



Wireless LAN Mobility System

Wireless LAN Switch Manager

Reference Manual

WX4400 3CRWX440095A
WX1200 3CRWX120695A
WXR100 3CRWXR10095A

<http://www.3com.com/>

Part No. **10015082**
Published June 2006

3Com Corporation
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Marlborough, MA USA
01752-3064

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ABOUT THIS GUIDE

This manual shows you how to plan, configure, deploy, and manage a Mobility System wireless LAN (WLAN) using the 3Com Wireless LAN Switch Manager (3WXM).

Read this manual if you are a network administrator or a person responsible for managing a WLAN.



If release notes are shipped with your product and the information there differs from the information in this guide, follow the instructions in the release notes.



Most user guides and release notes are available in Adobe Acrobat Reader Portable Document Format (PDF) or HTML on the 3Com World Wide Web site:

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Conventions

Table 1 and Table 2 list conventions that are used throughout this guide.

Table 1 Notice Icons

Icon	Notice Type	Description
	Information note	Information that describes important features or instructions
	Caution	Information that alerts you to potential loss of data or potential damage to an application, system, or device

This manual uses the following text and syntax conventions:

Table 2 Text Conventions

Convention	Description
Menu Name > Command	Indicates a menu item that you select. For example, File > New indicates that you select New from the File menu.
Monospace text	Sets off command syntax or sample commands and system responses.
Bold text	Highlights commands that you enter or items you select.
<i>Italic text</i>	Designates command variables that you replace with appropriate values, or highlights publication titles or words requiring special emphasis.
[] (square brackets)	Enclose optional parameters in command syntax.
{ } (curly brackets)	Enclose mandatory parameters in command syntax.
(vertical bar)	Separates mutually exclusive options in command syntax.
Keyboard key names	If you must press two or more keys simultaneously, the key names are linked with a plus sign (+). Example: Press Ctrl+Alt+Del
Words in <i>italics</i>	Italics are used to: <ul style="list-style-type: none"> ■ Emphasize a point. ■ Denote a new term at the place where it is defined in the text. ■ Highlight an example string, such as a username or SSID.

Documentation

The 3WXM documentation set includes the following documents.

- *Wireless LAN Switch Manager (3WXM) Release Notes*
These notes provide information about the system software release, including new features and bug fixes.
- *Wireless LAN Switch and Controller Release Notes*
These notes provide information about the system software release, including new features and bug fixes.
- *Wireless LAN Switch and Controller Quick Start Guide*
This guide provides instructions for performing basic setup of secure (802.1X) and guest (WebAAA™) access, for configuring a Mobility Domain for roaming, and for accessing a sample network plan in 3WXM for advanced configuration and management.

- [Wireless LAN Switch Manager Reference Manual](#)

This manual shows you how to plan, configure, deploy, and manage a Mobility System wireless LAN (WLAN) using the 3Com Wireless LAN Switch Manager (3WXM).

- [Wireless LAN Switch Manager User's Guide](#)

This guide shows you how to plan, configure, deploy, and manage a Mobility System wireless LAN (WLAN) using the 3Com Wireless LAN Switch Manager (3WXM). It contains information about recommended system requirements you should meet for optimum 3WXM performance, installing 3WXM client and 3WXM Services software, and an introduction to using the 3WXM interface.

- [Wireless LAN Switch and Controller Hardware Installation Guide](#)

This guide provides instructions and specifications for installing a WX wireless switch in a Mobility System WLAN.

- [Wireless LAN Switch and Controller Configuration Guide](#)

This guide provides instructions for configuring and managing the system through the Mobility System Software (MSS) CLI.

- [Wireless LAN Switch and Controller Command Reference](#)

This reference provides syntax information for all MSS commands supported on WX switches.

Documentation Comments

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Please include the following information when contacting us:

- *Document title*
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Example:

- *Wireless LAN Switch and Controller Configuration Guide*
- *Part number 730-9502-0071, Revision B*
- *Page 25*



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1

INSTALLING 3WXM

This chapter describes how to install 3Com Wireless LAN Switch Manager (3WXM).

Hardware Requirements

Hardware Requirements for 3WXM Client

Table 3 shows the minimum and recommended requirements to run the 3WXM client.

Table 3 Hardware Requirements for Running 3WXM Client

	Minimum	Recommended
Processor	Intel Pentium 4 2 GHz or equivalent	Intel Pentium 4 3 GHz or equivalent
RAM	512 MB	1 GB
Hard drive space available	100 MB	200 MB
Monitor resolution	1024x768 pixels, 24-bit color	1600x1200 pixels, 32-bit color
CD-ROM drive	CD-ROM or equivalent	CD-ROM

Hardware Requirements for 3WXM Monitoring Service

Table 4 shows the minimum and recommended requirements to run the 3WXM monitoring service.

Table 4 Hardware Requirements for Running 3WXM Monitoring Service

	Minimum	Recommended
Processor	Intel Pentium 4 2.4 GHz or equivalent	Intel Pentium 4 3.6 GHz or equivalent
RAM	1 GB	2 GB
Hard drive space available	1 GB	2 GB
Monitor resolution	1024x768 pixels, 24-bit color	1600x1200 pixels, 32-bit color
CD-ROM drive	CD-ROM or equivalent	CD-ROM

Table 5 contains general recommended guidelines for hardware requirements and memory allocation based on the number of radios and WX switches your server will support. A larger number of WX switches implies more connections and data processing, and consequently, more CPU is required. A larger number of radios implies more data (including client sessions) which requires more RAM and storage.

Table 5 Recommended Server Hardware Allocation

Number of Radios	1-25 WX Switches	25-50 WX Switches	50+ WX Switches
1 – 1000	2.4 MHz P4	2.8 MHz P4	3.2 MHz Xeon
	500 MB RAM	500 MB RAM	1 GB RAM
	1 GB HD	1 GB HD	1 GB HD
1 – 2000	2.4 MHz P4	3.0 GHz P4	3.6 GHz Xeon
	1 GB RAM	1 GB RAM	2 GB RAM
	2 GB HD	2 GB HD	2 GB HD

Software Requirements

3WXM client and 3WXM monitoring services are each supported on the following operating systems:

- Microsoft Windows Server 2003
- Microsoft Windows XP with Service Pack 1 (SP1) or later
- Microsoft Windows 2000 with Service Pack 4



You must use the English version of the operating system you select. Operating system versions in other languages are not supported with 3WXM.

The following additional software is required for certain 3WXM features:

- Adobe Acrobat Reader 5.x or later (or plug-in)—For reading the *Wireless LAN Switch Manager Reference Manual* and release notes.
- Web browser (for example, Microsoft Internet Explorer 5.x or 6.x or Netscape Navigator 6.x or 7.x)—For displaying 3WXM work orders and inventory reports.

Preparing for Installation

A licensed copy of 3WXM comes with a base license key. Before you install 3WXM, make sure you have the appropriate administrative privileges on the system.

After you have installed 3WXM, you will need to register your license and the serial number with 3Com in order to obtain an activation key.



The base key along with its activation key enables you to manage up to 10 wireless LAN switches. To manage more than 10 wireless LAN switches, you also need an upgrade key and an additional activation key, which you obtain from 3Com. See “Serial Number and License Key” on page 24 for more information.

User Privileges

Before you install 3WXM, make sure that you are logged in as a user who has permission to install software, or as an administrator.

After you install 3WXM, you can configure 3WXM access privileges for the user accounts on the machine. Likewise, you can configure access privileges for the monitoring service, if installed. Access privileges for the 3WXM client are completely independent of access privileges for the monitoring service, and are configured separately.

Serial Number and License Key

3WXM comes with a base license key, which is provided on the CD cover. To use 3WXM Services, you need to enter the base key and an activation key, which you obtain from 3Com. The base key and activation key enable you to manage up to 10 wireless LAN switches. To manage more than 10 wireless LAN switches, you also need an upgrade key and additional activation key, which you obtain from 3Com.

Each time you connect the 3WXM client to the 3WXM services, it checks the license information. If the product is not licensed, the License wizard is displayed.

Installing 3WXM

To install the 3Com Wireless Switch Manager, follow the instructions below.



The 3WXM install program installs either just the 3WXM client, or both the 3WXM client and Services. There is no option to install the 3WXM Services only.

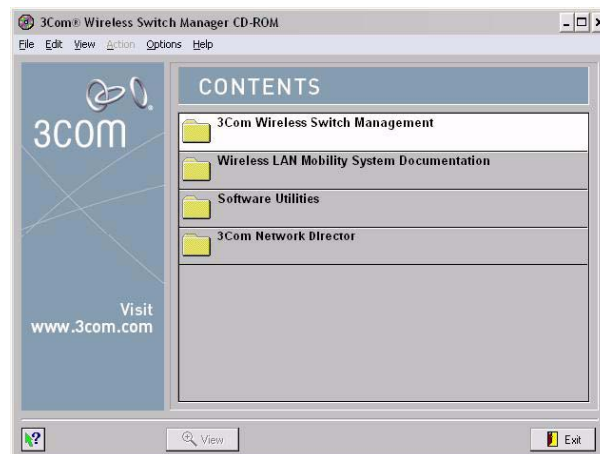
- 1 Insert the 3WXM CD in the CD-ROM drive.

If Autorun is enabled, wait briefly for the install program to start.

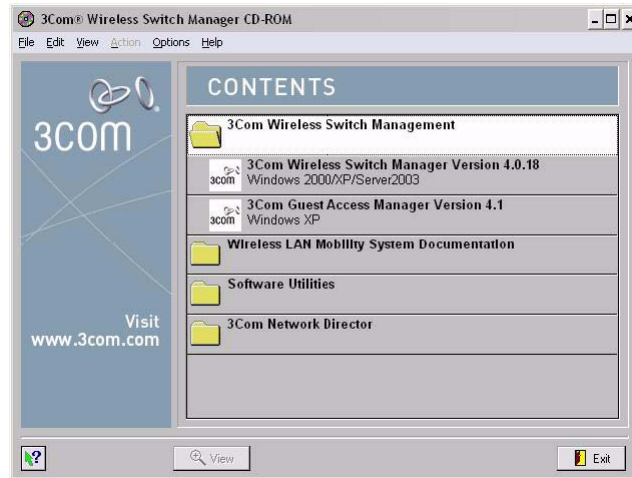
If Autorun is disabled, follow these steps:

- a In Windows Explorer, navigate to your CD-ROM drive.
- b In the Software\3WXM directory, double-click **install.exe**.

The Introduction page of the 3Com Wireless Switch Manager installation wizard appears, and then the Contents screen appears, as shown below.



- 2 Open the **3Com Wireless Switch Management** folder.
- 3 Select **3Com Wireless Switch Manager**.



- 4 Click the **View** button.
The 3Com Wireless LAN Switch Manager (3WXM) information screen appears.
- 5 Click the **Install** button.
The installation begins. During the installation, the 3Com Wireless Switch Manager installation wizard minimizes.
- 6 When the installation is complete, maximize the 3Com Wireless Switch Manager installation wizard screen, and then press the **Contents** button.
- 7 Press the **Exit** button to close the wizard, or navigate to the other items on the CD.
See "Getting Started" on page 47 for more information on getting started with 3WXM.

Installation Log File During installation, an installation log file, 3WXM_InstallLog.log, is created and placed in the 3WXM installation folder. Double-click the log file's icon to read the log file. Have this log file available if you need to contact 3Com Technical Support about an installation problem.

Upgrading 3WXM You can upgrade 3WXM by installing a newer version of 3WXM over a previous version. You do not need to uninstall the previous version before installing a newer version. Before you upgrade, 3Com recommends that you make a backup of the config-db directory in the 3WXM installation directory. As a best practice, back up the config-db directory on a regular basis to ensure that you have copies of your network plans.



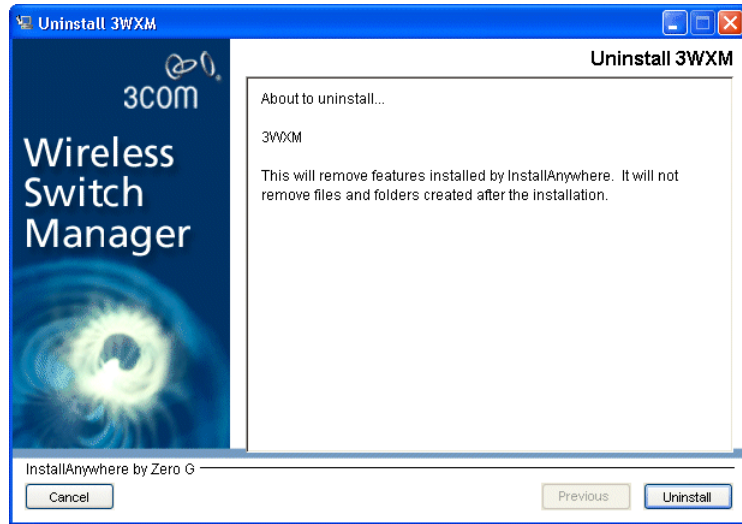
CAUTION: *If you uninstall a previous version of 3WXM before upgrading, make sure you note the serial number and license key from the License Information dialog box, which you access by selecting **Help>Licensing** from the main 3WXM window.*

You can also save a copy of the license information by starting 3WXM and clicking **Save** in the License Information dialog box.

Uninstalling 3WXM You uninstall 3WXM by using its Uninstall wizard. Access the Uninstall wizard from the 3Com program list in the Windows Start menu or the Control Panel.

To uninstall 3WXM on Windows systems:

- 1 Access the Windows Control Panel, and select **Add or Remove Programs**.
- 2 Select 3WXM and click **Change/Remove**.



3 Click **Uninstall**.

The 3WXM Uninstall Options dialog appears.

By default, the following are removed when you uninstall the client application:

- Network plans
- Access control

If the monitoring service was also installed, the monitoring service's database directory is also uninstalled by default. The database directory contains the data collected by the monitoring service.



CAUTION: Do not delete the serial number unless specifically asked to do so by 3Com Technical Support.

Your license(s) to use this software are registered against this serial number. If you delete the serial number, the software will generate a new serial number if it is ever reinstalled. You will then require new licenses to register against the new serial number. If you delete the serial number, the license information will also be deleted.



CAUTION: If you delete an item, the item is permanently lost. For example, if you delete the database directory, all data collected by the monitoring service is lost, including historical trend data.

To prevent an item from being uninstalled, click on the checkbox next to the item to remove the checkmark.

4 Click **Continue**.

The uninstall program reports its progress. When the uninstall process is complete, the uninstall program reports that the items were successfully deleted.

5 Click **Done**.

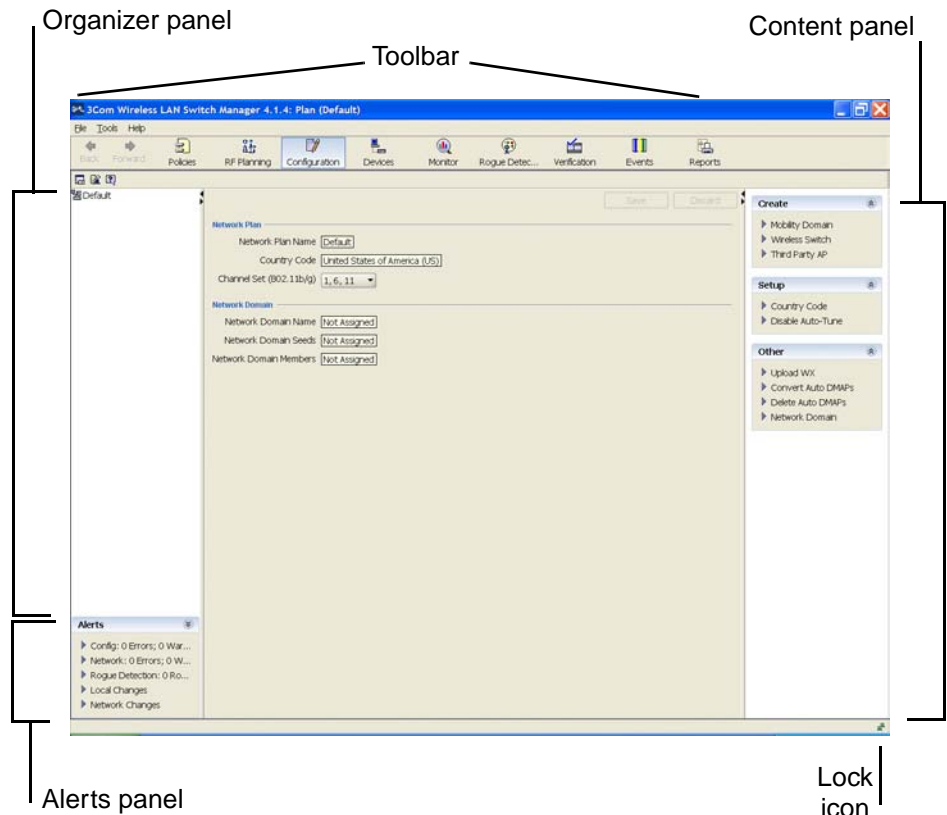
2

WORKING WITH THE 3WXM USER INTERFACE

This chapter describes how to use the 3Com Wireless LAN Switch Manager (3WXM) interface.

Overview

When you start 3WXM client and log into 3WXM Services, the network plan is displayed by the 3WXM client.



The network plan is the workspace in 3WXM you use to design and manage a 3Com network. The network plan defines the following:

- Network equipment (WX switches, MAPs, and third-party access points)
- Network site, including floor plans, RF characteristics of the floors, and radio coverage

You can use the planning tool to define the network site and add the equipment based on coverage and capacity needs. Alternatively, you can add new or existing switches and access points individually.

Planning and equipment configuration, and network management, are described in detail in other chapters of this manual. This chapter describes the 3WXM user interface.

Display Panels

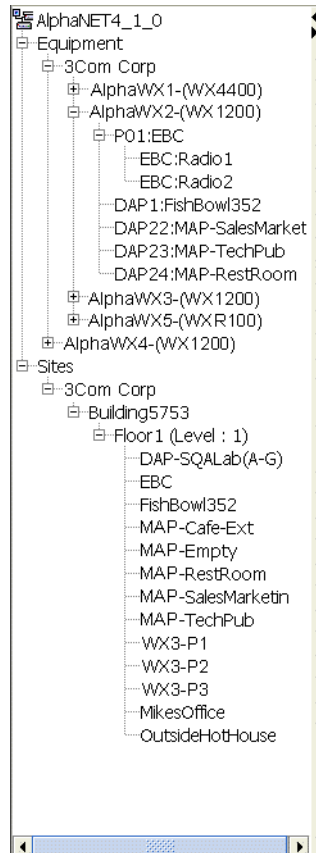
The main 3WXM window contains the following display panels. (Their locations are shown in the previous figure on page 34.)

- Organizer panel
- Alerts panel
- Content panel
- Task List panel

The main 3WXM window also contains a tool bar to navigate to major features.

Organizer Panel

The Organizer panel provides a tree-like view of the 3Com equipment and site data managed by 3WXM.



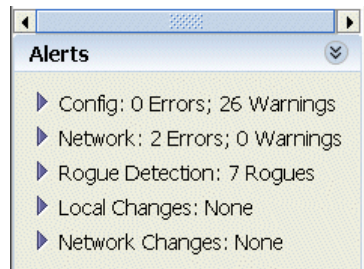
The Organizer panel can contain the following object trees, depending on the option selected on the tool bar:

- **Policies** (displayed by the Policies tool bar option) — The set of device configuration policies included in your network plan.
- **Equipment** (displayed by the Configuration tool bar option) — The set of devices in your network plan. This includes Mobility Domains, 3Com switches and MAPs, as well as third-party access points that 3WXM needs to be aware of while planning or monitoring the network.
- **Sites** (displayed by the RF Planning tool bar option) — Named sets of buildings and floors where 3Com equipment is deployed.

The tree that is displayed depends on the active tool bar option. (See “Tool Bar Options” on page 39.)

To expand the view of an object in the tree, click on the plus sign next to the object. For example, to display the buildings in a site, click on the plus sign next to the site name. To display the floors in the building, click next to the building name, and so on.

Alerts Panel The Alerts panel displays summary statistics for configuration changes or errors and for rogue devices. Click on a statistic to open the related tab in the Content panel. The Alerts panel is located on the left side of the main window, below the Content panel.



To navigate to more information and correct the warning or error, click on the arrow to expand the panel, then click on the statistic to open the corresponding tab in the Content panel.

Table 6 lists the types of alerts displayed in the Alerts panel.

Table 6 Alerts

Alert Category	Description
Configuration	<p>Lists the number of configuration errors and warnings encountered when 3WXM verifies WX switch configurations in the network plan.</p> <p>3WXM compares a switch's configuration to a set of configuration rules, and flags the items that must (error) or should (warning) be corrected before deploying the switch configuration from the network plan to the live network.</p> <p>Select this alert to open the Config Verification tab in the Content panel. You can use this tab to correct configuration errors or disable rules.</p> <p>(See "Verifying Configuration Changes" on page 363.)</p>

Table 6 Alerts (continued)

Alert Category	Description
Network	<p>Lists the number of configuration differences between all WX switches in the network and their counterparts in the network plan.</p> <p>Select this alert to open the Network Verification tab in the Content panel. You can use this tab to edit configuration items or disable rules.</p> <p>(See “Verifying Configuration Changes” on page 363.)</p>
Rogue Detection	<p>Lists the total number of rogues detected by 3Com radios and still operating in the Mobility Domain(s) defined in the network plan.</p> <p>Select this alert to open the Rogue Detection tab in the Content panel. You can use this tab to list information about non-3Com wireless devices detected in the network.</p> <p>(See “Detecting and Combatting Rogue Devices” on page 457.)</p>
Local Changes	<p>Lists the number of WX switch configuration changes that have occurred in 3WXM (in the network plan) since the last time the switches in the network were synchronized with their counterparts in 3WXM.</p> <p>Select this alert to open the Managed Devices tab in the Content panel. You can use this tab to review the local changes and deploy them to the network.</p> <p>(See “Synchronizing Local and Network Changes” on page 350.)</p>
Network Changes	<p>Lists the number of WX switch configuration changes that have occurred in the live network since the last time the switches in the network were synchronized with their counterparts in 3WXM.</p> <p>Select this alert to open the Managed Devices tab in the Content panel. You can use this tab to review the network changes and upload them to 3WXM.</p> <p>(See “Synchronizing Local and Network Changes” on page 350.)</p>

Content Panel The Content panel displays information or configuration settings, based on the selected tool bar option. The Content panel is located to the right of the Organizer panel. (See the figure on page 29.)

The Policies, RF Planning, and Configuration tool bar options display configuration fields. After selecting one of these tool bar options, you can click on a policy, WX switch, or site object in the Organizer panel to display and configure settings for that object.

(For more information about the tool bar options, see “Tool Bar Options” on page 39.)

Saving or Discarding Configuration Changes

When you select the Policies, RF Planning, or Configuration tool bar option, the Content panel contains a **Save** button and a **Discard** button.

- **Save**—Click **Save** to send unsaved configuration changes to 3WXM Services to save in the network plan. The 3WXM client buffers configuration changes you make to a policy, WX switch, or site until you click **Save** or save the network plan. When you click **Save**, the client sends all buffered configuration changes.
- **Discard**—Click **Discard** to undo all buffered changes.

The **Save** and **Discard** buttons are greyed out unless there are unsaved changes.

Configuration wizards have a **Finish** or **OK** button, which saves the configuration items you type or select in the wizard.

When you save changes in a wizard by clicking **Finish** or **OK**, the **Save** and **Discard** buttons in the Content panel remain greyed out because there are no unsaved changes to save or discard.

When you click a link to open a configuration wizard, if there are unsaved changes, 3WXM prompts you to apply or cancel the changes. Click **Apply** to save the buffered changes and open the wizard.

The **Save**, **Apply**, **Finish**, and **OK** buttons do not send configuration changes to the WX switches in the network. To send changes made in the network plan to switches in the network, *deploy* the changes. (See “Reviewing and Deploying Switch Configuration Changes”.)

Reviewing and Deploying Switch Configuration Changes

3WXM does not automatically deploy switch configuration changes from the network plan to the actual switches in the network. The following options in the Task List panel allow you to review and deploy changes:

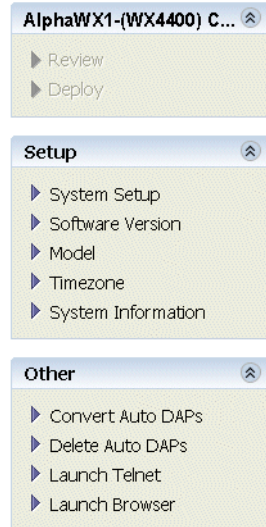
- **Review**—Displays a categorized list of the undeployed changes.
- **Deploy**—Sends the changes to the network.

When you click **Deploy**, 3WXM verifies the configuration changes and displays warnings or errors if applicable. If any errors are listed, 3WXM does not deploy the changes.

To resolve errors and deploy the changes, use the Verification option. The Verification option provides detailed information for errors and warnings and enables you to resolve them. Generally, you can resolve an error or warning by ignoring it or by clicking a link to open a configuration wizard. (For more information, see "" on page 363.)

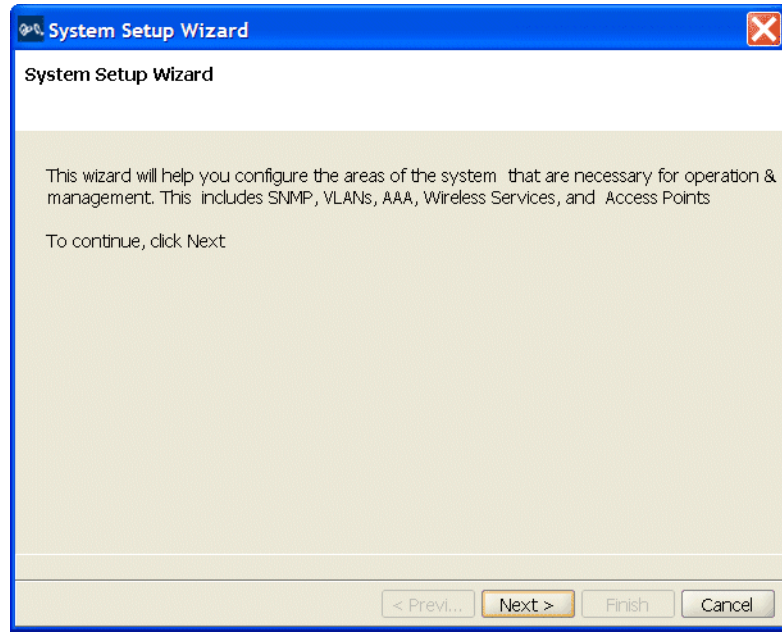
Task List Panel

The Task List panel displays lists of tasks related to the object selected in the Organizer panel. Click a task to open the configuration wizard required to perform that task. The Task List panel is located to the right of the Content panel. Here is an example of the task list for an individual WX switch.



Configuration Wizards

When you click on a task in the Task List panel, 3WXM opens a configuration wizard. For example, click on System Setup to open the System Setup wizard for configuring basic switch parameters.



Some wizards contain multiple pages. Click the **Next** and **Previous** buttons at the bottom of a wizard to navigate among the wizard's pages.

The **Finish** button saves the changes. If applicable, saving the changes also results in the newly configured object appearing in a table in the Content panel. The following example shows the Wireless Service Profiles table, which lists the SSID configurations on a switch.

Name	SSID	SSID Type	<input checked="" type="checkbox"/> Beacon	Radio Profile(s)
Secure-802.1x	employees	Encrypted	<input checked="" type="checkbox"/>	default
Voice	phones	Encrypted	<input checked="" type="checkbox"/>	default

Properties... Delete

The wizards displayed by selecting tasks in the Task List panel allow configuration of settings that are essential or that are commonly customized.

Properties Dialogs





To open a version of the configuration wizard that contains all the configurable settings for the object, even ones that rarely need to be changed, select the object in the table, then click **Properties**.

Resizing a Display Panel

You can resize a panel by clicking and dragging the panel's border, or by clicking the resize icons (where applicable).

The resize icons listed in Table 7 are supported for panels displayed by the RF Planning, Configuration, and Monitor tool bar options.

Table 7 Resize Icons

Option	Description
	Minimize the panel. When the panel is minimized, the panel title is displayed as a tab. Place the cursor over the tab to temporarily maximize the panel. The panel is maximized only until you move the cursor away from the panel. To make the panel stay maximized, click on the maximize icon. This option is supported on the Organizer and Task List panels.
	Maximize the panel. This option makes the panel remain maximized even when you move the cursor away. This option is supported on the Organizer and Task List panels.
	Maximize the Content panel. The panel fills the entire display area and minimizes the Organizer and Task List panels. This option applies only to the Content panel.
	Restore the Content panel. The Organizer and Task List panels are maximized and the Content panel is restored to its former size between the other two panels. This option applies only to the Content panel.

Panel sizes and window arrangements are associated with 3WXM usernames. When you close 3WXM, 3WXM remembers the panel sizes and window arrangements you assigned and restores them the next time you run 3WXM.

Menu Bar Options

Table 8 lists the options available from the menu at the top of the main 3WXM window. Click on a menu category to display the options for that category.

Table 8 3WXM Menu Options

Menu	Option	Description
File	Connect	Log on to 3WXM Services.
	Close	Close the currently open network plan.
	New Network Plan	Create a new network plan.
	Switch Network Plan	Close the currently open network plan and open another network plan.
	Delete Network Plan	Delete a network plan.
	Import Network Plan	Import objects from another network plan into the currently open plan.
	Save As	Save a copy of the currently open network plan under a new name.
	Import	Import a WX configuration file into the currently open network plan.
	Export	Export a WX configuration file from the currently open network plan.
Tools	Exit	Close 3WXM.
	Preferences	Change 3WXM user preferences.
	Performance	Display Ethernet or radio statistics.
	Certificate Management	Manage certificates.
	3WXM Services Setup	Configure preferences for 3WXM Services.
	3WXM Services Backup/Restore	Configure settings for backing up the database used by 3WXM Services, as well as restore a previously backed-up version of the database.
	3WXM Services Lock Management	Display information about the lock placed on the network plan and/or delete the lock.

Table 8 3WXM Menu Options (continued)

Menu	Option	Description
Help	Help	Open the online help (HTML version of the <i>3Com WXM Reference Manual</i>). You also can access the help by pressing the F1 key.
	Licensing	Open the License Information dialog box.
	Report Problem	Report a problem to 3Com Technical Support.
	About 3WXM	About 3WXM: <ul style="list-style-type: none"> ■ 3WXM version information ■ Memory usage ■ Java garbage collection (Force GC)

Tool Bar Options

Table 9 lists the options available from the tool bar of the main 3WXM window. Click on an option to open the data or tabs for that option. Some tool bar options fill the Content panel. Others fill the entire window area under the tool bar.

The larger icons provide access to 3WXM features. The smaller icons underneath the Back and Forward icons apply to the 3WXM application itself.

Table 9 3WXM Tool Bar Options

Option	Description
Back	Page back through the previously selected tool bar options or Organizer panel tree selections.
Forward	Page forward through previously selected tool bar options.
Policies	Display the tree of configured policies in the Organizer panel. <ul style="list-style-type: none"> ■ To display the configuration settings in a policy, click on the policy. The settings appear in the Content panel. ■ To create a new policy, click Policy in the Task List panel. <p>(See "Configuring and Applying Policies" on page 373.)</p>

Table 9 3WXM Tool Bar Options (continued)

Option	Description
RF Planning	<p data-bbox="708 305 1229 357">Display the tree of configured sites in the Organizer panel.</p> <ul data-bbox="708 374 1262 522" style="list-style-type: none"> <li data-bbox="708 374 1262 453">■ To display information about a site or an object in that site, click on it. The information appears in the Content panel. <li data-bbox="708 465 1262 522">■ To perform site-related tasks, click task links in the Task List panel. <p data-bbox="708 534 1282 560">(See “Planning the 3Com Mobility System” on page 69.)</p>
Configuration	<p data-bbox="708 574 1262 626">Display the tree of configured devices in the Organizer panel.</p> <ul data-bbox="708 644 1276 791" style="list-style-type: none"> <li data-bbox="708 644 1276 722">■ To display information about a device or a configuration area within that device, click on it. The information appears in the Content panel. <li data-bbox="708 734 1276 791">■ To perform device-related tasks, click task links in the Task List panel. <p data-bbox="708 803 1179 855">(See “Configuring WX System Parameters” on page 157.)</p>
Devices	<p data-bbox="708 869 1250 895">Display a list of the WX switches in the network plan.</p> <ul data-bbox="708 913 1276 1147" style="list-style-type: none"> <li data-bbox="708 913 1276 991">■ To upload, restart, or change the management status of switches, view scheduled tasks, or distribute certificates, use the Device tab. <li data-bbox="708 1003 1276 1081">■ To review and either allow or disallow local and network changes, or to schedule configuration deployment, use the Changes tab. <li data-bbox="708 1093 1276 1147">■ To manage and distribute MSS software images, use the Image tab. <p data-bbox="708 1164 1119 1216">(See “Managing WX System Images and Configurations” on page 345.)</p>
Monitor	<p data-bbox="708 1230 1262 1282">Display status information and statistics for equipment or site objects selected in the Organizer panel.</p> <p data-bbox="708 1295 1179 1326">(See “Monitoring the Network” on page 401.)</p>
Rogue Detection	<p data-bbox="708 1340 1276 1444">Display information about rogue or interfering devices detected by MAP radios. This option also provides tools for tuning rogue detection settings and for issuing countermeasures against rogues.</p> <p data-bbox="708 1461 1243 1512">(See “Detecting and Combatting Rogue Devices” on page 457.)</p>

Table 9 3WXM Tool Bar Options (continued)

Option	Description
Verification	<p data-bbox="753 305 1322 413">Display the Config Verification and Network Verification tabs. The Verification tabs enable you to troubleshoot configuration issues on WX switches in the network plan or in the live network.</p> <ul data-bbox="753 427 1322 597" style="list-style-type: none"> <li data-bbox="753 427 1322 505">■ To display more information about an error or warning message, click on the row containing the message. <li data-bbox="753 522 1322 597">■ To resolve the situation causing the message or to ignore the message, select options in the Resolutions area of the tab. <p data-bbox="753 614 1322 638">(See “Verifying Configuration Changes” on page 363.)</p>
Events	<p data-bbox="753 652 1322 730">Display the events log. The log includes events generated by 3WXM Services and events generated by the managed WX switches in the network plan.</p> <ul data-bbox="753 748 1322 866" style="list-style-type: none"> <li data-bbox="753 748 1322 774">■ To filter the message list, use the Filters tab. <li data-bbox="753 791 1322 866">■ To display more information about a message, click on the row containing the message, then use the Details tab. <p data-bbox="753 883 1322 909">(See “Using the Event Log” on page 377.)</p>
Reports	<p data-bbox="753 923 1322 949">Display links for configuring and generating reports.</p> <p data-bbox="753 966 1322 987">(See “Generating Reports” on page 383.)</p>
The following icons are smaller and are located underneath the Back and Forward icons.	
Exit the application	Close 3WXM.
Edit application preferences	<p data-bbox="753 1112 1322 1138">Open a dialog to configure 3WXM client preferences.</p> <p data-bbox="753 1156 1322 1177">(See “Changing 3WXM Preferences” on page 481.)</p>
Configure 3WXM Services	<p data-bbox="753 1194 1322 1220">Open a dialog to configure 3WXM Services.</p> <p data-bbox="753 1237 1322 1286">(See “Changing 3WXM Services Preferences” on page 491.)</p>
Launch 3WXM HTML Help	Open the online help (HTML version of this document).

Copying, Pasting, and Deleting Objects

You can copy, paste, and delete objects in the Organizer panel or in the Content panel. In the Organizer panel, right-click on an object to display a menu with the following options:

- **Copy**—Copy the selected object and its child objects to the clipboard.
- **Paste**—Add the object(s) in the clipboard to the selected object.
- **Paste Replace**—Replace the like-named object(s) in the selected object with the object(s) in the clipboard.
- **Delete**—Remove the selected object from the network plan.

Use the **Copy** and **Paste** options to create a new object. Use the **Copy** and **Paste Replace** options to replace an object with a copy of another instance of the same type of object.

You also can copy and paste objects listed in tables in the Content panel using the copy and paste icons. (See “Copy and Paste in the Content Panel” on page 43.)

To delete an object in a table, select the object, then click **Delete**.

Copy and Paste in the Organizer Panel

To create a new object in the Organizer panel:

- 1 Select the object you want to copy in the Organizer panel.
- 2 Right-click on the object and select **Copy**.
- 3 Select the parent object where you want the copy to go.
- 4 Right-click on the parent object and select **Paste**.

A configuration wizard appears, where you can modify the name of the object and other parameters as applicable. When you are finished, the new copy of the object appears under the parent object.



Copy and Paste Replace in the Organizer Panel

To replace an object with the Copy and Paste Replace options:

- 1 Select the object you want to copy in the Organizer panel.
- 2 Right-click on the object and select **Copy**.
- 3 Select the object you want to replace.
- 4 Right-click on the parent object and select **Paste Replace**.

A configuration wizard appears, where you can modify the name of the object and other parameters if needed. When you are finished, the replaced object is removed and the copied object appears under the parent object.

Copy and Paste in the Content Panel

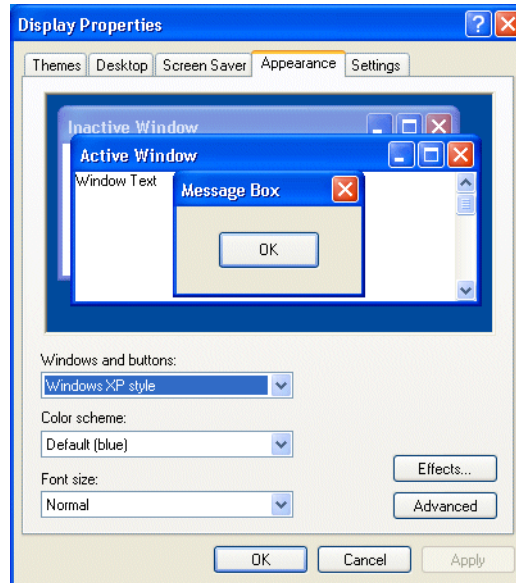
- 1 Select the objects (rows).
 - To select a single object, click on the row for the object.
 - To select multiple contiguous objects, click Shift while selecting them.
 - To select multiple noncontiguous objects, click Ctrl while selecting them.
- 2 Click the copy icon ()
- 3 Click the paste icon ()
A configuration wizard appears.
- 4 Edit settings to make the new object unique from the object you copied, then click **OK** or **Finish** to save the changes and close the configuration wizard.

Enabling Keyboard Shortcut Mnemonics (Windows XP Only)

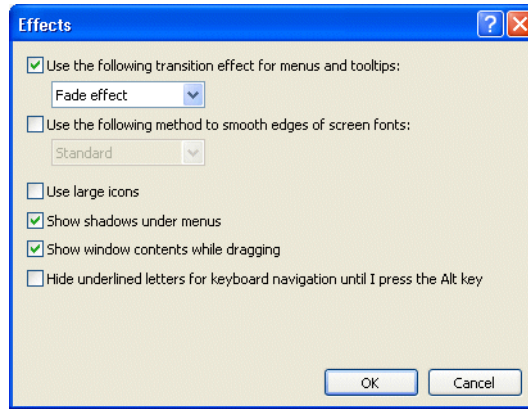
Keyboard shortcut mnemonics (also called *action mnemonics*) in 3WXM underline shortcut characters in action names in toolbars and menus. When a character is underlined, you can press the corresponding letter key on the keyboard to display the toolbar menu or perform the menu action. Depending on your Windows XP desktop setup, 3WXM might not show action mnemonics.

To enable action mnemonics:

- 1 Right-click on the desktop, and select **Properties**.
- 2 Click the **Appearance** tab. The Display Properties dialog box appears.



- 3 Click **Effects**.



4 Clear the box labeled **Hide underlined letters for keyboard navigation until I press the Alt key**.

Clearing this option allows programs to show the underlined character for mnemonics in 3WXM.

5 Click **OK**.

6 In the Display Properties dialog box, click **OK**.

3

GETTING STARTED

This chapter contains information about starting 3Com Wireless LAN Switch Manager (3WXM), restricting access to 3WXM, creating and managing network plans, and defining a Mobility Domain.

Starting 3WXM

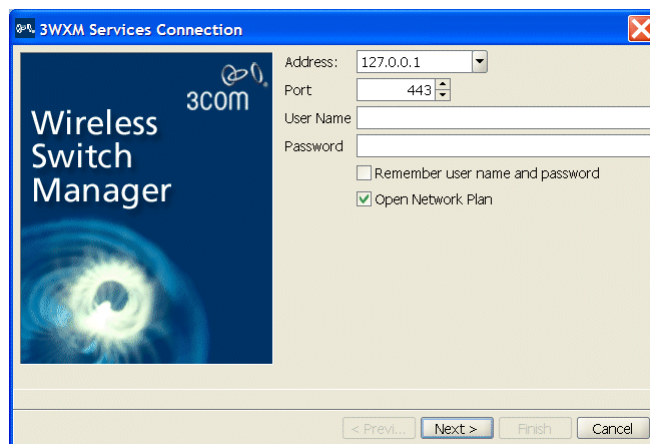
The following steps describe how to start 3WXM.



You must install a license key and activation key for the server before you can connect to the server and work with network plans. To license a server, you must start the 3WXM client on the same machine where the server is installed.

- 1 Select **Start > Programs > 3Com > 3WXM > 3WXM**, or double-click the **3WXM** icon on the desktop.

The 3WXM Service Connection dialog appears.

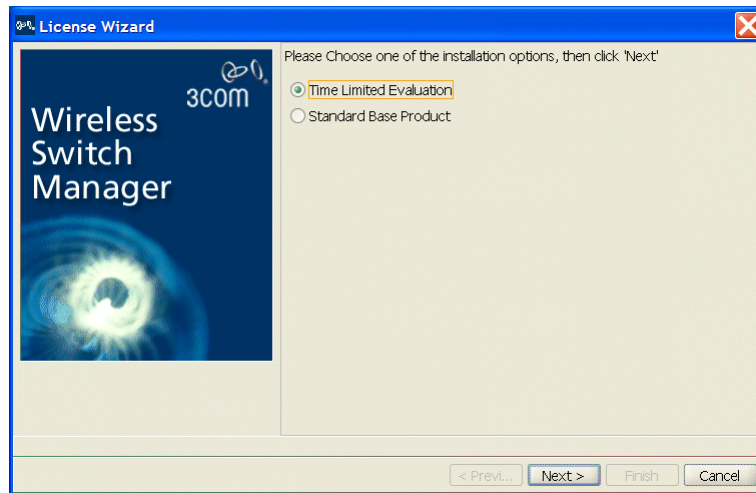


- 2 Click **Next**.

If a Certificate Check dialog appears, click **Accept**.

If this is the first time you are starting 3WXM, or you have not yet activated your license, the client will not establish a connection to the server when you click **Next**. Instead, the client will briefly contact the server, then display the following message: *Error: Missing license*.

- If you need to install license information, click **Cancel** to close the dialog and go to step 3.
 - If you have already installed license information, go to step 15.
- 3 Select **Help > Licensing** from the tool bar. The License Wizard is displayed.



- 4 If you are installing a licensed copy, select **Standard Base Product** and click **Next**. Go to step 5.

If you are installing an evaluation copy:

- a Select **Time Limited Evaluation** and click **Next**.
 - b Click **Finish** and go to step 13.
- 5 Type the license key that was supplied with the 3WXM CD, and click **Next**.
- 6 Click **Get Activation Key**. A 3Com web page appears. Enter your registration information (and the license key, if you are licensing a purchased copy) in order to obtain an activation key.
- 7 Copy the activation key from the web page and paste it onto the Activation Key box of the Activation Key page.

- 8 If you plan to manage 10 or fewer wireless LAN switches, click **Finish** and go to step 13.

If you plan to manage more than 10 wireless LAN switches, click **Next** and go to step 9.



If you are activating an evaluation copy, you can manage up to 10 wireless LAN switches.

- 9 Type the upgrade license key in the License Key box and click **Next**.
- 10 Click the **Get Activation Key** to access the product activation key for your upgrade license. Register your upgrade license in order to obtain its activation key.
- 11 Copy the activation key for the upgrade license from the web page and paste it into the Activation Key box of the Activation Key page.
- 12 Click **Finish**.
- 13 To connect to the server, select **File > Connect** from the menu bar. The 3WXM Services Connection dialog box appears.
- 14 In the 3WXM Services Connection dialog box, enter the IP address of a host running 3WXM Services (leave this as 127.0.0.1 if the services are being run on this host), and then click **Next**.
- 15 After a connection is established to the specified 3WXM Services host, do one of the following:
- Edit the currently loaded network plan. The first time you start 3WXM, a network plan called *Default* is opened.
 - Create a new network plan.
If you select this option, wizard pages guide you in setting up a network plan. For more information, see “Creating a Network Plan” on page 54.
 - Switch to an existing network plan. You can open the sample plan included with 3WXM or a plan that you or another 3WXM user has saved on the 3WXM Services host.

Restricting Access to 3WXM

By default, all users who have been successfully authenticated to a system with 3WXM installed on it can run 3WXM. You can restrict the users allowed to access 3WXM on a system and define their access privileges by creating three types of 3WXM user accounts:

- **Administrator**—This account can monitor the network, configure the network, and administer 3WXM. When creating an administrator account, you must assign an administrator password, which you are required to provide the next time you configure access privileges. This account also can remove locks.
- **Provision**—This account can configure and monitor the network. However:
 - On the File menu, the New, Switch Network Plan, and Delete Network Plan options are greyed out.
 - All configuration options in the 3WXM Services Setup dialog box are greyed out.
- **Monitor**—This account can only monitor the network. When users with a monitor account open a network plan, they can see configuration changes that have been deployed to the network. Any configuration changes that have not been deployed are not visible.
 - On the File menu, all options except Open, Close, and Exit are greyed out.
 - On the Tools menu, the Certificate Management option is greyed out.
 - All tasks for creating configuration items are greyed out.
 - All configuration options in the 3WXM Services Setup dialog box are greyed out.
 - Options to deploy and undo local changes and accept or undo network changes are not available.
 - The options on the right-click menu in the Organizer panel are greyed out.
 - Configuration items that are related specifically to monitoring (logs, managed devices, site surveys and work orders) can be configured. However, new network plans cannot be configured.

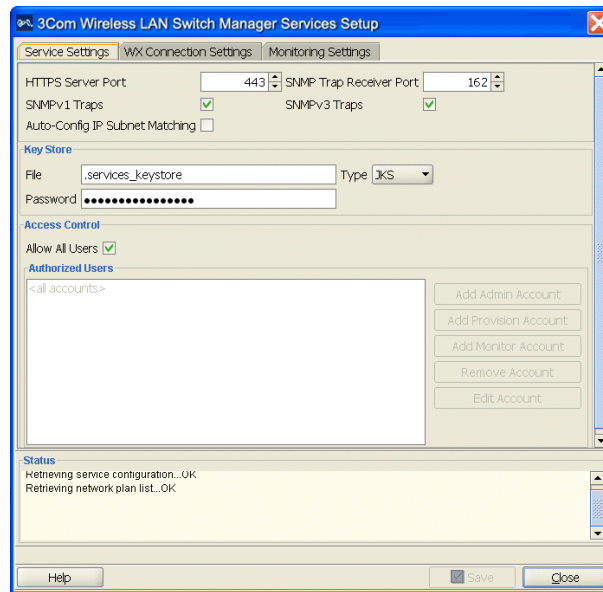
The 3WXM user accounts you create must also exist in the Windows domain or local operating system. Otherwise, those users cannot start 3WXM.

Creating an Administrator Account

Before you can restrict user access to 3WXM, you must create an administrator account. After creating an administrator account, you can create provision or monitor accounts.

To create an administrator account:

- 1 Select **Tools > 3WXM Services Setup**. The 3WXM Services Setup dialog box appears.



- 2 In the Access Control section of the dialog box, de-select **Allow All Users**.
- 3 Type a new password for the administrator (1 to 80 alphanumeric characters, with no spaces or tabs). The password is case-sensitive.
- 4 Type the administrator password again for verification.
- 5 Click **OK**.
- 6 In the **3WXM Services Setup** dialog box, click **Save** to save the changes.



If this is the first user account, 3WXM Services inserts the username you used to log onto the machine that is running 3WXM Services in the Account Name box. However, you are not required to use this name. In fact, you are not required to use a name that matches a user account on the machine.



3WXM Services automatically makes the first user account you add an Admin account.

Creating Provision or Monitor Accounts

After creating an administrator account, you can create provision or monitor accounts. To create a provision or monitor account:

- 1 Access the 3WXM Services Setup dialog box.
- 2 To add a provision user account, click **Add Provision Account**. To add a monitor account, click **Add Monitor Account**. The Add Account dialog box appears.
- 3 Type the name of a user account that has access to the system.
- 4 Type a new password for the user (1 to 80 alphanumeric characters, with no spaces or tabs). The password is case-sensitive.
- 5 Type the password again for verification, and then click **OK**.
- 6 In the **3WXM Services Setup** dialog box, click **Save** to save the changes.
- 7 Click **Close** to close the dialog box.

Deleting 3WXM User Accounts

To delete a 3WXM user account:

- 1 Access the 3WXM Services Setup dialog box.
- 2 Select a user account from the Authorized Users list.
- 3 Click **Remove an Account**. The account is deleted.
- 4 In the **3WXM Services Setup** dialog box, click **Save** to save the changes.
- 5 Click **Close** to close the dialog box.

Disabling Access Control

If you have enabled access control for 3WXM, you can disable access control. This allows all users who have successfully authenticated to the system on which 3WXM is installed to run 3WXM.

If you disable access control, the permissions and account types are deleted from 3WXM. However, these deletions have no effect on the Windows user accounts themselves.

To disable access control:

- 1 Access the 3WXM Services Setup dialog box.
- 2 Click **Allow all users**. All 3WXM accounts that were created are deleted.
- 3 In the **3WXM Services Setup** dialog box, click **Save** to save the changes.
- 4 Click **Close** to close the dialog box.

4

WORKING WITH NETWORK PLANS

A network plan is the workspace in 3WXM you use to design a 3Com network. In a network plan, you define components of the network (WX switches, MAP access points, and optional third-party access points). Regardless of whether you intend to use physical planning features, you must create a network plan before you can configure or manage WX switches or monitor network data.

A network plan allows modular management of large networks based on organizational or geographical boundaries. For example, a network plan can represent a campuswide network. You also can define a physical representation of the network (sites, buildings, and floors). In this case, you can import drawings of your floor plans into the network plan or draw plan details manually. You can then identify the RF characteristics by importing data from a site survey or by manually identifying RF objects.

3Com recommends that you limit a network plan to a single campus or Mobility Domain (3Com network domain).

Different countries have different regulatory limits for 802.11 radios. Setting the country code in the network plan automatically enforces the appropriate regulatory limits for all configured radios. The greatest geographical scope for a network plan is a country, because a network plan is based on one specific country code.

Creating a Network Plan

To create a network plan:

- 1 From the main 3WXM window, select **File > New**. The Create Network Plan wizard appears.
- 2 In the Network Plan Name box, type a name for the network plan. You can use 1 to 60 alphanumeric characters, with no spaces, tabs, or any of the following: slash (/), backslash (\), quotation marks (" "), asterisk (*), question mark (?), angle brackets (< >), or vertical bar (|).
- 3 In the Country Code list, select the country where the network is to be deployed.



You must select a country code before continuing. The country code you select here is the default for all MAPs in the network plan. However, you can override the country code in individual sites within the network plan.

- 4 In the Channel Set list, select the set of operating channels for any 802.11b/g MAP radios you plan to use.

The choices in the list are dependent on the country code you chose in step 3. The channel numbers you select are used later in the planning process when you assign channels to 802.11b/g radios.

You might be able to select a set of overlapping channels. However, in some network layouts, using overlapping channels reduces network performance.

Channel numbers used for 802.11a radios do not overlap and are not listed at this stage of the planning process. You can modify channel selections for 802.11a and 802.11b/g radios later in the planning process or allow WX switches to set the channels automatically.



The 802.11b/g channel set you select here is the default for all MAPs in the network plan. However, you can override the channel set in individual sites within the network plan.

- 5 Click **Next** to save the network plan on the server and open it in 3WXM.

The network plan settings appear in the Content panel and the following links appear in the Task List panel:

- Mobility Domain—Configure a named set of WX switches that support user roaming. (See “Creating a Mobility Domain” on page 62.)

- Wireless Switch—Use a wizard to configure basic switch parameters. (See “Using the Create Wireless Switch Wizard” on page 165.)
- Third-Party AP—Add a third-party AP for use in network planning. (See “Creating a Third-Party AP” on page 63.)
- Country Code—Change the regulatory domain for the MAPs in the network plan. (See “Changing the Country Code” on page 65.)
- Auto-Tune Settings—Update the channel and power information in the network plan to match the channel and power settings assigned to MAPs in the network by the RF Auto-Tune feature. (See “Applying the Network’s RF Auto-Tuning Settings to the Network Plan” on page 65.)
- Upload Wireless Switch—Add a WX switch that is already deployed in the live network to the network plan. (See “Uploading a WX Switch into the Network Plan” on page 66.)
- Convert Auto APs—Convert MAPs that were configured by an Auto-AP profile into statically configured MAPs. (See “Converting Auto DAPs into Statically Configured APs” on page 67.)
- Network Domain—Configure a group of Mobility Domains into a single Network Domain. (See “Creating a WX Switch” on page 63.)

Managing Network Plans

After creating a network plan, you can save, close, open, or delete it. You can also share a network plan with others.

Saving a Network Plan

When you create a network plan and save changes, a directory with the same name as the network plan is created in the config-db directory of the 3WXM installation directory on the 3WXM Services host.

Each time you save a configuration change, 3WXM saves the changes to the network plan. You do not need to explicitly save the network plan itself. However, if the network plan has unsaved changes when you select to exit 3WXM or close a network plan, 3WXM displays a prompt to ask whether you want to save or discard the changes, or cancel the request. (See “Saving or Discarding Configuration Changes” on page 34.)

3Com recommends that you regularly back up the config-db directory so that you have additional copies of your network plans.

(In addition to this section, see “Managing Network Plans” on page 503.)



If the plan has unsaved changes and 3WXM Services becomes unavailable before the changes are saved, 3WXM client buffers the changes until 3WXM Services becomes available again. However, for the changes to be buffered, you must leave your 3WXM client session open and leave the network plan open.

Saving a Network Plan with a New Name

You can save a network plan with a new name by using the Save As feature.

To save a network plan with a new name:

- 1** In the main 3WXM window, select **File > Save As**. The Save As Network Plan wizard appears.
- 2** In Specify Plan Name, type a new network plan name.
Optionally, you can select an existing network plan name to replace it.
- 3** Click **Next**. You see the status of the save process.
- 4** Click **Finish**.

Opening a Network Plan

Network plans reside on a host running 3WXM Services. You can open an existing network plan by connecting to the 3WXM Services host where the plan resides, selecting **File > Switch Network Plan**, then specifying the plan’s name in the dialog. The network plan is then opened in the 3WXM main window.

You can open a network plan created in a previous version of 3WXM with a later version of 3WXM. For example, if you created a network plan in 3WXM Version 4.0, you can open the plan in 3WXM Version 4.1. However, because a network plan created in 3WXM Version 4.0 manages WX switches running MSS Version 4.0, you cannot use new features available in MSS Version 4.1 unless you upgrade the WX switches to MSS Version 4.1. (To upgrade WX switches, see “Distributing System Images” on page 354.)

To open a network plan:

- 1 Establish a connection to the 3WXM Services host on which the network plan is saved.

You can do this by restarting 3WXM or selecting **File > Open**, and then entering the IP address of the 3WXM Services host in the 3WXM Services Connection dialog box.

- 2 After the connection is established with the 3WXM Services host, select **File > Switch Network Plan**.

If any changes were made to the currently loaded network plan, you are prompted to save them and close the file. The Switch Network Plan dialog box appears.

- 3 Select the network plan you want to open and click **Next**.

3WXM establishes a new connection to the host running 3WXM Services and loads the specified network plan.

Importing a Network Plan

You can import objects from another network plan into the currently open plan. When you import objects from another plan, objects are added to the currently open plan as follows:

- If an object (object name) exists in the plan you are importing but not in the open plan, the object is added to the open plan.
- If an object (object name) exists in both plans, the copy of the object in the imported plan replaces the object in the open plan.

If both plans have the same floor name, the floor in the plan you are importing *completely* replaces the floor of the same name in the other plan.



*3Com recommends that you save a backup copy of the plan before importing objects from another plan. To save a backup copy, you can use the **File > Save As** option.*

To import a plan:

- 1 In the main 3WXM window, select **File > Import Network Plan**.
- 2 Select the network plan you want to import, from the Select Plan drop-down list.

3WXM compares the object names in the plan to be imported with the object names in the open plan. If both plans have objects of the same name and type, the objects are listed and *Conflict* appears in the Status column.

- 3 Do one of the following, depending on whether you want to import all objects from the plan:
 - If you do not want to replace the objects in the open plan with their like-named objects in the other plan, click **Close**. 3WXM does not import any objects from the plan.
 - If you do want to replace the objects, click **Import Plan**. 3WXM imports the objects into the open plan. Click **Close**.

Closing a Network Plan

You can close a network plan at any time. If you have unsaved changes, you are asked whether you want to save the changes.

To close a network plan:

- 1 In the main 3WXM window, select **File > Close** or **File > Exit**.
If the network plan has no unsaved changes, the network plan is closed. Otherwise, go to the next step.
- 2 If there are unsaved changes, 3WXM displays a dialog asking whether you want to save the changes, discard them, or cancel the request to close the plan or exit the application. Do one of the following:
 - Select **Apply** to save the changes and close the plan.
 - Select **Discard** to close the plan without saving the changes.
 - Select **Cancel** to cancel the request to close the plan or exit the application, and continue working with the plan.

Deleting a Network Plan

You can delete a network plan at any time.



CAUTION: *The Delete Network Plan wizard has a Cancel button, but this button does not cancel deletion of a network plan. 3WXM deletes the plan as soon as you click **Next**.*



*You cannot delete the currently active plan. To delete the active plan, first use the **File > Switch Network Plan** option to select another plan to be active, then delete the plan.*

To delete a network plan

- 1 In the main 3WXM window, select **File > Delete Network Plan**. The Delete Network Plan wizard appears.
- 2 Select the network plan you want to delete from the list.
- 3 Click **Next**. The network plan is deleted.
- 4 Click **Finish**.

Sharing a Network Plan

Since the 3WXM plan repository resides on a networked server (the host running 3WXM Services), you can easily share access to network plans among hosts running the 3WXM client.

When you make changes to a network plan, 3WXM locks the part of the plan you are modifying. Other 3WXM clients can still open the network plan, but the lock prevents the other clients from modifying the part of the plan you are already modifying. The lock remains in effect until your modification is saved. 3WXM then removes the lock.

When a user with an administrator or provision account tries to access a part of a plan that is already locked by another user, 3WXM displays the Lock Info page. The Lock Info page indicates who has locked the network plan. You can optionally override the user's lock. Note that only a user with Administrator privileges can override another user's lock.

To override another user's lock

- 1 Select **Tools > 3WXM Services Lock Management**. The 3WXM Services Lock Management dialog box appears.
- 2 Select the lock you want to delete and click on **Delete Lock**. (Only an Administrator can delete a lock.)
- 3 A message is displayed indicating that the user whose lock you selected will not be able to save their changes when you delete their lock. Click **Yes** to confirm that you want to do this.

If you override the lock, 3WXM unlocks the part of the plan that was locked, and notifies the other 3WXM users about the lock change. From this point on, the former lock holder cannot save changes to the previously locked portion of the plan.

By default, 3WXM sends a message to all users who have the plan open with monitor access to inform them when changes are saved to the plan. In addition, 3WXM sends a message to each monitor user, so that one of them can then edit the plan.

To disable notification

- 1 In the main 3WXM window, select **Tools > Preferences**.
- 2 Click the **Persistence** tab.
- 3 To disable change notification, clear **Plan Change Notification**.
- 4 Click **Close**.

Defining a Mobility Domain

A Mobility Domain is a collection of WX switches that work together to support roaming users. One of the WX switches is defined as a seed device, which distributes information to the other WX switches defined in the Mobility Domain.

A Mobility Domain allows users to roam geographically from one WX switch to another without losing network connectivity. Users connect as a member of a VLAN through their authorized identities. If the native VLAN for a user is not present on the WX to which the user connects, the WX creates a tunnel to that VLAN.

A network plan can contain more than one Mobility Domain. Standalone WX switches and third-party APs do not need to be configured within a Mobility Domain.

You use 3WXM to create a Mobility Domain and define its seed device and the other WX switches in the Mobility Domain. If you already have WX switches installed and configured, you can upload the configurations of the switches to 3WXM to have them included in a Mobility Domain.

Roaming Behavior

For a client session to be considered a roaming session (and not a new session), the following criteria must be met:

- The client associates or reassociates with a MAP in the Mobility Domain, and the client already has a session on a different MAP in the Mobility Domain. The existing session can be in one of two states:
 - Active—The normal state for a client that has left radio range without sending a request to disassociate.
 - Diassociated—The state of a client that has sent an 802.11 disassociate frame, but has not roamed or aged out yet.

- Mobility Domain communications are stable. Generally, the communications required for roaming are the same as those required for VLAN tunneling. Roaming between ports on a WX is possible even if the Mobility Domain is down.
- Authentication, authorization, and accounting (AAA) on the MAP to which the client roams is successful on the first attempt. An authentication or authorization failure clears the client session. Depending on when the failure occurs, roaming can be disqualified or delayed.
- The client uses the same authorization parameters for the new session as for the old session. For example, changing the Encryption-Type or VLAN-Name parameter might cause a new session to be recorded, rather than a roam within the same session.

A disassociated session has a grace period of 5 seconds in which the session history can be retrieved and forwarded. After 5 seconds, the session is cleared, and its accounting is stopped. You cannot configure the grace period.

If the client MAC address in a Mobility Domain is not found in 5 seconds, the session is considered new.

The 802.1X reauthentication timeout has little impact on roaming. If the timeout lapses, 802.1X processing is performed on the existing association. Accounting and roaming history are not affected if the reauthentication is successful, because the client is still associated with the same MAP. If reauthentication fails, the session is cleared, and it is not eligible for roaming. If the client associates to the same MAP, that is recorded as a new session.

Roaming creates the following effects:

- Remote Authentication Dial-In User Service (RADIUS) accounting is treated as a continuation of an existing session, rather than a new one.
- For tracked users, you can view roaming history in the Monitor tab. See "Using the Client Monitor View" on page 415.
- The old session is cleared from the WX, even if the client did not explicitly disassociate from the MAP and the 802.1X reauthentication interval has not lapsed.

Traffic Ports Used by a Mobility Domain

When deploying a Mobility Domain, you might attach the WX switches to subnets that have firewalls or access controls between them. Within a Mobility Domain, the WX switches exchange information and other types of traffic, depending on your configuration of AAA and various management services.

Table 10 provides a summary of the traffic ports typically used by a Mobility Domain and its associated AAA and management functions.

Table 10 Traffic Ports Used for AAA Servers and Management Servers

Protocol	Port	Function
IP/UDP (17)	1812	RADIUS authentication (default setting)
IP/UDP (17)	1813	RADIUS accounting (default setting)
IP/TCP (6)	443	Secure Sockets Layer protocol (SSL) management using Web Management
IP/TCP (6)	8889	SSL management using 3WXM
IP/TCP (6)	23	Telnet management
IP/UDP (17)	161	SNMP get and set operations
IP/UDP (17)	162	SNMP traps
IP/ICMP (1)	N/A	Several types (for example, ping)
IP/UDP (17)	123	Network Time Protocol (NTP)
IP/UDP (17)	53	Domain Name Service (DNS)

The traffic typically sent between WX switches within a Mobility Domain uses IP/UDP protocol 17 traffic on port 8817 for both source and destination. Roaming traffic uses IP protocol 4.

Creating a Mobility Domain

The Create Mobility Domain wizard requires you to select the switches to place in the Mobility Domain and to select the seed switch. Add the switches to the network plan before you configure the Mobility Domain.

- 1 Select the Configuration tool bar option.
- 2 Select the network plan in the Organizer panel.
- 3 Select the Mobility Domain task in the Task List panel. The Create Mobility Domain wizard appears.
- 4 In the Name box, type the name for the Mobility Domain (1 to 16 characters, with no spaces or tabs).
- 5 Click **Next**.

- 6 In the Available Devices list, select the WX switches you want to add to the Mobility Domain.
- 7 Click **Next**.
- 8 Select the switch to act as the seed switch for the Mobility Domain.
- 9 Click **Finish**.

Creating a WX Switch


- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, select the network plan name.
- 3 In the Task List panel, select Wireless Switch.
- 4 Go to "Using the Create Wireless Switch Wizard" on page 165.

Creating a Third-Party AP

You can add a third-party AP to the network plan's equipment list.

When you use RF Planning, you can place the AP on its location on a floor plan. In this case, 3WXM take the AP's channel number into account when assigning channels to MAPs.

- 1 Select the Configuration tool bar option.
- 2 Select the network plan in the Organizer panel.
- 3 Select the Third Party AP task in the Task List panel. The Create Third Party AP wizard appears.
- 4 In the Name box, type a name for the access point. You can use 1 to 32 characters, with no punctuation except the following: period (.), hyphen (-), or underscore (_).
- 5 Optionally, in the Manufacturer ID box, type the manufacturer identification for the access point (1 to 30 characters, with no spaces).
- 6 In the Product ID box, type the product identification for the access point (1 to 30 characters, with no spaces).
- 7 In the IP Address box, type the IP address for the access point.
If you specify an IP address, you can use Telnet and a Web browser with this access point.
- 8 In the Telnet Port Number box, specify the port number for Telnet service.

- 9 In the HTTP Port Number box, specify the port number for HTTP service.
 - 10 Click **Next**.
 - 11 In the AP Model drop-down list, select one of the following:
 - **AP (Dual Radio)**—802.11a and 802.11b or 802.11b/g
 - **AP (Single Radio)**—802.11a, 802.11b, or 802.11g
 - 12 In the Radio Type drop-down list, select one of the following: **11a**, **11b**, **11g**.
The choices available depend on the selection you made in step 11.
 - 13 Click **Next**.
 - 14 Verify the radio slot number and radio type.
For a dual-radio access point, 802.11b/g radios have a slot number of 1. 802.11a radios have a slot number of 2.
 - 15 In the Channel Number list, select the channel number for the radio.
 - 16 In the Transmit Power box, specify the transmit power for the radio.
 - 17 To enable the radio, select **Enabled**.
-  *The access point's radio must be enabled in order to be considered in channel allocation.*
- 18 In the SSID box, type the service set identifier (SSID) for the radio.
 - 19 In the MAC Address box, type the MAC address of the radio.
 - 20 In the Antenna Gain list, select the antenna gain for the radio.
 - 21 If the access point has only one radio, click **Finish**. Otherwise, go to step 22.
 - 22 Click **Next**. The Radio A page appears.
 - 23 Repeat step 14 through step 20 for the 802.11a radio.
 - 24 Click **Finish** to save the changes.
 - 25 To place the AP on a floor plan, see “Moving a Third-Party AP Icon to its Floor Location” on page 131.

Changing the Country Code

The country code determines the valid radio types as well as channel numbers and power settings for MAP radios. The country code is one of the parameters you set when you create a network plan. If you need to change a plan's country code, use the following procedure.

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, select the network plan name.
- 3 In the Task List panel, select Country Code. The Change Country Code wizard appears.
- 4 Select the country code from the drop-down list.
- 5 Click **Next**.
3WXM changes the country code on all the WX switches in the network plan, and lists its progress as it does so.
- 6 Click **Finish**.

Applying the Network's RF Auto-Tuning Settings to the Network Plan

If RF Auto-Tuning is running on MAP radios in the network, you can update the radios in the network plan with the channel and power settings currently in effect on the same radios in the network. You also can lock down the channel and power settings in the plan and in the network by disabling RF Auto-Tuning on the radios.



RF Auto-Tuning settings are applied only to configured MAPs, not to Auto DAPs (Distributed MAPs configured using a Distributed MAP profile).



This option also disables RF Auto-Tuning on the radios. When RF Auto-Tuning is disabled, the channel and power settings on the radios are static.

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, select the network plan name.
- 3 In the Task List panel, select Auto-Tune Settings. The Apply Auto-Tune Settings wizard appears.
- 4 Select the RF Auto-Tuning settings you want to apply. Both channel and power settings are selected by default.

- 5 Select the scope:
 - Mobility Domain
 - WX switch
 - Radio profile
 - Individual MAP radio

To select a radio profile, display it first by clicking on the plus sign next to the WX switch. To select an individual radio, display it first by displaying its radio profile, then clicking on the plus sign next to the radio profile.

- 6 If you accessed the wizard from the toolbar, select the scope. You can select a Mobility Domain, WX switch, MAP, or radio profile.
- 7 Click **Next**. The progress is displayed.
- 8 Click **Finish**.

Uploading a WX Switch into the Network Plan

- 1 Select the Configuration tool bar option.
- 2 In the Task List panel, select Upload Wireless Switch.
- 3 In the IP Address box, type the IP address for the WX switch.
- 4 In the Enable Password box, type the enable password for the WX switch.
This password must match the enable password that was defined using the CLI command **set enablepass**. For more information, see the [Wireless LAN Switch and Controller Configuration Guide](#).
- 5 Click **Next**. The uploading progress is shown.
- 6 After the *Successfully uploaded device* message is displayed, click **Next**.
3WXM uses its verification rules to check the switch's configuration. If an item in the configuration generates an error or warning, 3WXM displays the error or warning message.
- 7 Review the verification messages to determine whether you will need to make changes to the switch's configuration after uploading it into 3WXM.
- 8 Click **Next**.
- 9 Click **Finish**.
- 10 If 3WXM displayed error or warning messages, select the Verification tool bar option and go to "Verifying Configuration Changes" on page 363.

Converting Auto DAPs into Statically Configured APs

Distributed MAPs that are not configured on any WX switches in the Mobility Domain can nonetheless be booted and managed by a switch if the switch has a profile for Distributed MAPs, and has capacity to manage the MAP. A MAP that is booted and managed using a Distributed MAP profile is here called an *Auto DAP*.

You can convert the temporary connection of an Auto DAP to a WX switch into a permanent, statically configured connection on the switch.

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, select the WX switch.
- 3 In the Task List panel, select Convert Auto APs.

The Convert Auto APs wizard appears. The MAPs that were configured using a Distribute MAP template are listed.

- 4 Select the MAPs you want to convert into statically configured MAPs.
- 5 Click **Next**.
- 6 Select the temporary connections you want to convert into static connections.
- 7 Click **Finish**.

Creating a Network Domain

MSS Version 4.1 allows functionality found in Mobility Domains to be extended over a multiple-site installation, in a Network Domain. A Network Domain is a group of geographically dispersed Mobility Domains that share information over a WAN link. This shared information allows a user configured in one Mobility Domain to establish connectivity on a WX switch in a remote Mobility Domain. The WX switch forwards the user traffic by creating a VLAN tunnel to a WX switch in the remote Mobility Domain.

In a Network Domain, one or more WX switches acts as a seed device. A Network Domain seed stores information about all of the VLANs on the Network Domain members. The Network Domain seeds share this information among themselves, so that every seed has an identical database.

(For more information, see the "Configuring Network Domains" chapter of the [Wireless LAN Switch and Controller Configuration Guide](#).)

To simplify configuration, 3WXM assumes that the extent of the Network Domain is the same as extent of the entire network plan. 3WXM also automatically sets the seed affinities on each switch as described in Table 11.

Table 11 Affinities for Network Domain Seeds

Affinity Value	Assigned To...
10	The switch itself, if it is a Network Domain seed.
8	Another switch in the same Mobility Domain, if that switch is both a Network Domain seed and the seed switch for the Mobility Domain the two switches are in.
5	All switches that do not fit either of the descriptions above.



3Com recommends that you allow 3WXM to automatically assign affinity values instead of using the CLI to manually set them. Even if you do use the CLI to set them, 3WXM does not replace the affinity values it automatically sets with values set on individual switches. Thus, if you accept network changes that include Network Domain affinity changes, 3WXM ignores the affinity changes and overrides them with auto computed values. As a result, 3WXM might generate local changes.

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, select the network plan name.
- 3 In the Task List panel, select Network Domain.
- 4 In the Network Domain Name box, type the name for the Network Domain (1 to 60 characters, with no spaces or tabs).
- 5 Click **Next**.
- 6 In the Available Devices list, select the WX switches you want to use as the Network Domain seeds.
- 7 Click **Next**.
- 8 In the Available Devices list, select the WX switches you want to use as Network Domain members.



Make sure to select the seed switch as a member. For the Network Domain to work properly, the seed must also be configured as a member.

- 9 Click **Finish**.

The Network Domain configuration is included in the summary information for the network plan. To display summary information for a plan, select the Configuration tool bar option, then select the network plan name in the Organizer panel. The summary information appears in the Content panel.

5

PLANNING THE 3COM MOBILITY SYSTEM

The 3Com Wireless LAN Switch Manager (3WXM) planning tools help you plan your mobility system. This chapter discusses the Building wizard and describes how to create a site, create or modify buildings, import or draw floor details, specify the RF characteristics of a floor, define a wireless coverage area, compute MAP placement, and generate RF network design information.

RF Planning Overview

The 3WXM planning tools calculate the 3Com equipment you need, how to configure it, and where to install it, all based on the information you provide about your wireless coverage needs.

You can display projected coverage, and even experiment with network changes. You can also optimize the plan based on RF measurements from the live network.

In addition, when you add the geographical information about your network to 3WXM, you can use 3WXM to visually find network clients or rogue devices.

Accessing the RF Planning Tools

To access the RF planning tools, select the RF Planning tool bar option and do one of the following:

- If you are creating a new building, click on the site name in the Organizer panel and select **Create Building** in the Task List panel.
- If you are modifying an existing building, click on the plus sign next to the site name to expand it, then click on the name of the building you want to modify.

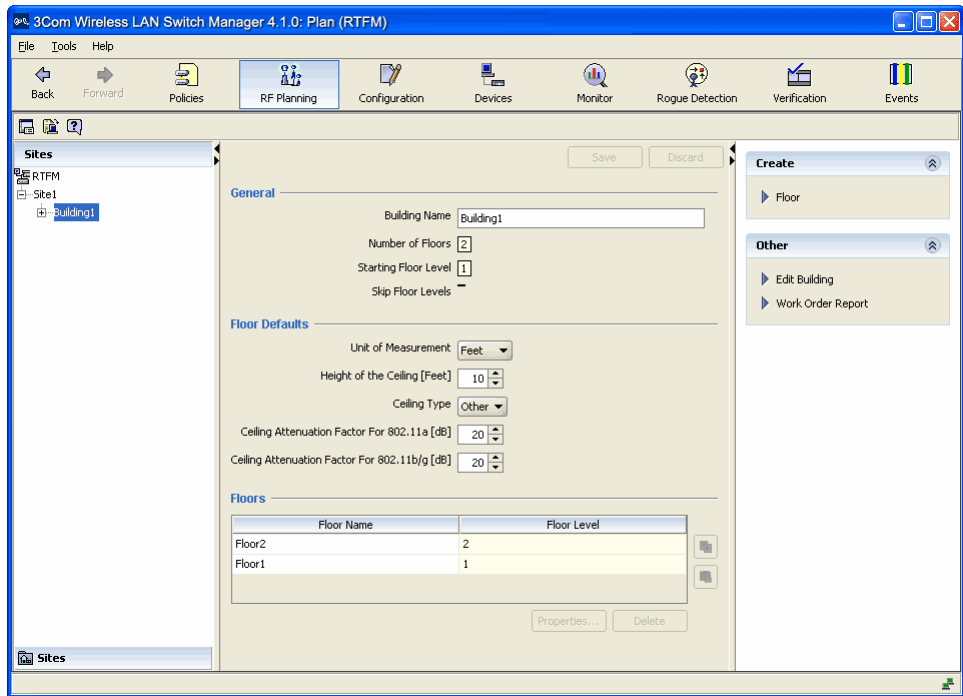


Table 12 lists the toolbar icons at the top of the floor display area.

Table 12 Toolbar icons available in RF Planning Tools




Option	Description
	Edit 3WXM preferences.
	Configure 3WXM Services.
	Launch Help.

Table 12 Toolbar icons available in RF Planning Tools (continued)



























Option	Description
	Adjust the paper space (crop the drawing).
	Define the drawing scale.
	Change the grid size.
	Zoom in.
	Zoom out.
	Fit view in window.
	Print the view displayed in the floor display area.
	Toggle AP label.
	Copy selected objects.
	Paste selected objects.
	Undo last change.
	Redo last change.
	Group selected objects.
	Ungroup selected objects.
	Select all visible objects.
	Assign layers to selected objects.
	Create RF obstacle.
	Edit properties.
	Remove RF obstacle information.
	Delete selected components.

Table 12 Toolbar icons available in RF Planning Tools (continued)

Option	Description
	View or change dimensions.
	Place an RF measurement point.
	Show 802.11a RF coverage in the floor display area.
	Show 802.11b RF coverage in the floor display area.
	Show 802.11g RF coverage in the floor display area.
	Hide display of 802.11 RF coverage in the floor display area.

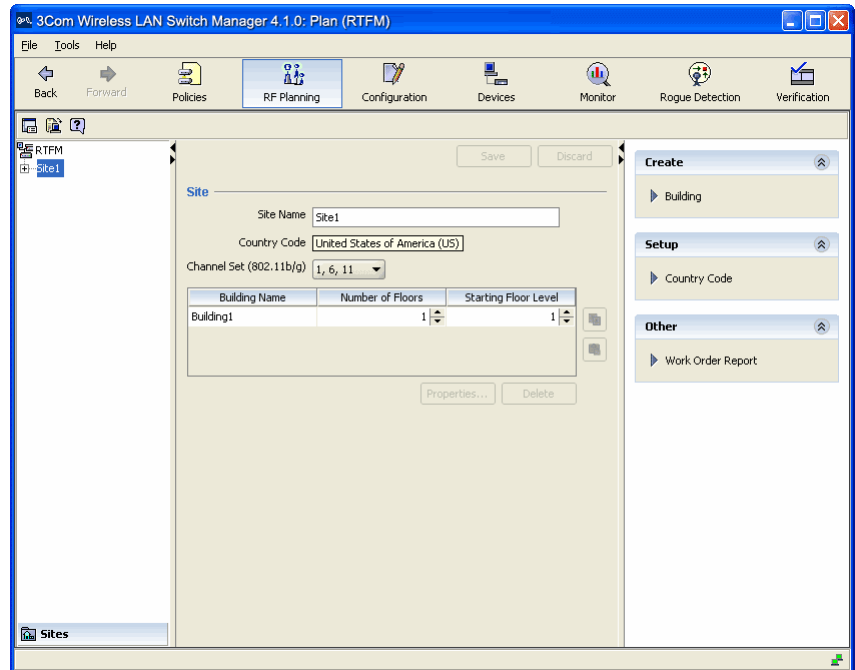
Creating or Modifying a Site

A site is a folder that contains the buildings in the network plan. A site usually represents a campus of geographically colocated buildings. If your network plan encompasses multiple campuses, create a site for each campus.

To create or modify a site

- 1 Select the RF Planning tool bar option.
- 2 In the Organizer panel, click the name of the network plan.
- 3 Do one of the following:
 - If you are creating a new site, click on the network plan name in the Organizer panel and select Create Site in the Task List panel. A series of dialog boxes prompts you for information about the new site.
 - If you are modifying an existing site, click on the plus sign next to the network plan to expand it, then click on the name of the site you want to modify. Information about the site appears in the Content panel.

The following figure illustrates the information displayed in the Content panel for a site. Note that this information is the same as the information for which you are prompted when you create a site.



- 1 In the Site Name box, type a name for the site (1 to 80 alphanumeric characters, with no spaces or tabs).
- 2 To change the Country Code, select Setup Country Code in the Task List panel, then in the Change Country Code dialog, select the country where the network is to be deployed.
- 3 In the Channel Set (802.11b/g) list, select the set of operating channels for any 802.11b/g MAP radios you plan to use (if different from the default).

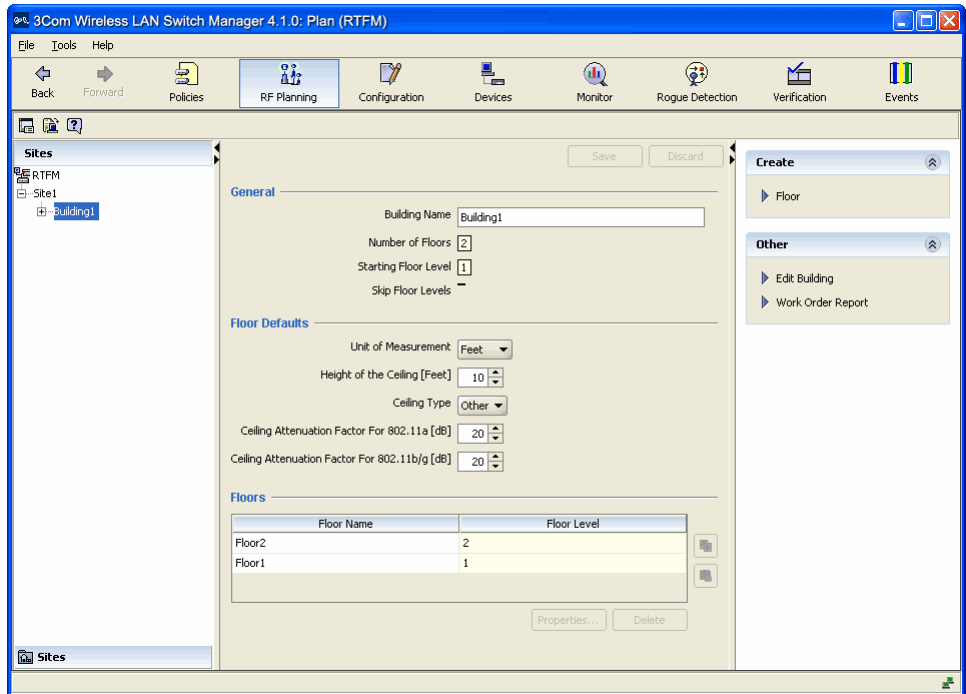
From the Content panel, you can also change the properties of existing buildings at the site. See "Creating or Modifying Buildings in a Site" next for more information.

Creating or Modifying Buildings in a Site

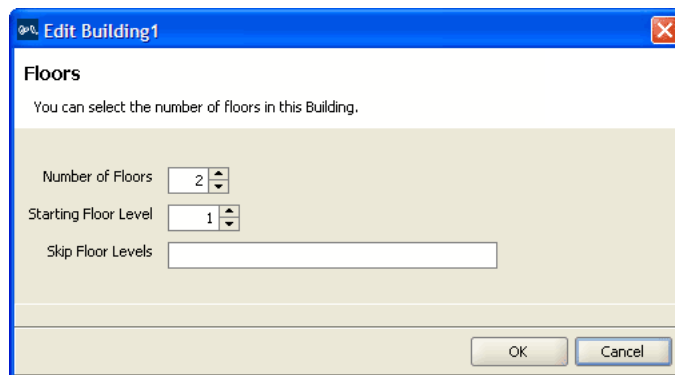
To create or modify a building in a site:

- 1 Select the RF Planning tool bar option.
- 2 In the Organizer panel, click the site name.
- 3 Do one of the following:
 - If you are creating a new building, click on the site name in the Organizer panel and select Create Building in the Task List panel. A series of dialog boxes prompts you for information about the new building.
 - If you are modifying an existing building, select the building name in the Content panel for the site, then click **Properties**. A dialog box allows you to edit the building's properties.
 - In the Organizer panel, click on the plus sign next to the site name to expand it, then click on the name of the building you want to modify. Information about the building appears in the Content panel. You can edit the building information in the Content panel.

