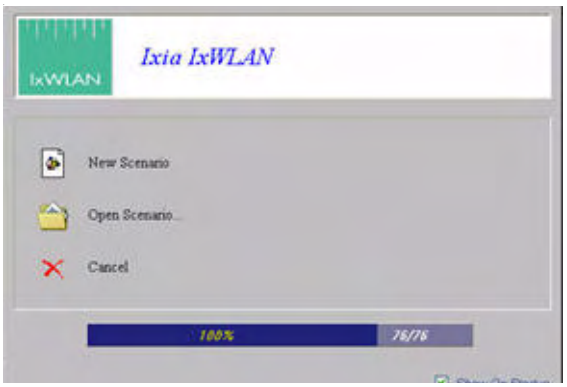


Figure 4-3. Screen Opening When There Are No Virtual Stations Definitions

- Click **New Scenario** to continue to the main page and create a new scenario.
- Click **Open Scenario** to choose from a list of scenario files that have already been created. When you open an existing scenario, IxWLAN information is already stored with the scenario file.
- Click **Cancel** to exit the dialog. You can create a new scenario or open an existing scenario in the main page.
- Unselect the Show On Startup checkbox if you do not want to show this screen each time you access the IxWLAN web server. You can restore this screen in the UI Configuration dialog (For more information, please refer to *Configuration->Preferences* on page 4-77).

When you click **Open Scenario**, the Open Scenario dialog opens, as shown in Figure 4-4.

Figure 4-4. Open Scenario Dialog

The list box shows a list of scenario files in IxWLAN. Click the **BrowsePC…** button to show scenario files stored on the command PC. Click a file name in the list of scenario files.

- Click the **Open** button to open the selected scenario file and continue.

- Click the **Delete** button to delete the selected file.
- Click the **Cancel** button to close this dialog without opening a scenario file. You can create a new scenario or open an existing scenario in the main page.

Main Page

Figure 4-5 shows the format of the main page that opens after you select any of the options in the start-up dialogs. This page looks differently, depending on whether you are running the web-based user interface on a SED or on a SED-MR+ chassis. Figure 4-5 shows the appearance of the IxWLAN SED-MR+ main page. For further details on the differences in the appearance of the main page on the two chassis, see *Using the Main Page* on page 4-14.

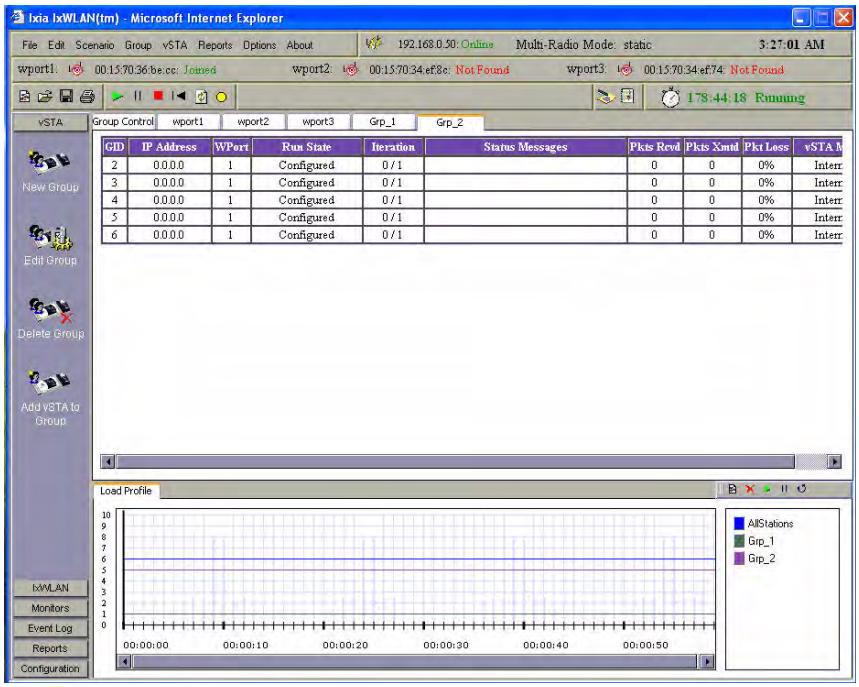


Figure 4-5. Main Page

The content of this page differs depending on whether you create a new scenario, open an existing scenario, or cancel/close any of the start-up dialogs. Figure 4-5 presents an existing scenario, with two groups defined.

NOTE: If no scenario has been created, the page is blank (No Scenario Defined).

If you have successfully opened a scenario file or chosen to use one that is already defined in IxWLAN, you can continue with the testing functions that are available in the menus and tool bars. For more information, please refer to *Running a Test* on page 4-9.

If you click the **Cancel** button or the **Create New Scenario** button, you must create a new scenario that contains one or more group(s) of one or more virtual station(s).

Creating an Internal Mode/Ping Test

For a simple internal mode/ping test:

1. Click **New Group** from the vSTA side bar to open the New IxWLAN Group dialog, as shown in Figure 4-6.

Figure 4-6. New IxWLAN Group Dialog

2. If you want IxWLAN to dynamically acquire IP addresses, select **DHCP** from the Address Generation drop-down list box. Otherwise, type an IP address in the *Starting IP Address* field to define the starting IP address to be used by virtual stations that are created in this scenario. Virtual stations are created with unique IP addresses, sequentially or randomly, based on this starting IP address.

If you set the SSID, you can create a group with a SSID.

3. Select the Traffic tab, as shown in Figure 4-7.

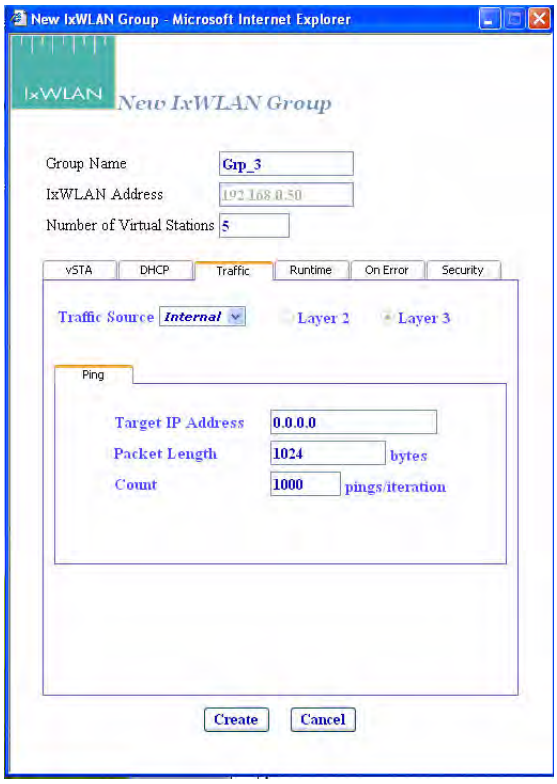


Figure 4-7. Traffic Tab

4. Make sure that the *Target IP Address* field is set to the address of a target server to be pinged. The default IP address (0.0.0.0) shown in this example screen must be replaced by a valid IP address (for example, 10.205.15.95). Click the **Create** button to create a group with five virtual stations. For more information on defining and editing groups and virtual stations in a scenario, please refer to *vSTA->New Group* on page 4-26.

5. Please refer to *Running a Test* on page 4-9 for procedures needed to run this test.

Creating an External Mode Test

For an external mode test, a third-party load generator outside IxWLAN must be set up to provide the traffic to be forwarded to the System Under Test.

1. Use the documentation provided by the manufacturer to set up the load generator.

2. Select **New Group** from the vSTA side bar to open the New IxWLAN Group dialog, as shown in Figure 4-8.

Figure 4-8. Select New Group from vSTA Side Bar

3. For layer 3, the source IP on your load generator must match the starting IP address assigned to the first vSTA on IxWLAN. For layer 2, the source MAC on your load generator must match the starting MAC address assigned to the first vSTA on IxWLAN.

4. Select the Traffic tab, as shown in Figure 4-9.

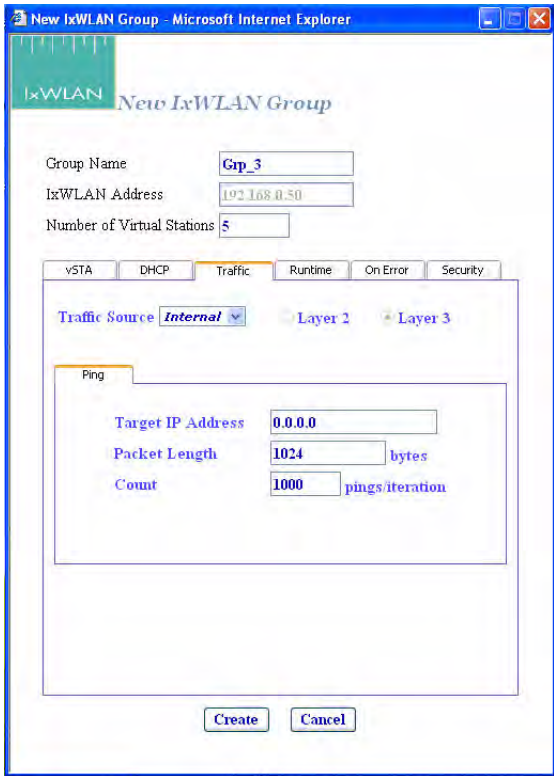


Figure 4-9. Traffic Tab

5. Select **External** in the *Traffic Source* field. Click the Layer 2 radio button to capture frames based on an 802.3 MAC source address. Click the Layer 3 radio button to capture frames based on an IP source address. A target IP address is not needed for an external mode test.
6. Click the **Create** button to create the scenario for an external mode test.

Running a Test

Allows you to run the scenario/test for all groups and all virtual stations in a scenario.

Allows you to run a test for selected virtual stations or groups.

If you have not joined with a System Under Test, the dialog shown in Figure 4-10 on page 4-10 opens.

Figure 4-10. Running a Test without Joining a SUT

Click **Yes** to open the Select System Under Test dialog and join with the System Under Test.

NOTE: It is always necessary to join with a System Under Test before running a test (internal or external). If there are no SSIDs listed in the main page, the Select System Under Test dialog does not show any systems to join. If this is the case, click the **Rescan** button in the main page to instruct IxWLAN to look for systems to test.

You can use any of the following methods to open the System Under Test dialog, shown in Figure 4-11 on page 4-11:

1. Click **Yes** in the You are not joined with the SUT dialog shown in Figure 4-10.

2. Click the SUT icon in the System Under Test status tool bar at the top of the main window.

3. Click the **Select SUT** button in the IxWLAN side bar.

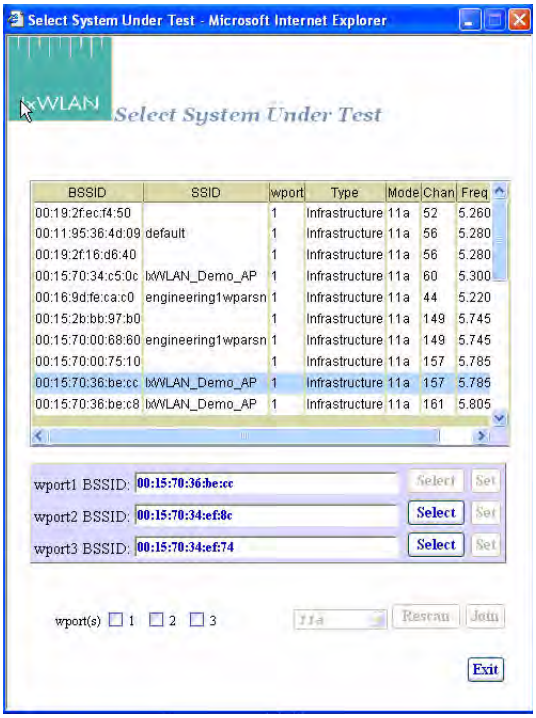


Figure 4-11. Select SUT Dialog

If you have created a new scenario and have not saved it using the **Save Scenario** option in the **File** menu, the dialog shown in Figure 4-12 opens, asking you to save the scenario.

Figure 4-12. Save Scenario Dialog

Click **Yes** to open the Save Scenario dialog and save the scenario file, as shown in Figure 4-13.

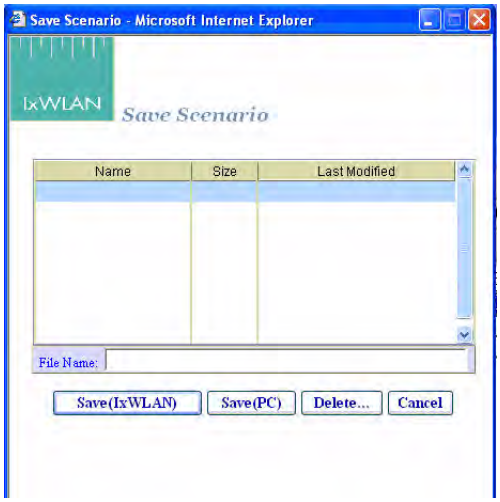


Figure 4-13. Save Scenario File

Type a name in the *File Name* field.

NOTE: Do not use colon (:), asterisk (*), question mark (?), quotes (“ “), less-than/greater than signs (< >), vertical bar (|), or spaces in a file name.

- Click the **Save (IxWLAN)** button to save the scenario in the IxWLAN flash file system.
- Click the **Save(PC)** button to save the scenario on the command PC. A standard save dialog opens, as shown in Figure 4-14.

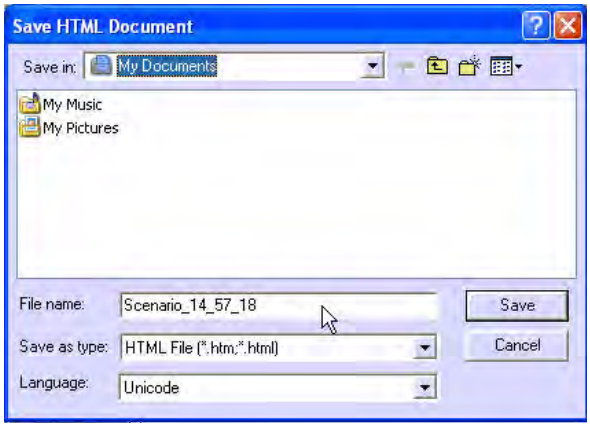


Figure 4-14. Save HTML Doc Dialog

Type a name in the *File Name* field.

NOTE: Do not use colon (:), asterisk (*), question mark (?), quotes (“ “), less-than/greater than signs (< >), vertical bar (|), or spaces in a file name.

A disk drive specification (for example, C:/, D:/) is optional. Click the **Save** button to save the scenario at the designated location on the command PC.

The virtual stations start running a few seconds after the scenario is saved. As the test runs, you can see the “Run State” in the group grid go through the 802.11 states: configure, starts, authenticate, associate, and run. When an internal mode/ping test is complete, the Run State shows **Done**.

NOTE: Any interaction with a running test can affect the operation of the test, which may result in skewed statistics.

Using the Main Page

NOTE: The appearance of the main IxWLAN window differs depending on the type of chassis used to run the web-based interface:

- In the main window of the IxWLAN SED chassis, the BSSIDs for the other two wports, which are available in the IxWLAN SED-MR+ chassis main window, are disabled, appearing dimmed, as well as the corresponding SUT-selection buttons.
- The wport tabs for the other two wports do not appear in the main window of the IxWLAN SED chassis.

Figure 4-15 shows the general format of the main page, as it displays on an IxWLAN SED-MR+ chassis. It illustrates a scenario with two virtual station groups defined and a group tab (Grp_2) selected.

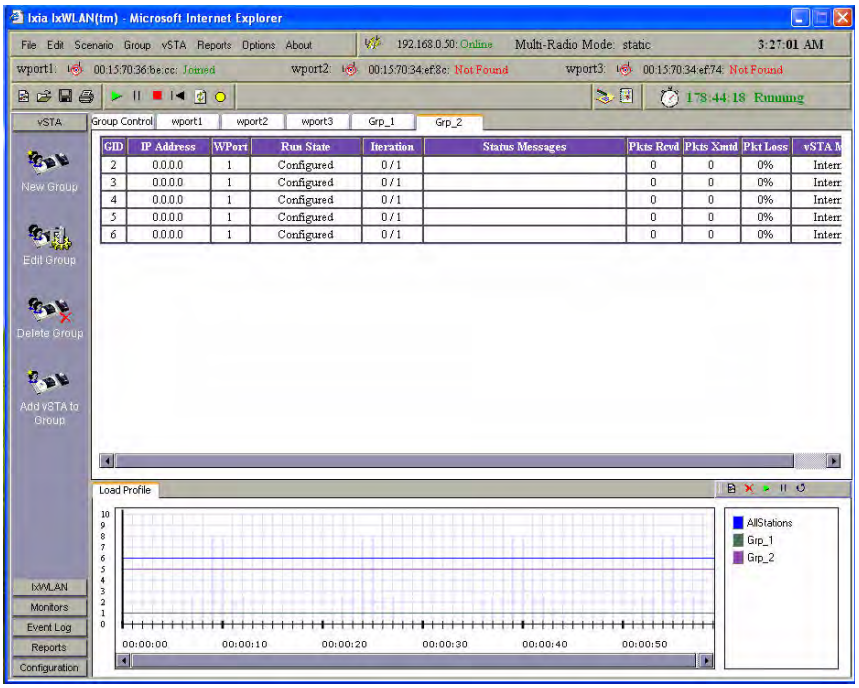


Figure 4-15. IxWLAN SED-MR+ Main Page

For the IxWLAN SED chassis, the main window has a similar appearance, except for the two other wports, which are dimmed. Figure 4-16 shows a scenario with one virtual station group defined and the Group Control tab selected.

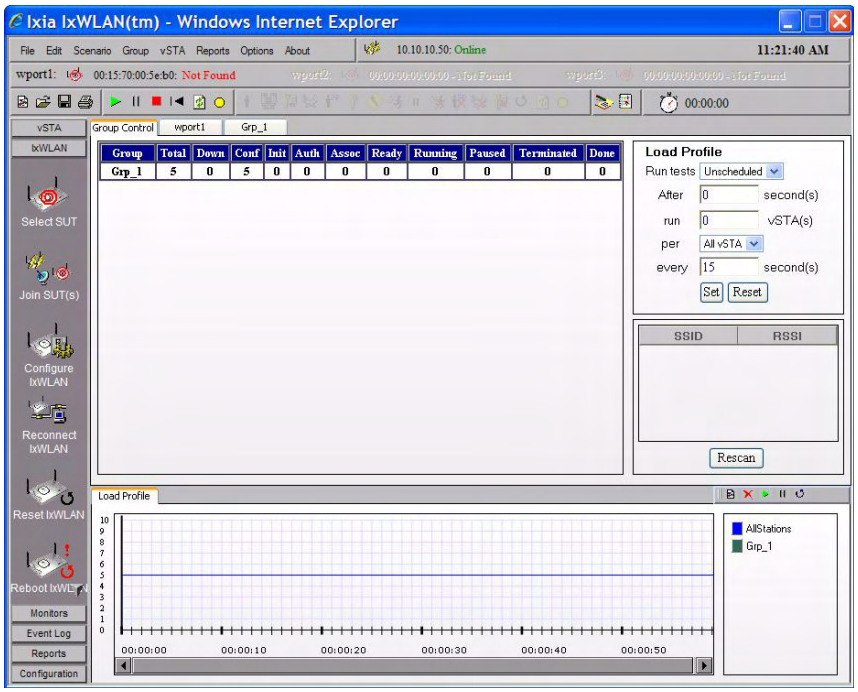


Figure 4-16. IxWLAN SED Main Page

When the Group Control tab is selected, the main page opens the Load Profile and a list of devices that have been discovered (if any) in a scan, as shown in Figure 4-17.

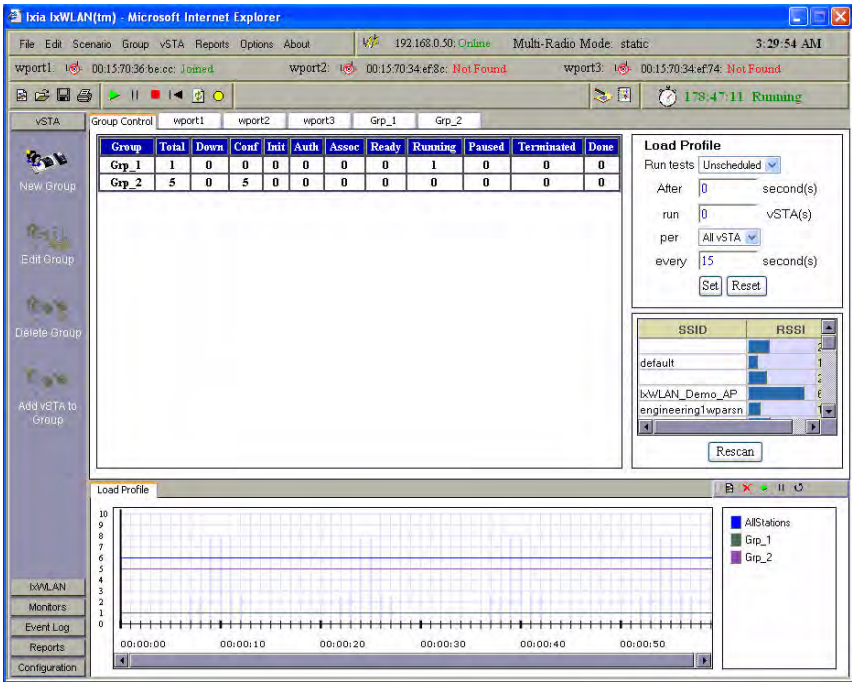


Figure 4-17. Load Profile and List of Devices

Menu tool bar: The top-left tool bar of the main page is a drop-down menu bar of all IxWLAN functions (Figure 4-18).

Figure 4-18. Menu Tool Bar

Status tool bar: The top-right tool bar shows the status of IxWLAN, the multiradio mode (**Static** or **Dynamic**), and the current time on the command PC (Figure 4-19).

Figure 4-19. Status Tool Bar

The status (for example, **Online**) next to IxWLAN IP Address indicates the current status of IxWLAN with the web-based user interface. This status may intermittently show **Busy** or **Offline**. If the Busy or Offline status displays frequently or for extended periods of time, check the Polling Interval and Polling Timeout values in the Configure IxWLAN dialog. The Multi-Radio Mode indicator on the tool bar shows the currently set multi-radio mode (**static** or **dynamic**). The default setting for the multi-radio mode indicator is **static**. The multi-radio mode can be changed in the Configure IxWLAN dialog. Please refer to *IxWLAN-*

>*Configure IxWLAN* on page 4-44 and to *IxWLAN Busy or Not Responding* on page 8-5.

System Under Test status tool bar: It is located under the Menu and Status tool bars and shows the BSSID(s) and buttons to choose SUT(s) for specific wports. The status (for example, **Not Found**) next to the BSSID/MAC address indicates the current status of IxWLAN with a System Under Test (Figure 4-20).

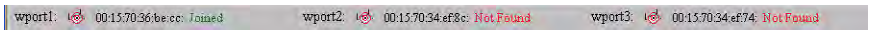


Figure 4-20. SUT Status Tool Bar

File tool bar: This tool bar is used to create, open, save, and print scenarios (Figure 4-21).

Figure 4-21. File Tool Bar

Scenario tool bar: The buttons in this section of the tool bar can be used to run, pause, stop, restart, refresh, or quiesce the entire scenario of all virtual stations (Figure 4-22).

Figure 4-22. Scenario Tool Bar

vSTA tool bar: The buttons in this tool bar are used to start, authenticate, associate, acquire an IP, run, pause, release an IP, stop, disassociate, de-authenticate, restart, refresh, or quiesce selected virtual stations or groups of virtual stations (Figure 4-23).

Figure 4-23. vSTA Tool Bar

Reports tool bar: The buttons in this tool bar are used to view reports and the event log (Figure 4-24).

Figure 4-24. Reports Tool Bar

Test Clock: The clock icon and time (hh:mm:ss) immediately adjacent to the Reports tool bar shows the elapsed duration of a test that is in progress or the most recent test that completed (Figure 4-25).

Figure 4-25. Test Clock

Side Bar Buttons: The side bar buttons are used to select vSTA, IxWLAN, Monitor, Report, Event Log, and Configuration functions in the web-based user interface (Figure 4-26).