The following figure illustrates the information displayed in the Content panel for a building. Note that this information is the same as the information that appears when you click the **Properties** button for the building.



- 1 In the Building Name box, type the name of the building (1 to 30 alphanumeric characters, with no spaces or tabs).
- 2 In the Task List Panel, under Other, click Edit Building. The Edit Building dialog box is displayed.



- 3 In the Number Of Floors box, specify how many floors the building has.

- 4 In the Starting Floor Level box, specify the floor number of the first floor in the building. To start with a subterranean floor, you can specify 0 or a negative floor number.
- 5 In the Skip Floor Levels box, specify floor numbers you want to skip. Skipping floors is useful when you want to model only certain floors in a building. To enter a list of floors, use commas to separate the floor numbers (example: 1,3,7). To enter a range, use a hyphen (example: 8-12).
- 6 Click **OK** to close the dialog box.
- 7 From the Content panel, you can also change default values for floors in the building. In the Unit of Measurement list, select **Feet** or **Metric**. If you are importing a drawing of a floor plan, choose the measurement system the drawing uses.
- 8 In the Height of the Ceiling box, type the number of feet or meters from the floor to the ceiling (1 to 1000 feet or meters).



The ceiling height is based on the surface of the ceiling where the access points will be mounted, not on the center of the plenum space between floors.

- 9 In the Ceiling Type box, select the type of ceiling used most commonly in the building.
3WXM adjusts the default attenuations based on your selection.
- 10 To change the default attenuation for radios, type the number of dB in the 802.11a (dB) box or 802.11b/g (dB) box.

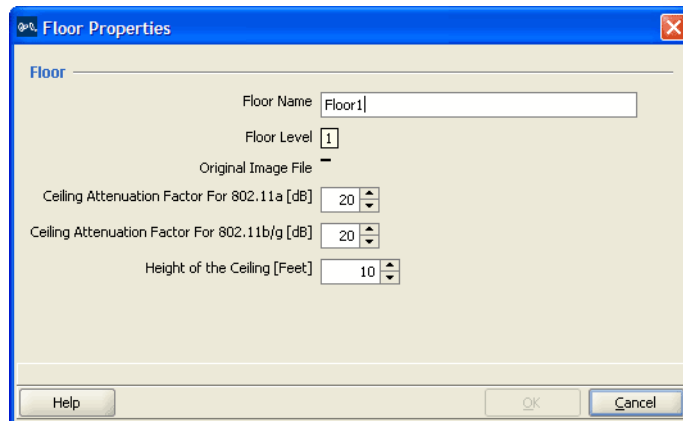
From the building's Content panel, you can edit the properties of existing floors in the building. See "Creating or Modifying Floors" next for more information.

Creating or Modifying Floors

To create or modify a floor in a building:

- 1 Select the RF Planning tool bar option.
- 2 In the Organizer panel, click the building name.
- 3 Do one of the following:
 - If you are creating a new floor, click on the building name in the Organizer panel and select Create Floor in the Task List panel. A series of dialog boxes prompts you for information about the new floor.
 - If you are modifying an existing floor, select the floor name in the Content panel for the building, then click **Properties**. A dialog box allows you to edit the floor's properties.
 - Click on the floor name in the Organizer panel, click on Floor in the Task List panel, and then select Floor properties under Edit Floor.

The following figure illustrates the information displayed in the Floor Properties dialog box for a floor. Note that this information is the same as the information for which you are prompted when you create a floor.



- 4 To change the floor name, type the new name in the Floor Name box (1 to 60 alphanumeric characters, with no tabs). Each floor name in a building must be unique.
- 5 To change the default attenuation for radios, type the number of dB in the 802.11a (dB) box or 802.11b/g (dB) box.

- 6 In the Height of the Ceiling box, type the number of feet or meters from the floor to the ceiling (1 to 1000 feet or meters).



The ceiling height is based on the surface of the ceiling where the access points will be mounted, not on the center of the plenum space between floors.

- 7 Click **OK**.

After creating a floor, you can import or draw details about the floor. See “Importing or Drawing Floor Details” next for more information.

Importing or Drawing Floor Details

You can add information for a floor by importing a drawing of the floor or by using 3WXM’s graphics tools to draw the floor.

After you import or draw the floor, you need to specify the RF characteristics of the floor, by specifying the attenuation of obstacles such as walls, doors, windows, and so on. The attenuation of an object indicates how much the object affects an 802.11 radio signal. 3WXM uses the attenuation information when calculating how many MAPs you need and where to place them in order to provide the desired wireless coverage.

The following sections describe how to import or draw a floor. For information about specifying the RF characteristics of the floor, see “Specifying the RF Characteristics of a Floor” on page 94.

Importing a Drawing of a Floor

You can import a drawing of your floor plan into 3WXM. 3WXM supports the following file types:

- AutoCAD drawing (DWG), a native binary format used by AutoCAD. You can import the following versions: R13, R14, R2000. Use R2000 if available.
- Drawing Interchange Format (DXF), an ASCII-based interchange format used for multi-vendor interoperability. You can import the following versions: R12, R13, R14, R2000. Use R2000 if available.
- Graphics Interchange Format (GIF) (.gif)
- Joint Photographic Experts Group (JPEG) (.jpeg, .jpg)

3WXM cannot import files in Visio format. However, you can export a Visio file to a DXF or JPG file, then import that file into 3WXM.

You can also draw a floor plan in 3WXM if you do not have a drawing of your floor in one of the supported file formats.

File Recommendations

For optimal results, use a DWG or DXF drawing. These types of drawings are made of vector graphics line objects (lines), which you can easily convert into RF obstacles after importing the drawing into 3WXM. In addition, the drawing objects are usually grouped together and organized by layers, enabling the display and manipulation of similar objects such as walls, doors, and windows.

Drawings in DXF format sometimes import more easily into 3WXM. However, 3Com recommends that you obtain copies of the drawing in both DWG and DXF formats if possible, so that you can try the other format if the first format you try does not import easily.

A GIF or JPG file is a raster graphics file (a screenshot or background image), which is not made of lines. To add RF obstacle information, you must manually draw the obstacles on top of the image.

For optimal performance, use files that are around 1 MB in size or less. (A DXF file is generally about 3 times the size of a DWG file for the same drawing.)

You can reduce the file size for a drawing by pruning unneeded information from the drawing, as described below.

Preparing a Drawing Before Importing It

3WXM has a file cleanup feature that can help remove unwanted information from an imported drawing. However, the more cleanup work you do before importing a file, the better the results will be. In addition, cleaning up a file before importing it helps reduce the file size, which in turn enhances performance when handling the file in 3WXM.

To prepare a drawing before importing it into 3WXM:

- Make sure the scale of the paper space is 1" : 1" (full size). Also, ensure that the scale type is the same as that of the model space.
- Verify that the origin point (0,0) aligns correctly for all floors.
- Delete all workspaces or paper layouts that are not required. If the drawing contains multiple paper layouts, delete all but the last one (which cannot be deleted) and delete the contents of that layout.
- Check for externally referenced files. 3WXM requires the drawing file to be monolithic. If a floor plan uses externally referenced files, significant portions of the floor plan might be missing, even with all layers unfrozen and visible.

In AutoCAD, when you load the drawing file, you might see messages about the files not being found. To check for external references, you can select **Insert > Xref Manager**. If you look at the layers, externally referenced layers have a common prefix label with the \$ delimiter between the label and the description (for example, SC03\$a-WALL-FULL). If you can see the layer itself, the layer either will be blank or will be a single read-only object.

To include the information in externally referenced files, place the files in the same directory as the master file. In AutoCAD, you also can bind the information to the master file by selecting **Insert > Xref Manager**, selecting the file, then clicking Bind.

Adding information from referenced files can increase the file size. If the information you will need to convert into RF obstacles is in the referenced file but not the master file, try just importing the referenced file into 3WXM. For information on the location of referenced files in AutoCAD, see the AutoCAD documentation.

- Audit the drawing. An audit finds problems between objects in the file and fixes them automatically. To perform an audit in AutoCAD, select **File > Drawing Utilities > Audit**.
- Check for grouped objects, especially groups that span multiple layers or include the entire drawing. If a grouped object contains objects that you will to assign differing RF values to, or if some objects will not become RF obstacles, ungroup the objects and delete the unneeded objects. If all the RF objects in the grouped object will have the same RF value, you might want to leave the object grouped.

A grouped object can contain multiple layers, and can contain visible and invisible objects. (When you select an object that spans multiple layers, the object is not selected normally when you click on it. Instead, a selection square appears, offset to the side of the object.) If you decide to delete a grouped object, ensure that the object does not contain objects to which you will need to assign RF values.

- Turn visible, unlock, and unfreeze all layers. Then delete unnecessary layers. (Locking a layer keeps the layer visible but also prevents changes to the layer. Freezing a layer locks the layer and makes it invisible.)

In many cases, the information in invisible or frozen layers is not related to objects that will be RF obstacles, and so is unnecessary in the floor plan. The information you need to keep is the structural information to which you will assign RF values in 3WXM.

To check the contents of the invisible layers to make sure the information can be discarded, reverse the frozen/unfrozen status of all layers, to that only the layers that normally are frozen are visible. In TurboCAD, delete the unneeded layers. In AutoCAD, click-drag around all the visible objects to select them, and delete the objects.



CAUTION: Do not use *Ctrl+A* (Select All) in AutoCAD to select the objects to delete. This option selects all objects in the model space, regardless of layer status (invisible, locked, or frozen). All invisible objects are unprotected and will be deleted. Instead, always use click-drag to select multiple objects, or lock the layers you want to keep first.

- Remove all blocks, line types, and layers that are unused.
 - In TurboCAD:

To delete a block, select it on the Blocks palette and click **Delete**. A line type is an object. To delete an object, select the object and select **Edit > Clear > Selection**.
 - In AutoCAD:

Click-drag to select unwanted objects and delete them. When all unwanted objects are deleted, purge the drawing of all unwanted layers, blocks, and fonts by selecting **File > Drawing Utilities > Purge**. Make sure purge nested items is selected. Click **Purge** until the option is greyed out.



CAUTION: In AutoCAD, you cannot delete a layer if the layer is not empty. However, in TurboCAD, **Options > Layers** allows you to delete a layer even if there are objects in it.

- Create RF-specific layers and move walls, windows, doors, and other objects that affect RF propagation from other layers into the new layers. For example, create a new layer called *RF-ExtWalls* for external walls, and move all external wall objects into that layer. In 3WXM, you can easily select all objects in the layer and assign the same RF attenuation value to them. Create *RF-IntWalls* for interior walls and *RF-Windows* for windows.

If walls or windows are shown with multiple parallel lines, delete all but one of the lines. (3WXM can remove unneeded parallel lines during cleanup too, depending on how close together the lines are.)

To create a new layer in TurboCAD 9, select **Options > Layers**. In AutoCAD, select **Format > Layer**.

To move objects to the new RF layers, click-drag to select objects, select **Modify > Properties**, and change the objects' layer.

- Save the drawing on DWG and DXF formats, in case one format does not import well. To save the file into a specific format, select **File > Save As** and select the format. Use version R2000 of the format you save as, if available.

Useful AutoCAD Operations and Naming-Conventions

Table 13 and Table 14 provide AutoCAD operating tips and naming conventions that can be helpful as you prepare your floor plans for 3WXM.

Table 13 Operating Tips

Operation	Path	Hotkey
Zoom Extension— Arranges all items in the drawing view.		Ctrl+Backspace
Explode— Ungroups all items.	Format > Explode	Alt+Shift+E
Group— Group items.	Use "Create Group" tool or Format > Create Group	
Select all items except locked and frozen items.		Ctrl+A



The operating tips in the previous table refer to specific command names in AutoCAD. The commands are mentioned in 3WXM documentation as a guide for finding the appropriate commands or options in your CAD application. However, the best source of information about how to use your CAD application is the user documentation for that application.

Table 14 Common AutoCAD Layer Names

AutoCAD Layer Name	Commonly Represents...
glaz	windows
scol	steel columns
p-fixt	bathroom
p-part	bathroom stall
partitions	ext – exterior int – interior

Importing the Drawing

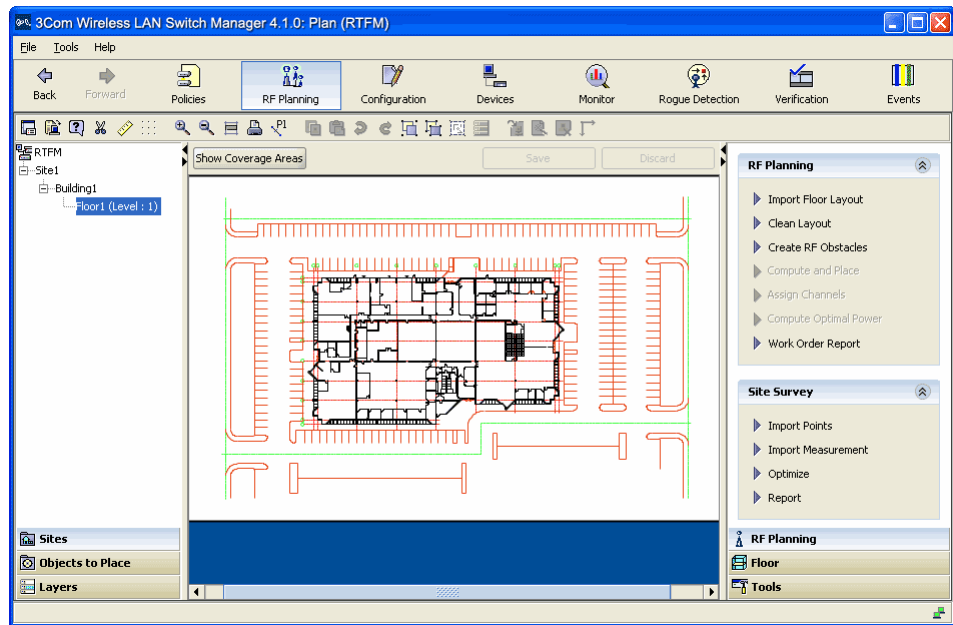
To import a floor drawing:

- 1 Select the RF Planning tool bar option.
- 2 In the Organizer panel, click on the plus sign next to the building to expand it, then click on the name of the floor for which you are importing the drawing. An empty floor layout appears in the Content panel.
- 3 In the Task List panel, under RF Planning, select Import Floor Layout.
- 4 After navigating to the directory containing the drawing, select it, and click **Open**. The drawing appears.
 - After you import a drawing, 3WXM remembers the directory you chose.
 - If you originally imported a DXF or DWG file, you can import a DXF, DWG, GIF, or JPEG file and layer it over the original file.

When you import another file, you are asked whether you want to delete the existing layout or add the objects to the existing layout. If you are reimporting the original file, 3WXM adds only incremental changes to the existing layout.

- 5 Read the message about verifying the drawing scale, then click **OK**. (“Adjusting the Scale of a Drawing” on page 85 describes how to adjust the scale.)

The imported drawing is displayed in the Content panel.

Figure 1 Floor Plan After Importing

At this point, you can edit the floor contents. Go to “Cropping the Paper Space”, next, to begin.


Cropping the Paper Space

You can crop the paper space of a drawing to remove unneeded space and objects around the floor. For example, if the drawing includes parking lot information, you can easily remove the parking lot by cropping.



CAUTION: All objects that are outside the area you select to keep, are permanently removed.

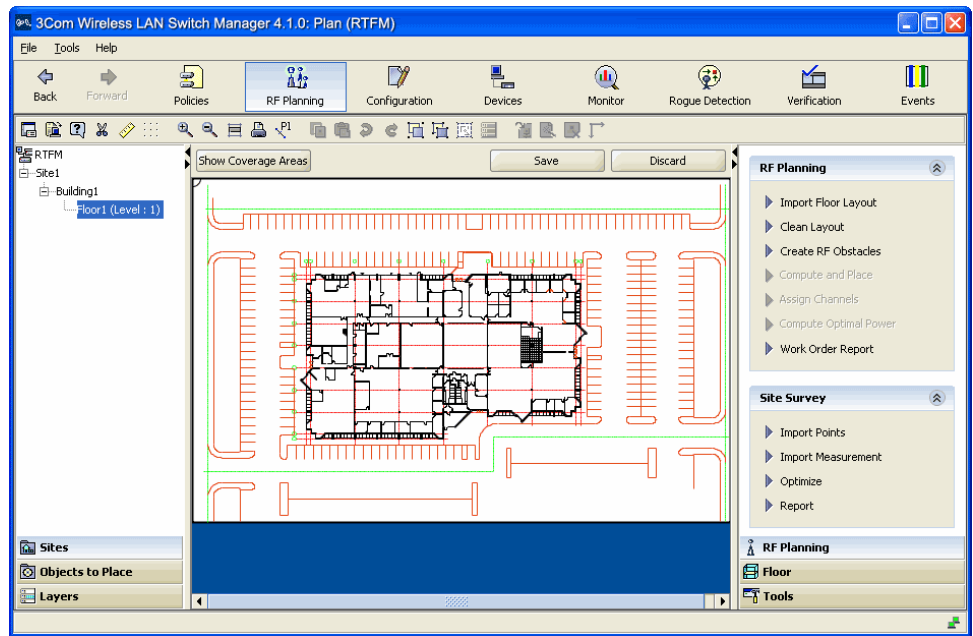
To crop the paper space

- 1 Display the floor plan in the Content panel.
- 2 Click  on the toolbar.
- 3 Click and diagonally drag the cursor over the area you want to keep.
- 4 Release the mouse button. A warning is displayed.
- 5 Read the warning. To complete the crop, click **Yes**. To cancel the crop request, click **No**.

If you click **Yes**, all objects and paper space outside the area you selected are removed and the image is resized to fill the removed space.

Figure 1 on page 84 shows the same floor plan as Figure 2 (below) after cropping the paper space.


Figure 2 Floor Plan After Cropping



Adjusting the Scale of a Drawing

If you imported a DWG or DXF drawing, you might need to adjust the scale of the drawing because the units used in these drawings might not have a one-to-one correspondence to meters and feet. To adjust the scale of the drawing, you draw a line between two points of known distance and adjust the measurement.

To adjust the scale

- 1 Display the floor plan in the Content panel.
- 2 Click  on the toolbar.
- 3 Drag to create a line between two points. A dialog box appears.
- 4 In the dialog box, type the actual distance between the two points.
- 5 Click **OK**.


Adjusting the Origin Point

3WXM uses a building's origin point to understand what is above or below a given floor. When calculating RF coverage, 3WXM needs to understand where MAP access points on adjacent floors are located so that 3WXM can take RF from those MAPs into account when assigning channels.

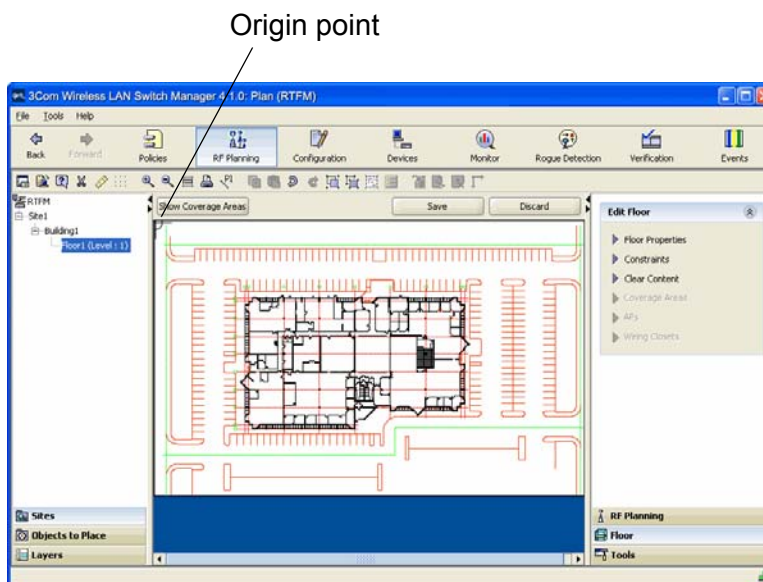
If an imported drawing has an origin point defined, 3WXM tries to use that origin point. Otherwise, 3WXM places the origin point in the upper left corner of the drawing by default.

You are not required to use the upper left corner of the building as the origin point. You can select an easily identifiable feature on all floors, such as an elevator shaft. Or, to include additional features that are not on the floor itself, you can extend the drawing beyond the exterior walls by moving the origin farther up and left.

To adjust the origin point

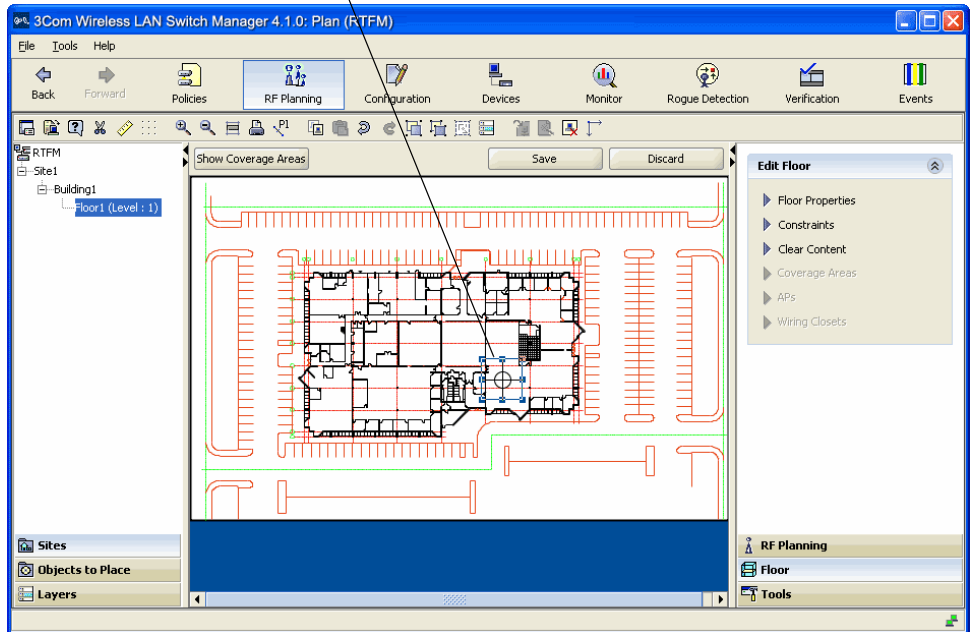
- 1 Access the floor plan in the Edit Content page.
- 2 Drag and drop  (the crosshairs icon) to the new location.

The following example shows a floor plan with an origin point in the upper left corner of the drawing.



In this example, the origin point has been moved to an interior shaft.

New location of
origin point



Working with Layers

Most drawings contain multiple layers of information. 3WXM allows you to hide, add and delete individual layers. You also can add and remove objects and move objects from one layer to another. For RF planning, you can convert existing objects into RF obstacles and add new RF obstacles.

Generally, only some of a drawing's layers contain details relevant to RF planning. You can hide layers to simplify a drawing. 3WXM performs RF calculations only with information in visible layers. Each drawing that you import into 3WXM has a layer 0, which contains information that 3WXM creates. You can hide layer 0 but you cannot delete it, and 3WXM requires layer 0 to be visible when calculating RF coverage or performing rogue detection. If you start one of these operations with layer 0 hidden, 3WXM displays a message offering to make layer 0 visible again.

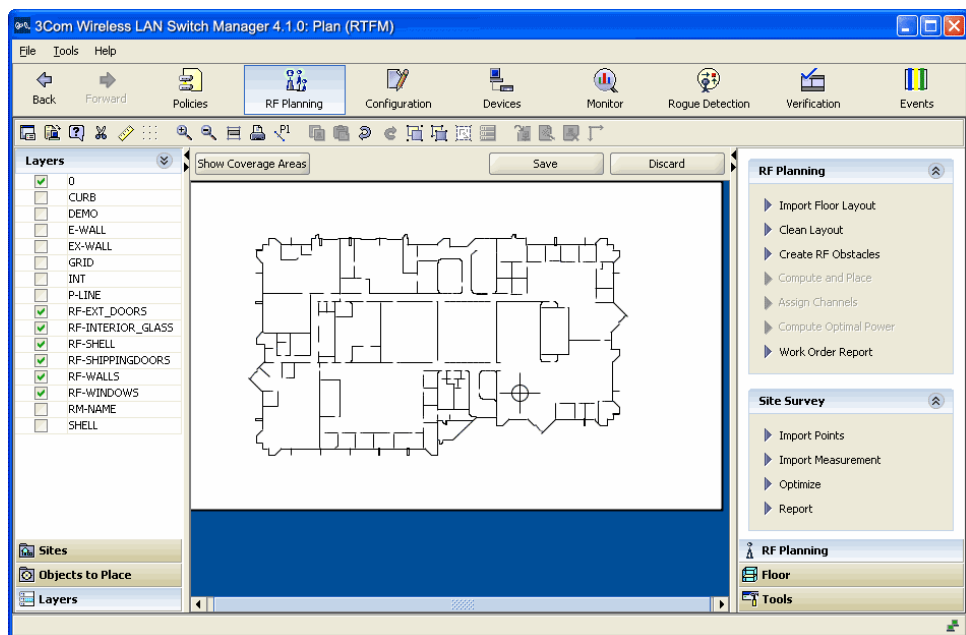
For best performance and simpler planning, 3Com recommends that you hide or remove unnecessary layers and remove unnecessary objects. The Clean Layout option automatically deletes all objects that meet the cleanup criteria, which you can modify. (See “Cleaning Up a Drawing” on page 89.) You also can select and delete individual objects.

Hiding Layers

With the drawing displayed in the Content panel, click Layers in the Organizer panel to bring up a list of the layers in the drawing. Click the checkbox next to the layer name to show or hide the layer.

Figure 3 shows the same floor plan as Figure 2 after hiding unnecessary layers.

Figure 3 Floor Plan After Layers Hidden




Adding or removing a layer

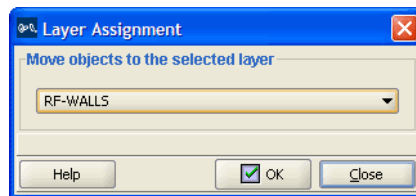
To add a new layer to a drawing, do the following:

- 1 Right-click the list of layers in the Organizer panel.
- 2 Select Add Layer from the menu that is displayed. 3WXM adds the new layer to the list and highlights its name so you can edit it.
- 3 Edit the name.

Moving an object from one layer to another

To move an object from one drawing layer to another:

- 1 In the drawing, select the object(s).
- 2 Click  on the toolbar. The Layer Assignment dialog box appears.



- 3 Click the down arrow to display the list of layers in the drawing, and select the layer to which you want to move the object(s).
- 4 Click **OK**.

Cleaning Up a Drawing

3WXM can simplify an imported CAD drawing by removing unnecessary objects from each layer. Drawing cleanup eliminates unneeded objects, lines, and text.

Note the following when cleaning up a drawing:

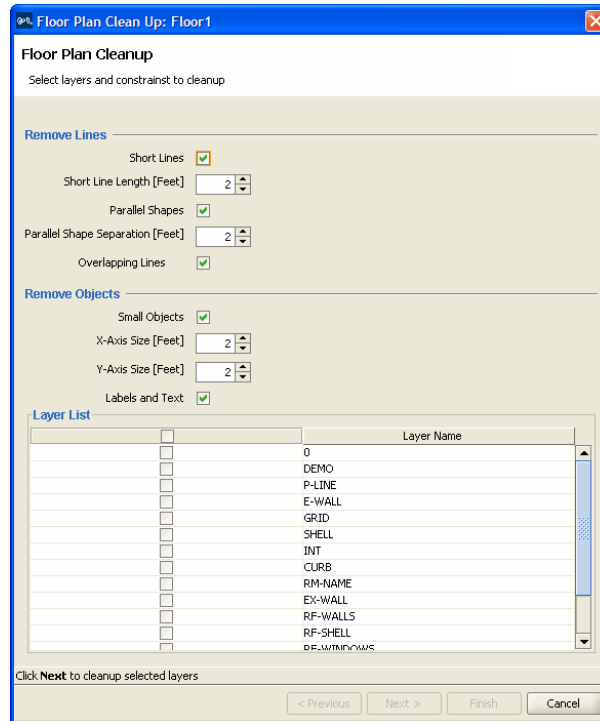
- Drawing cleanup does not apply to GIF or JPEG drawings.
- Drawing cleanup does not change objects that are grouped.
- If two objects that would normally be cleaned (such as two parallel lines close together) exist on different layers, then neither object is removed.



You cannot remove a layer from a drawing using the procedure in this section. See "Adding or removing a layer" on page 89.

To clean up a drawing

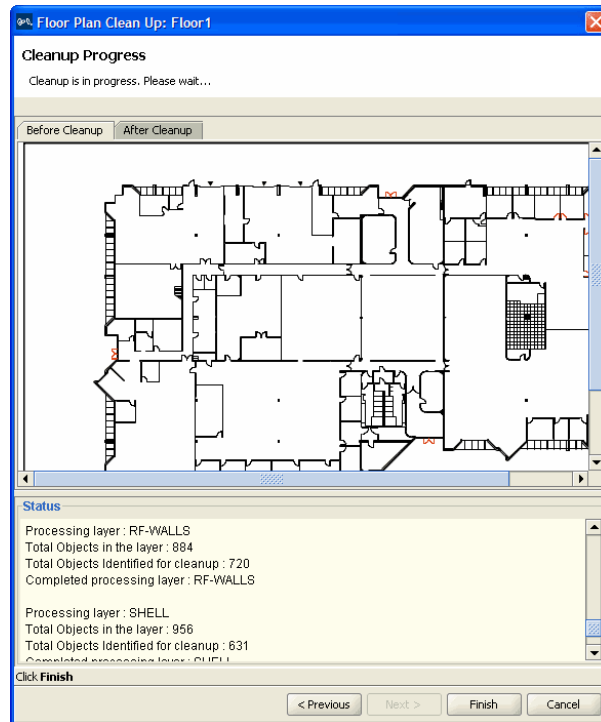
- 1 Display the floor plan in the Content panel.
- 2 In the Task List panel, under RF Planning, click **Clean Layout**. The Floor Plan Clean Up wizard appears.



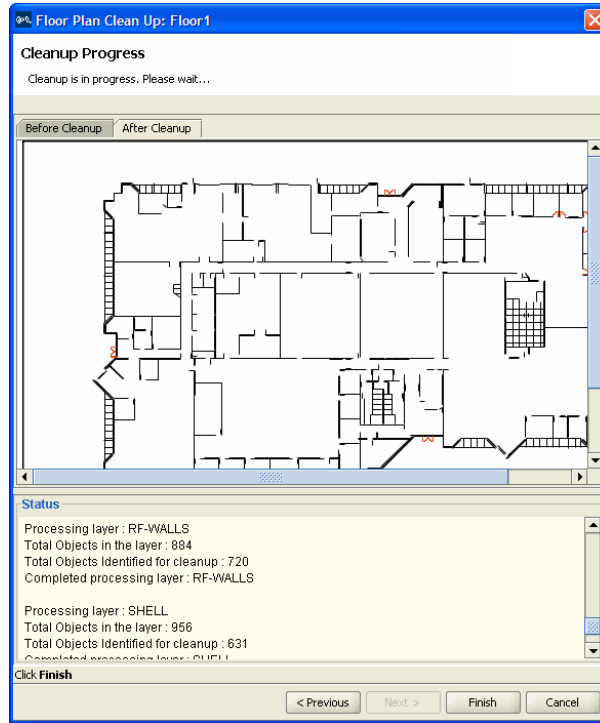
- 3 In the Remove Lines and Remove Objects group boxes, click next to any items you do not want 3WXM to remove from the drawing during cleanup. 3WXM removes all these items by default.
- 4 To change the short line length, type the new length in the Short Line Length box. 3WXM removes all lines that are this length or shorter.
- 5 To change the parallel shape separation distance, type the new length in the Parallel Shape Separation box.

3WXM removes parallel shapes that are this distance or shorter from the shape they parallel. For example, if a wall is drawn as parallel lines, 3WXM can remove one of the lines to make the wall a single line.

- 6 To change the maximum size of objects to be removed, type the new horizontal and vertical dimensions in the X-axis and Y-axis boxes. 3WXM removes all objects that fit within both the specified axes.
- 7 In the Layer List group box, select the layers you want to clean up. You can select individual layers or all layers. 3WXM removes the specified objects only from the layers you select. By default, no layers are selected.
- 8 Click **Next**. The Before Cleanup tab appears. The progress of the cleanup is listed in the message area below the floor plan. When cleanup is finished, the After Cleanup tab appears. (The example below shows a cleanup in progress.)



- 9 Click the **After Cleanup** tab. The cleaned up drawing appears.



- 10** Do one of the following:
- Click **Finish** to accept the changes.
 - Click **Previous** to change the cleanup constraints. Go back to step 2 on page 75.
 - Click **Cancel** to cancel the changes.

Drawing Floor Objects Manually





You can use the Free Draw palette to add objects to your floor drawing that are not related to RF obstacles (for example, a conference room table).



The tools for drawing non-RF objects work the same as the tools for drawing RF objects, but the tools are different. To draw a non-RF object, use the tools in the Free Draw group box. To draw RF objects, use the tools in the RF Obstacle group box. (See “Drawing RF Obstacles” on page 97.)

To draw an object

- 1 Display the floor plan in the Content panel.
- 2 In the Task List panel, click Tools.
- 3 In the Free Draw area under Layout, click one of the icons and draw the object as described in the following table.

Object	Action
 (circle)	Diagonally drag the cursor over the area where you want the circle to appear.
 (square)	Diagonally drag the cursor over the area where you want the square to appear.
 (parallelogram)	<ol style="list-style-type: none"> 1 Click at a vertex, and drag the cursor to the next vertex. 2 Click again, and drag the cursor until the parallelogram takes the shape you want. 3 Click to finish.
 (polygon)	<ol style="list-style-type: none"> 1 Click at a vertex, then move the cursor to the next vertex. 2 Repeat until the polygon takes the shape you want. For a polygon with n sides, click $n-1$ additional times at the vertices. For example, to draw a 7-sided polygon, click at 6 vertices. 3 At the last vertex before completing the shape, Right-click to complete the polygon.



(line)

- 1 Click at the start of the line.
- 2 Drag the cursor to the end of the line.
- 3 Click to finish.

(cursor, under
Select)

- 1 Click to exit free draw mode.

Specifying the RF Characteristics of a Floor

3WXM uses RF attenuation information in the floor plan when calculating how many MAPs you need and where to place them to provide the wireless coverage required for the floor. The RF attenuation information comes from the attenuation values associated with objects on the floor plan that have been converted into RF obstacles. An RF obstacle is an object that has an attenuation value associated with it.

You can add RF obstacles to a floor plan in the following ways:

- Select the objects that will be RF obstacles and assign attenuation values to them. This method is available for floor plans that are imported from CAD drawings. (See “Converting Objects into RF Obstacles” on page 95.)
- Use the graphics tools in 3WXM to draw the RF obstacles and assign attenuation values to them. This method is available for any floor plan. (See “Drawing RF Obstacles” on page 97.)
- Import RF measurements from a site survey. This method requires the Ekahau Site Survey™ tool to create the site survey. You can use this method alone or in combination with the methods above. (See “Importing RF Obstacle Data from a Site Survey” on page 98.)



You also can use site survey data to optimize a network plan after you install 3Com equipment. (See “Optimizing a Network Plan” on page 475.)

Recommendations

Consider the following when creating RF obstacles:

- Be aware if a CAD drawing contains overlapping objects. If you create RF obstacles on objects that are on top of each other, the attenuation is increased at that point. (3WXM sums the attenuation factors in dB.)
- Grouping objects is useful if you want one attenuation factor for an area on the floor.

Converting Objects into RF Obstacles

You have several options when creating RF obstacles:

- Convert all objects in a layer of a CAD drawing into RF obstacles.
- Convert all objects in an area of the drawing into RF obstacles.
- Convert multiple objects in the drawing into RF obstacles.
- Convert grouped objects in the drawing into RF obstacles.

To create RF obstacles for all objects in a layer

3WXM preserves the layers defined in a CAD drawing. You can convert all of the objects in the layer into a specific type of RF obstacle.

- 1 Click Layers in the Organizer panel to bring up a list of the layers in the drawing.
- 2 Right-click the list of layers in the Organizer panel.
- 3 Select Create RF Obstacles from the menu that is displayed. The Create RF Obstacle dialog box appears.
- 4 Go to “To use the Create RF Obstacle Dialog box” on page 96.

To create RF obstacles for an area in a drawing


- 1 Diagonally drag the cursor over the area where you want to create RF obstacles.
- 2 Right-click, and select Create RF Obstacle. The Create RF Obstacle dialog box appears.
- 3 Go to “To use the Create RF Obstacle Dialog box” on page 96.

To create RF obstacles for multiple selected objects in a drawing

- 1 Click an object on the floor.
- 2 Press **Shift** while clicking on additional objects.
- 3 Right-click, and select Create RF Obstacle. The Create RF Obstacle dialog box appears.
- 4 Go to “To use the Create RF Obstacle Dialog box” on page 96.

To create RF obstacles by grouping objects

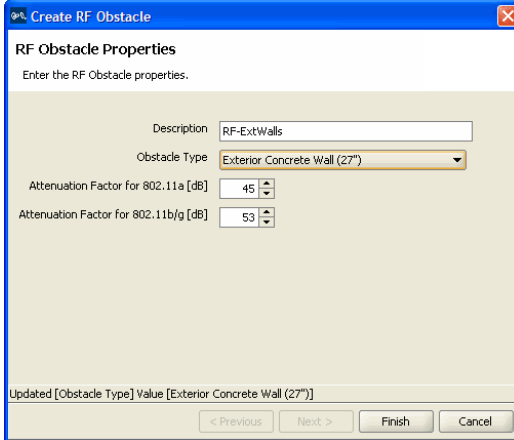
You can group several objects in a drawing to specify them as one RF obstacle. For example, if a wall consists of several lines, the lines can be grouped. If you subsequently ungroup the objects, the RF obstacle information is removed.

- 1 Select an object on the floor.
- 2 Press **Shift** while clicking additional objects.
- 3 Click the  (group objects) icon on the toolbar. The grouped objects now appear as one object group.
- 4 Right-click, and select **Create RF Obstacle**. The Create RF Obstacle dialog box appears. See “To use the Create RF Obstacle Dialog box”.

To use the Create RF Obstacle Dialog box

The Create RF Obstacle dialog box is shown in Figure 4.

Figure 4 Create RF Obstacle Dialog Box






- 1 In the Description box, type a description for the RF obstacle (1 to 60 characters, with no tabs).
- 2 In the Obstacle Type list, select the material of which the RF obstacle is made.




Select **Other** if the material is not listed. This allows you to create your own obstacle type.

- 3 In the Attenuation Factor boxes, specify the attenuation factor for 802.11a and 802.11b/g technology (0 to 100 dB). The default is the typical attenuation factor for the material chosen.
- 4 Click **Finish** to save the changes and close the dialog box.
 - If you created RF obstacles for all objects in a layer, all objects in the layer are converted into separate RF obstacles.
 - If you created RF obstacles for an area, all objects in the area are converted into separate RF obstacles.
 - If you created RF obstacles for multiple selected objects, all objects you selected are converted into separate RF obstacles.
 - If you created RF obstacles for grouped objects, each grouped object is converted into a single RF obstacle.

Drawing RF Obstacles

- 1 Display the floor plan in the Content panel.
- 2 In the Task List panel, click Tools.
- 3 In the RF Obstacle area under Layout, click one of the icons and draw the object as described in the following table.

Object	Action
 (circle)	Diagonally drag the cursor over the area where you want the circle to appear.
 (square)	Diagonally drag the cursor over the area where you want the square to appear. 3WXM treats squares as one solid object when calculating RF attenuation. To draw a square outline, draw four lines in a square shape, which are treated as four separate RF obstacles.
 (parallelogram)	<ol style="list-style-type: none"> 1 Click at a vertex, and drag the cursor to the next connected vertex. 2 Click again, and drag the cursor until the parallelogram takes the shape you want. 3 Click to finish.

 (polygon)	<ol style="list-style-type: none"> 1 Click at a vertex, then move the cursor to the next vertex. 2 Repeat until the polygon takes the shape you want. For a polygon with n sides, click $n-1$ additional times at the vertices. For example, to draw a 7-sided polygon, click at 6 vertices. 3 At the last vertex before completing the shape, Right-click to complete the polygon. 3WXM supports concave polygons. A concave polygon contains an internal angle greater than 180 degrees.
 (line)	<ol style="list-style-type: none"> 1 Click at the start of the line. 2 Drag the cursor to the end of the line. 3 Click to finish.
 (cursor)	<ol style="list-style-type: none"> 1 Click to exit RF obstacle mode.



Using an object other than a line to represent an RF obstacle's dimensions does not materially affect the calculation of RF attenuation. When 3WXM calculates attenuation along any vector passing through the obstacle, it counts the obstacle's RF attenuation only once, regardless of the floor space it occupies.

The Create RF Obstacle dialog box appears.

- 4 Go to "To use the Create RF Obstacle Dialog box" on page 96.

Importing RF Obstacle Data from a Site Survey

You can import RF measurements from a site survey file generated by the Ekahau Site Survey Tool. 3WXM uses the site survey data to assign attenuation values to objects in the floor plan.

This method of adding RF obstacle data requires the following tools:

- 3WXM 4.1
- Ekahau Site Survey™ Tool (www.ekahau.com) and a laptop PC on which to run the tool when you take measurements.
- An "AP on wheels", a portable AP that you can move to different locations on the floor as you take RF measurements with the site survey tool.

To use this method, perform the following tasks:

- 1 In 3WXM, identify the major RF obstacles and assign an attenuation value to them. You can select any attenuation value. 3WXM will use the RF measurement data from the site survey to correct the attenuation values. (See "Converting Objects into RF Obstacles" on page 95 and "Drawing RF Obstacles" on page 97.)



3WXM also can create new obstacles based on the RF measurement data. But adding major obstacles before you import the survey results helps 3WXM provide a more complete set of RF obstacles.

- 2 In 3WXM, indicate the positions where you will place the portable AP. These positions are line of sight (LOS) points. You can create the LOS points in 3WXM or import them from a comma separated values (CSV) file. In either case, you must assign a unique MAC address to each LOS. Even though each LOS will use the same portable AP, each position where you use the AP must have a unique MAC address. (See "Adding LOS Points" on page 100.)

You can place the LOS points at the places where you are thinking of installing the permanent MAPs, but this is not a requirement.

- 3 In 3WXM, generate a site survey order. The site survey order includes the locations and MAC addresses of the LOS points, and also provides a GIF image of the floor. (See "Generating a Site Survey Order" on page 106.)
- 4 In the site survey tool, import the GIF of the floor plan and use the map name specified in the site survey work order.
- 5 Place the portable AP at the first LOS position and assign it the MAC address specified in the work order. Start the site survey tool on the laptop PC and take the measurements. (See the Ekahau site survey documentation for specific instructions.)
- 6 In 3WXM, import the RF measurements from the site survey file. (See "Importing RF Measurements" on page 108.)
- 7 In 3WXM, build the attenuation library. This task updates the attenuation of RF obstacles that are already in the plan. In addition, this step adds any new obstacles detected during the survey. (See "Applying the RF Measurements to the Floor Plan" on page 110.)
- 8 In 3WXM, define wireless coverage areas. (See "Defining Wireless Coverage Areas" on page 110.)

Site Survey Recommendations

This manual does not describe how to use the site survey application. For this information, consult the Ekahau site survey documentation.

When conducting the survey, use the following best practices for optimal results:

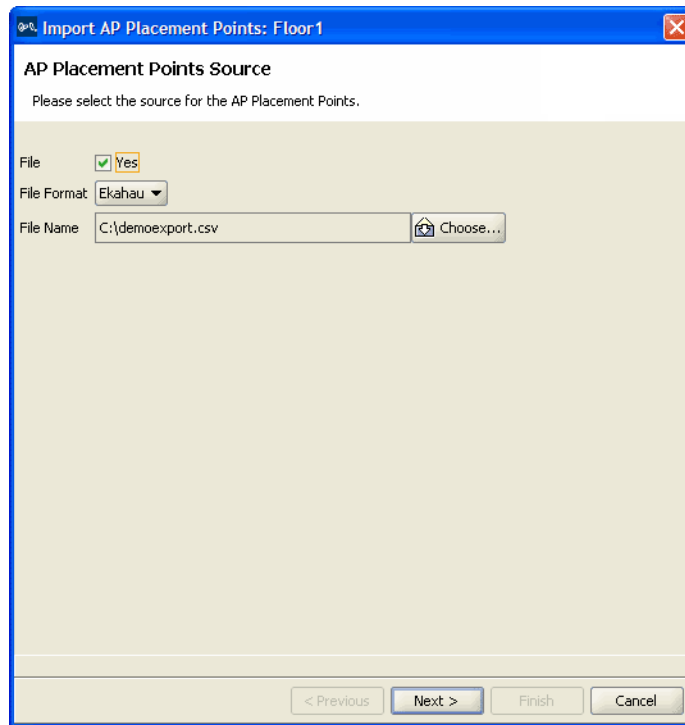
- Verify that the scale of the floor plan is correct before generating a work order. If you use a drawing of the floor that is from another source, make sure the scale of the drawing is correct.
- Use an AP with an omnidirectional antenna, instead of a directional antenna.
- Run the AP at full power in each location.
- Make sure you use a unique MAC address at each of the portable AP's locations. If you accidentally use the same MAC address for multiple locations, the RF measurement data will be inaccurate.
- While conducting the survey:
 - Walk slowly and evenly, and click at each turn.
 - Walk completely around the area you are surveying, completing a 360-degree scan of the area.
 - Avoid placing your body between the AP and the laptop PC. Your body adds attenuation.

Adding LOS Points

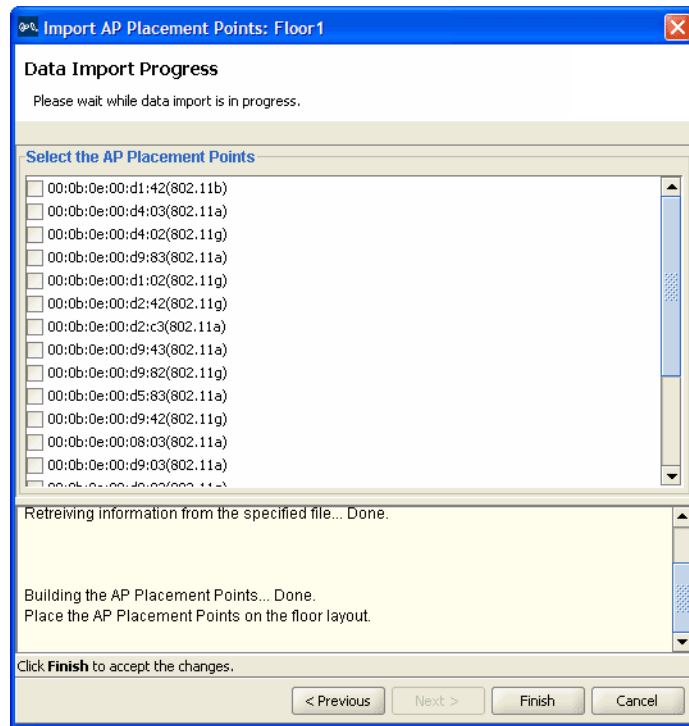
Line of sight (LOS) points are the locations for the portable AP. You must add the LOS points to the floor plan before you generate a site survey order. You can add LOS points by importing them from a file or by creating them in 3WXM.

To import LOS points from a file

- 1 Use the site survey tool or some other means to prepare a csv file containing the MAC addresses of each LOS point.
- 2 Display the floor plan in the Content panel.
- 3 In the Task List panel, click **RF Planning**.
- 4 Under Site Survey, click **Import Points**. The Import AP Placement Points dialog is displayed.



- 5 Click **Yes** next to File.
- 6 In the File Format listbox, select **Ekahau**.
- 7 Click **Choose** to navigate to the csv file that contains the LOS points.
- 8 Click **Next**. The MAC addresses of the LOS points appear.



- 9 Click next to the MAC address of each LOS point you want to import.

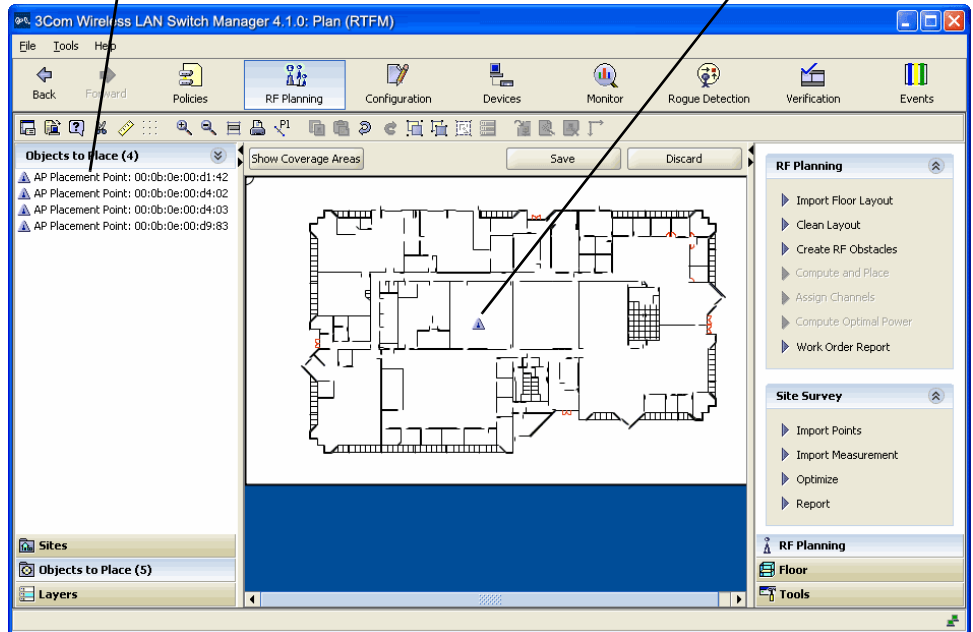


The MAC addresses are associated with specific radio types. Select the MAC addresses for the radio types you want to use in the network.

- 10 Click **Finish**.
- 11 Place the LOS points on the floor plan. Click Objects to Place in the Organizer panel to display the LOS points for each MAC address you selected. Click on an LOS point to select it, then move the cursor to the floor location and click again to place the LOS point.


LOS points in Organizer Panel

LOS point placed in floor location



When you place an LOS point onto the floor plan, the icon disappears from the Organizer Panel.

To create LOS points in 3WXM

- 1 Display the floor plan in the Content panel.
- 2 In the Task List panel, click Tools.
- 3 Under Site Survey, click the  icon.
- 4 On the floor plan, click on the location for the LOS. The Create AP Placement Point wizard appears.

Create AP Placement Point

AP Identifier

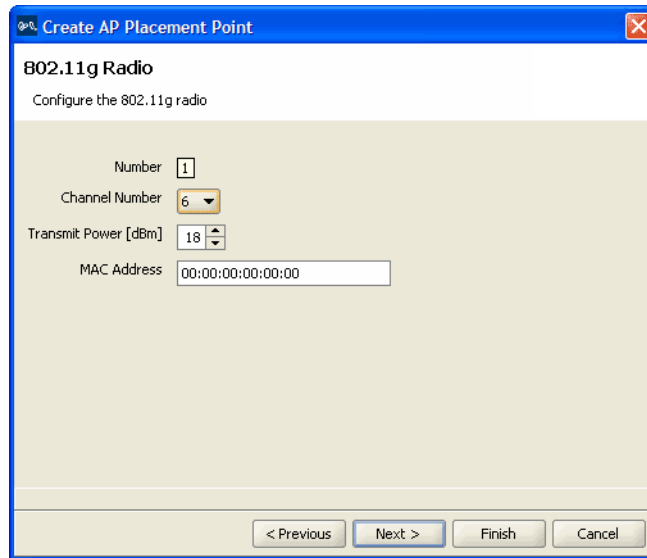
Enter a unique name for the AP

Name

Updated [Name] Value [LOS1]

< Previous Next > Finish Cancel

- 5 In the Name box, type a name for the LOS point and click **Next**.
- 6 In the AP Model listbox, select the type or model of AP you plan to use for the portable AP. If the model is not listed, select AP (Dual Radio) for a dual-radio AP or AP (Single Radio) for a single-radio AP.
- 7 In the Radio Type listbox, select the 802.11 radio type. The radio types that are available depend on the AP model or type you selected.
- 8 Click **Next**. The radio configuration page appears.



- 9 In the Channel Number listbox, specify the channel number on which the AP radio will be operating.
- 10 In the Transmit Power listbox, specify the transmit power of the AP's radio.
- 11 In the MAC Address box, type the MAC address you want to use for this position of the AP.



To ensure valid site survey results, you must use a unique MAC address for each LOS point.

- 12 If the AP model you selected has more than one radio, configure the other radio.
- 13 Click **Finish** to save the changes and close the wizard.
An LOS point icon appears on the floor plan where you clicked to open the Create AP Placement Point wizard.

To move an LOS point

To move an LOS icon, click-and-drag to select the icon and move it to its new location.

To temporarily remove an LOS point onto the Objects to Place tab

To temporarily remove an LOS point from the floor without deleting it, click and drag the LOS icon to the Objects To Place area of the Organizer panel.

To move the LOS back onto the floor:

- 1 Click on the LOS in the Objects To Place area of the Organizer panel.
- 2 Move the cursor to the floor location where you want to place the LOS.
- 3 Click to place the LOS.



You cannot delete an LOS point directly from the Objects To Place tab. To delete an LOS point, place the LOS point somewhere on the floor space, then delete it. (See "To delete an LOS point".)

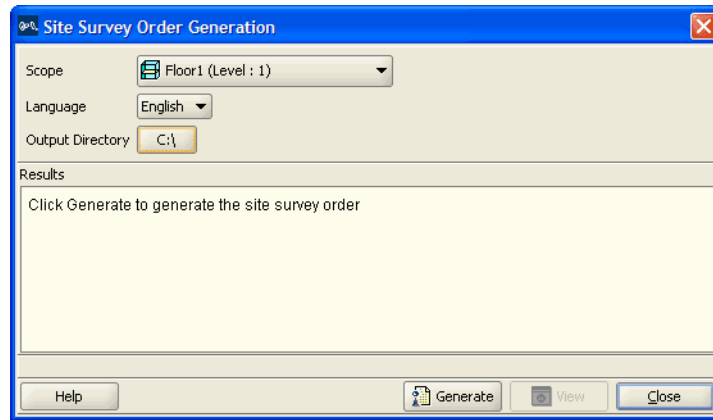
To delete an LOS point

To permanently remove an LOS icon from the floor:

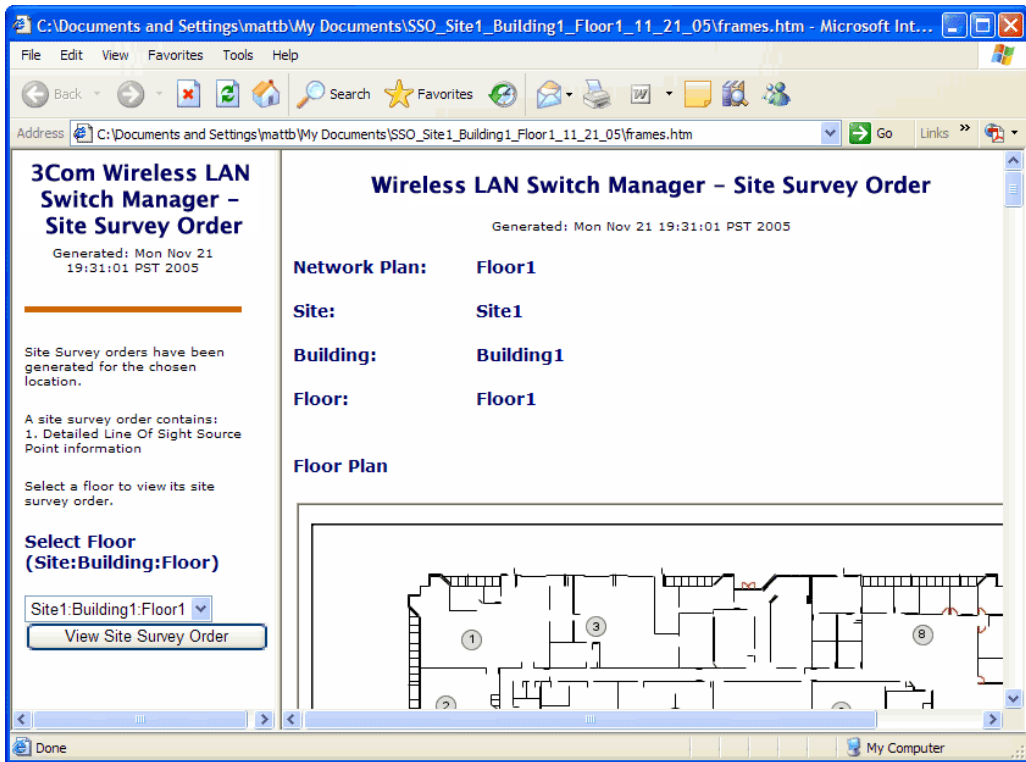
- 1 Right-click on the LOS icon.
- 2 Select **Delete**. The Delete Objects wizard appears.
- 3 Click **Finish** to confirm the deletion.

Generating a Site Survey Order

- 1 Display the floor plan in the Content panel.
- 2 In the Task List panel, click RF Planning.
- 3 Under Site Survey, click Report. The Site Survey Order Generation dialog is displayed.



- 4 Select the scope for which you want generate a site survey order. You can specify the Network Plan, an individual site, an individual building, or an individual floor.
- 5 Select the language for the site survey order:
 - English
 - German
- 6 To specify the output directory for the site survey order, click the button below Output Directory, and navigate to the directory where you want 3WXM to place the site survey order.
- 7 Click **Generate**.
3WXM generates the site survey order. When the order is complete, the **View** button becomes available.
- 8 To view the site survey order, click **View**. A browser window opens.



- 9 Select a floor to display LOS point information for that floor. Scroll down to view the MAC address assignments for the LOS points.

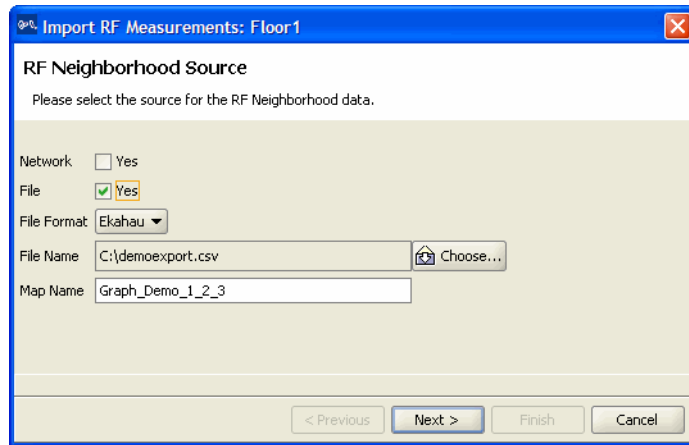
Use the instructions in the Ekahau Site Survey Initial Setup section of the work order to set up the survey.



When you import the floor map into the site survey tool, make sure you use the map name specified in the work order. The site survey data will not appear when you import RF measurements into 3WXM unless the map name is correct.

Importing RF Measurements

- 1 Display the floor plan in the Content panel.
- 2 In the Task List panel, click RF Planning.
- 3 Under Site Survey, click Import Measurement. The Import RF Measurements wizard is displayed.



- 4 Click **Yes** next to File.
- 5 In the format listbox, select **Ekahau**.
- 6 Click **Choose** to navigate to the csv file that contains the RF measurement data.
- 7 In the Map Name field, specify the map name.



The map name must match the name specified in the site survey work order, and must be the same map name used in the site survey tool.

- 8 Click **Next**.

The import progress is displayed. When the import is done, check the *Total valid RF measurements found* line in the progress messages.

- If the number is greater than 0, 3WXM successfully imported measurements.
- If the number is 0, no measurements were imported. Try the import again and verify that the map name is correct.

Applying the RF Measurements to the Floor Plan

- 1 Under Site Survey in the Task List panel, click **Optimize**.

A wizard appears, listing the progress of the request.

- The *Total number of RF measurements that did not intersect any object* line lists the number of measurements that did not experience attenuation due to an RF obstacle in the path between them.

If the measurements came from a site survey file, they are measurements between the portable AP (LOS point) and the PC running the site survey tool. If the measurements came from MAP radios in the network, they are measurements between MAP radios.

- The *Total number of objects that will be corrected* line indicates the number of measurements that did experience attenuation. For existing RF objects, 3WXM corrects the attenuation to match the results. If the floor plan does not have an RF obstacle where the attenuation library indicates one exists, 3WXM creates an RF obstacle.

For RF obstacles created by 3WXM, the description is **auto-generated** and the obstacle type is **Other**. You can edit these values by selecting the obstacle, clicking the Edit properties icon to open the Modify RF Obstacle wizard, and modifying the values. Click **OK** to close the wizard and save the changes. (See “To use the Create RF Obstacle Dialog box” on page 96. The wizard is the same whether it is labeled Create or Modify.)

- 2 Click **Finish**.

Defining Wireless Coverage Areas

You must define which areas of your enterprise require wireless network coverage. In 3WXM, you plan for both coverage and capacity requirements in a particular area on the floor. Capacity requirements are determined by the number of users in the area and the amount of wireless network bandwidth desired for every user.

The floor of a building can contain multiple coverage areas if several groups of users on the floor require different bandwidth. For example, an engineering department might have its own coverage area to accommodate a need for higher bandwidth, but the rest of the floor might be planned for general use with lower bandwidth requirements.

You must also identify the wireless technology required (802.11a or 802.11b/g) for coverage areas. For areas requiring multiple wireless technologies, two completely overlapping coverage areas are created—one for 802.11a and one for 802.11b/g.

You define coverage by creating the following items:

- Wiring closets (at least one is required if you plan to install directly connected MAPs). See “Creating a Wiring Closet” on page 111.
- Coverage areas (required). See “Defining a Coverage Area” on page 113.
- RF measurement points (optional). See “Showing RF Coverage” on page 150.
- Third-party access points (optional).


Creating a Wiring Closet

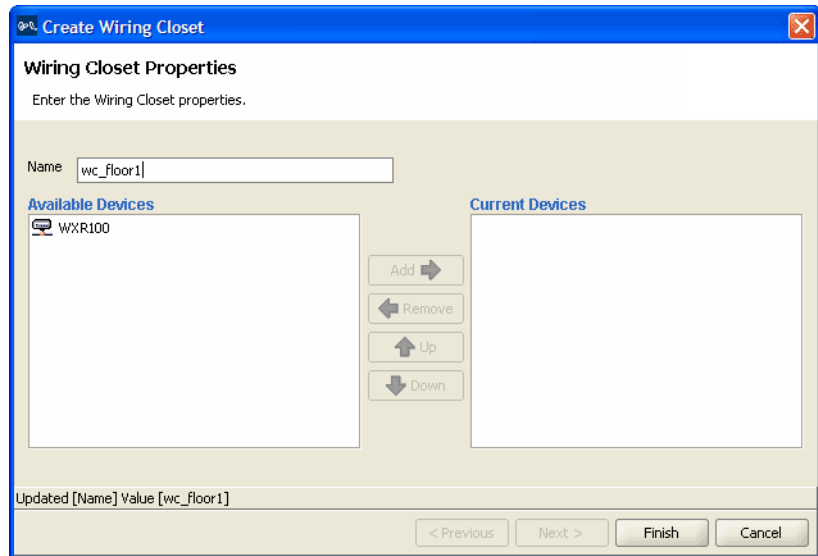
A wiring closet is a room that contains networking devices, such as switches. If you have an existing wiring closet, you can draw it on the floor layout.

If you have previously installed WX switches and defined them in 3WXM, you can place them in the wiring closet and specify them as switches to be used when 3WXM calculates how many MAP access points are required. If you do not have any WX switches placed in the wiring closet, 3WXM automatically creates and configures the switches that are needed.

Each floor plan must have at least one wiring closet, if the floor will use MAPs that are directly connected to their WX switches. However, a floor is not required to have a wiring closet if MAPs will be indirectly attached through the network. In this case, if you do not create a wiring closet, 3WXM assumes the switch that will manage the Distributed MAPs will be located in a wiring closet on another floor in the building.

To create a wiring closet

- 1 Display the floor plan in the Content panel.
- 2 In the Task List panel, click Tools.
- 3 In the Wiring Closer/Misc area under Coverage Area, click the  (Insert Wiring Closet) icon.
- 4 Click in the floor display where you want to place the wiring closet. The Create Wiring Closet wizard appears.



- 5 In the Name box, type the name of the wiring closet (1 to 60 characters, with no tabs).
- 6 If you have not defined a WX switch in 3WXM, click **Finish** to save the changes. Otherwise, go to step 7.

3WXM determines how many WX switches are needed when it computes how many MAP access points are required and automatically creates them.

- 7 To add a WX switch you previously created to the wiring closet, click the WX switch in the Available Devices box, then click the **Add** button to move it to the Current Devices box.

To remove a WX switch from the wiring closet, click the WX switch in the Current Devices box, then click the **Remove** button to move it to the Available Devices box.

If there are two or more WX switches in the wiring closet, you can change the order in which 3WXM checks switches for free ports. If there are no free ports on the switches listed, 3WXM creates and inserts a new switch in the wiring closet. Select a WX switch and click the Up or Down buttons to change the order of the switches.

- 8 Click **Finish** to save the changes.

Defining a Coverage Area Using the coverage area drawing tool, you can specify the coverage area graphically on your floor plan.

You perform the following tasks to define a coverage area:

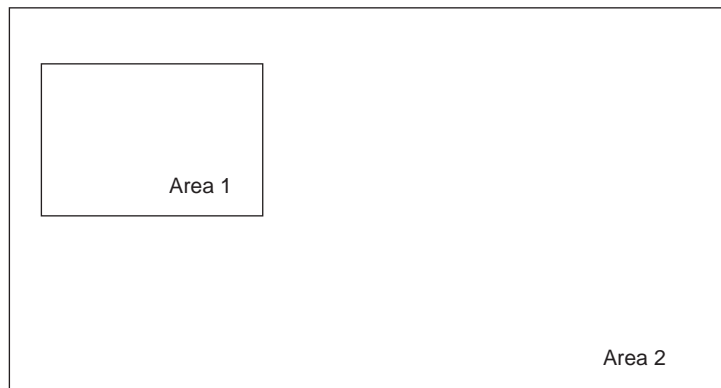
- 1 "Drawing a Coverage Area" on page 114
- 2 "Specifying the Wireless Technology for a Coverage Area" on page 116
- 3 "Specifying Coverage Area Properties" on page 117
- 4 "Specifying Floor Properties for the Coverage Area" on page 118
- 5 "Specifying Default Device Settings for the Coverage Area" on page 119
- 6 "Specifying Redundancy Computation for MAPs in the Coverage Area" on page 120
- 7 "Configuring Capacity Calculation for Data" on page 122
- 8 "Configuring Capacity Calculation for Voice" on page 123
- 9 "Specifying Mobility Domain, Radio Profile, and Wiring Closet Associations" on page 125

Shared Coverage Areas

3WXM supports the sharing of coverage areas if one area is completely within a larger area. For example, you might want to provide 802.11a and 802.11b coverage in a conference room that is part of a larger coverage area only providing 802.11a coverage. (Coverage areas that partially overlap are not supported.) MAP access points are shared only in the overlapped area.

Figure 5 shows an example of shared coverage areas.

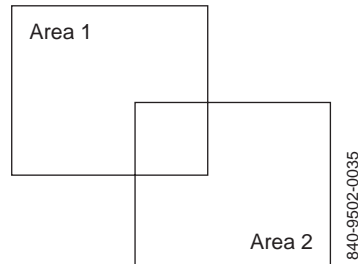
Figure 5 Supported Shared Coverage Areas Example



840-9502-0035

The coverage areas shown in Figure 6 cannot share coverage and are not supported by 3WXM. (However, separate, nonshared coverage areas can overlap.)

Figure 6 Unsupported Shared Coverage Area Example



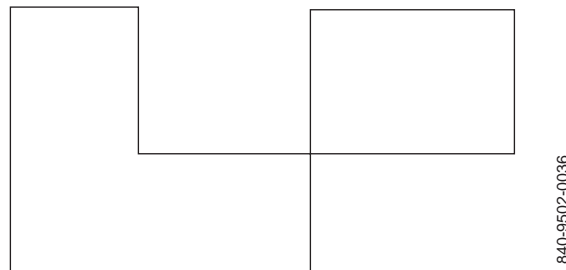
Keep the following in mind when planning shared coverage areas:

- Two coverage areas using the same wireless technology cannot be shared.
- A coverage area using 802.11b and a coverage area using 802.11g cannot be shared.
- MAP access points placed in shared areas must be configured as dual-radio models.

Drawing a Coverage Area

3WXM supports concave polygons, which have an internal angle greater than 180 degrees. When drawing a polygon, make sure that two sides of the polygon do not intersect each other, as shown in Figure 7. Also make sure start and end points and the vertices are not too close.







Figure 7 Unsupported Polygon Shape



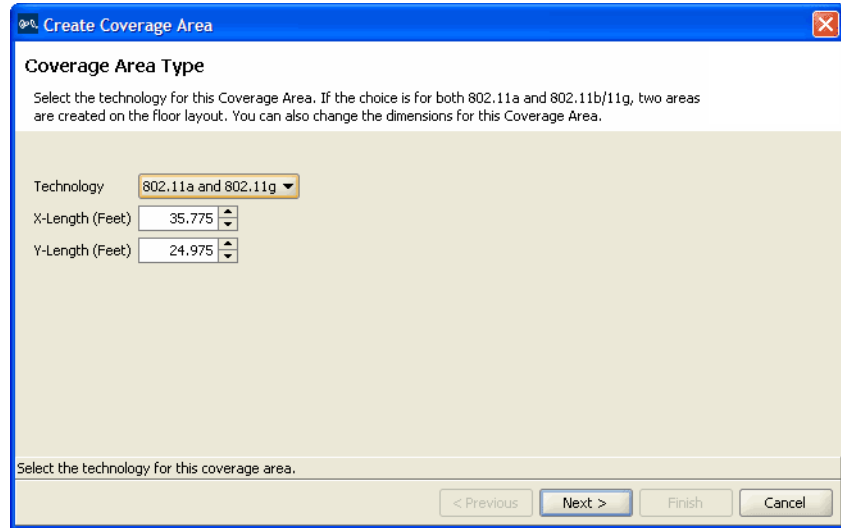
If you are using a complex concave polygon as a coverage area, computation of MAP access points might take longer than the computation for an area with a less complicated shape.

When drawing a coverage area, make sure it extends just short of external walls. If the coverage area includes external walls, 3WXM accounts for the external walls when computing how many MAP access points are required for the coverage area. This might lead to an inaccurate MAP count.

- 1 Display the floor plan in the Content panel.
- 2 In the Task List panel, click Tools.
- 3 In the Create area under Coverage Area, click one of the icons and draw the object as described in the following table.

Object	Action
 (circle)	Diagonally drag the cursor over the area where you want the circle to appear.
 (square)	Diagonally drag the cursor over the area where you want the square to appear.
 (parallelogram)	<ol style="list-style-type: none"> 1 Click at a vertex, and drag the cursor to the next vertex. 2 Click again, and drag the cursor until the parallelogram takes the shape you want. 3 Click to finish.
 (polygon)	<ol style="list-style-type: none"> 1 Click at a vertex, then move the cursor to the next vertex. 2 Repeat until the polygon takes the shape you want. For a polygon with n sides, click $n-1$ additional times at the vertices. For example, to draw a 7-sided polygon, click at 6 vertices. 3 At the last vertex before completing the shape, Right-click to complete the polygon.
 (line)	<ol style="list-style-type: none"> 1 Click at the start of the line. 2 Drag the cursor to the end of the line. 3 Click to finish.
 (cursor)	<ol style="list-style-type: none"> 1 Click to exit Insert Area mode.

The Create Coverage Area wizard appears.



Go to “Specifying the Wireless Technology for a Coverage Area”.

Specifying the Wireless Technology for a Coverage Area

(To draw a coverage area, see “Drawing a Coverage Area” on page 114.)

To specify wireless technology for a coverage area:

- 1 In the Technology list, select one of the following:
 - **802.11a**
 - **802.11b**
 - **802.11g**
 - **802.11a and 802.11b**
 - **802.11a and 802.11g**

Select **802.11a and 802.11b** if the area requires 802.11a and 802.11b coverage. Select **802.11a and 802.11g** if the area requires 802.11a and 802.11g coverage.

When you specify a coverage area requiring different technologies, 3WXM creates two areas that completely overlap each other: one area for 802.11a and another for 802.11b/g. An area requiring 802.11a and 802.11b uses a dual-radio MAP model for calculation even if you specify a single-radio MAP.

- 2 To refine the dimensions of the coverage area, specify the appropriate dimension in the X-Length and Y-Length boxes.
- 3 Click **Next**.

The wizard presents properties and association pages for the technology you chose in step 1. The following example shows the wizard for 802.11a and 802.11g technologies.

Specifying Coverage Area Properties

To specify coverage area properties:

- 1 In the Name box for each technology, type a name for the coverage area (1 to 60 characters long, with no tabs).
- 2 In the Rate [Mb/s] list for each technology, select the average desired association rate for typical clients in this coverage area.
- 3 For 802.11g, to prevent the association of 802.11b clients to any radio in this coverage area, select **Exclude 802.11b clients**. To allow 802.11b clients to associate to radios in the coverage area, clear **Exclude 802.11b clients**.



Even when association of 802.11b clients is disabled, if an 802.11b/g radio detects a beacon from an 802.11b network, the radio enters protection mode to protect against interference.

- 4 Click **Next**. The Floor Properties page appears.

Create Coverage Area

Optional: Floor Properties

Enter the Floor properties for the Coverage Area(s).

Height of the Ceiling [Feet]

AP Placement Height [Feet]

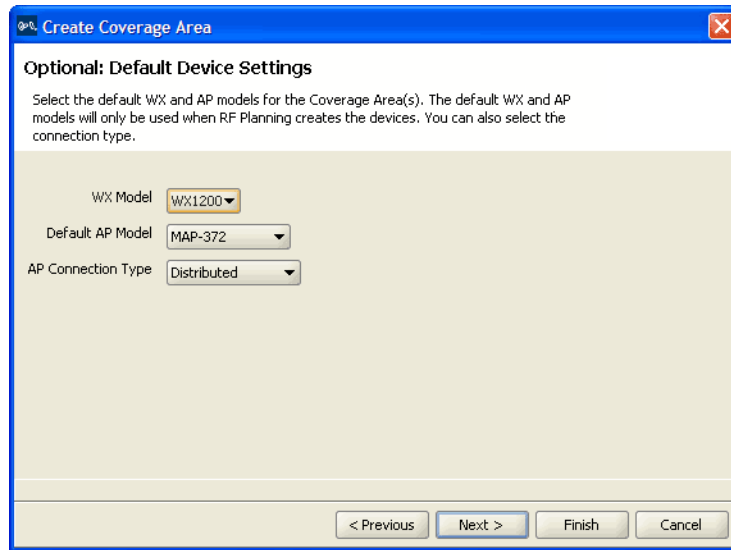
Enter the height at which the AP will be placed. This needs to be entered only if it is different from the ceiling height.

< Previous Next > Finish Cancel

Specifying Floor Properties for the Coverage Area

You can optionally specify floor properties for the coverage area (if they are different from the defaults for the floor):

- 1 To change the ceiling height, specify the new height in the Height of the Ceiling box.
- 2 To change the height where MAPs are mounted, specify the new mounting height in the MAP Placement Height box.
- 3 Click **Next**. The Default Device Settings page appears.



Specifying Default Device Settings for the Coverage Area

You can optionally specify the WX switch or MAP models that 3WXM uses when calculating the devices to include in the coverage area.

- 1 To change the WX switch model, select the model from the WX Model list.
- 2 To change the default MAP model, select the model from the Default AP Model list.



If this is a shared area (more than one radio technology), only dual-radio models are listed. If the area is not shared, all models are listed.

- 3 To change the MAP connection type, select the type from the AP Connection Type list:
 - Direct—MAPs are directly attached to dedicated WX switch ports.
 - Distributed—MAPs can be indirectly attached through intermediate Layer 2 or Layer 3 devices.
 - Distributed (Auto)—MAPs can be indirectly attached through intermediate Layer 2 or Layer 3 devices. They receive their configuration automatically using a profile that assigns a Distributed MAP number and name to the MAP from among the unused valid MAP numbers available on the switch. The profile also configures the MAP with the MAP and radio parameter settings in the profile. See “Viewing and Changing the Auto-DAP Profile” on page 269 for information on creating a profile.

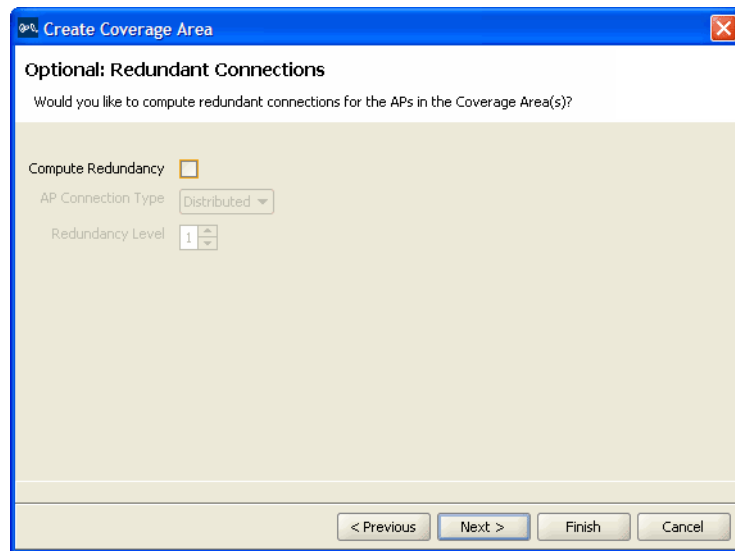


If the MAPs are directly connected to the WX, ensure that UTP Cat 5 cabling distances between the MAP and the WX in the wiring closet do not exceed 100 meters (330 feet).



An indirectly attached MAP requires Power over Ethernet (PoE) from a source other than a WX switch, such as a power injector.

- 4 Click **Next**. If you selected Direct or Distributed in the AP Connection Type list, the Redundant Connections page appears. Go to “Specifying Redundancy Computation for MAPs in the Coverage Area” on page 120. If you selected Distributed (Auto) in the AP Connection Type list, the Capacity Planning for Data page appears. Go to “Configuring Capacity Calculation for Data” on page 122.



Specifying Redundancy Computation for MAPs in the Coverage Area

You can optionally configure 3WXM to compute redundant connections for the APs in the coverage area.

- 1 To plan for redundant MAP connections to WX switches, select **Compute Redundancy**.



Only AP models that have two Ethernet ports can support redundant direct connections. However, models with one Ethernet port can support redundant distributed connections.

- To change the MAP connection type for the redundant connection, select **Direct** or **Distributed** from the MAP Connection Type list.



WX4400 switches support indirect MAP connections only.

- To change the number of redundant connections for the distributed connection type, type the number in the Redundancy Level box.

For direct connections, the redundancy level is always 1.

- Click **Next**. The Capacity Planning for Data page appears.

Create Coverage Area

Optional: Capacity Planning for Data
Select if you would like to use Capacity planning for data. If this is not selected, RF Planning will only be based on Coverage criteria.

CoverA

Use Capacity Calculation for Data

Per Station Throughput [Kb/s] 1,000

Expected Station Count 50

Station Oversubscription Ratio 5 : 1
Select the oversubscription ratio that best describes the average transmit behavior of the stations in your network

CoverG

Use Capacity Calculation for Data

Per Station Throughput [Kb/s] 1,000

Expected Station Count 50

Station Oversubscription Ratio 5 : 1
Select the oversubscription ratio that best describes the average transmit behavior of the stations in your network

Updated [Use Capacity Calculation for Data] Value [Yes]

< Previous Next > Finish Cancel

Configuring Capacity Calculation for Data

3WXM can perform multiple calculations for MAP placement. One is based on coverage only. Another is based on capacity for data traffic, using the data capacity parameters. 3WXM compares the results of the calculations and selects the calculation that results in more MAPs.

- 1 To calculate MAP placement and configuration based on both coverage and on capacity, enable **Use Capacity Calculation for Data**. Otherwise, click **Next**.

By default, 3WXM performs only the coverage calculation. If you enable the **Use Capacity Calculation for Data** option, 3WXM performs both calculations.

- 2 In the Per Station Throughput list, specify the throughput (combined transmit and receive) in kilobits per second (Kbps) for a station.

The throughput value cannot exceed the value you selected for the baseline association rate.



3Com recommends that per-station throughput values do not exceed 1 Mbps for 802.11b technology and 5 Mbps for 802.11a/g technology.

- 3 In the Expected Station Count list, specify the number of clients you expect to be in the coverage area.
- 4 In the Station Oversubscription Ratio list, select the ratio for the average transmit behavior of the stations.

The station oversubscription ratio is the ratio of active clients compared to total clients. For example, the ratio 5:1 indicates that, statistically, 20 percent of the clients are active at any given time.

- 5 Click **Next**. The Capacity Planning for Voice page appears.

Create Coverage Area

Optional: Capacity Planning for Voice
Select if you would like to use Capacity planning for voice.

CoverA

Plan for Voice over IP

Active Call Bandwidth [Kb/s]

Active Handsets per AP

Expected Handset Count

Handset Oversubscription Ratio

Select the oversubscription ratio that best describes the average transmit behavior of the handsets in your network

CoverG

Plan for Voice over IP

Active Call Bandwidth [Kb/s]

Active Handsets per AP

Expected Handset Count

Handset Oversubscription Ratio

Select the oversubscription ratio that best describes the average transmit behavior of the handsets in your network

Updated [Plan for Voice over IP] Value [Yes]

< Previous Next > Finish Cancel

Configuring Capacity Calculation for Voice

3WXM can perform multiple calculations for MAP placement. One is based on coverage only. Another is based on capacity for voice over IP service, using the capacity for voice parameters. 3WXM compares the results of the calculations and selects the calculation that results in more MAPs.

- 1 To calculate MAP placement and configuration based on both coverage and on capacity for voice over IP, enable **Use Capacity Calculation for Voice**. Otherwise, click **Next**.

By default, 3WXM performs only the coverage calculation. If you enable the **Use Capacity Calculation for Voice** option, 3WXM performs both calculations.

- 2 In the Active Call Bandwidth list, specify the amount of bandwidth in kilobits per second (Kbps) that you expect for each call.

- 3 In the Active Handsets per AP list, specify the number of voice over IP phones that you want each MAP to handle.
- 4 In the Expected Handset Count list, specify the number of voice over IP phones you expect to be in the coverage area.
- 5 In the Handset Oversubscription Ratio list, select the ratio for the average transmit behavior of the voice over IP phones.

The handset oversubscription ratio is the ratio of active handsets compared to total handsets. For example, the ratio 4:1 indicates that, statistically, 25 percent of the voice over IP phones are active at any given time.

- 6 Click **Next**. The Mobility Domain, Radio Profile, Wiring Closet(s) page appears.

Create Coverage Area

Optional: Mobility Domain, Radio Profile, Wiring Closet(s)
Select the Mobility Domain, Radio Profile, Wiring Closet(s) for the Coverage Area(s).

Mobility Domain
Mobility Domain:
Select the mobility domain that will contain the APs in the coverage area.

Radio Profile
Radio Profile:
Select or Enter the Radio Profile Name. This Radio Profile will be used to configure the radios in the coverage area. If this Radio Profile does not exist on the WX, it will be created.

Wiring Closet(s)
Wiring Closet:
Select the wiring closet that will support the wired connection to the APs
Redundant Wiring Closet:
Select the wiring closet that will support the redundant wired connection to the APs

Click **Finish** to exit the wizard.

< Previous Next > Finish Cancel

Specifying Mobility Domain, Radio Profile, and Wiring Closet Associations

To specify association information for the coverage area:

- 1 In the Mobility Domain list, select the Mobility Domain that contains the MAPs used for this coverage area.
- 2 In the Radio Profile list, select the radio profile used for this coverage area.

The profiles available depend on the Mobility Domain you selected in step 1. For a policy to appear in this list, you must have already configured a policy and selected the Wireless Service Profiles and Radio Profiles checkbox in the Policy Areas dialog.

The policy you select applies to all radios associated with the coverage area. If you type the name of a radio profile that does not already exist, 3WXM creates it.

- 3 In the Wiring Closet list, select the wiring closet that contains the WX switch or switches to be connected to the shared MAP access points.
If the MAPs will be directly connected to WX switches, a wiring closet is required. If all the MAPs in the coverage area will be indirectly connected to WX switches through the network, a wiring closet is not required.
- 4 In the Redundant Wiring Closet list, select the wiring closet that will provide redundant connection to the MAP access points. This is required for directly connected MAPs, if you require the MAPs to have redundant connections. Otherwise, this is not required.



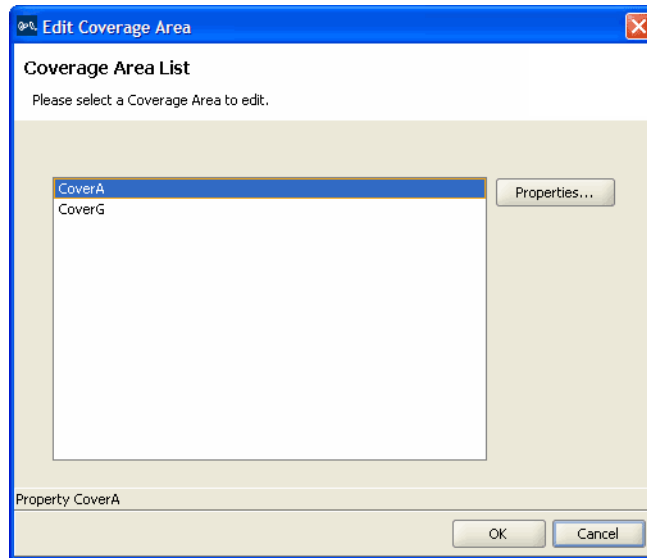
Only AP models that have two Ethernet ports can support redundant direct connections. However, models with one Ethernet port can support redundant distributed connections.

- 5 Click **Finish** to complete the wizard and create the coverage area.

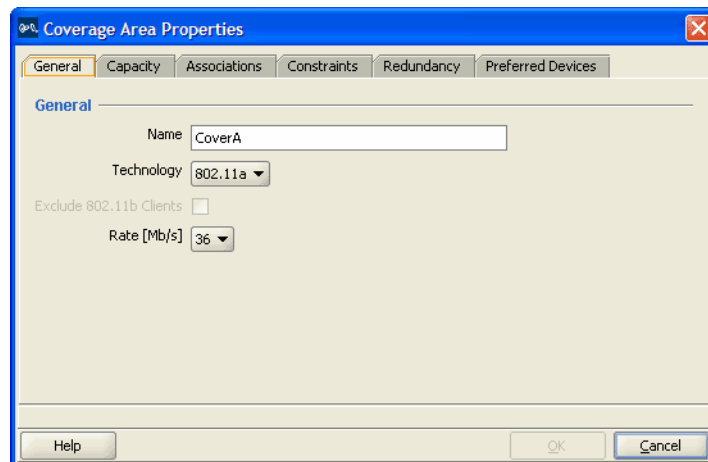
Editing Coverage Areas

To edit existing coverage areas:

- 1 Display the floor plan in the Content panel.
- 2 In the Task List panel, click Floor.
- 3 Under Edit Floor, click Coverage Areas. The Coverage Areas List dialog is displayed.



- 4 Select the coverage area you want to edit and click **Properties**. The Coverage Area Properties dialog for the selected coverage area appears. (You can also display this dialog by displaying the floor plan, selecting Coverage Areas in the Organizer panel, then right-clicking on the coverage area and selecting Edit Properties from the menu.)



5 Under the General tab, you can do the following:

- In the Name box, edit the name of the coverage area (1 to 60 characters long, with no tabs).
- In the Technology list, select one of the following:
 - **802.11a**
 - **802.11b**
 - **802.11g**
 - **802.11a and 802.11b**
 - **802.11a and 802.11g**

Select **802.11a and 802.11b** if the area requires 802.11a and 802.11b coverage. Select **802.11a and 802.11g** if the area requires 802.11a and 802.11g coverage.
- For 802.11g, to prevent the association of 802.11b clients to any radio in this coverage area, select **Exclude 802.11b clients**. To allow 802.11b clients to associate to radios in the coverage area, clear **Exclude 802.11b clients**.
- In the Rate [Mb/s] list, select the average desired association rate for typical clients in this coverage area.

6 Under the Capacity tab, you can do the following:

- To calculate MAP placement and configuration based on coverage and on capacity for data, enable **Use Capacity Calculation for Data**.
- In the Per Station Throughput list, specify the throughput (combined transmit and receive) in kilobits per second (Kbps) for a station.
- In the Expected Station Count list, specify the number of clients you expect to be in the coverage area.
- In the Station Oversubscription Ratio list, select the ratio for the average transmit behavior of the stations.

The station oversubscription ratio is the ratio of active clients compared to total clients. For example, the ratio 5:1 indicates that, statistically, 20 percent of the clients are active at any given time.
- To calculate MAP placement and configuration based on coverage and on capacity for voice over IP, enable **Use Capacity Calculation for Voice**.
- In the Active Call Bandwidth list, specify the amount of bandwidth in kilobits per second (Kbps) that you expect for each call.

- In the Active Handsets per AP list, specify the number of voice over IP phones that you want each MAP to handle.
- In the Expected Handset Count list, specify the number of voice over IP phones you expect to be in the coverage area.
- In the Handset Oversubscription Ratio list, select the ratio for the average transmit behavior of the voice over IP phones.

The handset oversubscription ratio is the ratio of active handsets compared to total handsets. For example, the ratio 4:1 indicates that, statistically, 25 percent of the voice over IP phones are active at any given time.

7 Under the Associations tab, you can do the following:

- In the Mobility Domain list, select the Mobility Domain that contains the MAPs used for this coverage area.
- In the Radio Profile list, select the radio profile to be used for this coverage area.

All radio profile policies configured in the network plan are listed. In addition, a *default* policy is listed. If you select *default*, the default radio profile settings are applied to the coverage area. (For information about policies, see “Configuring and Applying Policies” on page 373.)

- In the Shared Area list, select a coverage area that will share MAP access points with the one you are configuring.
- If you selected two radio technologies when defining the coverage area, a shared area is automatically created.
- In the Wiring Closet list, select the wiring closet that contains the WX switch or switches to be connected to the shared MAPs.
- In the Redundant Wiring Closet list, select the wiring closet that will provide redundant connection to the MAPs. This is required for directly connected MAPs, if you require the MAPs to have redundant connections. Otherwise, this is not required.
- In the Available Access Points box, select an available MAP, if one is configured, to use in the coverage area, then click **Add** to move the MAP to the Current Access Points box.

This assumes that the network plan already has a MAP and that the MAP is physically located within the area you are configuring. If you are planning a new installation, you do not need to specify a MAP to use.

8 Under the Constraints tab, you can do the following:

- To change the ceiling height, specify the new height in the Height of the Ceiling box.
- To change the height where MAPs are mounted, specify the new mounting height in the AP Placement Height box.
- To change the WX switch model, select the model from the WX Model list.
- To change the default MAP model, select the model from the Default AP Model list.
- To change the MAP connection type, select the type from the AP Connection Type list:
 - Direct—MAPs are directly attached to dedicated WX switch ports.
 - Distributed—MAPs can be indirectly attached through intermediate Layer 2 or Layer 3 devices.
 - Distributed (Auto)—MAPs can be indirectly attached through intermediate Layer 2 or Layer 3 devices. They receive their configuration automatically using a profile that assigns a Distributed MAP number and name to the MAP from among the unused valid MAP numbers available on the switch. The profile also configures the MAP with the MAP and radio parameter settings in the profile.
- To allow locked MAP access points to be deleted when the Compute and Place function determines that they are no longer required, select **Allow Deletion of Locked MAPs**.
 A locked MAP is a MAP that is already associated with the coverage area. For example, if you computed and placed MAPs in this coverage area on a previous occasion and you are now optimizing the plan, the MAPs are still associated with the coverage area.
- To change the amount of power to reserve when calculating optimal power, type or select the number of dBm in the Reserved Tx Power Margin listbox. This is the number of dBm below the maximum power setting that you want 3WXM to reserve in case the power needs to be increased later.

9 Under the Redundancy tab, you can do the following:

- To plan for redundant MAP connections to WX switches, select **Compute Redundancy**.

- To use the same WX switch for redundant connections, select **Use the Same WX for Redundancy**.
 This option places both of a MAP's wired connections on the same WX switch. For optimal resiliency, 3Com recommends the use of different WX switches for redundancy.
 - To change the MAP connection type for the redundant connection, select **Direct** or **Distributed** from the AP Connection Type list.
 - To change the number of redundant connections for the distributed connection type, type the number in the Redundancy Level box.
 For direct connections, the redundancy level is always 1.
- 10** Under the Preferred Devices tab, you can do the following:
- In the Available Devices box, select an available WX switch, if one is configured, to use in the coverage area, then click **Add** to move the WX switch to the Current Devices box.
 This assumes that the network plan already has a WX switch defined. If you are planning a new installation, you do not need to specify a WX switch to use.
- 11** When you have finished editing the properties of the coverage area, click **OK** to exit the Coverage Area Properties dialog and **OK** again to exit the Coverage Area Selection dialog.

Placing Third-Party Access Points

If you have third-party access points in your network, you can place icons for them on your floor layout. You also can configure their radio attributes using 3WXM. The radio attributes are taken into consideration when 3WXM assigns channels to MAP access points.

- If you add third-party access points while using the Configuration or Rogue Detection tool bar options, the access points are listed in RF Planning on the Objects to Place tab, from which you can move them to their locations on the floor plans. (See "Moving a Third-Party AP Icon to its Floor Location".)
- You also can add third-party access points in RF Planning. (See "Creating and Placing an Icon for a Third-Party Access Point".)

Moving a Third-Party AP Icon to its Floor Location

If you added a third-party access point while using the Configuration or Rogue Detection tool bar options, the access point is on the Objects to Place tab.


- 1 In RF Planning, navigate to the floor plan.
- 2 In the Organizer panel, click **Objects to Place**.
- 3 Select the icon or description of the AP.
- 4 On the floor plan, click on the location where you want to place the AP.



You must click in a coverage area.

3WXM removes the AP from the Objects to Place list and places an icon for it on the floor plan.

Creating and Placing an Icon for a Third-Party Access Point

- 1 In RF Planning, navigate to the floor plan.
- 2 In the Task List panel, click **Tools**.
- 3 In the Coverage Area task group, under Wiring Closet/Misc, click the  (Insert Third-Party AP) icon
- 4 On the floor plan, click where you want the third-party access point to be placed. The Create Third-Party AP wizard appears.

Create Third Party AP

AP Identifier

Enter a unique name for the AP

Name

Manufacturer ID

Product ID

Enter the serial number of the AP

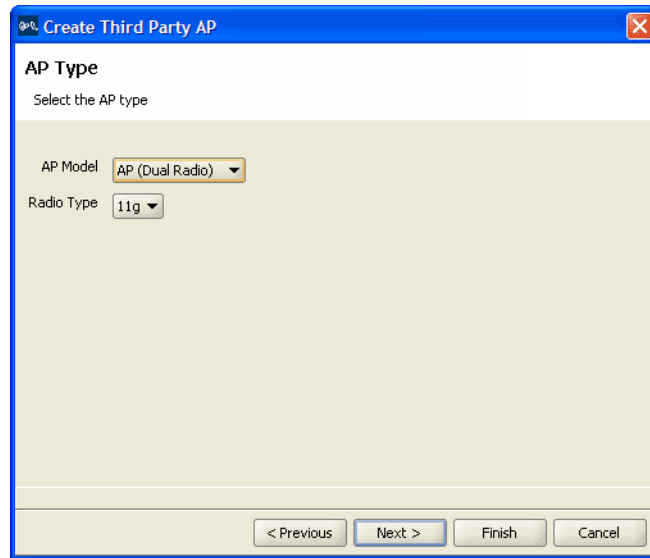
IP Address

Telnet Port Number

HTTP Port Number


< Previous Next > Finish Cancel

- 5 In the Name box, type a name for the access point. You can use 1 to 32 characters, with no punctuation except the following: period (.), hyphen (-), or underscore (_).
- 6 Optionally, in the Manufacturer ID box, type the manufacturer identification for the access point (1 to 30 characters, with no spaces).
- 7 In the Product ID box, type the product identification for the access point (1 to 30 characters, with no spaces).
- 8 In the IP Address box, type the IP address for the access point.
If you specify an IP address, you can use Telnet and a Web browser with this access point.
- 9 In the Telnet Port Number box, specify the port number for Telnet service.
- 10 In the HTTP Port Number box, specify the port number for HTTP service.
- 11 Click **Next**. The following dialog appears:



- 12 In the AP Model drop-down list, select one of the following:
 - **AP (Dual Radio)**—802.11a and 802.11b or 802.11b/g
 - **AP (Single Radio)**—802.11a, 802.11b, or 802.11g
- 13 In the Radio Type drop-down list, select one of the following: **11a**, **11b**, **11g**.

The choices available depend on the selection you made in step 12.
- 14 Click **Next**. The following dialog appears:

- 15 Verify the radio slot number and radio type.
For a dual-radio access point, 802.11b/g radios have a slot number of 1. 802.11a radios have a slot number of 2.
 - 16 In the Channel Number list, select the channel number for the radio.
 - 17 In the Transmit Power box, specify the transmit power for the radio.
 - 18 To enable the radio, select **Enabled**.
-  *The access point's radio must be enabled in order to be considered in channel allocation.*
- 19 In the SSID box, type the service set identifier (SSID) for the radio.
 - 20 In the MAC Address box, type the MAC address of the radio.
 - 21 In the Antenna Gain list, select the antenna gain for the radio.
 - 22 If the access point has only one radio, click **Finish**. Otherwise, go to the next step.
 - 23 Click **Next**. The Radio A page appears.
 - 24 Repeat step 15 through step 21 for the 802.11a radio.
 - 25 Click **Finish** to save the changes.

Placing Installed and Auto-Configured MAPs

You can place MAPs that are already installed on the floor into the network plan. To do this, you upload the MAP configuration into 3WXM, associate the MAP with a coverage area, then place them on the floor plan.

In addition, MAPs that receive their configuration using a profile are automatically added to the network plan. They appear under Objects to Place in the Organizer panel. From the Objects to Place panel, you can place these MAPs onto the floor plan.

To place installed MAPs on the floor plan:

- 1 Select the Verification option in the main 3WXM tool bar, click the Network Verification tab, and upload the MAP configuration into 3WXM. (See "Verifying Configuration Changes" on page 363.)
- 2 Select the RF Planning option in the main 3WXM tool bar and display the floor plan in the Content panel.
- 3 In the Coverage Areas section, right-click on the coverage area for which the MAP is providing coverage, and select **Edit Properties**. The Coverage Area Properties dialog appears.
- 4 Click the **Associations** tab.
- 5 Select the MAP in the Available Access Points group box and click the **Add** button to move the MAP to the Current Access Points group box.
- 6 Click **OK** to save the changes and close the dialog box.
- 7 Click on Objects to Place in the Organizer panel.
- 8 Click on the MAP icon, then click on the location where you installed the MAP. The MAP icon moves from the Objects To Place panel to its location on the floor.

Computing MAP Placement

After you provide information about floor plans, RF obstacles, and wireless coverage requirements, 3WXM can design your 3Com wireless network for this floor using the following process:

- Compute and place MAPs (See “Computing and Placing MAP Access Points for a Coverage Area” on page 136.)
- Assign channels to MAPs (See “Assigning MAP Channels” on page 144.)
- Compute optimal power (See “Computing Optimal Power” on page 147.)

3WXM determines the number of MAPs that need to be installed in the area and the number of WX switches needed in the wiring closet (if the floor has them), and then places them on the floor plan. You can move the MAPs on the floor plan to more convenient locations to simplify installation. 3WXM also determines the WX to which a MAP should connect.

3WXM assigns transmit power levels and channels for each MAP. The power levels and association rates are set to optimize cell sizes for the coverage area. 3WXM shows the expected (simulated) coverage of the completed design, and allows you to see how the coverage changes when you make adjustments to MAP location or power levels.

Computing and Placing MAP Access Points for a Coverage Area

When you perform Compute and Place for one or more coverage areas, 3WXM automatically calculates the number of MAPs you require, based on coverage area information, and also places them in appropriate locations on the floor.

3WXM assumes that MAPs are mounted on the ceiling and takes the ceiling height into account when placing MAPs. 3WXM assumes that coverage is required down to 3 feet above the floor (the average height of a user’s desk). By default, 3WXM assumes that you want to directly connect the MAP access points to WX1200 switches and that you do not want redundant MAP connections for backup. You can change these design constraints.

By default, especially when you are performing Compute and Place for a coverage area for the first time, the results do not account for existing MAP access points. Manual overrides of the MAP results are not taken into account if you perform Compute and Place again.

If you are modifying an existing coverage area with deployed MAPs or if you need to preserve manual changes made to the current configuration, you can lock the MAPs. Locked MAPs cannot be moved or deleted during the Compute and Place process.

You perform the following tasks to compute and place MAPs:

- 1 Specify design constraints. (See “To specify design constraints”.)
- 2 Compute and place MAPs. (See “To compute and place MAPs” on page 140.)
- 3 Review coverage area computation progress. (See “To review coverage area computation” on page 141.)

To specify design constraints

- 1 Display the floor plan in the Content panel.
- 2 In the Task List panel, click Floor.
- 3 Under Edit Floor, click Constraints. The Manage Constraints dialog is displayed.

Manage Constraints for: Floor1

Manage Constraints
Edit the constraints.

General

Height of the Ceiling [Feet] 10

AP Placement Height [Feet] 10

WX Model WX-20

AP Connection Type Distributed

Reserved Tx Power Margin [dBm] 0

Allow Deletion of Locked APs

Redundancy

Compute Redundancy

AP Connection Type Distributed

Redundancy Level 1

Updated [Compute Redundancy] Value [Yes]

< Previous Next > Finish Cancel

- 4 To change the ceiling height, specify the new height in the Height of the Ceiling box.

- 5 To change the height where MAPs are mounted, specify the new mounting height in the AP Placement Height box.
- 6 To change the WX switch model, select the model from the WX Model list.
- 7 To change the MAP connection type, select the type from the AP Connection Type list:
 - Direct—MAPs are directly attached to dedicated WX switch ports.
 - Distributed—MAPs can be indirectly attached through intermediate Layer 2 or Layer 3 devices.
 - Distributed (Auto)—MAPs can be indirectly attached through intermediate Layer 2 or Layer 3 devices. They receive their configuration automatically using a profile that assigns a Distributed MAP number and name to the MAP from among the unused valid MAP numbers available on the switch.
- 8 To change the amount of power to reserve when calculating optimal power, type or select the number of dBm in the Reserved Tx Power Margin listbox. This is the number of dBm below the maximum power setting that you want 3WXM to reserve in case the power needs to be increased later.
- 9 To allow locked MAP access points to be deleted when Compute and Place determines that they are no longer required, select **Allow Deletion of Locked MAPs**.

A locked MAP is a MAP that is already associated with the coverage area. For example, if you computed and placed MAPs in this coverage area on a previous occasion and you are now optimizing the plan, the MAPs are still associated with the coverage area. (See “Locking and Unlocking MAPs” on page 143.)

- 10 To plan for redundant MAP connections to WX switches, select **Compute Redundancy**.



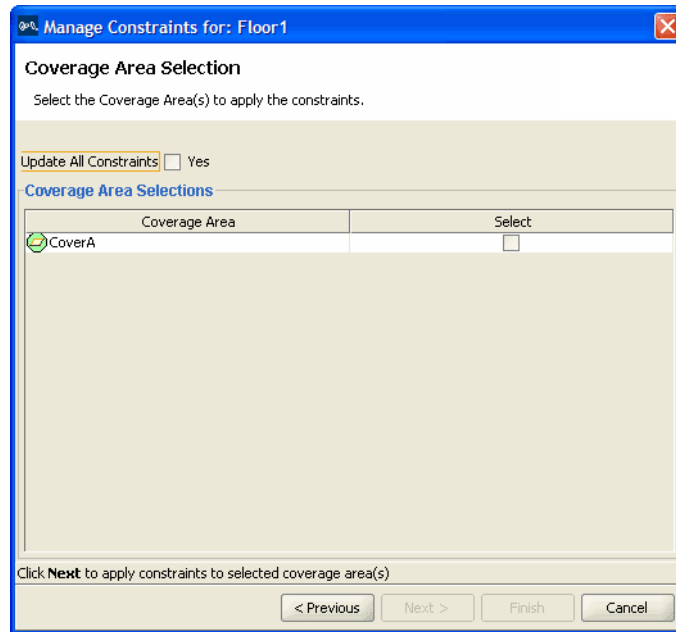
Only AP models that have two Ethernet ports can support redundant direct connections. However, models with one Ethernet port can support redundant distributed connections.

- 11 To change the MAP connection type for the redundant connection, select **Direct**, **Distributed**, or **Distributed (auto)** from the AP Connection Type list.



WX4400 switches support indirect MAP connections only.

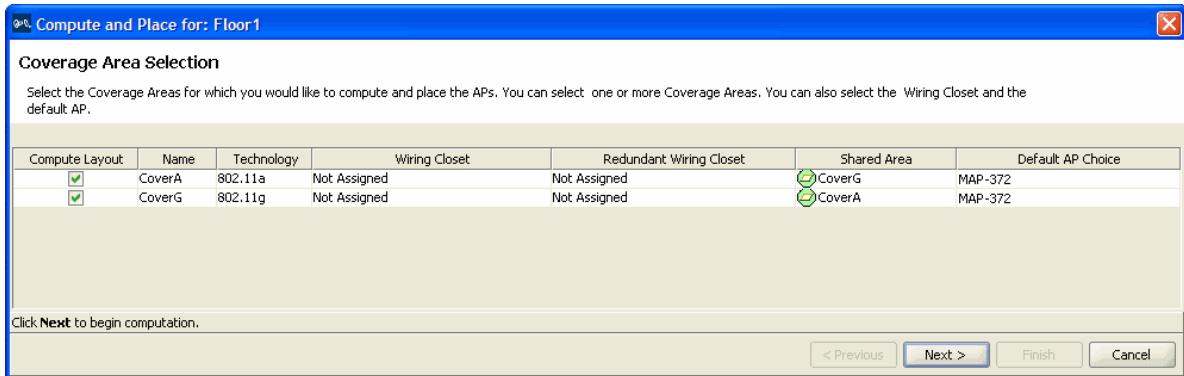
- 12 To change the number of redundant connections for the distributed connection type, type the number in the Redundant Level box.
For direct connections, the redundancy level is always 1.
- 13 Click **Next**. The Coverage Area Selection dialog is displayed.



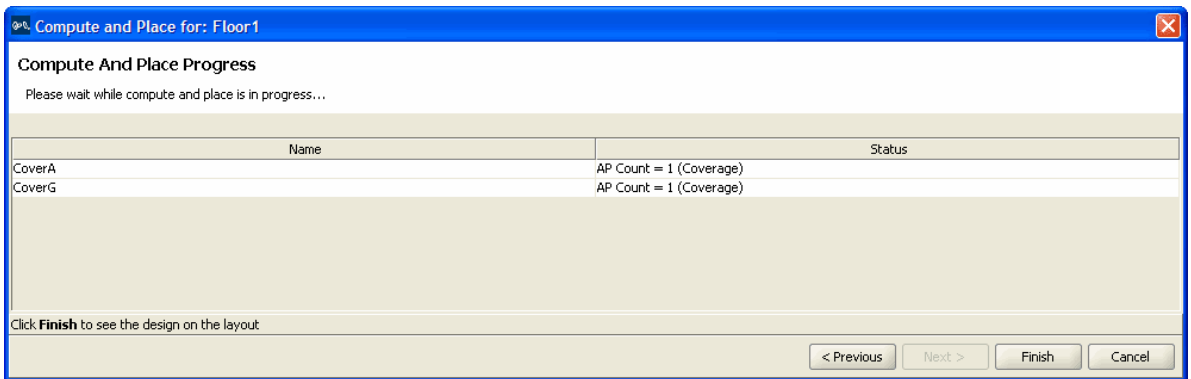
- 14 To update all the constraints for the selected coverage areas, select **Update All Constraints**. By default, 3WXM applies only changed constraint values to the selected areas. This default behavior preserves any constraint changes you make to individual areas when you configure them.
- 15 Select the coverage areas for which you want to apply constraints. To select a coverage area, click the box in the select column.
- 16 Click **Next**. The Manage Constraints Progress page is active.
- 17 When the Completed Applying Constraints message is displayed in the Manage Constraints Progress page, click **Finish** to save the changes.

To compute and place MAPs

- 1 Display the floor plan in the Content panel.
- 2 In the Task List panel, click **RF Planning**.
- 3 Under RF Planning, click **Compute and Place**. The Compute and Place wizard appears.



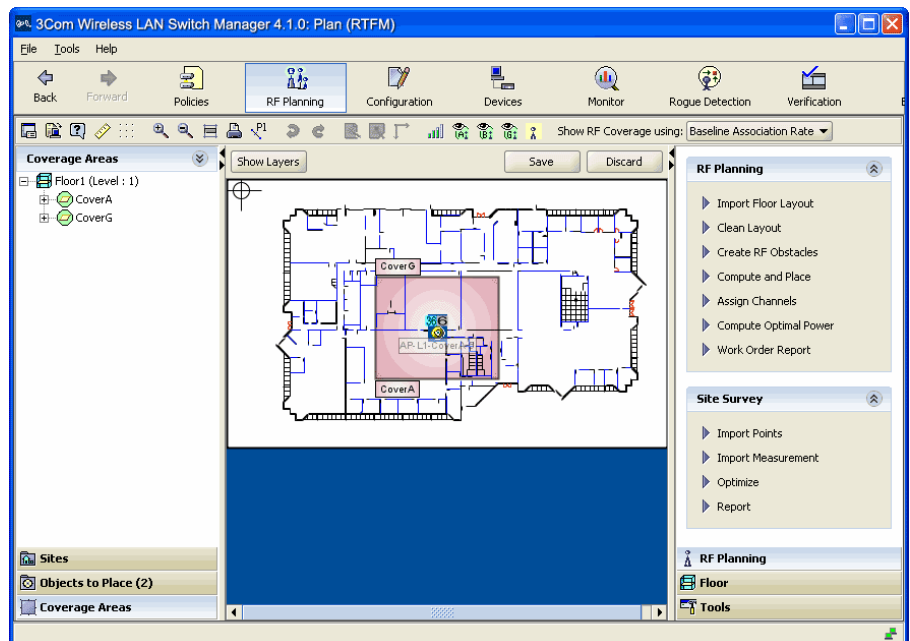
- 4 To remove a coverage area from MAP placement and computation, clear the area's Compute Layout box.
- 5 To specify the primary wiring closet for a coverage area, click in the Wiring Closet column to display the wiring closet list and select a wiring closet from the list.
You must specify the primary wiring closet for directly attached MAP access points. Specifying the primary wiring closet for distributed MAPs is optional.
- 6 To specify the redundant wiring closet for a coverage area, click in the Redundant Wiring Closet column to display the wiring closet list and select a wiring closet from the list. This step is optional.
- 7 To specify the shared area for a coverage area, click in the Shared Area column to display the shared area list and select a coverage area from the list. This step is optional.
- 8 To specify the default AP to be used in a coverage area, click in the Default AP Choice column to display a list of APs and select an AP from the list. This step is optional.
- 9 Click **Next**. The Coverage Area Progress page appears.



10 Go to “To review coverage area computation”.

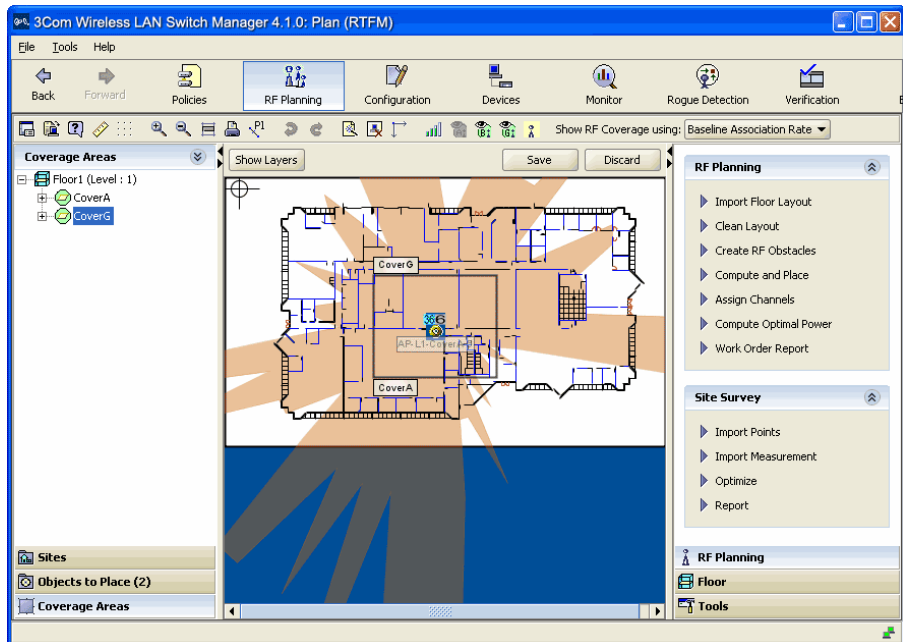
To review coverage area computation

- 1 Review the number of MAPs required for each coverage area, and the overriding criterion used (coverage or capacity).
- 2 Click **Finish** to apply the changes. Icons for the suggested MAP locations appear on the floor plan.



To see the RF coverage area for an area, right-click on the area (either in the organizer panel or on the floor) and select **Display RF Coverage**. If the area supports more than one radio technology, you also need to select the technology. The choices available depend on the wireless technology you chose for the coverage area.

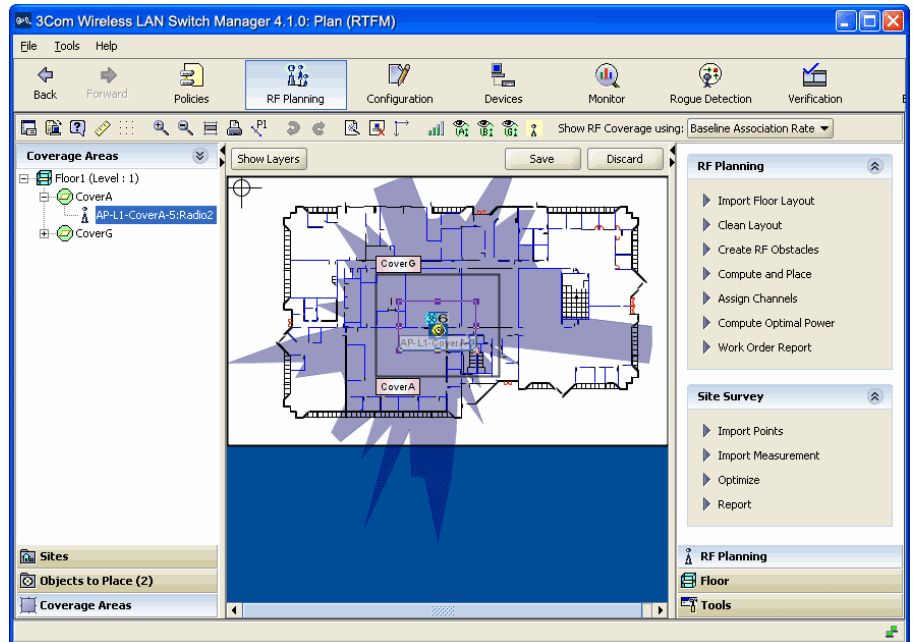
This example shows the 802.11b coverage for an area.



- 3 To see the RF coverage area for a specific MAP or radio, right-click the MAP or radio, and select one of the following:
 - **Display RF Coverage > 802.11a**
 - **Display RF Coverage > 802.11b**
 - **Display RF Coverage > 802.11g**

The choices available depend on the wireless technology you chose for the coverage area.

The following example shows RF coverage provided by a specific MAP's 802.11a radio.



You must now compute the optimal power. See “Computing Optimal Power” on page 147.

Locking and Unlocking MAPs

After you compute and place the necessary MAPs for a coverage area, you can move them to fine-tune the wireless coverage. If you need a MAP to be located at a fixed location on the floor, you can lock its current location when you recompute the necessary coverage. A dual-radio MAP model that is part of two coverage areas and is not locked can be placed in the shared coverage area.

To lock a MAP

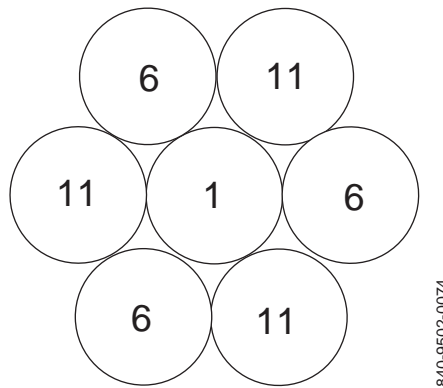
- 1 Select the MAP you want to lock.
- 2 Right-click, and select **Lock**. You can no longer move the MAP.

Assigning MAP Channels

If you do not plan to use the RF Auto-Tuning feature to automatically set the channels on the MAPs after deployment and installation, use the Assign Channels to MAPs option to assign channels to the MAPs.

Appropriate assignment of channels across the floor minimizes co-channel interference. Figure 8 shows how to minimize co-channel interference for an 802.11b environment when using the nonoverlapping channels 1, 6, and 11.

Figure 8 Channel Assignment to Minimize Co-Channel Interference



To assign channels

- 1 Display the floor plan in the Content panel.
- 2 In the Task List panel, click **RF Planning**.
Under RF Planning, click **Assign Channels**. The Channel Assignment wizard appears, showing the current channel assignment constraints.

Channel Assignment: Building1

Floor Selection

Select the floors for which you would like to perform channel assignment. You can also select the technology type.

Direction of channel assignment will be from Top Floor to Bottom Floor

Begin On Floor: Floor1 (Level : 1)

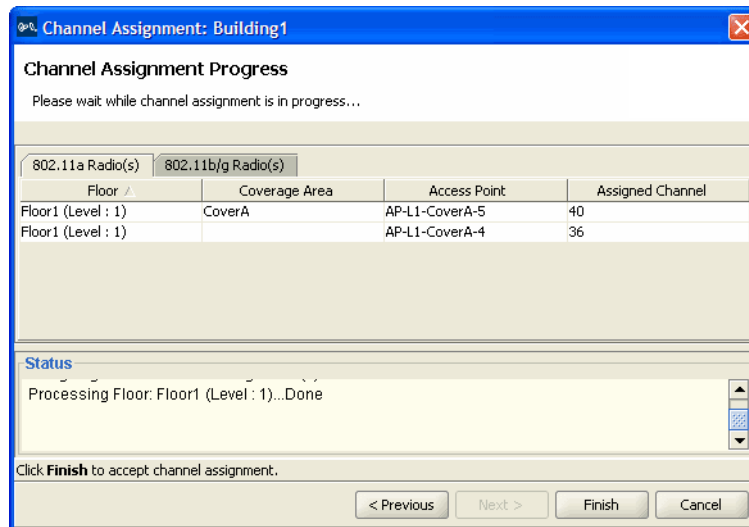
End On Floor: Floor1 (Level : 1)

Technology: All

Use Cross-Floor Channel Information Yes

< Previous Next > Finish Cancel

- 3 To change the starting floor for channel assignment, select the floor from the Begin On Floor List. By default, 3WXM starts at the top floor and works down.
- 4 To change the ending floor for channel assignment, select the floor from the End On Floor List.
The ending floor number must be lower than or equal to the starting floor number.
- 5 To change the radio type for which to assign channels, select the radio type from the Technology list. By default, 3WXM assigns channels for all radio types on the MAPs placed in the building.
- 6 To prevent 3WXM from taking the channel assignments for the floor above into account when calculating the channel assignments for a floor, clear **Use Cross-Floor Channel Information**.
- 7 Click **Next**. The Channel Assignment Progress page appears.
- 8 Review the results. The 802.11a channel assignments are listed on the 802.11a Radio(s) tab. The 802.11b/g channel assignments are listed on the 802.11b/g Radio(s) tab.



9 Click **Finish** to accept the channel assignments.

The new channel assignments are reflected in the Coverage Areas panel.

10 Do one of the following:

- To verify the RF network, see “Verifying the Wireless Network” on page 150.
- Click **Finish** to save the changes and close the wizard.

For MAPs that are in the network plan but are not yet deployed and managed by 3WXM, the channel number is changed to match the results of channel assignment. However, the channel is not changed for MAPs that are running in the live network and are being managed by 3WXM. For these MAPs, 3WXM displays the channels that are in use on the live MAPs.

To make the MAPs in the live network use the channels assigned by RF Planning, deploy the configuration to the network. After you deploy the configuration with the new channel settings, the channel information on the floor plan should match the channels assigned by RF Planning.

The MAPs on a floor plan in RF Planning are color coded to indicate their monitored status:

- Green—Up

- Yellow—Up (but with minor service degradation)
- Orange—Up (but with major service degradation)
- Red—Down
- Blue—Unknown

A MAP with a blue background is not in the live network even though it is on the floor plan. The channel number for this MAP will match the channel number assigned by RF Planning. However, a MAP with a green background is running in the live network, and this MAP's channel number will indicate the channel on which the MAP is operating, which is not necessarily the channel assigned by RF Planning.

If RF Auto-Tuning of channels is enabled, the channels can change on live MPs even if you do not change them.

Computing Optimal Power

If you do not plan to use the RF Auto-Tuning feature to automatically set the power levels on the MAPs after deployment and installation, use the Compute Optimal Power option to calculate the power settings for the MAPs.

Transmit power levels must be high enough to adequately cover an area, but also low enough to minimize co-channel interference. 3WXM factors in these considerations when calculating optimal power.



3Com recommends that you assign channels before you compute optimal power, to ensure successful power computation.

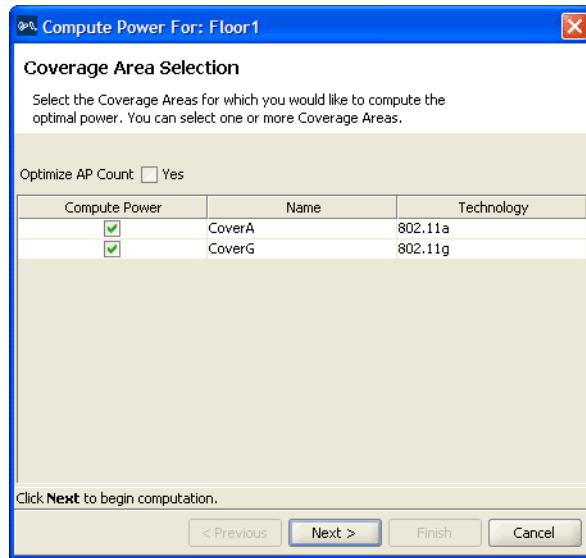


If the MAP is using an external antenna, specify the antenna model and the direction of the antenna's coverage before you compute power. See step 8 in "Configuring Advanced MAP Settings" on page 277.

To compute optimal power

- 1 In the Task List panel, click RF Planning.
- 2 Under RF Planning, click Compute Optimal Power.

The Compute Power For wizard appears, showing a list of the areas you defined and the corresponding technology.



- 3** To optimize the AP count, select **Optimize AP Count**. This option checks for coverage overlaps and removes a MAP if neighboring MAPs provide enough coverage to make the MAP unnecessary.

This option applies only to coverage areas that are configured for coverage, not capacity. Unless you disabled the option to place MAPs based on capacity, do not select the Optimize AP Count option.

- 4** Select **Compute Power** for the areas for which you want to compute power.
- 5** Click **Next**. The Compute Power For Progress page appears.
- If the power computation succeeds, click **Finish** to see the results.
 - If the power computation fails, click **OK** in the Optimal Power Computation box, and click **Finish**. See “To resolve optimal power computation problems” on page 149.

To resolve optimal power computation problems

If power levels for one or more coverage areas could not be optimized, show the RF coverage at baseline association and minimum transmit rates for the coverage areas by doing the following:

- 1 In the Show RF coverage using listbox, select how you want to display the coverage:
 - Baseline Association Rate—Coverage is shown based on the MAP radio baseline association rate. The baseline association rate is the typical data rate the radio is expected to support for client associations. (The baseline association rate is specified during planning, on a coverage area basis.)
 - Data Rate—Coverage is shown in colored bands that represent each of the data transmit rates supported by the radio. These rates are standard for each radio type.
 - RSSI—Coverage is shown based on the received signal strength indication (RSSI) of the radio's signal heard by other radios.
- 2 In the Coverage Areas section of the Organizer panel, select the scope for which you want to display coverage. You can display coverage for an individual radio, a specific coverage area, or all coverage areas on the floor.
 - To select multiple contiguous objects, click **Shift** while selecting.
 - To select multiple noncontiguous objects, click **Ctrl** while selecting.

If you need to make adjustments, do the following:

- a Manually move the MAPs, or increase the transmit power levels.
- b Manually create more MAPs, and place them on the floor.
- c Modify the coverage area so that the capacity requirements are higher.



If you manually add MAPs to a coverage area, they might be moved or removed the next time you perform Compute and Place.

Verifying the Wireless Network

You can use the following tools to help verify the wireless network:

- Show RF coverage.
- Place RF measurement points.
- Use RF interactive measurement mode.

Showing RF Coverage

Looking at the RF coverage allows you to see if the entire area is adequately covered by the MAPs. You can move the MAPs and see how the coverage changes.

You can see the RF coverage for an area by doing the following:

- 1 In the Coverage Areas section of the Organizer panel, select the coverage area.
- 2 Right-click, and select **Show RF Coverage**.

This procedure displays coverage provided by the access points on a single floor. To also view coverage provided to the current floor from access points on the floor above or below, do the following.

- 3 In the Coverage Areas section of the Organizer panel, navigate to the floor.
- 4 Expand the floor to display its coverage areas.
- 5 Right-click on a coverage area, and select **Show RF Coverage**.

If the coverage area provided by an access point on the floor above or below is one meter or less, 3WXM displays a message. This coverage area is not displayed on the current floor plan.

Resolving coverage gaps

You might see small “holes” when looking at the coverage areas at the baseline association rate. These small holes are most likely areas where users still have wireless access but not at the baseline association rate. In most situations, increasing transmit power levels to close the holes will generate more co-channel interference. 3Com recommends that you allow these small holes during the planning process.

If you need to resolve the gaps in coverage, try the following:

- 1 Select the coverage area.
- 2 Right-click, and select **Show RF Coverage**.

- 3 In the Show RF coverage using listbox, select how you want to display the coverage:
 - Baseline Association Rate—Coverage is shown based on the MAP radio baseline association rate. The baseline association rate is the typical data rate the radio is expected to support for client associations. (The baseline association rate is specified during planning, on a coverage area basis.)
 - Data Rate—Coverage is shown in colored bands that represent each of the data transmit rates supported by the radio. These rates are standard for each radio type.
 - RSSI—Coverage is shown based on the received signal strength indication (RSSI) of the radio's signal heard by other radios.

If you need to make adjustments, do the following:

- 1 Move the MAPs, or increase the transmit power levels to provide better coverage.
- 2 Create more MAPs, and place them on the floor.
- 3 Modify the coverage area so that the capacity requirements are higher.



If you manually add MAPs to a coverage area, they might be moved or removed when you next perform Compute and Place.




If you have already installed a MAP in the network and you want to add it to the coverage area, see "Adding New MAPs that Are Already Installed to the Network Plan" on page 480.

Placing RF Measurement Points

An RF measurement point on the floor plan simulates the measurement of signal strength from all MAPs at a specific position on the floor. Placing RF measurement points is optional. RF measurement points are helpful for verifying the wireless network. You can place as many RF measurement points as you want. You can place them anywhere and move them later. Information from RF measurement points is included in a floor's work order.

To place an RF measurement point

- 1 Display the floor plan in the Content panel.
- 2 In the Task List panel, click Tools.
- 3 In the Coverage Area task group, under Wiring Closet/Misc, click the  (Insert Measurement Point) icon.

- 4 On the floor plan, click where you want the measurement point to be placed. The Create RF Measurement Point dialog box appears.

Create RF Measurement Point

Please enter description

Description:

RF Point

X (Feet):

Y (Feet):

RSSI Options

Show Unreachable APs

Show Disabled APs

Show APs on Other Floors (Indicated by *)

802.11a

AP / AP /	Distance (Feet)	Channel	RSSI (dBm)	Status
AP-L1-CoverA-6	67.8	36	-76.7	OK
AP-L1-CoverG-7	48.0	36	-150.0	Disabled

802.11b/g

AP / AP /	Distance (Feet)	Channel	RSSI (dBm)	Status
AP-L1-CoverA-6	67.8	6	-150.0	Disabled
AP-L1-CoverG-7	48.0	6	-65.5	OK

Updated [Description] Value [Floor 1 RF Point]

OK Cancel

- 5 In the Description box, type a description for the measurement point (1 to 60 characters).
- 6 In the RSSI Options box, select display options for the dialog box:
- To list access points that cannot be detected from this RF measurement point, select **Show Unreachable MAPs**.
 - To list disabled access points, select **Show Disabled MAPs**.
 - To list access on other floors that can be detected from this RF measurement point, select **Show MAPs on Other Floors**.


See “Reading the RF Measurement Table” on page 153 for information about the fields in the display.

- 7 Click **OK** to save the changes and close the box.
- 8 Do one of the following:
 - To use the RF interactive measurement mode, see “Using RF Interactive Measurement Mode”.
 - To generate network design information, see “Generating RF Network Design Information” on page 155.
 - Click **Finish** to save the changes and close the wizard.

Using RF Interactive Measurement Mode

RF interactive measurement mode is useful when you are troubleshooting or surveying the coverage areas on the floor. You can quickly measure signal strengths for any location on the floor.

To use the RF interactive measurement mode

- 1 Click the  icon in the toolbar.
- 2 Click any location on the floor. Received signal strength indication (RSSI) measurements for the selected location appear next to the Floor View. See “Reading the RF Measurement Table” for information about the fields in the display.

Reading the RF Measurement Table

The projected signal strengths for the planned equipment from that measurement point are shown in the RF measurement table.

X-Y coordinates for the measurement point and display options are also available to customize the RSSI table. Using this interactive mode can be valuable when verifying deployment coverage with a portable WLAN measurement tool on the floor.



Table 15 shows the information available in the RF measurement table.

Table 15 RF Measurement Information

Item	Value
X	Distance in the X direction from the 0,0 coordinate (the upper left corner of the panel).
Y	Distance in the Y direction from the 0,0 coordinate (the upper left corner of the panel).
Show Unreachable APs	Show MAPs that are too far away to accurately measure signal strength.
Show Disabled APs	Show all disabled MAPs.
Show APs on Other Floors	Show the MAPs located on other floors that can be detected from this RF measurement point.
MAP/AP	MAP or third-party access points detected.
Distance	Distance between MAP and RF measurement point.
Channel	Channel of the MAP or third-party access point.
RSSI (dBm)	Signal strength from the MAP at the RF measurement point.
Status	Whether the MAP is active (OK) or disabled.

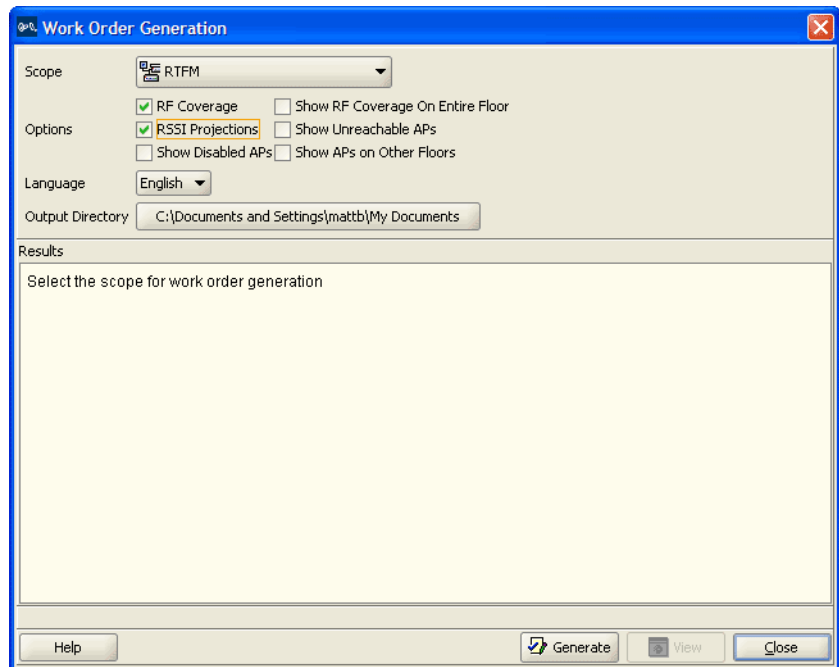
Generating RF Network Design Information


After 3WXM has calculated the number of MAPs required to provide wireless coverage, you can generate a work order report. The work order report provides all of the necessary information for the physical installation of the 3Com Mobility System. A work order shows where the MAPs should be installed, WX initial setup configuration information, and projected RSSI information that is useful when verifying the installation.

After deployment, you can generate a work order with the optional RSSI projection tables and MAP MAC addresses, and use it for post-deployment verification.

To generate a work order report

- 1 Display the floor plan in the Content panel.
- 2 In the Task List panel, click RF Planning.
- 3 Under RF Planning, click Work Order Report. The Work Order Generation dialog is displayed.



- 4 Specify whether to include the following information in the work order:
 - **RF Coverage**
 - **RSSI Projections**
 - **Show Disabled MAPs** (only available if **RSSI Projections** is selected)
 - **Show RF Coverage On Entire Floor** (only available if **RSSI Projections** is selected)
 - **Show Unreachable MAPs** (only available if **RSSI Projections** is selected)
 - **Show MAPs on Other Floors** (only available if **RSSI Projections** is selected)
 - 5 In the Language list, select **English** or **German**.
The language you select is the language used when you next access this page.
 - 6 To select the directory to which the inventory report is saved, click **Choose**. The Select dialog box appears.
 - 7 Navigate to the directory you want, and click **Select**.
3WXM uses this directory when generating subsequent reports.
 - 8 Click **Generate Work Order**.
The work order is saved in the directory you specified in the format *WO_scope_name_date*. If you generate another order for the same scope on the same day, the old work order is overwritten.
When the work order has been generated, the **View** button becomes available.
 - 9 Click **View**. A browser window opens to display the work order in HTML format.
-  *A browser must be specified in the Tools tab in the Preferences dialog box (**Tools > Preferences**).*
- 10 Select a floor from the Select Floor list and click **View Work Order**. The work order is displayed starting at the floor you specified. You can scroll to view additional information.
 - 11 Click **Close** to close the dialog.

6

CONFIGURING WX SYSTEM PARAMETERS

This chapter and the following two chapters describe how to view and configure WX switches using 3WXM.



If you want to use 3WXM planning to configure switches for you as part of coverage planning, see “Planning the 3Com Mobility System” on page 69.

If you are planning to use 3WXM to configure switches in a remote office, see “Configuring WX Switches Remotely” on page 331.

WX Switch Configuration Objects

Configuration objects for WX switches are organized into the following categories:

- System
- Wireless
- AAA

You can access configuration wizards for these object types by clicking on tasks in the Task List panel, or by selecting the object type under a WX switch in the Organizer panel.

Table 16 lists the WX switch object types.

Table 16 WX Switch Object Types

Category	Object Type	Description
System	Ports	Settings for individual ports. (See “Viewing and Changing Port Settings” on page 176.)
	Port Groups	Settings for port groups. (See “Viewing and Changing Port Groups” on page 184.)
	Management Services	Settings for the following management services: <ul style="list-style-type: none"> ■ System Information, including contact and location information, CLI prompt, and message of the day. ■ HTTPS—Controls Web Management access to the WX switches. ■ Telnet—Controls Telnet management access to the WX switches. ■ SSH—Controls Secure Shell (SSH) management access to the WX switches. ■ Web Portal—Controls web-based login of network users (clients). ■ SNMP—Configures traps, communities, and trap receivers. ■ Timezone—Controls local offsets to Universal Mean Time (UMT). (See “Viewing and Changing Management Settings” on page 186.)
	Log	Controls log and trace settings. (See “Viewing and Setting Log and Trace Settings” on page 198.)
	IP Services	Settings for IP parameters: <ul style="list-style-type: none"> ■ IP routes to the default gateway ■ IP aliases ■ Domain Name Service (DNS) settings ■ Network Time Protocol (NTP) settings ■ Address Resolution Protocol (ARP) settings (See “Viewing and Configuring IP Services Settings” on page 201.)

Table 16 WX Switch Object Types (continued)

Category	Object Type	Description
System, cont.	VLANs	Groups of physical ports configured as a distinct Layer 2 broadcast domain. Each VLAN has its own Spanning Tree Protocol (STP) and Internet Group Management Protocol (IGMP) settings. Optionally, a VLAN can be associated with an IP interface. (See "Viewing and Configuring VLANs" on page 206.)
	ACLs	Access Control Lists (ACLs) to filter traffic (See "Viewing and Configuring ACLs" on page 220.)
	QoS	Mappings between Differentiated Services Code Point (DSCP) values and internal Class of Service (CoS) values (See "Viewing and Changing CoS Mappings" on page 231.)
Wireless	Wireless Services	Settings for SSIDs to provide network services. Wizards are provided for configuring the following types of services: 802.1X, voice, Web Portal, open access, and custom. (See "Viewing and Configuring Wireless Services" on page 235.)
	Radio Profiles	Sets of radio parameters that can be applied to multiple radios, including the beacon interval, RF Auto-Tuning settings, and service profiles (See "Viewing and Configuring Radio Profiles" on page 263.)
	Auto-DAP	Settings for the Auto-DAP profile (See "Viewing and Changing the Auto-DAP Profile" on page 269.)
	Access Points	Settings for MAPs (See "Viewing and Configuring MAPs" on page 272.)
	Radios	Settings for individual MAP radios (See "Viewing and Changing Radio Settings" on page 281.)

Table 16 WX Switch Object Types (continued)

Category	Object Type	Description
Wireless, cont.	RF Detection	Configuration parameters for rogue detection and countermeasures (See “Viewing and Changing RF Detection Settings” on page 282.)
AAA	Local User Database	Users configured on the WX switch instead of on the RADIUS server (See “Creating and Managing Users in the Local User Database” on page 287.)
	RADIUS	RADIUS servers and server groups (See “Viewing and Configuring RADIUS Settings” on page 298.)
	802.1X	Global 802.1X settings (See “Viewing and Configuring Global 802.1X Settings” on page 303.)
	802.1X Access Rules	Access rules for 802.1X clients (See “Viewing and Configuring 802.1X Network Access Rules” on page 306.)
	MAC Access Rules	Access rules for MAC clients (See “Viewing and Configuring MAC Network Access Rules” on page 310.)
	WebAAA Access Rules	Access rules for WebAAA (Web Portal) clients (See “Viewing and Configuring WebAAA Network Access Rules” on page 313.)
	Last Resort Access Rules	Access rules for last resort access (See “Viewing and Configuring Last-Resort Network Access Rules” on page 316.)
	Admin Access Rules	Access rules for administrative access to the WX switch (See “Viewing and Configuring WX Administrator Access Rules” on page 318.)
	Third-Party APs	Configuration settings for third-party APs (See “Viewing and Configuring AAA Support for Third-Party AP Users” on page 322.)

Table 16 WX Switch Object Types (continued)

Category	Object Type	Description
AAA, cont.	Location Policy	Policies to locally override VLAN or security ACLs assigned to a user by a RADIUS server (See "Viewing and Changing Location Policy Rules" on page 325.)
	Mobility Profiles	Rules to allow or deny a specific user or group of users network access through specific MAPs or wired authentication ports (See "Viewing and Changing Mobility Profiles" on page 328.)

Adding a WX Switch to the Network Plan

You can use any of the following methods to add a WX switch to a network plan:

- Allow 3WXM to create the switch as part of RF planning.
- Use the Create Wireless Switch wizard.
- Copy and paste a switch that is already in the network plan.
- Upload the switch from the network.
- Import the switch's XML configuration file.

Creating a WX Switch as Part of RF Planning

Select the Planning tool bar option and use the instructions in "Planning the 3Com Mobility System" on page 69.

Creating a WX Switch Using the Create Wireless Switch Wizard

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, select the network plan name.
- 3 In the Task List panel, select Create Wireless Switch.
- 4 Go to "Using the Create Wireless Switch Wizard" on page 165.

Creating a New WX Switch Based on a Configured Switch in the Network Plan

You can copy and modify a switch that is already in the network plan, by copying and pasting the switch in the Organizer panel.

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, select the switch you want to copy, then right-click on the switch and select **Copy**.
- 3 Right-click and select **Paste**. The Wireless Switch Properties wizard appears.
- 4 In the WX Name box, type the name of the WX switch (1 to 256 alphanumeric characters, with no spaces or tabs).



Within a network plan (and all Mobility Domains), each WX must have a unique name.

- 5 Type the switch's serial number in the Serial Number box.
- 6 To modify the system IP address and VLAN, select them from the System VLAN/IP drop-down list.

The system IP address determines the interface or source IP address MSS uses for system tasks, including the following:

- Mobility Domain operations
- Topology reporting for dual-homed MAP access points
- Default source IP address used in unsolicited communications such as AAA accounting reports and SNMP notifications

- 7 Click **Management Interface**.

- 8 To enable the switch to be managed by 3WXM, select Managed. Until this option is selected, you cannot deploy the switch configuration you create in 3WXM to the actual switch in the network.



This option also enables the Launch Telnet and Launch Browser options in the Task List panel.



CAUTION: After you select Managed to enable management of the switch by 3WXM, do not change this option unless advised to do so by 3Com Technical Support. If you change a WX switch to an unmanaged state in a network plan, all network operations (polling) stop for that WX switch. If you change back to a managed state, the entire configuration of the switch is replaced with the settings from the network plan, which can result in loss of connectivity to the switch.

- 9 To modify the management interface, select the IP interface and VLAN from the VLAN/IP drop-down list.
- 10 To modify the enable password, edit the string in the Enable Password box.



Use this option when you are creating a new switch in 3WXM. This option modifies the password in the network plan. However, if the switch is already deployed in the network, 3WXM cannot apply configuration changes to the switch unless the enable password in 3WXM matches the enable password already configured on the switch.

- 11 Click **WX Associations**.
- 12 To change the switch's Mobility Domain membership, select the Mobility Domain from the Mobility Domain drop-down list.
To leave the switch out of all Mobility Domains, select Not Assigned.
- 13 To change the switch's wiring closet membership, select the closet from the Wiring Closet drop-down list.
To leave the switch out of all wiring closets, select Not Assigned.
- 14 Click **OK** to save the changes and close the wizard.
- 15 Edit other parameters as required. (See the rest of this chapter and the following two chapters.)

Adding a Switch by Uploading its Configuration from the Network

If you have already deployed a WX switch in the network and you want to add the switch to the network plan, you can upload the switch's configuration into 3WXM, edit the switch, then redeploy the switch with the new parameters. (See "Uploading a WX Switch into the Network Plan" on page 66.)

Adding a Switch by Importing a Configuration File

You can add a switch to the network plan by importing a switch configuration file. The configuration is imported in XML format.

- 1 Use the procedure in "Importing and Exporting Switch Configuration Files" on page 359 to import the switch's configuration file.
- 2 In the Organizer panel, click the plus sign next to the new WX switch to expand the configuration options.
- 3 Select a configuration option, then use the instructions in this chapter or one of the following chapters to modify the configuration information:
 - Chapter 7, "Configuring Wireless Parameters" on page 235
 - Chapter 8, "Configuring Authentication, Authorization, and Accounting Parameters" on page 287

Configuring Basic and Advanced Settings

Clicking on an option in the Task List panel opens a configuration wizard. Configuration wizards enable you to configure basic settings for an object. For most types of WX switch objects, after you configure the settings and close the wizard, the new object is added to a table in the Content panel.

Some objects have advanced, infrequently modified settings that are not configurable using the wizard. To configure advanced settings for an object listed in a table in the Content panel, select the object, then click **Properties**. The **Properties** button opens a configuration dialog containing all configurable settings for the object, including the advanced settings.

For simple changes, you can select multiple objects and click **Properties** to make the change for all the selected objects. For example, to disable or reenable multiple ports, you can select all the ports, click **Properties**, change the port state in the dialog, then close the dialog. The changes take effect on all the ports you selected.

Reviewing and Deploying Changes

3WXM does not automatically deploy switch configuration changes from the network plan to the actual switches in the network. The following options in the Task List panel allow you to review and deploy changes:

- **Review**—Displays a categorized list of the undeployed changes.
- **Deploy**—Sends the changes to the network.

Reviewing Changes

Click **Review** to review undeployed configuration changes. Changes are listed by feature category. To hide or redisplay a category, click on the double arrow next to the category name.

A plus sign next to a configuration item indicates there are multiple changes for that item. Click the plus sign to display the individual changes.

To print the list of changes, click **Print**.

Deploying Changes To deploy all the changes, click **Deploy**. 3WXM compares the changes to the verification rules, and lists any warnings or error messages. If there are any errors, 3WXM will not deploy the changes. To deploy the changes, you must first resolve the errors. To resolve configuration errors, use the Verification option. (See "" on page 363.)

Using the Create Wireless Switch Wizard

- 1 Access the Create Wireless Switch wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, select the network plan name.
 - c In the Task List panel, select the Wireless Switch task.
- 2 In the WX Name box, type the name of the WX switch (1 to 256 alphanumeric characters, with no spaces or tabs).



Within a network plan (and all Mobility Domains), each WX must have a unique name.

- 3 In the WX Model list, select the WX switch model.
- 4 In the Software Version list, select the version of Mobility System Software (MSS) you expect to run on the WX switch.
- 5 In the Enable Password box, type the enable password for the WX.
This password must match the enable password that was defined on the switch using the CLI command **set enablepass**. For more information, see the [Wireless LAN Switch and Controller Configuration Guide](#).
The password is encrypted when you type it.
- 6 Click **Next**.
- 7 Edit the IP address and network mask in the IP Address field.
3WXM will assign this IP address to the default VLAN (VLAN 1).
- 8 Click **Next**.
- 9 In the Available Members list, select the ports to add to the default VLAN and click **Add** or **Move**.
 - The **Add** button adds the ports to the new VLAN without removing them from any other VLANs.

- The **Move** button removes the ports from all other VLANs, and places them in the new VLAN.

The ports appear in the Current Members list.

- 10 To tag ports in the VLAN, select Tag and edit the tag value.

Use this option if you used the **Add** button instead of the **Move** button to place the ports in the VLAN. For a port to be a member of more than one VLAN, the port must be tagged. By default, ports are untagged.

When you enable tagging, the default tag value is the same as the VLAN ID.

- 11 Click **Next**.

- 12 Edit the IP address to match the address of the gateway router for the default VLAN's IP interface.

- 13 Click **Next**.

- 14 To place the switch in a Mobility Domain, select the Mobility Domain from the Mobility Domain drop-down list.

The Mobility Domain must already be created. (See "Defining a Mobility Domain" on page 60.) If you still need to create the Mobility Domain, finish creating the switch, then create the Mobility Domain.

Select the switch in the Organizer panel to display its basic settings in the Content panel, and select the Mobility Domain from the Mobility Domain drop-down list.

- 15 To place the switch in a wiring closet, select the closet from the Wiring Closet drop-down list.

The wiring closet must already be created on a floor plan. If you still need to create the wiring closet, finish creating the switch, then create the wiring closet. The Create Wiring Closet wizard in RF Planning enables you to create a wiring closet and add the switch to it. (See "Creating a Wiring Closet" on page 111.)

If you do not select the switch when you configure the wiring closet, select the switch in the Organizer panel to display its basic settings in the Content panel, and select the wiring closet from the Wiring Closet drop-down list.

- 16 Click **Finish**.

Setting Up a Switch

After you create a switch, you can use the System Setup Wizard to configure the following essential operation and management parameters:

- SNMP settings for monitoring of the switch by 3WXM
- VLANs
- RADIUS servers and server groups
- Wireless services
- Auto-DAP profile settings



The SNMP security level and enabled version configured with this wizard apply to all SNMP notification targets. However, the security model, community string, and access type apply only to the notification target 3WXM Services.

To set up a switch

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, select the WX switch.
- 3 In the Task List panel, select System Setup.
The System Setup wizard appears.
- 4 Read the first page, then click **Next**.
- 5 Configure SNMP settings:
 - a Select the minimum level of security to allow for any SNMP communication with the switch from the Security Level drop-down list:
 - **Unsecured**—SNMP message exchanges are not secure. This is the default, and is the only value supported for SNMPv1 and SNMPv2c. (This security level is the same as the noAuthNoPriv level described in SNMPv3 RFCs.)
 - **Authenticated**—SNMP message exchanges are authenticated but are not encrypted. (This security level is the same as the authNoPriv level described in SNMPv3 RFCs.)
 - **Encrypted**—SNMP message exchanges are authenticated and encrypted. (This security level is the same as the authPriv level described in SNMPv3 RFCs.)

- **AuthRequest-UnsecuredNotify**—SNMP message exchanges are authenticated but are not encrypted, and notifications are neither authenticated nor encrypted.
The only security level supported for SNMPv1 and SNMPv2c is Unsecured. To use a higher security level, you must use USM (SNMPv3).
- b** Select the version(s) of SNMP you want the switch to run:
 - **V1**
 - **V2c**
 - **USM** (SNMPv3)
 - c** Click **Next**.
 - d** In the Security Model drop-down list, select the security model to use specifically for SNMP communications between the switch and 3WXM:
 - **USM** (SNMPv3)
 - **V1**
 - e** If you selected USM, then select the minimum level of security for SNMP communication between the switch and 3WXM Services:
 - **Unsecured**—SNMP message exchanges are not secure. This is the default, and is the only value supported for SNMPv1 and SNMPv2c. (This security level is the same as the noAuthNoPriv level described in SNMPv3 RFCs.)
 - **Authenticated**—SNMP message exchanges are authenticated but are not encrypted. (This security level is the same as the authNoPriv level described in SNMPv3 RFCs.)
 - **Encrypted**—SNMP message exchanges are authenticated and encrypted. (This security level is the same as the authPriv level described in SNMPv3 RFCs.)
 - f** Click **Next**.
 - g** Type the USM name or community string name in the corresponding box.
 - h** Select the access type from the Access Type drop-down list:
 - **read-notify**—An SNMP management application using the string can get object values on the switch but cannot set them. The switch can use the string to send notifications.

- **notify-only**—The switch can use the string to send notifications.
- **read-write-notify**—An SNMP management application using the string can get and set object values on the switch. The switch can use the string to send notifications.

i Click **Next**.

6 Configure VLANs.

VLANs that already exist, such as the default VLAN, are listed. You can modify existing VLANs and create new ones.

To create a VLAN:

- a Click **Create**. The Create VLAN wizard appears.
- b See “Viewing and Configuring VLANs” on page 206.
- c When you are finished configuring VLANs, click **Next** and go to step 7.

7 Configure RADIUS servers and server groups.

RADIUS servers that are already configured are listed. You can modify existing servers and groups and create new ones.

To create a RADIUS server and place it in a group:

- a Click **Create**. The Create RADIUS Server wizard appears.
- b See “Viewing and Configuring RADIUS Settings” on page 298.
- c When you are finished configuring RADIUS settings, click **Next** and go to step 8.

8 Configure wireless services.

Wireless services that are already configured are listed. You can modify existing services and create new ones.

To create a wireless service:

- a Click **Create** and select the type of service you want to create:
 - 802.1X Service Profile—Provides wireless access to 802.1X clients.
 - Voice Service Profile—Provides wireless access to Voice over IP (VoIP) devices.
 - Web-Portal Service Profile—Provides wireless access to clients who log in using a web page.
 - Open Access Service Profile—Provides wireless access to clients without requiring them to log in.

- Custom Service Profile—Provides wireless access based on the combination of options you choose. (Use this option only if none of the other options applies to the type of service you want to offer.)
 - b See “Viewing and Configuring Wireless Services” on page 235 for information about wireless service parameters.
 - c When you are finished configuring wireless services, click **Next** and go to step 8.
- 9 Configure basic Auto-DAP profile settings:
- a To enable the Auto-DAP profile, select Enabled.
 - b To change the radio type the profile assumes for 802.11b/g radios in dual-radio MAP models, select the radio type from the AP Radio Type drop-down list:
 - **11b**
 - **11g**
- 10 Click **Finish**.

Modifying Basic Switch Parameters

Basic switch parameters are displayed in the Content panel when you select a switch in the Organizer panel.

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, select the WX switch.
Basic parameters for the switch appear in the Content panel.
- 3 To modify the name, edit the string in the WX Name box.
- 4 To modify the serial number, edit the string in the Serial Number box.



Modification of the serial number applies only when you are prestaging a specific switch. This option does not change the serial number of an installed switch.

- 5 To modify the system IP address and VLAN, select them from the System VLAN/IP drop-down list.

The system IP address determines the interface or source IP address MSS uses for system tasks, including the following:

- Mobility Domain operations
- Topology reporting for dual-homed MAP access points

- Default source IP address used in unsolicited communications such as AAA accounting reports and SNMP notifications
- 6 To enable the switch to be managed by 3WXM, select Managed. Until this option is selected, you cannot deploy the switch configuration you create in 3WXM to the actual switch in the network.



This option also enables the Launch Telnet and Launch Browser options in the Task List panel.



After you select Managed to enable management of the switch by 3WXM, do not change this option unless advised to do so by 3Com Technical Support. If you change a WX switch to an unmanaged state in a network plan, all network operations (polling) stop for that WX switch. If you change back to a managed state, the entire configuration of the switch is replaced with the settings from the network plan, which can result in loss of connectivity to the switch.

- 7 To modify the management interface, select the IP interface and VLAN from the VLAN/IP drop-down list.
- 8 To modify the enable password, edit the string in the Enable Password box.



Use this option when you are creating a new switch in 3WXM. This option modifies the password in the network plan. However, if the switch is already deployed in the network, 3WXM cannot apply configuration changes to the switch unless the enable password in 3WXM matches the enable password already configured on the switch.

- 9 To change the switch's Mobility Domain membership, select the Mobility Domain from the Mobility Domain drop-down list.
To leave the switch out of all Mobility Domains, select Not Assigned.
- 10 To change the switch's wiring closet membership, select the closet from the Wiring Closet drop-down list.
To leave the switch out of all wiring closets, select Not Assigned.
- 11 Click **Save**.

Changing the WX Software Version To change the WX software version:

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, select the WX switch.
- 3 In the Task List panel, select Change Software Version.
The Change Software Version wizard appears.
- 4 Select the software version from the drop-down list.
- 5 Click **OK**.

Changing the WX Model To change the WX model:

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, select the WX switch.
- 3 In the Task List panel, select Change Model.
The Change Model wizard appears.
- 4 Select the model from the drop-down list.
- 5 Click **OK**.

Changing Timezone Properties You can specify the number of hours (and optionally the minutes) that the WX switch's real-time clock is offset from Coordinated Universal Time (UTC)—also known as Greenwich Mean Time (GMT). The time zone information is used by Network Time Protocol (NTP) if you enabled it.

You can also specify whether the WX modifies the clock during daylight savings time or similar summertime period.

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, select the WX switch.
- 3 In the Task List panel, select **Timezone**.
The Timezone Properties wizard appears.
- 4 In the Name box, type the name for the time zone (1 to 16 alphanumeric characters, with no spaces or tabs).
- 5 In the Offset Hours box, select the number of hours (between -23 and 23) to subtract from or add to UTC.

- 6 Optionally, in the Offset Minutes box, select the number of minutes (between -59 to 59) to subtract from or add to UTC.
- 7 In the DST Name box, type the name for the summertime offset (1 to 16 alphanumeric characters, with no spaces or tabs).
- 8 In the Start Month list, select the month of the year when the time change starts.
- 9 In the Start Week list, select the week of the month when the time change starts (**First, Second, Third, Fourth, or Last**).
- 10 In the Start Day list, select the day of the week when the time change starts.
- 11 In the Start Hour box, specify the hour (between 0 and 23) to start the time change.
- 12 In the Start Minute box, specify the minute (between 0 and 59) when the time change starts.
- 13 In the End Month list, select the month of the year when the time change ends.
- 14 In the End Week list, select the week of the month when the time change ends (**First, Second, Third, Fourth, or Last**).
- 15 In the End Day list, select the day of the week when the time change ends.
- 16 In the End Hour box, specify the hour (between 0 and 23) when the time change ends.
- 17 In the End Minute box, specify the minute (between 0 and 59) when the time change ends.
- 18 Click **OK**.

Changing System Information

To change system information:

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, select the WX switch.
- 3 In the Task List panel, select **System Information**.
The System Information wizard appears.
- 4 In the Contact box, type the contact name for the WX.
- 5 In the Location box, type the location of the WX.

- 6 In the Prompt box, type the CLI prompt for the WX.
If you do not specify a prompt, the CLI uses the following default prompts:
 - WX1200> for restricted access
 - WX1200# for enabled access
- 7 In the Message of the Day box, type the message that appears before the beginning of each login prompt of each CLI session. Do not use the number sign (#), single quotation mark ('), double quotation marks (" "), or ampersand (&).
- 8 Click **OK**.

Converting Auto DAPs into Statically Configured DAPs

Distributed MAPs that are not configured on any WX switches in the Mobility Domain can nonetheless be booted and managed by a switch if the switch has a profile for Distributed MAPs, and has capacity to manage the MAP. A MAP that is booted and managed using a Distributed MAP profile is here called an *Auto DAP*.

You can convert the temporary connection of an Auto DAP to a WX switch into a permanent, statically configured connection on the switch.



This procedure converts Auto DAPS into configured Distributed MAPs only on the switch you are managing. To convert Auto DAPs on a Mobility Domain basis, see "Converting Auto DAPs into Statically Configured APs" on page 67.

To convert an Auto DAP

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, select the WX switch.
- 3 In the Task List panel, select Convert Auto APs.
The Convert Auto APs wizard appears. The MAPs that were configured using a Distributed MAP template are listed.
- 4 Select the MAPs you want to convert into statically configured MAPs.
- 5 Click **Next**.
- 6 Click **Finish**.

Deleting Auto DAPs 3WXM automatically updates an Auto DAP's information in the network plan when the DAP either is converted into a configured MAP, or reboots and then connects to a different WX.

However, if an Auto DAP leaves the network without being converted into a statically configured MAP or connecting to a different WX, 3WXM continues to list the DAP as a device being managed by the WX.

In this case, you can manually delete the MAP from the WX switch's Auto DAP list.



This procedure does not delete an active Auto DAP. To remove an Auto DAP that is still attached to the network, remove it from the network. (Unplug it or power it down.) Then use this procedure to remove it from the Auto DAP list.

To delete an Auto DAP

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, select the WX switch.
- 3 In the Task List panel, select Delete Auto APs.

The Delete Auto APs wizard appears. The MAPs that were configured using a Distributed MAP template are listed.

- 4 Select the Auto DAP that is no longer on the network.
- 5 Click **Next**.
- 6 Click **Finish**.

Launching a Telnet Management Session with the Switch

This option is available only if the switch is running and can be reached through the network by 3WXM Services. This option also requires the Managed option for the switch to be enabled. (See step 6 in "Modifying Basic Switch Parameters" on page 170.)

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, select the WX switch.
- 3 In the Task List panel, select **Launch Telnet**.

Launching a Web Management Session with the Switch

This option is available only if the switch is running and can be reached through the network by 3WXM Services. This option also requires the Managed option for the switch to be enabled. (See step 6 in “Modifying Basic Switch Parameters” on page 170.)

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, select the WX switch.
- 3 In the Task List panel, select **Launch Browser**.

Viewing and Changing Port Settings

You can configure and display information for the following port parameters:

- Name
- State
- Type (network, MAP, or wired authentication)
- Speed and autonegotiation
- Power over Ethernet (PoE) state
- Media type (gigabit Ethernet ports only)
- Load sharing (see “Viewing and Changing Port Groups” on page 184)

Viewing Port Settings

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, click the plus sign next to the WX switch.
- 3 Click the plus sign next to System.
- 4 Select **Ports**.

The ports and their configuration settings appear in the Content panel. The 10/100 Ethernet ports and the gigabit Ethernet ports (if the switch has them) are listed separately.

Changing Port Settings

To change settings for a port, edit the row of information for the port.

- 1 In the Name box, type a name for the port (1 to 16 alphanumeric characters, with no spaces or tabs).
- 2 To enable the port, select **Enabled**. To disable the port, clear **Enabled**. By default, the port is enabled.

- 3 To specify the speed of a 10/100 Ethernet port, select one of the following:
 - **Auto**—Sets the port to automatically detect the traffic speed and set the speed accordingly. This is the default value.
 - **10**—Sets the speed to 10 Mbps.
 - **100**—Sets the speed to 100 Mbps.

The port speed for gigabit Ethernet ports is predefined as 1000 Mbps and cannot be configured.

- 4 To specify the operating mode of a 10/100 Ethernet port, select **Half** for half-duplex or **Full** for full-duplex mode.
- 5 To enable PoE on a 10/100 Ethernet port, select **PoE Enabled**.



CAUTION: *If you enable PoE on a port connected to a device other than a MAP access point, hardware damage can result.*

By default, PoE is disabled. To disable PoE, clear **PoE Enabled**.

- 6 For a gigabit Ethernet port (if supported by the switch), to disable auto-negotiation, clear **Auto-Negotiation**. This option is enabled by default.
- 7 For a gigabit Ethernet port (if supported by the switch), select the interface you want to enable.
 - **GBIC**—Enables the fiber interface and disables the copper interface.
 - **RJ45**—Enables the copper interface and disables the fiber interface.

The port supports only the physical interface you select. The other interface is disabled. The port cannot dynamically switch between one interface and the other.

- 8 Click **Save**.

Enabling Link Notifications

By default, notifications for link state changes are disabled. If you enable them, SNMP link traps are sent when the port state changes, and 3WXM also polls and monitors the port's status. To generate the LinkDown and LinkUp SNMP traps, you must enable this option.



You also must globally enable SNMP traps. See "Configuring a Notification Target" on page 191.

- 1 Access the port table:
 - a Select the Configuration tool bar option.

- b** In the Organizer panel, click the plus sign next to the WX switch.
 - c** Click the plus sign next to System.
 - d** Select **Ports**.
- 2** Select the port.
 - 3** Click **Properties**.
 - 4** Select **SNMP Link Traps**.
 - 5** Click **OK**.

Configuring a Port for a Directly Connected AP

A MAP access port directly connects the WX switch to a MAP. The port also can provide power to the MAP.



A Distributed MAP, which is connected to WX switches through intermediate Layer 2 or Layer 3 networks, does not use a MAP access port. To configure for a Distributed MAP, see “Viewing and Configuring MAPs” on page 272.

- 1** Access the Create AP wizard:
 - a** Select the Configuration tool bar option.
 - b** In the Organizer panel, click the plus sign next to the WX switch.
 - c** Click the plus sign next to System.
 - d** Select **Ports**.
 - e** Select **PoE Enabled**, if you have not already done so.
 - f** In the Task List panel, select **AP**.
- 2** To change the name, edit the string in the Name field. (The name can contain up to 16 alphanumeric characters, with no spaces or tabs).
- 3** Click **Next**.
- 4** To change the model, select the model from the AP Model pull-down list.
- 5** To change the radio type, select it from the AP Radio Type drop-down list:
 - **11a**—802.11a
 - **11b**—802.11b only
 - **11g**—802.11b/g

The radio type is configurable on single-radio MAP models. For dual-radio models, the radio type is configurable on the 802.11b/g radio.

6 Click **Next**.



The non-editable number (1 or 2) indicates the radio number on the MAP.

7 To enable the radio, select **Enabled**.

8 In the Channel Number list, select the channel number for the radio.



If RF Auto-Tuning for channel configuration is enabled, setting this value has no effect. The channel number is controlled by RF Auto-Tuning.

9 In the Transmit Power box, specify the transmit power for the radio.



If RF Auto-Tuning for power configuration is enabled, setting this value has no effect. The power level is controlled by RF Auto-Tuning.

10 Click **Finish**.

Configure a Port for Wired Authentication

A wired authentication port is an Ethernet port that has 802.1X authentication enabled for access control. Like wireless users, users that are connected to the WX switch over Ethernet can be authenticated before they can be authorized to use the network. However, data for wired users is not encrypted after they are authenticated.



For 802.1X clients, wired authentication works only if the clients are directly attached to the wired authentication port, or are attached through a hub that does not block forwarding of packets from the client to the PAE group address (01:80:c2:00:00:03). Wired authentication works in accordance with the 802.1X specification, which prohibits a client from sending traffic directly to an authenticator's MAC address until the client is authenticated. Instead of sending traffic to the authenticator's MAC address, the client sends packets to the PAE group address. The 802.1X specification prohibits networking devices from forwarding PAE group address packets, because this would make it possible for multiple authenticators to acquire the same client.

For non-802.1X clients, who use MAC authentication, WebAAA, or last-resort authentication, wired authentication works if the clients are directly attached or indirectly attached.



If you plan to specify a RADIUS server group, configure the group first, before using the wizard. The wizard does not provide a way to configure RADIUS servers or groups. (See "Viewing and Configuring RADIUS Settings" on page 298.)

- 1 Access the Configure Wired Auth wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to System.
 - d Select **Ports**.
 - e Select the row for the port.
 - f In the Task List panel, select **Wired Auth**.
- 2 Select the fallthru authentication method from the Fall Through Authentication list box. The WX switch uses the fallthru method to try to authenticate a client if the client name or MAC address does not match the userglob or MAC address glob in an 802.1X or MAC authentication rule for the SSID. You can select one of the following:
 - Open Access—Automatically authenticates the client and allows access to the SSID requested by the client, without requiring a username and password from the client.
 - Web Portal—Serves the client a web page from the WX switch's nonvolatile storage for login to the SSID.
 - None—Denies authentication and prohibits the client from accessing the SSID. This is the default.



The fallthru authentication method is attempted only if the switch does not have an 802.1X or MAC authentication rule for wired access that matches the client's username or MAC address, and the client is not denied by either method.



Web Portal requires the Web Portal server on the WX switch to be enabled. The Web Portal server is enabled by default. (See "Viewing and Changing Management Settings" on page 186.)

- 3 In the Maximum Sessions column, type the maximum number of sessions allowed on the port (1 up to as many as you need). The default is 1.
- 4 Click **Next**.
- 5 To use 802.1X authentication to control access to the port, create an 802.1X authentication rule or use one already configured for wired access. Otherwise, go to step 6.

To create a new rule:

- a Click **Create**.

- b** Specify the user glob in the Matching User Glob box. To match on all usernames, leave the wildcards (**) in the box. (For syntax information, see “Access Rules” on page 238.)

To use an existing rule, leave the rule in the list.

- c** Click **Next**.

- d** Select the EAP type:

- **EAP-MD5 Offload**
- **PEAP Offload**
- **Local EAP-TLS**
- **External RADIUS Server**

If you select PEAP, the EAP Sub-Protocol is MS-CHAPV2. For other protocols, the EAP Sub-Protocol is None.

(For information, see “EAP Type (802.1X Only)” on page 239.)

- e** Click **Next**.

- f** Select the authentication and accounting method.

(For information, see “AAA Methods (RADIUS Server Groups and the Local User Database)” on page 240.)

- g** Click **Next**.

- h** To configure accounting, select Enabled, select the record type (Start-Stop or Stop-Only), then select a RADIUS server group or LOCAL for the accounting and click **Add**.