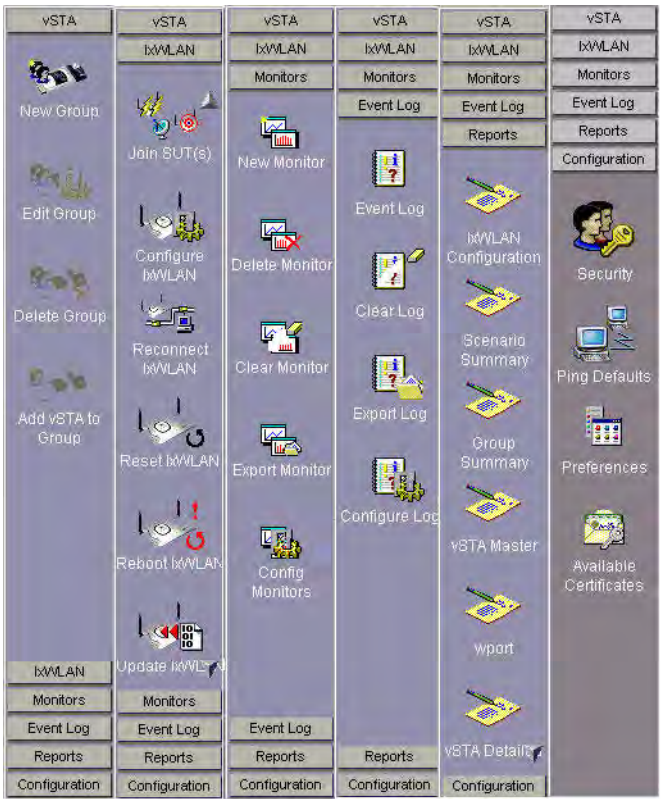
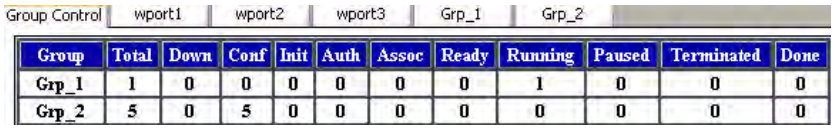


Figure 4-26. Side Bar Buttons

Note the down-arrow buttons at the bottom of the IxWLAN and Reports side bars. These arrows indicate additional functions or information in the down side of the side bar displayed. When you click the down-arrow button, the additional information displays and an up-arrow button is shown at the top of the side bar.

Group Control Grid

If the Group Control tab is selected, the table shows the status of each group and its associated virtual stations, as shown in Figure 4-27.



Group	Total	Down	Conf	Init	Auth	Assoc	Ready	Running	Paused	Terminated	Done
Grp_1	1	0	0	0	0	0	0	1	0	0	0
Grp_2	5	0	5	0	0	0	0	0	0	0	0

Figure 4-27. Group Status

Group: Shows the name of each group. The name is assigned in the New IxWLAN Group dialog (For more information, please refer to *vSTA->New Group* on page 4-26).

The remaining fields in the group line are counters that show the state of each group's virtual stations during a test.

Total: Shows the total number of virtual stations in each group.

Down: Shows the total number of virtual stations in a group that have not been configured in IxWLAN and are in a down state.

Conf (Configured): Shows the total number of virtual stations in each group that have been configured in IxWLAN.

Init (Initialized): Shows the total number of virtual stations in each group that have been started in IxWLAN.

Auth (Authenticated): Shows the total number of virtual stations in each group that have been 802.11 authenticated with the System Under Test.

Assoc (Associated): Shows the total number of virtual stations in each group that have been 802.11 associated with the System Under Test.

Ready: Shows the total number of virtual stations in each group that are ready to run.

Running: Shows the total number of virtual stations in each group that are currently performing an operation defined by the scenario. The operation that is being performed depends on whether the virtual stations are configured for internal or external traffic generation.

Paused: Shows the total number of virtual stations in each group that have paused in their execution.

Terminated: Shows the total number of virtual stations in each group that have been ended. These virtual stations must be reset before they can be used again.

Done: Shows the total number of virtual stations in each group that have completed their run of an internal mode/ping test. This field is not to be incremented for virtual stations that are running an external mode test or an internal mode test with infinite iterations.

wport Tabs: Each wport has its own tab. When a wport tab is selected, the table displays details on the vSTAs corresponding to the respective wport. The table columns are the same as for the Groups tabs, except for the wport column.

NOTE: While in the wport tab view, the **Edit** and **Group** menu items are dimmed.

Group Tabs: Each group defined in the scenario has its own tab. When an individual group tab is selected, the table displays details of each virtual station in the group, as shown in Figure 4-28.

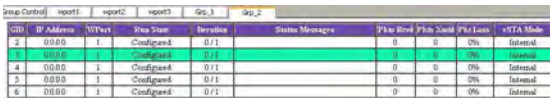


Figure 4-28. Group Tabs

GID: The global ID is a unique ID that is assigned by IxWLAN to each virtual station in a scenario group. It is an unique ID across all groups in IxWLAN. The GID is the vSTA ID.

IP Address: Shows each virtual station's IP Address.

WPort: Shows the wport on which the vSTA resides

Run State: Shows the current state of each virtual station in the scenario group (that is, Initializing, Authenticating, Authenticated, Associating, and so on).

Iteration: The two numbers in this column show the current iteration of the test that a virtual station is running or has completed and the number of iterations that are configured for the virtual station (for example, 5/10 = 5 iterations have been completed/10 iterations are to be run). These numbers can be a value in the range zero (0) to 9999 or Infinite.

Status Messages: Shows the status and/or the error messages returned by IxWLAN for each virtual station in the scenario group. For more information about the messages that can be shown in this column, please refer to Appendix E, *Error and Status Messages*.

Pkts Rcvd: Shows the total number of packets received by each virtual station in this group.

Pkts Xmtd: Shows the total number of packets transmitted by each virtual station in this group.

Pkt Loss: Shows the percentage of packet loss for each virtual station in this group.

vSTA Mode: Shows the traffic generation mode (Internal or External) of each virtual station in the scenario group.

You can select one or more line items/virtual stations in the table and choose a menu item or tool bar button to execute a command for an individual or multiple virtual stations.

You can double-click a virtual station line item in the table to open the Edit Virtual Station dialog. For more information about this dialog, please refer to *vSTA->Add New vSTA to Group* on page 4-39.

You can right-click the selected virtual stations to open the vSTA menu. For more information about the selections in this menu, please refer to *vSTA Menu* on page 4-89.

Group Tab Columns: Within a group, you can double-click the table heading to configure the displayed columns, as shown in Figure 4-29.

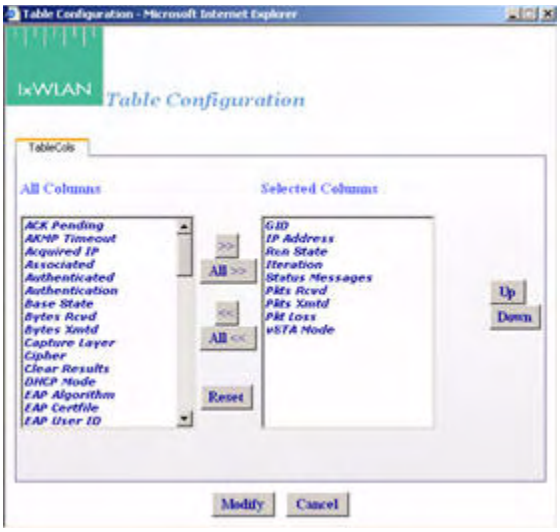


Figure 4-29. Group Tab Columns

Select one or more items in the All Columns list box and click the **[>>]** button to move them to the Selected Columns list box. Click the **Modify** button to add the columns to the group table. Click the **Reset** button to return the columns to their default setting.

Load Profile

The Load Profile section of the page can be used to automatically execute scenarios at scheduled intervals, as shown in Figure 4-30 on page 4-22.

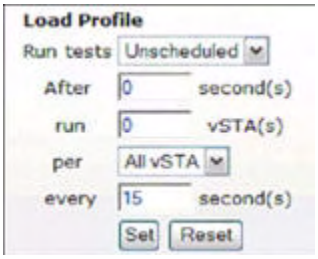


Figure 4-30. Load Profile

When automatic scheduling is defined, the grid in the down side of the Scheduling/Group table charts the status of each virtual station over the period of the test. For further information about using this feature please refer to *Using Load Profiles* on page 4-23.

Systems to Test

In the down side of the Load Profile, the main page shows a list of systems and their signal strength in relationship to IxWLAN, as shown in Figure 4-31.

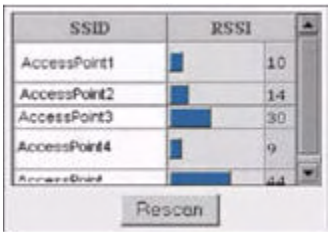


Figure 4-31. System to Test

Click the **Rescan** button to instruct IxWLAN to rescan for all systems. The devices shown in this list box are shown in the Select System Under Test dialog, that allows you to choose a system to test.

Load Profile/Monitor Graphs

The bottom half of the web page is reserved for charts that graphically show a load profile and monitor test results. If selected, the Load Profile tab allows you to view the loading profile based on an active Load Profile, as shown in Figure 4-32.

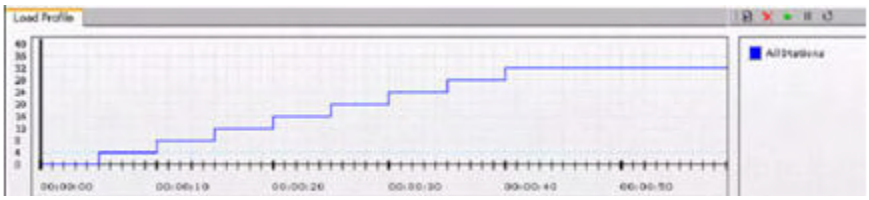


Figure 4-32. Load Profile / Monitor Graphs

For more information about how to set up a Load Profile, please refer to *Using Load Profiles* on page 4-23.

If there are multiple monitors defined, use the horizontal tabs at the top of this section to select and view each monitor, as shown in Figure 4-33.

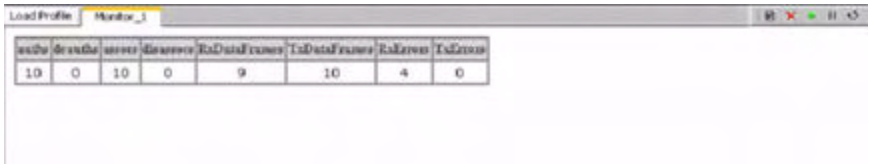


Figure 4-33. Multiple Monitors

A maximum of four monitors can be defined in each scenario. The tool bar in the top right corner of the monitor area allows you to define a new monitor, delete a monitor, run a paused monitor, pause a running monitor, and clear a monitor's view. For more information about this section of the page, please refer to *Monitors Side Bar* on page 4-55.

Range Checking/ Error Messages

In the dialogs described later in this chapter, the web-based user interface verifies all entries that need values within a specified range.

If a field contains a very large number, do not type commas (,) for values larger than 999 (for example, use 1000 rather than 1,000).

If you use an invalid character in a field or specify a value that is not within the allowable range, a dialog opens, as shown in Figure 4-34.

Figure 4-34. Range Checking

When an Invalid Data dialog opens, click **OK** and retype a value that is within the allowable range for the field.

Using Load Profiles

Load Profiles allows you to control the execution of virtual stations: Unscheduled or Scheduled, as shown in Figure 4-35.

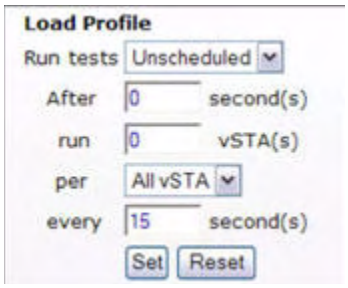


Figure 4-35. Load Profile Settings

When using the Unscheduled mode, the virtual stations can be manually controlled.

When using the Scheduled mode, the virtual stations can be run incrementally based on groups (all virtual stations within the group) or by individual virtual stations.

NOTE: When requests are batched for transmission, they may not be sent at the scheduled interval defined by the Load Profile. See the *Batch IxWLAN Requests* field in the Configure IxWLAN dialog (see *IxWLAN->Configure IxWLAN* on page 4-44).

Run tests: Select **Unscheduled** or **Scheduled**. The default is **Unscheduled**. If **Scheduled** is selected (and set by clicking the **Set** button), the Load Profile is in effect for the scenario. If **Unscheduled** is selected, the Load Profile is not in effect.

After: Defines a first delay before a run starts: from 0 to 3600 s (1 h). It is the number of seconds after a **Run** command has been issued (for example, the **Run** button is selected in the tool bar) that the Load Profile begins executing.

run: Type the number of virtual stations to start each time interval of the load profile. The time interval is specified in the *every* field.

per: Defines what scheduling is based on (All vSTA = all virtual stations, Groups = virtual stations within each group). If **All vSTA** is selected, the Load Profile runs the next *run* number of virtual stations at each scheduled iteration. If **Group** is selected, the Load Profile runs the next *run* number of virtual stations from each group at each scheduled iteration. The scheduled iteration is defined in the *every* field.

every: Defines the number of seconds between each repetition of the Load Profile: from 1 to 3600 s (1 h). When this time expires, the next set of virtual stations (as defined in the *run* field) is executed.

Select the Load Profile tab in the Load Profile/Monitors section of the page to show the Load Profile graph. The Load Profile graph opens the Load Profile setup: x-Axis = time, y-Axis = Groups or All vSTA depending on the selection in the *per* field. Figure 4-36 on page 4-25 shows a sample Load Profile setup and graph.

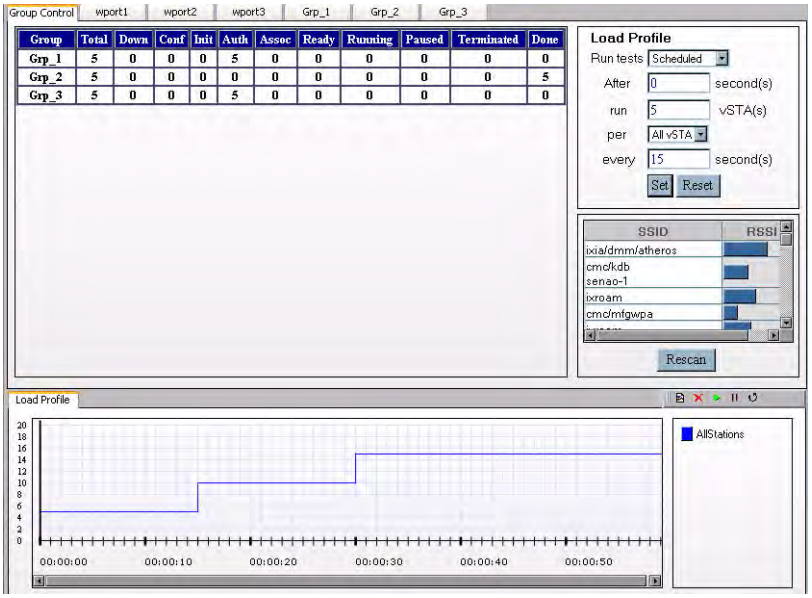


Figure 4-36. Load Profile Setup and Graph

After a five-second delay, the web-based user interface instructs IxWLAN to run four virtual stations. Every five seconds thereafter, the web-based user interface instructs IxWLAN to run another four virtual stations until all virtual stations are executed. The graph depicts this scheduling scheme.

vSTA Side Bar

In the web-based user interface, you can create scenarios that consist of one or more groups of virtual stations. The group configuration defines a test sequence that IxWLAN activates to exercise the System Under Test. Virtual stations can be configured individually or by group. In internal mode, you can configure each virtual station and/or group to generate traffic to the system being tested. You can also configure virtual stations to operate in external mode where an external load generator generates the traffic.

New Group: Defines a new group in a scenario.

Edit Group: Modifies the definition of a group.

Delete Group: Removes a group and all its virtual stations from a scenario.

Add vSTA to Group: Defines a new virtual station in a scenario group.

vSTA->New Group

The New Group dialog allows you to define new groups of virtual stations in a scenario. It is a tabbed dialog with the following sections: vSTA, Traffic, Runtime, On Error, and Security.

- The **Create** button allows you to create the group.
- The **Cancel** button allows you to exit the dialog.

vSTA->New Group->vSTA

The vSTA section of the New IxWLAN Group dialog defines the range of IP and MAC addresses to be used by virtual stations, as shown in Figure 4-37 on page 4-26.

The range of MAC addresses specified in this dialog must be within the range of MAC addresses defined by the WLAN Base MAC Address and WLAN MAC Mask in the IxWLAN configuration (see *IxWLAN->Configure IxWLAN* on page 4-44).

Figure 4-37. vSTA Section

Group Name: Use a group name that helps you identify the devices to be tested (for example, Warehouse, Stock_Room, Ctrl_Tower, Shop_Floor, and so on.). It can be up to 12 characters (a…z, 0…9, and underscore (_)).

IxWLAN Address: Shows the IP address of IxWLAN that runs this scenario/test.

Number of Virtual Stations: Type the number of virtual stations to create in this scenario group. The maximum number of vSTAs for the IxWLAN SED chassis is 64, and 128 for the IxWLAN SED-MR+ chassis. The default value is **5**. If you specify zero virtual stations in this dialog, you must use the Add vSTA to Group dialog to add one or more virtual stations to this group. The Add vSTA to Group dialog uses the default parameters that you set in this group definition.

NOTE: If you intend to configure all virtual stations for WPA or RSN authentication, the maximum number of virtual stations is 59.

wport: Select the number of the wport (1, 2, or 3). Subsequently, the group is created on the chosen wport.

Starting IP Address: If **Sequential** or **Random** is selected in the *Address Generation* field, type the starting IP address to use for virtual station IP address generation of newly-created virtual stations in this group. Successive virtual station IP addresses are sequentially or randomly generated from this base address.

Netmask: Shows the network mask to be used by virtual stations in this group. It cannot be set here. It is global for all virtual stations and an IxWLAN configuration parameter.

Ending IP Address: If **Random** is selected in the *Address Generation* field, type the ending IP address to be used by virtual stations in this group when generating random addresses within a range.

Address Generation: Select **Sequential**, **Random**, or **DHCP** from the drop-down list box. The **Sequential** or **Random** selections instruct IxWLAN to sequentially or randomly assign IP addresses to newly-created virtual stations. The **DHCP** mode allows virtual stations to have IP addresses dynamically acquired from a DHCP server on the WLAN network rather than a fixed, configured IP address. If **DHCP** is selected, IxWLAN initiates lease negotiation if association succeeds for each individual virtual station.

Starting MAC Address: Type the starting MAC address to be used for virtual station MAC address generation of newly-created virtual stations in this group. Successive virtual station MAC addresses are sequentially or randomly generated from this base address. The starting MAC address must be within the range of MAC addresses defined by the WLAN Base MAC Address and WLAN MAC Mask in IxWLAN configuration (see *IxWLAN->Configure IxWLAN* on page 4-44).

WLAN MAC Mask: The WLAN MAC Mask is a display-only field. It is defined in IxWLAN configuration (see *IxWLAN->Configure IxWLAN* on page 4-44). It limits the range of MAC addresses that can be detected on the wireless LAN and received by IxWLAN. For example, if the WLAN MAC is set to **00:0b:cd:59:23:44** and the mask is set to **ff:ff:ff:ff:00:00**, the only MAC addresses that can be detected on the wireless LAN and received by IxWLAN are **00:0b:cd:59:00:00** - **00:0b:cd:59:ff:ff**. All other MAC addresses are filtered out.

Ending MAC Address: Type the ending MAC address to be used by virtual stations in this group.

SSID: Set the SSID to a string. The user can create a vSTA with a SSID. This is an optional field.

vSTA->New Group->Traffic

The Traffic section of the New IxWLAN Group dialog defines the type of traffic (Internal/Ping or External/Load Generator) to be used by the virtual station(s), as shown in Figure 4-38.

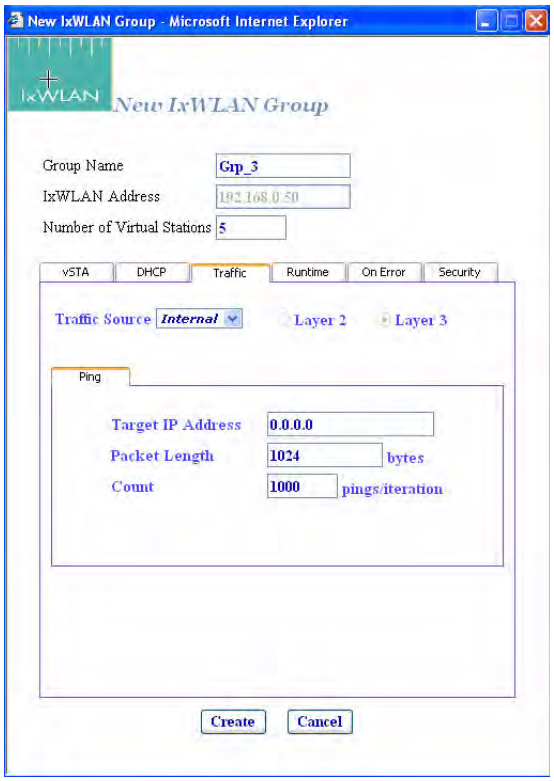


Figure 4-38. vSTA Traffic

Traffic Source: Select **Internal** or **External** from the list box. In **Internal** mode, traffic is generated internally by each vSTA using ICMP Echo (Ping) Request/Reply packets. In **External** mode, packets coming into IxWLAN over 802.3 are mapped to virtual stations by source IP or MAC address and forwarded via 802.11. Packets coming back via 802.11 are remapped to the originating MAC address.

Layer 2/Layer 3: If **External** is selected in the *Traffic Source* field, select one of these radio buttons to identify the external frames to be captured. If **Layer 2** is selected, frames are captured based on the source 802.3 MAC address. If **Layer 3** is selected, frames are captured based on the source IP address. For vSTAs configured at layer 3, IP and ARP packets generated from this host that contain the

virtual station's IP address as a source are translated at the MAC layer to appear as if sourced from the virtual station's MAC address.

Target IP Address: Type the target IP address where ICMP Echo (Ping) Requests should be sent. The default IP address (**0.0.0.0**) shown in this example dialog must be replaced by a valid IP address (for example, 192.168.0.19).

Packet Length: Specify the size of the ping data buffer (64…1024). The default is **1024**.

Count: Specify the total number of pings to be sent: 0…10000 (**0=forever**).

vSTA->New Group->Runtime

The Runtime section of the New IxWLAN Group dialog allows you to run a virtual station's test multiple times. This is applicable only to internal traffic generation. After each iteration of a test, the state of the virtual station can be set to a **base state**. A user-defined delay between successive iterations is defined in milliseconds (ms). Optionally, any results collected for the virtual station can be cleared at the start of each iteration.

Figure 4-39 shows the Runtime section of the New IxWLAN Group dialog.

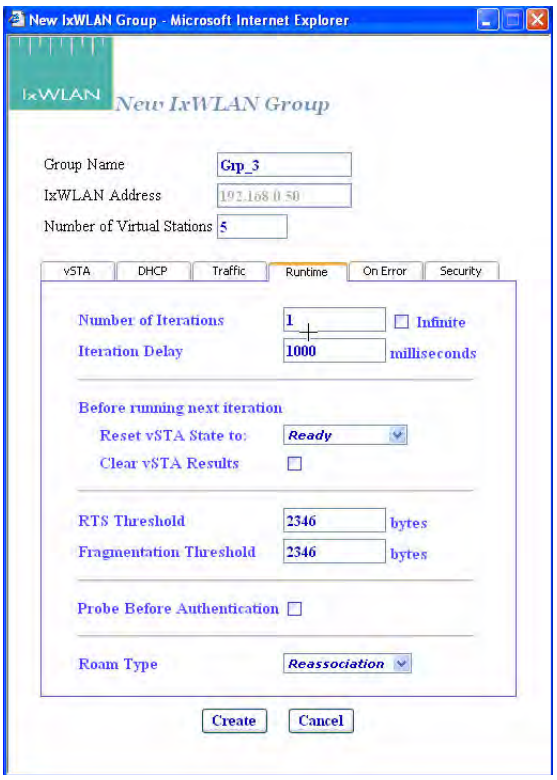


Figure 4-39. vSTA Runtime

Number of Iterations: Type the number of times (1…10000) to repeat the virtual station's task (Ping) or click the Infinite checkbox to continuously iterate indefinitely.

Iteration Delay: Type the delay (in ms) to be introduced between iterations of the test. It can be set to a value in the 0 to 300000 ms (5 min) range.

Before Running Next Iteration->Reset vSTA State to: Select a state from the list box. Each virtual station in this group resets to the selected state (started, authenticated, or associated) at the end of each iteration.

Before Running Next Iteration->Clear vSTA Results: Select this checkbox to clear test results before successive iterations of the test.

RTS Threshold: Type a value in the 1 to 2346 range to define the RTS threshold for the virtual station(s) in this group. Any frame to be transmitted by a virtual station that exceeds the RTS threshold needs a successful RTS/CTS frame exchange before the frame is transmitted. The minimum value (1) effectively needs RTS/CTS for all transmit frames. The maximum value (2346) is the maximum 802.11 frame size and effectively disables RTS.