- i** Click **Finish**.

- j** Click **Next**.

- 6** To use MAC authentication to control access to the port, create or select a MAC authentication rule. Otherwise, go to step 7.

If a MAC access rule for this port has already been configured, the rule appears in the list on this page. You can select the rule or create a new one.

To create a new rule:

- a** Click **Create**.

- b** Specify the MAC address glob in the Matching MAC Glob box. To match on all MAC addresses, leave the wildcard (*) in the box. (For syntax information, see “Access Rules” on page 238.)

To use an existing rule, leave the rule in the list.

c Click **Next**.

d Select the authentication and accounting method (RADIUS server group or local database).

(For information, see “AAA Methods (RADIUS Server Groups and the Local User Database)” on page 240.)

e Click **Next**.

f To configure accounting, select **Enabled**, select the record type (Start-Stop or Stop-Only), then select LOCAL or a RADIUS server group for the accounting and click **Add**.

g Click **Finish**.

- If you selected None in step 2, you are finished with this procedure.
- If you selected Web Portal in step 2, go to step 7.
- If you selected Open Access in step 2, go to step 11.

7 If you selected Web Portal in step 2, select the VLAN to which you want the switch to assign Web Portal users. Otherwise, go to step 11.

8 Click **Next**.

The ACEs (ACL rules) that 3WXM will configure for the Web-Portal service are listed. The ACEs are required to allow DHCP traffic while blocking all other traffic while a user is being authenticated. These ACEs are used only during authentication. After the user is authenticated, the ACEs are not used.

If you need to add ACEs, continue with this step. Otherwise, go to step 9.

- To add an ACE, click **Add Rule**. 3WXM adds an ACE to the end of the list. The ACE matches on all source and destination IP addresses and denies them.
- To modify an ACE, select the part of the ACE you want to modify, and edit or select the new value. (For information about ACE settings, see “Viewing and Configuring ACLs” on page 220.)



CAUTION: Do not change the deny rule at the bottom of the ACL. This rule must be present and the capture option must be used with the rule. If the rule does not have the capture option, the Web Portal user never receives a login page.

9 Click **Next**.

- 10** Create a Web Portal authentication rule to control access to the port, or use one that has already been created.

To create a new rule:

- a** Click **Create**.
- b** Specify the user glob in the Matching User Glob box. To match on all usernames, leave the wildcards (**) in the box. (For syntax information, see "Access Rules" on page 238.)

To use an existing rule, leave the rule in the list.

- c** Click **Next**.
- d** Select the authentication and accounting method (RADIUS server group or local database).
(For information, see "AAA Methods (RADIUS Server Groups and the Local User Database)" on page 240.)
- e** Click **Next**.
- f** To configure accounting, select **Enabled**, select the record type (Start-Stop or Stop-Only), then select LOCAL or a RADIUS server group for the accounting and click **Add**.
- g** Click **Finish**.
 - If you selected Local as an authentication method, the users in the local database are listed. Go to step 12.
 - If you did not select LOCAL, click **Finish** to close the wizard and save the changes. You are finished with this procedure.

- 11** If you selected Open Access in step 2, select the VLAN to which you want the switch to assign users. Otherwise, go to step 12.

Click **Finish** to close the wizard and save the changes. You are finished with this procedure.

- 12** Click **Next**.

If you selected LOCAL as an authentication method, the users in the switch's local database are listed. For convenience, you can add, modify, or delete users on this page. To add a user, click **Create** and see "Creating a Named User" on page 289. To modify a user, select the user and click **Properties**. To delete a user, select the user and click **Delete**.



If you select Web Portal in step 2, 3WXM automatically creates a user named web-portal-wired. Similarly, if you select Open Access, 3WXM creates a user called last-resort-wired. Do not delete or modify these users.

(You can add, modify, or delete users at any time, even after this wizard is closed. See “Creating and Managing Users in the Local User Database” on page 287.)

13 Click **Finish**.

Viewing and Changing Port Groups

A port group is a set of physical ports that function together as a single link and provide load sharing and link redundancy. Only network ports can participate in a port group.

The WX balances port group traffic among the group’s physical ports by assigning traffic flows to ports based on the source and destination MAC addresses of the traffic. The WX assigns a traffic flow to an individual port in the group and uses the same port for all subsequent traffic for that flow.

A port group ensures link stability by providing redundant connections for the same link. If an individual port in a group fails, the WX reassigns traffic to the remaining ports. When the failed port starts operating again, the WX begins using it for new traffic flows. Traffic that belonged to the port before it failed continues to be assigned to other ports.

Layer 2 configuration changes apply collectively to a port group as a whole but not to individual ports within the group. For example, Spanning Tree Protocol (STP) changes affect the entire port group rather than individual ports. When you make Layer 2 configuration changes, you can use a port group name in place of the port list. Ethernet port statistics continue to apply to individual ports and not to port groups.

Viewing Port Groups To view port groups:

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, click the plus sign next to the WX switch.
- 3 Click the plus sign next to System.
- 4 Select **Port Groups**.

The configured port groups and their member ports appear in the Content panel.

Creating a Port Group To create a port group:

- 1 In the Task List panel, select Port Group.
The Create Port Group wizard appears.
- 2 In the Port Group Name box, type the name of the port group (1 to 16 alphanumeric characters, with no spaces or tabs).
- 3 Click **Next**. The Port Group Selection page appears.
- 4 To add a port to the port group, select the Member checkbox for the port.
- 5 To remove a port from a port group, clear the Member checkbox for the port.
- 6 To change the membership of a port that is in another port group, select the Member checkbox for the port.
The Port Group Member Remove dialog box appears. Click **Yes** to change the port's membership. Click **No** to leave the membership unchanged.
- 7 Click **Finish**.

Changing a Port Group To change a port group:

- 1 In the Content panel, select the row for the port group.
- 2 Click **Properties**.
The Port Group Properties wizard appears.
- 3 To add a port to the port group, select the Member checkbox for the port. The port group name appears in the Port Group column for the port.
- 4 To remove a port from a port group, clear the Member checkbox for the port.
- 5 To change the membership of a port that is in another port group, select the Member checkbox for the port.
The Port Group Member Remove dialog box appears. Click **Yes** to change the port's membership. Click **No** to leave the membership unchanged.
- 6 Click **Finish**.

Viewing and Changing Management Settings

By default, HTTPS is enabled on the WX, allowing you to use Web Management on port 443 for a secure session. If you disable HTTPS, you cannot use Web Management. 3WXM communications also use HTTPS, but 3WXM is not affected by the HTTPS configuration on the WX. For 3WXM, HTTPS is always enabled and listens on port 8889.

Viewing Management Service Settings

To view management service settings:

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, click the plus sign next to the WX switch.
- 3 Click the plus sign next to System.
- 4 Select **Management Services**.

The management services and their settings appear in the Content panel.

Changing Management Service Settings

To change management service settings:

- 1 To enable or disable a management service, select or deselect it by clicking the checkbox next to the service name.

For example, to enable Telnet, click the checkbox to place a checkmark in the box.

You can individually enable or disable the following management services:

- HTTPS
 - Telnet
 - SSH
 - Web Portal
 - SNMP
- 2 To change the Telnet service port, select or type the new port number in the Port box next to Telnet. The default TCP port is 23.
 - 3 To change the idle timeout for CLI management sessions, edit the value in the Idle Timeout checkbox.

You can specify from 0 to 86400 seconds (one day). The default is 3600 (one hour). If you specify 0, the idle timeout is disabled. The timeout interval is in 30-second increments. For example, the interval can be 0, or 30 seconds, or 60 seconds, or 90 seconds, and so on. If you enter an interval that is not divisible by 30, the switch rounds up to the next 30-second increment. For example, if you enter 31, the switch rounds up to 60.

This option applies to all types of CLI management sessions: console, Telnet, and SSH. The timeout change applies to new sessions only, not to existing sessions.

- 4 To configure SNMP settings, go to "Configuring SNMP". Otherwise, click **Save**.

Configuring SNMP

On each switch in the network plan, you must enable notifications and configure 3WXM Services as a notification target (trap receiver). 3WXM Services does not start listening for SNMP notifications from a WX switch until you add 3WXM Services as an SNMP notification target to the switch. (For simple configuration of 3WXM Services as an SNMP notification target, see "Setting Up a Switch" on page 167.)

- 1 Click the checkbox next to SNMP to enable it, if you have not already done so. By default, SNMP is disabled.
- 2 To change the minimum level of security MSS requires for SNMP, select one of the following from the Security Level drop-down list:
 - **Unsecured**—SNMP message exchanges are not secure. This is the default, and is the only value supported for SNMPv1 and SNMPv2c. (This security level is the same as the noAuthNoPriv level described in SNMPv3 RFCs.)
 - **Authenticated**—SNMP message exchanges are authenticated but are not encrypted. (This security level is the same as the authNoPriv level described in SNMPv3 RFCs.)
 - **Encrypted**—SNMP message exchanges are authenticated and encrypted. (This security level is the same as the authPriv level described in SNMPv3 RFCs.)
 - **AuthRequest-UnsecuredNotify**—SNMP message exchanges are authenticated but are not encrypted, and notifications are neither authenticated nor encrypted.

The only security level supported for SNMPv1 and SNMPv2c is Unsecured.

- 3 Select the version(s) of SNMP you want the switch to run:
 - **V1**
 - **V2c**
 - **USM** (SNMPv3)
- 4 See the following sections for more configuration options.

Configuring an SNMP V1 or V2c Community String

- 1 Access the Create Community wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to System.
 - d Select **Management Services**.
 - e In the Task List panel, select **Community**.
- 2 In the Community String box, type the name of the community. The name can be 1 to 32 alphanumeric characters, with no spaces or tabs.



Community string names are transmitted in clear text.



*If you enable SNMP service on the WX, 3Com recommends that you do not use the well-known strings **public** (for READ) or **private** (for WRITE). These strings are commonly used and can easily be guessed.*

- 3 Select the access type.
 - **read-only**—An SNMP management application using the string can get (read) object values on the switch but cannot set (write) them. This is the default.
 - **read-notify**—An SNMP management application using the string can get object values on the switch but cannot set them. The switch can use the string to send notifications.
 - **notify-only**—The switch can use the string to send notifications.
 - **read-write**—An SNMP management application using the string can get and set object values on the switch.
 - **notify-read-write**—An SNMP management application using the string can get and set object values on the switch. The switch can use the string to send notifications.
- 4 Click **OK**.

Configuring a USM (SNMP V3) User

- 1 Access the Create USM User wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to System.
 - d Select **Management Services**.
 - e In the Task List panel, select **USM User**.
- 2 In the Username box, type the name of the SNMPv3 user. The name can be 1 to 32 alphanumeric characters, with no spaces or tabs.
- 3 Select the access type.
 - **read-only**—An SNMP management application using the string can get (read) object values on the switch but cannot set (write) them. This is the default.
 - **read-notify**—An SNMP management application using the string can get object values on the switch but cannot set them. The switch can use the string to send notifications.
 - **notify-only**—The switch can use the string to send notifications.
 - **read-write**—An SNMP management application using the string can get and set object values on the switch.
 - **notify-read-write**—An SNMP management application using the string can get and set object values on the switch. The switch can use the string to send notifications.
- 4 Specify the Engine ID, which is the unique identifier for this instance of the SNMP engine:
 - a Select the format:
 - **Hex**—ID is a hexadecimal string.
 - **IP**—ID is based on the IP address of the station running the management application. Enter the IP address of the station. MSS calculates the engine ID based on the address.
 - **LocalID**—Uses the value computed from the switch's system IP address.

To send informs, you must specify the engine ID of the inform receiver. To send traps and to allow get and set operations and so on, specify **local** as the engine ID.

- b If you select Hex or IP, type the hexadecimal string or IP address in the Value box and click **Next** and go to step 5. Otherwise, click **Finish**.
- 5 Select the authentication type used to authenticate communications with the remote SNMP engine:
 - **None**—No authentication is used. This is the default.
 - **MD5**—Message-digest algorithm 5 is used.
 - **SHA**—Secure Hashing Algorithm (SHA) is used.
- 6 If you select MD5 or SHA, you can specify a passphrase or a hexadecimal key:
 - a Select the format from the Format pull-down list.
 - b Type the value in the Password box.
 - If you selected Key as the format, type a 16-byte hexadecimal string for MD5 or a 20-byte hexadecimal string for SHA.
 - If you selected Pass Phrase as the format, type a string at least 8 characters long.
- 7 Select the encryption type used for SNMP traffic:
 - **None**—No encryption is used. This is the default.
 - **DES**—Data Encryption Standard (DES) encryption is used.
 - **3DES**—Triple DES encryption is used.
 - **AES**—Advanced Encryption Standard (AES) encryption is used.
- 8 If you select DES, 3DES, or AES, you can specify a passphrase or a hexadecimal key:
 - a Select the format from the Format pull-down list.
 - b Type the value in the Password box.
 - If you selected Key as the format, type a 16-byte hexadecimal string.
 - If you selected PassPhrase as the format, type a string at least 8 characters long for DES or 3DES, or at least 12 characters long for AES.
- 9 Click **Finish**.

Configuring a Notification Profile

A *notification profile* is a named list of all the notification types that can be generated by a switch, and for each notification type, the action to take (drop or send) when an event occurs.

- 1 Access the Create Notification Profile wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to System.
 - d Select Management Services.
 - e In the Task List panel, select Notification Profile.
- 2 In the Profile Name box, type the name of the notification profile. The name can be 1 to 32 alphanumeric characters, with no spaces or tabs.
- 3 Click the checkbox next to each notification type you want to enable. To enable all notification types, click the Enable checkbox at the top of the list.
- 4 Click **Finish**.

Configuring a Notification Target

A notification target is a remote device to which MSS sends SNMP notifications. You can configure the MSS SNMP engine to send confirmed notifications (informs) or unconfirmed notifications (traps). The available options differ depending on the SNMP version and the type of notification you specify.



To monitor a switch using 3WXM Services, you must configure 3WXM Services to be one of the switch's notification targets.



3WXM Services does not start listening for SNMP notifications from the WX switches in the network plan until you save the network plan.

- 1 Access the Create Notification Target wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to System.
 - d Select Management Services.
 - e In the Task List panel, select Notification Target.

- 2 Specify the target ID.
- 3 Type the IP address of the target.
- 4 Specify the protocol port on which the target listens for SNMP notifications. The default is 162.
- 5 Click **Next**.
- 6 Select the notification profile that will use this target.

To view the profile's notification types, or to enable or disable notification types:

- a Click **Properties**.
- b Click the checkbox next to each notification type you want to enable or disable. To enable or disable all notification types, click the Enable checkbox at the top of the list.

To create a new profile:

- a Select Create new Notification Profile and click **Next**.
 - b In the Profile Name box, type the name of the notification profile. The name can be 1 to 32 alphanumeric characters, with no spaces or tabs.
 - c Click **Next**.
 - d Click the checkbox next to each notification type you want to enable. To enable all notification types, click the Enable checkbox at the top of the list.
 - e Click **Next**.
- 7 From the Security Model drop-down list, select the SNMP version.
 - 8 For USM (SNMPv3), select the security type:
 - **Unsecured**—SNMP message exchanges are not secure. This is the default, and is the only value supported for SNMPv1 and SNMPv2c. (This security level is the same as the noAuthNoPriv level described in SNMPv3 RFCs.)
 - **Authenticated**—SNMP message exchanges are authenticated but are not encrypted. (This security level is the same as the authNoPriv level described in SNMPv3 RFCs.)
 - **Encrypted**—SNMP message exchanges are authenticated and encrypted. (This security level is the same as the authPriv level described in SNMPv3 RFCs.)

9 Click **Next**.

- If you selected V1 or V2C in step 7, go to step 10.
- If you selected USM in step 7, go to step 12.

10 For SNMPv1 or SNMPv2c, select or create the SNMP community string.

If a community string with access type read-write-notify, read-notify, or notify-only is already configured, you can select it. Otherwise, you must create a new one. You also can create a new community string even if one is already configured.

To create a new SNMP community string:

- a If a list of community string is displayed, select Create new Community and click **Next**.
- b In the Community String box, type the name of the community. The name can be 1 to 32 alphanumeric characters, with no spaces or tabs.



Community string names are transmitted in clear text.



*If you enable SNMP service on the WX, 3Com recommends that you do not use the well-known strings **public** (for READ) or **private** (for WRITE). These strings are commonly used and can easily be guessed.*

- c Select the access type.
 - **read-notify**—An SNMP management application using the string can get object values on the switch but cannot set them. The switch can use the string to send notifications.
 - **notify-only**—The switch can use the string to send notifications.
 - **notify-read-write**—An SNMP management application using the string can get and set object values on the switch. The switch can use the string to send notifications.

11 Click **Next** and go to step 14.

12 For USM (SNMPv3), select or create the USM user.

If a USM user with access type read-write-notify, read-notify, or notify-only is already configured, you can select it. Otherwise, you must create a new one. You also can create a new USM user even if one is already configured.

To create a new USM user:

- a If a list of USM users is displayed, select Create new USM User and click **Next**.

- b In the Username box, type the name of the SNMPv3 user. The name can be 1 to 32 alphanumeric characters, with no spaces or tabs.
- c Select the access type.
 - **read-notify**—An SNMP management application using the string can get object values on the switch but cannot set them. The switch can use the string to send notifications.
 - **notify-only**—The switch can use the string to send notifications.
 - **notify-read-write**—An SNMP management application using the string can get and set object values on the switch. The switch can use the string to send notifications.
- d Select the Engine ID format:
 - **Hex**—ID is a hexadecimal string.
 - **IP**—ID is based on the IP address of the station running the management application. Enter the IP address of the station. MSS calculates the engine ID based on the address.
 - **LocalID**—Uses the value computed from the switch's system IP address.

To send informs, you must specify the engine ID of the inform receiver. To send traps and to allow get and set operations and so on, specify **local** as the engine ID.

If you select Hex or IP, type the hexadecimal string or IP address in the Value box.

To configure authentication and encryption settings, finish this procedure, then select the USM user and click **Properties**.

- 13 Click **Next**.
- 14 For SNMPv2c or SNMPv3, select the notification type:
 - **Inform**—The switch expects to receive acknowledgements from the notification target.
 - **Trap**—The switch does not expect to receive acknowledgements from the notification target.
- 15 To change the acknowledgement settings for informs, specify the following:
 - a In the Timeout box, specify the number of seconds you want the switch to wait for acknowledgement of a notification. You can specify from 1 to 5 seconds. The default is 2.

- b In the Retry Count box, specify the number of times the MSS SNMP engine will resend a notification that has not been acknowledged by the target. You can specify from 0 to 3 retries. The default is 0.

16 Click **Finish**.

Modifying a USM User, Notification Profile, or Notification Target



- 1 Select the object you want to modify.
- 2 Click **Properties**.
- 3 Make the changes.
- 4 Click **OK**.

For information about the settings you can modify, see the descriptions in the following sections:

- “Configuring a USM (SNMP V3) User” on page 189
- “Configuring a Notification Profile” on page 191
- “Configuring a Notification Target” on page 191

Configuring 3WXM Services as a Notification Target

- 1 Access the Setup 3WXM Notification Target wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to System.
 - d Select **Management Services**.
 - e In the Task List panel, select **3WXM Notification Target**.
- 2 In the Security Model drop-down list, select the security model to use specifically for SNMP communications between the switch and 3WXM:
 - **USM** (SNMPv3)
 - **V1**
- 3 If you selected USM, then select the minimum level of security for SNMP communication between the switch and 3WXM Services:
 - **Unsecured**—SNMP message exchanges are not secure. This is the default, and is the only value supported for SNMPv1 and SNMPv2c. (This security level is the same as the noAuthNoPriv level described in SNMPv3 RFCs.)

- **Authenticated**—SNMP message exchanges are authenticated but are not encrypted. (This security level is the same as the authNoPriv level described in SNMPv3 RFCs.)
 - **Encrypted**—SNMP message exchanges are authenticated and encrypted. (This security level is the same as the authPriv level described in SNMPv3 RFCs.)
- 4 Click **Next**.
- If you selected V1 or V2C in step 2, go to step 5.
 - If you selected USM in step 2, go to step 7.
- 5 For SNMPv1 or SNMPv2c, select or create the SNMP community string. If a community string with access type read-write-notify, read-notify, or notify-only is already configured, you can select it. Otherwise, you must create a new one. You also can create a new community string even if one is already configured.
- To create a new SNMP community string:
- a If a list of community string is displayed, select Create new Community and click **Next**.
 - b In the Community String box, type the name of the community. The name can be 1 to 32 alphanumeric characters, with no spaces or tabs.
-  *Community string names are transmitted in clear text.*
-  *If you enable SNMP service on the WX, 3Com recommends that you do not use the well-known strings **public** (for READ) or **private** (for WRITE). These strings are commonly used and can easily be guessed.*
- c Select the access type.
 - **read-notify**—An SNMP management application using the string can get object values on the switch but cannot set them. The switch can use the string to send notifications.
 - **notify-only**—The switch can use the string to send notifications.
 - **notify-read-write**—An SNMP management application using the string can get and set object values on the switch. The switch can use the string to send notifications.
- 6 Click **Next** and go to step 14.
- 7 For USM (SNMPv3), select or create the USM user.

If a USM user with access type read-write-notify, read-notify, or notify-only is already configured, you can select it. Otherwise, you must create a new one. You also can create a new USM user even if one is already configured.

To create a new USM user:

- a If a list of USM users is displayed, select Create new USM User and click **Next**.
- b In the Username box, type the name of the SNMPv3 user. The name can be 1 to 32 alphanumeric characters, with no spaces or tabs.
- c Select the access type.
 - **read-notify**—An SNMP management application using the string can get object values on the switch but cannot set them. The switch can use the string to send notifications.
 - **notify-only**—The switch can use the string to send notifications.
 - **notify-read-write**—An SNMP management application using the string can get and set object values on the switch. The switch can use the string to send notifications.
- d Select the Engine ID format:
 - **Hex**—ID is a hexadecimal string.
 - **IP**—ID is based on the IP address of the station running the management application. Enter the IP address of the station. MSS calculates the engine ID based on the address.
 - **LocalID**—Uses the value computed from the switch's system IP address.

To send informs, you must specify the engine ID of the inform receiver. To send traps and to allow get and set operations and so on, specify **local** as the engine ID.

If you select Hex or IP, type the hexadecimal string or IP address in the Value box.

To configure authentication and encryption settings, finish this procedure, then select the USM user and click **Properties**.

8 Click **Finish**.

Viewing and Setting Log and Trace Settings

System logs provide information about system events that you can use to monitor and troubleshoot MSS. Event messages for the WX switch and its attached MAPs can be stored or sent to the following destinations:

- Stored in a local buffer on the WX
- Displayed on the WX console port
- Displayed in an active Telnet session
- Sent to one or more syslog servers, as specified in RFC 3164

The system log is a file in which the newest record replaces the oldest. These entries are preserved in nonvolatile memory through system reboots.

Traces enable you to perform diagnostic routines. You can set a trace with a keyword, such as **authentication** or **sm**, to trace activity for a particular feature, such as authentication or the session manager.



CAUTION: *Setting traces can have adverse effects on system performance. 3Com recommends that you use the lowest levels possible for initial trace commands, and slowly increase the levels to get the data you need.*

Viewing Log Settings

To view log settings:

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, click the plus sign next to the WX switch.
- 3 Click the plus sign next to System.
- 4 Select Log.

The log and trace settings appear in the Content panel.

Changing Log Settings

To change log settings:

- 1 To enable logging to the local buffer on the WX, select **Enabled**. To disable the option, clear **Enabled**.
- 2 In the Severity Filter list, select the lowest level of severity to be logged:
 - **Emergency**—The WX is unusable.
 - **Alert**—Action must be taken immediately.

- **Critical**—You must resolve the critical condition. If you do not resolve the condition, the WX can reboot or shut down.
- **Error**—The WX is missing data or unable to form a connection.
- **Warning**—A possible problem exists.
- **Notice**—Events that can cause system problems have occurred. These are logged for diagnostic purposes.
- **Info**—Informational messages only. No problems exist.
- **Debug**—Output from debugging.
The default severity level is Error.



The debug level produces a lot of messages, many of which can appear to be somewhat cryptic. Debug messages are used primarily by 3Com for troubleshooting and are not intended for administrator use.

- 3 Configure logging to the console:
 - a To specify that logging messages be sent to the console, select **Enabled**. Clear **Enabled** to disable the logging of messages to the console.
 - b In the Severity Filter list, select the lowest level of severity of the event or condition to be logged (see the list in step 2).
The default severity level is Error.
- 4 Configure logging to the current login session:
 - a To specify that logging messages be sent to the current login session, select **Enabled**. Clear **Enabled** to disable the logging of messages sent to the current login session.
 - b In the Severity Filter list, select the lowest level of severity of the event or condition to be logged (see the list in step 2).
The default severity level is Info.
- 5 Configure trace logging:
 - a To enable trace logging, select **Enabled**. Clear **Enabled** to disable trace logging.
 - b In the Severity Filter list, select the lowest level of severity of the event or condition to be logged (see the list in step 2).
The default severity level is Debug.
 - c In the Maximum Size box, specify the maximum size for the trace log (1 to 50 MB). The default is 1 MB.
- 6 To create an external log server, go to “Creating an External Log Server”. Otherwise, click **Save**.

Creating an External Log Server

You can specify a syslog server. Syslog facilities are identifiers that allow a syslog server to handle different syslog messages from different sources. You can use a facility in the range of Local 0 through Local 7.

- 1 Access the Create Syslog Server wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to System.
 - d Select Log.
 - e In the Task List panel, select Syslog Server.
- 2 In the IP Address box, type the IP address of the syslog server.
- 3 In the Severity Filter list, select the lowest level of severity of the event or condition to be logged (see the list in step 2 on page 198). The default severity level is Error.
- 4 To map all the facilities to a standard local facility, select **Facility Mapping**.
Some syslog servers require the facility to be set to a standard local facility name.
- 5 In the Map to Local Facility List, select the local facility (Local 0 to Local 7) that all the facilities are mapped to. The default value is Local 0.
- 6 Click **Finish**.

Creating a Trace Area

- 1 Access the Create Trace Area wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to System.
 - d Select Log.
 - e In the Task List panel, select Trace Area.
- 2 In the Area box, type the name of the trace type you want to activate.
For a list of valid trace types, access the CLI and enter the following command: **trace ?**

- 3 Optionally, in the Level box, specify the amount of information included in the trace output (0 to 10). 0 provides the minimum amount of information and 10 provides the maximum amount of information. The default is 5.
- 4 Optionally, in the User Name box, type the username to trace.
Specify a username no longer than 60 alphanumeric characters that contains no spaces or tab characters.
- 5 Optionally, in the MAC Address box, type the MAC address to trace.
Specify a MAC address, using colons to separate the octets (for example, 00:11:22:aa:bb:cc).
- 6 Optionally, in the Port Name box, type the port number to trace.
- 7 Click **Finish**.

Viewing and Configuring IP Services Settings

You can configure the following IP services:

- Static routes
- IP aliases
- Domain Name System (DNS) service
- Network Time Protocol (NTP) service
- Address Resolution Protocol (ARP) entries

Viewing IP Services Setting

To view IP services setting:

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, click the plus sign next to the WX switch.
- 3 Click the plus sign next to System.
- 4 Select IP Services.

The IP services settings appear in the Content panel.

Creating a Static Route

The IP routing table contains routes that MSS uses for determining the interfaces for a WX switch's external communications. When you add an IP interface to a VLAN that is up, MSS automatically adds corresponding entries to the IP routing table.

For destination routes that are not directly attached, you can add static routes. A static route specifies the destination and the gateway router through which to forward traffic. You can add the following types of static routes:

- Explicit route—Forwarding path for traffic to a specific destination
- Default route—Forwarding path for traffic to a destination without an explicit route

If the IP routing table contains an explicit route for a given destination, MSS uses the route. Otherwise, MSS uses a default route.

(For more information about static routes, see the "Configuring and Managing IP Routes" section in the "Configuring and Managing IP Interfaces and Services" chapter of the [Wireless LAN Switch and Controller Configuration Guide](#).)

To create a static route:

- 1 Access the Create Route wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to System.
 - d Select **IP Services**.
 - e In the Task List panel, select **Route**.
- 2 To configure a default route, select **Default Route** and go to step 3. Otherwise, in the Destination IP Address box, type the destination IP address and subnet mask in classless interdomain routing (CIDR) notation (for example, 10.10.0.0/16).
- 3 In the Gateway box, type the IP address of the gateway that the route uses.
- 4 In the Metric box, specify the cost for using the route (0 to 2,147,483,647). Lower-cost routes are preferred. The default is 1.
- 5 Click **Finish**.

Create an IP Alias You can map an IP address to a name by creating an IP alias. For example, if you create an IP alias *carmel* for IP address 10.20.30.40, you could type **telnet carmel** rather than **telnet 10.20.30.40**. You can use IP aliases in conjunction with DNS. If you use IP aliases and DNS is enabled, the WX looks up IP aliases before checking for entries on a DNS server.

- 1 Access the Create IP Alias wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to System.
 - d Select **IP Services**.
 - e In the Task List panel, select **IP Alias**.
- 2 In the Host Name box, type the name of the IP alias (1 to 32 characters, with no spaces or tabs).



*You cannot use the word **all** as the name of an IP alias.*

- 3 In the Host IP Address box, type the IP address that the IP alias is mapped to.
- 4 Click **Finish**.

Configuring DNS You can configure the WX switch to resolve hostnames to their IP addresses by querying a Domain Name Service (DNS) server. By enabling DNS, you can specify a hostname rather than an IP address. For example, rather than typing **telnet 10.1.2.3**, you could type **telnet monterey.example.com**. By default, DNS is not enabled. You can specify one primary DNS server and up to five secondary DNS servers.

You configure DNS by performing the following tasks:

- Enable the DNS client and configure a default domain name for DNS queries.
- Specify the IP addresses of the DNS servers.

To enable DNS and create a DNS server:

- 1 Under DNS in the Content panel, select **Enabled**.
- 2 In the Default DNS Domain box, type the default domain suffix that is appended to a hostname if the hostname cannot be resolved as entered. The suffix can be up to 64 characters long with no spaces or tabs.
- 3 Access the Create DNS Server wizard:
 - a Select the Configuration tool bar option.

- b** In the Organizer panel, click the plus sign next to the WX switch.
 - c** Click the plus sign next to System.
 - d** Select **IP Services**.
 - e** In the Task List panel, select **DNS Server**.
- 4** Type the server address in the IP Address box.
 - 5** Select whether the server is primary or secondary.
You can designate only one DNS server as the primary DNS server. All other DNS servers are secondary servers.
 - 6** Click **OK**.

Configuring NTP You can configure a WX switch to use the Network Time Protocol (NTP) to automatically set the system date and time. NTP polls network time servers at regular intervals and synchronizes the system date and time with the servers. By default, NTP is not enabled. You can specify up to three NTP servers.



If NTP is configured on a system whose current time differs from the NTP server time by more than 10 minutes, convergence of the WX time can take many NTP update intervals. 3Com recommends that you set the time manually to the NTP server time before enabling NTP to avoid a significant delay in convergence.

- 1** Under NTP in the Content panel, select **Enabled**.
- 2** To change the interval at which an NTP server is polled, specify its value in seconds (16 to 1024) in the Update Interval box. The default is 64 seconds.
- 3** Access the Create NTP Server wizard:
 - a** Select the Configuration tool bar option.
 - b** In the Organizer panel, click the plus sign next to the WX switch.
 - c** Click the plus sign next to System.
 - d** Select **IP Services**.
 - e** In the Task List panel, select **NTP Server**.
- 4** Type the server address in the IP Address box.
- 5** Click **OK**.

Configuring ARP

The Address Resolution Protocol (ARP) table maps IP addresses to MAC addresses. ARP is enabled by default on the WX and cannot be disabled. An ARP entry is added to the table in one of the following ways:

- Automatically by the WX. The WX adds a local entry for its own MAC address and adds dynamic entries for addresses learned from traffic received by the WX. When the WX receives an IP packet, the WX adds the packet's source MAC address and source IP address to the ARP table.
- By the system administrator. Using 3WXM, you can add permanent entries to the ARP table. Permanent entries do not age out and remain in the table even after the WX is rebooted.

In addition to adding permanent ARP entries, you can set the amount of time unused dynamic entries remain in the table before they are removed.

- 1 In the Aging Time box, specify the amount of time a dynamic entry can remain unused before the entry is removed from the ARP table.

The value range for the aging timeout is 0 to 1,000,000 seconds. The default value is 1200 seconds. To disable aging, specify **0** as the aging timeout.

The local entry for the WX, static entries, and permanent entries in the ARP table are not affected by the aging timeout.

- 2 Access the Create ARP Entry wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to System.
 - d Select **IP Services**.
 - e In the Task List panel, select **ARP Entry**.
- 3 In the MAC Address box, type the MAC address that the IP address is to be mapped to.
- 4 In the IP Address box, type the IP address for the ARP entry.
- 5 Click **Finish**.

Viewing and Configuring VLANs

A virtual LAN (VLAN) is a Layer 2 broadcast domain that can span multiple wired or wireless LAN segments. Each VLAN is a separate logical network, and, if you configure IP interfaces on the VLANs, MSS treats each VLAN as a separate IP subnet.

You configure VLANs on a WX switch's network ports by configuring them on the switch itself. You configure a VLAN by assigning a name and network ports to the VLAN. Optionally, you can assign VLAN tag values on individual network ports. You can configure multiple VLANs on a WX switch's network port. Optionally, each VLAN can have an IP address.

You do not need to configure VLANs on MAP access ports or wired authentication ports, because the VLAN membership of these types of ports is determined dynamically through the authentication and authorization process. Users who require authentication connect through WX ports that are configured for MAPs or wired authentication access. Users are assigned to VLANs automatically through authentication and authorization mechanisms such as 802.1X.

By default, none of a WX switch's ports are in VLANs. A switch cannot forward traffic on the network until you configure VLANs and add network ports to those VLANs.

Users and VLANs

When a user successfully authenticates to the network, the user is assigned to a specific VLAN. A user remains associated with the same VLAN throughout the user's session on the network, even when roaming from one WX switch to another within the Mobility Domain.

You assign a user to a VLAN by setting one of the following attributes on the RADIUS servers or in the local WX user database:

- Tunnel-Private-Group-ID—This attribute is described in RFC 2868, *RADIUS Attributes for Tunnel Protocol Support*.
- VLAN-Name—This attribute is a 3Com vendor-specific attribute (VSA).



You cannot configure the Tunnel-Private-Group-ID attribute in the local user database.

Specify the VLAN name, not the number. If both attributes are used, the WX uses the VLAN name in the VLAN-Name attribute.

Roaming and VLANs

WX switches in a Mobility Domain contain a user's traffic within the VLAN the user is assigned to. For example, if you assign a user to VLAN *red*, the WX switches in the Mobility Domain contain the user's traffic within VLAN *red* configured on the switches.

The WX switch through which a user is authenticated must be a member of the Mobility Domain the user is assigned to. However, you are not required to configure the VLAN on all WX switches in the Mobility Domain. When a user roams to a switch that is not a member of the VLAN the user is assigned to, the switch can tunnel traffic for the user through another switch that is a member of the VLAN. (For more information about Mobility Domains, see "Defining a Mobility Domain" on page 60.)



Because the default VLAN might not be in the same subnet on each switch, 3Com recommends that you do not rename the default VLAN or use it for user traffic. Instead, configure other VLANs for user traffic.

Viewing VLANs

To view VLANs:

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, click the plus sign next to the WX switch.
- 3 Click the plus sign next to System.
- 4 Select **VLANs**.

The VLAN settings appear in the Content panel.

Creating a VLAN

To create a VLAN:

- 1 Access the Create VLAN wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to System.
 - d Select **VLANs**.
 - e In the Task List panel, select **VLAN**.
- 2 In the VLAN Name box, type the name of the VLAN (1 to 16 alphabetic characters long, with no spaces or tabs). You cannot use a number as the first character in a VLAN name.

VLAN names must be globally unique across a Mobility Domain to ensure the intended user connectivity as determined through authentication and authorization.

Every VLAN on a WX has a VLAN name, used for authorization purposes, and a VLAN number. VLAN numbers can vary uniquely for each WX and are not related to 802.1Q tag values even when used.

3 In the VLAN ID box, specify a VLAN number (2 to 4093). The VLAN number must be unique on a particular WX.

4 Click **Next**.

5 From the list of available members, select a port or port group (if you previously created port groups).

If a port or port group is currently a member of a VLAN, the VLAN name is listed in the VLAN(s) column. To make multiple selections, press **Shift** (for contiguous items) or **Control** (for noncontiguous items) while clicking items.

6 Do one of the following:

- To add a port or port group to the VLAN and remove previous VLAN membership, click **Move**.

Moving a port or port group could potentially affect multiple VLANs.

- To add a port or port group to the VLAN and retain previous VLAN membership, click **Add**.

7 Click **Next**.

8 To add an IP interface to the VLAN, do one of the following:

- Statically configure an address by editing the IP address and subnet mask (for example, 10.10.10.10/16).
- Select **DHCP Client** to use a DHCP server to dynamically obtain an IP address for the VLAN.

Generally, VLANs are equivalent to IP subnets. If a WX is connected to the network by only one IP subnet, the WX must have at least one VLAN configured. Optionally, each VLAN can have its own IP address. However, no two IP addresses on the switch can belong to the same IP subnet.



MSS does not support assigning a switch's system IP address to an address received through the DHCP client. 3Com recommends that you use the DHCP client only on WXR100 switches that you plan to configure using the drop-ship method.

9 Select **Interface Enabled** to enable the IP interface.

10 Click **Finish**.

Changing VLAN Membership

A port or port group can be in one or more VLANs. To be in multiple VLANs, the port or group must have an 802.1Q VLAN tag. A tag is a numeric value that identifies a virtual port within the VLAN. The same VLAN can have different tag values on different ports. However, a port can have only one tag value in a given VLAN. A VLAN can also have untagged ports. An untagged port can be a member of only one VLAN.

MSS supports the IEEE 802.1Q tag type, described in the IEEE 802.1Q specification.

The tagging capabilities of the WX are flexible. You can assign 802.1Q tag values on a per-VLAN, per-port basis. The same VLAN can have different tag values on different ports. In addition, the same tag value can be used by different VLANs but on different network ports.

If you use a tag value, 3Com recommends that you use the same value as the VLAN number. MSS does not require the VLAN number and tag value to be the same, but some other vendors' devices do.



Do not assign the same VLAN multiple times using different tag values to the same network port. Although MSS does not prohibit you from doing so, the configuration is not supported.

- 1 Access the VLAN table:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to System.
 - d Select **VLANs**.
- 2 In the Content panel, select the VLAN.
- 3 In the Task List panel, select **Configure VLAN Members**.
- 4 To add a port or port group to the VLAN and remove previous VLAN membership, select the port or port group and click **Move**.

To make multiple selections, press **Shift** (for contiguous items) or **Control** (for noncontiguous items) while clicking items.



Only ports configured as network ports are listed. You cannot add MAPs, Distributed MAPs, or wired authentication ports to a VLAN.

- 5 To add a port or port group to the VLAN and retain previous VLAN membership, select the port or port group and click **Add**.

- 6 To tag a port or port group, select the Tag checkbox.



If you specify a tag value, 3Com recommends that you use the same value as the VLAN number. 3Com switches do not require the VLAN number and tag value to be the same, but some other vendors' devices do.

- 7 To change a tag value, change the number in the Tag Value field.
By default, a port or port group's tag value is the same as the VLAN ID.
- 8 Click **OK**.

Changing VLAN Spanning Tree Settings

The purpose of the Spanning Tree Protocol (STP) is to maintain a loop-free network. A loop-free path is accomplished when a device recognizes a loop in the topology and blocks one or more redundant paths.

Mobility System Software (MSS) supports 802.1D and Per-VLAN Spanning Tree protocol (PVST+).

- MSS uses 802.1D bridge protocol data units (BPDUs) on VLAN ports that are untagged. However, each VLAN still runs its own instance of STP, even if two or more VLANs contain untagged ports. To run a single instance of STP in 802.1D mode on the entire switch, configure all network ports as untagged members of the same VLAN.
- MSS uses PVST+ BPDUs on VLAN ports that are tagged. PVST+ BPDUs include tag information in the 802.1Q field of the BPDUs. MSS runs a separate instance of PVST+ on each tagged VLAN.



When you create a VLAN, STP is disabled on the new VLAN by default, regardless of the STP state of other VLANs on the WX switch.



The IEEE 802.1D spanning tree specifications refer to networking devices that forward Layer 2 traffic as bridges. In this context, a WX switch is a bridge. Where this manual or the product interface uses the term bridge, you can assume the term is applicable to the WX switch.

To change a VLAN's STP settings:

- 1 Access the VLAN table:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to System.
 - d Select **VLANs**.

- 2 In the Content panel, select the VLAN.
- 3 In the Task List panel, select **Configure Spanning Tree**.



This wizard configures STP features for an individual VLAN but does not configure fast convergence features, which are global. (See “Enabling STP Fast Convergence Features” on page 213.)

- 4 To enable STP, click **Enabled**.
- 5 In the Bridge Priority box, specify this STP bridge’s priority (0 to 65,535). The default is 32,768.
The bridge with the lowest priority value becomes the root bridge for the spanning tree.
- 6 In the Max Age box, specify the maximum age value (6 to 40 seconds), which controls how long information from other bridges is kept. The default is 20 seconds.
- 7 In the Hello Time box, specify the interval (1 to 10 seconds) between each configuration message from the root bridge. The default is 2 seconds.
- 8 In the Forward Delay box, specify the amount of time (4 to 30 seconds) a bridge waits after a topology change to begin forwarding data packets. The default is 15 seconds.
- 9 Click **OK**.

Changing STP Port Settings in a VLAN

- 1 Access the VLAN table:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to System.
 - d Select **VLANs**.
- 2 In the Content panel, select the VLAN.
- 3 Click **Properties**.
- 4 Click the Spanning Tree Ports tab.
- 5 To enable spanning tree packet processing (Tx/Rx) on that port, make sure **Enabled** is selected. This is the default.
To disable this feature, clear **Enabled**. If you disable spanning tree packet processing on the port, the following might happen:

- If STP is enabled on the VLAN, spanning tree packets are dropped at the port.
 - If STP is disabled on the VLAN, spanning tree packets are forwarded transparently through the VLAN to and from that port.
- 6** In the Port Priority box, specify a priority value (0 to 255). The default is 128.
- 7** In the Path Cost box, specify a value (0 to 65,535) for the cost. The default depends on the port speed and link type:
- 1000 Mbps, full duplex aggregate link (port group)—3
 - 1000 Mbps, full duplex—4
 - 100 Mbps, full duplex aggregate link (port group)—15
 - 100 Mbps, full duplex—18
 - 100 Mbps, half duplex—19
 - 10 Mbps, full duplex aggregate link (port group)—90
 - 10 Mbps, full duplex—95
 - 10 Mbps, half duplex—100

Specify **0** to use the default cost for the port based on link speed.

- 8** To enable port fast convergence, select the PortFast checkbox.
- Port fast convergence bypasses both the listening and learning stages and immediately places a port in the forwarding state. Use port fast convergence on network ports that are directly connected to servers, hosts, or other MAC stations.



Do not use port fast convergence on ports connected to other bridges.

- 9** Click **OK**.

Enabling STP Fast Convergence Features

The standard STP timers delay traffic forwarding briefly after a topology change. The time a port takes to change from the listening state to the learning state or from the learning state to the forwarding state is called the forwarding delay. In some configurations, this delay is unnecessary.

The WX switch provides the following fast convergence features to bypass the forwarding delay:

- **Backbone fast convergence**—Backbone fast convergence accelerates a port's recovery following the failure of an indirect link. Normally, when a forwarding link fails, a bridge that is not directly connected to the link does not detect the link change until the maximum age timer expires. Backbone fast convergence enables the WX switch to listen for bridge protocol data units (BPDUs) sent by a designated bridge when the designated bridge's link to the root bridge fails, and immediately verifies whether BPDU information stored on a port is still valid. If the BPDU information on the port is no longer valid, the bridge immediately starts the listening stage on the port.



If you plan to use the backbone fast convergence feature, you must enable it on all the bridges in the spanning tree.

- **Uplink fast convergence**—Uplink fast convergence enables a WX switch that has redundant links to the network core to immediately change the state of a backup link to forwarding if the primary link to the root fails. Uplink fast convergence bypasses the listening and learning states to immediately enter the forwarding state.



The uplink fast convergence feature is applicable to bridges that are acting as access switches to the network core (distribution layer) but are not in the core themselves. Do not enable the feature on WX switches that are in the network core.

To enable fast convergence features:

- 1 Access the VLAN table:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to System.
 - d Select **VLANs**.

- 2 To switch to an alternate port if the root port fails, select **Enable Uplink Fast**.
- 3 To enable the backbone fast convergence feature, select **Enable Backbone Fast**.
- 4 Click **Save**.

Changing VLAN IGMP Settings

Internet Group Management Protocol (IGMP) snooping controls multicast traffic on a WX by forwarding packets for a multicast group only on the ports that are connected to members of the group. IGMP is especially useful for WLANs because bandwidth is relatively constrained. The WX listens for multicast packets and maintains a table of multicast groups, as well as their sources and receivers, based on the traffic. IGMP snooping is enabled by default.

You can configure IGMP snooping parameters and enable or disable the feature on an individual VLAN basis.

The current software version supports IGMP versions 1 and 2.

To configure IGMP snooping:

- 1 Access the VLAN table:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to System.
 - d Select **VLANs**.
- 2 In the Content panel, select the VLAN.
- 3 In the Task List panel, select **Configure IGMP**.
- 4 To enable IGMP snooping, select **Enable**. To disable IGMP snooping, clear **Enable**. By default, IGMP snooping is enabled.
- 5 In the Version list, select **Version 1** or **Version 2** of IGMP.
- 6 If IGMP queriers are not on the subnet (for example, multicast routers), select **Querier Enabled**.

3Com recommends that you use the pseudo-querier only when the VLAN contains local multicast traffic that is not routed.
- 7 In the Query Interval box, specify the interval (1 to 65,535 seconds) at which the WX switch sends general IGMP queries on behalf of multicast routers to advertise multicast groups. The default interval is 125 seconds.

- 8 In the Other Querier Present Interval box, specify how long (1 to 65,535 seconds) the WX switch waits for a general query to arrive before making itself the querier. The default interval is 255 seconds.
- 9 In the Query Response Interval box, specify how long (1 to 65,535 tenths of a second) a device can take to respond to an IGMP query. The default interval is 100 tenths of a second (10 seconds).
- 10 In the Last Member Query Interval box, specify how long (1 to 65,535 tenths of a second) the WX switch waits for a response to a group query, after receiving a leave message for that group, before removing the group. The default value is 10 tenths of a second (1 second).
- 11 In the Robustness Value box, specify the robustness value (2 to 255), which sets IGMP timers to adjust to the amount of traffic loss on the network. Set the robustness value higher to adjust for more traffic loss. The default is 2.
- 12 To enable proxy reporting, which summarizes collected station IGMP reports, select **Proxy Report**.
- 13 To enable multicast router solicitation, which allows the WX to discover multicast routers on the subnet, select **Multicast Router Solicitation**.
- 14 In the Solicitation Interval box, specify the interval (1 to 65,535 seconds) between multicast router solicitations by a WX. The default interval is 30 seconds.
- 15 Click **OK**.

Configuring Static Multicast Ports

A WX learns about multicast routers and receivers from multicast traffic received from those devices. When the WX receives traffic from a multicast router or receiver, the WX adds the port that received the traffic as a multicast router or receiver port. The WX forwards traffic to multicast routers only on the multicast router ports and forwards traffic to multicast receivers only on the multicast receiver ports.

The router and receiver ports that the WX learns based on multicast traffic age out if they are unused. If necessary, you can statically configure multicast router ports or multicast receiver ports on the WX.

You can only add network ports as static multicast router ports or multicast receiver ports. Ports you add are immediately added to the list and do not age out.



You cannot add MAP ports or wired authentication ports as static multicast ports. However, MSS can dynamically add these port types to the list of multicast ports based on multicast traffic.

To add or remove static multicast router and receiver ports:

- 1 Access the VLAN table:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to System.
 - d Select VLANs.
- 2 In the Content panel, select the VLAN.
- 3 Click **Properties**.
- 4 Click the VLAN Member Details tab.
- 5 To add a static multicast receiver port, select the **Forward Multicast IP Out** checkbox for each port you want to add.

By default, ports are not selected. To remove a static multicast receiver port, clear the checkbox.
- 6 To add a multicast router port, select the Multicast Router Present checkbox for each port you want to add.

By default, ports are not selected. To remove a static multicast receiver port, clear the checkbox.
- 7 Click **OK**.

Restricting Layer 2 Traffic Among Clients in a VLAN

By default, clients within a VLAN are able to communicate with one another directly at Layer 2. You can enhance network security by restricting Layer 2 forwarding among clients in the same VLAN. When you restrict Layer 2 forwarding in a VLAN, MSS allows Layer 2 forwarding only between a client and a set of MAC addresses, generally the VLAN's gateway routers. Clients within the VLAN are not permitted to communicate among themselves directly. To communicate with another client, the client must use one of the specified gateway routers.

You can specify up to four gateway MAC addresses. The addresses must be unicast (not multicast or broadcast).



For networks with IP-only clients, you can restrict client-to-client forwarding using ACLs. Use the Restrict L3 Traffic option. (See "Restricting Layer 3 Traffic Among Clients in a VLAN".)

- 1 Access the VLAN table:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to System.
 - d Select **VLANs**.
- 2 In the Content panel, select the VLAN.
- 3 In the Task List panel, select Restrict L2 Traffic.
- 4 Select **Restrict L2 Traffic** to enable the feature for the VLAN.
- 5 Click **Create**.
- 6 In a Permitted MAC Address box, edit the address to be the MAC address of the VLAN's gateway.
- 7 Click **Finish**.
- 8 Click **OK**.

Restricting Layer 3 Traffic Among Clients in a VLAN

To restrict Layer 3 traffic among clients in the same VLAN, use an ACL. You can configure the ACL yourself or use the Restrict L3 Traffic option in 3WXM.

- 1 Access the VLAN table:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to System.
 - d Select **VLANs**.
- 2 In the Content panel, select the VLAN.
- 3 In the Task List panel, select Restrict L3 Traffic.
- 4 Type the IP address of the VLAN's gateway.
- 5 Click **Next**.
The ACL 3WXM will configure to block the traffic is displayed.
- 6 Read the information on the wizard page about the ACL. If you need to modify the ACL, see "Viewing and Configuring ACLs" on page 220.
- 7 Click **Finish**.

Changing a VLAN's Tunnel Affinity

WX switches configured to comprise a Mobility Domain allow users to roam seamlessly across MAP access points and across WX switches. Although a WX that is not a member of a user's VLAN cannot directly forward traffic for the user, the WX can tunnel the traffic through another WX that is a member of the user's VLAN.

If a WX that is not in the user's VLAN has a choice of more than one other WX through which to tunnel the user's traffic, the WX selects the path based on the tunnel affinity value. This is a numeric value that each WX within the Mobility Domain advertises for each of its local VLANs to all other WX switches in the Mobility Domain. The WX the user is roaming from selects the WX with the highest affinity value for the user's VLAN as the path for the user's data. If two or more WX switches have the same tunnel affinity value, the WX the user is roaming from randomly selects a WX.

- 1 Access the VLAN table:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.

- c Click the plus sign next to System.
 - d Select **VLANs**.
- 2 In the Tunnel Affinity box, specify the numeric value (1 to 10) that the WX will advertise to other WX switches in the Mobility Domain for the VLAN. The default is 5.
- A higher tunnel affinity indicates a greater preference.
- 3 Click **Save**.

Configuring the MSS DHCP Server

MSS has a DHCP server that the switch uses to allocate IP addresses to the following. DHCP service for these items is enabled by default.

- Directly connected MAPs
- Host connected to a new (unconfigured) WXR100 or WX1200, to configure the switch using the Web Quick Start

Optionally, you can configure the DHCP server to also provide IP addresses to Distributed MAPs and to clients.



Use of the MSS DHCP server to allocate client addresses is intended for temporary, demonstration deployments and not for production networks. 3Com recommends that you do not use the MSS DHCP server to allocate client addresses in a production network.

To enable the MSS DHCP server on a VLAN:

- 1 Access the VLAN table:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to System.
 - d Select **VLANs**.
- 2 In the Content panel, select the VLAN.
- 3 Click **Properties**.
- 4 Select **DHCP Server** to enable it on the VLAN.
- 5 To change the range of addresses available to the DHCP server, edit the addresses in the **Start IP Addresses** and **Stop IP Addresses** boxes.

By default, all addresses except the host address of the VLAN, the network broadcast address, and the subnet broadcast address are included in the range. If you specify the range, the start address must be lower than the stop address, and all addresses must be in the same subnet. The IP interface of the VLAN must be within the same subnet but is not required to be within the range.

- 6 Click **OK**.

Changing the Aging Time for FDB Entries

The aging timeout period specifies how long a dynamic entry can remain unused before the software removes the entry from the database.

- 1 Access the VLAN table:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to System.
 - d Select **VLANs**.
- 2 In the Content panel, select the VLAN.
- 3 Click **Properties**.
- 4 In the Aging Time box, specify the aging timeout period (0 to 1,000,000 seconds) for dynamic entries in the forwarding database. The default is 300 seconds (5 minutes). If you specify 0, aging is disabled.
- 5 Click **OK**.

Viewing and Configuring ACLs

An access control list (ACL) filters packets to restrict or permit network usage by certain users, network devices, or traffic types. You can also assign a class of service (CoS) level, which allows priority handling, to packets. For example, you can use ACLs to enable users to send and receive packets within an intranet, but restrict incoming packets to the server that stores confidential salary information.

An ACL is an ordered list of access control entries (ACEs)—rules that specify how to handle packets. The rule consists of a filter and an action. When a packet matches the filter, the action is applied to the packet.

If there are no ACE matches in the ACL, an ACL contains an implicit rule that denies all access. If there is not at least one ACE that permits access in an ACL, no traffic will be allowed. The implicit “deny all” rule is always the last ACE of an ACL.

You can choose to count the number of times an ACE is matched. This hit count is useful for troubleshooting complex ACL configurations and for monitoring traffic load for specific network applications or protocols. The hit count can only be seen from the CLI. To start updating hit counter statistics in the CLI, you must first set the hits sampling rate to a nonzero value, such as 15 seconds. For more information about security ACLs, see the [Wireless LAN Switch and Controller Configuration Guide](#).

You cannot perform ACL functions that include permitting, denying, or marking with a Class of Service (CoS) level on packets with a multicast or broadcast destination address.

Viewing ACLs

To view ACLs:

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, click the plus sign next to the WX switch.
- 3 Click the plus sign next to System.
- 4 Select **ACLs**.

The configured ACLs and their mappings appear in the Content panel.

Creating an ACL

The Create ACL wizard enables you to configure ACEs with the following parameters:

- Match criteria:
 - Source IP address
 - Destination IP address
 - Protocol
 - Source protocol port
 - Destination protocol port
 - Differentiated Services Code Point (DSCP) value or Type Of Service (TOS) and IP precedence values
- Action: deny or permit
- Marking: Class of Service (CoS) value

These parameters are sufficient for most ACEs. To configure additional parameters, use the wizard to configure the basic parameters, then select the ACE and click **Properties**. (See "Configuring Advanced ACL Settings" on page 226.)

To configure an ACL

- 1 Access the Create ACL wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to System.
 - d Select **ACLs**.
 - e In the Task List panel, select ACL.
- 2 In the ACL Name box, type the name for the ACL (1 to 32 alphanumeric characters, with no spaces or tabs). The name can include hyphens (-), underscores (_), or periods (.). ACL names are case-sensitive and must begin with a letter. Do not include any of the following terms in the name: **all, default-action, map, help, editbuffer**.
- 3 Click **Add Rule**. A new ACE (ACL rule) appears above the implicit deny all rule that is at the end of every ACL.



Each ACL has a rule at the end that denies all source and destination IP addresses. This rule provides security by ensuring that the only traffic permitted by an ACL is the traffic you want to permit. This rule is automatically added to the end of each ACL and cannot be edited or removed.

After you add an ACE to the table, each subsequent ACE appears above the implicit deny all ACE at the bottom of the list, but beneath all the other ACEs you have configured.

The switch uses the ACEs in the order they appear in the list, beginning at the top. Because the action in the first ACE that matches a packet is used, the order the ACEs appear in is important. (You can reorder them. See step 13.)

- 4 Specify the source IP address by clicking in the Source IP column and editing the value. To match on all source IP addresses, leave the value 0.0.0.0/0.
- 5 Specify the destination IP address by clicking in the Source IP column and editing the value. To match on all destination IP addresses, leave the value 0.0.0.0/0.
- 6 To specify the protocol:
 - a Click on the down arrow in the Protocol column.

- b** Select the well-known name of the protocol from the Protocol Name drop-down list.

If the protocol's name is not listed, select Other to activate the Protocol Number box, then type or select the number.

- c** Click **OK**.

- d** If you selected **tcp** or **udp**, go to step 7. Otherwise, go to step 9.

To match on all protocols, leave the value *any*.

The following table lists commonly used IP protocol numbers.

IP Protocol Number	Protocol
1	Internet Control Message Protocol (ICMP)
2	Internet Group Management Protocol (IGMP)
6	Transmission Control Protocol (TCP)
9	Any private interior gateway (used by Cisco for Internet Gateway Routing Protocol)
17	User Datagram Protocol (UDP)
41	IPv6
46	Reservation Protocol (RSVP)
47	Generic Routing Encapsulation (GRE)
50	Encapsulation Security Payload for IPsec (IPSec-ESP)
51	Authentication Header for IPsec (IPSec-AH)
55	IP Mobility (Mobile IP)
88	Enhanced Interior Gateway Routing Protocol (EIGRP)
89	Open Shortest Path First (OSPF) protocol
103	Protocol Independent Multicast (PIM)
112	Virtual Router Redundancy Protocol (VRRP)
115	Layer Two Tunneling Protocol (L2TP)

- 7** To specify the TCP or UDP source port:

- a** Click on the down arrow in the Source Port column.

- b** Select the comparison operator from the Operator drop-down list:

- Less Than
- Greater Than
- Equal

- Not Equal
 - Range
 - None (no comparison is required)
- c Select the well-known port name from the Port Name drop-down list. If the name is not in the list, select Other and type or select the port number in the Port Number box.
- d If you selected Range as the comparison operator, type or select the ending port number of the range in the Range End box. The number must be higher than the port number in the Port Number box.
- e Click **OK**.
- 8 Specify the TCP or UDP destination source port. The options are the same as those for the source port.
- 9 To match based on DSCP value or IP TOS and IP precedence values:
- a Click on the down arrow in the DSCP column.
 - b Select Type Of Service or Diff-Serv Code Point.
 - c If you selected Type Of Service, select the IP precedence value from the Precedence drop-down list.
 - **Any (-1)**—All packets are subject to the ACL regardless of whether precedence is set.
 - **Routine (0)**—Packets with routine precedence are filtered.
 - **Priority (1)**—Packets with priority precedence are filtered.
 - **Immediate (2)**—Packets with immediate precedence are filtered.
 - **Flash (3)**—Packets with flash precedence are filtered.
 - **Flash Override (4)**—Packets with flash override precedence are filtered.
 - **CRITIC/ECP (5)**—Packets with critical precedence are filtered.
 - **Internetwork Control (6)**—Packets with internetwork control precedence are filtered.
 - **Network Control (7)**—Packets with network control precedence are filtered.

Select the ToS value in the TOS box.

- **-1 (any)**—All packets are subject to the ACE regardless of whether TOS is set.

- **0 (normal)**—Packets with normal TOS defined are filtered.
- **1 (minimum monetary cost)**—Packets with minimum monetary cost TOS defined are filtered.
- **2 (maximum reliability)**—Packets with maximum reliability TOS defined are filtered.
- **4 (maximum throughput)**—Packets with maximum throughput TOS defined are filtered.
- **8 (minimum delay)**—Packets with minimum delay TOS defined are filtered.

By default, the TOS value is -1 (any).

In addition to these specific values, you can specify a number from 1 to 15 that is the sum of TOS option values. For example, to select minimum delay and maximum throughput as the TOS options, type **12**, which is the sum of the two values.

d Click **OK**.

- 10** Select the action from the Action drop-down list:
 - Permit—allows access if the conditions in the ACE are matched
 - Deny—refuses access if the conditions in the ACE are matched
- 11** To mark the packet with a CoS value, select the value in the CoS box.

Packet Priority Desired	CoS Value	MAP Forwarding Queue Assignment
Background	1 or 2	4
Best effort	0 or 3	3
Video	4 or 5	2
Voice	6 or 7	1

By default, the CoS value is -1 (any).

- 12** Repeat step 3 to step 11 for each ACE.
- 13** To reorder the ACEs, select an ACE and click the up or down arrow to move it.
- 14** Click **OK** to save the ACL. The ACL appears in the ACL table.

Configuring Advanced ACL Settings

After you configure an ACL, you can configure the following advanced settings:

- Hit counter (enable or disable)
- Hit sample rate (applies if the hit counter is enabled)
- Established option, to apply a new TCP ACE only to established (existing) TCP sessions. By default, TCP ACEs apply to new sessions as well as existing ones.
- ICMP properties, to specify the type and code values for ICMP ports (applies only to ACEs that have ICMP as the protocol)
- Capture option, to redirect matching packets to the CPU (applies to ACEs used for Web Portal access)

To change the hit sample rate

The hit sample rate specifies the time interval, in seconds, at which the packet counter is sampled for each security ACE on which the hit counter is enabled.

By default, the hit sample rate is 0, even when the hit counter is enabled. To use the hit counter, you must enable it *and* set the hit sample rate. The hit sample rate applies globally to all ACEs on which the hit counter is enabled.

- 1 In the Task List panel, select Edit ACL hit sample rate.
- 2 Select or type the number of seconds between updates in the Hit Sample Rate box.
- 3 Click **OK**.

To enable the hit counter for an ACE

You can enable the hit counter on an individual ACE basis.

- 1 Select the ACE in the ACL table.
- 2 In the Task List panel, select **Enable Hits for this rule**.



You also must set the hit sample rate to a value greater than 0, which is the default. (See “To change the hit sample rate”.)

To enable the established option for TCP ACEs

By default, a new TCP ACE applies to new sessions as well as established (existing) sessions. To apply the ACE only to established sessions, enable the established option.

- 1 Select the TCP ACE in the ACL table.
- 2 In the Task List panel, select **Enable Established Connections**.

To specify the type and code for ICMP ACEs

- 1 Select the ICMP ACE in the ACL table.
- 2 In the Task List panel, select **ICMP Properties**.
- 3 Select or type the ICMP message type in the Type box. (See Table 17.)
- 4 Select or type the ICMP message code in the Code box. (See Table 17.)
- 5 Click **OK**.

Table 17 ICMP Messages and Codes

ICMP Message (Type Number)	Code (Number)
Echo Reply (0)	None
Destination Unreachable (3)	<ul style="list-style-type: none"> ■ Network Unreachable (0) ■ Host Unreachable (1) ■ Protocol Unreachable (2) ■ Port Unreachable (3) ■ Fragmentation Needed (4) ■ Source Route Failed (5)
Source Quench (4)	None
Redirect (5)	<ul style="list-style-type: none"> ■ Network Redirect (0) ■ Host Redirect (1) ■ TOS and Network Redirect (2) ■ TOS and Host Redirect (3)
Echo (8)	None
Time Exceeded (11)	<ul style="list-style-type: none"> ■ TTL Exceeded (0) ■ Fragment Reassembly Time Exceeded (1)
Parameter Problem (12)	None

Table 17 ICMP Messages and Codes (continued)

ICMP Message (Type Number)	Code (Number)
Timestamp (13)	None
Timestamp Reply (14)	None
Information Request (15)	None
Information Reply (16)	None

Adding a New ACE to a Configured ACL

To add a new ACE to a configured ACL:

- 1 Access the ACL table:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to System.
 - d Select ACLs.
- 2 Select any ACE in the ACL to which you want to add the new ACE.
- 3 In the Task List panel, select Add Rules.
- 4 Go to step 3.

Mapping an ACL

An ACL does not take effect until you map it to a user or an interface.

You can map ACLs to ports (or port groups), VLANs, or virtual ports. You cannot map an ACL to a MAP port or a wired authentication port.

You also can map ACLs to user, by configuring the filter.in and filter.out user attributes. User-based ACLs are more specific than ACLs applied to interfaces and are therefore processed first. (See “Authorization Attributes” on page 293.)

- 1 Access the ACL table:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to System.
 - d Select **ACLs**.
- 2 Select any ACE in the ACL you want to map.
- 3 In the Task List panel, select ACL Mappings.

- 4 Select the mapping type:
 - To map to a physical port, select **port** and go to step 5.
 - To map to a virtual port, select **vport** and go to step 6.
 - To map to a VLAN, select **vlan** and go to step 7.
 - To map to a Distributed MAP, select **dap** and go to step 8.
- 5 To map an ACL to a port:
 - a In the Port list, select the port or port group to which you want to map the ACL.

You cannot map an ACL to a MAP port or a wired authentication port.
 - b In the Direction list, select **In** to filter incoming packets or **Out** to filter outgoing packets.
 - c Click **Finish**.
- 6 To map an ACL to a virtual port:
 - a In the Tag Value box, specify the 802.1Q tag value that identifies a virtual port in a VLAN.

The tag value can be a number from 1 to 4093. The default value is 1. Make sure that you do not specify duplicate mappings that specify the same port and tag value.
 - b In the port list, select the port to which you want to map the ACL.

You cannot map an ACL to a MAP port or a wired authentication port.
 - c In the Direction list, select **In** to filter incoming packets or **Out** to filter outgoing packets.
- 7 To map an ACL to a VLAN:
 - a In the Type list, select **ID** to identify the VLAN by number or **Name** to identify it by name.
 - If you selected **Name**, select or type the VLAN name from the Name drop-down list.
 - If you selected **ID**, select or type the VLAN number in the ID box.
 - b In the Direction list, select **In** to filter incoming packets or **Out** to filter outgoing packets.
- 8 To map an ACL to a Distributed MAP:
 - a In the DAP ID list, select the Distributed MAP from the list.

- b** In the Direction list, select **In** to filter incoming packets or **Out** to filter outgoing packets.
- 9** Click **Finish**.
- The mapping appears in the ACL Mappings table.

Deleting an ACL To delete an ACL:

- 1** Access the ACL table:
 - a** Select the Configuration tool bar option.
 - b** In the Organizer panel, click the plus sign next to the WX switch.
 - c** Click the plus sign next to System.
 - d** Select **ACLs**.
- 2** Select any ACE in the ACL you want to delete.
- 3** In the Task List panel, select Delete ACL.

Deleting an Individual ACE from an ACL To delete an individual ACE from an ACL:

- 1** Access the ACL table:
 - a** Select the Configuration tool bar option.
 - b** In the Organizer panel, click the plus sign next to the WX switch.
 - c** Click the plus sign next to System.
 - d** Select **ACLs**.
- 2** Select any ACE in the ACL.
- 3** In the Task List panel, select ACL Rules.
- 4** Select the ACE and click **Delete**.
- 5** Click **OK**.



You cannot delete the ACE at the bottom of the list. This ACE is added to the ACL automatically and cannot be deleted. The ACE at the bottom denies all traffic that does not match other ACEs in the ACL.

Viewing and Changing CoS Mappings

MSS supports Layer 2 and Layer 3 classification and marking of traffic, to help provide end-to-end QoS throughout the network. QoS support includes support of Wi-Fi Multimedia (WMM), which provides wireless QoS for time-sensitive applications such as voice and video.

QoS support is automatically enabled. WX switches and MAPs each provide QoS:

- WX switches classify and mark traffic based on 802.1p tag value (for tagged traffic) or Differentiated Services Code Point (DSCP) value.
- MAPs classify ingress traffic from wireless clients based on the service type value in the 802.11 header, and mark the DSCP value in the IP tunnel on which the MAP forwards the user traffic to the WX.

MAPs place traffic from a WX to a wireless client in a forwarding queue based on the DSCP value in the tunnel carrying the traffic, then forward the traffic based on the queue's priority.

MSS performs classification on ingress to determine a packet's CoS value. This CoS value is used to mark the packet at the egress interface.

The classification and marking performed by the switch depend on whether the ingress interface has an 802.1p or DSCP value other than 0, and whether the egress interface is tagged or is an IP tunnel.

The mappings between DSCP and CoS values are configurable.

(For more information about how MSS QoS works, see the "Configuring Quality of Service" chapter in the [Wireless LAN Switch and Controller Configuration Guide](#).)

Viewing CoS Mappings

To view CoS mappings:

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, click the plus sign next to the WX switch.
- 3 Click the plus sign next to System.
- 4 Select **QoS**.

The QoS mappings appear in the Content panel. The DSCP to CoS table lists the internal CoS values to which MSS maps DSCP values during classification of ingress traffic. The CoS to DSCP table lists the DSCP values to which MSS maps internal CoS values during marking of egress traffic.

Changing a DSCP-to-CoS Mapping

To change the mapping between a DSCP value in an ingress packet and its internal CoS value:

- 1 Access the QoS tables:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to System.
 - d Select **QoS**.
- 2 In the CoS column of the DSCP to CoS table, use the arrows to select the new value or type the new value.
- 3 Click **Save**.

Changing a CoS-to-DSCP Mapping

To change the mapping between an internal CoS value and the DSCP value that is marked in egress traffic:

- 1 Access the QoS tables:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to System.
 - d Select **QoS**.
- 2 In the DSCP column of the CoS to DSCP table, use the arrows to select the new value or type the new value.
- 3 Click **Save**.

Setting a Range of DSCP Values to a Single CoS Value

To set a range of DSCP values to a single CoS value:

- 1 Access the QoS tables:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to System.
 - d Select **QoS**.
- 2 In the Task List panel, select Set DSCP to CoS Range.
- 3 In the First DSCP list, select the lower DSCP value in the range.
- 4 In the Last DSCP list, select the upper DSCP value in the range.
- 5 In the CoS value list, select the internal CoS value to which you want MSS to map all DSCP values within the selected range.
- 6 Click **Finish**.

Resetting CoS Mapping to their Default Values

To reset CoS mapping to their default values:

- 1 Access the QoS tables:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to System.
 - d Select **QoS**.
- 2 In the Task List panel, select Reset to defaults.
- 3 Click **Save**.

7

CONFIGURING WIRELESS PARAMETERS

This chapter describes how to view and configure the following wireless parameters for WX switches:

- Service Set Identifiers (SSIDs), which are managed by service profiles
- Radio profiles, which assign IEEE 802.11 settings and a service profile to radios
- Auto-DAP profile
- MAPs
- MAP radios
- RF detection

Viewing and Configuring Wireless Services

3WXM provides wizards to configure the following types of wireless services:

- 802.1X Service Profile—Provides wireless access to 802.1X clients.
- Voice Service Profile—Provides wireless access to Voice over IP (VoIP) devices.
- Web-Portal Service Profile—Provides wireless access to clients who log in using a web page.
- Open Access Service Profile—Provides wireless access to clients without requiring them to log in.
- Custom Service Profile—Provides wireless access based on the combination of options you choose. (Use this option only if none of the other options applies to the type of service you want to offer.)

Wireless Service Parameters

A wireless service consists of the following parameters:

- Service profile
- Access rules

Service Profiles

A service profile configures an SSID. Table 18 lists the parameters. For parameters that are assigned default values by the wizards, the table also lists the default values.

Table 18 Service Profile Parameters

Service Profile Parameter	Description	Default Value Assigned by Service Profile Wizard
Service profile name	Name of the service profile	Based on service profile type: <ul style="list-style-type: none"> ■ Secure-802.1x ■ Voice ■ Web-Portal ■ Open Custom service profiles do not have a default name.
SSID name	SSID name with wireless clients will associate	Blank (no default value)
SSID type	Encryption setting for data: <ul style="list-style-type: none"> ■ Encrypted ■ Clear (unencrypted) 	Based on service profile type: <ul style="list-style-type: none"> ■ 802.1X—Encrypted (clear is not applicable) ■ Voice—Encrypted ■ Web-Portal—Clear ■ Open—Clear ■ Custom—Encrypted
Beaconing state	Advertisement of the SSID using beacons	Enabled
Fallthru access type	Access type attempted if neither 802.1X nor MAC access are applicable to the client	Based on service profile type: <ul style="list-style-type: none"> ■ 802.1X—None ■ Voice—None ■ Web-Portal—Web Portal ■ Open—Last Resort ■ Custom—Depends on access type(s) selected for service profile

Table 18 Service Profile Parameters (continued)

Service Profile Parameter	Description	Default Value Assigned by Service Profile Wizard
Custom Web Portal login page	Subdirectory path and filename of an HTML page customized for login to the SSID	Blank (default page with 3Com logo is used)
Security modes	<p>For encrypted SSIDs only, the types of encryption supported:</p> <ul style="list-style-type: none"> ■ Robust Security Network (RSN); also called WPA2 ■ Wi-Fi Protected Access (WPA) ■ Dynamic Wired Equivalent Privacy (WEP) 	<p>Based on service profile type:</p> <ul style="list-style-type: none"> ■ 802.1X—Dynamic WEP ■ Voice—Static WEP ■ Web-Portal—No default ■ Open—Not applicable ■ Custom—Dynamic WEP for 802.1X access; no default for other access types
Encryption algorithms	<p>For encrypted SSIDs only, the algorithms used to encrypt data when the WPA or RSN security mode is used:</p> <ul style="list-style-type: none"> ■ Advanced Encryption Standard (AES) with Counter Mode with Cipher Block Chaining Message Authentication Code Protocol (CCMP) ■ Temporal Key Integrity Protocol (TKIP) ■ WEP with 104-bit keys ■ WEP with 40-bit keys 	TKIP
Authentication method	<p>Location of user information the switch checks when authenticating and authorizing users.</p> <p>Can be one or more RADIUS server groups, the switch's local database, or both.</p>	<ul style="list-style-type: none"> ■ Voice—LOCAL (a RADIUS server group cannot be selected) ■ All others—blank (you must select the method)
Default authorization attributes	Attributes assigned to the service profile. An attribute value is used only if the attribute is not otherwise set, for example on a user group or individual user.	Blank (not set)
Radio profile	Set of 802.11 radios and 802.11 settings for them	Radio profile named <i>default</i>

You don't need to select the values for all these parameters when you configure a service. The Service Profile wizards help you configure the essential parameters and assign appropriate values to the rest. Some of the parameters that 3WXM automatically sets are not configurable using the Service Profile wizards. To view all settings (except access rules) or change settings, select the service profile and click **Properties**.

Access Rules

The service profile wizards automatically create network access rules to control access to the SSIDs configured by the wizards. The access rules match on all usernames (or MAC addresses for voice service profiles). Table 19 lists the access rules automatically created by the service profile wizards.

Table 19 Access Rules Automatically Created by Service Profile Wizards

Service Profile Type	Access Rule Type	Default Access Glob
802.1X	802.1X	**
Voice	MAC	*
Web-Portal (WebAAA)	Web	**
Open (no user login required)	Last-resort	last-resort-ssid-name
Custom	One or more of the above, depending on the type(s) selected during configuration of the service profile.	None. No access rule is created automatically. You must configure the rules.

The ** and * values are wildcards. The ** wildcard matches on all usernames. To match on all MAC addresses (MAC access rules only), use only a single *.

You can restrict access by specifying part of the username or MAC address along with a wildcard *. In this case, only the usernames or MAC addresses that match the partial username or address are allowed access.

User Globs and MAC Address Globs For a user glob, type a full or partial username to be matched during authentication (1 to 80 alphanumeric characters, with no spaces or tabs). The format of a user glob depends on the client type and EAP method.

- For Windows domain clients using Protected EAP (PEAP), the user glob is in the format *Windows_domain_name\username*. The Windows domain name is the NetBIOS domain name and must be specified in capital letters. For example, *EXAMPLE\sydney*, or *EXAMPLE*.**, which specifies all usernames whose usernames contain periods.
- For EAP with Transport Layer Security (EAP-TLS) clients, the format is *username@domain_name*. For example, *sydney@example.com* specifies the user *sydney* in the domain name *example.com*. The **@marketing.example.com* glob specifies all users in the marketing department at *example.com*. The user glob *sydney@engineering.example.com* specifies the user *sydney* in the engineering department at *example.com*.

For a MAC address glob, type a full or partial username to be matched during authentication. MAC addresses must be specified with colons as the delimiters (for example, *00:11:22:33:44:55*). You can use wildcards by specifying an asterisk (*) in MAC addresses. The following lists examples of using wildcards in MAC addresses:

- * (all MAC addresses)
- 00:*
- 00:01:*
- 00:01:02*
- 00:01:02:03:*
- 00:01:02:03:04:*
- 00:01:02:03:04:0*

To view a service profile's access rules, see "Viewing SSID Encryption Settings and Access Rules" on page 258. To edit or create access rules for a service profile, see "Modifying SSID Encryption Settings and Access Rules" on page 260.

EAP Type (802.1X Only) 802.1X access rules include information about the Extensible Authentication Protocol (EAP) type to use for AAA communication between the client and the AAA server. The EAP type can be one of the following:

- **EAP-MD5 Offload**—Extensible Authentication Protocol (EAP) with message-digest algorithm 5. Select this protocol for wired authentication clients.

- Uses challenge-response to compare hashes.
- Provides *no* encryption or integrity checking for the connection.



The EAP-MD5 option does not work with Microsoft wired authentication clients.

- **PEAP Offload**—Protected EAP with Microsoft Challenge Handshake Authentication Protocol Version 2 (MS-CHAP-V2). Select this protocol for wireless clients.
 - Uses TLS for encryption and data integrity checking.
 - Provides MS-CHAP-V2 mutual authentication.
 - Only the server side of the connection needs a certificate.
- **Local EAP-TLS**—EAP with TLS.
 - Provides mutual authentication, integrity-protected negotiation, and key exchange.
 - Requires X.509 public key certificates on both sides of the connection.
 - Provides encryption and integrity checking for the connection.
 - Cannot be used with RADIUS server authentication (requires user information to be in the switch's local database)
 - **External RADIUS Server**—No protocol is used by the WX. The switch sends the authentication traffic to a RADIUS server for EAP processing.

If you select PEAP, the EAP Sub-Protocol is MS-CHAPV2. For other protocols, the EAP Sub-Protocol is None.

Other access types do not use EAP.

AAA Methods (RADIUS Server Groups and the Local User Database)

In addition to user globs or MAC address globs, access rules specify AAA methods, which can be one or both of the following:

- RADIUS server group—Named set of RADIUS servers.
- LOCAL—Switch's local user database.

You can select both a server group and LOCAL. The switch tries the methods in the order they appear in the list, starting with the one at the top.

- If you specify a RADIUS server group as the first method and a user is denied access by the RADIUS server, no authentication and authorization are attempted with the other methods specified in the list.
- If you specify LOCAL as the first method and a user is not in the local user database on the WX, authentication and authorization are attempted with a RADIUS server group if one is defined in the method list.

The methods you select for authentication are also used for authorization. You also can configure accounting for Start-Stop or Stop-Only messages. The authentication method(s) for accounting can be but are not required to be the same as the method(s) for authentication and authorization.



If you plan to specify a RADIUS server group, configure the group first, before using the wizard. To be available for selection in the wizard, the RADIUS server group must already be configured before you open the wizard. (See “Viewing and Configuring RADIUS Settings” on page 298.)

Viewing Wireless Services

To view wireless services:

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, click the plus sign next to the WX switch.
- 3 Click the plus sign next to Wireless.
- 4 Select **Wireless Services**.

The service profiles appear in the Content panel. Each row in the table shows settings for an individual service profile.

To display all settings for a service profile, select the service profile and click **Properties**.

**Configuring an
802.1X Wireless
Service**

The 802.1X Service Profile wizard requires you to select one or more RADIUS server groups and does not allow you to complete the configuration without selecting one. To be available for selection in the wizard, a RADIUS server group must already be configured before you open the wizard. (See “*Viewing and Configuring RADIUS Settings*” on page 298.)

- 1 Access the 802.1X Service Profile wizard:
 - a In the Organizer panel, click on the plus sign next to the WX switch on which you want to configure the service profile.
 - b Click on the plus sign next to Wireless.
 - c Select **Wireless Services**.
 - d In the Task List panel, select **802.1X Service Profile**.
- 2 Read the description of the wizard on the first page, then click **Next**.
- 3 Edit the service name in the Name box.

Editing the name is optional if this is the first service of this type you are configuring on the switch.
- 4 Type the SSID name in the SSID box.
- 5 Click **Next**.
- 6 Select the security modes you want the SSID to support. You can select one or more of the following:
 - RSN (WPA2)
 - WPA
 - Dynamic WEP
- 7 Click **Next**.
- 8 If you selected RSN or WPA in step 6, select the encryption algorithms to use. Otherwise, go to step 11.
 - AES (CCMP)—Usually used with RSN (WPA2)
 - TKIP—Usually used with WPA
 - WEP-104—Used with dynamic WEP
 - WEP-40—Used with dynamic WEP
- 9 Click **Next**.

10 Select the EAP type:

- **EAP-MD5 Offload**
- **PEAP Offload**
- **Local EAP-TLS**
- **External RADIUS Server**

If you select PEAP, the EAP Sub-Protocol is MS-CHAPV2. For other protocols, the EAP Sub-Protocol is None.

(For information, see “EAP Type (802.1X Only)” on page 239.)

11 Specify the authentication method (RADIUS server group or local database).

(For information, see “AAA Methods (RADIUS Server Groups and the Local User Database)” on page 240.)

12 Click **Next**.

13 To assign a default VLAN to the SSID, select the VLAN from the VLAN Name drop-down list.

The VLAN and other authorization attributes can be assigned to users in the local database, on remote servers, or in the service profile of the SSID the user logs into. The VLAN you select here is used only if a VLAN attribute is not configured for the user on the RADIUS server or in the switch’s local database.

14 Select or create the radio profile to map to this service profile.

By default, the *default* radio profile is selected.

- To map the service profile to the default radio profile, leave *default* selected and go to step 15.
- To map the service profile to a different radio profile, select the radio profile and go to step 15.
- To create a new radio profile:

a Select Create new Radio Profile and click **Next**.

b Type the radio profile name in the Name box and click **Next**.

c Select the radios you want to manage with the radio profile and click **Move** to move them to the Current Members list.



*If you have not planned RF coverage or configured any MAPs in the network plan yet, no radios are listed. You can add the radios later. (Select the radio profile, click **Properties**, then select Radio Selection. See “Configuring Advanced Radio Profile Settings” on page 265.)*

d Go to step 15.

15 Click **Finish**.

The service profile appears in the service profile table.

Configuring a Voice over Wireless Service

If the VoIP devices use Wi-Fi Multimedia, you do not need to configure a service profile. WMM is supported automatically. A voice service profile is required only for non-WMM devices.

1 Access the Voice Service Profile wizard:

a In the Organizer panel, click on the plus sign next to the WX switch on which you want to configure the service profile.

b Click on the plus sign next to Wireless.

c Select **Wireless Services**.

d In the Task List panel, select **Voice Service Profile**.

2 Read the description of the wizard on the first page, then click **Next**.

3 Edit the service name in the Name box.

Editing the name is optional if this is the first service of this type you are configuring on the switch.

4 Type the SSID name in the SSID box.

5 Select the SSID type from the SSID Type box:

- Encrypted—Traffic on the SSID is encrypted.
- Clear—Traffic on the SSID is unencrypted.

6 Select the VoIP vendor from the Vendor drop-down list:

- SpectraLink—Non-WMM SVP devices
- Vocera—Non-WMM Vocera devices
- Avaya—Non-WMM Avaya devices
- Other—Non-WMM devices that are not SVP or Avaya phones.

7 Click **Next**.

The next step depends on the encryption type you selected in step 5:

- If you selected Encrypted, go to step 8.
- If you selected Clear, go to step 18.