*Fragmentation Threshold***:** Type a value in the 256 to 2346 range to define the fragmentation threshold for the virtual station(s) in this group. The fragmentation threshold limits the number of bytes in any 802.11 frame transmitted by the virtual station(s). If this field is set to **2346** (that is, the maximum 802.11 frame size), fragmentation is effectively disabled.

Probe before Authentication: An option to select whether to issue a Probe Request in the course of association lifecycle, before the 802.11 authentication.

Roam Type: Select **Reassociation** or **Disassociation**. Indicates the type of frame exchange to be used for virtual station(s) in this group during a Roam operation: Reassociation (a Reassociation Request is sent to the target AP) or Disassociation (a Disassociation frame is first sent to the origin AP and an Association Request frame is sent to the target AP).

vSTA->New Group->On Error

The On Error section of the New IxWLAN Group dialog defines whether virtual stations should reconnect to the System Under Test during a test if the system deauthenticates or disassociates a virtual station, as shown in Figure 4-40 on page 4-31.

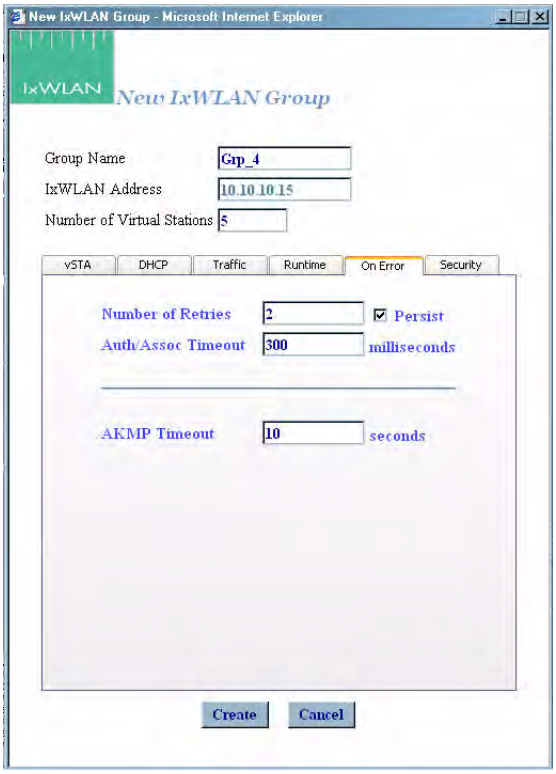


Figure 4-40. vSTA Error

Number of Retries: Specifies the number of times IxWLAN should issue authentication and association requests before failing the operation. It can be a value in the 0 to 10 range.

Persist: Click the checkbox to enable or disable persistence. When enabled, virtual stations in this group remain persistent (connected) if the System Under Test deauthenticates or disassociates. If IxWLAN loses connection to a System Under Test, persistence allows it to recover and continue the test at the point where it was interrupted. For example, if a virtual station is in a run or associated state and an 802.11 management frame (deauth or disassoc) is sent by the System Under Test and received by IxWLAN, the virtual station tries to return to the state it was in, before the management frame was received. If the virtual station was running a ping test, the ping test continues. If it was in an associated state, the virtual station reissues the associate request.

Auth/Assoc Timeout: Specifies the timeout value (in ms) for authentication and association requests. It can be set to a value in the 250 to 60000 ms (1 min) range.

AKMP Timeout: Sets a wait state timer (0…3600 s) for the virtual stations in the group. In situations where the System Under Test does not start or respond during a 4-way handshake, the affected virtual station may stall in a wait state. The timer can be used to recover the virtual station into an operable state. If the virtual station remains in a wait state until this timer expires, it is 802.11 de-authenticated and returned to the beginning state. The default value (**zero**) disables the timer (that is, wait forever).

vSTA->New Group->Security

This section of the New Group dialog defines whether the virtual station uses security, the type of authentication to be used for authenticating with the System Under Test, and the associated cipher to use.

Encryption: Select **On** or **Off** from the drop-down list box to enable/disable encryption.

Authentication: Select an authentication type: Open System, Shared Key, RSN, RSN-PSK, WPA, or WPA-PSK. If you select **RSN** or **WPA**, define user credential parameters in the EAP tab. If you select **RSN-PSK** or **WPA-PSK**, define a pre-shared key or passphrase in the PSK tab.

Cipher: For Open System or Shared Key Authentication, **WEP** is the only valid selection. For RSN, RSN-PSK, WPA, and WPA-PSK Authentication, select **TKIP** or **AES-CCM** (that is, CCMP cipher mode).

Fast Radius: The default value of this attribute is **Disabled**. When a vSTA is configured for fast RADIUS reconnection and the vSTA has cached the TLS session information, it tries fast resumption in subsequent 802.1X authentication exchanges by using the session_id and master_key from that cached TLS session.

PMKSA Cache: Enables the use of the cached PMKSA information when (re)associating. The default value is **Enabled**. Each entry in the PMKSA cache contains the BSSID of the corresponding AP, a PMKID, and the Pairwise Master Key (PMK). A PMKSA can be obtained by 802.1X authentication or by pre-authentication.

vSTA->New Group->Security WEP Tab

For Open System or Shared Key Authentication and WEP Cipher mode, this section of the New Group dialog allows you to define up to four shared keys, as shown in Figure 4-41 on page 4-33.

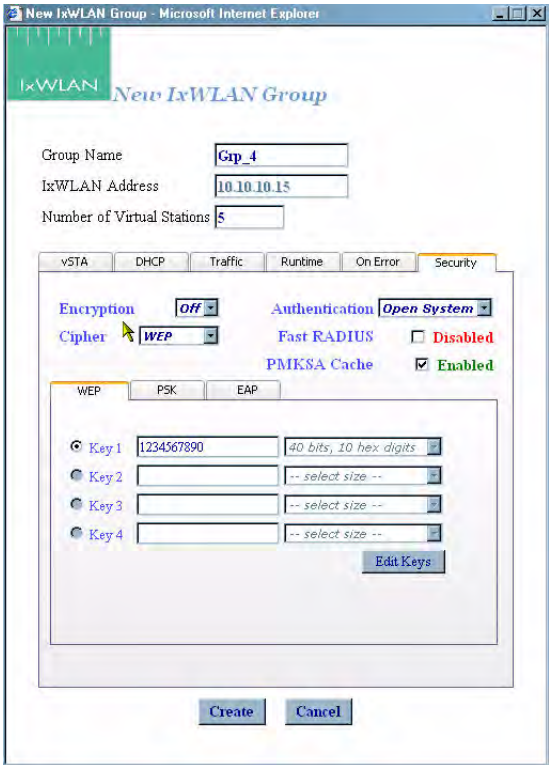


Figure 4-41. Security Keys

Key 1…4: This section of the dialog shows the shared keys that were defined in the Security Configuration dialog. For further information, please refer to *Configuration->Security* on page 4-71. Select the shared key to be used. These keys are used for encryption by virtual stations in this group with the System Under Test.

Edit Keys: The **Edit Keys** button allows you to change the keys in this dialog.

vSTA->New Group->Security PSK Tab

If you have selected **WPA-PSK** or **RSN-PSK** in the *Authentication* field, this section of the dialog defines a Pre-Shared Key or passphrase, as shown in Figure 4-42.

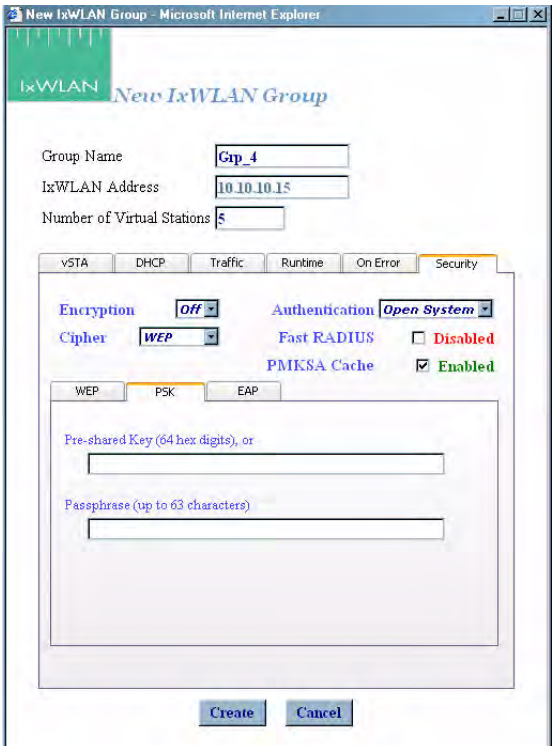


Figure 4-42. Security PSK Tab

Pre-Shared Key (64 hex digits): Defines a Pre-Shared Key (64 ASCII-hex characters) for all virtual stations in this group.

NOTE: When using a Pre-Shared Key, it is not necessary to specify the passphrase.

Passphrase (up to 63 characters): Defines a passphrase of up to 63 ASCII characters.

NOTE: When a passphrase is defined, it is not necessary to specify the Pre-Shared Key. The passphrase is used to generate the Pre-Shared Key.

vSTA->New Group->Security EAP Tab

If you have selected **RSN** or **WPA** in the *Authentication* field, this dialog allows you to define user credential parameters, as shown in Figure 4-43.

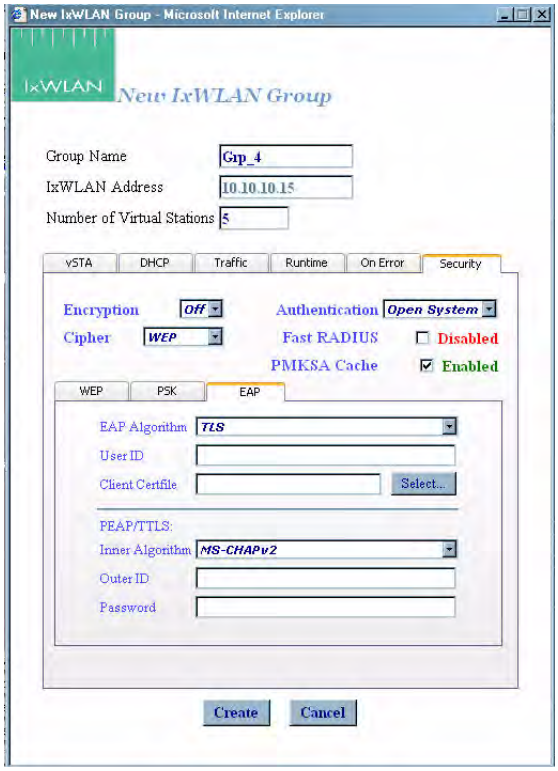


Figure 4-43. Security EAP Tab

EAP Algorithm: Select **TLS**, **TTLS**, or **PEAP** from the drop-down list box. If you select **PEAP** or **TTLS**, define Inner Algorithm, Outer ID, and Password in the PEAP/TTLS section.

User ID: Defines the user ID for virtual stations in this group. It can be up to 64 characters in the range A…Z, a…z, 0…9, or other legal characters: period (.), dash (-), at-sign (@).

Client Certfile: Defines the certificate file for virtual stations in this group.

Select…: Click the **Select...** button to open the Available Certificates dialog and select a certificate file. See *Available Certificates* on page 4-36.

*PEAP/TTLS Parameters***:** When **PEAP** or **TTLS** is selected in the EAP Algorithm list box, use this section of the dialog to define PEAP/TTLS parameters.

Inner Algorithm: Select the inner algorithm to use in Phase 2 authentication. MS-CHAPv2 is normally used for TTLS. EAP-MS-CHAPv2 is normally used for PEAP.

Outer ID: Type an outer identity to use in Phase 1 authentication. It can be up to 64 characters in the range A…Z, a…z, 0…9, or other legal characters: period (.), dash (-), at-sign (@).

Password: Type a password to use in Phase 2 authentication. It can be up to 64 characters.

NOTE: Inner Algorithm, Outer ID, and Password are only used for TTLS and PEAP. They are ignored for TLS.

Available Certificates

The **Select** button in the New Group/Security EAP tab opens the Available Certificates dialog, as shown in Figure 4-44.

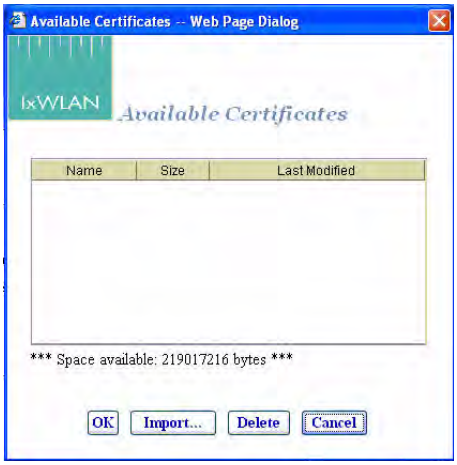


Figure 4-44. Available Certificate Dialog

The *Space available* indicates the total available space in the IxWLAN flash file system. This number changes when certificate files are added or deleted.

- The **OK** button (or double-clicking a file name in the list) allows you to set the *Client Certfile* field to the currently highlighted certificate file name.
- The **Delete** button allows you to delete the currently highlighted certificate file. A confirmation dialog asks you to confirm this selection. An error dialog opens if the certificate file is in use by any vSTA, otherwise the certificate file is deleted.
- The **Cancel** button allows you to exit the dialog.
- The **Import…** button allows you to open the Import Certfile dialog.

Certfile: Type the complete path and name of a certificate file or click the **Browse…** button to open the File Browse dialog as shown in Figure 4-45 on page 4-37 and then select from the files stored on the command PC.

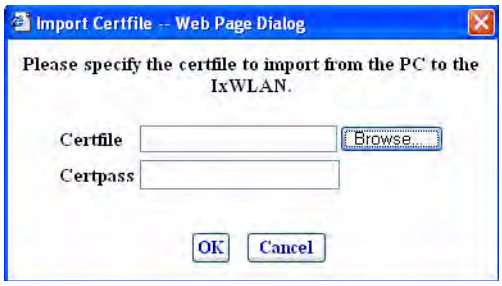


Figure 4-45. Import Certfile Dialog

NOTE: Certificate files must be in PKCS#12 format, which is usually indicated by a `.p12` or a `.pfx` file extension.

Certpass: After a file name is typed or selected, enter the password needed for the certificate file.

- The **OK** button allows you to transfer the specified file to IxWLAN with the same file name and extension. The newly-added certificate file is then listed as one of the available certificates.
- The **Cancel** button allows you to close this dialog without selecting a certificate file.

NOTE: You can view each vSTA's User ID and Certificate file by editing the vSTA or by including the **WPA User ID** and **WPA Certfile** attributes in the table view. See Group Tab Columns under Group Control Grid in *Using the Main Page* on page 4-14.

vSTA->Edit Group

The Edit IxWLAN Group dialog opens, as shown in Figure 4-46, when the **Edit Group** button is selected in the vSTA side bar.

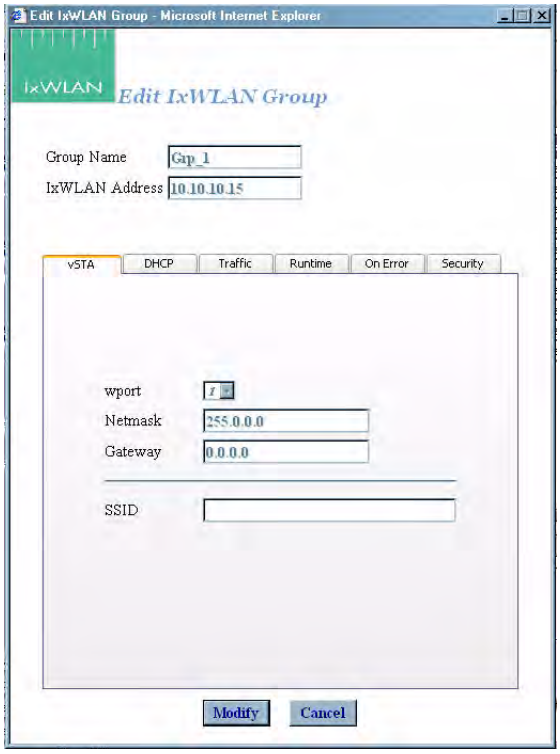


Figure 4-46. Edit IxWLAN Group Dialog

Figure 4-46 is the same as the vSTA->New Group dialog, except for the vSTA tab, which is different. Thus, in the vSTA tab, after the virtual stations have been created, the *wport*, *Netmask*, and *Gateway* group attributes cannot be changed. In addition, the *Number of virtual stations* field is not present in the Edit IxWLAN Group dialog. To add a virtual station to the group, refer to *vSTA->Add New vSTA to Group* on page 4-39. For more information about the description of the fields in this dialog, please refer to *vSTA->New Group* on page 4-26.

- The **Modify** button allows you to modify all virtual stations with the new settings.
- The **Cancel** button allows you to close this dialog without modifying any virtual stations.

NOTE: The group's **wport** attribute can be edited only if the system is in the dynamic mode. In the static mode, the wport selection is disabled, appearing dimmed.

vSTA->Delete Group

When the **Delete Group** button is clicked from the vSTA side bar, a confirmation dialog prompts you to confirm this selection, as shown in Figure 4-47.

Figure 4-47. Confirmation Dialog

- Click **Yes** to remove the group and all virtual stations that it contains from the system.
- Click **No** to close this dialog without removing the group.

vSTA->Add New vSTA to Group

Figure 4-48 opens when the **Add New vSTA to Group** button is selected in the vSTA side bar.

Figure 4-48. Add New vSTA to Group

This dialog is used to add new virtual stations to an existing group. All fields in this dialog default to the values that were first entered when the group was created. Any changes to this dialog also update these group default values. See *vSTA->New Group* on page 4-26 for a description of the fields in this dialog.

- The **Add** button allows you to add the virtual station.
- The **Cancel** button allows you to close this dialog.

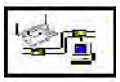
IxWLAN Side Bar

The buttons in this side bar are used to configure and manage IxWLAN and to select and join with a System Under Test.

Select SUT: Opens the Select System Under Test dialog.

Join SUT(s): Joins with the System Under Test.

Configure IxWLAN: Configures IxWLAN.



Reconnect IxWLAN: Reconnects to IxWLAN. This is used after a reboot of IxWLAN.

Reset IxWLAN: Resets all statistics counters to zero and all virtual stations to a configured state.

Reboot IxWLAN: Reboots IxWLAN.

Update IxWLAN: Updates IxWLAN with a new firmware image file or feature key.

IxWLAN->Select SUT

You can access the Select System Under Test dialog (Figure 4-49) in two ways:

1. Click one of the wport-specific Select SUT buttons in the System Under Test status tool bar at the top of the main window. In this case, when the Select System Under Test dialog opens, only the wport checkbox corresponding to the checked button is selected.
2. Click the **Select SUT(s)** button in the IxWLAN side bar. In this case, when the Select System Under Test dialog opens, none of the three wport checkboxes are selected.

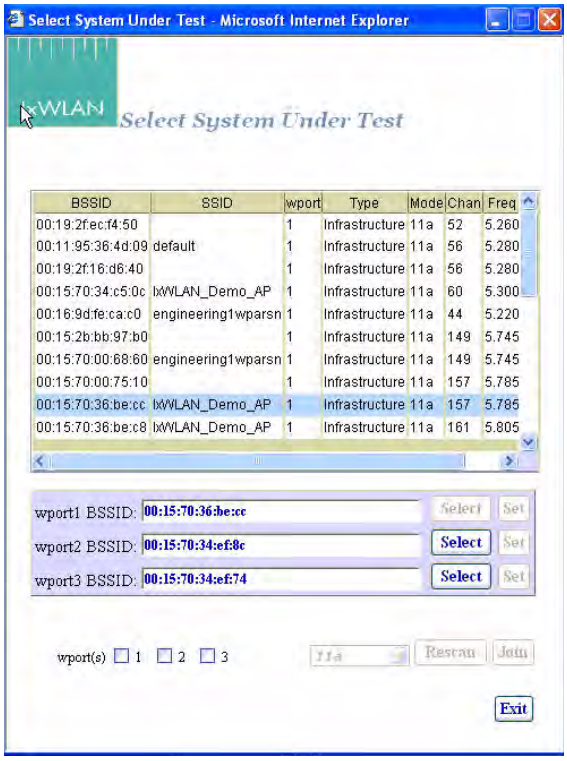


Figure 4-49. Select System Under Test

- Select one of the wport BSSID checkboxes (for example, wport1).
- Click a BSSID in the list box.
- Click the **Select** button next to the wport1 BSSID box. The selection is copied into the wport1 BSSID box.
- Click the **Set** button corresponding to the wport1 BSSID box.
- Select the wport1 checkbox.
- Click the **Join** button to join wport1 with the selected System Under Test.

NOTE: Clicking **Join** implicitly performs a **Set** action first (if not done explicitly by clicking the **Set** button).

- Click the **Rescan** button to update the list of BSSIDs. The merged list of new wport1 BSSIDs and old BSSIDs for wport2 and wport3 displays.

NOTE: If no wport checkbox is selected, the **Rescan** and **Join** buttons are dimmed, as shown in Figure 4-49 on page 4-41.

- The **Select** button adjacent to a wport adds the respective BSSID in the list box to the edit box left of it.
- The **Set** button sets the wport adjacent to it to the BSSID left of it.
- Click the **Exit** button to close this dialog without making any further changes.

NOTE: The **Exit** button does not undo any set, join, and rescan operations that have already taken place.

To change the wireless mode, select **11a**, **11b**, **11g**, or **All Modes** (that is, all valid wireless modes) from the drop-down list adjacent to the **Rescan** button. This field is used to select a wireless mode for optional successive scanning. It defaults to the current wireless mode configured for the unit.

NOTE: The wireless mode for the unit is set in the IxWLAN Radio tab of the Configure IxWLAN dialog.

NOTE: For the IxWLAN SED chassis, the Select System Under Test dialog looks the same, except for wports 2 and 3, which are dimmed.

If a scenario with virtual stations already exists and you have previously joined with a system under test, the dialog shown in Figure 4-50 opens when you select a different BSSID in the Select System Under Test dialog.

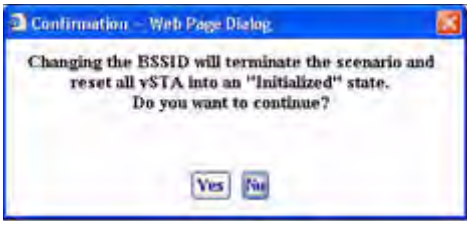


Figure 4-50. Selecting Different BSSID in the Select SUT Dialog

- Click **Yes** to continue and join with a different System Under Test.
- Click **No** to return to the Select System Under Test dialog.

IxWLAN->Join SUT(s)

When the **Join SUT** button is selected in the IxWLAN side bar, a confirmation dialog opens.

If the web-based user interface is running on an IxWLAN SED chassis, clicking this icon results in an attempt to join wport1, provided it is not already joined. When on an IxWLAN SED-MR+ chassis, clicking this button results in an attempt to join a combination of wport1, wport2, and wport3 (whichever is not already joined). The joins are attempted on all (not joined) wports, regardless of whether their corresponding checkbox in the Select System Under Test dialog is selected or not. For example, if wport1 is not joined, the Join SUT dialog shown in Figure 4-51 opens.

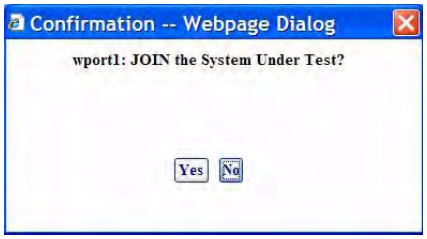


Figure 4-51. Join SUT wport1 Confirmation Dialog

Figure 4-52 and Figure 4-53 open if wport2 and wport3 respectively are not joined.

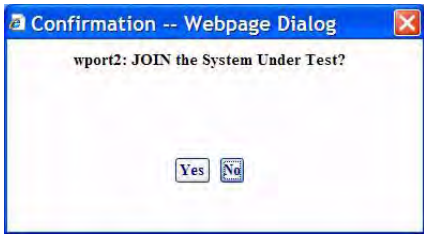


Figure 4-52. Join SUT wport2 Confirmation Dialog

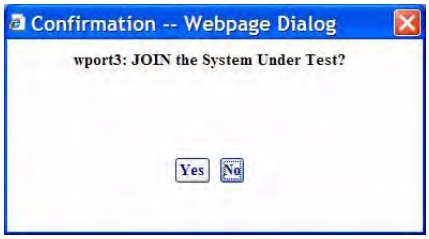


Figure 4-53. Join SUT wport3 Confirmation Dialog

- Click **Yes** to join with the System Under Test.
- Click **No** to cancel this operation.

For each wport that is already joined with a SUT, either Figure 4-54, Figure 4-55, or Figure 4-56 opens.