8 Select the access type:

- 802.1X Access—Device is allowed onto the SSID only after successful authentication using 802.1X.
- MAC Access—Device is allowed onto the SSID only if its MAC address matches an entry on a RADIUS server or the switch's local database.
- Open Access—All devices are allowed onto the SSID.

9 Click **Next**.

10 Select the security modes you want the SSID to support. You can select one or more of the following:

- RSN (WPA2)
- WPA
- Static WEP

11 Click **Next**.

12 If you selected RSN or WPA in step 10, select the encryption algorithms to use. Otherwise, go to step 16.

- AES (CCMP)—Usually used with RSN (WPA2)
- TKIP—Usually used with WPA
- WEP-104—Used with dynamic WEP
- WEP-40—Used with dynamic WEP

13 Click **Next**.

14 If you selected RSN or WPA in step 10, you can select whether to use dynamically generated keys, or static keys based on a passphrase.

- To use dynamically generated keys, leave the Pre-shared Key box blank and go to step 15.
- To use static keys, type a string from 8 to 63 characters long in the Pre-shared Key box and click **Generate**.

15 Click **Next**.

16 If you selected Static WEP in step 12, specify WEP keys. Otherwise, go to step 17.

- For each key (up to four), type the key value in the corresponding key box.

- By default, data in unicast and multicast packets are encrypted using WEP key 1. To use another key for either type of packet, select the key number in the WEP Unicast Key Index or WEP Multicast Key Index box.

17 Click **Next**.

18 Select or type the name of the VLAN into which you want the switch to place voice clients.

19 Click **Next**.



This step and the following step do not apply if the vendor selected in step 6 is Vocera.

If applicable, the ACEs (ACL rules) that 3WXM will configure for the voice service are listed. For non-WMM clients, ACEs are required in order to provide priority treatment of voice traffic. The ACEs differ depending on the vendor you selected in step 6. The wizard describes the ACEs.

If you need to modify the ACEs, go to step 20. Otherwise, go to step 21.

20 To add an ACE, click **Add Rule**. 3WXM adds an ACE to the end of the list. The ACE matches on all source and destination IP addresses and denies them.

To modify an ACE, select the part of the ACE you want to modify, and edit or select the new value. (For information about ACE settings, see “Viewing and Configuring ACLs” on page 220.)

21 If you selected MAC Access in step 8, select or create the MAC address globs you want to allow to access the voice VLAN. Otherwise, go to step 23.

To create a new rule:

- Click **Create**.
- Specify the MAC address glob in the Matching MAC Glob box. To match on all MAC addresses, leave the wildcard (*) in the box. (For syntax information, see “Access Rules” on page 238.)

To use an existing rule, leave the rule in the list.

22 Select or create the radio profile to map to this service profile.

By default, the *default* radio profile is selected.

- To map the service profile to the default radio profile, leave *default* selected and go to step 23.
- To map the service profile to a different radio profile, select the radio profile and go to step 23.

- To create a new radio profile:
 - a Select Create new Radio Profile and click **Next**.
 - b Type the radio profile name in the Name box and click **Next**.
 - c Select the radios you want to manage with the radio profile and click **Move** to move them to the Current Members list.



*If you have not planned RF coverage or configured any MAPs in the network plan yet, no radios are listed. You can add the radios later. (Select the radio profile, click **Properties**, then select Radio Selection. See “Configuring Advanced Radio Profile Settings” on page 265.)*

- d Go to step 23.

23 Click **Finish**.

The service profile appears in the service profile table.

Configuring a Web-Portal (WebAAA) Service

To configure a Web-Portal (WebAAA) service:

- 1 Access the Web-Portal Service Profile wizard:
 - a In the Organizer panel, click on the plus sign next to the WX switch on which you want to configure the service profile.
 - b Click on the plus sign next to Wireless.
 - c Select **Wireless Services**.
 - d In the Task List panel, select **Web-Portal Service Profile**.
- 2 Read the description of the wizard on the first page, then click **Next**.
- 3 Edit the service name in the Name box.

Editing the name is optional if this is the first service of this type you are configuring on the switch.
- 4 Type the SSID name in the SSID box.
- 5 Select the SSID type:
 - Encrypted—Traffic on the SSID is encrypted.
 - Clear—Traffic on the SSID is unencrypted.
- 6 Click **Next**.
 - If you selected Encrypted in step 5, configure the encryption settings. Go to step 7.

- If you selected Clear in step 5, go to step 15.
- 7 Select the security modes you want the SSID to support. You can select one or more of the following:
 - RSN (WPA2)
 - WPA
 - Static WEP
- 8 Click **Next**.
- 9 If you selected RSN or WPA in step 7, you can select whether to use dynamically generated keys, or static keys based on a passphrase.
 - To use dynamically generated keys, leave the Pre-shared Key box blank and go to step 10.
 - To use static keys, type a string from 8 to 63 characters long in the Pre-shared Key box and click **Generate**.
- 10 Click **Next**.
- 11 Select the encryption algorithms to use:
 - AES (CCMP)—Usually used with RSN (WPA2)
 - TKIP—Usually used with WPA
 - WEP-104—Used with dynamic WEP
 - WEP-40—Used with dynamic WEP
- 12 Click **Next**.
- 13 If you selected Static WEP in step 7, specify WEP keys. Otherwise, click **Next** and go to step 15.
 - For each key (up to four), type the key value in the corresponding key box.
 - By default, data in unicast and multicast packets are encrypted using WEP key 1. To use another key for either type of packet, select the key number in the WEP Unicast Key Index or WEP Multicast Key Index box.
- 14 Click **Next**.
- 15 Select or type the name of the VLAN to place clients in.



Clients are placed in this VLAN regardless of any other VLAN assignment. For example, if the VLAN-Name attribute assigns the user to another VLAN, the switch nonetheless places the user in the VLAN you specify here.

16 Click **Next**.

The ACEs (ACL rules) that 3WXM will configure for the Web-Portal service are listed. The ACEs are required to allow DHCP traffic while blocking all other traffic while a user is being authenticated. These ACEs are used only during authentication. After the user is authenticated, the ACEs are not used.

If you need to add ACEs, use the following procedure. Otherwise, go to step 17.

a Click **Next**.

b To add an ACE, click **Add Rule**. 3WXM adds an ACE to the end of the list. The ACE matches on all source and destination IP addresses and denies them.

To modify an ACE, select the part of the ACE you want to modify, and edit or select the new value. (For information about ACE settings, see “Viewing and Configuring ACLs” on page 220.)



CAUTION: Do not change the deny rule at the bottom of the ACL. This rule must be present and the capture option must be used with the rule. If the rule does not have the capture option, the Web Portal user never receives a login page.

17 Click **Next**.

18 Specify the authentication method (RADIUS server group or local database).

(For information, see “AAA Methods (RADIUS Server Groups and the Local User Database)” on page 240.)

If you selected LOCAL as an authentication method, go to step 19. Otherwise, go to step 21.

19 Click **Next**.

The users in the switch’s local database are listed. For convenience, you can add, modify, or delete users on this page. To add a user, click **Create** and see “Creating a Named User” on page 289. To modify a user, select the user and click **Properties**. To delete a user, select the user and click **Delete**.



3WXM automatically creates a user named *web-portal-ssid*, where *ssid* is the SSID name. This username is used temporarily for users while they are being authenticated. Do not delete or modify this user.

(You can add, modify, or delete users at any time, even after this wizard is closed. See “Creating and Managing Users in the Local User Database” on page 287.)

20 Select or create the radio profile to map to this service profile.

By default, the *default* radio profile is selected.

- To map the service profile to the default radio profile, leave *default* selected and go to step 21.
- To map the service profile to a different radio profile, select the radio profile and go to step 21.
- To create a new radio profile:
 - a Select Create new Radio Profile and click **Next**.
 - b Type the radio profile name in the Name box and click **Next**.
 - c Select the radios you want to manage with the radio profile and click **Move** to move them to the Current Members list.



*If you have not planned RF coverage or configured any MAPs in the network plan yet, no radios are listed. You can add the radios later. (Select the radio profile, click **Properties**, then select Radio Selection. See “Configuring Advanced Radio Profile Settings” on page 265.)*

- d Go to step 21.

21 Click **Finish**.

Configuring an Open Access Service

To configure an Open Access service:

- 1 Access the Open Access Service Profile wizard:
 - a In the Organizer panel, click on the plus sign next to the WX switch on which you want to configure the service profile.
 - b Click on the plus sign next to Wireless.
 - c Select **Wireless Services**.
 - d In the Task List panel, select **Open Access Service Profile**.
- 2 Read the description of the wizard on the first page, then click **Next**.
- 3 Edit the service name in the Name box.

Editing the name is optional if this is the first service of this type you are configuring on the switch.
- 4 Type the SSID name in the SSID box.

- 5 Select the SSID type from the SSID Type drop-down list:
 - Encrypted—Traffic on the SSID is encrypted.
 - Clear—Traffic on the SSID is unencrypted.
- 6 Click **Next**.
 - If you selected Encrypted in step 5, configure the encryption settings. Go to step 7.
 - If you selected Clear in step 5, go to step 15.
- 7 Select the security modes you want the SSID to support. You can select one or more of the following:
 - RSN (WPA2)
 - WPA
 - Static WEP
- 8 Click **Next**.
- 9 If you selected RSN or WPA in step 7, you can select whether to use dynamically generated keys, or static keys based on a passphrase.
 - To use dynamically generated keys, leave the Pre-shared Key box blank and go to step 10.
 - To use static keys, type a string from 8 to 63 characters long in the Pre-shared Key box and click **Generate**.
- 10 Click **Next**.
- 11 Select the encryption algorithms to use:
 - AES (CCMP)—Usually used with RSN (WPA2)
 - TKIP—Usually used with WPA
 - WEP-104—Used with dynamic WEP
 - WEP-40—Used with dynamic WEP
- 12 Click **Next**.
- 13 If you selected Static WEP in step 7, specify WEP keys. Otherwise, go to step 14.
 - For each key (up to four), type the key value in the corresponding key box.
 - By default, data in unicast and multicast packets are encrypted using WEP key 1. To use another key for either type of packet, select the key number in the WEP Unicast Key Index or WEP Multicast Key Index box.

14 Click **Next**.

15 Select the VLAN into which you want the switch to place users of the SSID.

If you want to specify the VLAN later when configuring the access rules, you can leave the VLAN Name box blank.

16 Select or create the radio profile to map to this service profile.

By default, the *default* radio profile is selected.

- To map the service profile to the default radio profile, leave *default* selected and go to step 17.
- To map the service profile to a different radio profile, select the radio profile and go to step 17.
- To create a new radio profile:
 - a** Select Create new Radio Profile and click **Next**.
 - b** Type the radio profile name in the Name box and click **Next**.
 - c** Select the radios you want to manage with the radio profile and click **Move** to move them to the Current Members list.



*If you have not planned RF coverage or configured any MAPs in the network plan yet, no radios are listed. You can add the radios later. (Select the radio profile, click **Properties**, then select Radio Selection. See “Configuring Advanced Radio Profile Settings” on page 265.)*

d Go to step 17.

17 Click **Finish**.

Configuring a Custom Service

If none of the other service types is appropriate, you can use the Custom Service Profile wizard to configure the service. The screens and options that are displayed depend on the access types and other elections you make as you use the wizard. All pages and options occur in at least one of the other service profile wizards. For information, see the procedures for the other wizards.

Modifying Service Profile Settings

You can modify the following service profile settings in the Wireless Service Profiles table itself:

- SSID name
- SSID type (encrypted or clear)
- Beacon state (advertisement of the SSID)
- Radio profile (maps MAP radios to the service profile)

To view or change other settings, select the service profile in the Wireless Service Profiles table and click **Properties**. A dialog with the following tabs is displayed:

- Service Profile
- WPA, RSN
- Static WEP
- Authorization Attributes
- Broadcast Settings
- Radio Profile Selection
- Voice Configuration
- Client Timeout
- Rate Configuration
- SODA

Service Profile Tab

All the settings on the Service Profiles tab are explained in the sections on the service profile wizards. For descriptions, see Table 18 on page 236.

WPA, RSN Tab

Most of the settings on the WPA, RSN tab are explained in the sections on the service profile wizards.

The TKIP Countermeasures Time specifies how many ms the switch will hold down traffic on the SSID if more than one Message Integrity Check (MIC) error occurs within a one-minute interval. You can specify from 0 to 60000 (one minute). The default is 60000.

Static WEP Tab

All of the settings on the Static WEP tab are explained in the sections on the service profile wizards.

Authorization Attributes Tab

The Authorization Attributes tab lists the default authorization attributes for the SSID. When a user is authorized for the SSID, the switch applies the default attributes to the user unless those attributes are otherwise specified. For example, if a default session-timeout is set for the SSID, and the session-timeout attribute is not defined as part of the individual user or the user's group, the switch assigns the SSID's default session-timeout to the user.

Where applicable, the service profile wizards allow you to specify the SSID's default VLAN but do not allow configuration of the other default attributes.

To change the default VLAN, select it from the VLAN-Name box. To set other default attributes, click in the value column and type the values.

(For more information about attributes and how they are selected, see the "Assigning Authorization Attributes" section in the "Configuring AAA for Network Users" chapter of the [Wireless LAN Switch and Controller Configuration Guide](#).)

Broadcast Settings Tab

The Broadcast Settings tab lists the settings for the following broadcast control features. These features help enhance throughput for client data by reducing the amount of bandwidth used by broadcast traffic.

- Proxy ARP—WX responds on behalf of wireless clients to ARP requests for their IP addresses.
- DHCP Restrict—WX captures and does not forward any traffic except DHCP traffic for a wireless client who is still being authenticated and authorized.
- No Broadcast—Sends unicasts to clients for ARP requests and DHCP Offers and Acks instead of forwarding them as multicasts.

All these broadcast control options are disabled by default.

Radio Profile Selection Tab

The Radio Profile Selection tab lists the radio profiles mapped to the service profiles. Service profile wizards map the service profiles to the default radio profile by default.

To map another radio profile to the service profile, select the radio profile in the Available Radio Profiles list, then click **Add**.

To unmap a radio profile from the service profile, select the radio profile in the Current Radio Profiles list, then click **Remove**.

Voice Configuration Tab

The Voice Configuration tab lists settings used for VoIP service profiles. For some options, the settings selected by 3WXM differ depending on the vendor you select when you create the service profile.

- **Static CoS**—When enabled, marks all traffic on the SSID with the same CoS value (the Static CoS Value). This option is automatically enabled for Vocera voice service profiles but is disabled for all other service profile types.
- **Static CoS Value**—CoS value assigned by the MAP to all traffic on the service profile's SSID, when static CoS is enabled. This value is used only when static CoS is enabled. The default is 0 if you enable static CoS manually. However, if static CoS is enabled automatically as part of a Vocera service profile, the default is 7 (highest priority).
- **CAC Mode**—Call Admission Control (CAC) policy for allowing new sessions on the radios serving an SSID:
 - **None**—CAC is disabled. This is the setting automatically selected for all service profile types except Vocera voice service profiles.
 - **Sessions**—CAC is session-based. A MAP radio cannot have more than the specified number of active sessions for the SSID. This is the setting automatically selected for Vocera voice service profiles.
- **Max Sessions**—When the CAC mode is Sessions, specifies the maximum number of active sessions radios can have for the SSID. The default is 12.
- **Short Retry Count**—Number of times (1 to 15) the MAP transmits an unacknowledged unicast frame that is shorter than the fragment threshold before discarding the frame. The default is 5.

- Long Retry Count—Number of times (1 to 15) the MAP transmits an unacknowledged unicast frame that is equal to or longer than the fragment threshold before discarding the frame. The default is 5.

Client Timeout Tab

The Client Timeout tab lists settings for client session timers:

- User idle timeout—Number of seconds a client can remain idle before the client's session is changed to the Disassociated state. A client is considered to be idle until it either sends data or responds to an idle client probe. You can specify from 20 to 86400 seconds. The default is 180 seconds (3 minutes.) To disable the timer, specify 0.
- Idle client probing—When enabled, sends a keepalive probe (a null data frame) to each wireless client. The frame is sent as a unicast. The WX expects a reply in the form of an Ack. Idle client probing is enabled by default.
- Web-portal session timeout—Specifies how many seconds MSS waits after a Web-Portal client enters the Disassociated state before terminating the client's session. This can be useful if you want to allow a client connecting through Web Portal WebAAA to enter standby or hibernation mode, then be able to resume its session after waking up, without having to log in again. You can specify from 5 seconds up to 2800 seconds (a little over 46 minutes). The default is 5 seconds. The timeout change applies globally for all Web-Portal sessions on the service profile's SSID. This option applies only to Web-Portal service profiles.

Rate Configuration Tab

The Rate Configuration tab lists the data rates supported and used by MAP radios. For each radio type (802.11a, 802.11b, and 802.11g), the following rates are individually configurable:

- Beacon rate—Data rate at which the radio sends beacon (SSID advertisement) frames and probe-response frames. The valid rates depend on the radio type and are the same as the mandatory rates. However, you cannot set the beacon rate to a disabled rate. The default depends on the radio type:
 - 802.11a—6.0
 - 802.11b—2.0
 - 802.11g—2.0

- Multicast rate—Data rate at which the radio sends multicast frames. The valid rates depend on the radio type and are the same as the mandatory rates. The default is Automatic, which sets the multicast rate to the highest rate that can reach all clients connected to the radio.
- Mandatory rates—Set of data transmission rates that clients are required to support in order to associate with an SSID on a MAP radio. A client must support at least one of the mandatory rates. These rates are advertised in the basic rate set of 802.11 beacons, probe responses, and reassociation response frames sent by MAP radios. Management frames sent by MAP radios use one of the specified mandatory rates.

The valid rates depend on the radio type:

- 802.11a—6.0, 9.0, 12.0, 18.0, 24.0, 36.0, 48.0, 54.0
- 802.11b—1.0, 2.0, 5.5, 11.0
- 802.11g—1.0, 2.0, 5.5, 6.0, 9.0, 11.0, 12.0, 18.0, 24.0, 36.0, 48.0, 54.0

The default depends on the radio type:

- 802.11a—6.0, 12.0, and 24.0
- 802.11b—1.0, and 2.0
- 802.11g—1.0, 2.0, 5.5, and 11.0
- Supported rates—Rates that are not mandatory but that the radio can nonetheless use to send data. By default, all valid rates that are not mandatory are still supported.
- Disabled rates—Data transmission rates that MAP radios will not use to transmit data. This setting applies only to data sent by the MAP radios. The radios will still accept frames from clients at disabled data rates. By default, none of the data rates are disabled.



All rate settings apply specifically to data rates used by radios for transmission. Radios can accept frames from a wireless client at any valid rate.

SODA Tab

The SODA tab has settings for the Sygate On-Demand (SODA) feature. SODA is an endpoint security solution that allows enterprises to enforce security policies on client devices without having to install any special software on the client machines. WX switches can be configured to run SODA security checks on users' machines as a requirement for gaining access to the network.

- Sygate on Demand—Enables or disables SODA on the service profile's SSID. When SODA functionality is enabled for a service profile, a SODA agent is downloaded to clients attempting to connect to a MAP managed by the service profile. The SODA agent performs a series of security-related checks on the client.
- Enforce checks—Enables or disables the enforcement of the SODA security checks, so that the client is allowed access to the network immediately after the SODA agent is downloaded, rather than waiting for the security checks to be run.
- Remediation ACL—ACL to be applied to a client if it fails the checks performed by the SODA agent.
- Failure Page—Name of the web page served to the user's browser if the user's computer fails one of the SODA agent checks.
- Success Page—Name of the web page served to the user's browser when the user's computer successfully completes all the SODA agent checks.
- Logout Page—Name of the web page served to the user's browser when the user logs out of the SODA-protected network.
- Agent Directory—Name of the directory in the WX switch's nonvolatile storage that contains the SODA agent files.

Viewing SSID Encryption Settings and Access Rules

A service profile's encryption settings and access rules are not displayed in the service profile table or in the wizard opened by the **Properties** button.

To display an SSID's encryption settings and access rules from the Service Profile table

- 1 Display the Wireless Service Profiles table:
 - a In the Organizer panel, click on the plus sign next to the WX switch on which the service profile is configured.

- b** Click on the plus sign next to Wireless.
 - c** Select Wireless Services.
- 2** Select the service profile in the table.
A set of tasks appears under Setup in the Task List panel.
 - 3** To display encryption settings and access rules, select one of the following in the Task List panel:
 - 802.1X Access
 - MAC Access
 - Web Portal Access
 - Open Access

To display the service profile's access rules only, select Access Rules.

To display an SSID's encryption settings and access rules in an Access Rule table

- 1** In the Organizer panel, click on the plus sign next to the WX switch on which the service profile is configured.
- 2** Click on the plus sign next to AAA.
- 3** Select the type of access rule assigned to the service profile:
 - 802.1X Access Rules—for 802.1 service profiles
 - MAC Access Rules—for Voice service profiles
 - Web Access Rules—for Web-Portal (WebAAA) service profiles
 - Last Resort Access Rules—for Open service profiles

For a custom service profile, the option to select depends on the access rule type selected when the service profile was created.

After you select the access rule type, a table listing all the access rules of that type configured on the WX switch is displayed.

- 4** Look in the SSID column for the SSID name configured in the service profile, and select the table row.
- 5** Click **Properties**.
A Network Access Properties wizard containing the configuration settings for the access rule appears.

Modifying SSID Encryption Settings and Access Rules

You can create access rules for a service profile from within a service profile wizard. You also can create or modify a service profile's access rules after creating the service profile.

- 1 Display the Wireless Service Profiles table:
 - a In the Organizer panel, click on the plus sign next to the WX switch on which the service profile is configured.
- 1 Click on the plus sign next to Wireless.
- 1 Select **Wireless Services**.
- 2 Select the service profile in the table.
A set of tasks appears under Setup in the Task List panel.
- 3 To configure encryption settings and access rules, select one of the following in the Task List panel and go to "Modifying Encryption Settings".
 - 802.1X Access
 - MAC Access (used for voice)
 - Web Portal Access
 - Open Access

To configure access rules only, select Access Rules and go to "Modifying Access Rules" on page 262.

Modifying Encryption Settings

- 1 Select the security modes you want the SSID to support. You can select one or more of the following:
 - RSN (WPA2)
 - WPA
 - Static WEP
- 2 Click **Next**.
- 3 If you selected RSN or WPA, you can select whether to use dynamically generated keys, or static keys based on a passphrase.
 - To use dynamically generated keys, leave the Pre-shared Key box blank.
 - To use static keys, type a string from 8 to 63 characters long in the Pre-shared Key box and click **Generate**.
- 4 Click **Next**.

5 Select the encryption algorithms to use:

- AES (CCMP)—Usually used with RSN (WPA2)
- TKIP—Usually used with WPA
- WEP-104—Used with dynamic WEP
- WEP-40—Used with dynamic WEP

6 Click **Next**.

7 If you selected Static WEP, specify WEP keys.

- For each key (up to four), type the key value in the corresponding key box.
- By default, data in unicast and multicast packets are encrypted using WEP key 1. To use another key for either type of packet, select the key number in the WEP Unicast Key Index or WEP Multicast Key Index box.

8 Click **Next**.

9 If the access type is Web Portal or Open Access, select the VLAN into which you want the switch to place users of the SSID.

If you want to specify the VLAN later when configuring the access rules, you can leave the VLAN Name box blank.

10 Click **Next**.

If the access type is Web Portal, the ACEs (ACL rules) that 3WXM will configure for the Web-Portal service are listed. The ACEs are required to allow DHCP traffic while blocking all other traffic while a user is being authenticated. These ACEs are used only during authentication. After the user is authenticated, the ACEs are not used.

If you need to add ACEs, continue with this step. Otherwise, click **Next** and go to “Modifying Access Rules” on page 262 or click **Finish** to save the changes and close the wizard.

- To add an ACE, click **Add Rule**. 3WXM adds an ACE to the end of the list. The ACE matches on all source and destination IP addresses and denies them.
- To modify an ACE, select the part of the ACE you want to modify, and edit or select the new value. (For information about ACE settings, see “Viewing and Configuring ACLs” on page 220.)



Do not change the deny rule at the bottom of the ACL. This rule must be present and the capture option must be used with the rule. If the rule does not have the capture option, the Web Portal user never receives a login page.

- 11 To modify access rules, click **Next** and go to “Modifying Access Rules”. Otherwise, click **Finish**.

Modifying Access Rules

- 1 If you have not already done so, access the Access Rules Configuration page for the service profile:
 - a Select the service profile in the Wireless Service Profiles table.
 - b Select one of the following in the Task List panel:
 - 802.1X Access
 - MAC Access (used for voice)
 - Web Portal Access
 - Open Access
 - Access Rules
 - c If you selected Access Rules, go to step 2. Otherwise, click **Next** to advance through the wizard until you reach the Access Rules Configuration page.
- 2 To create a new rule, click **Create**.
 - Specify the user glob or MAC address glob. (For syntax information, see “Access Rules” on page 238.)
 - To modify an existing rule, select the rule and click **Properties**.
(For information, see the procedure for configuring the type of service profile you are modifying. For example, if you selected an 802.1X profile, see “Configuring an 802.1X Wireless Service” on page 242.)
- 3 When you finish making changes, click **Finish** to save them and close the wizard.

Viewing and Configuring Radio Profiles

A radio profile is a set of attributes that you can apply to multiple radios. A default radio profile named *default* is provided and cannot be deleted. Rather than configuring each radio individually, you can create a new radio profile and apply it to multiple radios that you select. You can also create a radio profile as part of a domain policy and apply it to MAPs on different WX switches.



3Com recommends that you create a new radio profile and leave the default radio profile unchanged as a backup.

The default radio profile is associated with a WX switch's MAPs, unless you created a new radio profile while configuring a floor plan's coverage area and configured the WX switches with the information in the floor plan.

If you create a new radio profile while configuring a coverage area for a floor, 3WXM automatically copies the new profile to the domain policy of the Mobility Domain selected for the coverage area. Later, when you configure WX switches in the Mobility Domain using the information in the floor plan, 3WXM also copies the radio profile to the Radio Profiles policy of each of the switches.

Viewing Radio Profile Settings

To view radio profile settings:

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, click the plus sign next to the WX switch.
- 3 Click the plus sign next to Wireless.
- 4 Select **Radio Profiles**.

The radio profiles appear in the Content panel. Each row in the table shows settings for an individual radio profile.

To display all settings for a radio profile, select the radio profile and click **Properties**.

Creating a Radio Profile

To create a radio profile:

- 1 Access the Create Radio Profile wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to Wireless.
 - d Select **Radio Profiles**.
 - e In the Task List panel, select **Radio Profile**.
- 2 In the Name box, type the name of the radio profile (1 to 16 characters, with no spaces or tabs).
- 3 Click **Next**.
- 4 To add radios to the profile:
 - a Select the radios in the Available Members list.
 - b Click **Move**.

The radios are removed from the radio profile they are currently in and added to the new profile.
- 5 Click **Next**.
- 6 To map the radio profile to a service profile, select the service profile in the Available Service Profiles list and click **Add**.
- 7 Click **Finish**.

Moving Radios Back to the Default Radio Profile

To move radios back to the default radio profile:

- 1 Access the Radio Profiles table:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to Wireless.
- 2 In the Radio Profiles table, select the radio profile to which the radios are currently mapped.
- 3 Click **Properties**.
- 4 In the Current Members list, select the radios you want to return to the default radio profile.

- 5 Click **Reset To Default**.
- 6 Click **OK**.

Configuring Advanced Radio Profile Settings

After you configure a radio profile, you can select the radio profile, and click **Properties** to display a configuration wizard that contains all the configurable parameters for the radio profile. A dialog with the following tabs is displayed:

- Radio Profile
- 802.11 Attributes
- Auto Tune
- Service Profile Selection
- Radio Selection
- Voice Configuration

Radio Profile Tab

The Radio Profile tab lists settings for the following options:

- Name—Radio profile name
- Countermeasures Mode:
 - None—Radios do not use countermeasures. This is the default.
 - All—Radios use countermeasures against devices classified by MSS as rogues and against devices classified by MSS as interfering devices.

A rogue is a device that is in the 3Com network but does not belong there. An interfering device is not part of the 3Com network but also is not a rogue. MSS classifies a device as an interfering device if no client connected to the device has been detected communicating with any network entity listed in the forwarding database (FDB) of any WX switch in the Mobility Domain. Although the interfering device is not connected to your network, the device might be causing RF interference with MAP radios.

- Rogue—Radios use countermeasures against devices classified by MSS as rogues, but do not use countermeasures against devices classified by MSS as interfering devices.



CAUTION: Countermeasures affect wireless service on a radio. When a MAP radio is sending countermeasures, the radio is disabled for use by network traffic, until the radio finishes sending the countermeasures.

- Configured—Causes radios to attack only devices specified in the attack list on the WX switch (on-demand countermeasures). When this option is used, devices found to be rogues by other means, such as policy violations or by determining that the device is providing connectivity to the wired network, are not attacked.
- Enable Active Scan—Sends *probe any* requests (probe requests with a null SSID name), to solicit probe responses from other access points. Radios also passively scan by listening for beacons and probe responses. When active scan is disabled, radios perform passive scanning only.

802.11 Attributes Tab

The 802.11 Attributes tab lists the settings of the following options:

- Beacon Interval—Interval at which the MAP advertises its SSIDs. You can specify from 25 to 8191 milliseconds (ms). The default is 100 ms.
- DTIM Period—Number of beacons (1 to 31) the MAP transmits before transmitting the multicast and broadcast frames stored in its buffers. The default is 1.
- Fragment Threshold—Frame length (256 to 2346 bytes) at which the long-retry-count is applicable instead of the short-retry-count. The default is 2,346 bytes.
- Max. Tx MSDU Lifetime—Maximum amount of time, from 500 ms to 250,000 ms (250 seconds), the MAP can hold an outbound frame in buffer storage. The default value is 2,000 ms (2 seconds).
- Max. Rx MSDU Lifetime—Maximum amount of time, from 500 ms to 250,000 ms (250 seconds), the MAP can hold an inbound frame in buffer storage. The default is 2000 ms (2 seconds).
- RTS Threshold—Minimum length (256 to 3000 bytes) a frame can be for the MAP to use the Request-To-Send/Clear-To-Send (RTS/CTS) method to send the frame. Frames smaller than the RTS threshold are not sent using the RTS/CTS method. The default is 2346 bytes.
- Enable Long Preambles—Enables advertisement of long preambles for 802.11b/g radios. This option is enabled by default. This option applies only to 802.11b/g radios.

Auto Tune Tab

The Auto Tune tab lists settings for RF Auto-Tuning:

- Tune Channel—Automatically configures and tunes the channel. This feature is enabled by default.



RF Auto-Tuning of channels on 802.11a radios uses only the bottom eight channels in the band (36, 40, 44, 48, 52, 56, 60, and 64). To use a higher channel number, you must disable RF Auto-Tuning of channels on the radio profile the radio is in, and statically configure the channel.

- Tune Transmit Power—Automatically configures and tunes the power. This feature is disabled by default.
- Channel Tuning Interval—Interval at which RF Auto-Tuning decides whether to change the channels on radios in a radio profile.

At the end of each interval, MSS processes the results of the RF scans performed during the previous interval, and changes radio channels if needed.

You can specify from 0 to 65535 seconds. The default channel interval is 3600 seconds. 3Com recommends that you use an interval of at least 300 seconds (5 minutes). If you set the interval to 0, RF Auto-Tuning does not reevaluate the channel at regular intervals. However, RF Auto-Tuning can still change the channel in response to RF anomalies.

- Tx. Power Tuning Interval—Interval at which RF Auto-Tuning decides whether to change the power level on radios. You can specify from 1 to 65535 seconds. The default is 300 seconds.
- Channel Tuning Holddown—Minimum number of seconds a radio in a radio profile must remain at its current channel assignment before RF Auto-Tuning can change the channel.

The channel holddown provides additional stability to the network by preventing the radio from changing channels too rapidly in response to spurious RF anomalies such as short-duration channel interference.

You can specify from 0 to 65535 seconds. The default channel interval is 900 seconds.

- Tx. Power Backoff Timer—Interval at which radios reduce power after temporarily increasing the power to maintain the minimum data rate for an associated client.

At the end of each power-backoff interval, radios that temporarily increased their power reduce it by 1 dBm. The power backoff continues in 1 dBm increments after each interval until the power returns to expected setting.

You can specify from 0 to 65535 seconds. The default is 10 seconds.

Service Profile Selection Tab

The Profile Selection tab lists the service profiles to which the radio profile is mapped. The radios managed by the radio profile provide wireless service for the service profiles' SSIDs.

To map the radio profile to a service profile, select the service profile in the Available Service Profiles list. Click **Add** to move the profile name to the Current Service Profiles list.

To remove the mapping between the radio profile and a service profile, select the service profile in the Current Service Profiles list. Click **Remove** to move the profile name to the Available Service Profiles list.

Radio Selection Tab

The Radio Selection Tab lists the radios managed by the radio profile. A radio can be managed by only one radio profile.

To add a radio to the radio profile, select the radio in the Available Members list. Click **Add** to move the radio to the Current Members list.

To remove a radio from the radio profile, select the radio in the Current Members list. Click **Reset to Default** to return the radio to the default radio profile.



If the Available Members list is empty, no MAPs have been configured for the switch yet. To configure MAPs, see "Configuring a Directly Connected MAP" on page 275 and "Creating a Distributed MAP" on page 273. After you configure the MAPs, return to this wizard page to apply the radio profile to radios.

Voice Configuration Tab

The Voice Configuration tab lists settings for VoIP services:

- QoS Mode—Classification and marking of high priority traffic on the WX and MAP:
 - WMM—Classifies, marks, and forwards traffic for Wi-Fi Multimedia (WMM) devices based on 802.1p and DSCP values.
 - SVP—Optimizes forwarding of SpectraLink Voice Priority (SVP) traffic by setting the random wait time a MAP radio waits before transmitting the traffic to 0 microseconds.



The SVP QoS mode also requires an ACL to mark CoS in the SVP traffic. The ACL is automatically configured by 3WXM when you use the Voice Service Profile wizard with the SVP vendor option.

Viewing and Changing the Auto-DAP Profile

You can use an Auto-DAP profile to deploy unconfigured Distributed MAPs. A Distributed MAP that does not have a configuration on a WX switch can receive its configuration from the Auto-DAP profile instead.

The Auto-DAP profile assigns a Distributed MAP number and name to the MAP, from among the unused valid MAP numbers available on the switch. The Auto-DAP profile also configures the MAP with the MAP and radio parameter settings in the profile. The MAP and radio parameter settings in the Auto-DAP profile are configurable.

The Auto-DAP profile does not control SSIDs, encryption parameters, or any other parameters managed by service profiles. You still need to configure a service profile separately for each SSID.

A WX switch can have one Auto-DAP profile.

Viewing Auto-DAP Profile Settings

To view Auto-DAP profile settings:

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, click the plus sign next to the WX switch.
- 3 Click the plus sign next to Wireless.
- 4 Select **Auto-DAP**.

The Auto-DAP profile settings appear in the Content panel.

Changing Auto-DAP Profile Settings

To change settings for a switch's Auto-DAP profile:

- 1 To enable the Auto-DAP profile, select **Enabled**.
- 2 To select the radio type, click the MAP Radio Type box and select the radio type from the list:
 - **11a**—802.11a
 - **11b**—802.11b only
 - **11g**—802.11b/g
- 3 In the Enable Blink list, select **Yes** to enable LED blink mode or **No** to disable it.

When blink mode is enabled, the health and radio LEDs on models alternately blink green and amber, allowing you to visually identify a MAP. (On an AP2750, the 11a LED blinks on and off.) By default, blink mode is disabled.

- 4 If you are configuring dual-homing support, in the Bias list, select **High** or **Low**.

Bias is the priority of one WX connection over other WX connections to a single MAP for booting, configuration, and data transfer. You can set a Distributed MAP's bias to be low or high. A configuration with a high bias has priority over a configuration for the same MAP with low bias. The default is **High**.

If the bias for all connections is the same, the MAP selects the switch that has the greatest capacity to add more active MAPs. For example, if a MAP is dual homed to two WX4400 switches, and one of the switches has 50 active MAPs while the other switch has 60 active MAPs, the new MAP selects the switch that has only 50 active MAPs.



Bias applies only to WX switches that are indirectly attached to the MAP through an intermediate Layer 2 or Layer 3 network. A MAP always attempts to boot on MAP port 1 first, and if the MAP is directly attached to a WX switch on MAP port 1, it boots from that switch regardless of the bias settings.

- 5 To add the MAP to a MAP group for session load balancing, type the group name in the Load Balance Group box.

- 6 In the Enable Firmware Update list, select **Yes** to automatically upgrade MAP boot firmware. The upgrade version of the firmware is loaded from a WX when the MAP is booting.

Select **No** to disable automatic firmware upgrading. Automatic firmware upgrading is enabled by default.
- 7 To enable an individual radio, select **Enabled**.
- 8 To configure RF Auto-Tuning on a radio:
 - a To change the maximum default power level that RF Auto-Tuning can assign to the radio, select the power level from the drop-down list in the Max Tuned Power column.

The Default power level is the same as the maximum power level allowed for the country of operation.
 - b To change the minimum transmit data rate for 802.11b/g clients or 802.11a clients associated with the radio, select the rate from the drop-down list in the Client Data Rate column.

By default, a radio does not lower the transmit data rate for any client below the following values:
 - 5.5 Mbps for 802.11b/g clients
 - 24 Mbps for 802.11a clients
 - c To change the maximum percentage of client retransmissions a radio can experience before RF Auto-Tuning considers changing the channel on the radio, select the percentage from the drop-down list in the Max Retransmissions column.

By default, the maximum percentage of client retransmissions a radio can experience before RF Auto-Tuning considers changing the channel on the radio is 10 percent.
- 9 To change the radio profile used to manage the radios, select the profile from the drop-down list in the Radio Profile column.
- 10 Click **Save**.

Converting Auto DAPs into Statically Configured DAPs

See “Converting Auto DAPs into Statically Configured APs” on page 67.

Deleting Auto DAPs

See “Deleting Auto DAPs” on page 175.

Viewing and Configuring MAPs

MAPs contain radios that provide networking between your wired network and IEEE 802.11 wireless users. A MAP connects to the wired network through a 10/100 Ethernet link and connects to wireless users through radio signals.

To configure the WX switch to support a MAP, you must first determine how the MAP will connect to the switch. There are two types of MAP-to-WX connection: direct and distributed.

- In direct connection, a MAP connects to one or two 10/100 ports on a WX. The WX port is then configured specifically for a direct attachment to a MAP. There is no intermediate networking equipment between the WX and MAP and only one MAP is connected to the WX port. The WX 10/100 port provides PoE to the MAP. The WX also forwards data only to and from the configured MAP on that port. The port numbers on the WX configured for directly attached MAPs reference a particular MAP.
- A MAP that is not directly connected to a WX is considered a Distributed MAP. There may be intermediate Layer 2 switches or Layer 3 IP routers between the WX and MAP. The WX may communicate to the Distributed MAP through any network port. (A network port is any port connecting the switch to other networking devices, such as switches and routers, and it can also be configured for 802.1Q VLAN tagging.) The WX contains a configuration for a Distributed MAP based on the MAP’s serial number. Similar to ports configured for directly connected MAPs, Distributed MAP configurations are numbered and can reference a particular MAP. These numbered configurations do not, however, reference any physical port.

(For more information, including network requirements for Distributed MAPs, see the “Configuring MAP Access Points” chapter of the [Wireless LAN Switch and Controller Configuration Guide](#).)

Viewing the Configured MAPs

To view the configured MAPs:

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, click the plus sign next to the WX switch.
- 3 Click the plus sign next to Wireless.
- 4 Select **Access Points**.

The MAPs that are configured on the WX switch appear in the Content panel. The radio settings appear in the Content panel. Each row in the table shows settings for an individual MAP.

To display all settings for a MAP, select the MAP and click **Properties**.

Creating a Distributed MAP

A MAP can connect to the wired network through a direct 10/100 Ethernet connection to a WX or indirectly through other Layer 2 or Layer 3 wired networking devices. Configure a Distributed MAP for each indirectly connected MAP.

Table 20 lists how many MAPs you can configure on a WX switch, and how many MAPs a switch can boot. The numbers are for directly connected and Distributed MAPs combined.

Table 20 Maximum MAPs Supported Per Switch

WX Switch Model	Maximum Configured	Maximum Booted
WX4400	300	40, 80, or 120, depending on the license.
WX1200	30	12
WXR100	8	3



For a MAP that is directly connected to the WX, configure a MAP port instead. (For information, see “Configuring a Directly Connected MAP” on page 275.)

To create a distributed MAP

- 1 Access the Create Distributed AP wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to Wireless.

- d Select **Access Points**.
 - e In the Task List panel, select **Distributed AP**.
- 2 In the Name box, type a name (1 to 16 alphanumeric characters, with no spaces or tabs).
 - 3 In the DAP Number box, specify the connection number for the WX switch's connection to this Distributed MAP. The range of valid connection numbers depends on the WX switch model:
 - For a WX4400, you can specify a number from 1 to 300.
 - For a WX1200, you can specify a number from 1 to 30.
 - For a WXR100, you can specify a number from 1 to 8.
 - 4 In the Serial Number box, type the serial number of the MAP.
 - 5 In the Fingerprint box, type the 16-digit hexadecimal number of the MAP's encryption fingerprint. Use either of the following formats:
 - 11:22:33:44:55:66:77:88:99:aa:bb:cc:dd:ee:ff:00
 - 1122:3344:5566:7788:99aa:bbcc:ddee:ff00

A MAP's fingerprint is the hash value of the MAP's public encryption key. The fingerprint is displayed on a label on the back of the MAP, and is labeled *RSA key*. If the MAP is already installed and operating, use the CLI command **display dap status** command to display the fingerprint.



The fingerprint is used for secure communication between the WX switch and the MAP, and applies only to Distributed MAPs.

- 6 Click **Next**.
- 7 Select the MAP model from the MAP Model list.
- 8 To select the radio type for a single-radio model, click the MAP Radio Type box and select the radio type from the list:
 - **11a**—802.11a
 - **11b**—802.11b only
 - **11g**—802.11b/g
- 9 Click **Next**.
- 10 Configure the radios:
 - a To enable the radio, select **Enabled**.

b In the Radio Profile list, select the profile to which the radio belongs. (For more information, see “Viewing and Configuring Radio Profiles” on page 263.)

c In the Channel Number list, select the channel number for the radio.



If RF Auto-Tuning for channel configuration is enabled, setting this value has no effect. The channel number is controlled by RF Auto-Tuning.

d In the Transmit Power box, specify the transmit power for the radio.



If RF Auto-Tuning for power configuration is enabled, setting this value has no effect. The power level is controlled by RF Auto-Tuning.

e If the MAP has two radios, click **Next** and repeat this step for the other radio. Otherwise, go to step 11.

11 Click **Finish**.

Configuring a Directly Connected MAP

MAPs contain radios that provide networking between your wired network and IEEE 802.11 wireless users. A MAP can connect to the wired network through a direct 10/100 Ethernet connection to a WX or indirectly through other Layer 2 or Layer 3 wired networking devices. Configure a MAP port for each directly connected MAP.

Table 21 lists how many MAPs you can configure on a WX switch, and how many MAPs a switch can boot. The numbers are for directly connected and Distributed MAPs combined.

Table 21 Maximum MAPs Supported Per Switch

WX Switch Model	Maximum Configured	Maximum Booted
WX4400	300	40, 80, or 120, depending on the license.
WX1200	30	12
WXR100	8	3



For a MAP that is indirectly connected to the WX through an intermediate Layer 2 or Layer 3 network, configure a Distributed MAP instead. (See “Creating a Distributed MAP” on page 273.)



You cannot configure any gigabit Ethernet port, or port 7 or 8 on a WX1200 switch, or port 1 on a WXR100 switch, as a MAP port. To manage a MAP on a WX4400 switch, configure a Distributed MAP connection on the switch. (See “Creating a Distributed MAP” on page 273.)

To configure a directly connected MAP

- 1 Access the Create Direct-Connect AP wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to Wireless.
 - d Select **Access Points**.
- 2 In the Task List panel, select **Direct-Connect AP**.
- 3 Select the WX port the MAP will be connected to from the Available Ports drop-down list.



Configuring a directly connected MAP in a port converts the port to a MAP access port. If the port is a statically configured member of a VLAN, the port is removed from the VLAN.

- 4 Click **Next**.
- 5 Select the MAP model from the MAP Model list.
- 6 To select the radio type for a single-radio model, click the MAP Radio Type box and select the radio type from the list:
 - **11a**—802.11a
 - **11b**—802.11b only
 - **11g**—802.11b/g

- 7 Click **Next**.



The non-editable number (1 or 2) indicates the radio number on the MAP.

- 8 To select the radio type for a single-radio model, click the MAP Radio Type box and select the radio type from the list:
 - **11a**—802.11a
 - **11b**—802.11b only
 - **11g**—802.11b/g
- 9 Click **Next**.
- 10 Configure the radios:
 - a To enable the radio, select **Enabled**.
 - b In the Radio Profile list, select the profile to which the radio belongs. (For more information, see “Viewing and Configuring Radio Profiles” on page 263.)



c In the Channel Number list, select the channel number for the radio.
If RF Auto-Tuning for channel configuration is enabled, setting this value has no effect. The channel number is controlled by RF Auto-Tuning.



d In the Transmit Power box, specify the transmit power for the radio.
If RF Auto-Tuning for power configuration is enabled, setting this value has no effect. The power level is controlled by RF Auto-Tuning.

e If the MAP has two radios, click **Next** and repeat this step for the other radio. Otherwise, go to step 11.

11 Click **Finish**.

Changing the MAP-WX Security Mode

To change the MAP-WX security mode for all Distributed MAPs, select the value from the Security Mode drop-down list:

- None—Management traffic between Distributed MAPs and the WX is not encrypted, even for MAPs that support encryption.
- Optional—Distributed MAPs can be managed by the switch even if they do not have encryption keys or their keys have not been verified by an administrator. Encryption is used for MAPs that support it.
- Require—Distributed MAPs can be managed by the switch only if they have encryption keys *and* their keys have been verified by an administrator. If a MAP does not have an encryption key or the key has not been verified, the WX does not establish a management session with the MAP.

The setting applies to all Distributed MAPs booted and managed by the switch. A change to this setting affects only new management sessions established after you deploy the change to the switch. The change does not affect existing sessions.

Configuring Advanced MAP Settings

After you configure a MAP, you can select the MAP and click **Properties** to display a configuration wizard that contains all the configurable parameters for the MAP.

You also can edit values listed in the table by editing them in the table itself.

- 1** Access the MAP table:
 - a** Select the Configuration tool bar option.
 - b** In the Organizer panel, click the plus sign next to the WX switch.

- c Click the plus sign next to Wireless.
 - d Select **Access Points**.
- 2 Select the MAP you want to modify and click **Properties**.
 - 3 To select the radio type for a single-radio model, click the MAP Radio Type box and select the radio type from the list:
 - **11a**—802.11a
 - **11b**—802.11b only
 - **11g**—802.11b/g
 - 4 To change the Name, edit the string in the Name box.
 - 5 If you are configuring dual-homing support, in the Bias list, select **High** or **Low**.

Bias is the priority of one WX connection over other WX connections to a single MAP for booting, configuration, and data transfer. You can set a Distributed MAP's bias to be low or high. A configuration with a high bias has priority over a configuration for the same MAP with low bias. The default is **High**.

If the bias for all connections is the same, the MAP selects the switch that has the greatest capacity to add more active MAPs. For example, if a MAP is dual homed to two WX4400 switches, and one of the switches has 50 active MAPs while the other switch has 60 active MAPs, the new MAP selects the switch that has only 50 active MAPs.



Bias applies only to WX switches that are indirectly attached to the MAP through an intermediate Layer 2 or Layer 3 network. A MAP always attempts to boot on MAP port 1 first, and if the MAP is directly attached to a WX switch on MAP port 1, it boots from that switch regardless of the bias settings.

- 6 In the Enable Blink list, select **Yes** to enable LED blink mode or **No** to disable it.

When blink mode is enabled, the health and radio LEDs alternately blink green and amber, allowing you to visually identify a MAP. By default, blink mode is disabled.
- 7 In the Enable Firmware Update list, select **Yes** to automatically upgrade MAP boot firmware. The upgrade version of the firmware is loaded from a WX when the MAP is booting.

Select **No** to disable automatic firmware upgrading. Automatic firmware upgrading is enabled by default.

- 8 To configure settings for a radio, click **802.11g Radio** or **802.11a Radio**.
 - a To enable the radio, select **Enabled**.
 - b If the MAP model supports external antennas, select the external antenna model from the Antenna Type box.
 - c To indicate the direction of the antenna's coverage, change the value in the Directionality of antenna box. The default value of 0 degrees directs the antenna's coverage to the right on the floor plan. For example, to move the coverage 90 degrees (so that the antenna's area of coverage faces downward as you view the floor plan), type 90 in the box.

You can verify and change the antenna's coverage direction after you finish using this wizard. To verify the antenna's coverage, display the floor plan where the MAP is located. The antenna direction is indicated by an arrow.

To show the antenna's RF coverage, select the MAP, right-click, and select Display RF Coverage and the radio type from the drop-down list.

To adjust the coverage, select the MAP, right-click, and select Edit Properties from the drop-down list to display the Modify MAP or Modify DAP wizard. In the wizard, click the tab for the radio to display its configuration page, edit the value in the Antenna Direction box, and click **OK**.



3WXM assumes that the external antenna will be installed so that the front faces in the direction of coverage (not up or down), and so that the antenna cable connector faces down or up. 3WXM also assumes that the antenna does not provide any coverage behind itself.



The Antenna Type and Directionality of antenna boxes appear only if the MAP model supports an external antenna.

- d In the Radio Profile list, select the profile to which the radio belongs. (For more information, see "Viewing and Configuring Radio Profiles" on page 263.)

- e In the Channel Number list, select the channel number for the radio.



If RF Auto-Tuning for channel configuration is enabled, setting this value has no effect. The channel number is controlled by RF Auto-Tuning.

- f In the Transmit Power box, specify the transmit power for the radio.



If RF Auto-Tuning for power configuration is enabled, setting this value has no effect. The power level is controlled by RF Auto-Tuning.

- a To change the maximum power level RF Auto-Tuning can assign to the radio, select the power level from the Max. Transmit Power pull-down list.

The default power level is default, which means RF Auto-Tuning can assign up to the maximum power level allowed for the radio.

You can specify from 1 to 20.

- b To change the minimum rate at which a radio is allowed to transmit traffic to clients, select the rate from the Client Data Rate pull-down list.

The radio automatically increases its transmit power when necessary to maintain at least the minimum rate with an associated client.

The valid values depend on the radio type. All values are in Mbps.

- For 802.11g radios—**54, 48, 36, 24, 18, 12, 11, 9, 6, 5.5, 2**, or **1**
- For 802.11b radios—**11, 5.5, 2**, or **1**
- For 802.11a radios—**54, 48, 36, 24, 18, 12, 9**, or **6**

The default minimum data transmit rate depends on the radio type:

- The default minimum data rate for 802.11b/g and 802.11b radios is 5.5 Mbps.
 - The default minimum data rate for 802.11a radios is 24 Mbps.
- c To change the maximum percentage of client retransmissions a radio can experience before RF Auto-Tuning considers changing the channel on the radio, select the percentage from the Data Retransmissions pull-down list.

A high percentage of retransmissions is a symptom of interference on the channel.

You can specify from 1 to 100. The default is 10.

- 9 Click **OK**.

Viewing and Changing Radio Settings

You can configure MAP radio settings when you configure the MAPs. You also can view or change radio settings after the MAPs are configured.

Viewing Radio Settings

To view radio settings:

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, click the plus sign next to the WX switch.
- 3 Click the plus sign next to Wireless.
- 4 Select **Radios**.

The radio settings appear in the Content panel. Each row in the table shows settings for an individual radio.

To display all settings for a radio, select the radio and click **Properties**.

Changing Radio Settings

To change radio settings:

- 1 Access the radio table:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to Wireless.
 - d Select **Radios**.
- 2 To change basic radio settings, select the new values in the table. To change more advanced features, select the radio and click **Properties**.
(For information about the radio parameters in the table, see step 10 on page 276. For information about the radio parameters in the Radio Properties wizard, see step 8 on page 279.)
- 3 If you edit settings in the table, click **Save**. If you configure settings in the Radio Properties wizard, clicking **OK** to close the wizard also saves the changes.

Viewing and Changing RF Detection Settings

This section contains procedures for configuring RF detection on an individual switch. For an overview of RF detection and for specific information about the configuration options, see “Configuring Wireless Parameters” on page 235.



The tasks available here allow you to configure entries for permit lists, the ignore list, and the black list. However, you must enter the SSID, Organizationally Unique Identifier (OUI), or MAC address you are adding to a list. To add a value to a list by selecting it, use the RF Detection window instead. (See “Detecting and Combatting Rogue Devices” on page 457.)



To convert a rogue into a third-party AP, see “Converting a Rogue into a Third Party AP” on page 471.

Viewing RF Detection Settings

To view RF detection settings:

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, click the plus sign next to the WX switch.
- 3 Click the plus sign next to Wireless.
- 4 Select **RF Detection**.

The RF detection settings appear in the Content panel.

Adding an Entry to the Permitted Vendor OUI List

To add an entry to the permitted vendor OUI list:

- 1 Access the RF detection settings:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to Wireless.
 - d Select **RF Detection**.
- 2 In the Task List panel, select **Vendor OUIs**.
- 3 Select the device type(s):
 - Client
 - AP

- 4 Select the vendor from the Vendor drop-down list.
- 5 Select the specific OUIs you want to allow for the selected vendor. Go to step 9.



*If the vendor or OUI is not listed, click **Cancel**, then select Permitted OUI Entry in the Task List panel. Go to step 6.*

- 6 Edit the OUI in the Vendor OUI box.
- 7 Select the device type from the Type drop-down list: Client, AP, or All (both client and AP).
- 8 Click **OK**.
- 9 Click **Add** to move the OUIs to the Permitted OUI List.
- 10 Click **OK**.

Adding an Entry to the Permitted SSID List

To add an entry to the permitted SSID list:

- 1 Access the RF detection settings:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to Wireless.
 - d Select **RF Detection**.
- 2 Type the SSID name in the SSID box.
- 3 Click **OK**.

Adding an Entry to the Ignore List

To add an entry to the Ignore list:

- 1 Access the RF detection settings:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to Wireless.
 - d Select **RF Detection**.
- 2 Edit the MAC address in the MAC Address box.
- 3 Click **OK**.

Adding an Entry to the Rogue List To add an entry to the Rogue list:

- 1 Access the RF detection settings:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to Wireless.
 - d Select **RF Detection**.
- 2 Edit the MAC address in the MAC Address box.
- 3 Click **OK**.

Adding an Entry to the Client Black List To add an entry to the client black list:

- 1 Access the RF detection settings:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to Wireless.
 - d Select **RF Detection**.
- 2 Edit the MAC address in the Client MAC Address box.
- 3 Click **OK**.

Enabling Countermeasures To enable countermeasures:

- 1 Access the RF detection settings:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to Wireless.
 - d Select **RF Detection**.
- 2 To enable countermeasures against rogues detected by radios managed by this profile, select one of the following from the Countermeasures Type pull-down list for the radio profile:
 - None—Radios do not use countermeasures. This is the default.
 - All—Radios use countermeasures against devices classified by MSS as rogues and against devices classified by MSS as interfering devices.

A rogue is a device that is in the 3Com network but does not belong there. An interfering device is not part of the 3Com network but also is not a rogue. MSS classifies a device as an interfering device if no client connected to the device has been detected communicating with any network entity listed in the forwarding database (FDB) of any WX switch in the Mobility Domain. Although the interfering device is not connected to your network, the device might be causing RF interference with MAP radios.

- Rogue—Radios use countermeasures against devices classified by MSS as rogues, but do not use countermeasures against devices classified by MSS as interfering devices.



Countermeasures affect wireless service on a radio. When a MAP radio is sending countermeasures, the radio is disabled for use by network traffic, until the radio finishes sending the countermeasures.

- Configured—Configures radios to attack only devices specified in the attack list on the switch (*on-demand* countermeasures). When this option is used, devices found to be rogues by other means, such as policy violations or by determining that the device is providing connectivity to the wired network, are not attacked.

3 Click **Save**.

To view or change other radio profile options, select the radio profile and click **Properties**.

Enabling MAP Signatures

A MAP signature is a set of bits in a management frame sent by a MAP that identifies that MAP to MSS. If someone attempts to spoof management packets from a 3Com MAP, MSS can detect the spoof attempt.

- 1 Access the RF detection settings:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to Wireless.
 - d Select **RF Detection**.
- 2 Select **Enable AP Signature**.
- 3 Click **Save**.

8

CONFIGURING AUTHENTICATION, AUTHORIZATION, AND ACCOUNTING PARAMETERS

This chapter describes how to view and configure the following Authentication, Authorization, and Accounting (AAA) parameters for WX switches:

- Local database entries for AAA processing of administrator and network client access
- RADIUS servers, for backend AAA processing of WX administrator access and network client access
- Global 802.1X Settings
- Network client access rules
- WX administrator access rules
- RADIUS proxy entries and 802.1Q mapping to provide AAA for clients of third-party APs
- Location policies for overriding authorization parameters assigned by AAA to network clients
- Mobility profiles for controlling network client access to specific MAP ports, Distributed MAPs, or wired authentication ports

Creating and Managing Users in the Local User Database

The WX switch contains a local database that can store user information for a 3Com Mobility System. You can use the local database to create users and authenticate them, or you can use the local database in conjunction with a RADIUS server. For example, although you might use a RADIUS server to manage most users, you could define IT staff as users in the local database in the event that the RADIUS server is unavailable.

You can create two types of users in the local database:

- **Named users** — These users are authenticated by username and password and are assigned to specific VLANs. Users include administrators and network users. You can group these users by creating user groups, in order to simplify configuration.
- **MAC address users** — These users are authenticated by a MAC address. For example, devices such as PDAs or cellular phones that do not support 802.1X authentication are identified when the WX switch discovers the MAC addresses of these devices from received frames. The MAC address is the username and is authenticated by the local database. You can group these users by creating user groups. MAC address users and user groups cannot be assigned administrative access to the WX switch.

In addition to username and password, you can configure authorization attributes for users. Authorization attributes specify the network resources the user can access. The most commonly used attribute is VLAN-Name, which specifies the VLAN to place the user in after they are authorized.

You can configure authorization attributes for individual users and for user groups. When you configure attributes for a user group, the attribute settings apply to all users in the group. However, if attributes are also configured for an individual user in the group, the values for the attributes configured for the individual user override the attribute values configured for the group.

You can configure groups for named users and groups for MAC users. A group cannot contain both named users and MAC users.

Viewing Users and Groups in the Local Database

To view users and groups in the local database:

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, click the plus sign next to the WX switch.
- 3 Click the plus sign next to AAA.
- 4 Select Local User Database.

The users and user groups configured in the local user database appear.

Creating a Named User

To create a named user:

- 1 Access the Create Named User wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to AAA.
 - d Select **Local User Database**.
 - e In the Task List panel, select **Named User**.
- 2 In the Name box, type the name of the user (1 to 60 alphanumeric characters, with no spaces or tabs).
- 3 In the Password box, type the password for the user (1 to 80 alphanumeric characters, with no spaces or tabs). You must specify a password if you want the password to be encrypted in the configuration file.
- 4 In the User Group list, select a user group to assign the user to, if the group is already configured.

You do not need to assign a user to a user group. If you do select a user group, you only need to specify a password for the user. All other attributes are obtained from the user group.
- 5 To set authorization attributes for the user, click **Next** and go to step 6.
- 6 In the VLAN Name box, select or type the name of the VLAN that the user belongs to (1 to 16 alphanumeric characters, with no spaces or tabs). The WX switch will authorize the user for that VLAN. For more information on VLANs, see "Viewing and Configuring VLANs" on page 206.

If the user requires administrative access only, you do not need to specify a VLAN.

Otherwise, if you plan to set authorization attributes in another way, such as adding the user to a group or configuring default AAA attribute values for the SSID the user will access, click **Finish**.
- 7 In the attribute row you want to configure, click the Attribute Value column.

See Table 22 on page 293 for a description of user attributes and their values.
- 8 Type the new attribute value in lowercase characters. ACL names are case-sensitive.

- 9 Repeat step 5 through step 7 for each attribute value you want to change.
- 10 Click **Finish**.

Creating a User Group and Assigning Users To It

To create a user group and assign users to it:

- 1 Access the Create Named User Group wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to AAA.
 - d Select **Local User Database**.
 - e In the Task List panel, select **Named User Group**.
- 2 To set authorization attributes for users in the group, click **Next** and go to step 3.
 Otherwise, if you plan to set authorization attributes in another way, such as configuring default AAA attribute values for the SSID the user will access, click **Finish**.
- 3 In the VLAN Name box, select or type the VLAN that the user group belongs to (1 to 16 alphanumeric characters, with no spaces or tabs). The WX switch will authorize the users in this group for that VLAN. For more information on VLANs, see "Viewing and Configuring VLANs" on page 206.
- 4 In the attribute row you want to configure, click the Attribute Value column.
 See Table 22 on page 293 for a description of user attributes and their values.
- 5 Type the new attribute value in lowercase characters. ACL names are case-sensitive.
- 6 Repeat step 4 through step 5 for each attribute value you want to change.
- 7 To add users to the group, click **Next**.
- 8 Select users in the Available Users list.
- 9 Click **Add** to move them to the Current Users list.
- 10 Click **Finish**.

Creating a MAC User To create a MAC user:

- 1 When creating MAC address users, you configure authentication Access the Create MAC User wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to AAA.
 - d Select Local User Database.
 - e In the Task List panel, select MAC Address User.
- 2 In the User MAC Address box, type the MAC address for the user device, using colons (:) as delimiters. You must specify all 6 bytes of the MAC address.
- 3 In the MAC User Group list, select the MAC user group that the user device belongs to, if the group is already configured.
- 4 To set authorization attributes for the user, click **Next** and go to step 5.
Otherwise, if you plan to set authorization attributes in another way, such as adding the user to a group or configuring default AAA attribute values for the SSID the user will access, click **Finish**.
- 5 In the VLAN Name box, select or type the name of the VLAN that the user device belongs to (1 to 16 alphanumeric characters, with no spaces or tabs). The WX switch will authorize the user for that VLAN. For more information on VLANs, see "Viewing and Configuring VLANs" on page 206.
- 6 In the attribute row you want to configure, click the Attribute Value column.
See Table 22 on page 293 for a description of user attributes and their values.
- 7 Type the new attribute value in lowercase characters. ACL names are case-sensitive.
- 8 Repeat step 5 through step 7 for each attribute value you want to change.
- 9 Click **Finish**.

Creating a MAC User Group and Assigning Users To It

To create a MAC user group and assign users to it:

- 1 Access the Create MAC User Group wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to AAA.
 - d Select **Local User Database**.
 - e In the Task List panel, select **MAC User Group**.
- 2 In the User Group Name box, type a name for the MAC address user group (1 to 60 alphanumeric characters, with no spaces or tabs).
- 3 To set authorization attributes for MAC addresses in the group, click **Next** and go to step 5.
- 4 Otherwise, if you plan to set authorization attributes in another way, such as configuring default AAA attribute values for the SSID the user will access, click **Finish**.
- 5 In the VLAN Name box, select or type the VLAN that the group belongs to (1 to 16 alphanumeric characters, with no spaces or tabs). The WX switch will authorize the MAC users in this group for that VLAN. For more information on VLANs, see "Viewing and Configuring VLANs" on page 206.
- 6 In the attribute row you want to configure, click the Attribute Value column.
See Table 22 on page 293 for a description of user attributes and their values.
- 7 Type the new attribute value in lowercase characters. ACL names are case-sensitive.
- 8 Repeat step 5 through step 7 for each attribute value you want to change.
- 9 To add MAC addresses to the group, click **Next**.
- 10 Select users in the Available MAC Address Users list.
- 11 Click **Add** to move them to the Current MAC Address Users list.
- 12 Click **Finish**.

Authorization Attributes

Authorization attributes can be assigned to users in the local database or on remote servers. The attributes, which include access control list (ACL) filters, VLAN membership, encryption type, session time-out period, and other session characteristics, let you control how and when users access the network. When a user or group is authenticated, the local database or RADIUS server passes the authorization attributes to MSS to characterize the user's session.

Table 22 lists the user attributes and their value ranges. You can specify these attributes in lowercase when using the CLI.

Table 22 Authentication Attributes for Local Users

Attribute	Description	Valid Value(s)
encryption-type	<p>Type of encryption required for access by the client. Clients who attempt to use an unauthorized encryption method are rejected.</p> <p>Encryption-Type is a 3Com vendor-specific attribute (VSA). The vendor ID is 43, and the vendor type is 3.</p>	<p>One of the following numbers that identifies an encryption algorithm:</p> <ul style="list-style-type: none"> ▪ 1—AES_CCM (Advanced Encryption Standard using Counter with CBC-MAC) ▪ 2—Reserved ▪ 4—TKIP (Temporal Key Integrity Protocol) ▪ 8—WEP_104 (the default) (Wired-Equivalent Privacy protocol using 104 bits of key strength) ▪ 16—WEP_40 (Wired-Equivalent Privacy protocol using 40 bits of key strength) ▪ 32—NONE (no encryption) ▪ 64—Static WEP <p>In addition to these values, you can specify a sum of them for a combination of allowed encryption types. For example, to specify WEP_104 and WEP_40, use 24.</p>
end-date	<p>Date and time after which the user is no longer allowed to be on the network.</p>	<p>Date and time, in the following format: YY/MM/DD-HH:MM</p> <p>You can use end-date alone or with start-date. You also can use start-date, end-date, or both in conjunction with time-of-day.</p>

Table 22 Authentication Attributes for Local Users (continued)

Attribute	Description	Valid Value(s)
filter-id (network access mode only)	Inbound or outbound ACL to apply to the user.	<p>If configured in the WX switch's local database, this attribute can be an access control list (ACL) to filter outbound or inbound traffic. Use the following format:</p> <p><i>inboundacl.in</i></p> <p>or</p> <p><i>outboundacl.out</i></p> <p>If you are configuring the attribute on a RADIUS server, the value field of filter-id can specify up to two ACLs. Any of the following are valid:</p> <p>filter-id = "Profile=acl1 "</p> <p>filter-id = "OutboundACL=acl2 "</p> <p>filter-id = "Profile=acl1 OutboundACL=acl2 "</p> <p>(Each example goes on a single line on the server.) The format in which to specify the values depends on the RADIUS server.</p> <p>Regardless of whether the attributes are defined locally or on a RADIUS server, the ACLs must already be configured on the WX switch.</p> <p>(For more information, see "Mapping an ACL" on page 228.</p>
idle-timeout	This option is not implemented in the current MSS version.	
mobility-profile (network access mode only)	<p>Mobility Profile attribute for the user. (For more information, see "Viewing and Changing Mobility Profiles" on page 328.)</p> <p>Mobility-Profile is a 3Com vendor-specific attribute (VSA). The vendor ID is 43, and the vendor type is 2.</p>	<p>Name of an existing Mobility Profile, which can be up to 32 alphanumeric characters, with no tabs or spaces.</p> <p>If the Mobility Profile feature is enabled, and a user is assigned the name of a Mobility Profile that does not exist on the WX switch, the user is denied access.</p>

Table 22 Authentication Attributes for Local Users (continued)

Attribute	Description	Valid Value(s)
service-type	Type of access the user is requesting.	<p>Access type, which can be one of the following:</p> <ul style="list-style-type: none"> ▪ 2—Framed; for network user access ▪ 6—Administrative; for administrative access, with authorization to access the enabled (configuration) mode. The user must enter the enable command and the correct enable password to access the enabled mode. ▪ 7—NAS-Prompt; for administrative access to the nonenabled mode only. In this mode, the user can still enter the enable command and the correct enable password to access the enabled mode. <p>For administrative sessions, the WX switch always sends 6 (Administrative).</p> <p>The RADIUS server can reply with one of the values listed above.</p> <p>If the service-type is not set on the RADIUS server, administrative users receive NAS-Prompt access, and network users receive Framed access.</p> <p>Note: MSS will quietly accept Callback Framed but you cannot select this access type in MSS.</p>
session-timeout (network access mode only)	Maximum number of seconds for the user's session.	Number between 0 and 4,294,967,296 seconds (approximately 136.2 years).
ssid (network access mode only)	SSID the user is allowed to access after authentication.	Name of the SSID you want the user to use. The SSID must be configured in a service profile, and the service profile must be used by a radio profile assigned to 3Com radios in the Mobility Domain.

Table 22 Authentication Attributes for Local Users (continued)

Attribute	Description	Valid Value(s)
start-date	<p>Date and time at which the user becomes eligible to access the network.</p> <p>MSS does not authenticate the user unless the attempt to access the network occurs at or after the specified date and time, but before the end-date (if specified).</p>	<p>Date and time, in the following format: YY/MM/DD-HH:MM</p> <p>You can use start-date alone or with end-date. You also can use start-date, end-date, or both in conjunction with time-of-day.</p>

Table 22 Authentication Attributes for Local Users (continued)

Attribute	Description	Valid Value(s)
<p>time-of-day (network access mode only)</p>	<p>Day(s) and time(s) during which the user is permitted to log into the network.</p> <p>After authorization, the user's session can last until either the Time-Of-Day range or the Session-Timeout duration (if set) expires, whichever is shorter.</p> <p>Time-Of-Day is a 3Com vendor-specific attribute (VSA). The vendor ID is 43, and the vendor type is 4.</p>	<p>One of the following:</p> <ul style="list-style-type: none"> ▪ never—Access is always denied. ▪ any—Access is always allowed. ▪ al—Access is always allowed. ▪ One or more ranges of values that consist of one of the following day designations (required), and a time range in <i>hhmm-hhmm</i> 4-digit 24-hour format (optional): <ul style="list-style-type: none"> mo—Monday tu—Tuesday we—Wednesday th—Thursday fr—Friday sa—Saturday su—Sunday wk—Any day between Monday and Friday <p>Separate values or a series of ranges (except time ranges) with commas (,) or a vertical bar (). Do not use spaces.</p> <p>The maximum number of characters is 253.</p> <p>For example, to allow access only on Tuesdays and Thursdays between 10 a.m. and 4 p.m., specify the following: time-of-day tu1000-1600,th1000-1600</p> <p>To allow access only on weekdays between 9 a.m and 5 p.m., and on Saturdays from 10 p.m. until 2 a.m., specify the following: time-of-day wk0900-1700,sa2200-0200</p> <p>You can use time-of-day in conjunction with start-date, end-date, or both.</p>

Table 22 Authentication Attributes for Local Users (continued)

Attribute	Description	Valid Value(s)
url (network access mode only)	URL to which the user is redirected after successful WebAAA.	Web URL, in standard format. For example: http://www.example.com You must include the <i>http://</i> portion.
vlan-name (network access mode only)	Virtual LAN (VLAN) assignment. VLAN-Name is a 3Com vendor-specific attribute (VSA). The vendor ID is 43, and the vendor type is 1. On some RADIUS servers, you might need to use the standard RADIUS attribute Tunnel-Pvt-Group-ID, instead of VLAN-Name.	Name of a VLAN that you want the user to use. The VLAN must be configured on a WX switch within the Mobility Domain to which this WX switch belongs.

Viewing and Configuring RADIUS Settings

Remote Authentication Dial-In User Service (RADIUS) is a client-server security protocol that provides authentication, authorization, and accounting for network users and devices. A RADIUS server stores user profiles, which include usernames, passwords, and other user attributes. After you have defined RADIUS servers, you define RADIUS server groups (named sets of RADIUS servers). You must create at least one server group.

RADIUS server groups can authenticate administrators and network users. You can specify up to four RADIUS server groups for AAA services in a 3Com Mobility System.



Although you can use the local database on the WX switch to authenticate users, 3Com recommends using RADIUS to accommodate the large number of users in an enterprise network.

For information about the RADIUS attributes supported by MSS, see the [Wireless LAN Switch and Controller Configuration Guide](#)

Viewing RADIUS Settings, Servers, and Server Groups

To view RADIUS settings, servers, and server groups:

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, click the plus sign next to the WX switch.
- 3 Click the plus sign next to AAA.
- 4 Select **RADIUS**.

The RADIUS servers, server groups, and default settings appear.

Creating a RADIUS Server

To create a RADIUS server:

- 1 Access the Create RADIUS Server wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to AAA.
 - d Select **RADIUS**.
 - e In the Task List panel, select **RADIUS Server**.
- 2 In the Name box, type the name of an existing RADIUS server (1 to 64 alphanumeric characters, with no spaces or tabs). Do not use the same name for a RADIUS server and a RADIUS server group.
- 3 In the IP Address box, type the IP address for the RADIUS server, in dotted decimal notation.

3WXM suggests the name of a server group to place the server in. The server group is required because AAA rules refer to server groups, not to individual servers.
- 4 Click **Next**.
- 5 If you need to change port numbers or timers, go to step 6. Otherwise, go to step 11.
- 6 In the Authentication Port box, specify the UDP destination port to which the WX switch listens for authentication and authorization. The default port is 1812.
- 7 In the Accounting Port box, specify the UDP destination port to which the WX switch listens for accounting. The default port is 1813.

- 8 In the Timeout box, specify how long (1 to 65,535 seconds) the WX switch must wait for a RADIUS server to respond before retransmitting. The default is 5 seconds.
- 9 In the Retry Count box, specify how many retransmissions (1 to 100) are sent for a RADIUS request. The default is 2.
- 10 In the Dead Time box, specify how long (0 to 1440 minutes) the WX switch waits before attempting to reach an unresponsive RADIUS server. The default is 0 minutes.
- 11 In the Key box, type the password (also known as a shared secret key) used to authenticate to the RADIUS server (1 to 32 characters long, with no spaces or tabs).

You must provide the same password that is defined on the RADIUS server.

- 12 In the Authorization Password box, type the password used for outbound authentication and authorization to a RADIUS server (1 to 32 alphanumeric characters, with no spaces or tabs).

Providing an authorization password is required only for users whose devices are authenticated by their MAC addresses or for last-resort users, neither of which have a regular username or password. The default authorization password is *3Com*.

Changing the password applies both to MAC users and to last-resort users.



All MAC address-authenticated users or last-resort users must share the same authorization password on the RADIUS server.

- 13 Click **Next**.

Creating a RADIUS Server Group

A server group is a group of one to four RADIUS servers. Server groups enable RADIUS server redundancy by allowing another server to be used if the first server is unavailable. You must create at least one server group, even if you are using only one RADIUS server. You can specify the order in which servers are used for authentication. You can also specify load balancing, which uses all servers in a group using a round-robin algorithm.

- 1 Access the Create RADIUS Server Group wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to AAA.

- d Select **RADIUS**.
 - e In the Task List panel, select **RADIUS Server Group**.
- 2 In the Name box, type the name of the RADIUS server group (1 to 32 alphanumeric characters, with no spaces or tabs). Do not use the same name for a RADIUS server and a server group.
 - 3 Click **Next**.
 - 4 To enable load balancing in the server group, select **Load Balance**.
If you enable load balancing, a round-robin approach is used to balance the load among servers. Authentication and accounting requests for a given user are always sent to the same server. Each new authentication event uses the next server in the list.
If load balancing is not enabled, the first server in the list is contacted first. If the first server does not respond, the second server in the list is contacted.
 - 5 To add RADIUS servers to the server group, select the servers in the Available RADIUS Servers list and click **Add**.
 - 6 To reorder the servers, select a server and click **Up** or **Down**.
If load balancing is enabled, the first AAA request goes to the first RADIUS server in the list. The second AAA request goes to the second RADIUS server in the list, and so on, until the end of the list is reached, after which the first server in the list is used again. Any server that does not respond is skipped. If none of the servers responds, the WX goes to the next method in the method list.
 - 7 Click **Next**.



When you add a RADIUS server to a RADIUS server group, all RADIUS timers for the server group are restarted.

Changing Default RADIUS Settings

You can set default values for certain RADIUS parameters that apply to RADIUS servers and server groups you create for an individual WX. The following RADIUS parameters, except system IP address, are defined with default values, which you can change:

- Timeout (generally set for only troubleshooting purposes)
- Retry count (generally set for only troubleshooting purposes)
- Dead time
- Key

- Authorization password
- Use of the WX switch's system IP address as the source address for RADIUS packets from the switch

When you create a new RADIUS server, the default settings apply to the new server.

To change default values for RADIUS parameters

- 1 Access the RADIUS defaults:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to AAA.
 - d Select **RADIUS**.
- 2 In the Timeout box, specify how long WX switch must wait (1 to 65,535 seconds) for a RADIUS server to respond before retransmitting. The default is 5 seconds.
- 3 In the Retry Count box, specify the number of transmission attempts (1 to 100) for a RADIUS request. The default is 3.
- 4 In the Dead Time box, specify the amount of time (0 to 1440 minutes) that must elapse before the WX switch attempts to reach an unresponsive RADIUS server. The default is 0 minutes.

When the dead time is set to 0, and there are two or more RADIUS servers in a RADIUS server group, authentication starts with the first server in the group, unless there are two or more RADIUS servers and load sharing is configured, in which case authentication starts by trying a server in round-robin style.

- 5 In the Key box, type the password (also known as a shared secret key) used to authenticate to the RADIUS server.

You must provide the same password that is defined on the RADIUS server. The password can be 1 to 64 characters long, with no spaces or tabs.

- 6 In the Authorization Password box, type the password used for outbound authentication and authorization to a RADIUS server. The authorization password can be 1 to 32 alphanumeric characters long, with no spaces or tabs.

Providing an authorization password is required only for users whose devices are authenticated by their MAC addresses or for last-resort users, neither of which have a regular username or password. The default authorization password is *3Com*.

Changing the password applies both to MAC users and to last-resort users.



All MAC address-authenticated users or last-resort users must share the same authorization password on the RADIUS server.

- 7 To make RADIUS packets from the WX switch use the system IP address as the source IP address, select **Use System IP Address**.
- 8 Click **Save**.

Viewing and Configuring Global 802.1X Settings

The IEEE 802.1X standard provides an authentication framework that supports a variety of methods for authenticating and authorizing network access for wired or wireless users. You can configure 802.1X authentication parameters for an individual WX or for a domain policy.



CAUTION: *802.1X parameter settings are global for all SSIDs configured on the switch.*

Viewing Global 802.1X Settings

To view global 802.1X settings:

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, click the plus sign next to the WX switch.
- 3 Click the plus sign next to AAA.
- 4 Select **802.1X**.

The global 802.1X settings appear.

Changing Global 802.1X Settings

To change global 802.1x settings:

- 1 Access the 802.1X settings:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to AAA.
 - d Select **802.1X**.

- 2 To enable 802.1X authentication for all wired authentication ports on the WX switch, select **System Authentication Control**.

To disable 802.1X authentication for all wired authentication ports, clear **System Authentication Control**. By default, 802.1X authentication is enabled.

- 3 To specify the number of seconds the WX switch waits before attempting reauthentication, specify the timeout value (0 to 65,535 seconds) in the Quiet Period Timeout box. The default is 60 seconds.
- 4 To specify the number of seconds the WX switch waits before retransmitting an Extensible Authentication Protocol over LAN (EAPoL) packet, specify the timeout value (1 to 65,535 seconds) in the Retransmit Timeout box. The default is 5 seconds.
- 5 To specify the number of seconds before the WX switch times out an authentication session with an 802.1X client (supplicant), specify the timeout value (1 to 65,535 seconds) in the Supplicant Timeout box. The default is 30 seconds.
- 6 To specify the number of seconds before the WX switch times out a request to an authentication server, specify the timeout value (1 to 65,535 seconds) in the Authentication Server Timeout box. The default is 30 seconds.
- 7 To set the maximum number of times the WX switch retransmits an EAP request to the client before timing out the authentication session, specify the value (0 to 10) in the Maximum Requests box. The default is 2 attempts.



To support SSIDs that have both 802.1X and static WEP clients, MSS sends a maximum of two ID requests, even if this parameter is set to a higher value. Setting the parameter to a higher value does affect all other types of EAP messages.

- 8 To enable encryption key information to be sent to the client after authentication in EAPoL-Key PDUs, select **Key Transmit**.

The WX switch sends EAPoL key messages after successfully authenticating the client and receiving authorization attributes for the client. If the client is using dynamic Wired-Equivalent Privacy protocol (WEP), the EAPoL key messages are sent immediately after authorization.

To disable this option, clear **Key Transmit**. By default, this option is enabled.

- 9 To enable reauthentication of 802.1X clients, select **Reauthentication**.
To disable reauthentication, clear **Reauthentication**. By default, reauthentication is enabled.
- 10 To specify the number of reauthentication requests the WX switch attempts before a client becomes unauthorized, specify the value (1 to 10) in the Reauthentication Attempts box. The default is 2 attempts.



If the number of reauthentications for a wired authentication client is greater than the maximum number of reauthentications allowed, MSS sends an EAP failure packet to the client and removes the client from the network. However, MSS does not remove a wireless client from the network under these circumstances.

- 11 To specify the number of seconds before reauthentication is attempted, specify the timeout value, from 60 to 1,641,600 seconds (19 days), in the Reauthentication Period box. The default is 3600 seconds (one hour).
MSS reauthenticates dynamic WEP clients based on the reauthentication timer. MSS also reauthenticates WPA clients if the clients use the WEP-40 or WEP-104 cipher. For each dynamic WEP client or WPA client using a WEP cipher, the reauthentication timer is set to the lesser of the global setting or the value returned by the AAA server with the rest of the authorization attributes for that client.
- 12 To enable WEP key rolling (rotation) of the broadcast and multicast WEP keys, select **WEP Key Rolling**.
- 13 To specify the time to wait before rotating the WEP key, specify the value, from 30 to 1,641,600 seconds, (19 days) in the WEP Key Rolling Period box. The default is 3600 seconds (one hour).
- 14 To specify the number of seconds MSS retains session information for Bonded Auth™ (bonded authentication) purposes for an authenticated machine while waiting for the 802.1X client on the machine to start (re)authentication for the user, specify the value, from 1 to 300 seconds, in the Bonded Period box. The default is 0 seconds.
- 15 Click **Save**.

Viewing and Configuring 802.1X Network Access Rules

This section describes how to view and configure 802.1X rules for user network access.

To configure other types of network access rules, see the following:

- “Viewing and Configuring MAC Network Access Rules” on page 310
- “Viewing and Configuring WebAAA Network Access Rules” on page 313
- “Viewing and Configuring Last-Resort Network Access Rules” on page 316

To configure access rules for administrative access to the WX itself, see “Viewing and Configuring WX Administrator Access Rules” on page 318.

This section assumes that you are familiar with the AAA options in MSS. For detailed information, see the “Configuring AAA for Network Users” chapter of the *Wireless LAN Switch and Controller Configuration Guide*.

Viewing 802.1X Network Access Rules

To view 802.1X network access rules:

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, click the plus sign next to the WX switch.
- 3 Click the plus sign next to AAA.
- 4 Select **802.1X Access Rules**.

The configured 802.1X network access rules appear.

Creating an 802.1X Network Access Rule

If the network user name matches the userglob in an 802.1X access rule, the WX switch attempts to authenticate the client using 802.1X.

- 1 Access the Create 802.1X Network Access wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to AAA.
 - d Select **802.1X Access Rules**.
 - e In the Task List panel, select **802.1X Network Access**.

- 2 Specify whether the rule is for wireless access to an SSID or access through a wired authentication port:
 - If the rule is for access to an SSID, do one of the following:
 - To match on any SSID name, leave the value **any** in the SSID box.
 - To match only on a specific SSID name, select or type the name in the SSID box.
 - If the rule is for access through a wired authentication port, select **Wired**.



CAUTION: The default SSID name **any** matches on all SSID names. If the SSID box contains any and you do not change the SSID name, the authentication rule allows clients who match the *userglob* to access any SSID.

- 3 Type the *userglob* that is allowed to use 802.1X to access the SSID or wired authentication port.