Figure 4-54. Join SUT wport1 Re-initiation Confirmation Dialog

Figure 4-55. Join SUT wport2 Re-initiation Confirmation Dialog

Figure 4-56. Join SUT wport3 Re-initiation Confirmation Dialog

IxWLAN->Configure IxWLAN

The Configure IxWLAN dialog is a tabbed dialog that defines the interaction with the web-based user interface and IxWLAN operational parameters. The following fields appear in all sections of the Configure IxWLAN dialog:

IxWLAN Id: It is set by the system and cannot be changed.

IxWLAN Address: Shows IxWLAN's IP address.

- Click **OK** to save the configuration.
- Click **Cancel** to close the dialog.

IxWLAN->Configure IxWLAN->UI

The **Configure IxWLAN** button in the IxWLAN side bar opens the Configure IxWLAN dialog, as shown in Figure 4-57.

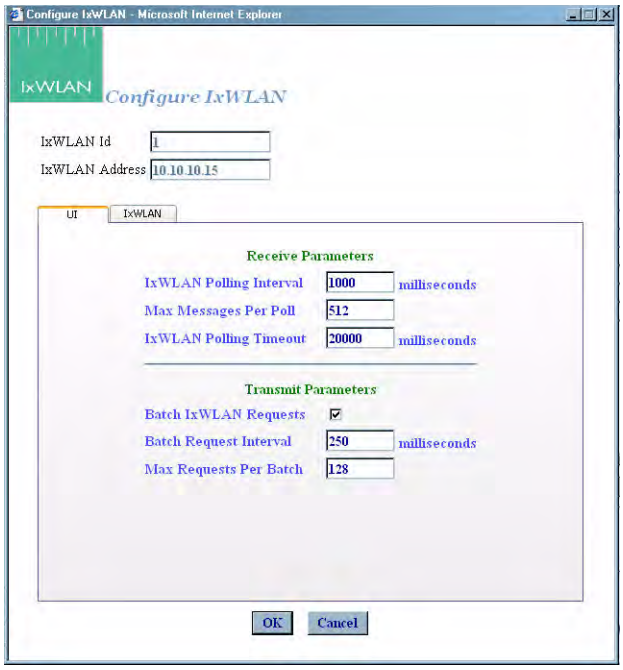


Figure 4-57. Configure IxWLAN Dialog

Receive Parameters

IxWLAN Polling Interval: Defines the interval (in ms) during which the Command PC polls IxWLAN for command and control messages from the virtual stations. It can be set to a value in the 250…60000 ms (1 min) range. If this time expires without an expected response from IxWLAN, the web-based user interface displays **Busy** next to IxWLAN icon in the tool bar. The Busy message indicates that IxWLAN is not responding to the user interface. Under normal conditions, the Busy message may appear periodically for short periods of time. If the Busy message appears frequently, you may want to increase the value assigned to the **IxWLAN Polling Interval**. Also see *IxWLAN Busy or Not Responding* on page 8-5.

Max Messages Per Poll: Specify the maximum number of messages to receive in each poll: 1…128.

IxWLAN Polling Timeout: Defines the time (in ms) that the Command PC waits for a response from IxWLAN. It can be set to a value in the 500…120000 ms (2 min) range. The recommended value is twice the **IxWLAN Polling Interval** value. If this time expires without an expected response from IxWLAN, the web-based user interface opens a dialog indicating that IxWLAN is not responding. When you dismiss the dialog, the status of the IxWLAN/System Under Test connection in the tool bar shows **Offline**. If this dialog and Offline status appears

frequently, a larger value should be assigned to the **IxWLAN Polling Timeout**. Also see *IxWLAN Busy or Not Responding* on page 8-5.

NOTE: Also see the Monitor Update Interval and Monitor Update Timeout in *Monitors->Config Monitors* on page 4-62 for the interval and update timeout values that are used by the command PC to collect statistics.

Transmit Parameters

Batch IxWLAN Requests: The checkbox enables/disables batching of request messages to be sent to IxWLAN. When virtual stations are running in an iterative fashion or you issue commands to many virtual stations, this produces a large number of requests to the web server on IxWLAN. Request batching maintains a number of these requests over a period of time (defined by the **Batch Request Interval**) and then issues one large request with all pending instructions.

NOTE: If you are currently running or intend to run a Load Profile, batching IxWLAN requests may affect the timing of the Load Profile if the Batch Request Interval is greater than the timing specified in the Load Profile.

Batch Request Interval: If **Batch IxWLAN Requests** is checked/enabled, specify the interval at which the web-based user interface l collects (batches) requests and sends them to IxWLAN. It can be set to a value in the 250…60000 ms (1 min) range.

Max Requests Per Batch: Specifies the maximum number of requests that should be batched before they are sent to the virtual stations. When this number of requests have been batched, they are sent to IxWLAN even if the **Batch Request Interval** has not expired.

IxWLAN->Configure IxWLAN->IxWLAN/Basic

This section of the Configure IxWLAN dialog defines the basic configuration of IxWLAN, as shown in Figure 4-58 on page 4-47.

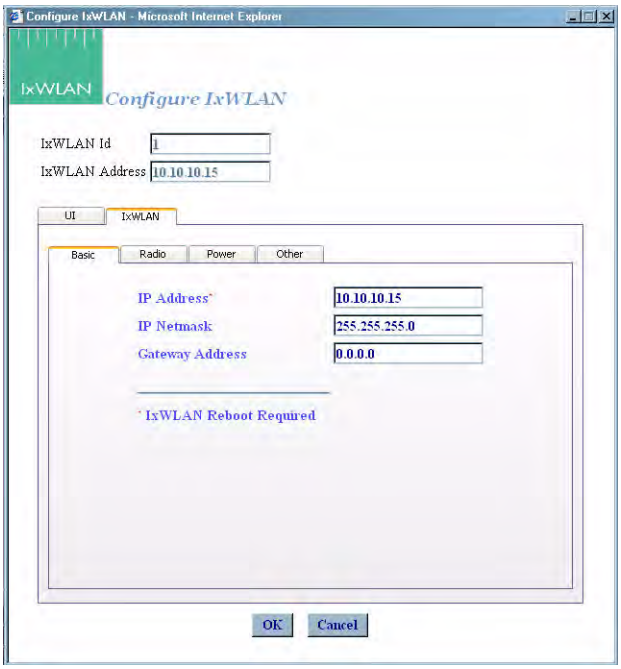


Figure 4-58. Basic Configuration of IxWLAN

IP Address: Type IxWLAN's new IP address. Use an IP address that is compatible with the network addressing scheme at your facility. The default IP address is **192.168.0.50**. If you change this field, you must select the **Reboot** option from the IxWLAN side bar, exit the web-based user interface, and reconnect to IxWLAN using the new IP address.

IP Netmask: Type IxWLAN's network mask. The network mask of IxWLAN must match the IP subnet addressing scheme for internal mode testing (it is not used for external mode). For example, if IxWLAN's IP address is **10.1.40.18** and the system being tested is **10.1.35.17**, then the subnet mask is 16 bits or **255.255.0.0**.

Gateway Address: Type IxWLAN's default gateway IP address. Use an IP address that is compatible with the network addressing scheme at your facility. The default gateway address is **0.0.0.0**.

IxWLAN->Configure IxWLAN->IxWLAN/Radio

This section of the IxWLAN->Configure IxWLAN dialog defines the wireless mode and data rate of IxWLAN, as shown in Figure 4-59.

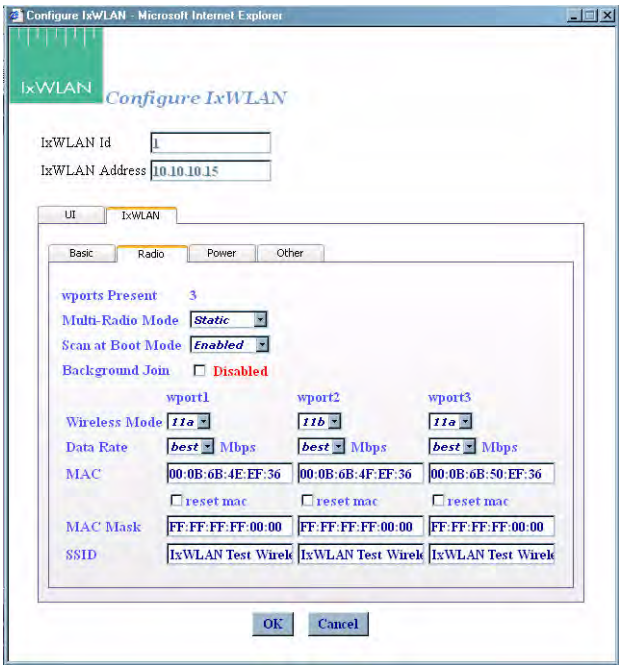


Figure 4-59. IxWLAN Radio

Wireless Mode: Select a wireless mode (11a, 11b, or 11g) from the list box. The items that are available in this list box are different depending on the feature set that you ordered from Ixia. The wireless mode also affects the types of devices that IxWLAN can discover during a scan operation. See *General Usage Notes* on page 1-12.

Data Rate: Select a data rate from the list box. The rates that are available in this list box are different depending on the Wireless Mode selection.

MAC: The Wireless LAN MAC address defaults to a specific address (typically in the **00:0b:cd:xx:xx:xx** range). It is a globally unique MAC address that is programmed on the IxWLAN SED/SED-MR+ chassis. The address can be changed to any non-broadcast or non-multicast valid MAC address. If you use multiple IxWLANs at your facility, each must have a WLAN MAC whose prefix is unique. For example, on the first IxWLAN, use WLAN MAC Address **04:0d:e0:62:23:57** and on the second IxWLAN, use WLAN MAC Address **06:0f:14:62:32:a0**.

reset mac: Select this checkbox to reset the WLAN MAC Base Address to its factory default setting.

MAC Mask: This address is used in conjunction with the WLAN Base MAC Address for configuration of virtual stations for a specific wport. If for example,

the WLAN MAC is set to **00:0b:cd:59:23:44** and the mask is set to **ff:ff:ff:ff:00:00**, the only MAC addresses that can be detected on WLAN and received by IxWLAN are **00:0b:cd:59:00:00 - 00:0b:cd:59:ff:ff**. All other MAC addresses are filtered out. The mask limits the range of MAC addresses that are assigned to virtual stations on a wport. The mask that is specified here displays in the *WLAN MAC Mask* field when the vSTA tab is selected in the New IxWLAN Group dialog (See *vSTA->New Group->vSTA* on page 4-26).

NOTE: The *MAC* and *MAC Mask* are per-wport attributes.

SSID: Defines a Service Set ID. The SSID is a text string of up to 32 characters. Control characters are not allowed. An SSID is used in Association Requests and in deriving the Pre-Shared Key from the Passphrase, when appropriate. Normally, the SSID supplied in the Beacon from the SUT is used. When the SUT is configured with a hidden SSID (not published in its Beacon), IxWLAN's **SSID** attribute is used as a default.

Multi-Radio Mode: Allows you to select the multi radio mode to be either **dynamic or static**.

Scan at Boot Mode: There are three options for this attribute: **Enabled**, **Disabled**, and **All Modes**. If enabled, a scan of all channels of the IxWLAN Wireless Mode (which can be set by the Wireless Mode list box shown in Figure 4-59 on page 4-48) takes place at boot. If disabled, no scan takes place at boot. If set to **All Modes**, a scan of all channels in all valid wireless modes (that is, 802.11a/b/g) takes place at boot. The BSS list resulting from the all-mode scan shows BSSs detected across all scanned channels.

Background Join: When **Background Join** is enabled, the unit allows management frames to be sent before formally joining with the SUT and it automatically conducts the Join in the background while this is happening. When disabled, the system must be explicitly joined with the SUT before any management frames (and thus data frames) can be sent.

IxWLAN->Configure IxWLAN->IxWLAN/Power

This section of the Configure IxWLAN dialog defines the power configuration of IxWLAN, as shown in Figure 4-60 on page 4-50.

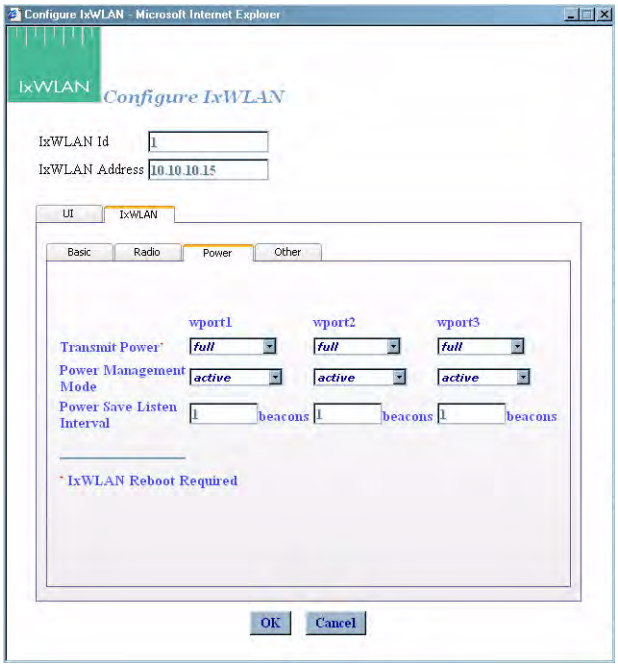


Figure 4-60. IxWLAN Power

*Transmit Power***:** Select **full**, **half**, **quarter**, **eighth**, or **min** from the list box.

The dBm/mW values in Table 4-1 are applicable only when the country code is **US**. In other countries, power settings are relative to the maximum transmit power available for the country. If you change the transmit power setting, you must select the **Reboot** option from the IxWLAN side bar in order for the new transmit power to be recognized and used in IxWLAN.

Table 4-1. Transmit Power Options

Selection	Description
full	maximum (normal) transmit power (18 dBm/64 mW)
half	fractional (1/2) transmit power (15 dBm/31.5 mW)
quarter	fractional (1/4) transmit power (12 dBm/16 mW)
eighth	fractional (1/8) transmit power (9 dBm/8 mW)
minimum	minimum transmit power (3 dBm/2 mW)

Power Management Mode: Select **active** (always awake) or **power save** (doze for the specified listen interval) from the list box. See the notes later in this section.

Power Save Listen Interval: Specify the listen interval in terms of the number of beacons (1…100). The default value is **1**.

NOTES:

When the Power Management mode is set to **Active**, IxWLAN remains in the awake state at all times. When the Power Management mode is set to **Power save**, IxWLAN enters a dozing state until awakened by the listen interval. When dozing:

- IxWLAN does not accept WLAN frames transmitted to any vSTA.
- IxWLAN awakens at each listen interval to receive the next beacon and poll for frames buffered for any vSTA in accordance with the 802.11 Power Management needs.
- IxWLAN awakens at DTIM intervals to receive DTIM beacons when buffered broadcast/multicast frames are indicated.

While in either state, any WLAN frames to be transmitted from any vSTA may be immediately placed into the Transmit Queue for transmission by the WLAN interface. Any transmission from any vSTA indicates the IxWLAN current Power Management mode.

The beacon interval is determined by the System Under Test, usually by some user-configurable parameter. IxWLAN receives beacons sent by the System Under Test. A typical beacon rate is one every 100 Time Units. An 802.11 Time Unit is defined as 1024 ms. So, the beacon rate would be one every 102.4 ms, or about 10 per second. As an example, if the Power Management Mode is set to **Power Save** and the Power Save Listen Interval is set to **3**, IxWLAN wakes up about every 307.2 ms to poll for frames queued in the System Under Test.

IxWLAN->Configure IxWLAN->IxWLAN/Other

This section of the Configure IxWLAN dialog enables/disables the MIC check on received TKIP-encrypted frames, as shown in Figure 4-61.

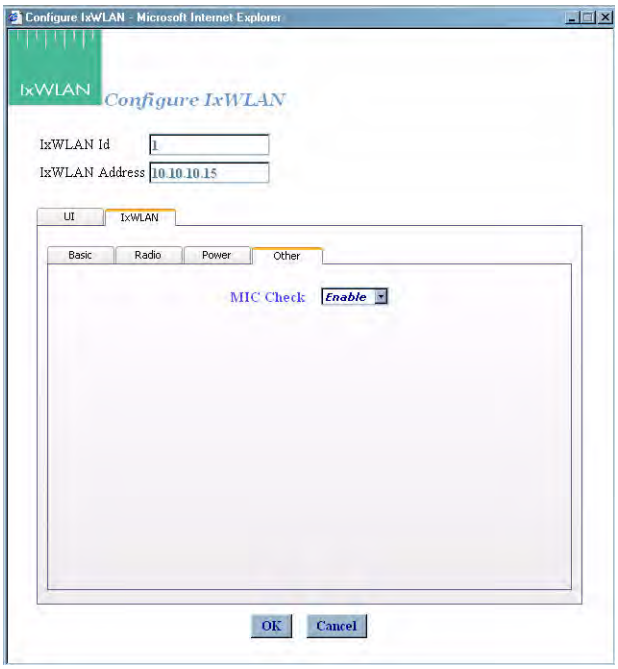


Figure 4-61. IxWLAN Other

MIC Check: Select **Enable**, **Disable**, or **Spot** from this list box. The MIC is an integrity check that is run on all received TKIP data frames and is achieved via the CPU-intensive Michael algorithm. This parameter allows the MIC check to be temporarily disabled or reduced to spot checks (in that case, only every 16th TKIP frame is checked). This applies to receive frames only. The MIC is always calculated for transmit frames when using TKIP.

IxWLAN->Reconnect IxWLAN

Reconnect is needed after reboot or if you become disconnected from IxWLAN for any reason. The **Reconnect IxWLAN** button in the IxWLAN side bar opens a confirmation dialog, as shown in Figure 4-62.

Figure 4-62. Reconnect Confirmation Dialog

- Click **Yes** to reconnect to IxWLAN.
- Click **No** to cancel the reconnect selection.

Following successful reconnect, the web-based user interface restores the scenario (if any) in IxWLAN.

IxWLAN->Reset IxWLAN

The **Reset IxWLAN** button in the IxWLAN side bar opens a confirmation dialog (Figure 4-63).

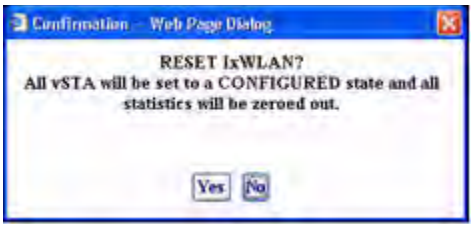


Figure 4-63. Reset Confirmation

- Click **Yes** to reset all virtual stations to a configured state and to reset all statistics counters to zero.
- Click **No** to cancel the reset selection.

IxWLAN->Reboot IxWLAN

The **Reboot IxWLAN** button in the IxWLAN side bar opens a confirmation dialog (Figure 4-64).

Figure 4-64. Reboot Confirmation

- Click **No** to cancel the reboot operation.
- Click **Yes** to reboot IxWLAN. When **Yes** is clicked, the message shown in Figure 4-65 displays.

Figure 4-65. Rebooting Dialog

This message box disappears when the reboot is complete.

IxWLAN->Update IxWLAN

The **Update IxWLAN** button in the IxWLAN side bar or the **Update IxWLAN…** selection in the **About** menu opens the Update IxWLAN dialog, as shown in Figure 4-66.

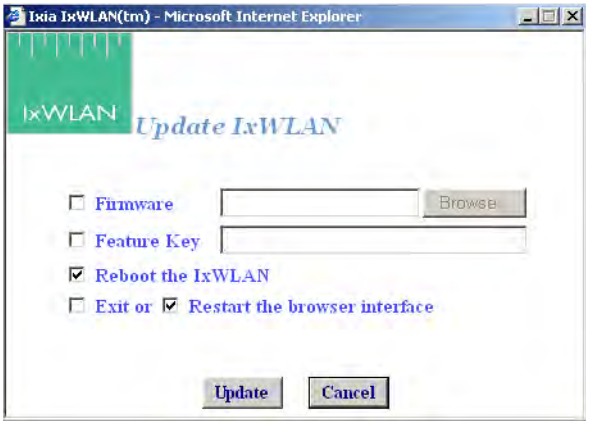


Figure 4-66. Update IxWLAN

Firmware: To update IxWLAN firmware, check this box and type the location of the firmware image file on the command PC or select the **Browse…** button to select the location on the command PC. The *Firmware* field must be a valid file name with a SYS file type (case insensitive) and the file must exist on the command PC.

Feature Key: To update the IxWLAN feature key, check this box and type the feature key hex string. The Feature Key must be an ASCII hex string containing a valid feature key for this IxWLAN.

Reboot IxWLAN: Check this box to reboot IxWLAN after the new firmware image or feature key is successfully loaded.

Exit or **Restart** the browser interface: Check the box next to **Exit** to exit the web-based user interface after the new firmware image or feature key is successfully loaded. Check the box next to **Restart** to restart the web-based user interface following successful IxWLAN update.

- Click the **Update** button to start IxWLAN Update.
- Click the **Cancel** button to exit the dialog.

If the dialog is not filled in correctly (for example, invalid or missing firmware file, invalid feature key, and so on), the field is highlighted and an error message dialog identifies the error.

If the Reboot IxWLAN checkbox is not clicked, a warning dialog opens, as shown in Figure 4-67.

Figure 4-67. Warning Dialog

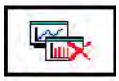
- Click **OK** to continue IxWLAN Update without rebooting.
- Click **Cancel** to return to the Update IxWLAN dialog.

If any errors occur during firmware update (for example, flash file system is full), the error is reported in an error message dialog. If an invalid or corrupted firmware image file is specified, the IxWLAN reboot fails. If this condition occurs, the CLI must be used to correct the problem. See *Recovering a Corrupted Firmware File* on page 8-9.

Monitors Side Bar

The Monitors side bar is used to define, delete, clear, export, and configure monitors. After a monitor is defined using **New Monitor**, the bottom section of the main page displays the statistics counters.

New Monitor: Defines a new monitor. You can define up to four different monitors in each scenario.



Delete Monitor: Deletes the currently displayed monitor.

Clear Monitor: Clears the statistics counters in the currently displayed monitor.

Export Monitor: Exports the statistics counters for one or more monitors.

Config Monitors: Configures how monitors are maintained and updated with data from IxWLAN.

A monitor is one or more user-selected statistics counters that the web-based user interface collects from IxWLAN and displays in the user-selected format (that is, line graph, bar graph, or table). All collected data can be exported. Monitors are based on Line graphs, Bar graphs, and Tables. You can use them to monitor the summary statistics of IxWLAN or a summary Master vSTA that shows virtual station statistics across all virtual stations.

NOTES:

- Each scenario can include up to four different monitors.
- Monitor values are stored in memory on the command PC. If you run one or more monitors for an extended period of time, available memory may become depleted and this can affect the performance of the command PC.

Monitors->New Monitor

The New Monitor dialog is a tabbed dialog that can be used to define predefined, summary, and summary virtual station counters to be maintained during the execution of a test.

Monitors->New Monitor->Predefined

Use the Predefined section of the Define New Monitor dialog to select predefined statistics counters, as shown in Figure 4-68.

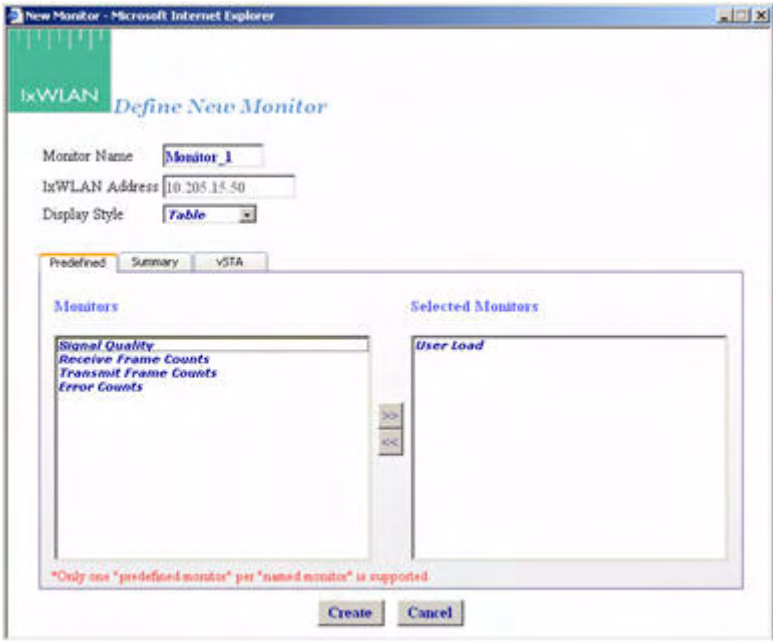


Figure 4-68. Define Monitor Dialog

Monitor Name: Type a monitor name. It can be up to 12 characters (a…z, 0…9, and underscore (_)).

IxWLAN Address: Shows IxWLAN's IP address.

Display Style: Select a display style from the list box. It can be one of the following: Line Graph, Bar Graph, or Table.

Monitors->Selected Monitors: Select one of the monitors to be maintained. Use the **[>>]** button (or double-click the line item) to transfer the predefined monitor to the Selected Monitors column. See Chapter 7, *Statistics Counters* for a description of each of these statistics counters.

- Click the **Create** button to create and display the monitor.
- Click the **Cancel** button to close this dialog.

Monitors->New Monitor->Summary

Use the Summary section of the Define New Monitor dialog to select summary statistics counters, as shown in Figure 4-69.

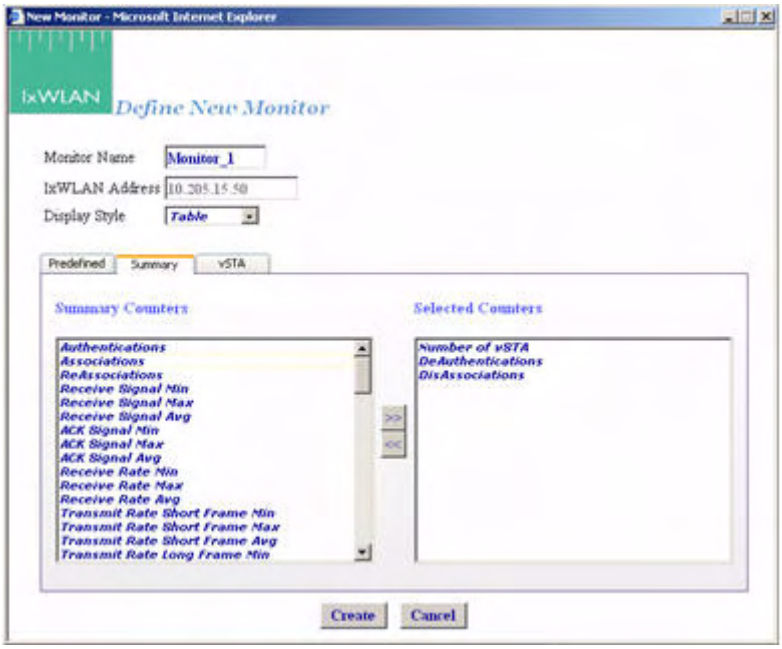


Figure 4-69. Summary

Summary Counters->Selected Counters: Select one or more of the counters to be maintained in the test results file. Use the **[>>]** button to transfer the counters to the Selected Counters column. See Chapter 7, *Statistics Counters* for a description of each of these statistics counters.

- Click the **Create** button to create and display the monitor.
- Click the **Cancel** button to close this dialog.

Monitors->New Monitor->vSTA

Use the vSTA section of the Define New Monitor dialog to select the master (summary) virtual station statistics counters, as shown in Figure 4-70.

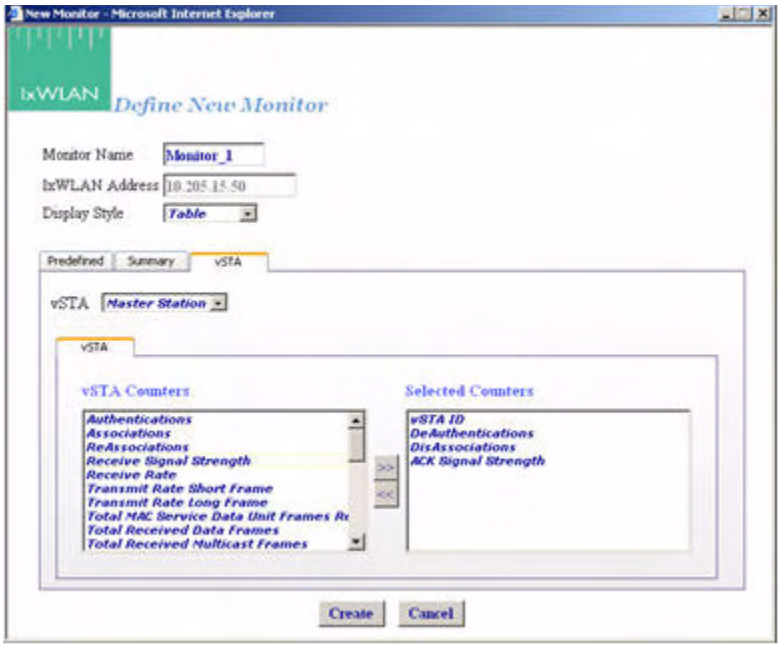


Figure 4-70. vSTA Section

vSTA (s): Select a virtual station from the list box. The Master Station is a summary that shows virtual station statistics across all virtual stations.

vSTA Counters->Selected Counters: Select one or more of the counters to be maintained in the test results file. Use the **[>>]** button to transfer the counters to the Selected Counters column. See Chapter 7, *Statistics Counters* for a description of each of these statistics counters.

- Click the **Create** button to create and display the monitor.
- Click the **Cancel** button to close this dialog.

When you select one or more counters and choose the **Create** button, the bottom half of the screen shows the current results in the selected display style, as shown in Figure 4-71.

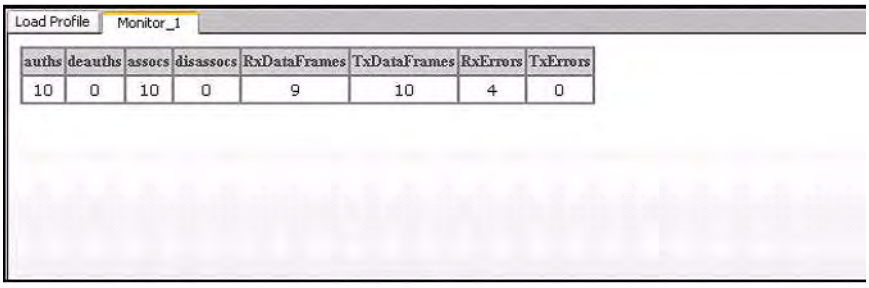


Figure 4-71. More Counters Selected

As you run scenario tests, the monitors update with current data from IxWLAN. For chart display styles, the legends on the right side of the monitor indicate the statistics counters selected in the New Monitor dialog. For table display styles, the table headings indicate the statistics counters selected in the New Monitor dialog. See Chapter 7, *Statistics Counters* for a description of each of these statistics counters. The tool bar buttons on the right side of the monitor display can be used for the following functions:

New Monitor: Defines a new monitor.

Delete: Allows you to delete a monitor. A dialog opens, asking you to confirm the selection.

Run: Runs a monitor. When the **Run Monitor** button is selected, the currently displayed monitor starts gathering and displaying its target statistics.

Pause: Pauses a monitor. When the **Pause Monitor** button is selected, the currently displayed monitor stops its target statistics. However, statistics are accumulated in the background and can be exported.

Clear: Clears a monitor. A dialog opens, asking you to confirm the selection. This selection sets all counters in the current monitor to zero. Statistics gathered up to this point are not cleared and are still exportable.

For more information about these buttons, please refer to *Monitor Tool Bar* on page 4-81.

Monitors->Delete Monitor

The **Delete Monitor** button in the Monitors side bar or the monitor tool bar opens a confirmation dialog, as shown in Figure 4-72.

Figure 4-72. Delete Monitor Confirmation

- Click **Yes** to delete the current monitor.
- Click **No** to cancel the delete selection.

Monitors->Clear Monitor

The **Clear Monitor** button in the Monitors side bar or the **Monitor** tool bar opens a confirmation dialog, as shown in Figure 4-73.

Figure 4-73. Clear Monitor Confirmation

- Click **Yes** to clear the monitor. All the counters in the monitor are set to zero. Statistics gathered up to this point are not cleared and can still be exported.
- Click **No** to close this dialog without clearing the monitor.

Monitors->Export Monitor

The function is used to export the collected statistics in a defined monitor. For export, the data obtained from the monitor is saved.

NOTE: For all graphs, each tick saves the information of each field that is requested. This can grow large depending on how long the monitor has run. An artificial limit of one hour has been enforced to clear this saved data. At the end of each hour, this stored data array is cleared.

The **Export Monitor** button in the Monitors side bar opens the Export Monitor dialog, as shown in Figure 4-74.

Figure 4-74. The Export Monitor Dialog

Select one or more monitors in the list box.

- Click the **Export** button to export the monitors in the Selected Monitors list box.
- Click the **Cancel** button to close this dialog without exporting monitors.

The **Export** button opens the Save HTML Document dialog, as shown in Figure 4-75.

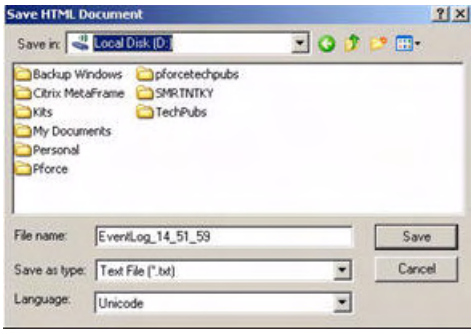


Figure 4-75. Save HTML Document

Identify the name of the file where you want to save the monitor information.

- Click the **Save** button to save the information to the specified file.
- Click the **Cancel** button to exit this dialog without exporting any data.

Monitors->Config Monitors

The **Config Monitors** button in the Monitors side bar opens the Configure Monitors dialog, as shown in Figure 4-76.

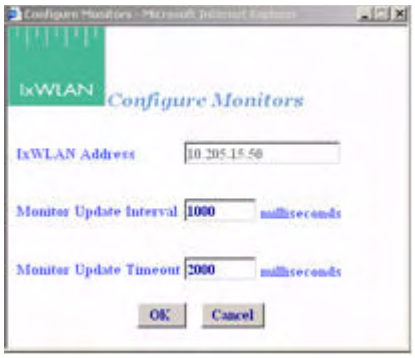


Figure 4-76. Configure Monitors Dialog

IxWLAN Address: Shows the IP address of IxWLAN.

Monitor Update Interval: Defines the interval (in milliseconds) that the Command PC polls IxWLAN for new statistics counters. It can be set to a value in the 250 to 60000 ms (1 min) range. Any value under 1000 ms is not advisable and may affect performance significantly. If you notice any issues with update performance, try increasing this value.

Monitor Update Timeout: Defines the time (in milliseconds) that the Command PC waits for a response from IxWLAN. It can be set to a value in the 500 to 120000 ms (2 min) range. The recommended value is twice the Monitor Update Interval value. If this time expires without an expected response from IxWLAN, the web-based user interface tries to restart the monitor update timer.

NOTE: Also see the IxWLAN Polling Interval and IxWLAN Polling Timeout in *IxWLAN->Configure IxWLAN* on page 4-44 for the interval and update timeout values that are used by the command PC to send command and control information to IxWLAN.

- Click **OK** to save the monitor configuration.
- Click **Cancel** to close the dialog.

Event Log Side Bar

The buttons in the Event Log side bar are used to display, clear, export, and configure the Event Log as follows:

Event Log: Shows the last 100 event log entries.

Clear Log: Clears the current contents of the event log.

Export Log: Exports the last 100 event log entries to a file.

Configure Log: Configures event logging.

For more information about how IxWLAN creates and maintains the event log, please refer to Appendix B, *Event Logging*.

Event Log->Event Log

When the **Event Log** button is selected in the Event Log side bar, the web-based user interface begins retrieving event log records from IxWLAN. The following message opens in the Event Log window: “Retrieving up to the last 100 records…”. Figure 4-77 shows the format of event records retrieved from IxWLAN.

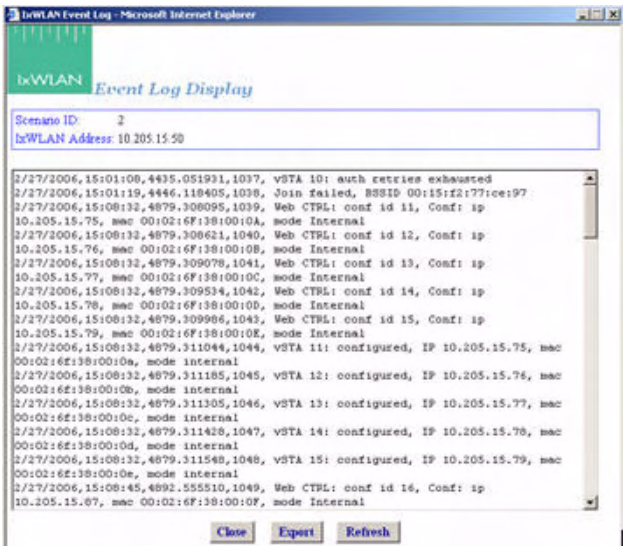


Figure 4-77. Event Log

- Click the **Close** button to close this dialog.
- Click the **Export** button to export this event log information to a file.
- Click the **Refresh** button to update the dialog with new events.

Event Log->Clear Log

The **Clear Log** button in the Event Log side bar opens a confirmation dialog, as shown in Figure 4-78.

Figure 4-78. Clear Log Confirmation

- Click **Yes** to clear the event log.
- Click **No** to exit this dialog without clearing the event log.

Event Log->Export Log

The **Export Log** button in the Event Log side bar opens a Save HTML Document dialog, as shown in Figure 4-79.

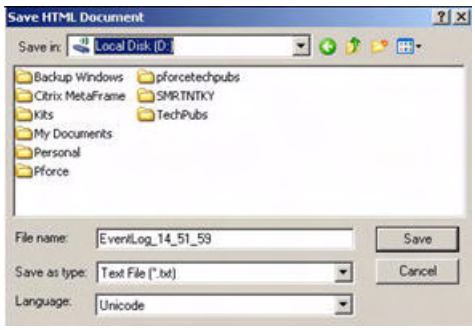


Figure 4-79. Export Log

Identify the name of the file where the log is to be written.

- Click the **Save** button to save the event log in a file.
- Click the **Cancel** button to exit this dialog.

Event Log->Configure Log

The **Configure Log** button in the Event Log side bar opens the Event Log Configuration dialog, as shown in Figure 4-80.

Figure 4-80. Configure Log

IxWLAN Address: Defines the IP address of IxWLAN where the log file resides.

Logging: Enables/disables event logging.

Logging to Console: Enables/disables event logging to the CLI console. When Logging to Console is enabled (checked), event data is posted to the console connected to IxWLAN's serial port (if available). The web-based user interface cannot be used to enable logging to a telnet session.

Logging to File: Enables/disables event logging to a file in the IxWLAN flash file system.

Clear Event Log on Reset: The checkbox enables/disables clearing the event log when the scenario is reset.

Log Verbosity: The verbosity level sets thresholds for which events are to be logged: at higher verbosity, more events are logged; at lower verbosity, fewer events are logged. Select **Critical**, **Low**, **Medium**, or **High** from the list box.

Modules Logged: Select one or more modules (system processes) from which event messages of the selected level should be collected.

- Click **OK** to close this dialog and save the event log configuration.
- Select **Cancel** to close this dialog without saving event log configuration.

Reports Side Bar

The options in the Reports side bar can be used to display statistics counters that are maintained by IxWLAN during the execution of a test.

IxWLAN Configuration: Opens the IxWLAN configuration report.

Scenario Summary: Shows summary statistics of IxWLAN and all virtual stations.

Group Summary: Shows summary statistics of a scenario group.

vSTA Master: Shows statistics collected for all virtual stations.

wport: Shows statistics collected per wport.

vSTA Detailed: Shows detailed statistics counters for each virtual station.

Export Reports: Exports/views reports in a CSV file format

Reports->IxWLAN Configuration

The **IxWLAN Configuration** button in the Reports side bar displays the IxWLAN Configuration Report, as shown in Figure 4-81.

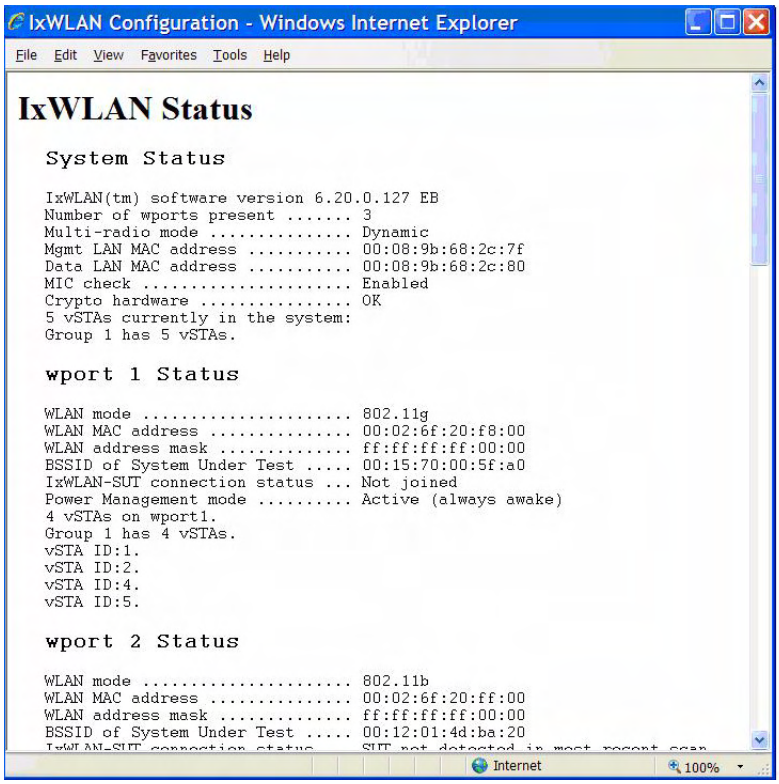


Figure 4-81. IxWLAN Configuration Report

This report shows the status and configuration of IxWLAN. If **WPA/RSN** is enabled, the status section of the report includes an indication of the cumulative crypto hardware status (that is, Crypto hardware…OK). If any faults have been detected in a self-test, the status shown indicates this condition (for example, Crypto hardware…Faulted, run the cryptotest CLI command for details).

Reports->Scenario Summary

The **Scenario Summary** button in the Reports side bar opens the Summary Statistics (Scenario) Report, as shown in Figure 4-82 on page 4-68.

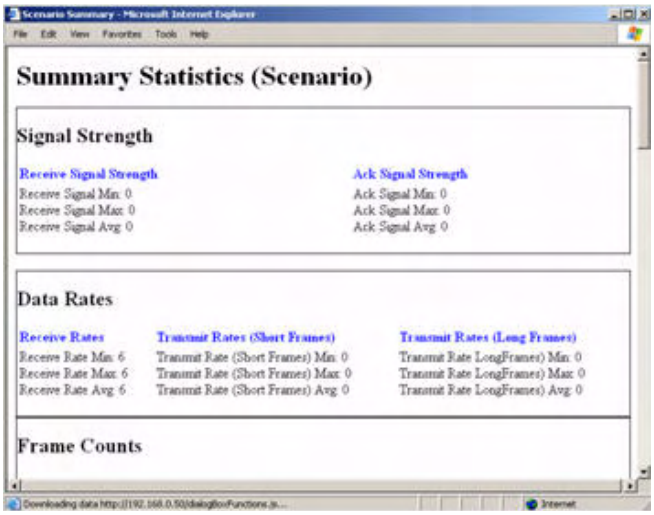


Figure 4-82. Scenario Summary Report

Summary statistics give a summary report taken over a set of virtual stations. The virtual station set can be a defined group or all virtual stations currently in the system. By contrast, the individual virtual station statistics report gives a list of statistics and counters for all virtual stations. The summary report gives a summary of the statistics and counters taken over the indicated set of virtual stations. The summary gives, for each counter, the minimum and maximum values for that counter found in the set of examined virtual stations, the average value, and where applicable, the (sum) total over the set of virtual stations. The Avg fields (that is, *Receive Rate Avg*, *Transmit Rate (Short Frame) Avg*, and *Transmit Rate (Long Frame) Avg*) in the Data Rate section of the summary statistics display is the average rate for the master vSTA since the time IxWLAN joined to a System Under Test. For more information about the statistics counters that can be shown in this report, please refer to Chapter 7, *Statistics Counters*.

Reports->Group Summary

The **Group Summary** button in the Reports side bar opens the Summary Statistics (Group #) Report, as shown in Figure 4-83 on page 4-69.

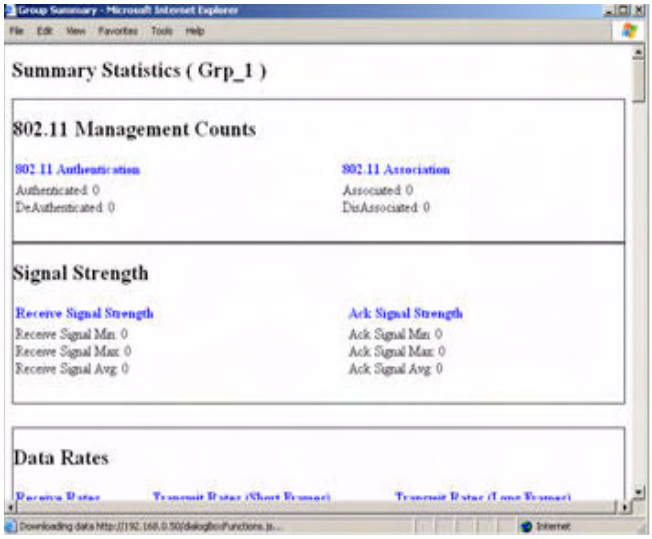


Figure 4-83. Group Summary Report

For more information about the statistics counters that can be displayed in this report, please refer to Chapter 7, *Statistics Counters*.

Reports->vSTA Master

The **vSTA Master** button in the Reports side bar opens the Summary Statistics (All vSTA) Report, as shown in Figure 4-84.

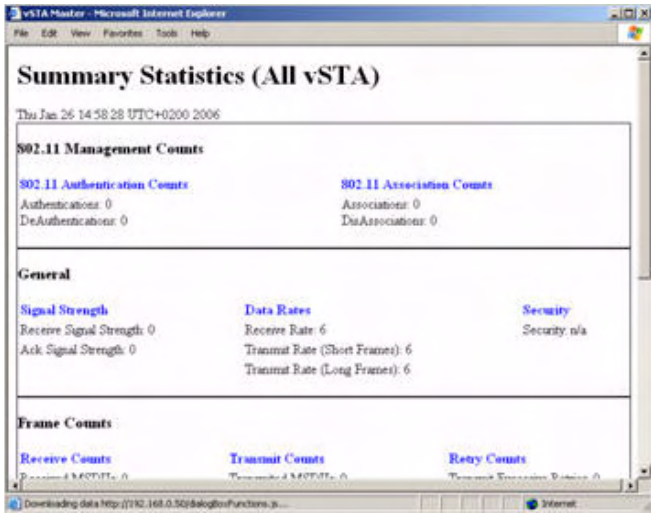


Figure 4-84. vSTA Master Report

For more information about the statistics counters that can be shown in this report, please refer to Chapter 7, *Statistics Counters*.

Reports->vSTA Detail

The **vSTA Detail** button in the Reports side bar opens the vSTA Detail Report, as shown in Figure 4-85.

Figure 4-85. vSTA Detail Report

For more information about the statistics counters that can be shown in this report, please refer to Chapter 7, *Statistics Counters*.

Reports->Export Reports

The **Export Reports** button in the Reports side bar opens the Generate Report dialog, as shown in Figure 4-86.

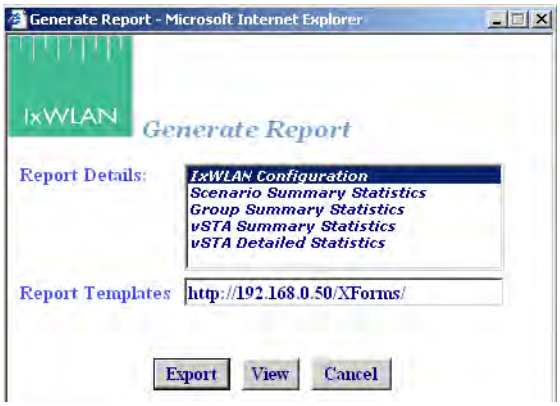


Figure 4-86. Export Reports

Report Details: Select one or more reports to export in the Report Details list box.

Report Templates: Defines the directory/path where XML transform files are retrieved. These XSLT files are then used to create reports from the XML data returned by IxWLAN. By specifying another directory path, you can customize reports to suit your needs.

- Click the **Export** button to export the report(s) to a comma-separated values (.CSV) file.
- Click the **View** button to show the selected report(s).
- Click the **Cancel** button to exit this dialog.

Configuration Side Bar

The buttons in the Configuration side bar are used to define default security, default ping settings, the appearance of the web-based user interface, and available certificates.

Security: Defines default security settings that can be used when a group or virtual stations is configured.

Ping Defaults: Defines a default ping target, ping packet length, and number of iteration values.

Preferences: Configures the appearance of the web-based user interface.

Available Certificates: Transfers certificate files from the command PC to IxWLAN, where they can be used by virtual stations.

Configuration->Security

The Security Configuration dialog, shown in Figure 4-87 on page 4-72, sets the default security settings that can be used when a new group is created.