A user glob is a string containing wildcards that matches on one or more user names. Type a full or partial username to be matched during authentication (1 to 80 alphanumeric characters, with no spaces or tabs). The format of a user glob depends on the client type and EAP method.

For Windows domain clients using Protected EAP (PEAP), the user glob is in the format *Windows_domain_name\username*. The Windows domain name is the NetBIOS domain name and must be specified in capital letters. For example, *EXAMPLE\sydney*, or *EXAMPLE*.**, which specifies all usernames whose usernames contain periods.

For EAP with Transport Layer Security (EAP-TLS) clients, the format is *username@domain_name*. For example, *sydney@example.com* specifies the user sydney in the domain name example.com. The **@marketing.example.com* glob specifies all users in the marketing department at example.com. The user glob *sydney@engineering.example.com* specifies the user sydney in the engineering department at example.com.

- 4 Click **Next**.
- 5 Select the EAP type from the EAP Type drop-down list:
 - **EAP-MD5**—Extensible Authentication Protocol (EAP) with message-digest algorithm 5. Select this protocol for wired authentication clients.
 - Uses challenge-response to compare hashes.
 - Provides *no* encryption or integrity checking for the connection.



The EAP-MD5 option does not work with Microsoft wired authentication clients.

- **PEAP**—Protected EAP with Microsoft Challenge Handshake Authentication Protocol Version 2 (MS-CHAP-V2). Select this protocol for wireless clients.
 - Uses TLS for encryption and data integrity checking.
 - Provides MS-CHAP-V2 mutual authentication.
 - Only the server side of the connection needs a certificate.
- **Local EAP-TLS**—EAP with TLS.
 - Provides mutual authentication, integrity-protected negotiation, and key exchange.
 - Requires X.509 public key certificates on both sides of the connection.
 - Provides encryption and integrity checking for the connection.
 - Cannot be used with RADIUS server authentication (requires user information to be in the switch's local database)
- **Pass-Through**—No protocol is used by the WX. 3Com Mobility System Software (MSS) sends the EAP processing to a RADIUS server.

If you select PEAP, the EAP Sub-Protocol is MS-CHAPV2. For other protocols, there is no the EAP Sub-Protocol to select.

6 Click **Next**.

7 If the authentication rule is disabled, select **Enabled**.

When a rule is disabled, 3WXM does not add it to the switch's configuration.

8 Select the authentication method(s) in the Available RADIUS Server Groups list and click **Add**.

An authentication method specifies where the switch will look for user information to authenticate users. You can select a RADIUS server group, LOCAL (the switch's local user database), or both.

MSS tries the methods in the order they appear in the Current RADIUS Server Groups list. To reorder the methods, select a method and click **Up** or **Down**.

- If you specify a RADIUS server group as the first method and a user is denied access by the RADIUS server, no authentication and authorization are attempted with the other methods specified in the list.
- If you specify LOCAL as the first method and a user is not in the local user database on the WX, authentication and authorization are attempted with a RADIUS server group if one is defined in the method list.

The authentication methods you select are also used for authorization.

9 Click **Next**.

10 To enable an accounting rule for the SSID, select **Enabled**.

By default, accounting rules you configure in 3WXM are disabled, which means 3WXM does not add the rules to the switch's configuration.

11 Select one of the following record options:

- Select **Start-Stop** to specify that records are sent at the start of a session and the end of a session.
- Select **Stop-Only** to specify that records are sent only at the end of a session.

12 Select the accounting method(s) in the Available RADIUS Server Groups list and click **Add**.

The options and processing are the same as those for authentication methods. (See step 8.)

13 Click **Finish**.

Viewing and Configuring MAC Network Access Rules

MAC network access rules allow users onto the network by authenticating their MAC addresses instead of their user names.

During log on, if the username does not match an 802.1X authentication rule, but the MAC address of the user's NIC or Voice-over-IP (VoIP) phone and the SSID (if wireless) do match a MAC authentication rule, MSS checks the RADIUS server group or local database for matching user information. If the MAC address (and password, if on a RADIUS server) matches, MSS grants access. Otherwise, MSS attempts the fallthru authentication type, which can be Web, Open Access (last-resort), or none.

This section assumes that you are familiar with the AAA options in MSS. For detailed information, see the "Configuring AAA for Network Users" chapter of the *Wireless LAN Switch and Controller Configuration Guide*.

Viewing MAC Network Access Rules

To view MAC network access rules:

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, click the plus sign next to the WX switch.
- 3 Click the plus sign next to AAA.
- 4 Select MAC Access Rules.

The configured MAC network access rules appear.

Creating a MAC Network Access Rule

To create a MAC network access rule:

- 1 Access the Create MAC Network Access wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to AAA.
 - d Select **MAC Access Rules**.
 - e In the Task List panel, select **MAC Network Access**.

- 2 Specify whether the rule is for wireless access to an SSID or access through a wired authentication port:
 - If the rule is for access to an SSID, do one of the following:
 - To match on any SSID name, leave the value **any** in the SSID box.
 - To match only on a specific SSID name, select or type the name in the SSID box.
 - If the rule is for access through a wired authentication port, select **Wired**.



CAUTION: The default SSID name **any** matches on all SSID names. If the SSID box contains any and you do not change the SSID name, the authentication rule allows clients who match the MAC address glob to access any SSID.

- 3 In the User Glob box, type a full or partial username to be matched during authentication.

MAC addresses must be specified with colons as the delimiters (for example, 00:11:22:33:44:55). You can use wildcards by specifying an asterisk (*) in MAC addresses. The following lists examples of using wildcards in MAC addresses:

- * (all MAC addresses)
- 00:*
- 00:01:*
- 00:01:02*
- 00:01:02:03:*
- 00:01:02:03:04:*
- 00:01:02:03:04:0*

- 4 Click **Next**.

- 5 If the authentication rule is disabled, select **Enabled**.

When a rule is disabled, 3WXM does not add it to the switch's configuration.

- 6 Select the authentication method(s) in the Available RADIUS Server Groups list and click **Add**.

An authentication method specifies where the switch will look for user information to authenticate users. You can select a RADIUS server group, LOCAL (the switch's local user database), or both.

MSS tries the methods in the order they appear in the Current RADIUS Server Groups list. To reorder the methods, select a method and click **Up** or **Down**.

- If you specify a RADIUS server group as the first method and a user is denied access by the RADIUS server, no authentication and authorization are attempted with the other methods specified in the list.
- If you specify LOCAL as the first method and a user is not in the local user database on the WX, authentication and authorization are attempted with a RADIUS server group if one is defined in the method list.

The authentication methods you select are also used for authorization.

7 Click **Next**.

8 To enable this accounting rule for the SSID, select **Enabled**.

By default, accounting rules you configure in 3WXM are disabled, which means 3WXM does not add the rules to the switch's configuration.

9 Select one of the following record options:

- Select **Start-Stop** to specify that records are sent at the start of a session and the end of a session.
- Select **Stop-Only** to specify that records are sent only at the end of a session.

10 Select the accounting method(s) in the Available RADIUS Server Groups list and click **Add**.

The options and processing are the same as those for authentication methods. (See step 6.)

11 Click **Finish**.

Viewing and Configuring WebAAA Network Access Rules

Web AAA allows network users to access the network by logging on a web page.

When a user attempts to access a web page over the network, the WX switch intercepts the HTTP or HTTPS request and serves a login Web page to the user. The user enters the username and password, and MSS checks the RADIUS server group or local database for matching user information. If the username and password match, MSS redirects the user to the web page she requested. Otherwise, MSS denies access to the user.

The fallthru access type for the SSID or wired authentication port must be set to Web. Otherwise, the web access rule will not take effect.



A web access rule is not used if the username matches on the user glob or MAC address glob in an 802.1X or MAC access rule, and the rule also matches on the SSID or wired authentication port through which the user is trying to access the network. In this case, the 802.1X or MAC rule is used instead.



Web Portal WebAAA replaces the WebAAA implementation in MSS Version 3.x. The previous implementation is deprecated beginning in MSS Version 4.0. During upgrade from MSS Version 3.x, your 3.x WebAAA configuration is automatically converted to a Web Portal WebAAA configuration.

This section assumes that you are familiar with the AAA options in MSS. For detailed information, see the “Configuring AAA for Network Users” chapter of the [Wireless LAN Switch and Controller Configuration Guide](#).

Viewing Web AAA Network Access Rules

To view Web AAA network access rules:

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, click the plus sign next to the WX switch.
- 3 Click the plus sign next to AAA.
- 4 Select **MAC Access Rules**.

The configured MAC network access rules appear.

Creating a Web AAA Network Access Rule

To create a Web AAA network access rule:

- 1 Access the Create MAC Network Access wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to AAA.
 - d Select **MAC Access Rules**.
 - e In the Task List panel, select **MAC Network Access**.
- 2 Specify whether the rule is for wireless access to an SSID or access through a wired authentication port:
 - If the rule is for access to an SSID, do one of the following:
 - To match on any SSID name, leave the value **any** in the SSID box.
 - To match only on a specific SSID name, select or type the name in the SSID box.
 - If the rule is for access through a wired authentication port, select **Wired**.



CAUTION: The default SSID name **any** matches on all SSID names. If the SSID box contains any and you do not change the SSID name, the authentication rule allows clients who match the userglob to access any SSID.

- 3 Type the userglob that is allowed to use Web AAA to access the SSID or wired authentication port.

A user glob is a string containing wildcards that matches on one or more user names. Type a full or partial username to be matched during authentication (1 to 80 alphanumeric characters, with no spaces or tabs). The format of a user glob depends on the client type and EAP method.

For Windows domain clients using Protected EAP (PEAP), the user glob is in the format *Windows_domain_name\username*. The Windows domain name is the NetBIOS domain name and must be specified in capital letters. For example, *EXAMPLE\sydney*, or *EXAMPLE*.**, which specifies all usernames whose usernames contain periods.

For EAP with Transport Layer Security (EAP-TLS) clients, the format is *username@domain_name*. For example, *sydney@example.com* specifies the user sydney in the domain name example.com. The **@marketing.example.com* glob specifies all users in the marketing department at example.com. The user glob *sydney@engineering.example.com* specifies the user sydney in the engineering department at example.com.

4 Click **Next**.

5 If the authentication rule is disabled, select **Enabled**.

When a rule is disabled, 3WXM does not add it to the switch's configuration.

6 Select the authentication method(s) in the Available RADIUS Server Groups list and click **Add**.

An authentication method specifies where the switch will look for user information to authenticate users. You can select a RADIUS server group, LOCAL (the switch's local user database), or both.

MSS tries the methods in the order they appear in the Current RADIUS Server Groups list. To reorder the methods, select a method and click **Up** or **Down**.

- If you specify a RADIUS server group as the first method and a user is denied access by the RADIUS server, no authentication and authorization are attempted with the other methods specified in the list.
- If you specify LOCAL as the first method and a user is not in the local user database on the WX, authentication and authorization are attempted with a RADIUS server group if one is defined in the method list.

The authentication methods you select are also used for authorization.

7 Click **Next**.

8 To enable this accounting rule for the SSID, select **Enabled**.

By default, accounting rules you configure in 3WXM are disabled, which means 3WXM does not add the rules to the switch's configuration.

9 Select one of the following record options:

- Select **Start-Stop** to specify that records are sent at the start of a session and the end of a session.
- Select **Stop-Only** to specify that records are sent only at the end of a session.

- 10 Select the accounting method(s) in the Available RADIUS Server Groups list and click **Add**.

The options and processing are the same as those for authentication methods. (See step 6.)

- 11 Click **Finish**.

Viewing and Configuring Last-Resort Network Access Rules

Last resort access allows users to access the network without entering a username or password.

This section assumes that you are familiar with the AAA options in MSS. For detailed information, see the “Configuring AAA for Network Users” chapter of the *Wireless LAN Switch and Controller Configuration Guide*.

Viewing Last-Resort Network Access Rules

To view last-resort network access rules:

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, click the plus sign next to the WX switch.
- 3 Click the plus sign next to AAA.
- 4 Select **Last Resort Access Rules**.

The configured last-resort network access rules appear.

Creating a Last-Resort Network Access Rule

To create a last-resort network access rule:

- 1 Access the Create Last Resort Network Access wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to AAA.
 - d Select **Last Resort Access Rules**.
 - e In the Task List panel, select **Last Resort Network Access**.

- 2 Specify whether the rule is for wireless access to an SSID or access through a wired authentication port:
 - If the rule is for access to an SSID, do one of the following:
 - To match on any SSID name, leave the value **any** in the SSID box.
 - To match only on a specific SSID name, select or type the name in the SSID box.
 - If the rule is for access through a wired authentication port, select **Wired**.



CAUTION: The default SSID name **any** matches on all SSID names. If the SSID box contains any and you do not change the SSID name, the authentication rule allows clients who match the *userglob* to access any SSID.

- 3 Click **Next**.

- 4 If the authentication rule is disabled, select **Enabled**.

When a rule is disabled, 3WXM does not add it to the switch's configuration.

- 5 Select the authentication method(s) in the Available RADIUS Server Groups list and click **Add**.

An authentication method specifies where the switch will look for user information to authenticate users. You can select a RADIUS server group, LOCAL (the switch's local user database), or both.

MSS tries the methods in the order they appear in the Current RADIUS Server Groups list. To reorder the methods, select a method and click **Up** or **Down**.

- If you specify a RADIUS server group as the first method and a user is denied access by the RADIUS server, no authentication and authorization are attempted with the other methods specified in the list.
- If you specify LOCAL as the first method and a user is not in the local user database on the WX, authentication and authorization are attempted with a RADIUS server group if one is defined in the method list.

The authentication methods you select are also used for authorization.

- 6 Click **Next**.

- 7 To enable this accounting rule for the SSID, select **Enabled**.

By default, accounting rules you configure in 3WXM are disabled, which means 3WXM does not add the rules to the switch's configuration.

- 8 Select one of the following record options:

- Select **Start-Stop** to specify that records are sent at the start of a session and the end of a session.
- Select **Stop-Only** to specify that records are sent only at the end of a session.

- 9 Select the accounting method(s) in the Available RADIUS Server Groups list and click **Add**.

The options and processing are the same as those for authentication methods. (See step 5.)

- 10 Click **Finish**.

Viewing and Configuring WX Administrator Access Rules

MSS supports administrative access to a WX switch through the serial console port or through the network. Connections through the network use Telnet or SSH.

This section assumes that you are familiar with the AAA options for administrative access. For detailed information, see the "Configuring AAA for Administrative and Local Access" chapter of the *Wireless LAN Switch and Controller Configuration Guide*.

Viewing WX Administrator Access Rules

To view WX administrator access rules:

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, click the plus sign next to the WX switch.
- 3 Click the plus sign next to AAA.
- 4 Select **Admin Access Rules**.

The configured administrative access rules appear.

Creating an Access Rule for Console Access

To create an access rule for console access:

- 1 Access the Create Console Admin User wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to AAA.
 - d Select **Admin Access Rules**.
 - e In the Task List panel, select **Console Access**.
- 2 Type the userglob that is allowed to access the switch through the console port.
- 3 Click **Next**.
- 4 If the authentication rule is disabled, select **Enabled**.

When a rule is disabled, 3WXM does not add it to the switch's configuration.

- 5 Select the authentication method(s) in the Available RADIUS Server Groups list and click **Add**.

An authentication method specifies where the switch will look for user information to authenticate users. You can select a RADIUS server group, LOCAL (the switch's local user database), or both.

MSS tries the methods in the order they appear in the Current RADIUS Server Groups list. To reorder the methods, select a method and click **Up** or **Down**.

- If you specify a RADIUS server group as the first method and a user is denied access by the RADIUS server, no authentication and authorization are attempted with the other methods specified in the list.
- If you specify LOCAL as the first method and a user is not in the local user database on the WX, authentication and authorization are attempted with a RADIUS server group if one is defined in the method list.

The authentication methods you select are also used for authorization.

- 6 Click **Next**.

- 7 To enable this accounting rule for the SSID, select **Enabled**.
By default, accounting rules you configure in 3WXM are disabled, which means 3WXM does not add the rules to the switch's configuration.
- 8 Select one of the following record options:
 - Select **Start-Stop** to specify that records are sent at the start of a session and the end of a session.
 - Select **Stop-Only** to specify that records are sent only at the end of a session.
- 9 Select the accounting method(s) in the Available RADIUS Server Groups list and click **Add**.
The options and processing are the same as those for authentication methods. (See step 5.)
- 10 Click **Finish**.

Creating an Access Rule for Telnet or SSH Access

To create an access rule for Telnet or SSH access:

- 1 Access the Create Admin User wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to AAA.
 - d Select **Admin Access Rules**.
 - e In the Task List panel, select **Admin Access**.
- 2 Type the userglob that is allowed to access the switch through Telnet or SSH.
- 3 Click **Next**.
- 4 If the authentication rule is disabled, select **Enabled**.
When a rule is disabled, 3WXM does not add it to the switch's configuration.
- 5 Select the authentication method(s) in the Available RADIUS Server Groups list and click **Add**.
An authentication method specifies where the switch will look for user information to authenticate users. You can select a RADIUS server group, LOCAL (the switch's local user database), or both.

MSS tries the methods in the order they appear in the Current RADIUS Server Groups list. To reorder the methods, select a method and click **Up** or **Down**.

- If you specify a RADIUS server group as the first method and a user is denied access by the RADIUS server, no authentication and authorization are attempted with the other methods specified in the list.
- If you specify LOCAL as the first method and a user is not in the local user database on the WX, authentication and authorization are attempted with a RADIUS server group if one is defined in the method list.

The authentication methods you select are also used for authorization.

6 Click **Next**.

7 To enable this accounting rule for the SSID, select **Enabled**.

By default, accounting rules you configure in 3WXM are disabled, which means 3WXM does not add the rules to the switch's configuration.

8 Select one of the following record options:

- Select **Start-Stop** to specify that records are sent at the start of a session and the end of a session.
- Select **Stop-Only** to specify that records are sent only at the end of a session.

9 Select the accounting method(s) in the Available RADIUS Server Groups list and click **Add**.

The options and processing are the same as those for authentication methods. (See step 5.)

10 Click **Finish**.

Viewing and Configuring AAA Support for Third-Party AP Users

A WX switch can provide network access for users associated with a third-party AP that has authenticated the users with RADIUS. You can connect a third-party AP to a WX switch and configure the WX to provide authorization for clients who authenticate and access the network through the AP.

- Configure a proxy access rule for the AP's users.
- Add a RADIUS proxy entry for the AP. The proxy entry specifies the IP address of the AP and the UDP ports on which the WX switch listens for RADIUS access-requests and stop-accounting records from the AP.
- Specify the WX port connected to the third-party AP.



For information about configuration requirements on the third-party AP, see the "Configuring AAA for Users of Third-Party APs" section in the "Configuring AAA for Network Users" chapter of the [Wireless LAN Switch and Controller Configuration Guide](#).

Viewing Settings for Third-Party AP AAA Support

To view settings for third-party AP AAA support:

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, click the plus sign next to the WX switch.
- 3 Click the plus sign next to AAA.
- 4 Select **Third Party APs**.

The configured settings appear.

Creating a Proxy Access Rule

To create a proxy access rule:

- 1 Access the Create Proxy User wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to AAA.
 - d Select **Third Party APs**.
 - e In the Task List panel, select **Proxy Access**.
- 2 Type the userglob that is expected access the SSID.

For the `userglob`, type a full or partial username to be matched during authentication (1 to 80 alphanumeric characters, with no spaces or tabs). The format of a user glob depends on the client type and EAP method.

- For Windows domain clients using Protected EAP (PEAP), the user glob is in the format `Windows_domain_name\username`. The Windows domain name is the NetBIOS domain name and must be specified in capital letters. For example, `EXAMPLE\sydney`, or `EXAMPLE*.*`, which specifies all usernames whose usernames contain periods.
- For EAP with Transport Layer Security (EAP-TLS) clients, the format is `username@domain_name`. For example, `sydney@example.com` specifies the user `sydney` in the domain name `example.com`. The `*@marketing.example.com` glob specifies all users in the marketing department at `example.com`. The user glob `sydney@engineering.example.com` specifies the user `sydney` in the engineering department at `example.com`.

3 Optionally, edit the name in the SSID box.



CAUTION: The default SSID name **any** matches on all SSID names. If the SSID box contains any and you do not change the SSID name, the rule allows clients who match the `userglob` to access any SSID.

4 Select the authentication method(s) in the Available RADIUS Server Groups list and click **Add**.

An authentication method specifies where the switch will look for user information to authenticate users. You can select a RADIUS server group, LOCAL (the switch's local user database), or both.

MSS tries the methods in the order they appear in the Current RADIUS Server Groups list. To reorder the methods, select a method and click **Up** or **Down**.

- If you specify a RADIUS server group as the first method and a user is denied access by the RADIUS server, no authentication and authorization are attempted with the other methods specified in the list.
- If you specify LOCAL as the first method and a user is not in the local user database on the WX, authentication and authorization are attempted with a RADIUS server group if one is defined in the method list.

The authentication methods you select are also used for authorization.

5 Click **Finish**.

Configuring a RADIUS Proxy for a Client

To configure a RADIUS proxy for a client:

- 1 Access the Create RADIUS Proxy Client wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to AAA.
 - d Select **Third Party APs**.
 - e In the Task List panel, select **RADIUS Proxy Client**.
- 2 Type the IP address of the third-party AP.
- 3 To change the UDP port number on which the WX switch will listen for RADIUS access-requests from the AP, edit the number in the Authentication Port box.
- 4 To change the UDP port number on which the WX switch will listen for RADIUS stop-accounting records from the AP, edit the number in the Accounting Port box.
- 5 Type the key, which is the shared secret configured on the RADIUS servers. MSS uses the shared secret to authenticate and encrypt RADIUS communication.
- 6 Click **Finish**.

Specifying the WX Port Connected to the Third-Party AP

To specify the WX port connected to the third-party AP:

- 1 Access the Create RADIUS Proxy Client wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to AAA.
 - d Select **Third Party APs**.
 - e In the Task List panel, select **802.1Q Mapping**.
- 2 Select the WX ports that are connected to the third-party AP and click **Add**.
- 3 Click **Finish**.

Viewing and Changing Location Policy Rules

During the login process, the AAA authorization process is started immediately after clients are authenticated to use the WX switch. During authorization, MSS assigns the user to a VLAN and applies optional user attributes, such as a session timeout value and one or more security ACL filters.

A *location policy* is a set of rules that enables you to locally set or change authorization attributes for a user after the user is authorized by AAA, without making changes to the AAA server. For example, you might want to enforce VLAN membership and security ACL policies on a particular WX based on a client's organization or physical location, or assign a VLAN to users who have no AAA assignment. For these situations, you can configure the location policy on the switch.

You can use a location policy to locally set or change the Filter-Id and VLAN-Name authorization attributes obtained from AAA.

Conditions within a rule are ANDed. All conditions in the rule must match in order for MSS to take the specified action. If the location policy contains multiple rules, MSS compares the user information to the rules one at a time, in the order the rules appear in the switch's configuration file, beginning with the rule at the top of the list. MSS continues comparing until a user matches all conditions in a rule or until there are no more rules.

Any authorization attributes not changed by the location policy remain active.

Each WX switch can have one location policy. The location policy consists of a set of rules. Each rule contains conditions, and an action to perform if all conditions in the rule match. The location policy can contain up to 150 rules.

Viewing Location Policy Rules

To view location policy rules:

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, click the plus sign next to the WX switch.
- 3 Click the plus sign next to AAA.
- 4 Select **Location Policy**.

The configured location policy rules appear.

Creating a Location Policy Rule

To create a location policy rule:

- 1 Access the Create Location Rule wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to AAA.
 - d Select **Location Policy**.
 - e In the Task List panel, select **Location Rule Policy**.
- 2 To match on SSID, select **Equal** and type the SSID name in the box.
- 3 Click **Next**.
- 4 To match on user glob, select one of the following:
 - **Equal**—Apply the location policy to all usernames matching a specified user glob. In the User Glob box, type the user glob for the users to which the location policy applies.
 - **Not Equal**—Apply the location policy to all usernames *not* matching a specified user glob. In the User Glob box, type the user glob for the users to which the location policy does not apply.

Type the user glob in the box. When specifying a user glob, enter a username, a double-asterisk wildcard character (**) to specify all usernames, or a single-asterisk wildcard character (*) to specify a set of usernames up to or following the first delimiter character, either an *at* sign (@) or a period (.).
- 5 To match on VLAN, select one of the following:
 - **Equal**—Apply the location policy to all users with a specified VLAN. In the VLAN box, type the name of the VLAN.
 - **Not Equal**—Apply the location policy to all users whose assigned VLAN does not match a specified VLAN. In the VLANs box, type the name of the VLAN.

Type the VLAN name in the box. To match on multiple VLAN names, use the single-asterisk wildcard character (*) in the string. To match on all VLAN names, use the double asterisk (**) and no other characters.
- 6 Click **Next**.
- 7 Select the ports for which the location policy is applied and click **Add**.
- 8 Click **Next**.

- 9 Select the Distributed MAPs for which the location policy is applied and click **Add**.
- 10 Click **Next**.
- 11 In the Action list, select one of the following:
 - **Permit**—Allows access if the conditions in the location policy rule are matched.

If you select **Permit**, you must specify at least one of following:

 - In ACL Name—ACL applies to packets sent *to* the WX (See step 12.)
 - Out ACL Name—ACL applies to packets sent *from* the WX (See step 13.)
 - VLAN Name (See step 14.)
 - **Deny**—Refuses network access if the conditions in the location policy rule are matched.

If you select **Deny**, go to step 14.
- 12 In the In ACL Name box, type the name of the input ACL that applies if the location policy rules are matched.

The ACL name can be 1 to 32 alphanumeric characters, with no spaces or tabs. The name can include hyphens (-), underscores (_), or periods (.). ACL names are case-sensitive and must begin with a letter. Do not include any of the following terms in the name: **all**, **default-action**, **map**, **help**, **editbuffer**.
- 13 In the Out ACL Name box, type the name of the output ACL that applies if the location policy rules are matched.
- 14 In the VLAN Name box, type the name of the VLAN to which users are assigned if the location policy rules are matched. The name can be 1 to 32 alphanumeric characters, with no spaces or tabs.
- 15 Click **Finish**.

Viewing and Changing Mobility Profiles

Mobility Profile™ attributes allow or deny access to the network for a specific user or group of users. When you create a Mobility Profile, you specify which MAP ports, Distributed MAPs, or wired authentication ports are to be included. Typically, you include ports that are defined as MAP ports or Distributed MAPs. You can specify that all or no ports are included, or you can specify a list of ports to be included.

After creating a Mobility Profile, you can assign it to users created in the local WX user database, or users who are authenticated and authorized by a RADIUS server. You assign the name of the Mobility Profile by using the Mobility-Profile RADIUS attribute, which is a 3Com vendor-specific attribute (VSA).

Viewing Mobility Profiles

To view mobility profiles:

- 1 Select the Configuration tool bar option.
- 2 In the Organizer panel, click the plus sign next to the WX switch.
- 3 Click the plus sign next to AAA.
- 4 Select **Mobility Profiles**.

The configured Mobility Profiles appear.

Creating a Mobility Profile

To create a mobility profile:

- 1 Access the Create Mobility Profile wizard:
 - a Select the Configuration tool bar option.
 - b In the Organizer panel, click the plus sign next to the WX switch.
 - c Click the plus sign next to AAA.
 - d Select **Mobility Profiles**.
 - e In the Task List panel, select **Mobility Profile**.
- 2 In the Profile Name box, type the name of the Mobility Profile.

The name can be up to 16 alphanumeric characters, and it cannot contain tabs.
- 3 Click **Next**.

4 In the Ports drop-down list, select the ports to include in the Mobility Profile:

- **All**—Include all MAP or wired authentication ports.
- **Selected**—Include a selected list of ports.
- **None**—Include no ports.

If you select **Selected**, select the individual ports in the Available Physical Ports list and click **Add**.

5 Click **Next**.

6 In the Distributed MAPs drop-down list, select the Distributed MAPs to include in the Mobility Profile:

- **All**—Include all Distributed MAPs.
- **Selected**—Include a selected list of Distributed MAPs.
- **None**—Include no Distributed MAPs.

If you select **Selected**, select the individual MAPs in the Available Distributed APs list and click **Add**.

7 Click **Finish**.

9

CONFIGURING WX SWITCHES REMOTELY

You can use 3WXM Services running in your corporate network to configure WX switches in remote offices. The following remote configuration scenarios are supported:

- Drop ship—3WXM Services running in the corporate network can configure a WXR100 switch shipped directly to a remote office. This option does not require any preconfiguration of the switch.
- Staged—You can stage any model of switch by preconfiguring IP connectivity and enabling auto-config, then sending the switch to the remote office. The switch contacts 3WXM Services in the corporate network to complete its configuration.

The drop ship option is supported only for the WXR100. The staged option is supported for all switch models. Both options require 3WXM Services. If you know a switch's serial number, you can create a complete configuration for the switch in 3WXM. When the switch requests its configuration from 3WXM, 3WXM sends the configuration for that serial number. If you do not know the switch's serial number, you can upload the partially configured switch into 3WXM, finish its configuration, then deploy the completed configuration back to the switch.

How Remote WX Configuration Works

Drop Ship (WXR100 Only)

- 1 The WXR100 is shipped directly to the remote office where it will be deployed.
- 2 The network administrator at the corporate office preconfigures the switch in a 3WXM network plan. The switch configuration must have a name for the switch, the model must be WXR100, and the serial number must match the switch's serial number. The configuration should also include all other settings required for the deployment, including MAP configuration, SSIDs, AAA settings, and so on.



If enabled to do so, 3WXM can give a switch another switch's configuration even though the serial number does not match. However, this capability is used only for replacing a failed switch with another switch of the same model, in a network containing only one WX switch. (See "Replacing a Switch and Reusing its Configuration" on page 342.)

- 3 Someone at the remote office where the switch is delivered physically installs the switch by connecting port 1 to the network. If the switch will manage a directly connected MAP, the MAP needs to be physically installed and connected by an Ethernet cable to port 2. If Distributed MAPs will be managed, these also must be physically installed, connected to the network by Ethernet cables, and connected to Power over Ethernet (PoE) sources.

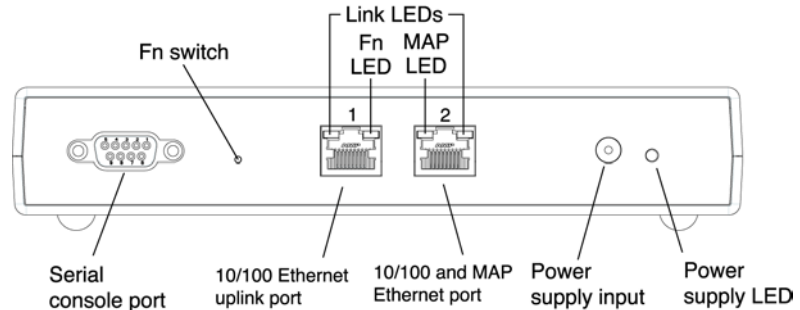


Drop ship configuration requires a DHCP server at the remote office. The WXR100 uses the DHCP server to obtain an IP configuration in order to communicate with 3WXM Services in the corporate network. The drop ship option also requires an entry in the local DNS server that maps the hostname wlan-config-srv to the IP address of the host where 3WXM Services are installed.

- 4 The person at the remote office powers on the WXR100, and inserts a paperclip or similar object into the WXR100's Fn hole to press the Fn switch. Normally, the Fn LED (the right LED above port 1) remains solidly lit for 3 seconds after power on. However, when the Fn switch is pressed, the LED flashes for 3 seconds instead.

Figure 9 shows the location of the Fn switch and the LED.

Figure 9 Fn Switch on WXR100



- 5 Because the Fn switch was pressed while the switch was starting, the WXR100 configures the following items, to enable itself to contact 3WXM Services:
 - Ports 1 and 2 in the default VLAN (VLAN 1)
 - DHCP client on VLAN 1 enabled
- 6 The WXR100 uses the DHCP client to obtain an IP configuration from a local DHCP server. After obtaining an IP configuration, the switch sends a DNS query for the IP address of well-known hostname wlan-config-srv.
- 7 DNS replies with the IP address of the host where 3WXM Services are installed. The WXR100 sends a configuration request to 3WXM Services.
- 8 3WXM receives the configuration request, and looks in the currently selected network plan for a WXR100 configuration with the same serial number as the one in the configuration request.
 - If the network plan contains a configuration with a matching serial number, 3WXM deploys the configuration to the switch. (See "Preconfiguring a Switch in 3WXM".)
 - If the network plan does not have a configuration with a matching serial number, one of the following occurs:
 - If the Auto-Config IP Subnet Matching is enabled and other requirements are met, 3WXM can give the configuration to another switch with a different serial number, if the switch is the same model and is in the same IP subnet. (See "Replacing a Switch and Reusing its Configuration" on page 342 for more information.)

- If the serial number does not match and the Auto-Config IP Subnet Matching option is disabled, 3WXM cannot give the switch a configuration. 3WXM generates a verification warning (on the Network Verification tab). The warning lists the switch's serial number and IP address. The network administrator can upload the switch into the network plan, configure switch parameters, and deploy the configuration to the switch. (See "Uploading a Partially Configured Switch and Completing its Configuration with 3WXM" on page 341.)

Staged WX

- 1 The switch is shipped to a network administrator who configures IP address and DNS information on the switch, and enables the auto-config option, to configure the switch to contact 3WXM Services in the corporate network.

The network administrator can configure the switch to use a DHCP client to obtain IP information, or can statically configure the information. The IP address and default gateway are required.

DNS information is optional, but is recommended if DNS is available. If DNS is available, an entry must be added to the DNS server that maps the IP address of the host where 3WXM Service are installed to the well-known hostname wlan-config-srv. Otherwise, an IP alias can be configured on the switch itself to map the address to the hostname.

- 2 The preconfigured switch is shipped to the remote office where it will be deployed.
- 3 Someone at the remote office physically installs the switch and MAPs.
- 4 The person at the remote office powers the switch on. The switch boots using the configuration created during staging.
- 5 The switch either uses its DHCP client to obtain an IP address from a local DHCP server, or uses a statically configured address. This depends on the switch's preconfiguration.
- 6 If the auto-config option is enabled, the switch sends a DNS query for the IP address of well-known hostname wlan-config-srv.
- 7 DNS replies with the IP address of the host where 3WXM Services are installed. The switch sends a request to 3WXM Services in the corporate network for a configuration. (If the auto-config option is not enabled, the switch boots using its configuration file. You can use the CLI, 3WXM, or Web Management to complete its configuration.)

- 8 3WXM receives the configuration request, and looks in the currently open network plan for a switch configuration with the same model and serial number as the one in the configuration request.
 - If the network plan contains a configuration with a matching model and serial number, 3WXM sends the configuration to the switch. (See “Preconfiguring a Switch in 3WXM”.)
 - If the network plan does not have a configuration with a matching serial number, one of the following occurs:
 - If the Auto-Config IP Subnet Matching is enabled and other requirements are met, 3WXM can give the configuration to another switch with a different serial number, if the switch is the same model and is in the same IP subnet. (See “Replacing a Switch and Reusing its Configuration” on page 342 for more information.)
 - If the serial number does not match and the Auto-Config IP Subnet Matching option is disabled, 3WXM cannot give the switch a configuration. 3WXM generates a verification warning (on the Network Verification tab). The warning lists the switch’s serial number and IP address. The network administrator can upload the switch into the network plan, configure switch parameters, and deploy the configuration to the switch. (See “Uploading a Partially Configured Switch and Completing its Configuration with 3WXM” on page 341.)

3WXM Requirements

- 3WXM must be installed and 3WXM Services must be running.
- The 3WXM Services option to always accept self-signed certificates must be enabled. This is required if you are using the drop-ship option with a WXR100, or you have staged any model switch with a self-signed certificate. (This option is disabled by default.)
- The network plan containing the WX switches must be open.

Preconfiguring the switch in the network plan is optional. If you know the switch’s serial number, you can preconfigure the switch in the network plan, and let 3WXM Services deploy the configuration to the switch.

If you do not know the switch’s serial number, you still can use 3WXM to configure the switch. However, you will need to wait for the switch to contact 3WXM, so you can upload the switch’s configuration, modify the configuration, then deploy the modified configuration back to the switch.

Staging a WX Switch for Configuration by 3WXM

The auto-config option must be enabled on a WX switch in order for the switch to try to contact 3WXM Services for configuration. The auto-config option is automatically enabled on an unconfigured WXR100 when the Fn switch is pressed during power on. However, auto-config is disabled by default on other models.

If you want another WX switch model to be able to access 3WXM Services for a configuration, you must preconfigure the WX with the following information:

- IP address
- Gateway address
- Domain name and DNS server address

You can enable the switch to use the MSS DHCP client to obtain this information from a DHCP server in the local network where the switch will be deployed. Alternatively, you can statically configure the information.

The IP address and DNS information are configured independently. You can configure the combination of settings that work with the network resources available at the deployment site. The following examples show some of the combinations you can configure.

If DNS is available, an entry must be added to the DNS server that maps the IP address of the host where 3WXM Services are installed to the well-known hostname wlan-config-srv. Otherwise, an IP alias can be configured on the switch itself to map the address to the hostname.

Example 1: Deployment Site Has DHCP and Local DNS

The deployment site in this example has a DHCP server. The switch is configured to use the MSS DHCP client to obtain an IP address, default gateway address, DNS domain name, and DNS server IP addresses.

1 Configure a VLAN:

```
WX1200# set vlan 1 port 7
success: change accepted.
```

2 Enable the DHCP client on VLAN 1:

```
WX1200# set interface 1 ip dhcp-client enable
success: change accepted.
```


- 3 Enable the auto-config option:

```
WX1200# set auto-config enable
success: change accepted.
```

- 4 Save the configuration changes:

```
WX1200# save config
success: configuration saved.
```

- 5 Power off or restart the switch.

Example 2: Deployment Site Has No DHCP and No DNS

The deployment site in this example does not have a DHCP server or a local DNS server. Therefore, IP and DNS information must be statically configured. Because no DNS server is available, an IP alias is configured to map the IP address of the host where 3WXM Services are installed to the well-known hostname wlan-config-srv.

- 1 Configure a VLAN:

```
WX1200# set vlan 1 port 7
success: change accepted.
```

- 2 Configure an IP interface on the VLAN.

```
WX1200# set interface 1 ip 192.168.1.252 255.255.255.0
success: change accepted.
```

- 3 Configure a default route through the local gateway:

```
WX1200# set ip route default 192.168.1.1 1
success: change accepted.
```

- 4 Configure the default DNS domain name:

```
WX1200# set ip dns domain example.com
Domain name changed
```

- 5 Configure an IP alias to map the 3WXM server IP address to the well-known name wlan-config-srv:

```
WX1200# set ip alias wlan-config-srv 172.16.22.84
```

- 6 Enable the auto-config option:

```
WX1200# set auto-config enable
success: change accepted.
```

- 7 Save the configuration changes:

```
WX1200# save config
success: configuration saved.
```

- 8 Power off or restart the switch.

Example 3: The deployment site in this example does not have a DHCP server but does have a local DNS server. The configuration is similar to Example 1, but includes DNS configuration information instead of an IP alias.

Deployment Site Has DNS But No DHCP

- 1 Configure a VLAN:

```
WX1200# set vlan 1 port 7
success: change accepted.
```

- 2 Configure an IP interface on the VLAN.

```
WX1200# set interface 1 ip 192.168.1.252 255.255.255.0
success: change accepted.
```

- 3 Configure a default route through the local gateway:

```
WX1200# set ip route default 192.168.1.1 0
success: change accepted.
```

- 4 Configure the default DNS domain name:

```
WX1200# set ip dns domain example.com
Domain name changed
```

- 5 Configure DNS server information:

```
WX1200# set ip dns server 192.168.11.2
```

- 6 Enable the MSS DNS client:

```
WX1200# set ip dns server enable
success: change accepted.
```

- 7 Enable the auto-config option:

```
WX1200# set auto-config enable
success: change accepted.
```

- 8 Save the configuration changes:

```
WX1200# save config
success: configuration saved.
```

- 9 Power off or restart the switch.

**Example 4:
Deployment Site Has
DHCP But Local DNS
Domain Differs From
Corporate DNS
Domain**

The deployment site in this example has a DHCP server, so the switch's DHCP client is enabled. Static IP address and default gateway information are not required. The site also has a local DNS server. However, the local DNS domain name is different from the corporate DNS domain name where 3WXM Services are located. The static DNS configuration on the switch overrides the DNS configuration from the DHCP server.

1 Configure a VLAN:

```
WX4400# set vlan 1 port 7
success: change accepted.
```

2 Enable the DHCP client on VLAN 1:

```
WX4400# set interface 1 ip dhcp-client enable
success: change accepted.
```

3 Configure the default DNS domain name:

```
WX4400# set ip dns domain examplecorp.com
Domain name changed
```

4 Configure DNS server information:

```
WX4400# set ip dns server 192.168.11.2
```

5 Enable the MSS DNS client:

```
WX4400# set ip dns server enable
success: change accepted.
```

6 Enable the auto-config option:

```
WX4400# set auto-config enable
success: change accepted.
```

7 Create a self-signed administrative certificate, to enable 3WXM or Web Management to communicate with the WX.

```
WX4400# crypto generate key admin 1024
key pair generated
WX4400# crypto generate self-signed admin
Country Name:
State Name:
Locality Name:
Organizational Name:
Organizational Unit:
Common Name: remoteswitch1@example.com
Email Address:
Unstructured Name:
success: self-signed cert for admin generated
```

8 Save the configuration changes:

```
WX4400# save config
success: configuration saved.
```

9 Power off or restart the switch.

Preconfiguring a Switch in 3WXM

If you know the switch's serial number, use the following procedure to set up the switch's configuration in 3WXM.

- 1** Start 3WXM Services.
- 2** Start a 3WXM client and connect to 3WXM Services.
- 3** Select **Tools > 3WXM Services Setup** from the menu bar in the main 3WXM window. The 3WXM Services Setup wizard appears.
- 4** On the Service Settings tab of the wizard (displayed by default), select **Allow remote access**, in the Access Control area.
- 5** Select the WX Connection Settings tab.
- 6** Select **Accept self-signed certificates**, in the Connection Security area.
- 7** Click **Save**, then click **Close**.
- 8** Open the network plan for the site, or select **File > New** to create a new network plan.
- 9** Access the Create Wireless Switch wizard:
 - a** Select the Configuration tool bar option.
 - b** In the Organizer panel, select the network plan name.
 - c** In the Task List panel, select Create Wireless Switch.
- 10** Enter a name for the switch in the WX Name box.
- 11** Select the switch model.
- 12** Enter the serial number in the Serial Number box.
- 13** Configure other parameters as required for the switch's deployment.



You can configure an enable password for the switch even if it does not already have one. When sending the configuration, 3WXM tries the configured password first, then tries a blank password if the enable password does not match the one on the switch. If the switch does not have an enable password, the blank password is accepted. 3WXM then sends the configuration to the switch, including the configured (non-blank) enable password.

- 14 Click **Finish** to save the switch configuration and close the wizard.

Leave 3WXM Services running, with the network plan open. When the switch is powered on at the remote site (and the Fn switch is pressed, if a WXR100), the switch contacts 3WXM Services to request a configuration.

Uploading a Partially Configured Switch and Completing its Configuration with 3WXM

Even if you do not know the serial number of a WX switch, you still can configure the switch in 3WXM. When the switch contacts 3WXM for a configuration, 3WXM generates a warning message such as the following:

```
No Matching configuration found for serial number -
serial-number; IP=ip-addr
```

You can upload the switch into 3WXM, complete its configuration, then deploy the complete configuration back to the switch.

- 1 Select the Verification option on the 3WXM tool bar.
- 2 Click on the warning message.
- 3 In the Resolutions section, click on *Upload WX* to display the Upload WX wizard.
- 4 The IP address is already filled in.
- 5 Type the Enable password, if one is configured on the switch. If an Enable password has not been configured yet, leave the Enable Password box blank.
- 6 Click **Finish**.
3WXM uploads the configuration file from the switch into the network plan. The switch appears in the Equipment section of the Organizer panel.
- 7 Select the Configuration tab on the 3WXM tool bar.
- 8 Select the WX switch.
- 9 Create or modify parameter settings for the switch.
After you complete all the changes, make sure you save the changes by clicking **Save**.
- 10 Select the Verification option on the 3WXM tool bar.
- 11 Review any error or warning messages for the switch.
- 12 Click on an error or warning message to display more information, and a list of resolutions for the error or warning condition.

- 13 Click on a resolution to correct the error or warning condition.
- 14 Select the Devices option on the 3WXM tool bar.
- 15 Select the switch.
- 16 In the Task List panel, select Deploy.

Replacing a Switch and Reusing its Configuration

If a remote switch that is configured by 3WXM fails, you can install a new switch in its place and use 3WXM to configure the switch with the replaced switch's configuration.

This method of switch replacement requires preconfiguration of an auto-config setting by the network administrator, but does not require any configuration by the person who actually performs the replacement at the remote office.

Remote switch replacement is disabled by default but can be enabled on a global basis in the network plan.



This feature applies only when the wireless switch being replaced is the only wireless switch in the network. (Also see the next section, "Requirements".)

Requirements

This method of switch replacement works only under the following conditions:

- The new switch must be the same model as the one being replaced.
- The new switch must run the same major MSS version (for example, 4.1.x) as the one being replaced.
- For models other than the WXR100, the new switch must be pre-staged by a network administrator. (See "Staging a WX Switch for Configuration by 3WXM" on page 336.)
- The new switch must send its configuration request to 3WXM from the same IP subnet as the management address of the switch being replaced. 3WXM will give the new switch the same IP address as the old switch.
- The new switch must be the only WX switch on the subnet.

How Switch Replacement Works

- 1 A network administrator enables the Auto-Config IP Subnet Matching option in 3WXM. (This option is on the 3WXM Services Setup dialog.)
- 2 Someone at the remote office physically unplugs the failed switch and plugs in a new, unconfigured switch or a pre-staged switch.
- 3 The person at the remote office powers on the new switch.
If the switch is a WXR100, the person at the remote office also inserts a paperclip or similar object into the WXR100's Fn hole to press the Fn switch. Normally, the Fn LED (the right LED above port 1) remains solidly lit for 3 seconds after power on. However, when the Fn switch is pressed, the LED flashes for 3 seconds instead.
- 4 The new switch requests a configuration from 3WXM, using the process described in "Drop Ship (WXR100 Only)" on page 332 or "Staged WX" on page 334. (The process depends on whether the switch is a WXR100 or is any model that has been prestaged.)
- 5 3WXM finds a switch configuration that matches the model and MSS version and has a management interface in the same subnet as the new switch.

3WXM also notices that the serial number of the new switch does not match the serial number in the switch configuration in 3WXM. However, because the Auto-Config IP Subnet Matching option is enabled, 3WXM does not reject the configuration request.

Enabling Replacement of Remote Switches

This configuration task is performed by the network administrator using 3WXM.

To enable replacement of remote switches

- 1 Open the network plan that contains the remote switches you want to allow to be replaced.
- 2 Select **Tools > 3WXM Services Setup** from the toolbar in the main 3WXM window.
- 3 On the Service Settings tab, select Auto-Config IP Subnet Matching.
- 4 Click **Save**.

Replacing a Switch This task is performed by someone at the remote office and does not require a network administrator.

3Com recommends that you read through the entire procedure before beginning.

To replace a switch

- 1 Remove the power cord from the old switch.
- 2 Unplug the network cables from the old switch.



If the cables are not already labeled to indicate the switch port numbers to which they are connected, you might want to label them before unplugging them.

- 3 Plug the network cables into the new switch.
- 4 Plug the power cord into the new switch.
- 5 Perform this step only if the switch is a WXR100 and was not prestaged by your network administrator.

While the switch is powering on, insert a paperclip or similar object into the WXR100's Fn hole to press the Fn switch.

Normally, the Fn LED (the right LED above port 1) remains solidly lit for 3 seconds after power on. However, when the Fn switch is pressed, the LED flashes for 3 seconds instead.

10

MANAGING WX SYSTEM IMAGES AND CONFIGURATIONS

This chapter describes the management of WX system files. It includes information about uploading a WX switch configuration into 3WXM, verifying configuration information, synchronizing local and network changes, deploying WX switches from a network plan to the network, distributing image and configuration files, importing and exporting WX switch configuration files, working with domain policies, and rebooting WX switches or MAP access points.

WX File Management Options

3WXM provides many options for managing WX system image files and configuration files. Table 23 lists the options and the places in this document where the options are described.

Table 23 WX File Management Options in 3WXM

Option	Description
Upload configuration	Creates a new WX switch in a network plan, by copying the configuration file from the live switch in the network. (See "Adding a Switch by Uploading its Configuration from the Network" on page 163.)
Configure and apply policies	Applies configuration settings from policies to a single switch or multiple switches. (See "Configuring and Applying Policies" on page 373.)
Deploy	Sends WX switch configurations from the network plan into the live network, to implement the network plan on the live switches. (See "Deploying Switch Configuration Changes" on page 352.)
Verify configuration changes	Checks switch configuration changes against a set of configuration rules, alerts you to configuration items that do not fit the rules, and enables you to either edit these configuration items or ignore the rules. (See "Verifying Configuration Changes" on page 363.)

Table 23 WX File Management Options in 3WXM (continued)

Option	Description
Synchronize local and network changes	Compares switch configurations in the network with their counterparts in the network plan, and enables you to review the differences, and either deploy the new changes to synchronize the configurations, or undo the changes. (See “Synchronizing Local and Network Changes” on page 350.)
Save image in repository	Adds a WX system image to a repository. When you distribute images and configuration files, you can select an image from the repository. (See “Using the Image Repository” on page 354.)
Distribute System Images	Applies software images to WX switches and optionally reboots the switches to place the new images into effect. (See “Distributing System Images” on page 354.)
Export configuration	Saves the configuration of a WX switch in the network plan into a file. You can save the configuration in XML format. (See “Importing and Exporting Switch Configuration Files” on page 359.)
Import configuration	Creates a new WX switch in a network plan, by copying a switch configuration file stored on a server. (See “Importing and Exporting Switch Configuration Files” on page 359.)

Devices Tab

The Devices tab allows you to manage configuration changes for WX switches in the network plan.

To access the Devices tab, do one of the following:

- Select the Devices tool bar option.
- In the Alerts panel, click on Local Changes or Network Changes.

The managed switches and unmanaged switches are listed separately. Managed switches can be deployed to the network and can be monitored by 3WXM Services. Unmanaged switches can be configured in 3WXM but cannot be deployed to the network or monitored by 3WXM Services. (See “Enabling or Disabling Management of a Switch by 3WXM” on page 357.)

Task List Options The Task List panel in the Devices tab has the following pages:

- Change Management
- Device Operations

Table 24 lists the tasks you can select on the Devices tab.

Table 24 Devices Tasks

Task Option	Task Group	Task	Description
Change Management	Local Changes	Review	Display the configuration changes that have occurred in 3WXM for the selected switch. (See "Reviewing Switch Configuration Changes" on page 350.)
		Deploy	Send the configuration changes to the same switch in the network. (See "Deploying Switch Configuration Changes" on page 352.)
		Schedule Deploy	Schedule configuration changes to be sent from 3WXM to the same switch in the network. ("Deploying Switch Configuration Changes" on page 352)
		Undo	Remove the changes from the switch in the network plan. (See "Undoing Local or Network Changes" on page 351.)
	Network Changes	Review	Display the configuration changes that have occurred in the network for the selected switch. (See "Reviewing Switch Configuration Changes" on page 350.)
		Accept	Update the switch in the network plan with the changes from the live switch. (See "Accepting Network Changes" on page 351.)
		Undo	Remove the changes from the switch in the network. (See "Undoing Local or Network Changes" on page 351.)

Table 24 Devices Tasks (continued)

Task Option	Task Group	Task	Description
	Other	Upload WX	Add a WX switch to the network plan by copying its configuration from a live switch in the network. (See "Adding a Switch by Uploading its Configuration from the Network" on page 163.)
		View Operation Log	Lists the tasks performed using the Devices tab. (See "Viewing the Operation Log" on page 358.)
		Cancel Scheduled Operation	Cancel a scheduled task, such as an image deployment. (See "Canceling a Scheduled Operation" on page 358.)
Device Operations	Images	Image Install	Install the selected MSS image onto WX switches. (See "Distributing System Images" on page 354.)
		Schedule Install	Schedule installation of the selected MSS image onto WX switches in the future. (See "Distributing System Images" on page 355.)
		Image Repository	Opens the Image Repository dialog box, which allows you to add or remove MSS images in the repository. (See "Using the Image Repository" on page 354.)

Table 24 Devices Tasks (continued)

Task Option	Task Group	Task	Description
Device Operations, cont.	Actions	Reboot WX and APs	Reboot a WX switch and the MAPs it is managing. (See "Rebooting WX Switches or MAP Access Points" on page 356.)
		Reboot APs	Reboot MAPs. (See "Rebooting WX Switches or MAP Access Points" on page 356.)
		Manage Device	Enable 3WXM management of WX switches. (See "Enabling or Disabling Management of a Switch by 3WXM" on page 357.)
		Unmanage Device	Disable 3WXM management of WX switches. (See "Enabling or Disabling Management of a Switch by 3WXM" on page 357.)
		Distribute Certificates	Install a certificate from a PKCS #12 file onto WX switches. (See "Distributing Certificates to WX Switches" on page 372.)
	Other	Upload WX	Add a WX switch to the network plan by copying its configuration from a live switch in the network. (See "Adding a Switch by Uploading its Configuration from the Network" on page 163.)
	View Operation Log	Lists the tasks performed using the Devices tab. (See "Viewing the Operation Log" on page 358.)	
	Cancel Scheduled Operation	Cancels a scheduled task, such as an image deployment. (See "Canceling a Scheduled Operation" on page 358.)	

Toolbar Options Table 25 lists the options on the Devices tab's toolbar.

Table 25 Toolbar Options on Devices Tab

Option	Description
Upload WX	Opens the Upload Wireless Switch dialog box, which lets you add a new switch to the network plan by copying the configuration from a switch already running in the network. (See "Adding a Switch by Uploading its Configuration from the Network" on page 163.)
Options	Opens the Managed Devices Options dialog box, which lets you modify parameters used to poll switches for configuration changes. (See "Modifying Configuration Change Polling Options" on page 361.)

Synchronizing Local and Network Changes

Whenever configuration changes occur to a switch, 3WXM alerts you that changes have occurred. If a configuration change occurs on a switch in the network or in the network plan, so that the network and network plan are out of sync, 3WXM displays a message in a popup window to alert you that a change has occurred.

The Devices tab enables you to review changes and synchronize the switches in the network with their counterparts in 3WXM by either copying the changes to the other switch, or removing the changes from the switch that was changed.

A row of information is displayed for each switch. The Local Status and Network Status columns indicate where changes have occurred.

Reviewing Switch Configuration Changes

To review switch configuration changes:

- 1 Select the Devices tool bar option.
- 2 At the bottom of the Task List panel, select **Change Management**.
- 3 Select one or more WX switches.

To select multiple switches, press **Shift** (for contiguous switches) or **Control** (for noncontiguous switches) while clicking.
- 4 In the Local Changes or Network Changes group in the Task List panel, select **Review**.

- Selecting **Review** in Local Changes displays changes made in 3WXM.
 - Selecting **Review** in Network Changes displays changes that have occurred in the network.
- 5 To print the changes, click **Print**.
 - 6 Click **Close** to return to the Managed Devices tab.

Accepting Network Changes

To accept network changes:

- 1 Select the Devices tool bar option.
- 2 At the bottom of the Task List panel, select **Change Management**.
- 3 Select one or more WX switches.
To select multiple switches, press **Shift** (for contiguous switches) or **Control** (for noncontiguous switches) while clicking.
- 4 In the Task List panel in the Network Changes group, click **Accept**.
The status is shown in the Network Status and Local Status columns.

Undoing Local or Network Changes

To undo local or network changes:

- 1 Select the Devices tool bar option.
- 2 At the bottom of the Task List panel, select **Change Management**.
- 3 Select one or more WX switches.
To select multiple switches, press **Shift** (for contiguous switches) or **Control** (for noncontiguous switches) while clicking.
- 4 In the Local Changes or Network Changes group in the Task List panel, select **Undo**.
 - Selecting **Undo** in Local Changes reverses changes made in 3WXM.
 - Selecting **Undo** in Network Changes reverses changes that have occurred in the network.

The status is shown in the Network Status and Local Status columns.

Deploying Switch Configuration Changes

You can deploy changes immediately or schedule them to be deployed later.

When you deploy changes to a WX, all of the changes are sent as a single transaction. If any parameter is unsuccessfully changed, the entire transaction is rolled back. If the transaction is successful, the configuration changes are immediately and dynamically put into effect. (A reboot is not required.)

The following procedures provide steps for deploying configuration changes from the Devices tab. You also can immediately deploy changes from the Configuration tab, by clicking **Deploy**.

To immediately deploy local changes

- 1 Select the Devices tool bar option.
- 2 At the bottom of the Task List panel, select Change Management.
- 3 Select one or more WX switches.
To select multiple switches, press **Shift** (for contiguous switches) or **Control** (for noncontiguous switches) while clicking.
- 4 In the Local Changes group in the Task List panel, click **Deploy**. The Deploy Configurations dialog box appears.
The dialog lists the switches that have configuration changes.
- 5 Select the switches to which you want to deploy the changes.
To select more than one WX, click **Shift** while clicking to select contiguous items, or click **Ctrl** while clicking to select noncontiguous items.
- 6 Click **Deploy**.
The deployment status for each affected WX is shown in the History window at the bottom left of the dialog box.
3WXM performs verification of the changes. If errors occur, they are listed in the Selected Errors at the bottom right of the dialog box. If there are errors, fix them and verify the changes before trying to deploy again. (You can use the Verification tab to fix the errors. See "" on page 363.)
If the deploy is successful, 3WXM also instructs the WX switch to save the changes in its configuration file.
- 7 Click **Close**.



You can click **Close** at any time after clicking **Deploy**. The operation continues in the background. To review the status of the operation, use the operation log. (See “Viewing the Operation Log” on page 358.)

To schedule deployment of local changes

- 1 Select the Devices tool bar option.
- 2 At the bottom of the Task List panel, select **Change Management**.
- 3 Select one or more WX switches.
To select multiple switches, press **Shift** (for contiguous switches) or **Control** (for noncontiguous switches) while clicking.
- 4 In the Task List panel in the Local Changes group, click **Schedule Deploy**. The Schedule Deploy dialog box appears.
- 5 Edit the start date and time.
(The date and time are based on the date and time on the machine where 3WXM Services is installed.)
- 6 Click **OK**.

Synchronizing When the Network and 3WXM Have Nonmatching Changes

If a WX switch in the network has configuration changes, and the switch’s counterpart in the network plan also has changes but the changes are different, you still can synchronize the changes.

The Devices tab indicates that both the network and the network plan have nonmatching changes in the following ways:

- When you select the WX switch, the links in both the Local Changes and Network Changes groups of the Task List panel become active.
- When you click **Deploy**, the deployment is not performed and the following message is displayed instead: wx is not synchronized.

To synchronize the changes, do one of the following:

- Review and either deploy (local changes) or accept (network changes), then review and either deploy or accept the other set of changes.
- Reject one set of changes (local or network) and accept or deploy the other set of changes.
- Reject both sets of changes.

Distributing System Images

You can use 3WXM to upgrade or downgrade the system image (MSS software) on WX switches. System images include switch software and MAP software.

Using the Image Repository

Use the image repository to add or delete WX system images. The image file is checked and its version is verified when added to the image repository. Images are stored in the `3Com_installation_directory\images\dp` directory.

To add a system image

- 1 Select the Devices tool bar option.
- 2 At the bottom of the Task List panel, select Device Operations.
- 3 In the Task List panel, select Image Repository.
- 4 Click **Add Image**. The Add to Repository dialog box appears.
- 5 Navigate to the directory containing the system image.
- 6 Select the system image.
- 7 Click **Add to Repository**. The image is added to the image repository and appears in the Image List.
- 8 To close the Image Repository dialog box, click **Close**.

To delete a system image

- 1 In the Image Repository dialog box, select the image you want to delete.
- 2 Click **Remove Image**. A prompt appears.
- 3 Click **Yes** to delete the system image.
- 4 To close the Image Repository dialog box, click **Close**.

Distributing System Images

You can distribute a system image to one or more WX switches in a network plan.

To use a new system image, you must reboot the WX. For more information, see “Rebooting WX Switches or MAP Access Points” on page 356.



3Com recommends that you use the Verification tab to resolve any configuration errors or warnings before you distribute system images.



Before you can distribute an image, you must add it to the image repository. (See “Using the Image Repository” on page 354.)

To immediately install an image on WX switches

- 1 Select the Devices tool bar option.
- 2 At the bottom of the Task List panel, select Device Operations.
- 3 In the Managed Devices list, select the WX switches onto which you want to install the image.

To select more than one WX, click **Shift** while clicking to select contiguous items, or click **Ctrl** while clicking to select noncontiguous items.

- 4 In the Task List panel, select **Image Install**.
- 5 Click on Select an Image to display the list of images in the repository.
- 6 Select the image and click **Install**.

To schedule installation of an image on WX switches

- 1 Select the Devices tool bar option.
- 2 At the bottom of the Task List panel, select Device Operations.
- 3 In the Managed Devices list, select the WX switches onto which you want to install the image.

To select more than one WX, click **Shift** while clicking to select contiguous items, or click **Ctrl** while clicking to select noncontiguous items.

- 4 In the Task List panel, select Schedule Install.
- 5 Click on Select an Image to display the list of images in the repository.
- 6 Click **Next**.

- 7 Edit the start date and time.
(The date and time are based on the date and time on the machine where 3WXM Services is installed.)
- 8 Click **Finish**.

Rebooting WX Switches or MAP Access Points

You can use 3WXM to reboot WX switches and MAPs.

To reboot WX switches and the MAPs they are managing

- 1 Select the Devices tool bar option.
- 2 At the bottom of the Task List panel, select Device Operations.
- 3 In the Managed Devices list, select the WX switches you want to reboot, or that are managing MAPs you want to reboot.

To select more than one WX, click **Shift** while clicking to select contiguous items, or click **Ctrl** while clicking to select noncontiguous items.
- 4 In the Task List panel, select **Reboot WX and APs**.
Information about the rebooting process is shown in the Status column.
- 5 Click **Close**.

To reboot MAPs without rebooting the switch

- 1 Select the Devices tool bar option.
- 2 At the bottom of the Task List panel, select **Device Operations**.
- 3 In the Managed Devices list, select the WX switches that are managing the MAPs you want to reboot.

To select more than one WX, click **Shift** while clicking to select contiguous items, or click **Ctrl** while clicking to select noncontiguous items.
- 4 In the Task List panel, select **Reboot APs**.
- 5 Select the MAPs you want to reboot.
- 6 Click **Reboot**.
Information about the rebooting process is shown in the Status column.
- 7 Click **Close**.

Enabling or Disabling Management of a Switch by 3WXM

The Devices tab lists managed switches and unmanaged switches separately. Managed switches can be deployed to the network and can be monitored by 3WXM Services. Unmanaged switches can be configured in 3WXM but cannot be deployed to the network or monitored by 3WXM Services.

To enable switches to be managed by 3WXM

- 1 Select the Devices tool bar option.
- 2 At the bottom of the Task List panel, select **Device Operations**.
- 3 In the Managed Devices list, select the WX switches you want to manage.
To select more than one WX, click **Shift** while clicking to select contiguous items, or click **Ctrl** while clicking to select noncontiguous items.
- 4 In the Task List panel, select **Manage Device**.

To disable management of switches by 3WXM

- 1 Select the Devices tool bar option.
- 2 At the bottom of the Task List panel, select **Device Operations**.
- 3 In the Managed Devices list, select the WX switches you want to stop managing with 3WXM.
To select more than one WX, click **Shift** while clicking to select contiguous items, or click **Ctrl** while clicking to select noncontiguous items.
- 4 In the Task List panel, select **Unmanage Device**.

Viewing the Operation Log

The operation log displays information about the operations you perform using the Devices options.

To display the operation log

- 1 Select the Devices tool bar option.
- 2 At the bottom of the Task List panel, select **Device Operations**.
- 3 In the Task List panel, select **View Operation Log**.

Table 26 lists the columns in the operation log.

Table 26 Devices Operation Log

Column	Description
Task	The operation that was requested. The operations are tasks available on the Devices tab.
Status	Status of the operation: <ul style="list-style-type: none"> ▪ Scheduled ▪ Completed ▪ Cancelled ▪ Failed
User	3WXM user name
Start Time	Date and time when the task was started or is scheduled to start
End Time	Date and time when the task ended
Details	Description of the success or failure of the task

Canceling a Scheduled Operation

To cancel a scheduled operation:

- 1 Select the Devices tool bar option.
- 2 At the bottom of the Task List panel, select **Device Operations**.
- 3 In the Managed Devices list, select the WX switches with scheduled tasks you want to cancel.

To select more than one WX, click **Shift** while clicking to select contiguous items, or click **Ctrl** while clicking to select noncontiguous items.

- 4 In the Task List panel, select **Cancel Scheduled Operation**.

The Deploy Status column in the Managed Devices table indicates that the operation has been canceled.

Importing and Exporting Switch Configuration Files

You can import or export switch configuration files in Extensible Markup Language (XML) format.

- The import option enables you to create a WX switch in the network plan by importing configuration files in Extensible Markup Language (XML) format. You also can update the configuration of a switch that is already in the plan.
- The export option enables you to save a switch's configuration to an XML file. After exporting a WX configuration to an XML file, you can import it to another instance of 3WXM or use it as a backup copy.

If you import a configuration containing information that an older version of 3WXM or MSS does not support, the information is ignored when the configuration is imported.

If you import a switch configuration, you must enable 3WXM management of the switch before you can deploy the switch to the network. (To enable 3WXM management of a switch, see "Modifying Basic Switch Parameters" on page 170.)

To import a configuration

- 1 In the main 3WXM window, select **File > Import**. The Import Configurations dialog box appears.
- 2 In the Import Into Mobility Domain group box, select one of the following options:
 - Click **Use File Info** to import the configuration information using the Mobility Domain specified in the configuration file.
 - Click **Select** to specify a Mobility Domain to import configuration information to. Then select the Mobility Domain from the list.
- 3 To replace existing WX switch information in 3WXM with information from the configuration file, select **Update existing WXs**.
- 4 Click **Select Files**. The Select Files To Import dialog box appears.
- 5 Select one or more configuration files to be imported. To make multiple selections, press **Shift** (for contiguous items) or **Control** (for noncontiguous items) while clicking items.
- 6 Click **Select Files To Import**. The file or files you selected appear in the File Import Results list.

To remove all the files you previously selected, click **Clear Files**.

- 7 Click **Import**. The status of the import process appears in the Status column.
- 8 Click **Close** to save the changes.
- 9 Enable 3WXM to manage the switch. (See “Modifying Basic Switch Parameters” on page 170.)

To export a configuration

- 1 Select **File > Export**. The Export Configurations dialog box appears.
- 2 In the Export From list, select the Mobility Domain whose configuration you want to export.
- 3 If you want to export the configuration file to a different directory, click the **Choose** button, which is labeled with the current output directory. The Select dialog box appears. Navigate to the directory you want to use as the output directory, and click **Select**.

- 4 To overwrite previously exported configuration files, select **Overwrite Existing Files**.

If you do not select this option, you cannot export a configuration file with the same name as an existing file in the output directory. You can rename the existing file or move the file to another directory.

- 5 To have 3WXM create a backup copy of a previous configuration file, select **Copy Files Before Overwriting**.
- 6 To include the default configuration commands in the exported file, select **Export Defaults**.
- 7 For each WX whose configuration you want to export, make sure the **Export** checkbox is selected.
- 8 Click **Export** to begin the exporting process. Messages appear in the Status column in the WX List box and the Results box.
The configuration is saved in the directory that you specified.
- 9 To close the Export Configurations dialog box, click **Close**.

Modifying Configuration Change Polling Options

By default, 3WXM client polls WX switches in the network every 15 minutes for network changes, and displays a popup message if changes are detected. The popup message is in addition to notification in the Alerts panel.

To modify configuration polling options

- 1 Select the Devices tool bar option.
- 2 Click **Options** on the Devices tab's toolbar. The Managed Device Options dialog box appears.
- 3 To enable the detection of configuration changes in the network, make sure **Enabled** is selected next to Poll for configuration changes.
- 4 To specify how often network checks occur, specify the interval between checks, from 1 to 1440 minutes (24 hours), in the Interval box. The default is 15 minutes.
- 5 To be notified of network changes by a popup message, select **Prompt when network changes are detected**.

To disable the popup message, deselect the option.



Disabling the popup message does not affect the Network Changes information in the Alerts panel. The Alerts panel still notifies you of network changes.

- 6 To instruct WX switches to save deployed configuration changes in their configuration files, select **Save WX Configuration on Deploy**.
- 7 Click **Close**.

11

VERIFYING CONFIGURATION CHANGES

3WXM uses a set of rules to verify WX switch configurations. Changes to a switch's configuration in 3WXM or in the live network are automatically evaluated by comparing the changes to the rules. If the evaluation detects any error or warning conditions, the information in the Alerts panel is updated:

- Errors or warnings in a switch's configuration in 3WXM affect the Configuration counts.
- Errors or warnings in the network affect the Network counts.

Verification Tabs

Click on Configuration or Network in the Alerts panel to display the Verification tabs in the Content panel.

The Verification tab contains a Config Verification tab and a Network Verification tab:

- The Config Verification tab shows errors and warnings for switch configuration information in 3WXM.
- The Network Verification tab shows errors and warnings for configuration information in the network. The errors and warnings can be for switch configuration items and for the monitoring service.

On each tab, the Message column lists error descriptions in red and lists warning descriptions in orange:

- Errors are serious problems that must be addressed before deployment. By default, you cannot deploy a network plan with errors in it. After fixing errors, verify the network plan again to ensure that the errors have been resolved.
- Warnings are noncritical issues that do not stop deployment. Review any warnings and consider resolving the issues before deployment.

Details about the selected error or warning appear in the lower left section of the tab.

The Resolution section of the tab lists options for resolving the warning or error.

Toolbar Options

Table 27 lists the options on the Event tab's toolbar.

Table 27 Toolbar Options on Verification Tab

Option	Description
Options	Displays the Verification Options dialog box, which enables you to change verification options and disable or reenable rules. (See "Changing Verification Options" on page 366.)

Filtering the Message List

By default, all warning and error messages are listed. You can use the following options to filter the message list:

- Show Errors—Error messages are listed only when this option is selected.
- Show Warnings—Warning messages are listed only when this option is selected.
- Show Disabled—Disabled rules are listed only when this option is selected. (See "Disabling a Rule from the Message List" on page 365.)

Resolving an Error or Warning

For most errors and warnings, 3WXM provides a link to edit the configuration information that caused the error or warning. The link appears in the Resolutions section of the tab, under the Messages column. When you click the edit link, 3WXM opens the configuration wizard for the configuration item.

For example, if you create a new WX switch called *dang-wxr100* but you do not specify the system IP address of the switch, the error message *System IP address is not assigned or is invalid* appears in the Message area. To correct the error, click on *Edit dang-wxr100* in the Resolutions section. The Modify WX switch wizard appears. Use the wizard to edit the System IP address. After you save the configuration change, 3WXM reevaluates the switch's configuration. If the system IP address is specified, the error no longer appears in the Verification tab.

To resolve an error or warning

- 1 Select the error or warning message in the Message column.
- 2 Read the information in the Error/Warning Details section. For some errors and warnings, this section contains information about how to resolve the error or warning.
- 3 If an Edit option is listed in the Resolution section, click on the option to display the configuration wizard for the item.
- 4 Edit the configuration item or resolve the network issue and save the change.
- 5 In the Verification tab, click **Refresh** on the tab's toolbar.
- 6 Check the messages to see whether the error or warning is gone.

Disabling a Rule from the Message List

All 3WXM rules are enabled by default. If you want 3WXM to stop alerting you about a specific error or warning, you can disable the rule for that error or warning.

You can disable rules on a per-instance basis or globally for all instances.

- If you disable a rule for a specific instance, 3WXM stops alerting you about that particular instance but still uses the rule when evaluating other configuration items.
- If you disable a rule for all instances, 3WXM stops using that rule altogether when verifying a configuration.



Rules that are disabled for all instances are disabled on a per-user basis, not a per-plan basis. When you disable all instances of a rule, the rule is disabled for any network plan that you open while you are logged on with the 3WXM client user name you were logged on with when you disabled the rule.

To disable a specific instance of a warning or error

- 1 Select the warning or error message.
- 2 In the Resolutions section, click **disable this rule for this instance only**.
As soon as you click on this option, the message disappears from the list. 3WXM will not display this particular instance of the message again.

To globally disable a warning or error

- 1 Select an instance of the warning or error message.
- 2 In the Resolutions section, click **disable this rule for all instances**.

As soon as you click on this option, all instances of the message disappear from the list. 3WXM will not display the message again.

Changing Verification Options

By default, 3WXM verifies configuration information in the following cases:

- When the switch's configuration is changed in 3WXM.
- When you deploy or export a switch from 3WXM to the network.
- When you upload a switch from the network into 3WXM.

3WXM verifies the switch's entire configuration by default each time a change occurs.

In addition, 3WXM allows you to deploy or export configuration changes that cause error messages by default.

To change verification options

- 1 On the toolbar of the Verification tab click **Options**. The Verification Options dialog box appears.
- 2 Select the cases in which you want 3WXM to perform verification:
 - **Verify changes only**—3WXM performs verification only on configuration items that change, instead of verifying the entire configuration when any change in that configuration occurs.
 - **Verify on edits**—3WXM performs verification whenever you edit a switch's configuration.
 - **Verify on deploy and export**—3WXM performs verification when you select the option to deploy switches from 3WXM to the live network.
 - **Verify on upload**—3WXM performs verification when you select the option to upload a switch's configuration from the network into 3WXM.
 - **Allow errors to be deployed and exported**—3WXM allows you to deploy or export a switch's configuration even if it contains errors.



3Com recommends that you do not deploy a network plan that contains configuration errors. Allowing configuration errors to be deployed to the network can affect network stability.

- 3 Click **Close** to place the changes into effect and close the dialog box.

Disabling and Reenabling Rules

If you disable a rule, you can use the Verification Options dialog box to reenable the rule. You also can disable rules, for the entire network plan or for specific instances.

To disable or reenable a rule

- 1 On the toolbar of the Verification tab click **Options**. The Verification Options dialog box appears.
- 2 Click **Rules Control**. The list of 3WXM verification rules appears.
- 3 Locate the rule you want to disable. You can click on the Class or Rule headers to sort alphabetically by rule class or by rule name. You also can filter the display to show only the rules in a specific class.

To filter the rule list based on class:

- a Click **Filter By Class**. The rule list changes to list the rules in the selected class.
 - b Select a rule class from the listbox. The list of rules changes to list the rules in the selected class. In this example, the selected rule class is 802.1X Network Access.
- 4 In the Enabled column, click on the checkbox next to the rule.
 - If you are reenabling a rule, go to step 5.
 - If you are disabling a rule, go to step 8.
 - 5 In the Rule column, click on the rule name. The disable settings are displayed and become editable.
 - If the rule is disabled for all instances, the **Disable All Instances** option is selected.
 - If individual instances of the rule are disabled, the **Disable Selected Instances** option is selected and the instances are listed. Instances that are disabled have checkmarks in the checkboxes next to them.

- 6 Reenable the rule or instances:
 - To reenable a rule all of whose instances are disabled, click on the checkbox in the Enabled column. The **Disable All Instances** option is deselected.
 - To reenable an individual instance of a rule, click on the checkbox next to the instance. Repeat for each instance you want to reenable. Alternatively, if you want to reenable all the disabled instances, you can click on the checkbox in the Enabled column.
- 7 Go to step 10.
- 8 Click on the checkbox in the Enabled column. The disable options become editable. By default, the **Disable All Instances** option is selected.
- 9 To leave all instances disabled, go to step 10.
To disable only specific instances:
 - a Select **Disable Selected Instances**. The individual instances of the rule are listed.
 - b Click next to the instances you want to disable, then go to step 10.
- 10 Click **Close**.

12

MANAGING CERTIFICATES

A digital certificate is a form of electronic identification for computers. This chapter describes processing and managing certificates, and distributing PKS #12 files.

Overview

A digital certificate is a form of electronic identification for computers. The 3Com Mobility System supports the following types of X.509 digital certificates:

- Administrative certificate for the monitoring service or a WX switch
- 802.1X-EAP certificate for a WX switch
- WebAAA certificate for a WX switch
- Certificate authority certificate to validate the administrator's certificate
- Certificate authority certificate to validate user and the EAP server certificates

When 3WXM connects to 3WXM Services or a WX switch, the administrative certificate is used to authenticate the service or WX switch and establish a secure connection.



If a WX switch does not already have certificates, MSS automatically generates them the first time you boot using MSS Version 4.2 or later. You do not need to install certificates unless you want to replace the ones automatically generated by MSS. (For more information, see the "Certificates Automatically Generated by MSS" section in the "Managing Keys and Certificates" chapter of the [Wireless LAN Switch and Controller Configuration Guide](#).)



Before installing a new certificate, verify that the WX switch is set to the correct date, time, and time zone. Otherwise, certificates might not be installed correctly.

For more information about certificates on the WX, see the [Wireless LAN Switch and Controller Configuration Guide](#).

Processing Certificates

When 3WXM client connects to 3WXM Services or to a WX switch that presents a certificate that is unknown to 3WXM client, the Certificate Check dialog box appears. The dialog shows information about the certificate and allows you to accept or reject the certificate and therefore accept or reject the connection.

Before 3WXM can communicate with the WX switch or 3WXM Services over a secure HTTPS connection, you must specify how to deal with the certificate required for secure communication



The options you select in this dialog box apply to all HTTPS connections with the 3WXM client. For example, the 3WXM client also checks the validity of certificates presented by 3WXM Services, and the settings you select in this dialog affect those connections too.

To process a certificate

- 1 If you do not want to see the Certificate Check dialog box each time 3WXM connects to a WX switch, select one of the following options:
 - **Always accept self-signed certificates.** — Use this option to configure the 3WXM client to always accept a self-signed certificate from the 3WXM monitoring service and from WX switches.
 - **Install this certificate to validate future connections.** — Use this option to accept the certificate and consider the certificate to be valid for future connections.



When you use this option, the Certificate Check dialog box is not shown again for the certificate, even if the certificate becomes out of date.

- 2 Do one of the following:
 - Click **Accept** to allow the connection to the WX switch.
If you did not select either of the options in step 1, when you click **Accept**, a secure connection with these certificate credentials is allowed for this session until you close the network plan.
 - Click **Reject** to reject the connection to the WX switch.

Managing Certificates

After you have installed certificates, you can review a certificate or delete a certificate that is stored in the 3WXM certificate store.

Reviewing Certificate Details

After installing a certificate in 3WXM, you can see information such as the time frame for which the certificate is valid and who issued the certificate.

To review certificate details

- 1 Select **Tools > Certificate Management** from the toolbar in the main 3WXM window.
- 2 Select a certificate from the list, and click **Details**. (You can also double-click the certificate to see its details.)

The Certificate Details dialog box appears, listing the certificate information.
- 3 Click **Close**.
- 4 In the Certificate Management dialog box, click **Close**.

Deleting Certificates

To delete certificates, follow these steps.

- 1 Select **Tools > Certificate Management**.
- 2 Select a certificate from the list.
- 3 Click **Delete**.
- 4 When prompted, click **Yes** to confirm the certificate deletion, or click **No** to cancel the deletion.

If you clicked **Yes**, the certificate is deleted.
- 5 In the Certificate Management dialog box, click **Close**.

Distributing Certificates to WX Switches

You can use 3WXM to distribute certificates from PKCS #12 files to one or more WX switches.



Although you can distribute one PKCS #12 file to many WX switches, as a best practice, you should install a unique certificate and key pair per WX.

- 1 Select the Devices tool bar option.
- 2 At the bottom of the Task List panel, select **Device Operations**.
- 3 In the Managed Devices list, select the WX switches to which you want to distribute the certificate.

To select more than one WX, click **Shift** while clicking to select contiguous items, or click **Ctrl** while clicking to select noncontiguous items.

- 4 In the Task List panel, select **Distribute Certificates**.
- 5 Click **Select PKCS12 File**.
- 6 Navigate to the PKCS #12 file and click **Select PKCS12 File**.
- 7 In the PKCS12 Password box, type the one-time password used to authenticate the PKCS12 file. The following characters cannot be used as part of the one-time password of a PKCS #12 file: quotation marks (" "), question mark (?), ampersand (&).



This password must match the password used when the file was generated.

- 8 In the Certificate Type list, select one of the following:
 - **EAP** — To install an 802.1X/EAP certificate
 - **Web** — To install a WebAAA certificate
 - **Admin** — To install an administrative certificate
- 9 Click **Start Download**. Download progress appears in the Status column.

When the download process is complete, you see a message indicating that the certificate was installed.

13

CONFIGURING AND APPLYING POLICIES

A *policy* is a set of WX configuration parameters that you can define once in 3WXM and then apply to multiple WX switches. When you apply a policy to a set of WX switches, all parameter settings in the policy are applied to the switches and update the settings already on the switches.

How Changes Are Managed

When you create a new policy, none of the policy's settings are applied to WX switches (even the ones you associate with the policy when you create it), until you explicitly apply the policy to the switches.

After you associate a new policy with a switch, all new switches (switches you create using the WX Switch wizard or switches you upload) that match the WX model and version number of the policy automatically receive the parameter settings in the policy.

However, after you have associated a policy with at least one switch, any changes you later make to the policy are *not* automatically applied to any switches. To apply the changes you make to a policy to the switches associated with that policy, you must explicitly reapply the policy to the switches.

Policies Created When You Migrate a 3.x Network Plan to 4.1

When you open a 3.x network plan in 3WXM 4.1, 3WXM automatically creates a policy for each Mobility Domain in the plan. The policy contains all the parameter settings that were in the Domain Policies for the Mobility Domain in 3.x.

To avoid unintended configuration changes, 3WXM does not automatically apply the Mobility Domain policy to new switches or to switches that already exist in the plan. However, you can use the Policy Manager to apply the parameter settings in the Mobility Domain policy to switches.

Viewing Policies

To view policies:

- 1 Select the Policies tool bar option.
- 2 To view the feature areas in the policy, click on the plus sign next to the policy name.
Only the areas that are configured in the policy are listed.
Click on the plus sign next to individual feature areas.
- 3 To view the parameter settings in a feature area, select the feature area.
The settings appear in the Content panel.

Creating a Policy

To create a policy:

- 1 Access the Create Policy wizard.
 - a Select the Policies tool bar option.
 - b In the Task List panel, select **Policy**.
- 2 In the Policy Name box, type a name for the policy. This name will appear in the Organizer panel when the Policies tool bar option is selected.
- 3 To configure a policy for a specific switch model, select the model from the WX Model Filter drop-down list.
- 4 To configure the policy to support an older version of 3WXM than is currently running, select the version from the WX Version Filter drop-down list.
- 5 Click **Next**.
- 6 Select the feature areas you want to set in the policy.
When you apply the policy to a switch, all parameter settings from all the feature areas you select are applied to the switch. This includes any settings you leave at their default settings in the policy.
- 7 Click **Next**.
- 8 In Available Devices list, select the switches to which you want to apply the policy, then click **Add** to move the switches to the Current Devices list.



Moving a switch to the Current Devices list does not automatically apply the policy to the switch. To apply policy settings, see "Applying Policy Changes to Switches" on page 375.

- 9 Click **Finish** and go to "Configuring Feature Settings in a Policy".

Configuring Feature Settings in a Policy

To configure feature settings in a policy:

- 1 If you have not already done so, use the procedure in “Creating a Policy” on page 374 to configure a policy and select the switches to which you want to apply the policy.
- 2 In the Organizer panel, select a feature area.
- 3 Use the Content panel or wizards accessed from the Task List panel to configure settings for the feature category.
To find information about a feature category, see Table 28 on page 376.
- 4 Click **Save** to save the changes to the policy.
- 5 In the Task List panel, select **View** to display the switches to which the policy change will apply.
- 6 Only the settings you change from their default values are listed.
- 7 After you review the changes, click **Close**.
- 8 Correct any changes if needed, then go to “Applying Policy Changes to Switches”.

Applying Policy Changes to Switches

To apply policy changes to WX switches:

- 1 Select **Apply** in the Task List panel to apply the changes to WX switches that are already associated with the policy.
- 2 Review the list of switches, then click **Apply** to apply the changes to the switches.
The changes are automatically applied to switches you associate with the policy *after* making the changes.
- 3 After the *done* message appears in the Apply Policy wizard, click **Close**.
- 4 Repeat step 2 through step 3 for each feature category.
Table 28 on page 376 lists the section where you can find configuration information for a feature category.

Table 28 Feature Categories

For This Feature Area	See...
System Features	
IP Services	"Viewing and Configuring IP Services Settings" on page 201
VLANs, Spanning Trees and Port Groups	"Viewing and Configuring VLANs" on page 206 "Changing STP Port Settings in a VLAN" on page 211 "Viewing and Changing Port Groups" on page 184
ACLs	"Viewing and Configuring ACLs" on page 220
QoS	"Viewing and Changing CoS Mappings" on page 231
Wireless Features	
Auto-DAP	"Viewing and Changing the Auto-DAP Profile" on page 269
Service Profiles and Radio Profiles	"Viewing and Changing RF Detection Settings" on page 282 "Viewing and Configuring Radio Profiles" on page 263
RF Detection	"Detecting and Combatting Rogue Devices" on page 457
AAA Features	
RADIUS	"Viewing and Configuring RADIUS Settings" on page 298
Local User Database	"Creating and Managing Users in the Local User Database" on page 287
Admin and Network Access Rules	"Viewing and Configuring WX Administrator Access Rules" on page 318 "Viewing and Configuring 802.1X Network Access Rules" on page 306 "Viewing and Configuring MAC Network Access Rules" on page 310 "Viewing and Configuring WebAAA Network Access Rules" on page 313 "Viewing and Configuring Last-Resort Network Access Rules" on page 316
Location Policy	"Viewing and Changing Location Policy Rules" on page 325
Mobility Profiles	"Viewing and Changing Mobility Profiles" on page 328

14

USING THE EVENT LOG

3WXM maintains a log of system events. The log contains messages generated by the following:

- WX switches in the network plan—messages generated by the WX switches in the network plan that are being monitored by the 3WXM service
- 3WXM Services—messages generated by the 3WXM server the client is in communication with
- 3WXM client—messages generated by the instance of the 3WXM client you are using

Displaying the Event Log

To display the event log, select the **Events** toolbar option in the main 3WXM window.

Event messages are displayed on top. The bottom section allows you to filter the display.

By default, only the messages generated by the 3WXM client are displayed. Messages are displayed for all severities and for all log facilities.

Toolbar Options

Table 29 lists the options on the Event tab's toolbar. These options are in addition to the standard toolbar options. (See "Tool Bar Options" on page 39.)


Table 29 Toolbar Options for Events Tab

Option	Description
Export	Displays the Export Data dialog box, which enables you to save log data into a file.
Refresh	Refreshes event data.
Display Event Details	Displays details for the currently selected message.
Display Filters	Toggles display of the filter tabs.

Refreshing Event Data

By default, the event data is refreshed whenever the 3WXM client generates a new message for itself, or receives a new message from the 3WXM Services.

To disable automatic refreshing of events, clear the **Auto-update** checkbox and click **Apply**. (The checkbox is located on the Filters tab.)

To manually refresh events at any time, click  on the Event tab's toolbar.

Reviewing Event Details

To see the details for a specific event, select the event. Event details appear in the Details tab.

Filtering Event Messages

You can limit the events you see in the Event tab by using predefined filters in 3WXM or by specifying filter criteria based on content, facility, or severity. You can save specified filter criteria as a stored filter.

Using Predefined Event Filters

To use predefined filters, select one of the following from the Name list in the Stored Filters group box:

- **All Entries**—Shows all entries in the log.
- **3WXM**—Shows only 3WXM client events.
- **Server**—Shows only 3WXM Services events.
- **Today**—Shows only events that occurred today.
- **Last 24 Hours**—Shows only events that occurred in the last 24 hours.
- **Last 500 Entries**—Shows only the last 500 entries in the log.
- Filters specific to the WX switches. For example, if you have a WX switch named *wx1*, you see a filter named *WX 'wx1'* in the list.

You now see the log entries in Event tab that match the criteria of the filter that you chose.

Filtering Events by Content

When using the predefined filters, you can limit the events you see in Event tab by specifying criteria such as IP address, date, or text in the log message. You can use advanced filters to further limit the events you see.

To filter messages by content

- 1 In the Event Source box, type an event source name or part of an event source name. You can type more than one name or partial name.

For example, type **3wxm** If you want to see only 3wxm events. If you have a WX named *wx1*, type **wx1** to see only events related to *wx1*. To see events related to all WX switches whose names start with *wx*, type **wx**.

To set the search criteria, select one of the following:

- **contains the string**—The filter looks for messages that contain the entire string you entered.
- **contains all of the strings**—The filter looks for messages that contain all the strings you entered. Select this option if you enter more than one string and want to see messages that contain all the strings.
- **contains at least one of the strings**—The filter looks for messages that contain one or more of the strings you entered. Select this option if you enter more than one string and want to see messages that contain any of the strings.

- 2 In the Message box, type a word or exact phrase used in a message.

For example, if you type **vlan**, you see all events that contain *vlan* in the message.

Set the search criteria by selecting contains the string, contains all of the strings, or contains at least one of the strings.

- 3 In the IP Address box, type an IP address or a partial IP address.

For example, if you type **10.20**, you see all events that pertain to IP addresses containing the string 10.20.

Set the search criteria by selecting contains the string, contains all of the strings, or contains at least one of the strings.

- 4 In the Date list, select one of the following to filter events by time:

- **Any**—No events are filtered based on time criteria.
- **Before**—Only events that occurred before a specified time.

- In the Start box, click the arrow to use the calendar to specify the day, month, and year.
 - Specify the end time.
 - **After**—Only events that occurred after a specified time
 - In the Start box, click the arrow to use the calendar to specify the day, month, and year.
 - Specify the starting time.
 - **Between**—Only events that occurred between specified times
 - In the Start box, click the arrow to use the calendar to specify the day, month, and year.
 - Specify the starting time.
 - In the End box, click the arrow to use the calendar to specify the day, month, and year.
 - Specify the end time.
- 5 In the Show list, select one of the following:
- **All**—To see all log entries
 - **Last**—To see a specified number of entries at the bottom of the log
 - **First**—To see a specified number of entries at the top of the log
- If you selected **All**, go to step 7. Otherwise, go to the next step.
- 6 In the Matching Entries box, type the number of log entries you want to see.
- The maximum number of entries you can specify depends on the number of entries in the log.
- 7 Click **Apply** to filter out the unwanted entries from the display.

Filtering Events by Severity

You can limit the events you see in Event tab based on event severity.

- 1 Click on the Severity tab.
- 2 Select or clear the severity levels to display (the following descriptions are WX-based):
 - **Emergency**—The WX is unusable.
 - **Alert**—Action must be taken immediately.
 - **Critical**—You must resolve the critical condition. If you do not resolve the condition, the WX might reboot or shut down.
 - **Error**—The WX is missing data or unable to form a connection.
 - **Warning**—A possible problem exists.
 - **Notice**—Events that potentially can cause system problems have occurred. These are logged for diagnostic purposes.
 - **Info**—Informational messages only. No problems exist.
 - **Debug**—Output from debugging.

By default, all severity levels are selected. Toggle the **All** checkbox to select or clear all severity levels.
- 3 After selecting the severity levels to log, click **Apply** to filter out the unwanted severity levels from the list.

Filtering Events by Facility

You can limit the events you see in Event Viewer by network facility or 3WXM facility.

- 1 Click on the Facility tab.
- 2 Select or deselect individual facilities.
- 3 After selecting the facilities to log, click **Apply** to filter out the unwanted facilities from the list.

Creating and Saving Filters

If you have specified additional criteria to filter the events, you can save the criteria as a stored custom filter.

- 1 In the Stored Filters group box, type a new filter name in the Name box.
- 2 Type a name for the filter (1 to 80 alphanumeric characters, with no tabs).
- 3 Click **Save**.

The filter is saved and appears in the Stored Filters list.

Deleting Filters

You can delete any filter that you create, but you cannot delete predefined filters.


To delete a filter:

- 1 In the Stored Filters group box, select the filter to be deleted.
- 2 Click **Delete**. The filter is deleted.

Exporting Filtered Data

You can export the filtered data shown in Event Viewer to a comma-delimited text (.csv) file.

To export filtered data

- 1 In the Event tab's toolbar, click . The Export Data dialog appears.
- 2 To specify a directory and name for the file, click **Choose**.
- 3 To overwrite existing files, select **Overwrite Existing Files**.

By default, this option is selected.

- 4 To copy files before overwriting them, select **Copy Files Before Overwriting**.

By default, this option is selected. The existing file is copied to a file with a .bak extension.

- 5 Click **Export**.

You can see the status of the export process in the Results box.

- 6 Click **Close**.

15

GENERATING REPORTS

This chapter describes the reports you can generate with 3WXM:

- Inventory
- Mobility Domain Configuration
- WX Configuration
- Client Summary
- Client Details
- Client Errors
- Watch List Client
- Network Usage
- RF Summary
- Radio Details
- Rogue Summary
- Site Survey
- Work Order

Overview

The **Reports** option of the 3WXM toolbar enables you to generate reports for network clients, RF usage, rogue devices, and 3Com equipment.

- Configuration reports:
 - Inventory
 - Mobility Domain Configuration
 - WX Configuration
- Client monitoring reports:
 - Client Summary
 - Client Details
 - Client Errors
 - Watch List Client
- RF reports:
 - Network Usage
 - RF Summary
 - Radio Details
- Rogue reports:
 - Rogue Details
 - Rogue Summary
- RF Planning reports:
 - Site Survey
 - Work Order

When you generate a report, you can specify the scope of the report and the location where 3WXM saves the report. Some reports also have additional options. 3WXM saves the reports in HTML format.

Generating an Inventory Report

The inventory report lists the WX switches and MAP access points in a specific Mobility Domain or that do not belong to a Mobility Domain.

To generate an inventory report

- 1 Select the **Reports** tool bar option.
- 2 In the Report Category list, select **Configuration Reports**.
- 3 In the Reports list, select **Inventory**.
- 4 Select the scope type of the report from the Report Scope Type drop-down list:
 - Network Plan
 - Mobility Domain
- 5 Select the instance for which you want the report. For example, if the scope is Mobility Domain, select the Mobility Domain.
- 6 To select or change the output directory for the report, click **Choose**, navigate to the new directory, and click **Select**.
- 7 To prevent 3WXM from replacing an existing report of the same type with this new report, click next to **Overwrite Existing Files** to deselect this option.
- 8 Click **Generate**.
- 9 When the report is generated, click the **report** link to view it.

Table 30 lists the sections in the report.

Table 30 Inventory Report Sections

Section	Description
Summary	Lists the equipment models and how many of each model are in the network plan in this Mobility Domain.
Wireless Switch Inventory	Lists information for each WX switch in the selected Mobility Domain.
Managed Access Point Inventory	Lists information for each MAP in the selected Mobility Domain.

Generating a Mobility Domain Configuration Report

The Mobility Domain configuration report lists information for all the WX switches in a Mobility Domain, including the VLANs, radio and service profiles, and RADIUS server groups and servers configured on the WX switch(es).

- 1 Select the **Reports** tool bar option.
- 2 In the Report Category list, select Configuration Reports.
- 3 In the Reports list, select Mobility Domain Configuration.
- 4 In the Report Scope Instance drop-down list, select the Mobility Domain for which you want the report.



The scope is always Mobility Domain and cannot be changed.

- 5 To select or change the output directory for the report, click **Choose**, navigate to the new directory, and click **Select**.
- 6 To prevent 3WXM from replacing an existing report of the same type with this new report, click next to **Overwrite Existing Files** to deselect this option.
- 7 Click **Generate**.
- 8 When the report is generated, click the **report** link to view it.

Table 31 lists the sections in the report.

Table 31 Mobility Domain Configuration Report Sections

Section	Description
Wireless Switches	Name, model, and system IP address of each WX switch in the Mobility Domain. The number of directly attached and Distributed MAPs configured on each WX switch are also listed.
VLANs	VLANs configured on the WX switches.
Radio Profiles	Radio profiles configured on the WX switches.
Service Profiles	Service profiles configured on the WX switches.
RADIUS Server Groups	RADIUS server groups configured on the WX switches.
RADIUS Servers	RADIUS servers configured on the WX switches.
MAPs	Lists information for each MAP in the selected Mobility Domain.

Generating a WX Configuration Report

The WX configuration report lists configuration details for a WX switch.

- 1 Select the **Reports** toolbar option.
- 2 In the Report Category list, select Configuration Reports.
- 3 In the Reports list, select WX Configuration.
- 4 In the Report Scope Instance drop-down list, select the switch for which you want the report.



The scope is always Wireless Switch and cannot be changed.

- 5 To select or change the output directory for the report, click **Choose**, navigate to the new directory, and click **Select**.
- 6 To prevent 3WXM from replacing an existing report of the same type with this new report, click next to **Overwrite Existing Files** to deselect this option.
- 7 Click **Generate**.
- 8 When the report is generated, click the **report** link to view it.

Table 32 lists the sections in the report.

Table 32 WX Configuration Report Sections

Section	Description
System Info	Name, system IP address, software, states of the management services, and states of active RF scanning and countermeasures.
Mobility Domain	System IP address of the seed for the Mobility Domain the WX switch is in.
10/100 Ports	10/100 Ethernet port settings configured on the WX switch.
Gig Ports	Gigabit port settings (if applicable) configured on the WX switch.
VLANs	VLANs configured on the WX switch.
Spanning Tree	STP settings configured on the WX switch.
IP Properties	IP settings, including routes and DNS parameters, configured on the WX switch.

Table 32 WX Configuration Report Sections (continued)

Section	Description
ACLs	Access Control Lists (ACLs) configured on the WX switch.
APs	Directly connected MAPs configured on the WX switch.
Distributed APs	Distributed MAPs configured on the WX switch.
Radio Profiles	Radio profiles configured on the WX switch.
Service Profiles	Service profiles configured on the WX switch.
802.1X	802.1X parameters configured on the WX switch.
RADIUS	RADIUS server groups and servers configured on the WX switch.
Access Rules	AAA rules configured on the WX switch.
Mobility Profile	Mobility profiles configured on the WX switch.
Location Policy	Location policies configured on the WX switch.
Local User DB	Users configured in the local database.

Generating a Client Summary Report

The client summary report lists current client sessions.



*The data for this report comes from the 3WXM Services. The **Enable client session collection** option, located in the Client Monitor group box of the Monitoring Settings tab, must be enabled. (See “Changing Monitoring Settings” on page 500.)*

- 1 Select the **Reports** tool bar option.
- 2 In the Report Category list, select Client Monitoring Reports.
- 3 In the Reports list, select Client Summary.
- 4 Select the scope type of the report from the Report Scope Type drop-down list:
 - Mobility Domain
 - Wireless Switch
 - Site
 - Building
 - Floor
 - Coverage Area

- 5 Select the instance for which you want the report. For example, if the scope is Building, select the building.
- 6 To select or change the output directory for the report, click **Choose**, navigate to the new directory, and click **Select**.
- 7 To prevent 3WXM from replacing an existing report of the same type with this new report, click next to **Overwrite Existing Files** to deselect this option.
- 8 Click **Generate**.
- 9 When the report is generated, click the **report** link to view it.

The client summary report contains the following sections:

- Session Summary
- Total Num Sessions
- Average SNR
- Average RSSI
- SSID Summary
- Access Type Summary
- Top Bandwidth Sessions
- Low RSSI Sessions
- Low SNR Sessions

(See “Using the Client Monitor View” on page 415 for information about the data columns in each section of the report.)

Generating a Client Details Report



The client details report lists details about current client sessions.

*The data for this report comes from 3WXM Services. The **Enable client session collection** option, located in the Client Monitor group box of the Monitoring Settings tab, must be enabled. (See “Changing Monitoring Settings” on page 500.)*

- 1 Select the **Reports** tool bar option.
- 2 In the Report Category list, select **Client Monitoring Reports**.
- 3 In the Reports list, select **Client Details**.

- 4 Click **Add** to add a report filter. The filter configuration fields are activated.
- 5 Click on the Select field, and select one of the following from the drop-down list:
 - User Name
 - IP Address
 - MAC Address
- 6 Click on the Value field. Erase the text in the field and type the username, IP address, or MAC address of the user, depending on the selection criterion you specified in step 5.
- 7 Press Enter to complete the filter.
- 8 Repeat step 4 through step 7 for each user you want to display details for.
- 9 To select or change the output directory for the report, click **Choose**, navigate to the new directory, and click **Select**.
- 10 To prevent 3WXM from replacing an existing report of the same type with this new report, click next to **Overwrite Existing Files** to deselect this option.
- 11 Click **Generate**.
- 12 When the report is generated, click the **report** link to view it.

The client details report contains the following sections:

- Session Properties
- Location History
- Session Statistics
- Current AP Statistics
- Lifetime AP Statistics

(See “Using the Client Monitor View” on page 415 for information about the data columns in each section of the report.)

Generating a Client Errors Report



The client errors report lists error statistics for current client sessions.

*The data for this report comes from 3WXM Services. The **Enable RF trending** option, located in the RF Monitor group box, must be enabled. (See “Changing Monitoring Settings” on page 500.)*

- 1 Select the **Reports** tool bar option.
- 2 In the Report Category list, select **Client Monitoring Reports**.
- 3 In the Reports list, select **Client Errors**.
- 4 Select the scope type of the report from the Report Scope Type list:
 - Mobility Domain
 - Wireless Switch
 - Site
 - Building
 - Floor
 - Coverage Area
- 5 Select the instance for which you want the report. For example, if the scope is Building, select the building.
- 6 Select the time period for the report:
 - 1 Hour
 - 24 Hours
 - 7 Days
 - 30 Days
- 7 To select or change the output directory for the report, click **Choose**, navigate to the new directory, and click **Select**.
- 8 To prevent 3WXM from replacing an existing report of the same type with this new report, click next to **Overwrite Existing Files** to deselect this option.
- 9 Click **Generate**.
- 10 When the report is generated, click the **report** link to view it.

The client errors report contains the following sections:

- Cumulative errors for the scope of the report
- Client errors on individual WX switches

(See “Using the Client Monitor View” on page 415 for information about the data columns in each section of the report.)

Generating a Watch List Client Report

The watch list client report lists session information and roaming history for clients on the watch list.



The client must be on the client watch list. (See “Managing the Client Watch List” on page 434.)

- 1 Select the **Reports** tool bar option.
- 2 In the Report Category list, select **Client Monitoring Reports**.
- 3 In the Reports list, select **Watch List Client**.
- 4 Select the time period for the report:
 - 1 Hour
 - 24 Hours
 - 7 Days
 - 30 Days
- 5 Click **Add** to add a report filter. The filter configuration fields are activated.
- 6 Click on the Select field, and select MAC Address. (3WXM monitors the clients on the watch list by MAC address.)
- 7 Click on the Value field. Erase the text in the field and type the MAC address of a client.
- 8 Press Enter to complete the filter.
- 9 Repeat step 5 through step 8 for each user you want to display details for.
- 10 To select or change the output directory for the report, click **Choose**, navigate to the new directory, and click **Select**.
- 11 To prevent 3WXM from replacing an existing report of the same type with this new report, click next to **Overwrite Existing Files** to deselect this option.
- 12 Click **Generate**.
- 13 When the report is generated, click the **report** link to view it.

The watch list client report contains the following sections:

- Session Properties
- Location History

- Session Statistics
- AP Statistics

(See “Using the Client Monitor View” on page 415 for information about the data columns in each section of the report.)

Generating a Network Usage Report



The network usage report lists network usage statistics.

*The data for this report comes from 3WXM Services. The **Enable RF trending** option, located in the RF Monitor group box of the Monitoring Settings tab, must be enabled. (See “Changing Monitoring Settings” on page 500.)*

- 1 Select the Reports tool bar option.
- 2 In the Report Category list, select **RF Reports**.
- 3 In the Reports list, select **Network Usage**.
- 4 Select the scope type of the report from the Report Scope Type drop-down list:
 - Mobility Domain
 - Wireless Switch
 - Site
 - Building
 - Floor
 - Coverage Area
- 5 Select the instance for which you want the report. For example, if the scope is Building, select the building.
- 6 Select the time period for the report:
 - 1 Hour
 - 24 Hours
 - 7 Days
 - 30 Days
- 7 To select or change the output directory for the report, click **Choose**, navigate to the new directory, and click **Select**.

- 8 To prevent 3WXM from replacing an existing report of the same type with this new report, click next to **Overwrite Existing Files** to deselect this option.
- 9 Click **Generate**.
- 10 When the report is generated, click the **report** link to view it.

The network usage report contains the following sections:

- Cumulative statistics for the scope of the report
- Usage statistics on individual WX switches

Generating an RF Summary Report



The RF summary report lists summary RF statistics.

*The data for this report comes from 3WXM Services. The **Enable RF trending** option, located in the RF Monitor group box of the Monitoring Settings tab, must be enabled. (See “Changing Monitoring Settings” on page 500.)*

- 1 Select the Reports tool bar option.
- 2 In the Report Category list, select **RF Reports**.
- 3 In the Reports list, select **RF Summary**.
- 4 Select the scope type of the report from the Report Scope Type drop-down list:
 - Mobility Domain
 - Wireless Switch
 - Site
 - Building
 - Floor
 - Coverage Area
- 5 Select the instance for which you want the report. For example, if the scope is Building, select the building.
- 6 Select the time period for the report:
 - 1 Hour
 - 24 Hours
 - 7 Days
 - 30 Days

- 7 To select or change the output directory for the report, click **Choose**, navigate to the new directory, and click **Select**.
- 8 To prevent 3WXM from replacing an existing report of the same type with this new report, click next to **Overwrite Existing Files** to deselect this option.
- 9 Click **Generate**.
- 10 When the report is generated, click the **report** link to view it.

The RF summary report contains the following sections:

- Cumulative data for the scope of the report
- Detailed data for each WX switch within the scope of the report

Generating a Radio Details Report

The radio details report lists details about an individual radio.



*The data for this report comes from 3WXM Services. The **Enable RF trending** option, located in the RF Monitor group box of the Monitoring Settings tab, must be enabled. (See "Changing Monitoring Settings" on page 500.)*

- 1 Select the Reports tool bar option.
- 2 In the Report Category list, select **RF Reports**.
- 3 In the Reports list, select **Radio Details**.
- 4 Select the radio for which you want the report.



The scope is always MAP Radio and cannot be changed.

- 5 Select the time period for the report:
 - 1 Hour
 - 24 Hours
 - 7 Days
 - 30 Days
- 6 To select or change the output directory for the report, click **Choose**, navigate to the new directory, and click **Select**.
- 7 To prevent 3WXM from replacing an existing report of the same type with this new report, click next to **Overwrite Existing Files** to deselect this option.

- 8 Click **Generate**.
- 9 When the report is generated, click the **report** link to view it.

(See “Using the RF Monitor View” on page 442 and “Using the RF Trends View” on page 447 for information about the data in each section of the report.)

Generating a Rogue Details Report



The rogue details report lists detailed information about rogue devices.

*The data for this report comes from the 3WXM client. The **Enable Rogue Detection** option, located in the Rogue Detection group box of the Monitoring Settings tab, must be enabled. (See “Changing Monitoring Settings” on page 500.)*

- 1 Select the Reports tool bar option.
- 2 In the Report Category list, select **Rogue Reports**.
- 3 In the Reports list, select **Rogue Details**.
- 4 Click **Add** to add a report filter. The filter configuration fields are activated.
- 5 Click on the Select field, and select MAC Address.
- 6 Click on the Value field. Erase the text in the field and type the BSSID of the rogue.
- 7 Press Enter to complete the filter.
- 8 Repeat step 4 through step 7 for each user you want to display details for.
- 9 To select or change the output directory for the report, click **Choose**, navigate to the new directory, and click **Select**.
- 10 To prevent 3WXM from replacing an existing report of the same type with this new report, click next to **Overwrite Existing Files** to deselect this option.
- 11 Click **Generate**.
- 12 When the report is generated, click the **report** link to view it.

Generating a Rogue Summary Report



The rogue summary report lists information about rogues.

*The data for this report comes from 3WXM Services. The **Enable Rogue Detection** option, located in the Rogue Detection group box of the Monitoring Settings tab, must be enabled. (See “Changing Monitoring Settings” on page 500.)*

- 1 Select the Reports tool bar option.
- 2 In the Report Category list, select **Rogue Reports**.
- 3 In the Reports list, select **Rogue Summary**.
- 4 Select the scope type of the report from the Report Scope Type drop-down list:
 - Mobility Domain
 - Site
 - Building
 - Floor
- 5 Select the instance for which you want the report. For example, if the scope is Building, select the building.
- 6 Select the time period for the report:
 - 1 Hour
 - 24 Hours
 - 7 Days
 - 30 Days
- 7 To specify the rogue type, click on the Value field in the Report Filter area of the dialog, and select one of the following from the drop-down list:
 - Rogue
 - Interfering
 - Ad-hoc
 - All (This option displays all three types: rogue, interfering, and ad-hoc.)

The default is Rogue.

- 8 To select or change the output directory for the report, click on the button next to output directory, navigate to the new directory, and click **Select**.

- 9 To prevent 3WXM from replacing an existing report of the same type with this new report, click next to **Overwrite Existing Files** to deselect this option.
- 10 Click **Generate**.
- 11 When the report is generated, click the **report** link to view it.

The report lists the BSSIDs of the rogues detected by each WX switch. The report also shows graphs of the distribution of rogues on the WX switches, and of trend data.

Generating a Site Survey Order

The site survey order contains the locations and MAC addresses of the line-of-site (LOS) points for use when conducting a site survey, and also provides a GIF image of the floor.



For the site survey order to be meaningful, you must specify the line-of-site (LOS) points first. (See “Importing RF Obstacle Data from a Site Survey” on page 98.)

To generate a site survey order

- 1 Select the Reports tool bar option.
- 2 In the Report Category list, select **RF Plan Reports**.
- 3 In the Reports list, select **Site Survey Order**.
- 4 Select the scope for the work order. You can select the network plan, a site, a building, or an individual floor.
- 5 Select the language:
 - English
 - German
- 6 To change the output directory for the report, click on the button next to output directory, navigate to the new directory, and click **Select**.
- 7 Click **Generate**.
- 8 When the report is generated, click **View**. A browser window containing the report opens.
- 9 Optionally, select the floor.
- 10 Click **View Site Survey Order**. The site survey order appears. LOS point information for the selected floor is displayed.

Scroll down to view the MAC address assignments for the LOS points.

Use the instructions in the Ekahau Site Survey Initial Setup section of the work order to set up the survey.



When you import the floor map into the site survey tool, make sure you use the map name specified in the work order. The site survey data will not appear when you import RF measurements into 3WXM unless the map name is correct.

Generating a Work Order

A work order provides all of the necessary information for the physical installation of the 3Com Mobility System. A work order shows where the MAP access points should be installed, WX initial setup configuration information, and projected RSSI information that is useful when verifying the installation.



The work order has meaning only after you add planning information. (See "Planning the 3Com Mobility System" on page 69.)

- 1 Select the Reports tool bar option.
- 2 In the Report Category list, select **RF Plan Reports**.
- 3 In the Reports list, select **Work Order**.
- 4 Select the scope for the work order. You can select the network plan, a site, a building, or an individual floor.
- 5 Select the options you want to use for the report:
 - **RF Coverage**
 - **RSSI Projections**
 - **Show Disabled MAPs** (only available if **RSSI Projections** is selected)
 - **Show RF Coverage On Entire Floor** (only available if **RSSI Projections** is selected)
 - **Show Unreachable MAPs** (only available if **RSSI Projections** is selected)
 - **Show MAPs on Other Floors** (only available if **RSSI Projections** is selected)
- 6 Select the language:
 - English
 - German

- 7 To change the output directory for the report, click on the button next to output directory, navigate to the new directory, and click **Select**.
- 8 Click **Generate**.
- 9 When the report is generated, click **View**. A browser window containing the report opens.
- 10 Optionally, select the floor.
- 11 Click **View Work Order**.



The origin reference point used in work orders to indicate MAP placement is the upper left corner of the coverage area. (Typically, this origin point will not match the origin point used on the floor plan itself.)

16

MONITORING THE NETWORK

This chapter describes how to use the 3WXM monitoring service. It includes information about monitoring service requirements, accessing monitored data, using the Explore, Status Summary, Client Monitor, RF Monitor, and RF Trends windows, and accessing realtime performance statistics and the event log.

Overview

The 3WXM Services regularly checks the status of the network and reports that status to each 3WXM client that is connected to the service. Optionally, the service also receives SNMP traps generated by the WX switches and shows information based on those traps.

The Monitor tab displays information retrieved from the 3WXM Services. Information is presented in the following windows within the Monitor tab:

- **Explore** — Shows the operational status of 3Com equipment: WX switches, MAP access points, and radios.
- **Status Summary** — Shows tables of basic information for the 3Com equipment.
- **Client Monitor** — Shows activity, errors, and session information for network clients. Additionally, you can configure a watch list of clients and track their activity and session histories over time, up to 30 days.
- **RF Monitor** — Shows RF information for radios, including power and channel information.
- **RF Trends** — Shows current and past statistics for radios. You can view statistics up to 30 days old, and display graphs of data trends.

The 3WXM Services is configured to provide data for the Explore and Status Summary windows by default. To provide data to the client and RF windows, you must enable the service to poll WX switches for client and RF data. You also can enable the service to receive SNMP traps generated by the WX switches. (See “Changing Monitoring Settings” on page 500.)

Requirements for Monitoring

To enable the 3WXM service to monitor network data, you or the 3WXM Services administrator must specify the WX switches to monitor. The 3WXM Services collects data from the switches and updates the information in the windows of the Monitor tab on 3WXM clients.

To specify the WX switches to monitor, you upload their configuration into 3WXM or add them to the network plan. In addition, SNMP traps must be enabled on the WX switches.

By default, the 3WXM Services supplies data to all of the windows within the Monitoring tab. This data is refreshed at regular intervals, according to the polling interval configured for the 3WXM Services. The default polling interval is 5 minutes.

You can optionally disable the 3WXM Services from supplying data to specified windows. To configure the 3WXM Services for monitoring, see “Changing Monitoring Settings” on page 500. To enable SNMP traps on WX switches, see “Configuring SNMP” on page 187.

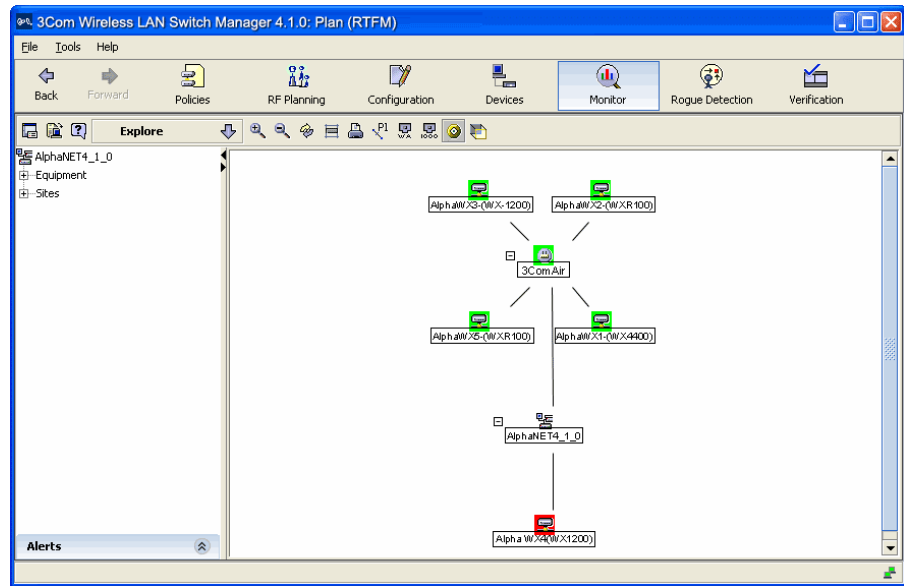
Accessing Monitored Data

Data provided by 3WXM Services is displayed in the Monitor tab in the Content panel. To access the data, 3WXM client must have a connection with the host running the 3WXM Services.

To access monitored data

- 1 Enable the 3WXM client to access the 3WXM Services, if you have not already done so.
- 2 Select the Monitor option in the main 3WXM tool bar.

By default, the Explore view of the Network Plan is displayed.

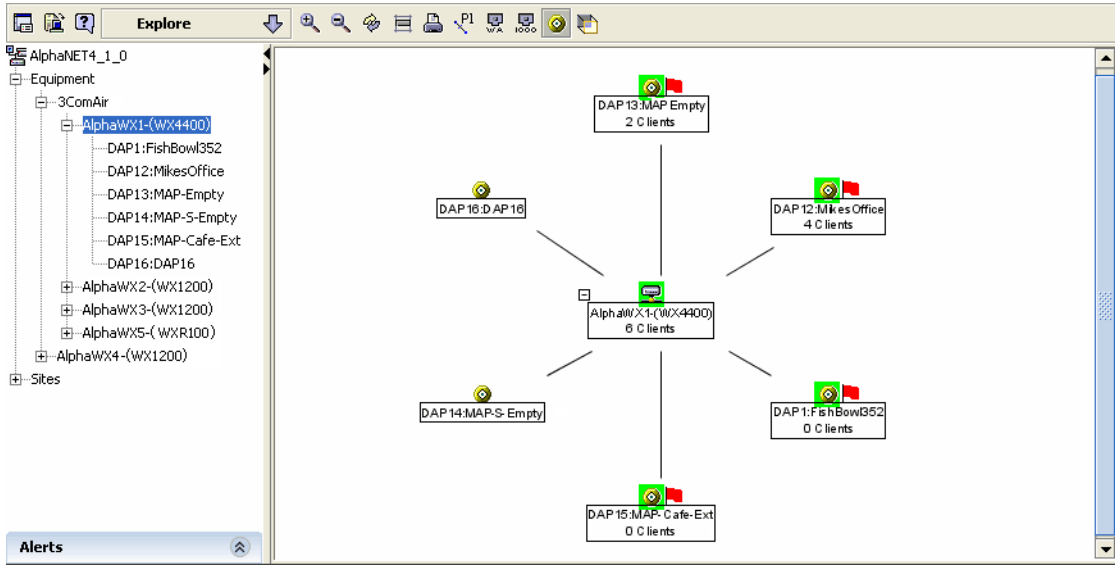


- 3 Select an object in the Organizer panel. Monitored data for the selected object is displayed.

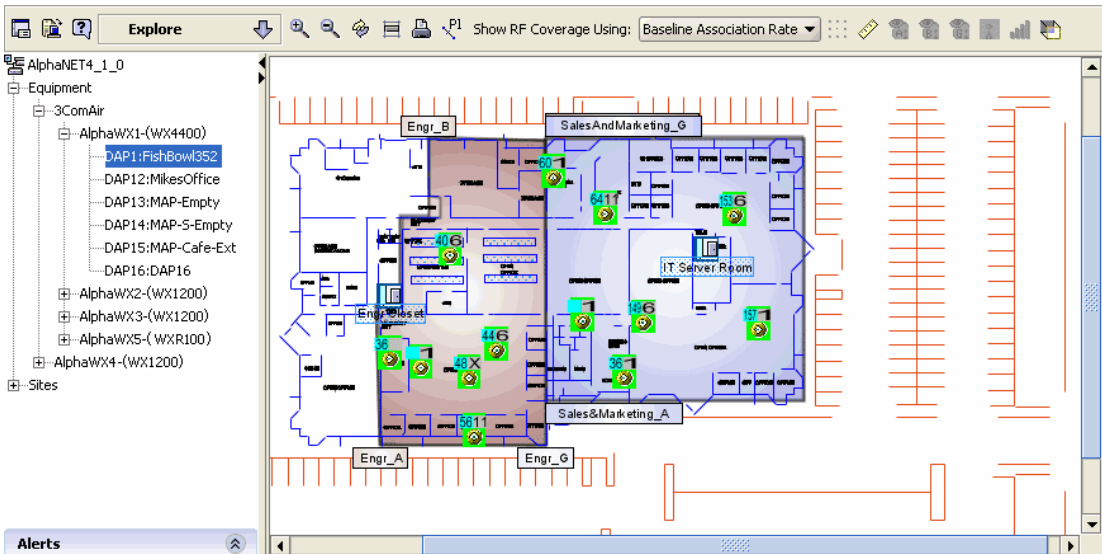
Using the Explore Window

The Explore view shows the status of 3Com equipment within the scope of the object selected in the Equipment or Sites section of the Organizer panel.

- If you select a Mobility Domain or WX switch, 3WXM presents a link-based view of the equipment. You can hide or redisplay the MAP access point connections on a WX switch by clicking on the minus sign or plus sign in the right corner of the object. Likewise, you can hide or redisplay the WX switches in a Mobility Domain.



- If you select a MAP access point, radio, wiring closet, or coverage area in the Sites section of the Organizer panel, the floor plan is displayed.



The floor plan is displayed only if you add the floor to the site information in the network plan.

In either the link display or the floor display, the operational status of 3Com equipment is indicated by the following colors:

- **Green** — Up
- **Yellow** — Up (but with minor service degradation)
- **Orange** — Up (but with major service degradation)
- **Red** — Down
- **Blue** — Unknown

Toolbar Options

The Explore view has a toolbar in the link display and the floor display. Table 33 lists the options on the toolbar in the link display.

Table 33 Toolbar Options in Link Display of Explore View














Icon	Description
	Edit 3WXM preferences.
	Configure 3WXM Services.
	Launch Help.
	Zoom in.
	Zoom out.
	Refresh the information.
	Fit the view in the window.
	Print the view displayed in the window.
	Display link labels for WX switches, ports, buildings, floors.
	Show wired authentication ports. A wired authentication port uses 802.1X authentication for wired Ethernet clients attached to the port.
	Show network ports. A network port provides a physical link to Ethernet devices.
	Show MAPs.
	Display the view in reverse video.

Table 34 lists the options on the toolbar in the floor display.

Table 34 Toolbar Options in Floor Display of Explore View


















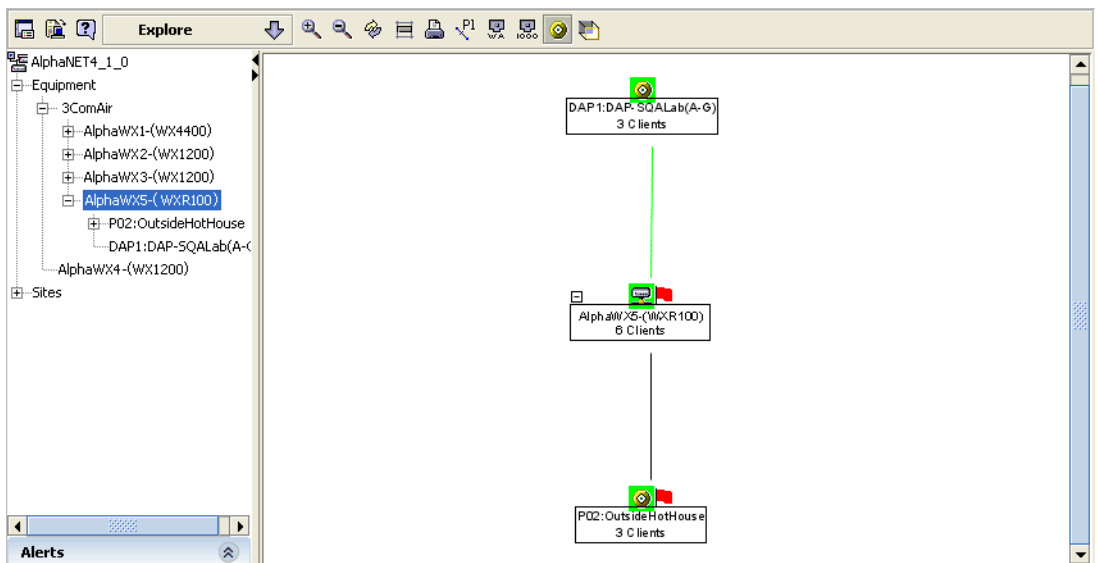
Icon	Description
	Edit 3WXM preferences.
	Configure 3WXM Services.
	Launch Help.
	Zoom in.
	Zoom out.
	Refresh the information.
	Fit the view in the window.
	Print the view displayed in the window.
	Display link labels for MAPs.
Show RF Coverage Using	<p>Modifies display of wireless coverage based on one of the following:</p> <ul style="list-style-type: none"> ■ Baseline association rate ■ Data rate ■ RSSI ■ SNR by data rate ■ Load by data rate ■ SNR by RSSI bands ■ Load by RSSI bands <p>To display coverage, click on the icon for the technology (802.11a, 802.11b, or 802.11g).</p>
	Change the grid size.
	Define the drawing scale.
	Show 802.11a coverage.

Table 34 Toolbar Options in Floor Display of Explore View (continued)

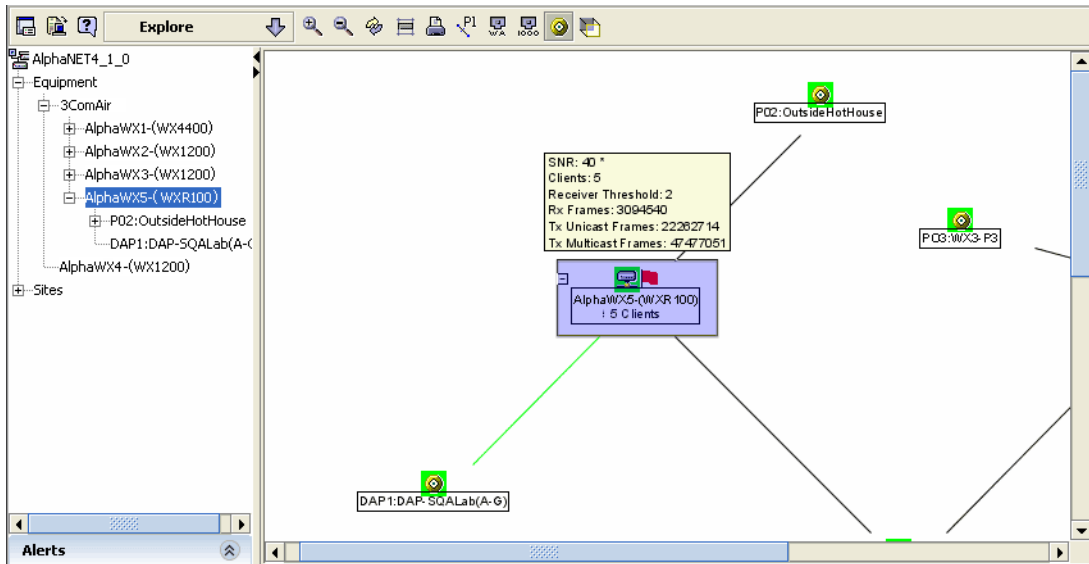
Icon	Description
	Show 802.11b coverage.
	Show 802.11g coverage.
	Hide the 802.11 coverage.
	Take an RF measurement.
	Display the view in reverse video.

Threshold Flags A red flag next to an object in the link view of the Explore view indicates that a threshold for the object has been exceeded. The thresholds are defined by the 3WXM Services. (See “Changing 3WXM Services Preferences” on page 491.)

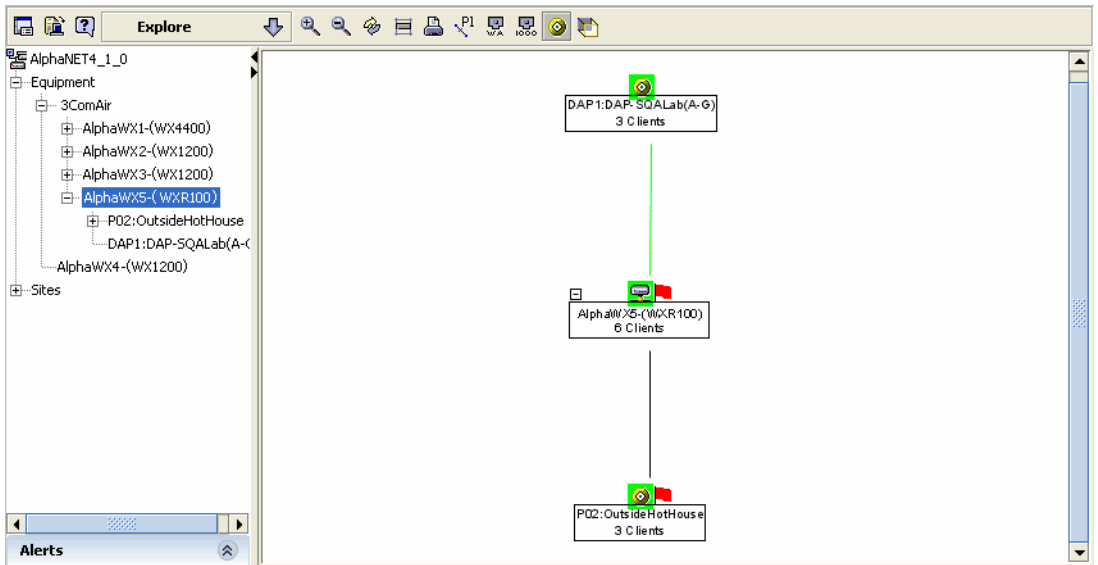
For example, a red flag next to a MAP might indicate that the threshold for the number of active clients on a MAP has been crossed.



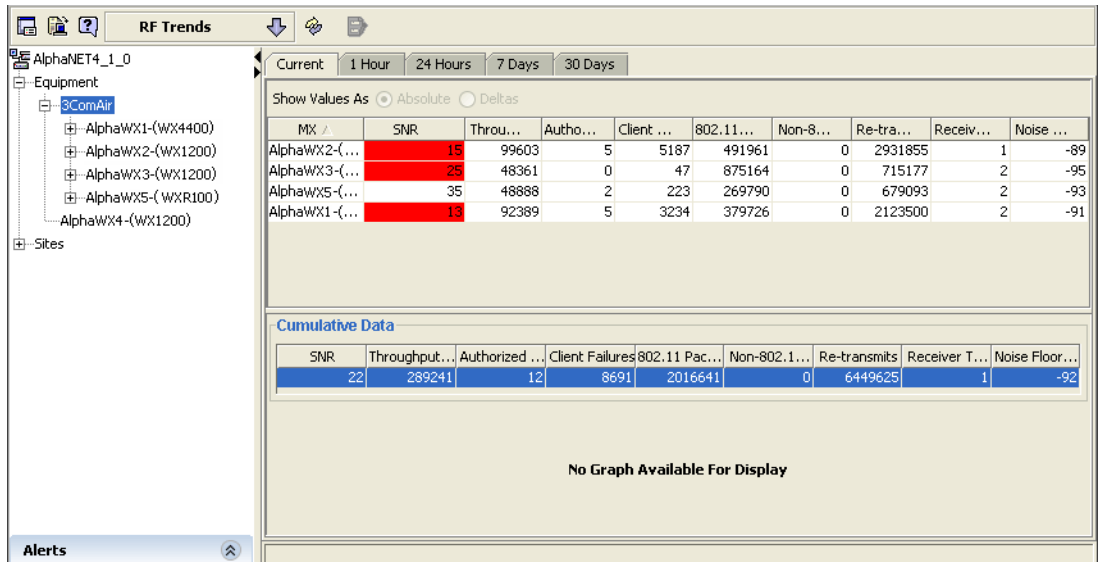
You can click on the object that has the red flag for more information. An asterisk indicates the statistic whose threshold was crossed. In the example below, the WX switch has a higher signal-to-noise ratio (SNR) than specified for the threshold.



Double-click on the object with the red flag to drill down to even more detailed information. In the example below, the client counts for each MAP being actively managed by the switch are displayed.



When a red flag appears in the Explore view, the column for the statistic whose threshold was exceeded also turns red in the RF Trends view.



Displaying Object Details

To drill down for more detailed information for an object in the Explore view, double-click on the object. All Monitor views, including the Explore view itself, are updated to display information specifically about the selected object.

For example, if the Explore window is showing link status for a Mobility Domain and you want to display information for a specific WX switch, double-click on the switch.

Displaying 802.11 Coverage

When a floor view is displayed in the Explore view, you can display 802.11 coverage for the floor. To display coverage, select MAPs, then click on one or more of the following icons on the Explore view's toolbar:



Displays 802.11a coverage.

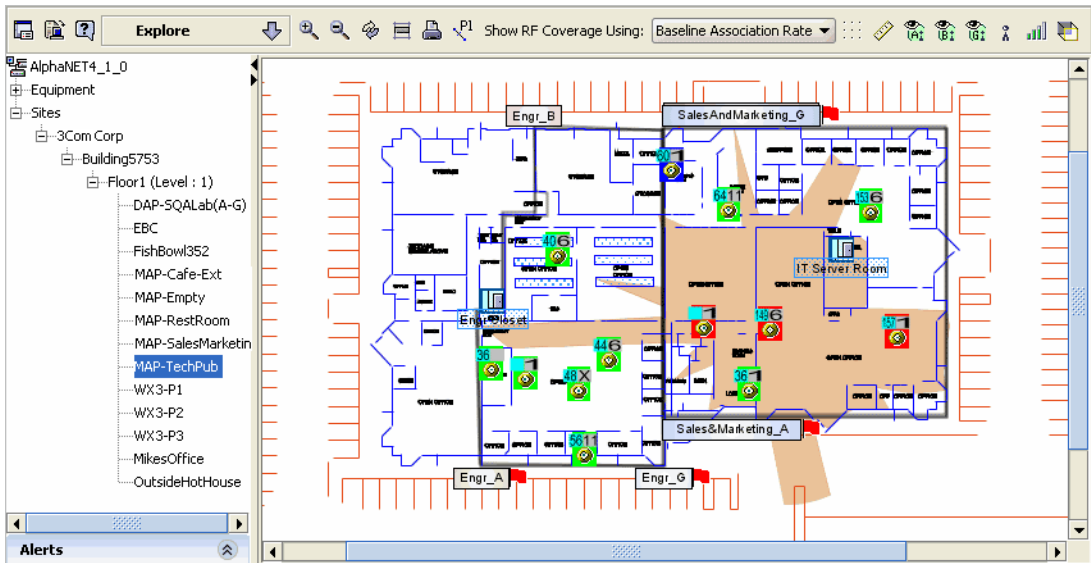


Displays 802.11b coverage.



Displays 802.11g coverage.

Here is an example of the 802.11g coverage of a MAP radio, displayed according to the baseline association rate of 36 Mbps.





The jagged appearance of the coverage area is normal and is caused by the RF obstacles around the radio. The RF obstacle information in the floor plan enables 3WXM to more accurately portray RF information for the network, including a radio's coverage. If the coverage area for a radio is displayed as a sphere, then the floor plan does not have any RF obstacles around the radio. (To add RF obstacles to a floor plan, see "Specifying the RF Characteristics of a Floor" on page 94.)

You can control how the coverage is shown by selecting an option from the Show RF Coverage Using box in the window's toolbar. Table 35 lists the options.

Table 35 Coverage Display Options in Explore Window


Display Option	Description
Baseline association rate	Coverage is shown based on the MAP radio's baseline association rate. The baseline association rate is the typical data rate the radio is expected to support for client associations. The baseline association rate is specified during planning, on a coverage area basis.
Data rate	Coverage is shown in colored bands that represent each of the data transmit rates supported by the radio. These rates are standard for each radio type.
RSSI	Coverage is shown based on the received signal strength indication (RSSI) of the radio's signal heard by other radios.
SNR by data rate	Average signal-to-noise ratio (SNR) for clients in each data rate.
Load by data rate	Average number of clients at each data rate.
SNR by RSSI bands	Average SNR for clients in each RSSI band.
Load by RSSI bands	Average number of clients in each RSSI band.

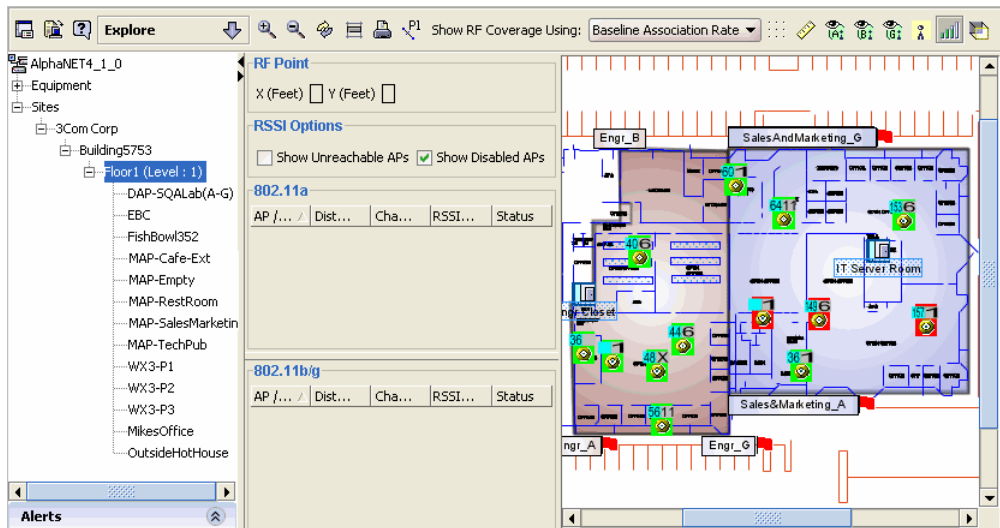
For all display options except the baseline association rate, a legend is displayed at the bottom of the window to indicate the values represented by each color.

Taking RF Measurements

In the floor plan display, you can take an RF measurement at any point on the floor plan. An RF measurement point indicates the RSSI value for each 3Com radio on the floor.

To take an RF measurement

- 1 In the floor plan display of the Explore view, click  on the window's toolbar. RF measurement options appear on the left.



- 2 In the RSSI Options box, select display options for the dialog box:
 - To list access points that cannot be detected from this RF measurement point, select **Show Unreachable MAPs**.
 - To list disabled access points, select **Show Disabled MAPs**.
- 3 Click on a spot on the floor plan. RF measurements for that spot appear. A triangle is also displayed where you clicked.

The screenshot displays the 'Explore' window with the following details:

- RF Point:** X (Feet) 335.4, Y (Feet) 232.6
- RSSI Options:**
 - Show Unreachable APs:
 - Show Disabled APs:
- 802.11a Table:**

AP ...	Dist...	Cha...	RSS...	Sta...
DAP-S...	149.9	40	-78.5	OK
EBC	33.0	36	-64.4	OK
FishBo...	135.9	60	-73.7	OK
Mikes...	124.0	56	-62.4	OK
MAP-C...	103.2	64	-74.3	OK
MAP-E...	98.7	153	-66.9	OK
- 802.11b/g Table:**

AP ...	Dist...	Cha...	RSS...	Sta...
DAP-S...	149.9	6	-66.9	OK
EBC	33.0	1	-52.8	OK
FishBo...	135.9	1	-71.1	OK
Mikes...	124.0	11	-58.3	OK
MAP-C...	103.2	11	-63.7	OK
MAP-E...	98.7	6	-59.8	OK

Table 36 lists the RF measurement information that is displayed for the measurement point.

Table 36 RF Measurement Information

Item	Value
X (Feet)	Distance in the X direction from the 0,0 coordinate (the upper left corner of the panel).
Y (Feet)	Distance in the Y direction from the 0,0 coordinate (the upper left corner of the panel).
Show Unreachable MAPs	Show MAP access points that are too far away to accurately measure signal strength.
Show Disabled MAPs	Show all disabled MAP access points.
MAP/AP	MAP or third-party access points detected.
Distance (Feet)	Distance between MAP and RF measurement point.
Channel	Channel of the MAP or third-party access point.
RSSI (dBm)	Signal strength from the MAP at the RF measurement point.
Status	Whether the MAP or third-party is active (OK) or disabled.

You can change the RSSI options even after measurement data is displayed. The data is immediately updated. To take a new measurement, click on the new measurement point. The measurement data is immediately updated for the new measurement point.

Using the Status Summary View

The Status Summary view shows the operational status of 3Com equipment (WX switches, their MAPs, and MAP radios). The Status column shows the equipment status, using the same colors as the Explore view. Additional information is displayed for each equipment type.

Radio	Status	Type	Tuned C...	Tuned P...	MAC	b/g prot...
AlphaWX5-(WXR100): P02 : R...	Up	802.11g	1	13	00:12:a9:5...	Yes
AlphaWX5-(WXR100): DAP1 : R...	Up	802.11a	40	11	00:0b:0e:0...	No
AlphaWX5-(WXR100): DAP1 : R...	Up	802.11g	6	15	00:0b:0e:0...	Yes
AlphaWX3-(WX1200): P03 : R...	Up	802.11a	36	4	00:12:a9:5...	No
AlphaWX3-(WX1200):P02: R...	Up	802.11a	48	11	00:0b:0e:0...	No
AlphaWX3-(WX1200):P02: R...	Operationa...	802.11g	6	15	00:0b:0e:0...	No
AlphaWX3-(WX1200): P01 : R...	Up	802.11a	44	10	00:0b:0e:1...	No
AlphaWX3-(WX1200): P01 : R...	Up	802.11g	6	13	00:0b:0e:1...	Yes
AlphaWX2-(WX1200): P01 : R...	Up	802.11a	36	11	00:0b:0e:2...	No
AlphaWX2-(WX1200): P01 : R...	Up	802.11g	1	15	00:0b:0e:2...	Yes
AlphaWX2-(WX1200): DAP24 : R...	Down	802.11g	N/A	N/A	00:0b:0e:0...	Yes
AlphaWX2-(WX1200): DAP23 : R...	Down	802.11a	N/A	N/A	00:0b:0e:0...	No
AlphaWX2-(WX1200): DAP23 : R...	Down	802.11g	N/A	N/A	00:0b:0e:0...	Yes
AlphaWX2-(WX1200): DAP22 : R...	Down	802.11a	N/A	N/A	00:0b:0e:0...	No
AlphaWX2-(WX1200): DAP22 : R...	Down	802.11g	N/A	N/A	00:0b:0e:0...	Yes
AlphaWX1-(WX4400): DAP15 : ...	Up	802.11a	64	11	00:0b:0e:0...	No
AlphaWX1-(WX4400): DAP15 : ...	Up	802.11g	11	14	00:0b:0e:0...	Yes
AlphaWX1-(WX4400): DAP13 : ...	Up	802.11a	153	14	00:0b:0e:0...	No
AlphaWX1-(WX4400): DAP13 : ...	Up	802.11g	6	14	00:0b:0e:0...	Yes
AlphaWX1-(WX4400): DAP12 : ...	Up	802.11a	56	11	00:0b:0e:0...	No
AlphaWX1-(WX4400): DAP12 : ...	Up	802.11g	11	11	00:0b:0e:0...	Yes

Using the Client Monitor View

The Client Monitor view shows detailed information about client activity on the network.

Client information is displayed in the following tabs:

- **Client Activity** — displays association and 802.1X information for the clients
- **Client Sessions** — lists bandwidth, signal-to-noise-ratio (SNR), and received signal strength indicator (RSSI) information for client sessions
- **Client Watch List** — lists the clients 3WXM is tracking. You can set up a watch list of clients you want 3WXM to track. 3WXM collects session and roaming information for the clients.

The Client Monitor view begins accumulating data as soon as 3WXM begins monitoring client activity traps from WX switches. Data is accumulated from up to 1000 traps, at which point the oldest traps are discarded to make way for new traps.

Toolbar Options

Table 37 lists the options on the toolbar in the Client Monitor view.

Table 37 Toolbar Options in Client Monitor View













Option	Description
	Edit 3WXM preferences.
	Configure 3WXM Services.
	Launch Help.
	Refreshes the data by immediately polling 3WXM Services when you click the icon.
	Displays the Find Clients dialog box, which lets you find user session data and add users to the watch list. (See "Managing the Client Watch List" on page 434.)
	Displays the Statistics dialog box, which contains detailed performance data for a user. (See "Accessing Realtime Performance Statistics" on page 449.)
	Ends a user's session. The user is disassociated from the radio. (See "Terminating a Client's Session" on page 441.)
	Displays the user's location on the floor plan. (See "Displaying a Client's Geographical Location" on page 439.)

Table 37 Toolbar Options in Client Monitor View (continued)

Option	Description
	Adds the user to the tracking list. 3WXM starts collecting session and roaming data for the user.
	Removes the user from the tracking list, so that 3WXM stops collecting session and roaming data for the user.
	Opens the Watch List Client Report dialog box, which enables you to generate a report for specific clients on the watch list. (See “Generating a Watch List Client Report” on page 392.)

Refreshing Client Data

The data displayed in the Client Monitor view is refreshed at regular intervals (every 5 minutes by default). The data is refreshed based on the client monitor polling interval specified. (See “Changing Monitoring Settings” on page 500.) You can also refresh the data on demand.

To refresh the data on demand, click the  (refresh) icon on the Client Monitor view’s toolbar.

Displaying Client Activity Information

The Client Activity tab displays current statistics for client activity on the network. The data fields in the display depend on the scope:

- If a Mobility Domain is selected, a row of data is displayed for each WX switch in the Mobility Domain.
- If a site is selected, a row of data is displayed for each building in the Site.
- If a building within a Site is selected, a row of data is displayed for each floor in the building.
- If a floor is selected, a row of data is displayed for each coverage area within the floor.
- If a WX switch, MAP, or radio is selected, SNMP traps reported to the 3WXM Services for that device are displayed.

Data Displayed When a Mobility Domain or Site is Selected

When a Mobility Domain is selected in the Organizer panel, the Client Monitor view’s Client Activity tab displays a row of information for each WX switch in the Mobility Domain.

Scope	Authentic...	Authoriza...	Associati...	Dot1x Fai...	Associati...	De-Assoc...	Roams	Clears
AlphaWX .. 0	3	2	1033	135	88	22	73	
AlphaWX .. 0	0	0	213	15	7	8	12	
AlphaWX .. 0	1	0	15	44	27	22	33	
AlphaMX... 0	11	0	210	229	61	58	103	

Refreshed at Thu Dec 01 21:05:48 PST 2005

The same counters appear when you select a Site, building, or floor.

Table 38 lists the data displayed on the Client Activity tab when a Mobility Domain is selected. The counters are incremented each time the 3WXM Services receives a client activity trap generated by a WX switch. The counters represent activity for all clients within the selected scope.

Table 38 Client Activity Columns When a Mobility Domain is Selected

Option	Description
Scope	<p>Scope of the data displayed in the row.</p> <p>For a Mobility Domain, the scope for each row in the Client Activity tab is always a WX switch.</p> <p>The down arrow in front of the WX switch name indicates that you can double-click on the arrow to change the scope in the Status Summary and Explore windows, to display information specifically for this switch in those windows.</p> <p>For a Site, the scope for each row is a building.</p> <p>For a building, the scope for each row is a floor.</p> <p>For a floor, the scope for each row is a coverage area.</p>

Table 38 Client Activity Columns When a Mobility Domain is Selected

Option	Description
Authentication Failures	<p>Number of times authentication for a client failed. Common causes of authentication failures include the following:</p> <ul style="list-style-type: none"> ■ User glob or MAC address glob mismatch or Unknown user ■ Invalid password ■ RADIUS server timeout
Authorization Failures	<p>Number of times authorization for a client who has been authenticated failed. Common causes of authorization failures include the following:</p> <ul style="list-style-type: none"> ■ Time-of-day, start-date, or end-date attributes do not allow access on the date and time the client is requesting it. ■ The VLAN the client is assigned to cannot be found.
Association Failures	<p>Number of times a 3Com radio refused a client's association request. Common causes of association failures include the following:</p> <ul style="list-style-type: none"> ■ The encryption cipher requested by the client is not enabled or not supported on the radio. ■ A static WEP key is required but the client did not present the correct key. ■ Session load balancing is enabled on the MAP and the MAP's maximum session count has already been reached. ■ The client is requesting a different SSID than the one for which they have been authenticated and are authorized. ■ The client is already associated with the radio.
Dot1x Failures	<p>Number of times a client experienced 802.1X failures. Common causes of 802.1X failures include the following:</p> <ul style="list-style-type: none"> ■ A radio has already failed the client and the 802.1X quiet period was in effect. ■ The authentication request sent to a RADIUS server on behalf of the client timed out. ■ Bonded authentication is enabled and there was no machine authentication session for client's machine. ■ The username does not match an authentication rule's userglob for the requested SSID.

Table 38 Client Activity Columns When a Mobility Domain is Selected

Option	Description
Associations	Number of times a client associated with a radio on this WX switch.
De-Associations	Number of times a client de-associated from a radio on this WX switch.
Roams	Number of times a client roamed to a new MAP access point, either on the same WX switch or another WX switch.
Clears	Number of times a client session was cleared.

Data Displayed When a Switch, MAP, or Radio is Selected

When a WX switch, MAP, or individual radio is selected in the Organizer panel, the Client Monitor view's Client Activity tab displays a row of information for each client activity trap generated by the selected device.

The screenshot shows the Client Monitor interface. On the left, a tree view displays the network hierarchy under 'AlphaNET4_1_0', with 'AlphaWX1-(WX4400)' selected. The main area shows the 'Client Activity' tab with a table of activity traps. The table has columns for Event Type, Time, Client MAC, Client Name, Client IP Address, and SSID. Below the table is an 'Activity Details' section with fields for User Name, MAC Address, Client VLAN Name, Auth Protocol Type, Client Location, Session ID, Client IP Address, Auth Server IP, and SSID.

Event Type	Time	Client MAC	Client Name	Client IP Address	SSID
Disassociation	Fri Dec 02 18:36:21 P...	00:0e:35:ca:ec:6c	3ComAir\pngo	192.168.15.117	3comwlan
Disassociation	Fri Dec 02 18:36:25 P...	00:0e:35:ca:ec:6c	3ComAir\pngo	192.168.15.117	3comwlan
Client Cleared	Fri Dec 02 18:36:25 P...	00:0e:35:ca:ec:6c	3ComAir\pngo	192.168.15.117	3comwlan
Authorization Succes...	Fri Dec 02 18:36:26 P...	00:0e:35:ca:ec:6c	3ComAir\pngo	0.0.0.0	3comwlan
Disassociation	Fri Dec 02 18:36:28 P...	00:0e:35:ca:ec:6c	3ComAir\pngo	192.168.15.117	3comwlan
Disassociation	Fri Dec 02 18:36:31 P...	00:0e:35:ca:ec:6c	3ComAir\pngo	192.168.15.117	3comwlan
Client Cleared	Fri Dec 02 18:36:31 P...	00:0e:35:ca:ec:6c	3ComAir\pngo	192.168.15.117	3comwlan
Authorization Succes...	Fri Dec 02 18:36:32 P...	00:0e:35:ca:ec:6c	3ComAir\pngo	0.0.0.0	3comwlan
Disassociation	Fri Dec 02 18:36:33 P...	00:0e:35:ca:ec:6c	3ComAir\pngo	192.168.15.117	3comwlan
Authorization Succes...	Fri Dec 02 18:36:35 P...	00:0e:35:ca:ec:6c	3ComAir\pngo	192.168.15.117	3comwlan

Activity Details

User Name	3ComAir\pngo	Session ID	5E55-4688-08d243-577330-ffff
MAC Address	00:0e:35:ca:ec:6c	Client IP Address	192.168.15.117
Client VLAN Name	vlan-pm	Auth Server IP	192.168.3.4
Auth Protocol Type	Pass-Through	SSID	3ComAirwlan
Client Location	AlphaNET4_1_0, AlphaWX1-(WX4400),DAP1:FishBow352, Radio		

Refreshed at Fri Dec 02 19:24:01 PST 2005

Table 39 lists the data displayed on the Client Activity tab when a WX switch, MAP, or individual radio is selected.

Table 39 Client Activity Columns When a WX Switch, MAP, or Radio is Selected

Option	Description
Event Type	Type of SNMP trap: <ul style="list-style-type: none"> ■ Association Failure—ClientAssociationFailure trap ■ Authentication Failure—ClientAuthenticationFailure trap ■ Authorization Failure—ClientAuthorizationFailure trap ■ Authorization Successful—ClientAuthorizationSuccess trap ■ Clear—ClientCleared trap ■ Disassociation—ClientDeAssociation trap ■ Dot1x Failure—ClientDot1xFailure trap ■ Roam—ClientRoaming trap
Time	System date and time on the WX switch when the 3WXM Services received the trap.
Client MAC	MAC address of the client.
Client Name	Username of the client.
Client IP Address	IP address of the client.
SSID	SSID the client was most recently associated with when the trap was generated.

The Activity Details section at the bottom of the view displays details for the selected row of information. The details differ depending on the trap type. The following tables list the data displayed in the Activity Details section for each trap type.

Table 40 Activity Details for Association Failure

Column	Description
MAC Address	MAC address of the client.
Failure Cause	Cause of the association failure: <ul style="list-style-type: none"> ■ already-exist ■ cipher-mismatch ■ cipher-rejected ■ load-balance ■ other ■ switching-ssid ■ wep-not-configured
Client Location	Mobility Domain, WX switch, MAP access point, and radio that were dealing with the client.
SSID	SSID the client was requesting.
Failure Cause Description	Cause of the failure.

Table 41 Activity Details for Authentication Failure

Column	Description
User Name	Username of the client.
MAC Address	MAC address of the client.
Auth Protocol Type	802.1X protocol used to authenticate the client: <ul style="list-style-type: none"> ■ EAP-TLS ■ MD5 ■ NONE ■ PASS-THROUGH ■ PEAP
Authentication Failure Cause	Reason the authentication failure trap was generated: <ul style="list-style-type: none"> ■ invalid-password ■ other ■ server-timeout ■ signature-failed ■ user-does-not-exist ■ user-glob-mismatch

Table 41 Activity Details for Authentication Failure (continued)

Column	Description
Client Location	Mobility Domain, WX switch, MAP access point, and radio that were dealing with the client.
Session ID	ID used by 3Com equipment to track the session within the Mobility Domain.
Auth Server IP	System IP address of the WX switch that was attempting to authenticate the client. Note — The system IP address is listed even if the switch was using a RADIUS server to authenticate the client.
SSID	SSID the client was requesting.
Failure Cause Description	Cause of the failure.

Table 42 Activity Details for Authorization Failure

Column	Description
User Name	Username of the client.
MAC Address	MAC address of the client.
Auth Protocol Type	802.1X protocol used to authenticate the client: <ul style="list-style-type: none"> ■ EAP-TLS ■ MD5 ■ NONE ■ PASS-THROUGH ■ PEAP ■ N/A
Location Policy Index	Rule number of a location policy rule used to change authorization attributes for the client.

Table 42 Activity Details for Authorization Failure (continued)

Column	Description
Authorization Failure Cause	Reason the authorization failure trap was generated: <ul style="list-style-type: none"> ■ acl-mismatch ■ crypto-type-mismatch ■ end_date_mismatch ■ location-policy ■ mobility-profile-mismatch ■ other ■ ssid-mismatch ■ start_date_mismatch ■ timeofday-mismatch ■ user-param ■ vlan-tunnel-failure
Client Location	Mobility Domain, WX switch, MAP, and radio that were dealing with the client.
Session ID	ID used by 3Com equipment to track the session within the Mobility Domain.
Auth Server IP	System IP address of the WX switch that was attempting to authenticate the client. Note — The system IP address is listed even if the switch was using a RADIUS server to authenticate the client.
SSID	SSID the client was requesting.
User Parameters	User attributes, if set to values other than null.
Failure Cause Description	Cause of the failure.

Table 43 Activity Details for Authorization Successful

Column	Description
User Name	Username of the client.
MAC Address	MAC address of the client.
Client VLAN Name	VLAN to which the client was assigned.
Session Start Time	System date and time on the WX switch when the client's session began.

Table 43 Activity Details for Authorization Successful (continued)

Column	Description
Auth Protocol Type	802.1X protocol used to authenticate the client: <ul style="list-style-type: none"> ■ EAP-TLS ■ MD5 ■ NONE ■ PASS-THROUGH ■ PEAP
Client Location	Mobility Domain, WX switch, MAP, and radio that were dealing with the client.
Session ID	ID used by 3Com equipment to track the session within the Mobility Domain.
Client IP Address	IP address of the client.
Session State	State of the user session: <ul style="list-style-type: none"> ■ Associated — User is authenticated using an 802.11 protocol and associated with a MAP. ■ Authorizing — User is authenticated and is starting the AAA authorization process. ■ Authorized — User is authorized. ■ Active — User's session is fully active. ■ Deassociated — User is disassociated from the MAP. ■ Roaming_away — User is roaming (a connection in the new location is established). ■ Updated_to_roam — User is roaming. Session statistics have been collected and will be transmitted to the new location. ■ Web_authing — User is being authenticated by WebAAA. ■ Wired — User is being authenticated using an 802.11 protocol on a wired authentication port. ■ Clearing — User session is being terminated. ■ Invalid — Usually indicates the session is being terminated, and session information is no longer available.
Auth Server IP	System IP address of the WX switch that was attempting to authenticate the client. <p>Note — The system IP address is listed even if the switch was using a RADIUS server to authenticate the client.</p>
SSID	SSID the client was requesting.

Table 43 Activity Details for Authorization Successful (continued)

Column	Description
User Access Type	Authentication type that granted access: <ul style="list-style-type: none"> ■ DOT1X ■ MAC ■ LAST-RESORT ■ WEB

Table 44 Activity Details for Client Cleared

Column	Description
User Name	Username of the client.
MAC Address	MAC address of the client.
SSID	SSID the client was associated with.
Session ID	ID used by 3Com equipment to track the session within the Mobility Domain.
Client IP Address	IP address of the client.
Client Location	Mobility Domain, WX switch, MAP, and radio that were dealing with the client.

Table 45 Activity Details for Disassociation

Column	Description
User Name	Username of the client.
MAC Address	MAC address of the client.
Client VLAN Name	VLAN to which the client was assigned.
Auth Protocol Type	802.1X protocol used to authenticate the client: <ul style="list-style-type: none"> ■ EAP-TLS ■ MD5 ■ NONE ■ PASS-THROUGH ■ PEAP ■ N/A
Client Location	Mobility Domain, WX switch, MAP, and radio that were dealing with the client.
Session ID	ID used by 3Com equipment to track the session within the Mobility Domain.

Table 45 Activity Details for Disassociation (continued)

Column	Description
Client IP Address	IP address of the client.
Auth Server IP	System IP address of the WX switch that was attempting to authenticate the client. Note — The system IP address is listed even if the switch was using a RADIUS server to authenticate the client.
SSID	SSID the client was associated with.

Table 46 Activity Details for Dot1x Failure

Column	Description
User Name	Username of the client.
Auth Protocol Type	802.1X protocol used to authenticate the client: <ul style="list-style-type: none"> ■ EAP-TLS ■ MD5 ■ NONE ■ PASS-THROUGH ■ PEAP
Client Location	Mobility Domain, WX switch, MAP, and radio that were dealing with the client.
Failure Cause	Cause of the failure.
MAC Address	MAC address of the client.
SSID	SSID the client was requesting.
Dot1x State	802.1X state of the client: <ul style="list-style-type: none"> ■ administrative-kill ■ bad-rsnie ■ bonded-auth-failure ■ fourway-hs-failure ■ max-sessions-exceeded ■ other ■ quiet-period ■ timeout ■ user-glob-mismatch
Failure Description	Description of the 802.1X failure.

Table 47 Activity Details for Roam

Column	Description
User Name	Username of the client.
MAC Address	MAC address of the client.
SSID	SSID the client was associated with.
Roamed from Client Location	WX switch, MAP access point, and radio <i>from</i> which the client roamed.
Session ID	ID used by 3Com equipment to track the session within the Mobility Domain.
Client IP Address	IP address of the client.
Client Location	Mobility Domain, WX switch, MAP access point, and radio <i>to</i> which the client roamed.

Displaying Client Session Information

The Client Session tab displays session statistics. The data fields in the display depend on the scope:

- If a Mobility Domain is selected, a row of data is displayed for each WX switch in the Mobility Domain.
- If a WX switch, MAP, or radio is selected, client sessions for that device are displayed.

Data Displayed When a Mobility Domain is Selected

When a Mobility Domain is selected in the Organizer panel, the Client Monitor view's Client Sessions tab displays a row of information for each WX switch in the Mobility Domain.

The screenshot shows the Client Monitor interface with the Client Sessions tab active. The left pane shows a tree view of the network hierarchy, with 'AlphaNET4_1_0' selected. The right pane displays a table of session statistics for the selected scope. The table has columns for Scope, Sessions, SNR (average), and RSSI (average dBm). The data rows are:

Scope	Sessions	SNR (average)	RSSI (average dBm)
AlphaWX1-(WX4400)	3	25	-64
AlphaWX2-(WX1200)	4	31	-58
AlphaWX3-(WX1200)	1	47	-59
AlphaWX5-(WX100)	1	48	-51

The total number of sessions is 9, with an average SNR of 37 and an average RSSI of -58.

Table 48 lists the data displayed on the Client Sessions tab when the scope is a Mobility Domain.

Table 48 Client Sessions Columns When a Mobility Domain is Selected

Column	Description
Scope	Scope of the data displayed in the row. The scope for each row in the Client Activity tab is always a WX switch. The down arrow in front of the WX switch name indicates that you can double-click on the arrow to change the scope in the Status Summary and Explore windows, to display information specifically for this switch in those windows.
Sessions	Number of active sessions on the switch.
SNR (average)	Average SNR of data transmissions from clients to the radios managed by the switch.
RSSI (average dBm)	Average RSSI of data transmissions from clients to the radios managed by the switch.

Data Displayed When a WX Switch, MAP, or Radio is Selected

When a WX switch, MAP, or individual radio is selected in the Organizer panel, the Client Monitor view’s Client Sessions tab displays a row of information for each client session.

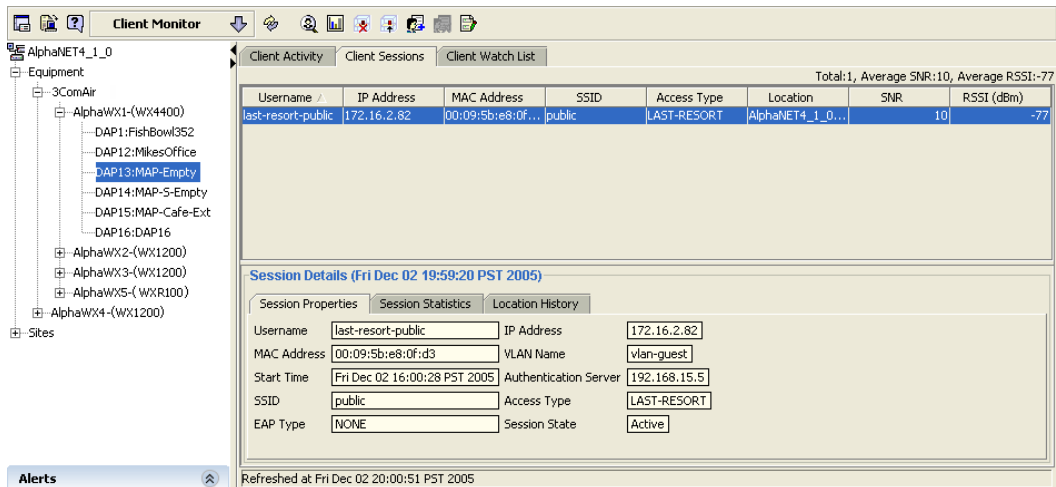


Table 49 lists the data displayed on the Client Sessions tab when the scope is a WX switch, MAP, or individual radio.

Table 49 Client Sessions Columns When Scope Is a WX Switch, MAP, or Radio

Column	Description
Username	Username the client used to log on to the network. The username is shown in one of the following formats: <ul style="list-style-type: none"> ■ Named user ■ Windows domain users using PEAP ■ MAC address (for devices that are authenticated by MAC authentication)
IP Address	IP address of the client.
MAC Address	MAC address of the client.
SSID	SSID with which the client is associated.
Access Type	Authentication type that granted access: <ul style="list-style-type: none"> ■ DOT1X ■ MAC ■ LAST-RESORT ■ WEB
Location	Mobility Domain, WX switch, MAP access point, and radio that were dealing with the client.
SNR	SNR of data transmissions from the client to the radio.
RSSI (dBm)	RSSI of data transmissions from the client to the radio.

Displaying Session Details

To display details for a user session, select the session in the Client Sessions list. Details for the session appear in the following tabs at the bottom of the window:

- Session Properties
- Session Statistics
- Location History

Displaying Session Properties On the Client Sessions tab, select the Session Properties tab at the bottom of the window. Table 50 lists the information displayed on the tab.

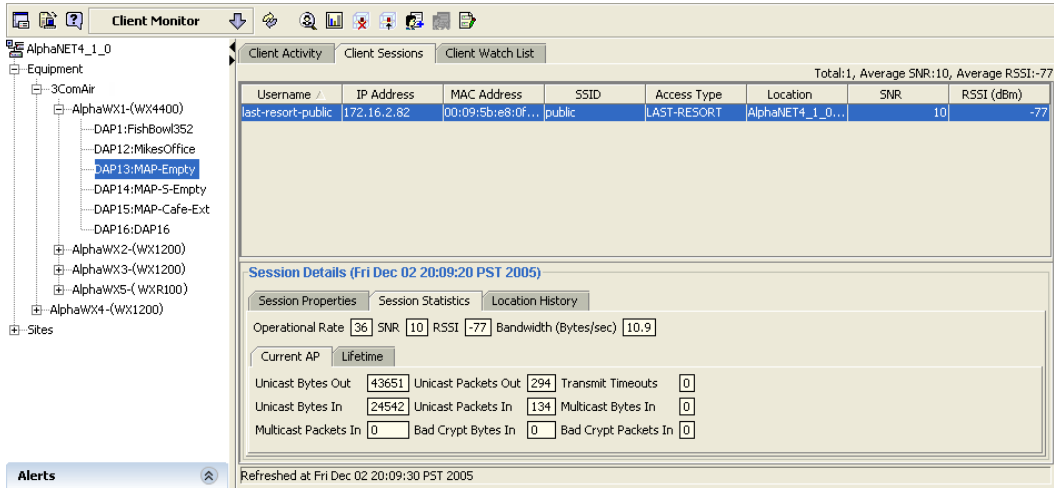
Table 50 Session Properties Columns

Column	Description
Username	Username the client used to log on to the network.
MAC Address	MAC address of the client.
Start Time	Date and time when the session began. The date and time are based on the system date and time of the WX switch with which the client is associated.
SSID	SSID with which the client is associated.
EAP Type	<p>Extensible Authentication Protocol (EAP) used for authentication:</p> <ul style="list-style-type: none"> ■ PEAP — Protected Extensible Authentication Protocol ■ MD5 — Message-digest algorithm 5 ■ TLS — Transport Layer Security protocol ■ Pass-Through — The switch established an EAP session directly between the client and the RADIUS server. All authentication information and certificate exchanges between the client and RADIUS server passed through the switch. ■ None — EAP was not used to authenticate this client. <p>None is the EAP type when MAC authentication, last-resort authentication, or WebAAA is used to authenticate the client.</p>
IP Address	IP address of the client.
VLAN Name	VLAN onto which the WX switch placed the user. This is the VLAN for which the user was authorized by the RADIUS server or the WX switch.
Authentication Server	<p>System IP address of the WX switch that was attempting to authenticate the client.</p> <p>Note — The system IP address is listed even if the switch was using a RADIUS server to authenticate the client.</p>
Access Type	<p>Authentication type that granted access:</p> <ul style="list-style-type: none"> ■ DOT1X ■ MAC ■ LAST-RESORT ■ WEB

Table 50 Session Properties Columns (continued)

Column	Description
Session State	<p>State of the user session:</p> <ul style="list-style-type: none"> ▪ Associated — User is authenticated using an 802.11 protocol and associated with a MAP. ▪ Authorizing — User is authenticated and is starting the AAA authorization process. ▪ Authorized — User is authorized. ▪ Active — User's session is fully active. ▪ Deassociated — User is disassociated from the MAP. ▪ Roaming_away — User is roaming (a connection in the new location is established). ▪ Updated_to_roam — User is roaming. Session statistics have been collected and will be transmitted to the new location. ▪ Web_authing — User is being authenticated by WebAAA. ▪ Wired — User is being authenticated using an 802.11 protocol on a wired authentication port. ▪ Clearing — User session is being terminated. ▪ Invalid — Usually indicates the session is being terminated, and session information is no longer available.