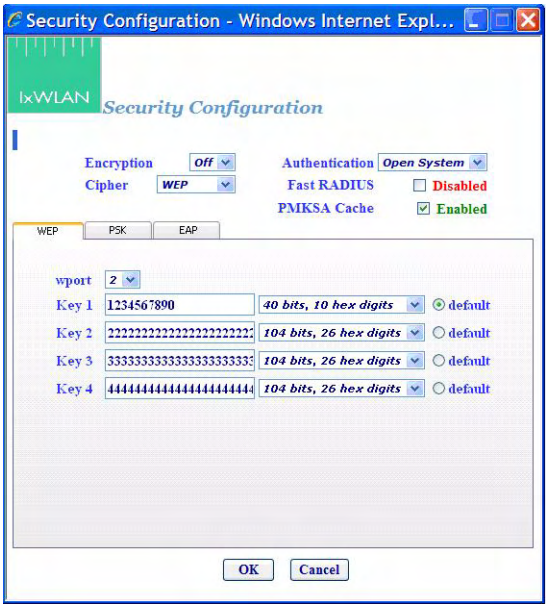


Figure 4-87. Configuration Security

Encryption: Select **On** or **Off** from the drop-down list box to enable/disable encryption.

Authentication: Select an authentication type: **Open System**, **Shared Key**, **RSN**, **RSN-PSK**, **WPA**, or **WPA-PSK**. If you select **RSN** or **WPA**, define user credential parameters in the EAP tab. If you select **RSN-PSK** or **WPA-PSK**, define a pre-shared key or passphrase in the PSK tab.

Cipher: For Open System or Shared Key Authentication, **WEP** is the only valid selection. For RSN, RSN-PSK, WPA, and WPA-PSK Authentication, select **TKIP** or **AES-CCM** (that is, CCMP cipher mode).

Fast Radius: The default value of this attribute is **Disabled**. When a vSTA is configured for fast RADIUS reconnection and the vSTA has cached the TLS session information, it tries fast resumption in subsequent 802.1X authentication exchanges by using the session_id and master_key from the cached TLS session.

PMKSA Cache: Enables the use of the cached PMKSA information when (re)associating. The default value is **Enabled**. Each entry in the PMKSA cache contains the BSSID of the corresponding AP, a PMKID, and the Pairwise Master Key (PMK). A PMKSA can be obtained by 802.1X authentication or by pre-authentication.

Configuration->Security WEP Tab

The WEP tab in this dialog is used to define up to four shared keys for WEP security. WEP encrypts data using an RC4 stream cipher seeded with a key of 40, 104, or 128 bits plus a 24-bit initialization vector, before transmission to the wireless network. If you change any of the fields, you must click **Reboot** from the IxWLAN side bar in order for the new encryption selections to be recognized and used by IxWLAN.

wport: Choose the wport to which these selections are to apply.

Key 1…4: Each shared key can be 40, 104, or 128 bits. If **40** is selected in the list box, you must type 10 hex digits. If **104** is selected in the list box, you must type 26 hex digits. If **128** is selected in the list box, you must type 32 hex digits. These keys are shown in the Security section of the New IxWLAN Group dialog, the Edit IxWLAN Group dialog, and the Add vSTA to Group dialog.

default: Select one of these radio buttons to identify which key(s) should be used as default.

NOTE: To delete a key, remove the key from the field.

- Click **OK** to save the security settings to IxWLAN.
- Click **Cancel** to close this dialog without saving this security configuration.

Configuration->Security PSK Tab

If **WPA-PSK** or **RSN-PSK** is selected in the *Authentication* field, this section of the dialog defines a Pre-Shared Key or passphrase, as shown in Figure 4-88.

Figure 4-88. Configuration Security PSK Tab

Pre-Shared Key (64 hex digits): Defines a Pre-Shared Key (64 ASCII-hex characters) for all virtual stations in this group. If using a Pre-Shared Key, it is not necessary to specify the passphrase.

Passphrase (up to 63 characters): Defines a passphrase of up to 63 ASCII characters. If a passphrase is defined, it is not necessary to specify the Pre-Shared Key. The passphrase is used to generate the Pre-Shared Key.

- Click **OK** to save this information to IxWLAN.
- Click **Cancel** to close this dialog without saving this security configuration.

Configuration->Security EAP Tab

If **WPA** or **RSN** is selected in the *Authentication* field, the Security EAP tab allows you to define an EAP Algorithm, user ID and certificate file, and PEAP/TTLS parameters, as shown in Figure 4-89.

Figure 4-89. Security EAP Tab

Inner Algorithm: Select **MS-CHAPv2** or **EAP-MS-CHAPv2** from the list box. MS-CHAPv2 is normally used for TTLS, while EAP-MS-CHAPv2 is normally used for PEAP.

User ID: Sets the user ID that is used as default for all virtual stations when a new group is created. It can be up to 64 characters in the range A…Z, a…z, 0…9, or other legal characters: period (.), dash (-), at-sign (@).

Client Certfile: Sets the certificate file that is used as the default for all virtual stations when a new group is created.

Select…: Click the **Select…** button to open the Available Certificates dialog and select the certificate file to use. See *Available Certificates* on page 4-36.

PEAP/TTLS *Parameters*: When **PEAP** or **TTLS** is selected in the EAP Algorithm list box, use this section of the dialog to define the PEAP/TTLS parameters.

EAP Algorithm: Select the EAP algorithm to be used in Phase 2 authentication. MS-CHAPv2 is normally used for TTLS. EAP-MS-CHAPv2 is normally used for PEAP.

Outer ID: Type an outer identity to be used in Phase 1 authentication. It can be up to 64 characters in the range A…Z, a…z, 0…9, or other legal characters: period (.), dash (-), at-sign (@).

Password: Type a password to be used in Phase 2 authentication. It can be up to 64 characters.

NOTE: **Inner Algorithm**, **Outer ID**, and **Password** are used only for TTLS and PEAP. They are ignored for TLS.

- Click **OK** to save this information to IxWLAN.
- Click **Cancel** to close this dialog without saving this security configuration.

Available Certificates

The **Select** button in the Security Configuration/EAP tab opens the Available Certificates dialog, as shown in Figure 4-90.

Figure 4-90. Available Certificates

The Space available indicates the total space available in the IxWLAN flash file system. This number changes when certificate files are added or deleted.

- Click the **OK** button (or double-click a file name in the list) to set the *Client Certfile* field to the currently highlighted certificate file name.
- Click the **Delete** button to delete the currently highlighted certificate file. A confirmation dialog opens, asking you to confirm this selection. An error dia-

log opens if the certificate file is in use by any vSTA, or otherwise the certificate file is deleted.

- Click the **Cancel** button to exit the dialog.
- Click the **Import…** button to open the Import Certfile dialog, as shown in Figure 4-91 on page 4-76.

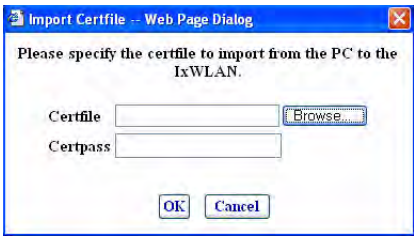


Figure 4-91. Import Certfile

Certfile: Type the complete path and name of a certificate file or click the **Browse…** button to open the File Browse dialog and select from the files stored on the command PC.

NOTE: Certificate files must be in PKCS#12 format, which is usually indicated by a `.p12` or a `.pfx` file extension

Certpass: After a file name is typed or selected, type the password that is needed for the certificate file.

- Click **OK** to transfer the specified file to IxWLAN with the same file name and extension. The newly-added certificate file is then listed as one of the available certificates.
- Click **Cancel** to close this dialog without selecting a certificate file.

Configuration->Ping Defaults

The **Ping Defaults** button in the Configuration side bar opens the Ping Defaults dialog, as shown in Figure 4-92.

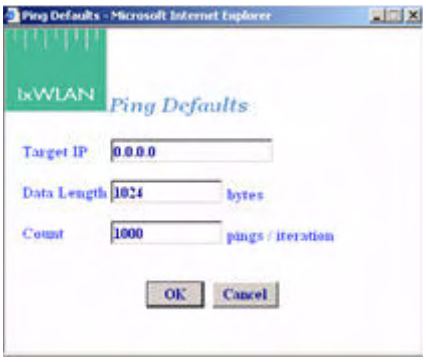


Figure 4-92. Ping Defaults Dialog

Any changes made in this dialog affect all future group/virtual station creation defaults for this session.

Target IP: Type the target IP address where ICMP Echo (Ping) Request/ Response messages should be sent.

Data Length: Specify the size (64…1024) of each message.

Count: Specify the total number of pings to send: 0…10000 (0=None).

- Click **OK** to save the default Ping configuration.
- Click **Cancel** to close this dialog without saving this configuration.

Configuration->Preferences

The **Preferences** button in the Configuration side bar opens the UI Configuration dialog, as shown in Figure 4-93.

Figure 4-93. UI Configuration Dialog

Display vSTA Transitional States: The checkbox enables/disables the update of the web-based user interface to show changes in virtual station transitional states such as authenticating, associating, de-authenticating, and disassociating. When deselecting this option, the web-based user interface performance improves.

Update vSTA Stats Each Iteration: Click the checkbox to enable/disable the automatic update of virtual station statistics. Statistics are gathered by making extra calls to IxWLAN. Under high virtual station load, when deselecting this option, the web-based user interface performance improves.

Group/vSTA Highlight Color: Click the **Color** button to open a color selector dialog and choose a color to highlight groups and virtual stations in the group grid. After a color has been chosen, the **Reset** button can be used to reset the color to its original state.

Group/vSTA Selected Color: Click the **Color** button to display a color selector dialog and choose a color for selected groups and virtual stations in the group grid. After a color has been chosen, the **Reset** button can be used to reset the color to its original state.

Show Welcome Screen on Startup: Click the checkbox to enable/disable the welcome screen that is shown when you successfully log on to the web-based user interface.

- Click **OK** to close this page and save the configuration.
- Click **Cancel** to close this dialog without saving this configuration.

Configuration->Available Certificates

The **Available Certificates** button in the Configuration side bar opens the Available Certificates dialog, as shown in Figure 4-94.

Figure 4-94. Available Certificates

For more information about Available Certificates, please refer to *Available Certificates* on page 4-75.

Menus and Tool Bars

The menus and tool bars at the top of the web-based user interface can be used to run tests, manipulate virtual stations, monitor results, and configure IxWLAN and general scenario management.

File Tool Bar

The buttons in this tool bar are used to create, open, save, and print scenarios (Figure 4-95).

Figure 4-95. File Tool Bar

New Scenario: Creates a new scenario.

Open Scenario: Opens an existing scenario.

Save Scenario: Saves the current scenario.

Print: Prints the scenario configuration.

Scenario Tool Bar

The buttons in this section of the tool bar can be used to run, pause, stop, restart, or refresh the entire scenario of all virtual stations (Figure 4-96).

Figure 4-96. Scenario Tool Bar

Run Scenario: Runs the test for all groups and all virtual stations in a scenario.

Pause Scenario: Pauses the test for all groups and all virtual stations in a scenario.

Terminate Scenario: Stops the test for all groups and all virtual stations in a scenario.

Reset Scenario: Resets the test for all groups and all virtual stations in a scenario.

Refresh Scenario: Refreshes the test for all groups and all virtual stations in a scenario.

Quiesce: This selection causes the scenario (that is, all virtual stations) to *gracefully* stop. The vSTA completes any currently active iteration, then stops. A quiesced vSTA must be reset before it can run again.

vSTA Tool Bar

The buttons in this tool bar are used to run, pause, stop, restart, or refresh selected virtual stations or groups of virtual stations. The selected action is executed for the group(s) and/or virtual station(s) that are selected/highlighted in the group control grid (Figure 4-97).

Figure 4-97. vSTA Tool Bar

Initialize: Starts the currently selected groups or virtual stations.

Probe: Submits a probe request and waits for a probe response.

Authenticate: Causes the currently selected virtual stations or all virtual stations in a group to initiate the 802.11 authentication sequence with the System Under Test.

Associate: Causes the currently selected virtual stations or all virtual stations in a group to initiate the 802.11 association sequence with the System Under Test. The 802.11 association sequence automatically transits through any necessary 802.1X authentication and key management if the virtual station is configured for RSN, RSN-PSK, WPA, or WPA-PSK.

Acquire IP: Causes the currently selected virtual stations to initiate a request for an IP address using DHCP. This option is available only for vSTAs created with the IP Generation Method of DHCP.

Pre-authenticate selected vSTA: Starts RSN (802.11i) pre-authentication by a vSTA with a selectable remote AP. This is valid only for stations configured for full RSN authentication. The virtual station(s) must be in the Ready or Running state.

Roam vSTAs: For the web-based user interface running on an IxWLAN SED chassis, it starts a Roam by all virtual stations to a selectable target AP. Each virtual station roams according to its configured **roam type** attribute. The Roam may include issuance of a Probe Request and optional 802.11 authentication.

For the web-based user interface running on an IxWLAN SED-MR+ chassis, it starts a Roam by the selected virtual stations or groups to a selectable target AP.

Run: Runs a test for selected groups or virtual stations.

Pause: Pauses a test for selected groups or virtual stations.

Stop: Ends a test for selected groups or virtual stations.

Release IP: Causes the currently selected virtual stations to release their IP address using DHCP. This option is available only for vSTAs created with the IP Generation Method of DHCP.

Disassociate: Causes the currently selected virtual stations or all virtual stations in a group to initiate the 802.11 disassociation sequence with the System Under Test. This sequence also drops any WPA/RSN security associations.

De-authenticate: Causes the currently selected virtual stations or all virtual stations in a group to initiate the de-authentication sequence with the System Under Test. This sequence also drops any WPA/RSN security associations.

Reset: Resets a test for selected groups or virtual stations.

Refresh: Refreshes a test for selected groups or virtual stations.

Quiesce: Causes the currently selected virtual stations to *gracefully* end. The vSTA completes any currently active iteration, then stops. A quiesced vSTA must be reset before it can run again.

Reports Tool Bar

The buttons in this tool bar are used to view the reports and event log (Figure 4-98).

Figure 4-98. Reports Tool Bar

View Reports: Opens the Generate Report dialog, where you can select a report to display or export.

View Event Log: Shows the last 100 entries in the event log.

Monitor Tool Bar

This tool bar is located in the top-right corner of the screen monitoring section. The buttons in this tool bar can be used to control monitor(s) (Figure 4-99).

Figure 4-99. Monitor Tool Bar

New Monitor: Allows you to define a new monitor.

Delete: Deletes a monitor. A dialog opens, asking you to confirm the selection.

Run: Runs a monitor. When the **Run Monitor** button is selected, the currently displayed monitor starts gathering and displaying its target statistics.

Pause: Pauses a monitor. When the **Pause Monitor** button is selected, the currently displayed monitor stops its target statistics. However, statistics are accumulated in the background and can be exported.

Clear: Clears a monitor. A dialog asks you to confirm the selection. TBDThis selection set all counters in the current monitor be exported.

File Menu

Figure 4-100 shows the **File** menu.

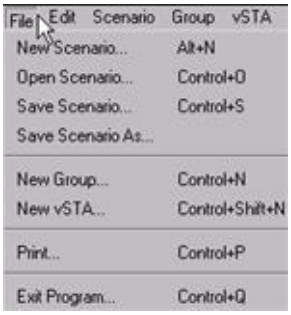


Figure 4-100. File Menu

New Scenario…: Creates a new scenario in which groups and virtual stations can be defined.

Open Scenario…: Opens the Open Scenario dialog, where you can choose from a list of existing scenario files on IxWLAN or browse your PC for scenario files.

Save Scenario…: Opens the Save Scenario dialog.

Save Scenario As…: Saves a scenario as a new instance.

New Group…: Opens the New IxWLAN Group dialog.

New vSTA…: Opens the Add vSTA to Group dialog.

Print: Sends the current scenario configuration to your printer.

Exit Program: Exits the web-based user interface. If a scenario is currently active/running, the dialog shown in Figure 4-101 opens.

Figure 4-101. Exit Program

- Click **Yes** to continue by exiting the web-based user interface.
- Click **No** to return to the currently running test.

If the current scenario has been modified during this web-based user interface session, the dialog shown in Figure 4-102 allows you to save these changes.

Figure 4-102. Save Scenario Modified

- Click **Yes** to open the Save Scenario dialog and save the scenario on your PC or in the flash on the IxWLAN SED/SED-MR+ chassis.
- Click **No** if you do not want to save the modified scenario.

If active virtual stations have been configured, the dialog shown in Figure 4-103 asks you to save the results to flash.

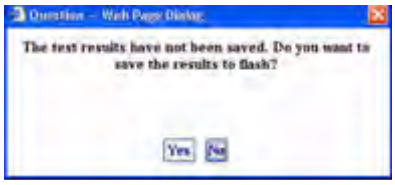


Figure 4-103. Flash Save Dialog

- Click **Yes** to save the results of any active scenario(s) in the IxWLAN flash file system.
- Click **No** to discard current test results.

The dialog shown in Figure 4-101 on page 4-82 asks you to confirm the exit from the web-based user interface:

- Click **Yes** to exit.
- Click **No** to return to the web-based user interface.

Edit Menu

Figure 4-104 shows the **Edit** menu.

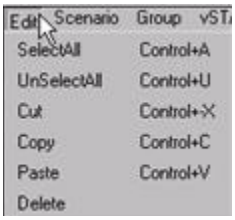


Figure 4-104. Edit Menu

Select All: If a group tab is selected, selects all virtual stations in a scenario group. If the Group Control tab opens, selects all groups.

Unselect All: If a group tab is selected, unselects all virtual stations in a scenario group. If the Group Control tab opens, unselects all groups.

Cut: Removes the definition of the currently selected virtual station and places it in the clipboard.

Copy: Copies a virtual station definition to clipboard.

Paste: Pastes the virtual station definition in the clipboard to the currently selected group.

Delete: If a group tab is selected, deletes the currently selected virtual station. If the Group Control tab opens, deletes the currently selected group.

Scenario Menu

After you have defined a scenario, use the **Scenario Menu** to start and exercise the scenario.

Figure 4-105 shows the **Scenario** menu.

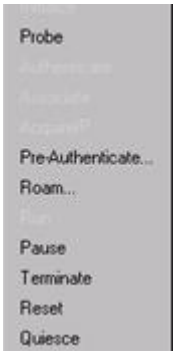


Figure 4-105. Scenario Menu

Initialize: Starts all virtual stations defined in the scenario.

Probe: A Probe Request is sent by all virtual stations in the currently selected group.

Authenticate: If clicked, all virtual stations defined in a scenario initiate the 802.11 authentication sequence to the System Under Test.

Associate: If clicked, all virtual stations defined in a scenario initiate the 802.11 association sequence to the System Under Test. The 802.11 association sequence automatically transits through any necessary 802.1X authentication and key management if the virtual station is configured for RSN, RSN-PSK, WPA, or WPA-PSK.

Acquire IP: Causes all virtual stations in the scenario to initiate a request for an IP address using DHCP. This option is available only for vSTAs created with the IP Generation Method of DHCP.

Pre-Authenticate: Starts RSN (802.11i) pre-authentication by a vSTA with a selectable remote AP. This is valid only for stations configured for full RSN authentication. The virtual station(s) must be in the Ready or Running state.

NOTE: Only one pre-authentication session per vSTA can be in progress at a time. If the user initiates a second pre-authentication while another one is in progress, an error message opens and logs in the event log

When **Pre-Authenticate** is selected, a dialog opens, as shown in Figure 4-106.

Figure 4-106. Pre-Authentication Dialog

Click the **Select** button to select a BSS from a list or to manually type a BSSID, as shown in Figure 4-107 on page 4-86.

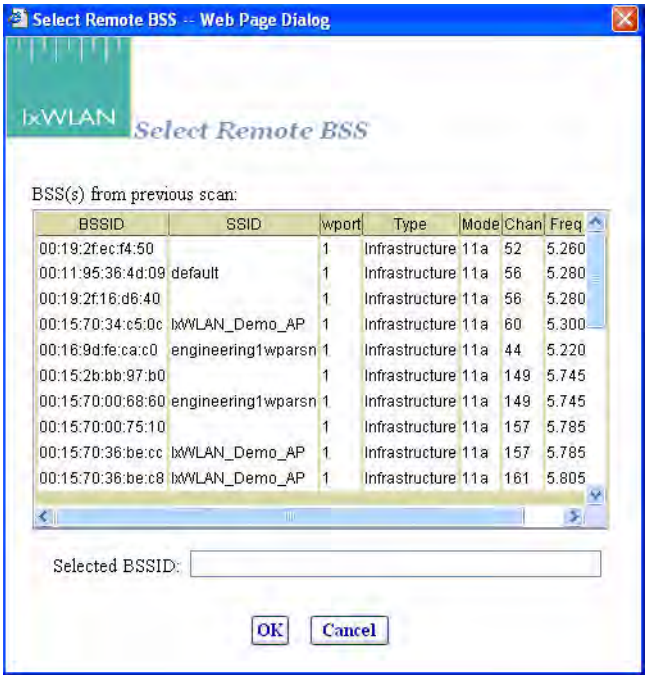


Figure 4-107. Select Remote BSS

Roam: Opens the Roam dialog, as shown in Figure 4-108. This command applies to all currently selected vSTAs in the Group or wport tabs.

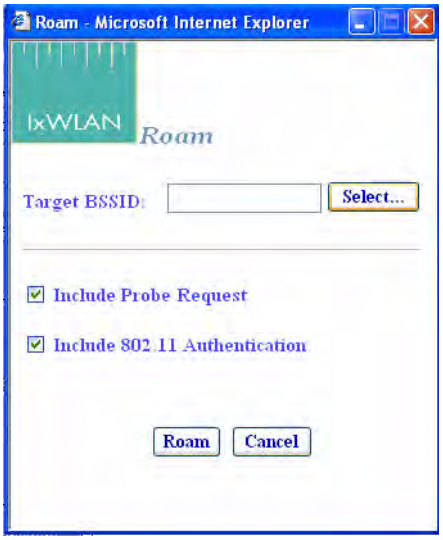


Figure 4-108. Roam Dialog

Click the **Select** button to select a BSS from a list or to manually type a BSSID, as shown in **Figure 4-107**.

The two checkboxes select the **Probe on Roam** and **Authenticate on Roam** options.

- Include Probe Request – Selects whether to issue a Probe Request during the Roam.When enabled, a Probe Request is issued (and a Probe Response expected) by each roaming virtual station during the Roam just before the 802.11 Authentication stage. When disabled, no Probe Request is sent.
- Include 802.11 Authentication – Selects whether to perform basic 802.11 Authentication during the Roam. When enabled, each roaming vSTA issues an Authentication Request to the target AP during a Roam and it expects an Authentication Response. When disabled, the 802.11 Authentication is skipped during a Roam and the vSTA proceeds to the (Re)Association exchange.

Run: Starts the execution of the test defined by this scenario.

Pause: Pauses the test and temporarily halts all virtual stations defined in the scenario. Virtual stations may be restarted by selecting the **Run** option. This option is dimmed (cannot be selected) if the scenario is not running.

Terminate: Stops a test and halts all virtual stations defined in the scenario. Virtual stations must be reset before they can be run again. This option is dimmed (cannot be selected) if the scenario is not running.

Reset: Resets all virtual stations in the scenario to a started state. Statistics for the virtual stations are reset to zero. This option can be used to restart any virtual stations that may have encountered problems during a test.

Quiesce: This selection causes the scenario (that is, all virtual stations) to *gracefully* stop. The vSTA completes any currently active iteration, then stops. A quiesced vSTA must be reset before it can run again.

Group Menu

After you have defined a group in a scenario, use the options in the **Group** menu to edit and control any/all selected group(s).

Figure 4-109 shows the **Group** menu.

Figure 4-109.Group Menu

Edit Group: This selection opens the Edit IxWLAN Group dialog.

Initialize: Starts all virtual stations defined in the currently selected group.

Probe: A Probe Request is sent by all virtual stations in the currently selected group. When invoked from the tool bar, probing does not change the Run State.

Authenticate: If clicked, all virtual stations in the currently selected group initiate the 802.11 authentication sequence to the System Under Test.

Associate: If clicked, all virtual stations in the currently selected group initiate the 802.11 association sequence to the System Under Test. The 802.11 association sequence automatically transits through any necessary 802.1X authentication and key management if the virtual station is configured for RSN, RSN-PSK, WPA, or WPA-PSK.

Acquire IP: Causes all virtual stations in the group to initiate a request for an IP address using DHCP. This option is available only for vSTAs created with the IP Generation Method of DHCP.

Pre-Authenticate: This command is similar to that described in the Scenario Menu section. For further information, please refer to *Scenario Menu* on page 4-84.

Roam: This command is similar to that described in the Scenario Menu section. For more information, please refer to *Scenario Menu* on page 4-84.

Run: Starts execution of all virtual stations defined in the currently selected group(s).

Pause: Pauses execution of all virtual stations defined in the currently selected group(s). This option is dimmed (cannot be selected) if the group is not running a test.

Terminate: Stops all virtual stations defined in the currently selected group(s). This option is dimmed (cannot be selected) if the group is not running a test.

Reset: Resets all virtual stations defined in the currently selected group(s).

Quiesce: Causes all virtual stations in the selected group to *gracefully* stop. The vSTA completes any currently active iteration, then stops. A quiesced vSTA must be reset before it can run again.

vSTA Menu

Figure 4-110 shows the **vSTA** menu.

Figure 4-110. vSTA Menu

Edit vSTA…: Opens the virtual station configuration dialog.

Initialize: Starts the currently selected virtual station(s).

Probe: A Probe Request is sent by all virtual stations in the currently selected group.

Authenticate: If clicked, the currently selected virtual station(s) start(s) the 802.11 authentication sequence to the System Under Test.

Associate: If clicked, the currently selected virtual station(s) start(s) the 802.11 association sequence to the System Under Test. The 802.11 association sequence automatically transits through any necessary 802.1X authentication and key management if the virtual station is configured for RSN, RSN-PSK, WPA, or WPA-PSK.

Acquire IP: Causes the currently selected virtual stations to initiate a request for an IP address using DHCP. This option is available only for vSTAs created with the IP Generation Method of DHCP.

Pre-Authenticate: This command is similar to that described in the Scenario Menu section. For further information, please refer to *Scenario Menu* on page 4-84.

Roam: This command is similar to that described in the Scenario Menu section. For further information, please refer to *Scenario Menu* on page 4-84.

Run: Starts the execution of the currently selected virtual station(s).

Pause: Pauses the execution of the currently selected virtual station(s). This option is dimmed (cannot be selected) if the virtual station is not running a test.

Terminate: Stops the currently selected virtual station(s). This option is dimmed (cannot be selected) if the virtual station is not running a test.

Reset: Resets the currently selected virtual station(s).

Quiesce: This selection causes the currently selected virtual stations to *gracefully* stop. The vSTA completes any currently active iteration, then stops. A quiesced vSTA must be reset before it can run again.

Reports Menu

Figure 4-111 shows the **Reports** menu.

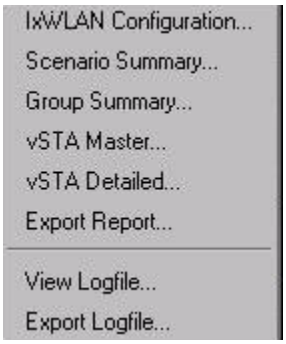


Figure 4-111. Reports Menu

IxWLAN Configuration…: Shows the IxWLAN configuration report.

Scenario Summary…: Shows the scenario summary statistics report.

Group Summary…: Shows the group summary statistics report.

vSTA Master…: Shows the virtual station master (that is, IxWLAN) statistics report.

vSTA Detailed…: Shows the virtual station detailed statistics report.

Export Report…: Opens the Generate Report dialog.

View Logfile…: Shows the event log.

Export Logfile: Opens the Export Logfile dialog.

Options Menu

Figure 4-112 shows the **Options** menu.

Figure 4-112. Options Menu

Configure IxWLAN…: Opens the Configure IxWLAN dialog.

Configure Monitors…: Opens the Configure Monitoring dialog.

Configure Ping…: Opens the Configure Ping dialog.

Configure Security…: Opens the Security Configuration dialog.

Configure Event Log…: Opens the Configure Event Log dialog.

Configure UI…: Opens the UI (User Interface) Configuration dialog.

Configure Table View…: Opens the Table Configuration dialog for group tab columns.

Configure Available Certificates…: Opens the Available Certificates dialog.

About Menu

Figure 4-112 shows the **About** menu.

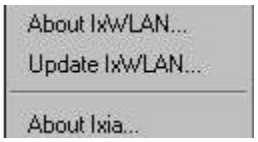


Figure 4-113. About Menu

About IxWLAN…: Shows the IxWLAN current version number.

Update IxWLAN…: Opens the Update IxWLAN dialog.

About Ixia…: Accesses the Ixia Web site.

5 The Command Line Interface (CLI)

This chapter covers the following topics:

- *CLI Usage Notes* on page 5-3.
- *User Login* on page 5-3.
- *User Logoff* on page 5-4.
- *CLI Commands* on page 5-4.
- *System Under Test Commands* on page 5-7.
- *Virtual Station Setup and Control Commands* on page 5-14.
- *Statistics File Commands* on page 5-51.
- *Event Log Commands* on page 5-53.
- *IxWLAN Commands* on page 5-58.
- *802.11b/g Commands* on page 5-86.
- *Administrative Mode Commands* on page 5-90.
- *Example Configurations* on page 5-97.
- *CLI Editor* on page 5-114.

The CLI can be used to show and modify the configuration of IxWLAN from a PC that is connected via Telnet or the serial port. The CLI also includes commands to configure and run virtual stations, show statistics, and access the System Under Test. IxWLAN maintains statistics and event log files that you can configure and display using CLI commands. Some of these commands apply to all wports, while other are wport-specific. The following commands are wport-specific:

- *bsslist (get)* on page 5-9.
- *join* on page 5-10.
- *hwtxretries (get/set)* on page 5-94.
- *scan* on page 5-11.
- *get association* on page 5-65.

- *get basic11g (11g only)* on page 5-91.
- *set basic11g (11g only)* on page 5-92.
- *get basic11b (11b only)* on page 5-87.
- *set basic11b (11b only)* on page 5-87.
- *get bssid* on page 5-8.
- *set bssid* on page 5-8.
- *clear bssid* on page 5-8.
- *get channel* on page 5-66.
- *get ctsmode (11g only)* on page 5-87.
- *set ctsmode (11g only)* on page 5-87.
- *get ctsrate (11g only)* on page 5-88.
- *set ctsrate (11g only)* on page 5-88.
- *get ctstype (11g only)* on page 5-88.
- *set ctstype (11g only)* on page 5-88.
- *get frequency* on page 5-69.
- *get key* on page 5-70.
- *set key* on page 5-80.
- *get pmmode* on page 5-71.
- *set pmmode* on page 5-81.
- *get power* on page 5-71.
- *set power* on page 5-82.
- *get psinterval* on page 5-71.
- *set psinterval* on page 5-83.
- *get rate* on page 5-72.
- *set rate* on page 5-83.
- *get shortpreamble (11b/11g)* on page 5-89.
- *set shortpreamble (11b/11g)* on page 5-89.
- *get shortslottime (11g only)* on page 5-89.
- *set shortslottime (11g only)* on page 5-89.
- *get ssid* on page 5-13.
- *set ssid* on page 5-13.
- *get station* on page 5-72.
- *get wirelessmode* on page 5-73.
- *set wirelessmode* on page 5-85.
- *get wlanmac* on page 5-73.

- *set wlanmac* on page 5-85.
- *reset wlanmac* on page 5-77.

CLI Usage Notes

1. CLI commands are not case sensitive (for example, **set Date** is the same as **set date**).
2. You do not need to type the entire command string to execute a command. Only the number of unique characters needed to identify the command are needed (for example, **se da** executes the **set date** command because there are no other CLI commands that begin with *se* and no other set objects that begin with *da*).
3. Some parameters can be assigned very large values in the 0 to 2,147,483,647 range. Do not type commas (,) for values larger than 999 (for example, use 1000 rather than 1,000).
4. It is very important to keep a printed record of configuration parameters. See *Configuration Records* on page 8-14.

User Login

The IxWLAN logon prompt displays after you successfully establish a connection to IxWLAN. See Chapter 3, *First Setup*. After you have successfully established this connection, the CLI prompts you to type a logon name and password.

```
IxWLAN login: Admin
Password: ******
```

The default logon user name is **Admin**. The default password is **IxWLAN**. Both entries are case-sensitive (that is, the default user name is **Admin**, not **admin**). After you type a valid user name and password, the CLI displays a version banner, the current system time and status, and a CLI prompt (IxWLAN ->).

```
Ixia IxWLAN(tm) Rev 6.20.0.129 EB

System date & time: FRI APR 20 10:03:31 2007
Use the "set date" or "set time" command to adjust

IxWLAN(tm) software version 6.20.0.129 EB
Number of wports present ....... 3
Multi-radio mode ............... Static
Mgmt LAN MAC address ........... 00:08:9b:68:2c:81
Data LAN MAC address ........... 00:08:9b:68:2c:82
MIC check ...................... Enabled
Crypto hardware ................ OK
0 vSTAs currently in the system.

[wport1]IxWLAN ->
```

The CLI is now ready to accept your commands.

NOTE: If the CLI shows the “This IxWLAN has not been Node Locked” message after you type the IxWLAN logon name and password, see *Missing Key File* on page 8-7.

User Logoff

Use the **quit** command to log off from the CLI.

```
IxWLAN -> quit
```

After logoff, you must re-establish the telnet connection to log on to the CLI.

CLI Commands

The **help** command shows a list of all CLI commands.

Example:

```
[wport1]IxWLAN -> help
List of IxWLAN CLI commands:
acquireip                 -- Acquire an IP address for a vSTA
 assoc                     -- Associate a vSTA with the SUT
 auth                      -- Authenticate a vSTA with the SUT
 autoconf                  -- Autoconfig-init-auth-assoc N vSTAs
 autorun                   -- Run N configured/associated vSTAs
 clear bssid               -- Clear BSSID for System Under Test
 clear evlog               -- Clear event log file or buffer
 clear group               -- Clear vSTA group data
 clear sntpserver          -- Clear SNTP/NTP server IP address
 clear systemname          -- Clear the IxWLAN system name
 clear vsta                -- Clear vSTA data
 conf                      -- Configure a vSTA
 cryptotest                -- Crypto hardware self-test
 deauth                    -- Deauthenticate a vSTA
 del group                 -- Delete a vSTA group
 del key                   -- Delete Encryption key
 del statfile              -- Delete a vSTA statistics file
 del summfile              -- Delete a vSTA statistics summary file
 del vsta                  -- Delete a vSTA
 disassoc                  -- Disassociate a vSTA
 exec                      -- Execute a command file
 ftp                       -- Software update via FTP
 get association           -- Display Association Table
 get basic11b              -- Display Basic 11b Rates
 get bootscan              -- Display Boot Scan Mode
 get bkjoin                -- Display Background Join
 get bssid                 -- Display BSSID of System Under Test
 get bsslist               -- Display list of discovered BSSIDs
 get channel               -- Display Radio Channel
 get config                -- Display current IxWLAN configuration
 get countrycode           -- Display Country Code
 get cryptocap             -- Display crypto hardware capabilities
 get evlog                 -- Display event log data
 get features              -- Display authorized features
```

```
get frequency             -- Display Radio Frequency (MHz)
get gateway               -- Display Gateway IP Address
get group                 -- Display information for a vSTA group
get hardware              -- Display Hardware Revisions
get ipaddr                -- Display IP Address
get ipmask                -- Display IP Subnet Mask
get key                   -- Display Encryption Key
get keyentrymethod        -- Display Encryption Key Entry Method
get login                 -- Display Login User Name
get mic                   -- Display Software MIC Control
get multiradiomode        -- Display multi-radio mode
get pmmode                -- Display Power Management Mode
get power                 -- Display Transmit Power Setting
get psinterval            -- Display Power Save Listen Interval
get rate                  -- Display Data Rate
get sntpserver            -- Display SNTP/NTP Server IP Address
get ssid                  -- Display Service Set ID
get statfile              -- Display vSTA statistics from file
get station               -- Display Station Status
get status                -- Display IxWLAN status
get summfile              -- Display vSTA statistics summary from file
get systemname            -- Display the IxWLAN system name
get telnet                -- Display Telnet Mode
get tzone                 -- Display Time Zone Setting
get uptime                -- Display UpTime
get version               -- Display Firmware Version
get vsta                  -- Display vSTA information
get wirelessmode          -- Display Wireless LAN Mode
get wlanmac               -- Display Wireless LAN MAC Address
get wlanmask              -- Display Wireless LAN Address Mask
get wport                 -- Display wport information
halt                      -- Halt a running vSTA
help                      -- Display CLI Command List
history                   -- Display the command line history
import                    -- Import PKCS#12 certfile via FTP
init                      -- Initialize a configured vSTA
join                      -- Join the IxWLAN with the System Under Test
ping                      -- Ping
preauth                   -- Pre-authenticate a vSTA with a remote AP
quit                      -- Logoff
reboot                    -- Reboot the IxWLAN
releaseip                 -- Release a vSTA's IP address
reset group               -- Reset a vSTA group to the initialized state
reset vsta                -- Reset a vSTA to the initialized state
reset wlanmac             -- Reset the WLAN MAC address to default value
roam                      -- Roam a vSTA to target BSS
run                       -- Run an associated vSTA
save evlog                -- Save the event log buffer to file
save group                -- Save vSTA group data
save vsta                 -- Save vSTA data
scan                      -- Acquire SUT (scan/join)
sendprobe                 -- Send probe request from vSTA
set bkjoin                -- Set Background Join
set bootscan              -- Set Bootscan mode
set bssid                 -- Set the BSSID for the System Under Test
set countrycode           -- Set Country Code
set date                  -- Set the system date
```

```
 set evlog                  -- Set event log controls
 set factorydefault         -- Restore to Default Factory Settings
 set features               -- Upgrade current feature set
 set gateway                -- Set Gateway IP Address
 set group                  -- Set vSTA group configuration parameters
 set ipaddr                 -- Set IP Address
 set ipmask                 -- Set IP Subnet Mask
 set key                    -- Set Encryption Key
 set keyentrymethod         -- Select Encryption Key Entry Method
 set login                  -- Modify Login User Name
 set mic                    -- Set Software MIC Control
 set multiradiomode         -- Set multi-radio mode
 set password               -- Modify Password
 set pmmode                 -- Set Power Management Mode
 set power                  -- Set Transmit Power
 set psinterval             -- Set Power Save Listen Interval
 set rate                   -- Set Data Rate
 set sntpserver             -- Set SNTP/NTP Server IP Address
 set ssid                   -- Set Service Set ID
 set systemname             -- Set the IxWLAN system name
 set telnet                 -- Set Telnet Mode
 set time                   -- Set the system time
 set tzone                  -- Set Time Zone Setting
 set vsta                   -- Set vSTA configuration parameters
 set wirelessmode           -- Set Wireless LAN Mode
 set wlanmac                -- Set WLAN MAC Address
 set wlanmask               -- Set WLAN Address Mask
 set wport                  -- Set wport for configuration
 timeofday                  -- Display Current Time of Day
 version                    -- Software version
[wport1]IxWLAN ->
```

This list does not include the commands that are available in the administrative mode. See *Administrative Mode Commands* on page 5-90 for a list including more commands that are available in the administrative mode. Also, the list of commands is slightly different depending on the wireless mode. If the wireless mode is 802.11a, for example, the list does not include commands that are specific to 802.11g.

NOTE: The **trace** command is available both in the user and admin mode. In the user mode, it is not listed among the other commands in the help output. For details about this command, see *Administrative Mode Commands* on page 5-90 or *trace* on page 5-95.

System Under Test Commands

These commands are used to scan for and join with a device that can be tested by IxWLAN. These commands must be used to select and join with a System Under Test before you can use the following Virtual Station Set-Up and Control Commands.

```
clear bssid                    -- Clear BSSID for System Under Test
get bssid                      -- Display BSSID of System Under Test
get bsslist                    -- Display list of discovered BSSIDs
get ssid                       -- Display Service Set ID
get wirelessmode               -- Display Wireless LAN Mode
join                           -- Join the IxWLAN with the System Under Test
scan                           -- Acquire SUT (scan/join)
set bssid                      -- Set the BSSID for the System Under Test
set ssid                       -- Set Service Set ID
set wirelessmode               -- Set Wireless LAN Mode
```

These commands also allow you to change the System Under Test while virtual stations are defined and active. Use the following command sequence:

1. Use the **reset** command to return all virtual stations to an initialized state:

```
reset vsta all
```

2. If the new System Under Test is not in IxWLAN's BSS list, a **scan** is needed:

```
scan
```

3. Use the **set bssid** command to set IxWLAN to another System Under Test:

```
set bssid <mac_address_of_new_SUT>
```

4. Use the **join** command to join with the System Under Test:

```
join
```

5. If virtual stations are configured for WPA or RSN authentication and the new System Under Test has a different passphrase, change the passphrase for all virtual stations to match the new System Under Test:

```
set vsta all passphrase <SUTs_passphrase>
```

6. Issue the **authenticate** command for all virtual stations:

```
auth vsta all
```

7. Issue the **associate** command for all virtual stations:

```
assoc vsta all
```

8. Run the test for all virtual stations:

```
run vsta all
```

This section covers the following commands:

- *bssid (get/set/clear)* on page 5-8
- *bsslist (get)* on page 5-9

- *join* on page 5-10
- *scan* on page 5-11
- *ssid (get/set)* on page 5-13

bssid (get/set/clear)

get bssid

Shows the current BSSID/MAC address of the system being tested.
`get bssid`

Example:

```
[wport1]IxWLAN -> get bssid
BSSID of System Under Test: 00:04:e2:34:e0:a8
[wport1]IxWLAN ->
```

set bssid

Specifies the BSSID/MAC address of the system to be tested. This is the System Under Test that IxWLAN scans for and joins with. The default value is all zeros.

NOTE: IxWLAN must be configured with a non-zero BSSID to perform a Join operation and to create and run virtual stations.

`set bssid <mac_address>`

<**mac_address**>: MAC address of the System Under Test.

Example:

```
[wport1]IxWLAN -> set bssid 00:04:e2:34:e0:a8
BSSID of System Under Test: 00:04:e2:34:e0:a8
IxWLAN ->
IxWLAN -> get bssid
BSSID of System Under Test: 00:04:e2:34:e0:a8
[wport1]IxWLAN ->
```

clear bssid

Clears the current BSSID.
`clear bssid`

Example:

```
[wport1]IxWLAN -> clear bssid
BSSID 00:04:e2:34:e0:a8 cleared
   use the set bssid CLI command to set the BSSID of the
System Under Test
[wport1]IxWLAN ->
```

bsslist (get)

Shows the Basic Service Sets discovered in the most recent scan. See *scan* on page 5-11.

```
get bsslist [detail]
```

Use the **[detail]** option to view detailed information regarding each BSS's rate capabilities and needs, country code and channel capabilities, and security information.

Example for **get bsslist**:

```
[wport1]IxWLAN -> get bsslist
Use "get bsslist detail" for additional info
Type  Chan  Sec  RSSI  BSSID              SSID
----  ----  ---  ----  -----              ----
AP      44         38  00:05:4e:41:3c:19  QA_A_AP
AP      60  WEP    61  00:04:e2:37:e6:a1  CK S-1
AP      64  TKIP   53  00:0b:6b:30:05:6c  cb/wpa
AP     149  TKIP   39  00:12:d9:c4:0a:90  s TKIP
AP SUT 157  AES    51  00:0b:6b:30:05:65  CK D-1
AP     165         52  00:0b:6b:30:05:86  cb/ap1
AP: 6, Ad-Hoc: 0, Total BSSs: 6
[wport1]IxWLAN ->
```

Type: The Type column indicates the type of BSS detected: AP=Infrastructure BSS, <Type> SUT=System Under Test, Ad-Hoc=Ad-Hoc BSS.

Chan: BSS channel number. The BSS list is sorted in channel number order.

Sec: Brief description of the security level of the BSS. If multiple security features are active, this column shows the highest level of security. Use the **[detail]** option to show all security options in effect.

RSSI: The RSSI column shows the relative received signal strength indicator for the BSS. A higher RSSI value indicates that a stronger signal is received.

BSSID: The BSSID column shows the BSS identifier.

SSID: The SSID column shows the service set identifier for the BSS discovered via a probe request.

Example for **get bsslist detail**:

```
[wport1]IxWLAN -> get bsslist detail
BSS Type  Channel       RSSI  BSSID              SSID
--------  -------       ----  -----              ----
AP BSS    5.220 ( 44)    38   00:05:4e:41:3c:19  QA_A_AP
  Rates:    *6, 9, *12, 18, *24, 36, 48, 54
AP BSS    5.300 ( 60)    61   00:04:e2:37:e6:a1  CK S-1
  Rates:    *6, 9, *12, 18, *24, 36, 48, 54
  Security: WEP
AP BSS    5.320 ( 64)    53   00:0b:6b:30:05:6c  cb/wpa
  Rates:    *6, 9, *12, 18, *24, 36, 48, 54
  Security: WPA/EAP/TKIP
```

```
  Country:  US [ 52 (5260)  4 23] [ 36 (5180)  4 17] [149 (5745)  5 30]
AP BSS    5.745 (149)    39   00:12:d9:c4:0a:90  s TKIP
  Rates:    *6, *9, *12, *18, *24, *36, *48, *54
  Security: WPA/PSK/TKIP
AP BSS    5.785 (157)    51   00:0b:6b:30:05:65  CK D-1
  * *  This is the System Under Test  * *
  Rates:    *6, 9, *12, 18, *24, 36, 48, 54
  Security: RSN/PSK/AES/TKIP
  Country:  US [ 52 (5260)  4 23] [ 36 (5180)  4 17] [149 (5745)  5 30]
AP BSS    5.825 (165)    52   00:0b:6b:30:05:86  cb/ap1
  Rates:    *6, 9, *12, 18, *24, 36, 48, 54
  Country:  US [ 52 (5260)  4 23] [ 36 (5180)  4 17] [149 (5745)  5 30]
AP: 6, Ad-Hoc: 0, Total BSSs: 6
```

The **get bsslist detail** command shows detailed information regarding the rate capabilities and needs, country code and channel capabilities, and security information of each BSS. This information is presented as it is read from the BSS's Beacon or Probe Response, when present. Not all APs broadcast this detail information. It is shown only when available.

The first line of each BSS detail line item shows the basic BSS information: type, channel, RSSI, BSSID, and SSID. The * * This is the System Under Test * * message displays after the basic BSS information line if the System Under Test is specified and detected.

Rates: This line indicates the set of transmit rates supported in the BSS. Entries marked by an asterisk (for example, *6, *24) indicate a member of the BSS's basic rate set.

Security: This line indicates all security information that can be determined passively through inspection of information found in the Beacon or Probe Response. WEP indicates basic WEP encryption. WPA or RSN indicate higher security in the form of advanced authentication and encryption algorithms. PSK indicates Pre-Shared Key authentication. EAP indicates the use of a more robust EAP-based authentication algorithm. TKIP and AES indicate the cipher algorithm in use. A WPA or RSN BSS may support more than one authentication or cipher suite.

Country: This line indicates information found in the Country information element, when present. This includes the country code and the channel list. The channel list is formatted in the form: [first channel, number of channels, maximum transmit power]. Example: [52 (5260) 4 23]. In this example, first channel=52, number of channels =4, maximum transmit power=23.

join

Joins with the System Under Test. It must be present in the current Basic Service Set list. See *bsslist (get)* on page 5-9.

```
join
```

Example:

```
[wport1]IxWLAN -> join
 The join should take about 1 sec
 [wport1]IxWLAN -> IxWLAN: wport1 Join: Checking BSS ... OK
```

```
IxWLAN: wport1 Join: Checking channel ... OK
IxWLAN: wport1 Join: Initiating JOIN ...
Infrastructure   5.260    29   00:0b:6b:30:05:9f  ixia/dmm/atheros
IxWLAN: wport1 Join: channel 52 (5260 MHz), ixia/dmm/atheros
OK

wport1 NOTIFY Operation JOIN succeeded - FRI MAR 30 14:05:57 2007
[wport1]IxWLAN ->
```

NOTE: If any virtual stations are configured for WPA-PSK or RSN-PSK authentication using a passphrase and IxWLAN is already joined at the time a **join** command selects a different SSID, the Pre-Shared Keys is regenerated for every vSTA that has a passphrase set.

Example**:**

```
[wport1]IxWLAN -> join
 The join should take about 1 sec
 [wport1]IxWLAN -> IxWLAN: wport1 Join: Checking BSS ... OK
 IxWLAN: wport1 Join: Checking channel ... OK
 IxWLAN: wport1 Join: Initiating JOIN ...
 Infrastructure 5.240 58 00:0b:6b:30:05:86 AccessPoint_1
 IxWLAN Join: channel 157 (5785 MHz), CK D-1
 OK
 [wport1]IxWLAN ->
 vSTA 1 PSK: f769e4fdc6b97b780c7f3799c6d58ce7250ca3779930cb4d2545dacbc45092d1
 [wport1]IxWLAN ->
 wport1 NOTIFY Operation JOIN succeeded - MON MAY 09 10:42:30 2005
 [wport1]IxWLAN ->
```

scan

Scans for Basic Service Set IDs and optionally joins with the System Under Test. The IxWLAN wireless mode affects the type of devices that can be detected in a scan. To change the IxWLAN wireless mode, see *Virtual Station Setup and Control Commands* on page 5-14.

NOTE: If a test is in process (see *get wirelessmode* on page 5-73), a scan operation is disruptive to the normal testing operations of IxWLAN.

```
[wport1]IxWLAN -> scan
Active (probe request) or passive (listen for beacons) [a/p:
p]?
```

Type **a** and press ENTER to select an active scan. Just press ENTER to select the default passive mode. If the passive mode is selected, the CLI prompts for the following scanning options:

```
Channel (0 = all, m=all modes) [0]?
Channel timeout in msec [300]?
```

If typing **m** for the channel, all valid channels in all valid modes are scanned.

The default entry of 0 selects all valid channels in the current wireless mode.

If the active mode is selected, the CLI prompts for the following scanning options:

```
Broadcast or directed probe request [b/d: d]?
Channel (0 = all, m=all modes) [0]?
Channel timeout in msec [300]?
```

In response to the Channel prompt, you may type zero for all channels or any valid 802.11a or 802.11b/g channel number or frequency. The range of channels/frequencies depends on the wireless mode and the features that are enabled on IxWLAN. See the specifications in Appendix A, *Specifications* for a list of valid channel numbers and frequencies for 802.11a, 802.11b, and 802.11g.

The CLI prompts to join with a system (if any) found in the scan. If IxWLAN is already joined with a System Under Test, the default response is **y**:

```
Attempt a join with SUT 00:04:e2:38:56:78 [y/n: y]?
```

If IxWLAN is not joined with a System Under Test, the default response is **n**:

```
Attempt a join with SUT 00:04:e2:38:56:78 [y/n: n]?
```

Type **y** or **n** and press ENTER or just press ENTER to select the default.

Example**:**

```
[wport1]IxWLAN -> scan
Active (probe request) or passive (listen for beacons) [a/p:p]?
Channel (0 = all) [0]?
Channel timeout in msec [300]?
Attempt a join with SUT 00:04:e2:38:a8:d2 [y/n: n]?
The scan should take about 4 sec
[wport1]IxWLAN -> OK
[wport1]IxWLAN ->
[wport1]IxWLAN ->
Passive scanning 5 GHz 54Mbps (802.11a) channels for 4 seconds...

Select BSS: Looking for .. 00:04:E2:38:A8:D2
Select BSS: Found ........ 00:04:E2:38:A8:D2

=> BSS'es from the selected wireless mode <=
BSS Type  Channel       RSSI  BSSID              SSID
--------  -------       ----  -----              ----
SUT BSS   5.220 ( 44)    31   00:04:e2:38:a7:87  AccessPoint_1
SUT BSS   5.260 ( 52)    55   00:04:e2:38:a8:d2  AccessPoint_2
SUT BSS   5.280 ( 56)    46   00:04:e2:38:56:68  AccessPoint_3
SUT BSS   5.300 ( 60)    44   00:04:e2:37:e6:a1  AccessPoint_4
SUT: 4, Ad-Hoc: 0. Total BSS: 4

wport1 NOTIFY Operation SCAN succeeded - FRI MAR 30 14:14:52 2007
wport1 NOTIFY Operation SCAN&JOIN succeeded - FRI MAR 30 14:14:52 2007

[wport1]IxWLAN -> scan
Active (probe request) or passive (listen for beacons) [a/p: p]? a
Broadcast or directed probe request [b/d: d]?
```

```
Channel (0 = all) [0]? 2412
Channel timeout in msec [300]?
Attempt a join with SUT 00:04:e2:38:a8:d2 [y/n: n]?
The scan should take about 1 sec
[wport1]IxWLAN -> OK
[wport1]IxWLAN ->
[wport1]IxWLAN -> InitSingleScan -- 2412, a00  cck 2.4
Active scanning 2.4GHz 11Mbps (802.11b) channels for 1 seconds...
wlanMlmeProbeRequest -- channel 2412
Select BSS: Looking for .. 00:04:E2:38:A8:D2
Select BSS: Found ........ 00:04:E2:38:A8:D2
InitSingleScan -- 2412, a00  cck 2.4
Active scanning 2.4GHz 11Mbps (802.11b) channels for 1 seconds...
wlanMlmeProbeRequest -- channel 2412
wport1 NOTIFY Operation SCAN succeeded - FRI MAR 30 14:14:52 2007
wport1 NOTIFY Operation SCAN&JOIN succeeded - FRI MAR 30 14:14:52 2007
[wport1]IxWLAN ->
```

ssid (get/set)

get ssid

Displays the IxWLAN global Service Set Identifier attribute.

```
[wport1]IxWLAN -> get ssid
SSID: IxWLAN Test Wireless Network
[wport1]IxWLAN ->
```

set ssid

Sets the given value to the IxWLAN global Service Set Identifier attribute.

To reset the global SSID to the factory default string, enter the following command: **set ssid default**.

```
[wport1]IxWLAN -> set ssid default
 * *
 * *  DO NOT REMOVE POWER FROM THE IxWLAN UNIT!
 * *  Wait for the IxWLAN to update the configuration file in Flas
 * *  or use the "reboot" command for immediate update & reboot.
 * *  Automatic update will be done within one minute.
 * *
[wport1]IxWLAN -> ...Configuration file update completed.
get ssid
SSID: IxWLAN Test Wireless Network
```

Virtual Station Setup and Control Commands

The following commands configure and activate virtual stations.

```
acquireip                -- Acquire an IP address for a vSTA
assoc                    -- Associate a vSTA with the SUT
auth                     -- Authenticate a vSTA with the SUT
autoconf                 -- Autoconfig-init-auth-assoc N vSTAs
autorun                  -- Run N configured/associated vSTAs
clear group              -- Clear vSTA group data
clear vsta               -- Clear vSTA data
conf                     -- Configure a vSTA
deauth                   -- Deauthenticate a vSTA
del group                -- Delete a vSTA group
del vsta                 -- Delete a vSTA
disassoc                 -- Disassociate a vSTA
get group                -- Display information for a vSTA group
get vsta                 -- Display vSTA information
halt                     -- Halt a running vSTA
preauth                  -- Pre-authenticate a vSTA with a remote AP
releaseip                -- Release a vSTA's IP address
reset group              -- Reset a vSTA group to the initialized state
reset vsta               -- Reset a vSTA to the initialized state
roam                     -- Roam a vSTA to target BSS
run                      -- Run an associated vSTA
save evlog               -- Save the event log buffer to file
save group               -- Save vSTA group data
save vsta                -- Save vSTA data
sendprobe                -- Send probe request from vSTA
set group                -- Set vSTA group configuration parameters
set vsta                 -- Set vSTA configuration parameters
```

Most of the commands in this group need that you join with a System Under Test. If a join or scan has not been done, the CLI shows the following message:

```
**You must do a "join" or a "scan" with the join option first.
```

NOTE: There is no need for an explicit Join when **Background Join** is enabled.

Use the described System Under Test commands to join with a System Under Test before using the commands in this group.

NOTE: Most of the commands in this group need that you specify a virtual station ID in the 1 to 64 range for the IxWLAN SED chassis, and in the 1 to 128 range for the IxWLAN SED-MR+. If you intend to configure all virtual stations for WPA or RSN authentication, the maximum number of virtual stations is:

- 59 for the IxWLAN SED chassis
- 59 per wport—in the **Static** multi-radio mode—for the IxWLAN SED-MR+ chassis
- 59—in the **Dynamic** multi-radio mode—for the IxWLAN SED-MR+ chassis

This section covers the following commands:

- *acquireip* on page 5-16.
- *assoc* on page 5-16.
- *auth* on page 5-17.
- *autoconf* on page 5-18.
- *autorun* on page 5-23.
- *clear group* on page 5-23.
- *clear vsta* on page 5-23.
- *conf* on page 5-24.
- *deauth* on page 5-26.
- *del group* on page 5-27.
- *del vSTA* on page 5-27.
- *disassoc* on page 5-27.
- *get group* on page 5-28.
- *get vsta* on page 5-30.
- *halt* on page 5-36.
- *init* on page 5-36.
- *preauth* on page 5-37.
- *releaseip* on page 5-37.
- *reset group* on page 5-38.
- *reset vsta* on page 5-38.
- *roam* on page 5-38.
- *run* on page 5-39.
- *save group(stats/summary)* on page 5-39.
- *save vsta(stats/summary)* on page 5-40.
- *sendprobe* on page 5-40.
- *set group* on page 5-42.
- *set vsta* on page 5-46.

acquireip

Starts the DHCP negotiation process for the specified virtual station(s). The virtual station must be in the 802.11 Associated state or 802.1X authenticated if security is turned on and the vSTA's DHCP mode (dhcpmode) must be set to **on**. See *autoconf* on page 5-18, *conf* on page 5-24 and *set vsta* on page 5-46 for information about setting the DHCP mode.

The following command starts the DHCP negotiation process for one or all virtual stations.

```
acquireip vsta <vStaId>
```

<**vStaId**>: Virtual Station ID (1…128) or all. If <vStaId> is set to **all** (that is, acquireip vsta all), the DHCP negotiation process is initiated for all virtual stations.

The following command starts the DHCP negotiation process for all virtual stations in a specified group.

```
acquireip group <grpId>
```

<**grpId**>: Group ID (1…128)

Example:

```
[wport1]IxWLAN -> acquireip vsta 1
[wport1]IxWLAN -> OK
vSTA ID:1 NOTIFY Operation ACQIP (10.1.35.10) succeeded - THU JAN 08 10:04:31 2004
```

assoc

Starts the 802.11 association sequence for one or more virtual stations. The 802.11 association sequence automatically transits through any necessary 802.1X authentication and key management if the virtual station is configured for RSN, RSN-PSK, WPA, or WPA-PSK. The virtual station(s) must be configured, initialized, and authenticated before this command can be used.

The following command starts the association sequence for one or all virtual stations.

```
assoc vsta <vStaId>
```

<**vStaId**>: Virtual Station ID (1…128) or all. If <vStaId> is set to **all** (that is, assoc vsta all), the association sequence is initiated for all virtual stations.

The following command starts the association sequence for all virtual stations in a specified group.

```
assoc group <grpId>
```

<**grpId**>: Group ID (1…128)

Example:

```
[wport1]IxWLAN -> assoc vsta 1
[wport1]IxWLAN -> OK
[wport1]IxWLAN ->
vSTA ID:1 NOTIFY Operation ASSOC succeeded - TUE JUL 15 03:08:38 2003
[wport1]IxWLAN ->
```

When a virtual station is configured for WPA-PSK authentication, this command shows additional AKMP information.

Example for **WPA-PSK**:

```
[wport1]IxWLAN -> assoc vsta 1
[wport1]IxWLAN -> OK
[wport1]IxWLAN ->
vSTA ID:1 NOTIFY Operation ASSOC succeeded - WED MAY 26 10:38:57 2004
[wport1]IxWLAN ->
vSTA ID:1 NOTIFY Remote initiated AKMP - WED MAY 26 10:38:57 2004
[wport1]IxWLAN ->
vSTA ID:1 NOTIFY AKMP succeeded - WED MAY 26 10:38:57 2004
[wport1]IxWLAN ->
```

When a virtual station is configured for WPA or RSN authentication, this command shows an additional NOTIFY message for the 802.1X authentication operation.

Example for **WPA**:

```
[wport1]IxWLAN -> assoc vsta 1
[wport1]IxWLAN -> OK
[wport1]IxWLAN ->
vSTA ID:1 NOTIFY Operation ASSOC succeeded - WED MAY 26 10:38:57 2004
[wport1]IxWLAN ->
vSTA ID:1 NOTIFY 1XAUTH succeeded - WED MAY 26 10:38:57 2004
[wport1]IxWLAN ->
vSTA ID:1 NOTIFY Remote initiated AKMP - WED MAY 26 10:38:57 2004
[wport1]IxWLAN ->
vSTA ID:1 NOTIFY AKMP succeeded - WED MAY 26 10:38:57 2004
[wport1]IxWLAN ->
```

auth

Starts the 802.11 authentication sequence for one or more virtual stations. The virtual station(s) must be configured and initialized before this command can be used.

The following command starts the authentication sequence for one or all virtual stations.

auth vsta <vStaId>

<**vStaId**>: Virtual Station ID (1…128) or all. If <vStaId> is set to **all** (that is, auth vsta all), the authentication sequence is initiated for all virtual stations.

The following command starts the authentication sequence for all virtual stations in a specified group.

```
auth group <grpId>
```

<**grpId**>: Group ID (1…128)

Example:

```
[wport1]IxWLAN -> auth vsta 1
[wport1]IxWLAN -> OK
[wport1]IxWLAN ->vSTA ID:1 NOTIFY Operation AUTH succeeded - TUE JUL 15 03:08:15
2003
[wport1]IxWLAN ->
```

autoconf

This command allows you to configure, initialize, authenticate, and associate a number of virtual stations using a single command. It can be issued multiple times. The first time the command is issued, the base MAC and IP virtual station addresses must be specified. For subsequent commands, the IP and MAC address parameters are not needed. The specified number of virtual stations is configured using either default values or the values specified in the command line. Except for the number of virtual stations to be configured, values are specified using a "name/value" pair syntax and may be given in any order.

```
autoconf <num> mac <mac_addr> [ip <ip_addr>] [group <grpId>] [wport <integer>]
[gateway <ip_addr>] [ipmask <ip_mask>]
 [csmode persistent|non-persistent] [retry <integer>] [timeout <integer>]
 [fastradius enabled|disabled] [pmkcache enabled|disabled]
 [roamtype disassociation|reassociation]
 [encryption on|off] [keyindex <integer>]
 [fragmentthreshold <integer>] [rtsthreshold <integer>]
 [mode external] [layer 2 | 3] |
 [mode internal] target <ip_addr> [count <integer>] [size <integer>]
 [dhcpmode off | on | auto] [dhcplease <integer>] [dhcpretry <integer>]
 [dhcpinterval <integer>] [dhcpoffers <integer>] [dhcpserver <ip_addr>]
 [SSID <string> | <quoted-string> | wildcard]
 [probe4auth] [authentication open-system|shared-key|rsn-psk|rsn|wpa-psk|wpa]
 [cipher wep|tkip|aes-ccm] [psk <key>] [passphrase <quoted-phrase>]
 [eapalgorithm tls|peap|ttls] [certfile <filename>] [userid <string>]
 [inneralgorithm <inner-auth-id>] [password <inner-auth-passwd>]
 [outeridentity <outer-auth-ID>] [kmtimeout <integer>]
```

<num>: Specifies the number of virtual stations to be configured. For IxWLAN SED, the maximum number of vSTAs is 64, while IxWLAN SED-MR+ supports a maximum number of 128 vSTAs. If this is not the first autoconf command, new virtual stations are configured starting with the last virtual station and incrementing for <num>. Default: **None**.

mac <mac_address>: Specifies the base/starting value to be used for virtual station MAC addresses. This parameter is needed for the first autoconf command and should not be specified for subsequent commands. Default: **Last MAC address + 1**. The starting MAC address must be within the range of MAC

addresses defined by the WLAN Base MAC Address and WLAN MAC Mask configured for the specified wport (see *set wlanmac* on page 5-85 and *set wlanmask* on page 5-85).

ip <ip_address>: Specifies the base/starting value to be used for virtual station IP addresses. This parameter is needed for the first autoconf command and should not be specified for subsequent commands. Default: **Last IP address + 1**.

[**group** <grpId>]: Specifies an optional group ID number (1…128).

[wport <integer**>]**: Creates the virtual station(s) on the specified wport. If this parameter is not specified, the virtual station(s) is/are created on the current wport.

[**gateway** <ip_addr>]: Specifies the IP address of the gateway to be used by the vSTA.

[**ipmask** <ip_mask>]: Specifies the subnet mask to be used by a vSTA.

[**csmode** persistent | non-persistent]: Specifies the connection mode (persistent or non-persistent).

[**retry** <integer>]: Specifies the Authentication/Association retry limit (1…2,147,483,647 or zero (0=no retries)).

[**timeout** <integer>]: Specifies the Authentication/Association timeout, in ms (1…2,147,483,647 or zero (0=immediate timeout)).

[**fastradius** enabled | disabled]: Enables the fast RADIUS reconnection when (re)associating or pre-authenticating. The default is **Disabled**.

[**pmkcache** enabled | disabled]: Enables the use of cached PMKSA information when (re)associating. The default value of this attribute is **Enabled**. Cached PMKSA information may be used by virtual stations configured for full RSN (802.11i) authentication.

[**roamtype** disassociation | reassociation]: Selects the roam type. The default value for roamtype is **reassociation**.

[**authentication** open-system|shared-key|wpa-psk|wpa|rsn|rsn-psk]: Defines the authentication mode: **open-system**, **shared-key**, **wpa-psk**, **wpa**, **rsn**, or **rsn-psk**.

[**encryption** on|off]: Specifies the encryption mode (**on** or **off**).

[**keyindex** <integer>]: If encryption is **on** and authentication is **shared-key**, this parameter specifies a shared key index number (1…4). These shared keys are defined by the **set key** command.

[**cipher** wep | tkip | aes-ccm]: Enables WEP, TKIP, or AES-CCM (that is, CCMP) cipher mode. If authentication is **open-system** or **shared-key**, **wep** is the only valid selection.

[**mode** internal | external]: If mode is **internal**, virtual station(s) generate data using Ping (ICMP Echo Request) packets. Each virtual station runs a ping transmitter process. The packets contain virtual station IP and MAC source address. If **internal** is specified, the **target** parameter must also be specified. If mode is **external**, data for virtual station(s) is generated by an external host connected to the same LAN as IxWLAN. For vSTAs configured at layer 3, IP and ARP packets generated from this host that contain the virtual station's IP address as a source is translated at the MAC layer to appear as if sourced from the virtual station's MAC address. Default: **internal.**

[**target** <ip_address>]: If mode is **internal**, this parameter specifies the target host's IP address. If mode is **internal**, this parameter is needed. Default: **None**.

[**count** <integer>]: If mode is **internal**, this parameter specifies the number of ping packets to send: 0…2,147,483,647. Default: **1000**.

[**size** <integer>]: If mode is **internal**, this parameter specifies the size of the ping data buffer (64…1024). Default: **1024**.

[**dhcpmode** <off | on | auto>]: The DHCP mode allows virtual stations to have IP addresses dynamically acquired from a DHCP server on the network rather than a fixed, configured IP address. If **dhcpmode** is **off**, DHCP mode is not active and virtual stations must have a static IP address. If **dhcpmode** is **on**, the **acquireip** command must be used to initiate lease negotiation. If **dhcpmode** is **auto**, IxWLAN automatically starts lease negotiation if the association succeeds. The default value is **off**.

[**dhcplease** <integer>]: Specifies the lease time that a vSTA is to request.

[**dhcpretry** <integer>]: Specifies the number of times that a vSTA retries a DHCP operation (discover, request) before timing out.

[**dhcpinterval** <integer>]: Specifies the interval between retries.

[**dhcpoffers** <integer>]: Specifies the number of offers to ignore before generating a request.

[**dhcpserver** <ip_addr>]: If set, specifies the DHCP server from which a vSTA is to accept offers (needed when testing with multiple servers).

[**SSID** <string> | <quoted-string> | wildcard]: The SSID is used in (re)association and in computing the pre-shared key from a passphrase for WPA/RSN-PSK. The default value for a vSTA's SSID is **Not Set**. If set to **Wildcard**, the SSID used in the probe and association/re-association requests is the wildcard SSID and the frame contains an SSID Information Element with a length of 0.

[**probeb4auth**]: Directs the **autoconfig** command to issue the **sendprobe** command before issuing the **auth** command.

[**layer** <2 | 3>]: If mode is **external**, this parameter specifies how the external data stream is captured. If layer is 2, frames are captured based on the source

802.3 MAC address. If layer is 3, frames are captured based on the source IP address. The default value is **3**.

[**fragmentthreshold** <nBytes>]: <nBytes> can be a value in the 256…2346 range and defines the fragmentation threshold for the virtual station(s) configured by this command. The fragmentation threshold limits the number of bytes in any 802.11 frame transmitted by the vSTA. If <nBytes> is set to **2346** (that is, the maximum 802.11 frame size), fragmentation is effectively disabled. The default value is **2346**.

[**rtsthreshold** <nBytes>]: <nBytes> can be a value in the 1…2346 range and defines the RTS threshold for the virtual station(s) configured by this command. Any frame to be transmitted by a vSTA that exceeds the vSTA's RTS threshold needs a successful RTS/CTS frame exchange before the frame is transmitted. The minimum value (**1**) effectively needs RTS/CTS for all transmit frames. The maximum value (**2346**) is the maximum 802.11 frame size and effectively disables RTS. The default value is **2346**.

[**psk** <key>]: If authentication is **wpa-psk** or **rsn-psk**, this parameter defines a Pre-Shared Key (64 ASCII-hex characters).

[**passphrase** <quoted-passphrase>]: If authentication is **wpa-psk** or **rsn-psk**, this parameter defines a passphrase of up to 63 ASCII characters. If the passphrase contains spaces, the passphrase must be specified in double quotes "like so". To specify a passphrase that contains a double quote, you must escape the double quote "like \" so".

[**kmtimeout** <integer>]: AKMP Timeout. This parameter sets a wait state timer (0…3600 seconds) for virtual stations. In cases when the System Under Test does not start or respond during a 4-way handshake, the affected virtual station may stall in a wait state. This timer can be used to recover the virtual station into an operable state. If the virtual station remains in a wait state until this timer expires, it is 802.11 de-authenticated and returned to the initialized state. The default value (zero) disables the timer (that is, wait forever).

[**userid** <username>]: If authentication mode is **wpa** or **rsn**, this parameter specifies the user ID to be used in the 802.1X exchange. It can be up to 64 characters in the range A…Z, a…z, 0…9, or other legal characters: period (.), dash (-), at-sign (@).

[**certfile** <filename>]: If authentication mode is **wpa** or **rsn**, this parameter specifies the filename of the certificate file to be used in the 802.1X exchange. The named certificate file must reside in the Certificates directory in the IxWLAN flash file system.

[**eapalgorithm** tls|peap|ttls]: If authentication mode is **rsn** or **wpa**, this parameter specifies an authentication protocol: TLS, PEAP, or TTLS.

[**inneralgorithm** ms-chapv2|eap-ms-chapv2]: If eapalgorithm is **peap** or **ttls**, this parameter specifies an inner algorithm for use in Phase 2 authentication. **ms-chapv2** is normally used for **ttls**. **eap-ms-chapv2** is normally used for **peap**.

[**outeridentity** <string>]: If eapalgorithm is **peap** or **ttls**, this parameter assigns a separate user ID for use in Phase 1 authentication. It can be up to 64 characters in the range A…Z, a…z, 0…9, or other legal characters: period (.), dash (-), at-sign (@).

[**password** <string>]: If eapalgorithm is **peap** or **ttls**, this parameter assigns a user password for use in Phase 2 authentication.

Example:

```
[wport1]IxWLAN -> set wport 2
Current wport: 2
[wport2]IxWLAN ->

[wport2]IxWLAN -> autoconf 1 mac 00:02:6f:58:01:01 ip
10.1.83.31 wport 3 target 10.1.83.1 count 100
vSTA ID:1 IP:10.1.83.31 MAC:00:02:6f:58:01:01 CONF OK
vSTA ID:1 INIT OK
vSTA ID:1 AUTH CMD OK
vSTA ID:1 AUTH NOTIFY OK
vSTA ID:1 ASSOC CMD OK
vSTA ID:1 ASSOC NOTIFY OK
[wport2]IxWLAN -> get vsta 1 conf

vSTA Configuration:
  ID ........................ 1
  Group ID .................. 1
  wport ..................... 3
  IP Address ................ 10.1.83.31
    DHCP Mode ............... Off
      dhcpLease (Request) ... 3600
      dhcpRetry (Limit) ..... 4
      dhcpInterval (Retry) .. 4 (Secs)
      dhcpOffers (Limit) .... 1
      dhcpServer(Preferred) . 0.0.0.0
  Subnet Mask ............... 0.0.0.0
  Gateway Address ........... 0.0.0.0
  MAC Address ............... 00:02:6f:58:01:01
  SSID ...................... Not set
  Connection Mode ........... persistent
  Auth/Assoc Retry .......... 2
  Authentication Timeout .... 300 mSec
  Association Timeout ....... 300 mSec
  Roam Type ................. Reassociation
  Authentication ............ Open-System
  Pre-Shared Key ............ Not set
  Passphrase ................ Not set
  EAP Algorithm ............. TLS
  Inner Auth Algorithm ...... MS-CHAPv2
  Certfile .................. Not set
  User ID ................... Not set
  Password .................. Not set
  Outer ID .................. Not set
  PMKSA Cache ............... Enabled
  Fast Reconnect ............ Disabled
  AKMP Timeout .............. 10 Seconds
```