Displaying Session Statistics On the Client Sessions tab, select the Session Statistics tab at the bottom of the view.



On the Session Statistics tab, you can select statistics for the MAP the client is associated with, or total statistics for the client’s entire roaming history. For the current statistics, select Current AP. For the totals for the entire roaming history, select Lifetime.

Table 51 lists the information displayed on the tab.

Table 51 Session Statistics Columns

Column	Description
Operational Rate	Data rate of the last packet received by the radio from the client.
SNR	SNR of data transmissions from the client to the radio.
RSSI	RSSI of data transmissions from the client to the radio.
Bandwidth (Bytes/sec)	Bytes-per-second rate of traffic between the radio and the client. The rate includes both send and receive traffic.
Unicast Bytes Out	Number of unicast bytes transmitted by the radio to the client during this session.
Unicast Packets Out	Number of unicast packets transmitted by the radio to the client during this session.

Table 51 Session Statistics Columns (continued)

Column	Description
Transmit Timeouts	Number of times a packet transmitted by the radio to a client remained unacknowledged long enough for the transmission attempt to time out.
Unicast Bytes In	Number of unicast bytes received by the radio from the client during this session.
Unicast Packets In	Number of unicast packets received by the radio from the client during this session.
Multicast Bytes In	Number of multicast bytes received by the radio from the client during this session.
Multicast Packets In	Number of multicast packets received by the radio from the client during this session.
Bad Crypt Bytes In	Number of bytes received by the radio that had encryption errors.
Bad Crypt Packets In	Number of packets received by the radio that had encryption errors.

Displaying Session Location History On the Client Sessions tab, select the Location History tab at the bottom of the window.

The screenshot shows the Client Monitor application window. On the left is a tree view of the network hierarchy under 'AlphaNET4_1_0', including 'Equipment' and '3ComAir' with various DAPs and radios. The main window has three tabs: 'Client Activity', 'Client Sessions', and 'Client Watch List'. The 'Client Sessions' tab is active, showing a table of sessions. Below this, the 'Session Details' for a specific session are shown, with the 'Location History' sub-tab selected. The location history table shows the start time and the radio/location for each session.

Username	IP Address	MAC Address	SSID	Access Type	Location	SNR	RSSI (dBm)
last-resort-public	172.16.2.82	00:09:5b:e8:0f...	public	LAST-RESORT	AlphaNET4_1_0...	10	-77

Start Time	Location
Fri Dec 02 18:12:42 PST 2005	AlphaNET4_1_0, AlphaWX1-(WX4400), DAP13:MAP-Empty, Radio1
Fri Dec 02 18:12:37 PST 2005	AlphaNET4_1_0, AlphaWX2-(WX1200), DAP23:MAP-TechPub, Radio1
Fri Dec 02 16:00:28 PST 2005	AlphaNET4_1_0, AlphaWX1-(WX4400), DAP13:MAP-Empty, Radio1

Each row represents a session with a 3Com radio. When a client roams from one radio to another, the session on the radio the client is leaving is closed and a new session is opened on the radio to which the client is roaming.

Sessions in the location history are sorted from newest to oldest, with the oldest session at the bottom of the list and the newest session at the top. Table 52 lists the information displayed on the tab.

Table 52 Location History Columns


Column	Description
Start Time	Date and time when the session with this radio began. The date and time are based on the system date and time of the WX switch that is managing the radio with which the client is associated.
Location	Name of the radio with which the client associated at the start time listed in the Start Time column.

Managing the Client Watch List

You can add clients to a watch list. The watch list allows you to monitor client roaming history and network performance. 3WXM monitors the clients on the watch list by MAC address.

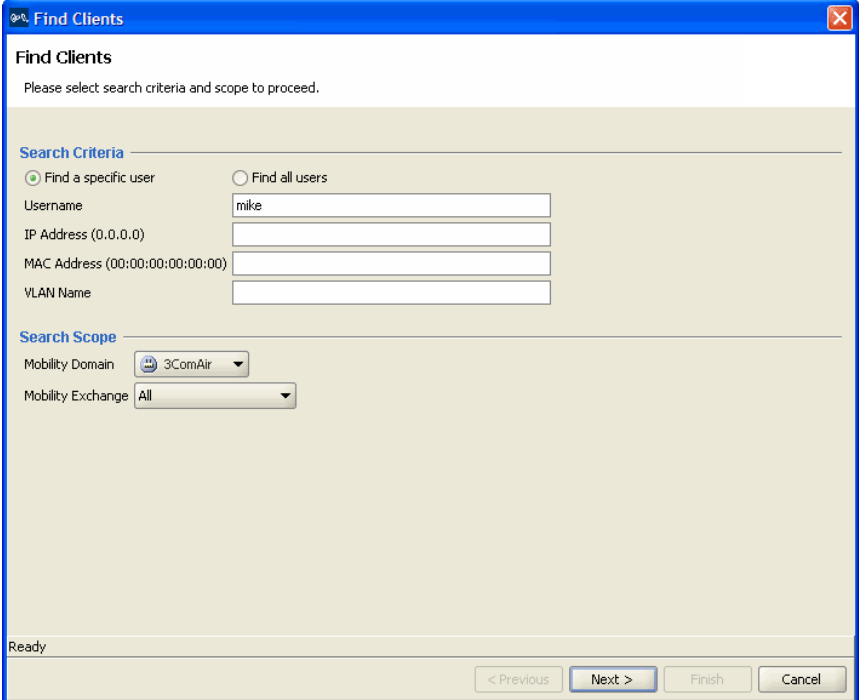
Adding a Client to the Watch List

You can add a client to the watch list using either of the following methods:

- On the Client Session tab, select the client, then click  on the Client Monitor window's toolbar.
- Use the Find Client dialog box to find the client's information, then select the Watch option.

Using the Find Client dialog box to find a user You can use 3WXM to find users (network clients) on the network. You can search for individual users based on specific criteria, or you can find all users in a Mobility Domain.

- 1 In the Client Monitor window, click  on the window's toolbar. The Find Clients dialog box appears.



Find Clients

Please select search criteria and scope to proceed.

Search Criteria

Find a specific user Find all users

Username

IP Address (0.0.0.0)

MAC Address (00:00:00:00:00:00)

VLAN Name

Search Scope

Mobility Domain

Mobility Exchange

Ready

< Previous Next > Finish Cancel

- 2 Select one of the following:
 - **Find a specific user** — to find a user using specific search attributes. Go to step 3.
 - **Find all users** — to find all users. Go to step 4.
- 3 Use any or all of the following search criteria:
 - In the Username box, specify the username of the user you want to find.
 - In the IP Address box, specify the IP address of the user.
 - In the MAC Address box, specify the MAC address of the user.
 - In the VLAN Name box, specify the VLAN whose users you want to find.

When specifying search criteria, you must provide an exact match. For a username, you can also specify the prefix of the username.

For example, to find natasha@example.com, you could specify the following:

- **natasha@example.com**
- **nat**

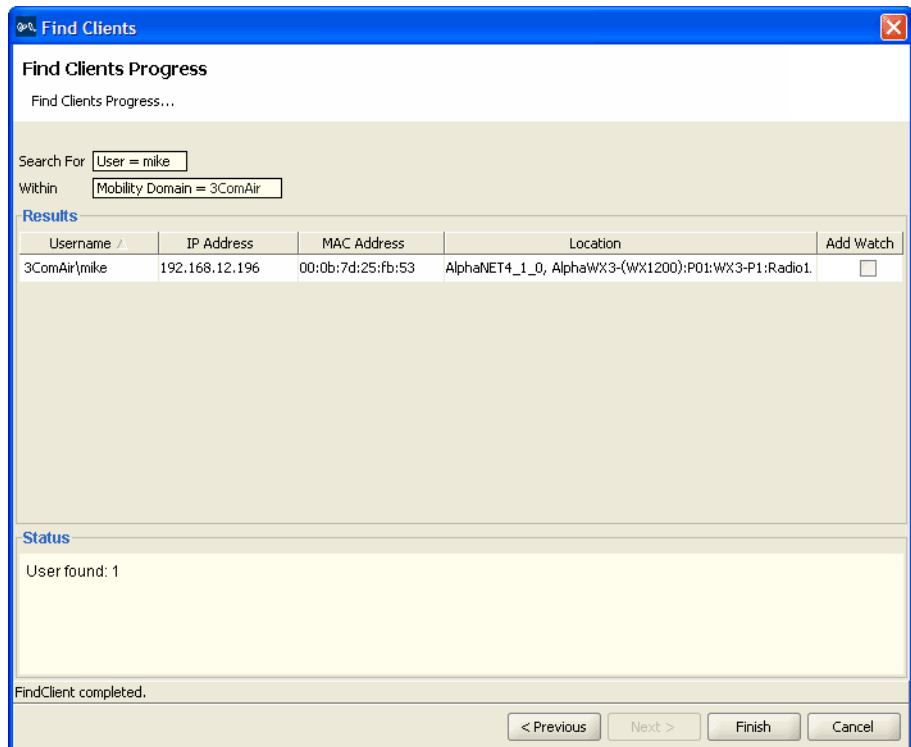
Wildcards are not supported in search criteria. For example, the user *natasha* cannot be found if you specify *nat** in the Username box.

- 4 In the Mobility Domain list, select the Mobility Domain that you want to search.
- 5 In the Wireless Switch list, select a specific WX switch, or select **All**.



*If you select **All**, you must have a seed device defined for the Mobility Domain in order for the search to be successful.*

- 6 Click **Next**. The search results appear.



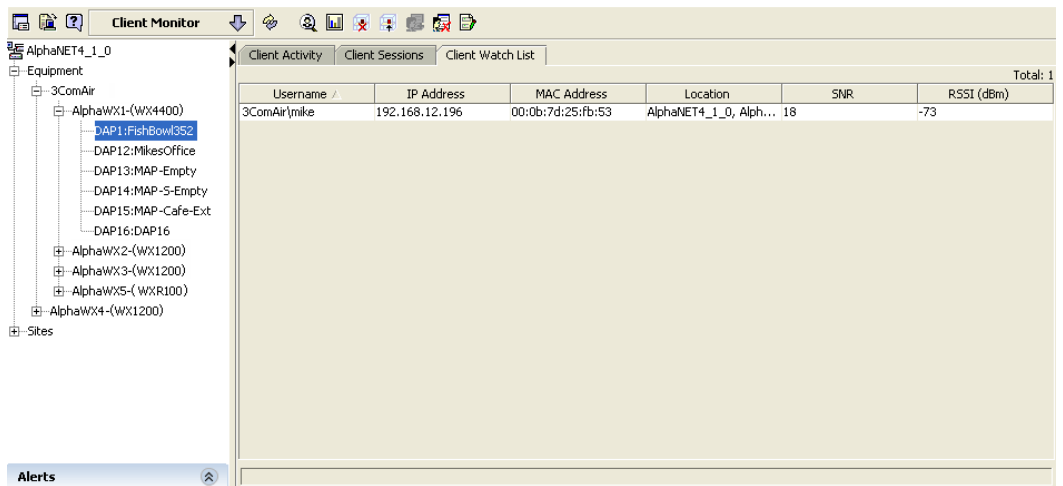
- 7 To add a user to the watch list in the User Management tab, select the **Add Watch** checkbox in the user row.

Repeat for all users that you want to add to the watch list.

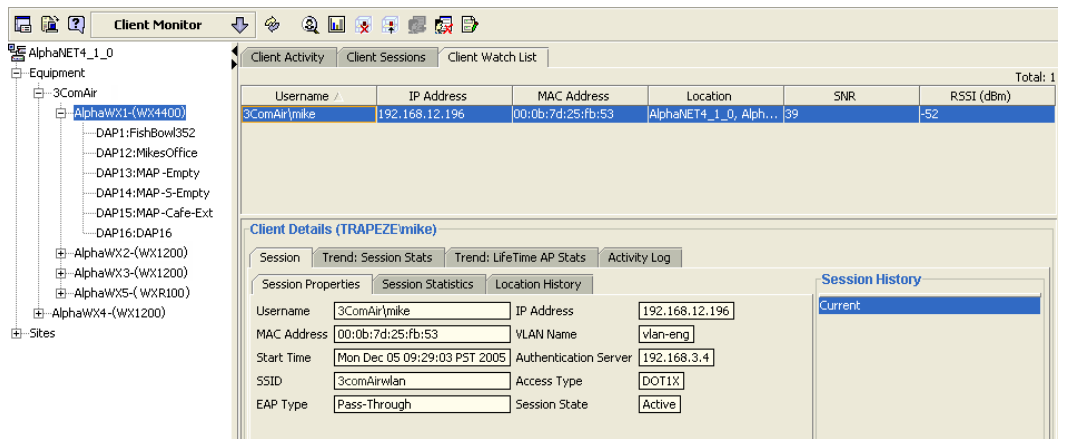
- 8 Click **Finish**.

Displaying the Client Watch List

To display the watch list, select the Client Watch List tab in the Client Monitor window.



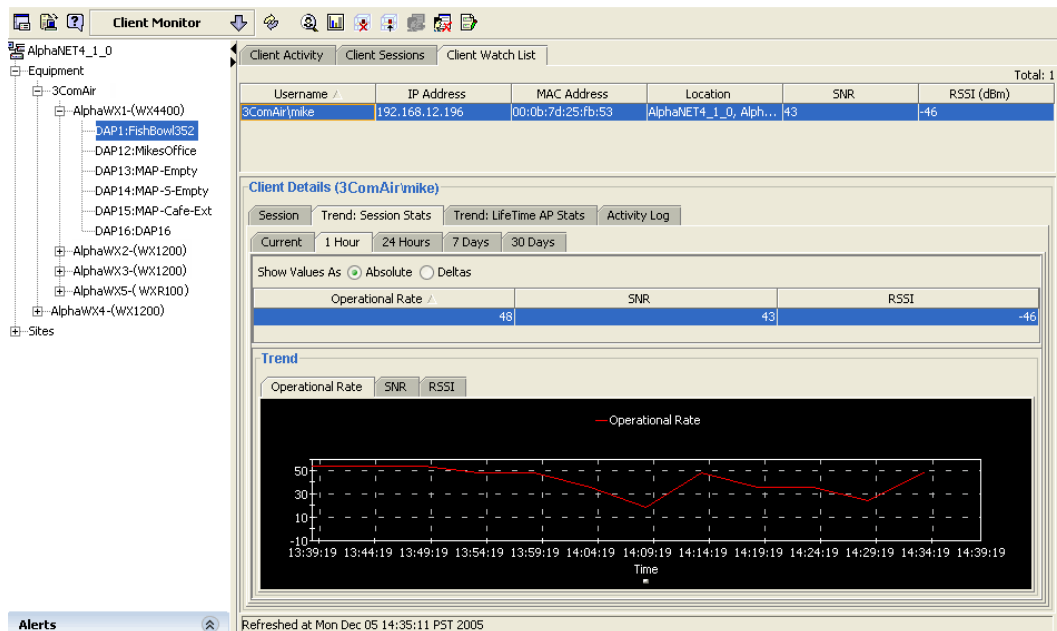
To display details for a client on the watch list, select the client. Details for the client appear in the window.



Details are displayed on the following tabs:

- **Session** — displays the Session Properties, Session Statistics, and Location History tabs. These are the same tabs displayed at the bottom of the Client Sessions tab. (For descriptions of the data they display, see “Displaying Client Session Information” on page 427.)
- **Trend: Session Stats** — Displays operational rate, SNR, and RSSI trend data. You can display trend data for periods covering the most recent one hour, 24 hours, 7 days, or 30 days. The data is also shown in a graph.
- **Trend: Lifetime AP Stats** — Shows byte and packet statistics for the client’s roaming history. If the client has roamed, statistics for each session are combined. (For column descriptions, see Table 57 on page 448.)
- **Activity Log** — Shows the activity messages accumulated for the client. (For descriptions of the message data, see “Displaying Client Activity Information” on page 416.)

Here is an example of session trend data shown for a client.




When looking at graphed data, you can see the data in absolute or delta values.

Delta (rate of change) values are calculated with the following equation:

$$\frac{\text{value at end of polling interval} - \text{value at beginning of polling interval}}{\text{time difference (in seconds)}}$$

To change how you view data values, select **Absolute** to see absolute values or **Deltas** to see rate-of-change values.


Removing a Client from the Watch List

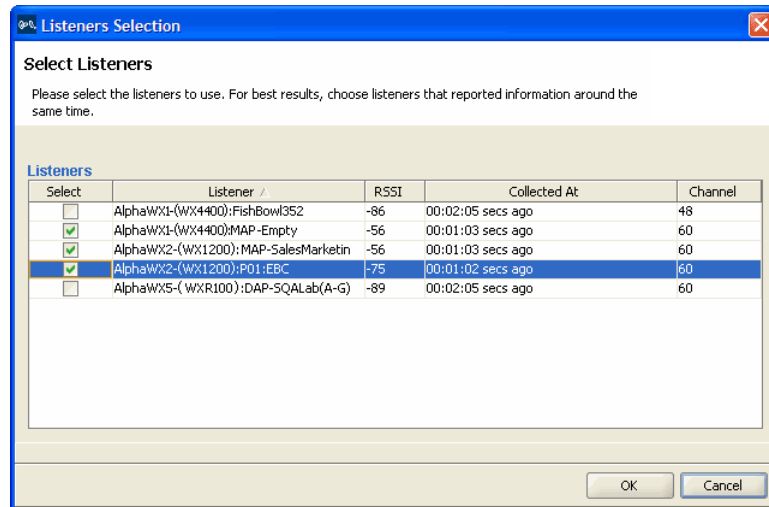
To remove a client from the watch list, select the client, then click  on the Client Monitor view's toolbar.

Displaying a Client's Geographical Location

You can show the approximate location of a client within a site. The floor the client is currently on is displayed, as well as the client's likely location on the floor.

To display a client's session

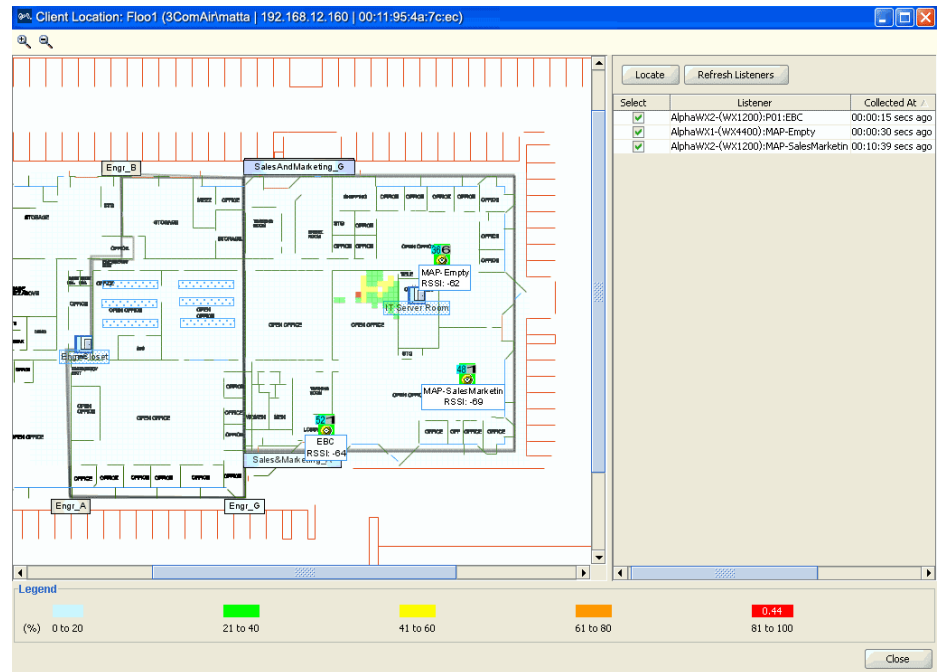
- 1 Select the client.
- 2 Click  on the Client Monitor view's toolbar.
3WXM checks whether three or more MAPs have detected the selected client within 15 seconds of each other. If so, the Client Location screen is displayed; go to step 5.
If three or more MAPs have not detected the client within 15 seconds of each other, the Listeners Selection dialog box appears, displaying a list of the MAPs that have detected the client.
- 3 If the Listeners Selection dialog box appears, select the MAPs for 3WXM to use when calculating the client's location.



To improve the accuracy of the client location display, you can select up to six MAPs from the list. 3WXM uses the selected MAPs to calculate the location of the client.

For best results, you should select the MAPs that have detected the client most recently. When selecting multiple MAPs, you should select those that have collected data at approximately the same time. In the example above, three MAPs are selected, all of which collected data about the client approximately 1 second before, which is the most recent data collected.


- 4 After selecting the MAPs from the Listeners list, click **OK** to display the approximate location of the client.



- 5 The client is most likely in the vicinity of the area indicated by the red squares in the floor plan. The number in red on the legend (0.44 in this example) is the probability (44%) that the client is where the display indicates.
- 6 The list of MAPs that detected the client is shown to the right of the floor display. To refresh the list of MAPs, click the **Refresh Listeners** button.
- 7 To change the MAPs used for calculating the client's location, select or deselect MAPs from the list and click the **Locate** button.

Terminating a Client's Session

To terminate a client's session

- 1 Select the client.
- 2 Click  on the Client Monitor view's toolbar. The Clear User dialog box appears.
- 3 Do one of the following:
 - Click **Yes** to terminate the session, then click **Close**.
 - Click **No** to cancel the termination request.

Using the RF Monitor View

The RF Monitor view shows detailed RF information for each radio. Radio information is displayed in the following tabs:

- **RF Neighborhood** — lists the other transmitting devices that the radio can hear.
- **SSID-BSSID Mapping** — lists the MAC address associated with each SSID the radio can hear.
- **Activity** — lists log messages for the radio.
- **RF Environment** — lists 802.11 statistics for the radio.

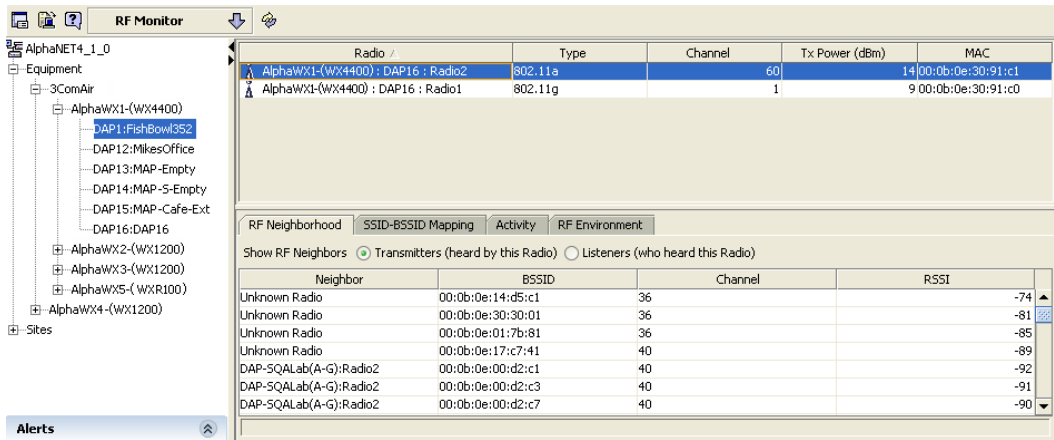


Table 53 lists the information displayed in the top section of the RF Monitor view.

Table 53 RF Monitor Columns

Column	Description
Radio	WX switch name, MAP name, and radio number
Type	Radio type: 802.11a, 802.11b, or 802.11g
Channel	Channel number on which the radio is operating
Tx Power	Power level at which the radio is transmitting
MAC	Base MAC address of the radio

Displaying RF Neighborhood Information

In the RF Monitor view, select the RF Neighborhood tab at the bottom of the window.

The screenshot shows the RF Monitor application window. On the left is a tree view of the network structure, including 'AlphaNET4_1_0', 'Equipment', '3ComAir', and various DAP and AlphaWX units. The main window displays a table of radio information:

Radio	Type	Channel	Tx Power (dBm)	MAC
AlphaWX1-(WX4400) : DAP16 : Radio2	802.11a	60		14:00:0b:0e:30:91:c1
AlphaWX1-(WX4400) : DAP16 : Radio1	802.11g	1		9:00:0b:0e:30:91:c0

Below this table, the 'RF Neighborhood' tab is selected. It shows 'Show RF Neighbors' with radio buttons for 'Transmitters (heard by this Radio)' (selected) and 'Listeners (who heard this Radio)'. A table of neighbors is displayed:

Neighbor	BSSID	Channel	RSSI
Unknown Radio	00:0b:0e:14:d5:c1	36	-74
Unknown Radio	00:0b:0e:30:30:01	36	-81
Unknown Radio	00:0b:0e:01:7b:81	36	-85
Unknown Radio	00:0b:0e:17:c7:41	40	-89
DAP-SQALab(A-G):Radio2	00:0b:0e:00:d2:c1	40	-92
DAP-SQALab(A-G):Radio2	00:0b:0e:00:d2:c3	40	-91
DAP-SQALab(A-G):Radio2	00:0b:0e:00:d2:c7	40	-90

The RF Neighborhood tab lists the transmitters that can hear or are heard by the radio selected in the top section of the window. You can select the viewpoint of the list:

- To list the other transmitters that the selected radio can hear, select Transmitters.
- To list the other transmitters that can hear the selected radio, select Listeners.

Information is displayed for a radio if the radio sends beacon frames or responds to probe requests. Even if a radio's SSIDs are unadvertised, 3Com radios detect the empty beacon frames (beacon frames without SSIDs) sent by the radio, and include the radio in the neighbor list.

Table 54 lists the information displayed on the tab.

Table 54 RF Monitor RF Neighborhood Columns

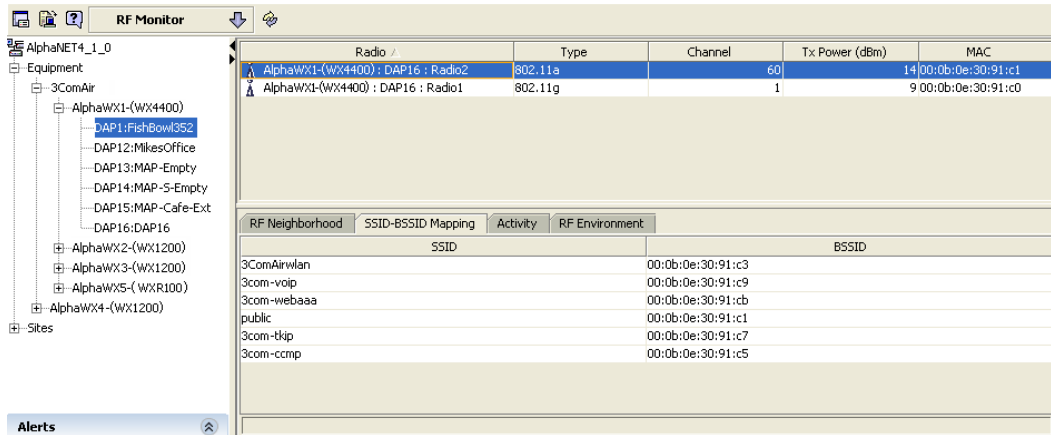
Column	Description
Neighbor	MAP name and radio number.
	Note — This information comes from the site plan and is displayed only if the MAP is in the plan.

Table 54 RF Monitor RF Neighborhood Columns (continued)

Column	Description
BSSID	BSSID detected by the radio. Note — This column displays a single entry for each 3Com radio, even if the radio is supporting multiple BSSIDs. However, BSSIDs for third-party 802.11 radios are listed separately, even if a radio is supporting more than one BSSID.
Channel	Channel on which the BSSID is detected.
RSSI	Received signal strength indication (RSSI), in decibels referred to 1 milliwatt (dBm). A higher value indicates a stronger signal.

Displaying the SSID-to-BSSID Mapping

To display the SSIDs configured on a radio and their BSSIDs, in the RF Monitor window, select the SSID-BSSID Mapping tab at the bottom of the window.



Displaying the Activity Log

The activity log displays RF Auto-Tuning and countermeasures activity for the radio. To display the activity log, in the RF Monitor view, select the Activity tab at the bottom of the window.

Radio	Type	Channel	Tx Power (dBm)	MAC
AlphaWX1-(WX4400) : DAP16 : Radio2	802.11a	0	0	00:00:00:00:00:00
AlphaWX1-(WX4400) : DAP16 : Radio1	802.11g		0	00:00:00:00:00:00
AlphaWX1-(WX4400) : DAP15 : Radio2	802.11a	64	11	11 00:0b:0e:08:e2:41
AlphaWX1-(WX4400) : DAP15 : Radio1	802.11g	11	11	14 00:0b:0e:08:e2:40
AlphaWX1-(WX4400) : DAP14 : Radio1	802.11g		0	00:00:00:00:00:00
AlphaWX1-(WX4400) : DAP13 : Radio2	802.11a	153	14	14 00:0b:0e:0f:7a:01
AlphaWX1-(WX4400) : DAP13 : Radio1	802.11g	6	14	14 00:0b:0e:0f:7a:00
AlphaWX1-(WX4400) : DAP12 : Radio2	802.11a	56	11	11 00:0b:0e:03:34:81

Table 55 lists the information displayed on the tab.

Table 55 RF Monitor Activity Log Columns

Column	Description
Time	System date and time on the WX switch when the switch generated the SNMP trap for the event message.
Event Type	Type of event that caused the message: <ul style="list-style-type: none"> ■ Counter Measure Start — The radio began countermeasures against a rogue transmitter. Event information comes from the CounterMeasureStart trap. ■ Tx. Power Change — The RF Auto-Tuning feature changed the transmit power level of the radio. Event information comes from the AutoTuneRadioPowerChange trap. ■ Channel Change — The RF Auto-Tuning feature changed the transmit channel of the radio. Event information comes from the AutoTuneRadioChannelChange trap.
Description	For countermeasure events, this column lists the target MAC address of the rogue device. For RF Auto-Tuning messages, this column lists the reason for the power or channel change.

Displaying RF Environment Statistics

To display RF environment statistics, in the RF Monitor window, select the RF Environment tab at the bottom of the window.

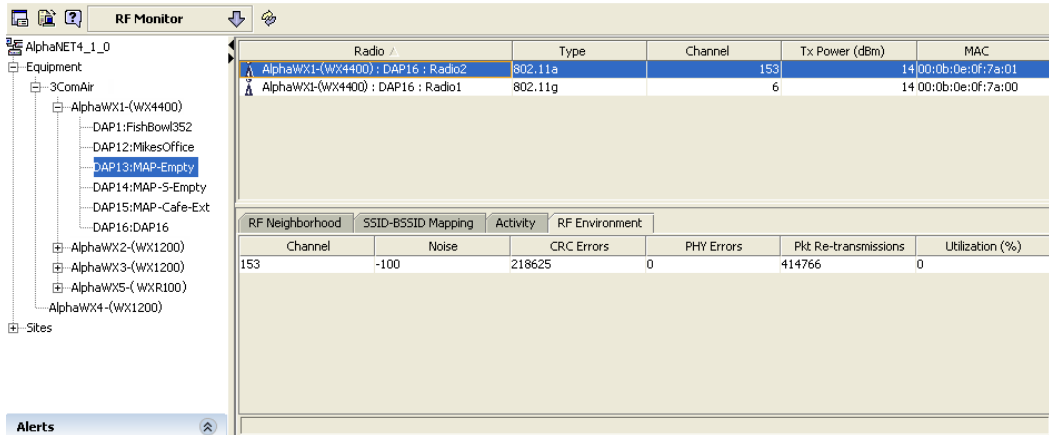


Table 56 lists the information displayed on the tab.

Table 56 RF Monitor Environment Columns

Column	Description
Channel	Radio channel to which the other columns apply.
Noise	Noise threshold on the active channel. RF Auto-Tuning prefers channels with low noise levels over channels with higher noise levels.
CRC Errors	Number of frames received by the radio on that active channel that had CRC errors. A high CRC error count can indicate a hidden node or co-channel interference.
PHY Errors	Number of packets that could not be decoded by the MAP. This condition can have any of the following causes: <ul style="list-style-type: none"> Collision of an 802.11 packet. Packet whose source is too far away, thus rendering the packet unintelligible by the time it reaches the MAP. Interference caused by an 802.11b/g phone or other source. <p>It is normal for this counter to be about 10 percent of the total RxByte count. It is also normal for higher data rates to have higher Phy error counts than lower data rates.</p>

Table 56 RF Monitor Environment Columns (continued)

Column	Description
Pkt Re-transmissions	Number of retransmitted packets sent from the client to the radio on the active channel. Retransmissions can indicate that the client is not receiving ACKs from the MAP radio.
Utilization	Number of multicast packets per second that a radio can send on a channel while continuously sending fixed size frames over a period of time. The number of packets that are successfully transmitted indicates how busy the channel is.

Using the RF Trends View

The RF Trends view shows current and past 802.11 statistics for radios. You can view statistics up to 30 days old, and display graphs of data trends.

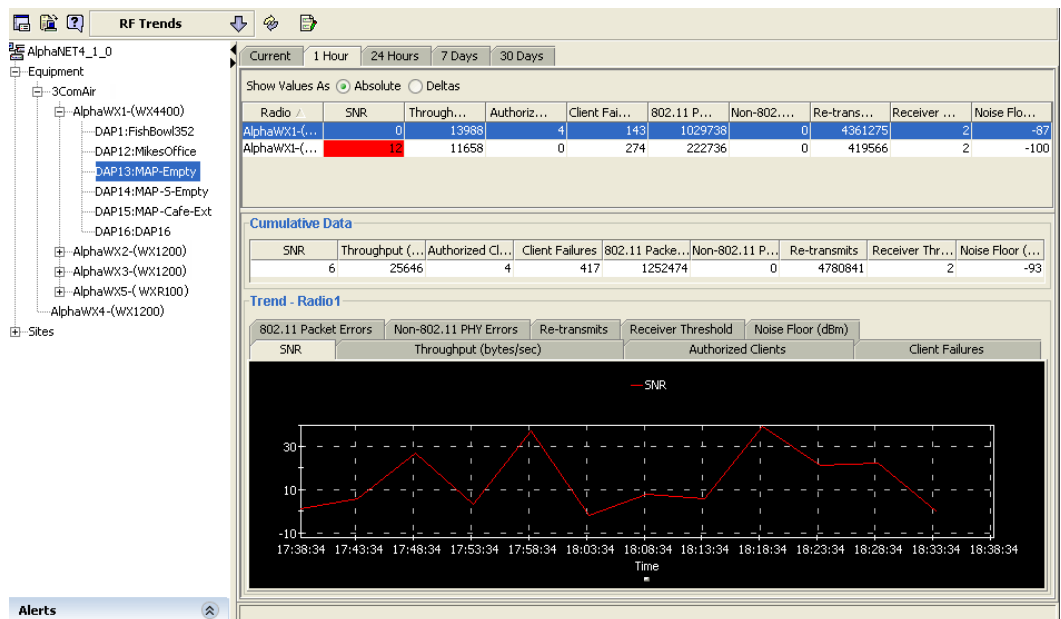


Table 57 lists the information displayed in the top section of the RF Trends view.

Table 57 RF Trends Columns

Column	Description
Radio	MAP name and radio number.
SNR	Signal-to-noise ratio of the last data packet received by the radio.
Throughput	Rate at which data is transmitted by the radio, in bits per second.
Authorized Clients	Number of authorized clients associated with the radio.
Client Failures	Combined number of the following types of errors: <ul style="list-style-type: none"> ■ 802.1X failures ■ association failures ■ authentication failures ■ authorization failures
802.11 Packet Errors	Number of frames received by the MAP radio that had physical layer errors on the active channel. These errors can indicate interference from a non-802.11 device.
Non-802.11 PHY Errors	Number of times the radio detected energy on the active channel that either was not recognizable as an 802.11 frame, or was above the power level of background noise.
Re-transmits	Number of retransmitted packets sent from the client to the radio on the active channel. Retransmissions can indicate that the client is not receiving ACKs from the MAP radio.
Receiver Threshold	Radio's hearing sensitivity, in decibels (dB).
Noise Floor (dBm)	Received signal strength at which the MAP can no longer distinguish 802.11 packets from ambient RF noise. A value around -90 or higher is good for an 802.11b/g radio. A value around -80 or higher is good for an 802.11a radio. Values near 0 can indicate RF interference.



If the SNR, Associated Clients, or Receiver Threshold column is red, this indicates that the threshold configured for this parameter has been exceeded. (See "Changing Monitoring Settings" on page 500.)

When looking at graphed data, you can see the data in absolute or delta values.


Delta (rate of change) values are calculated with the following equation:

$$\frac{\text{value at end of polling interval} - \text{value at beginning of polling interval}}{\text{time difference (in seconds)}}$$

To change how you view data values, select **Absolute** to see absolute values or **Deltas** to see rate-of-change values.

Refreshing RF Trend Data


The data displayed in the RF Trends view is refreshed at regular intervals (every 5 minutes by default). The data is refreshed based on the specified polling interval. (See “Changing Monitoring Settings” on page 500.) You can also refresh the data on demand.

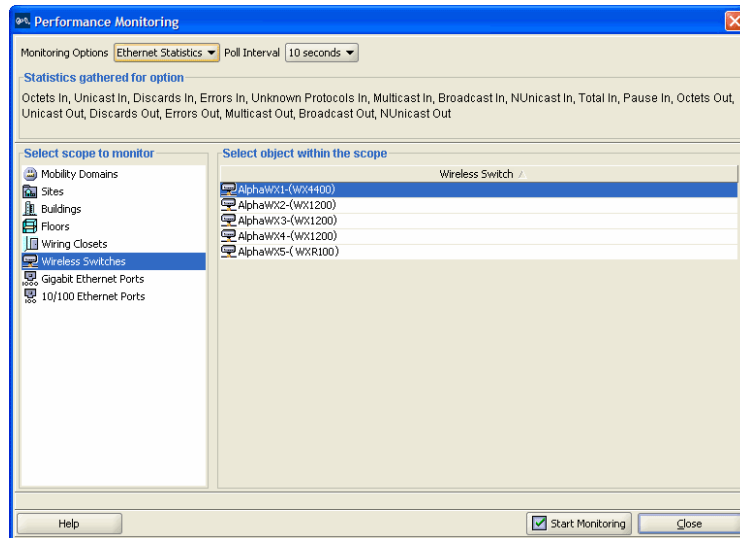
To refresh the data on demand, click the  (refresh) icon on the RF Trends view toolbar.

Accessing Realtime Performance Statistics

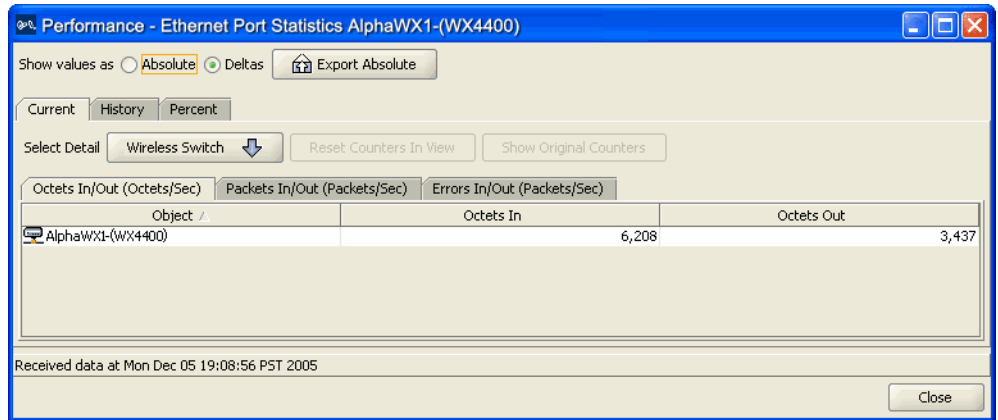
In addition to information supplied by 3WXM’s monitoring features, you can access performance statistics directly from the network.

To access performance statistics from the network

- 1 Do one of the following:
 - Select **Tools > Performance Monitor** from the toolbar in the main 3WXM window. The Performance Monitoring dialog box appears. Go to step 4.
 - Select an object in the Organizer panel, then right-click and select **Performance Statistics** and the type of statistics to monitor from the menu. The Performance Monitoring dialog box appears, with the scope and statistic type selected. Go to step 5.
 - In the Client Monitor window, click  on the window’s toolbar. Go to “Viewing Performance Data” on page 451.



- 2 Select the scope to monitor from the list on the left side of the dialog box.
- 3 Select the specific object(s) to monitor from the list on the right side of the dialog box.
 - To select multiple contiguous objects, click **Shift** while selecting.
 - To select multiple noncontiguous objects, click **Ctrl** while selecting.
- 4 Select the statistic type from the Monitoring Options box:
 - Ethernet Statistics
 - Ethernet Errors
 - EtherStats (packets per second by different packet lengths)
 - Radio Statistics
- 5 Select the polling interval from the Poll Interval box. The intervals available depend on the scope and statistic type you selected.
- 6 Click **Start Monitoring**. The Statistics dialog for your scope selection appears.



Generally, the scope is an aggregate object, which means that it is made up of sub-objects. (The exception is when a scope is a set of ports.) When you see performance data for the aggregate object, you are seeing the sum of the data of the sub-objects. For example, a WX consists of ports. Performance data for a WX is the sum of per-port performance data values.

- To change the level of detail, click the button next to Select Detail (the button text depends on what scope you selected), and select a level of detail from the list. (For more information, see “To see details for performance data” on page 452.)



If you make changes in the network plan that affect the object membership list (for example, you add a WX to a Mobility Domain and deploy it), the current monitoring session does not update this change. Stop the session, and restart performance monitoring for the scope.

For more information about viewing performance data, see “Viewing Performance Data” on page 451. For more information about exporting data, see “Exporting Performance Data” on page 455.

Viewing Performance Data

When looking at performance data in the Statistics tab, you can see the data in absolute or delta values.

Delta (rate of change) values are calculated with the following equation:

$$\frac{\text{value at end of polling interval} - \text{value at beginning of polling interval}}{\text{time difference (in seconds)}}$$

For example, if the number of octets in is 11,101,288 at the beginning of the polling period, the number of octets in is 11,146,904 at the end of the polling period, and the time difference is 60 seconds, the delta value is 760.267.

To change how you view data values, select **Absolute** to see absolute values or **Deltas** to see rate-of-change values.

Using the Statistics tab, you can see performance data in different formats:

- **Current data** — When the Statistics tab appears in the main 3WXM window, you see the current data in the Current tab. For more information, see “Viewing Current Data” on page 452.
- **Historical data** — You can see historical data in a line graph. For more information, see “Viewing Historical Data” on page 453.
- **Percentages** — You can see the data in percentages in a pie chart. For more information, see “Viewing Data in Percentages” on page 454.

Viewing Current Data

To see the current performance data, click the **Current** tab.

To sort data You can sort data in ascending or descending order to see the highest or lowest values at a glance. To sort data, click the title of the column whose data you want to sort. Click the column title again to toggle between ascending and descending order.

To see details for performance data You can see performance data for the objects in the scope you selected. For example, if you selected a Mobility Domain as the scope, you can see performance data for the Mobility Domain, WX switches in the Mobility Domain, or WX ports.

To see the objects available in the scope, click the button next to Select Detail (the button text depends on what scope you selected), and select the object whose performance data you want to see.

You can also select the category for the data you want to see by clicking the tab for the category:

- **Octets In/Out**
- **Packets In/Out**
- **Errors In/Out**

To reset counters in the current view For absolute values, you can reset the counters in the current view by clicking **Reset Counters In View**. Resetting counters applies to the current view only. The performance data continues to be collected. The view shows when you reset the counters.

To show the original counter values For absolute values, you can see the original counter values by clicking **Show Original Counters**. If you click **Show Original Counters**, the performance data values that were displayed since view reset are replaced with the current original counters.

Viewing Historical Data

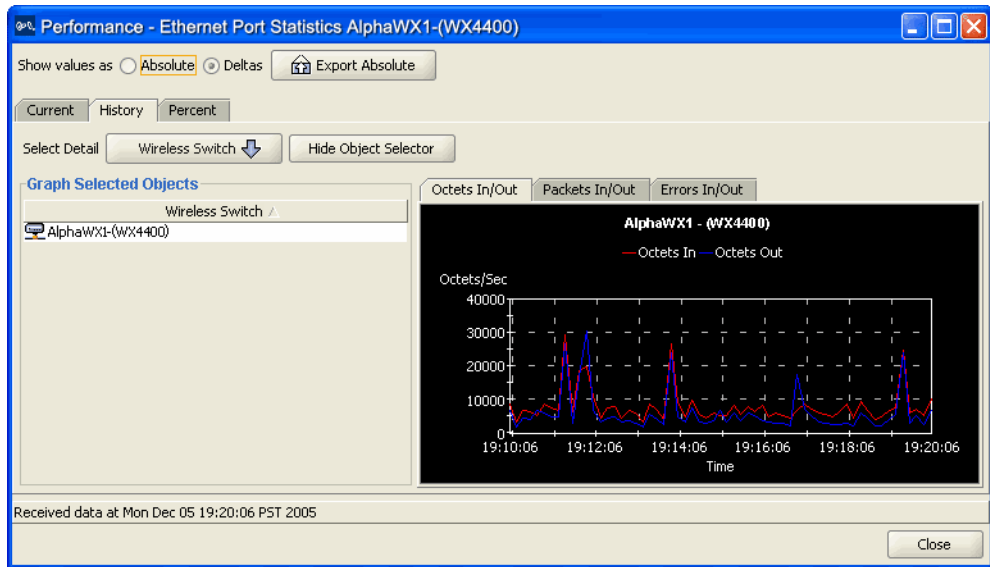
To see historical performance data in a graph, click the **History** tab. Graphing starts when you click the tab and is based on the polling interval you selected.

To see details for historical data You can see historical data for the objects in the scope you selected. For example, if you selected a Mobility Domain as the scope, you can see historical data for the Mobility Domain, WX switches in the Mobility Domain, or WX ports.

To see the objects available in the scope, click the button next to Select Detail (the button text depends on what scope you selected), and select the object whose historical data you want to see.

To hide the list of objects that you can graph, click **Hide Object Selector**. This allows you to see the graph in the full width of the Statistics tab in the View panel.

The following figure shows the historical data in delta values for the 10 minutes between 19:10:06 and 19:20:06. If the polling interval is 60 seconds, the graph is refreshed every 60 seconds, but the Time axis always spans 30 minutes.



Viewing Data in Percentages

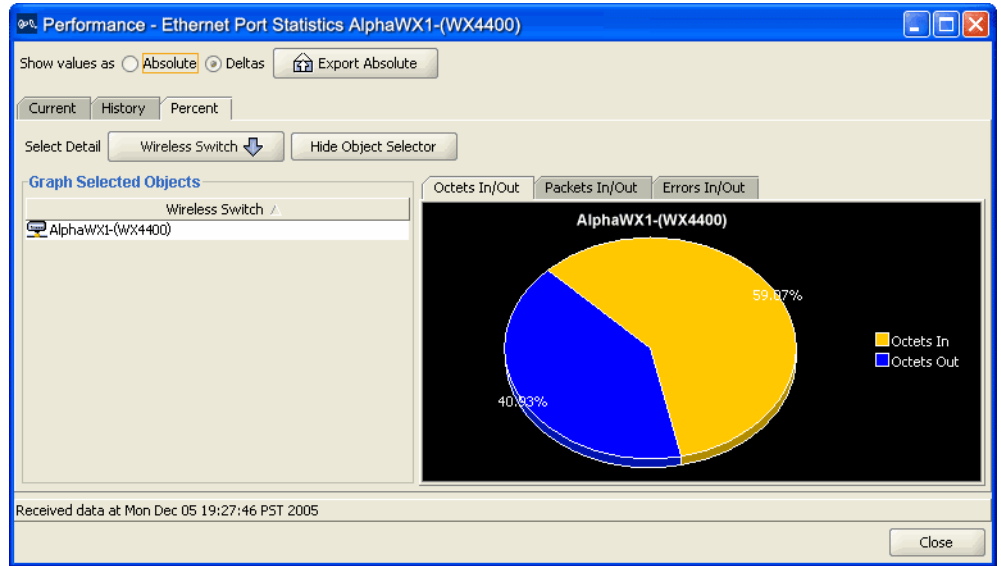
To see a set of objects in a particular category of data as percentages in a pie chart, click the **Percent** tab. Data for the pie chart is captured when you click the tab and is based on the polling interval you selected.

To see details for percentage-based performance data You can see percentage data for the objects in the selected scope. For example, if you selected a Mobility Domain as the scope, you can see percentage data for the Mobility Domain, WX switches in the Mobility Domain, or WX ports.

To see the objects available in the scope, click the button next to Select Detail (the button text depends on what scope you selected), and select the object whose percentage data you want to see.

To hide the list of objects that you can graph, click **Hide Object Selector**. Doing this allows you to see the graph in the full width of the Statistics tab.

The following figure shows the delta values for Octets In and Octets Out for the entire Mobility Domain as percentages in a pie chart.

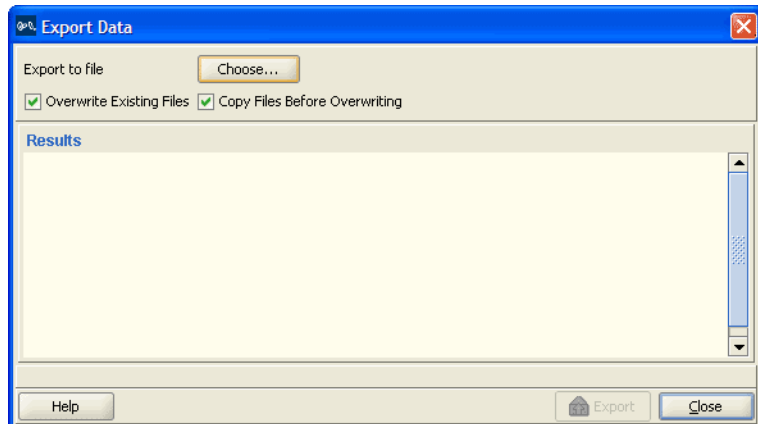


Exporting Performance Data

You can export performance data (absolute values only) to a file in comma-delimited text (.csv) format.

To export data to a file

- 1 In the Statistics tab, click **Export Absolute**.
The Export Data dialog box appears.



- 2 To specify a directory and name for the file, click **Choose**.
- 3 To overwrite existing files, select **Overwrite Existing Files**.
By default, this option is selected.
- 4 To make a copy of files before overwriting them, select **Copy Files Before Overwriting**.
By default, this option is selected. The existing file is copied to a file with a .bak extension.
- 5 Click **Export**.
You can see the progress in the Results box. The data is written to a comma-delimited file in the directory you specified.
- 6 To close the Export Data dialog box, click **Close**.

17

DETECTING AND COMBATTING ROGUE DEVICES

This chapter discusses how to manage rogue devices that try to use your wireless network. Information includes an overview of detection features, enabling countermeasures, using the Rogue Detection tab, displaying a rogue's geographical location, ignoring friendly third-party devices, and converting a rogue into a third party AP.

Overview

MAP radios automatically scan the RF spectrum for other devices transmitting in the same spectrum. The RF scans discover third-party transmitters in addition to other 3Com radios. MSS considers the third-party transmitters to be *devices of interest*, which are potential rogues.

You can display information about the devices of interest. To identify friendly devices, such as non-3Com access points in your network or neighbor's network, you can add them to the known devices list. You also can enable countermeasures to prevent clients from using the devices that truly are rogues.

With 3WXM, you also can display the physical location of a rogue device.

Rogue Detection Requirements

Rogue detection in 3WXM has the following requirements.

- The Enable Rogue Detection option must be selected on the Monitoring Settings tab of the 3WXM Services Setup dialog. (See “Changing Monitoring Settings” on page 500.)
- To use countermeasures, they must be enabled. You can enable them on an individual radio profile basis. (See “Viewing and Configuring Radio Profiles” on page 263.)
- SNMP notifications must be enabled on the WX switches. Table 58 lists the notification types related to RF detection. The notification types for Intrusion Detection System (IDS) and Denial of Service (DoS) protection are also listed. (To enable notifications on a switch, see “Configuring SNMP” on page 187.)

Table 58 SNMP Notifications for RF Detection

Notification Type	Description
Rogue detection notifications	
RogueDetect	Indicates that MSS has detected a rogue AP.
RFDetectRogueDisappear	Indicates that MSS is no longer detecting a previously detected rogue AP.
RFDetectInterferingRogueAP	Indicates that MSS has detected an interfering device.
RFDetectInterferingRogueDisappear	Indicates that MSS is no longer detecting a previously detected interfering device.
RFDetectAdHocUser	Indicates that MSS has detected an ad-hoc user.
RFDetectUnauthorizedSSID	Indicates that MSS has detected an SSID that is not on the permitted SSID list.
RFDetectUnauthorizedOUI	Indicates that MSS has detected a wireless device that is not on the list of permitted vendors.
RFDetectUnauthorizedAP	Indicates that MSS has detected the MAC address of an AP that is on the attack list.
IDS/DoS notifications	
For more information about IDS/DoS, see the “IDS and DoS Alerts” section in the “Rogue Detection and Countermeasures” chapter of the Wireless LAN Switch and Controller Configuration Guide .	
CounterMeasureStart	Indicates that MSS has begun countermeasures against a rogue AP.

Table 58 SNMP Notifications for RF Detection

Notification Type	Description
CounterMeasureStop	Indicates that MSS has stopped countermeasures against a rogue access point.
RFDetectSpoofedMacAP	Indicates that MSS has detected a wireless packet with the source MAC address of a 3Com MAP, but without the spoofed MAP's signature (fingerprint).
RFDetectSpoofedSSIDAP	Indicates that MSS has detected beacon frames for a valid SSID, but sent by a rogue AP.
RFDetectDoS	Indicates that MSS has detected a DoS attack other than an associate request flood, reassociate request flood, or disassociate request flood.
RFDetectDoSPort	Indicates that MSS has detected an associate request flood, reassociate request flood, or disassociate request flood.
RFDetectClientVARogueWiredAP	Indicates that MSS has detected, on the wired part of the network, the MAC address of a wireless client associated with a third-party AP.

To use countermeasures, they must be enabled. You can enable them on an individual radio profile basis. (See "Viewing and Configuring Radio Profiles" on page 263.)

Mobility Domain Requirement

RF Detection requires the Mobility Domain to be completely up. If a Mobility Domain is not fully operational (not all members are up), no new RF Detection data is processed. Existing RF Detection information ages out normally. Processing of RF Detection data is resumed only when all members of the Mobility Domain are up. If a seed switch in the Mobility Domain cannot resume full operation, you can restore the Mobility Domain to full operation, and therefore resume RF Detection data processing, by removing the inoperative switch from the member list on the seed.

Rogue Detection Lists

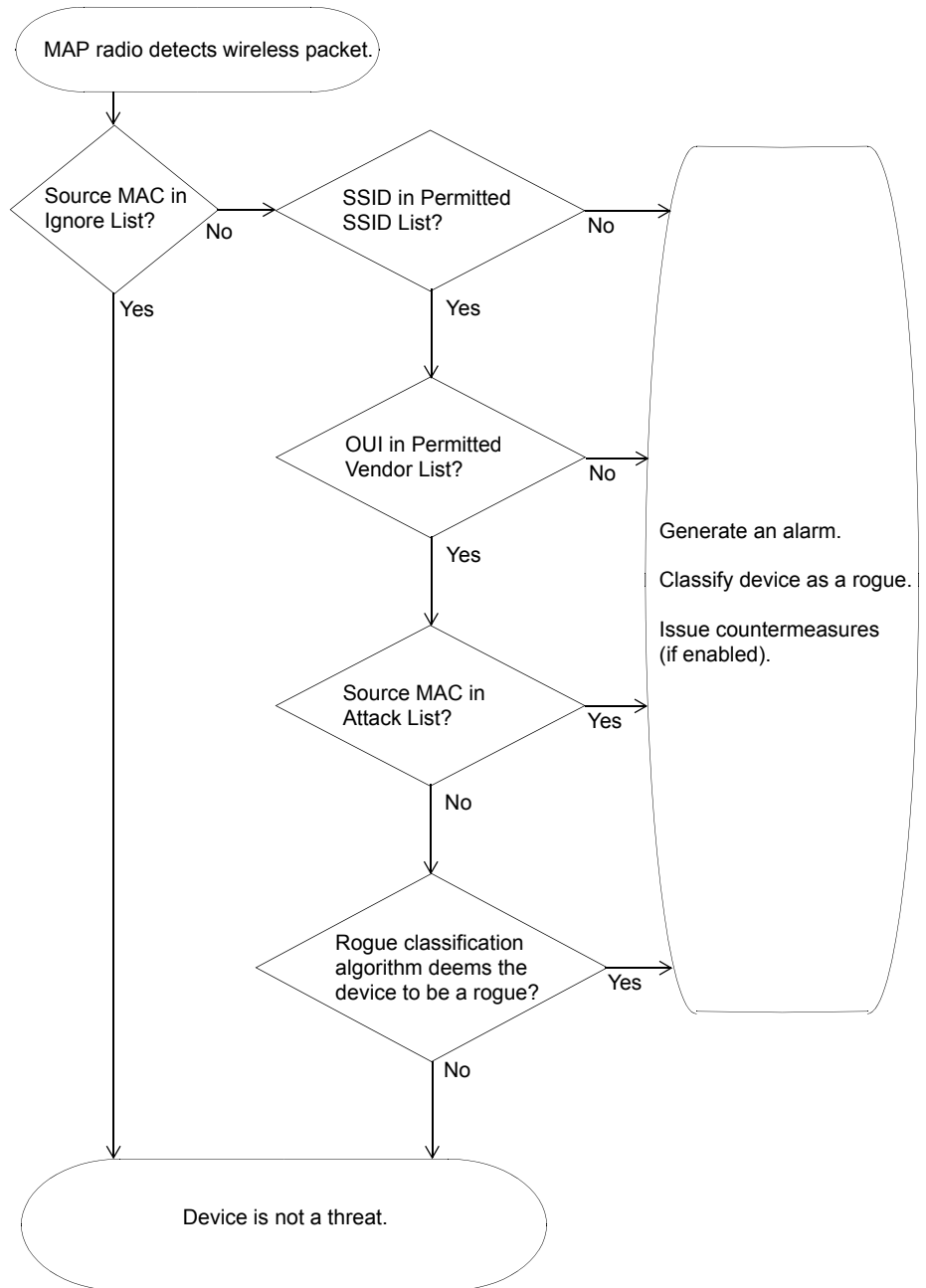
Rogue detection lists specify the third-party devices and SSIDs that MSS allows on the network, and the devices MSS classifies as rogues. You can configure the following rogue detection lists:

- Permitted SSID list—A list of SSIDs allowed in the Mobility Domain. MSS generates a message if an SSID that is not on the list is detected.
- Permitted vendor list—A list of the wireless networking equipment vendors whose equipment is allowed on the network. The vendor of a piece of equipment is identified by the Organizationally Unique Identifier (OUI), which is the first three bytes of the equipment's MAC address. MSS generates a message if an AP or wireless client with an OUI that is not on the list is detected.
- Client black list—A list of MAC addresses of wireless clients who are not allowed on the network. MSS prevents clients on the list from accessing the network through a WX switch. If the client is placed on the black list dynamically by MSS due to an association, reassociation or disassociation flood, MSS generates a log message.
- Ignore list—A list of third-party devices that you want to exempt from rogue detection. MSS does not count devices on the ignore list as rogues or interfering devices, and does not issue countermeasures against them.

An empty permitted SSID list or permitted vendor list implicitly allows all SSIDs or vendors. However, when you add an entry to the SSID or vendor list, all SSIDs or vendors that are not in the list are implicitly disallowed. An empty client black list implicitly allows all clients, and an empty ignore list implicitly considers all third-party wireless devices to be potential rogues.

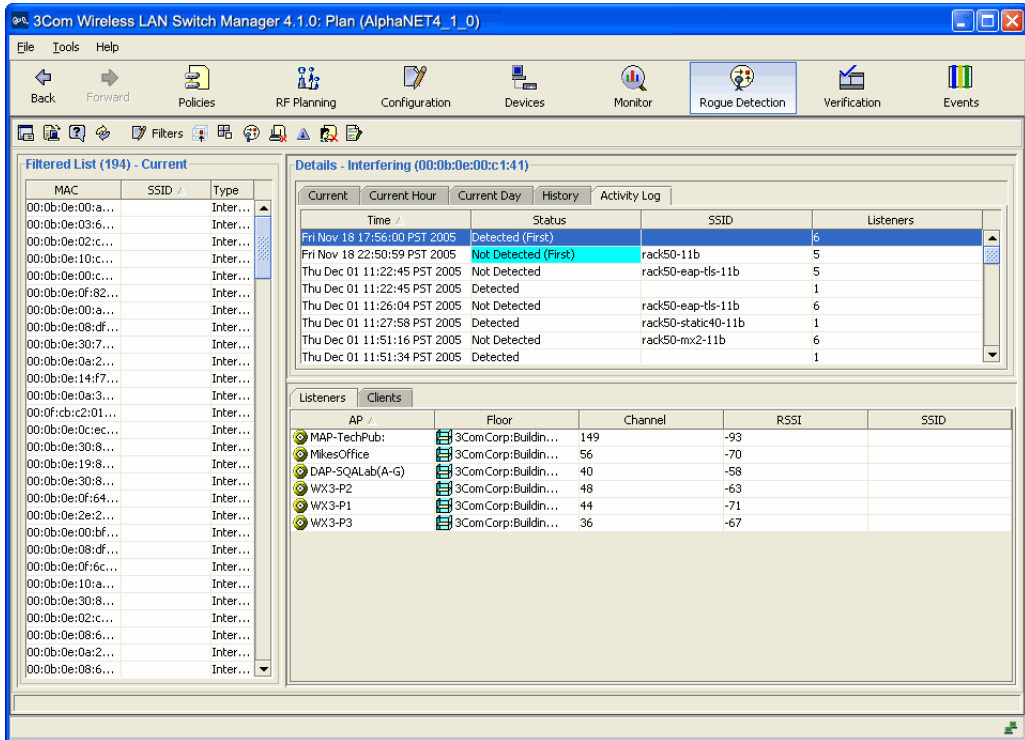
All the lists except the black list require manual configuration. You can configure entries in the black list and MSS also can place a client in the black list due to an association, reassociation or disassociation flood from the client.

The rogue classification algorithm examines each of these lists when determining whether a device is a rogue. The following figure shows how the rogue detection algorithm uses the lists.



Using the Rogue Detection Screen

To display rogue information, select the Rogue Detection option in the main 3WXM tool bar.



The Rogue Detection screen lists information about the rogue devices detected in the network. The rogue list section lists all rogues detected within the time period specified in the filter section. To display information about a rogue, select the rogue. Detailed information appears in the rogue details section of the screen.

The rogue details section contains the following tabs:

- Current, Current Hour, Current Day, and History** — List rogues detected during the most-recent polling interval, the most-recent hour, the most-recent day, or detected farther back in the past.

- **Activity Log** — Lists activity (appearance or disappearance) of the rogue selected in the rogue list.

The entries in the Activity Log tab come from either of the following sources:

- Notification data received from a switch
- 3WXM Services, if they detect the appearance or disappearance of the rogue when compared to the previous set of rogue data

3WXM Services keeps events in a circular log. Once the log becomes full, 3WXM Services purges old entries to make room for new ones. However, 3WXM Services never purges the entries for the first appearance and first disappearance of a rogue.

Toolbar Options

The Rogue Detection tab has a toolbar. Table 59 lists the options on the toolbar.

Table 59 Toolbar Options on Rogue Detection Screen













Icon	Description
	Edit 3WXM preferences.
	Configure 3WXM Services.
	Launch Help.
	Refresh the information.
 Filters	Opens the Rogue List Filter Options dialog box, which enables you to filter the rogue list.
	Displays the rogue's location on the floor plan. (See "Displaying a Rogue's Geographical Location" on page 468.)
	Displays the location on the floor plan of clients associated with the rogue.
	Adds the selected MAC address to the ignore list and removes it from the rogue list.
	Adds the selected MAC address to the attack list. If countermeasures are enabled, MAP radios start using them against the device.
	Changes the selected MAC address from a rogue into a third-party AP.


Table 59 Toolbar Options on Rogue Detection Screen (continued)

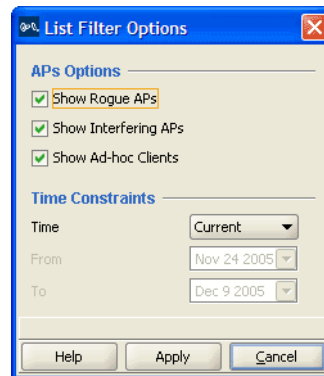
Icon	Description
	Adds the clients of the selected MAC address to the client black list. MSS prevents clients on the list from accessing the network through a WX switch.
	Opens the Rogue Details Report dialog box, which allows you to generate a report on the selected rogue.

Filtering the Rogue List

By default, the rogue list contains all rogues detected during the most-recent polling interval, in all Mobility Domains in the network plan. You can change the filter criteria for which rogues are listed.

To filter the rogue list

- 1 Click the  **Filters** icon on the Rogue Detection screen's toolbar. The Rogue List Filter Options dialog box appears.



- 2 Select the type of entries you want to display:
 - **Rogue APs**—APs that are on the 3Com network but do not belong there.
 - **Interfering APs**—Devices that are not part of the 3Com network but also are not rogues. No clients connected to these devices have been detected communicating with any network entity listed in the forwarding database (FDB) of any WX switch in the Mobility Domain. Although interfering devices are not connected to your network, they might be causing RF interference with MAP radios.

- **Ad-hoc clients**—Wireless clients who are configured to communicate wirelessly outside of the network infrastructure. Ad-hoc clients are not necessarily malicious, but they do steal bandwidth from your infrastructure users.

Ad-hoc clients are further categorized into rogues and interfering devices. The word *Rogue* or *Interfering* appears in parentheses next to the word *Ad-hoc*.

By default, all these entry types are displayed.

- 3 Select the period by which you want to filter the list from the Filter By listbox:
 - **Current**—Lists the rogues detected during the most-recent polling interval. Go to step 5.
 - **Current Hour**—Lists the rogues detected during the most-recent hour. Go to step 5.
 - **Current Day**—Lists the rogues detected during the most-recent day. Go to step 5.
 - **History**—Lists the rogues detected during a specific date range. Go to step 4.
- 4 To change the start and end dates for the History interval, edit the values in the boxes or click on the down arrows next to From and To to display calendars and select the dates.
- 5 Click **Apply**. 3WXM replaces the rogue list with the set of rogues detected during the period you selected.

Displaying Rogue Details

To display details for a rogue, select the rogue in the rogue list. Details are displayed in the tabs in the right portion of the Rogue Detection tab.

Current, Current Hour, Current Day, and History Tabs

The Current, Current Hour, Current Day, and History tabs show rogues detected in the past.

- **Current** — Lists the rogues observed during the most-recent polling intervals.
- **Current Hour** — Lists the rogues observed during the most-recent hour.
- **Current Day** — Lists the rogues observed during the most-recent day.
- **History** — Lists the rogues observed during the most-recent 30-day period.

Each rogue is listed only once, even if multiple entries for the rogue appear in the Activity Log tab. For example, if a rogue is detected during three polling intervals, separate entries for each polling interval appear in the Activity Log. However, at the end of the hour, when the activity data is consolidated and moved to the Current Hour tab, only one entry appears on that tab for the rogue.

On each tab, the Polled Results column lists the time when the data was received from the monitoring service.

Activity Log Tab

The Activity Log tab lists the appearance and disappearance of the selected rogue, the rogue's SSID, and the number of MAP radios that detected the rogue or its disappearance.

Table 60 lists the information displayed in the Activity Log tab.

Table 60 Activity Log Columns

Column	Description
Time	Time when 3WXM client received updated information from the monitoring service.
Status	Status change of the rogue: <ul style="list-style-type: none"> ■ Detected—The rogue appeared. ■ Not Detected—The rogue disappeared.
SSID	SSID of the rogue.
Listeners	Number of MAP radios that detected the rogue or noted its absence.

Listeners Tab

The Listeners tab lists listener details for each appearance or disappearance of the selected rogue. To display listener information for a rogue, select the rogue in the Filtered List.

Table 61 lists the information displayed in the Listeners tab.

Table 61 Listeners Columns

Column	Description
MAP	MAP whose radio detected the rogue or noted its absence. This column has data only if the radio that detected the rogue or its disappearance is modeled in a floor plan.
Floor	Floor on which the rogue was detected or disappeared, if the network plan contains floor information. Note — This column has data only if the radio that detected the rogue or its disappearance is modeled in a floor plan.
Channel	Channel on which the rogue was detected or disappeared.
RSSI	Strength of the signal received by the listener from the rogue.
SSID	SSID of the rogue.

Clients Tab

The Clients tab lists details about the clients of rogue devices. To display client information for a rogue, select the rogue in the Filtered List.

Table 62 lists the information displayed on the Clients tab.

Table 62 Client Columns

Column	Description
Client	MAC address of the client.
Vendor	Manufacturer of the client.
Channel	Channel the client is on.
SSID	SSID the client is associated with.


Displaying a Rogue's Geographical Location



If building and floor information for the site is modeled in the network plan, you can display the likely physical location of a rogue. 3WXM displays the floor plan for the floor where the rogue is believed to be located, and displays the areas where the rogue is probably located.

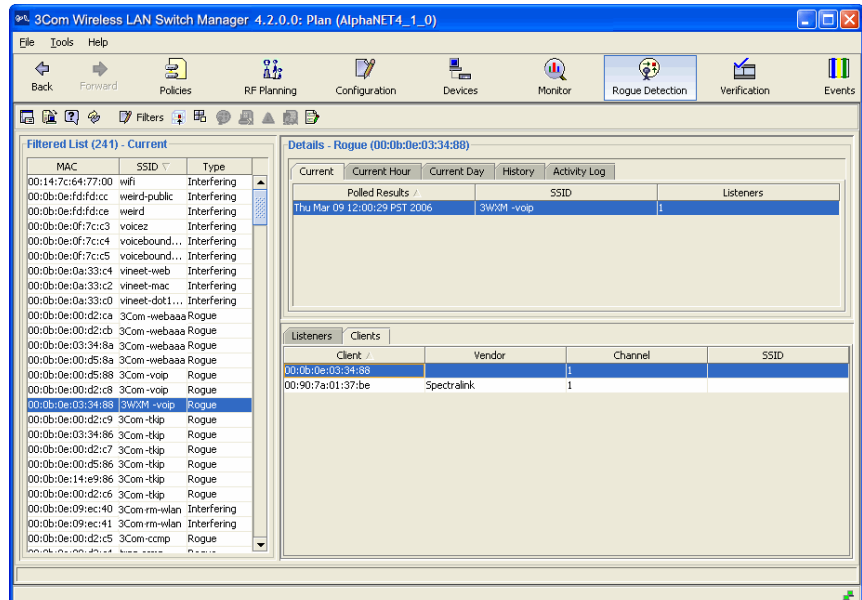
This option displays the likely location of the rogue when the data was collected by the monitoring service from the Mobility Domain's seed WX switch. If the rogue has moved since then, the location information will not be current.

To display the location of a rogue within a site

- 1 Select the rogue in the rogue list.
- 2 Click  on the toolbar. The Location tab appears, next to the details tab. The likely location of the rogue is indicated by color. The legend beneath the floor view indicates the likelihood represented by each color. The number in red on the legend is the probability that the rogue is where the display indicates.


To display the location of a client associated with the rogue:

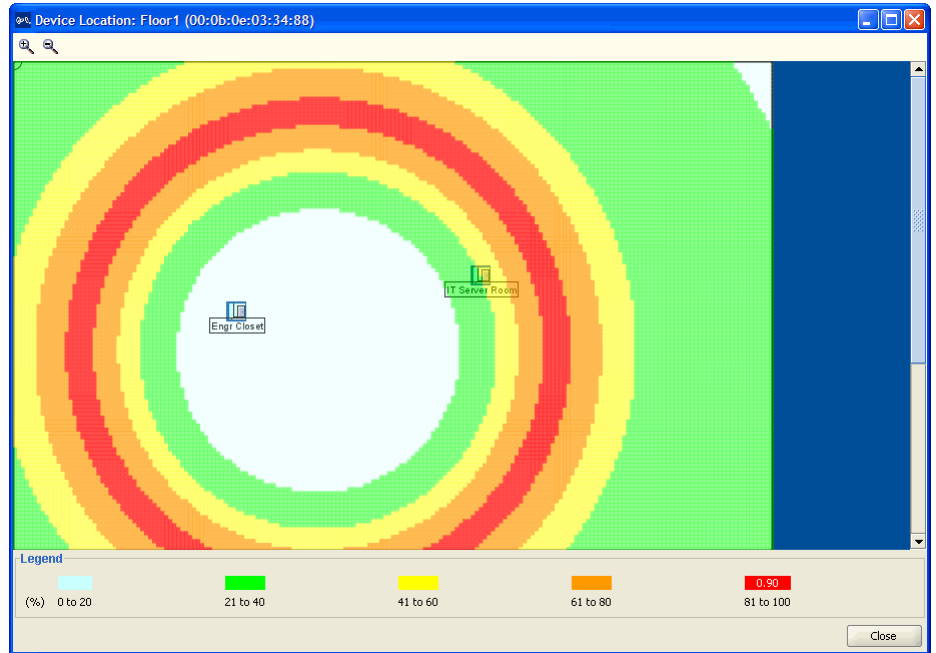
- 1 Select the rogue in the rogue list. A list of the clients associated with the rogue appears under the Clients tab.



MAC	SSID	Type
00:14:7c:64:77:00	wifi	Interfering
00:0b:0e:fd:fd:cc	weird-public	Interfering
00:0b:0e:fd:fd:ce	weird	Interfering
00:0b:0e:0f:7c:c3	voicez	Interfering
00:0b:0e:0f:7c:c4	voicebound...	Interfering
00:0b:0e:0f:7c:c5	voicebound...	Interfering
00:0b:0e:0a:33:c4	vineet-web	Interfering
00:0b:0e:0a:33:c2	vineet-mac	Interfering
00:0b:0e:0a:33:c0	vineet-dot1...	Interfering
00:0b:0e:00:d2:ca	3Com-webaaa	Rogue
00:0b:0e:00:d2:cb	3Com-webaaa	Rogue
00:0b:0e:03:34:8a	3Com-webaaa	Rogue
00:0b:0e:00:d5:8a	3Com-webaaa	Rogue
00:0b:0e:00:d5:88	3Com-voip	Rogue
00:0b:0e:00:d2:c9	3Com-voip	Rogue
00:0b:0e:03:34:88	3WXM-voip	Rogue
00:0b:0e:00:d2:c9	3Com-tkip	Rogue
00:0b:0e:03:34:86	3Com-tkip	Rogue
00:0b:0e:00:d2:c7	3Com-tkip	Rogue
00:0b:0e:00:d5:86	3Com-tkip	Rogue
00:0b:0e:14:e9:86	3Com-tkip	Rogue
00:0b:0e:00:d2:c6	3Com-tkip	Rogue
00:0b:0e:09:ec:40	3Com-vm-wlan	Interfering
00:0b:0e:09:ec:41	3Com-vm-wlan	Interfering
00:0b:0e:00:d2:c5	3Com-cmp	Rogue

Client	Vendor	Channel	SSID
00:0b:0e:03:34:88		1	
00:90:7a:01:37:be	Spectralink	1	

- 2 Select the client under the Clients tab.
- 3 Click  on the toolbar. The Device Location screen appears, indicating the approximate location of the client.




The client is most likely in the vicinity of the area indicated by the red squares in the floor plan. The number in red on the legend (0.90 in this example) is the probability (90%) that the client is where the display indicates.

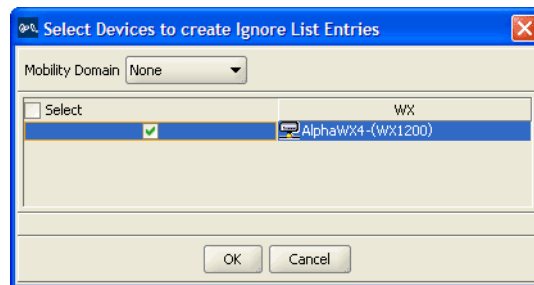
Ignoring Friendly Third-Party Devices

By default, when countermeasures are enabled, MSS considers any third-party transmitter to be a rogue device and can send countermeasures to prevent clients from using that device. To prevent MSS from sending countermeasures against a friendly device, add the device to the ignore list.

Each WX switch has its own ignore list. You can add an address to the ignore list of one or multiple switches.

To add a device to the ignore list


- 1 In the Filtered List of rogues on the Rogue Detection tab, select the devices you want to add to the ignore list.
- 2 Click  on the toolbar. The Select Devices to Create Ignore List dialog is displayed.



- 3 If the switch(es) on which you are configuring the ignore list are in a Mobility Domain, select the Mobility Domain. Otherwise, select **None**.
- 4 Click **Next** to select to select all the switches that are listed, or click **Next** to individual switches to select them.
- 5 Click **OK**. The devices are added to the ignore list and disappear from the Filtered List of rogues.

Adding a Device to the Attack List

An attack list is a switch's list of AP MAC addresses to attack whenever they are present on the network.

- 1 In the Filtered List of rogues on the Rogue Detection screen, select the devices you want to attack.
- 2 Click  on the toolbar. The Select Devices dialog is displayed.
- 3 If the switch(es) on which you are configuring the attack list are in a Mobility Domain, select the Mobility Domain. Otherwise, select **None**.
- 4 Click **Next** to select all the switches that are listed, or click **Next** to individual switches to select them.
- 5 Click **OK**. The devices are added to the attack list. If countermeasures are enabled, MSS uses them to attack the devices on the list.

Converting a Rogue into a Third Party AP


If a device in the rogue list belongs to a third-party AP in your network, you can convert the rogue into a third-party AP. When you convert a rogue into a third-party AP, the rogue disappears from the rogue list.

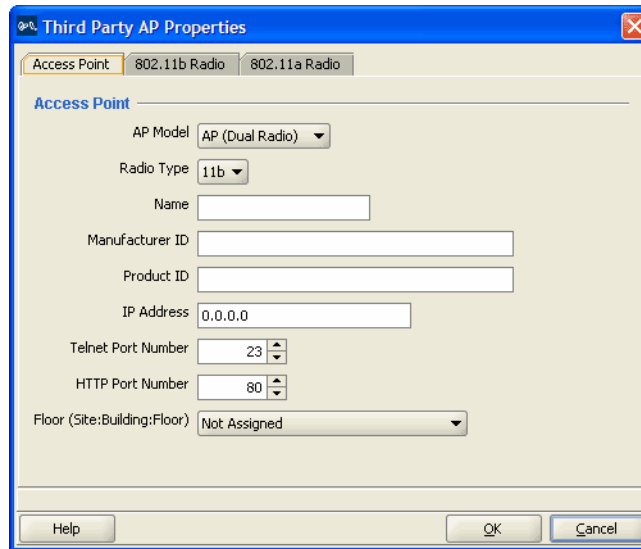


Converting a rogue into a third-party AP applies only to the network plan, in 3WXM. 3WXM does not send this information in any form to the WX switches in the network. To prevent MSS from issuing countermeasures against a third-party AP, you must also add the AP to the ignore list. 3WXM does send the ignore list to the WX switches in the network.

To convert a rogue into a third-party AP

To convert a rogue into a third-party AP, use the following procedure.

- 1 Select the rogue in the rogue list.
- 2 Click  on the toolbar. The Third Party AP Properties dialog is displayed.



- 3 Enter the information for the AP and place the icon for the AP in its floor location, if applicable. (See “Placing Third-Party Access Points” on page 130.) When you have finished, the AP appears under Objects to Place in RF Planning.

To display the list

Select the Configuration option in the main 3WXM tool bar and click on Third Party APs in the Organizer panel. The third-party APs are listed in the Content panel.


To remove a third-party AP

- 1 Select the Configuration option in the main 3WXM tool bar and click on Third Party APs in the Organizer panel. The third-party APs are listed in the Content panel.
- 2 Select on the third-party AP you want to remove and click the Delete button.

The address is removed from the third-party AP list. If the device is detected by rogue detection, the device appears in the rogue list. Set the display filter of the Rogue Detection screen to Current and click the Refresh option on the toolbar.

Adding a Rogue's Clients to the Black List

The client black list is a switch's list of MAC addresses of wireless clients who are not allowed on the network. MSS prevents clients on the list from accessing the network through a WX switch.

- 1 In the Filtered List of rogues on the Rogue Detection tab, select the rogues whose clients you want to place on the black list.
- 2 Click  on the toolbar. The Select Devices dialog is displayed.
- 3 Select the clients you want to add to the black list.
- 4 If the switch(es) on which you want to enforce the black list are in a Mobility Domain, select the Mobility Domain. Otherwise, select None.
- 5 Click next to Select to select all the switches that are listed, or click next to individual switches to select them.
- 6 Click **OK**. The selected clients are added to the attack list. MSS drops all packets from these clients.

Configuring RF Detection Options from the Organizer Panel

Although the Rogue Detection toolbar options provide the simplest way to configure rogue detection features, you also can configure them on an individual switch basis. To configure rogue detection settings for a switch, see "Viewing and Changing RF Detection Settings" on page 282.

18

OPTIMIZING A NETWORK PLAN

After you deploy a network plan to the 3Com equipment in your live network, you can optimize the plan based on RF information from the network. The RF information can be from a site survey or from MAP radios.

- Site survey—RF measurements come from a site survey file generated by the Ekahau Site Survey™ tool. Save the file in comma-separated values (csv) format and import the file into 3WXM.
- MAP radios—RF measurements come from the MAPs in the network.

Optimizing your network plan improves the accuracy of the model and provides more precise results when you visualize wireless coverage, locate users and rogue devices, and so on. You also can use optimization to find and fill coverage holes.

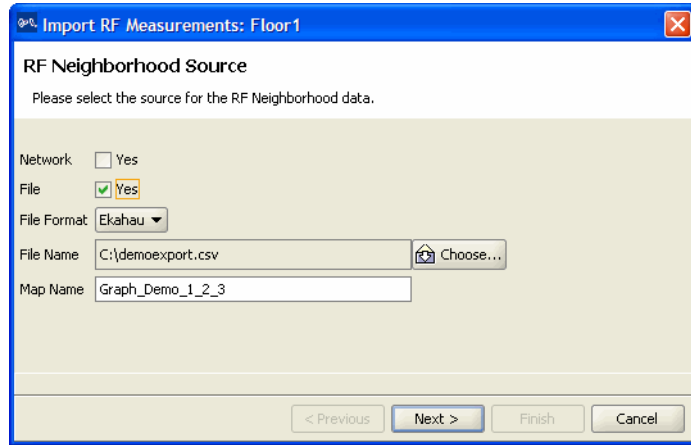
Importing RF Measurements

To import RF measurements, you need to import the measurements from MAP radio in the network, from a site survey file, or both. Then, update the RF obstacle data.

Importing the Measurements

To import the measurements:

- 1 Select the RF Planning option in the main 3WXM tool bar.
- 2 Display the floor plan in the Content panel.
- 3 In the Task List panel, click **RF Planning**.
- 4 Under Site Survey, click **Import Measurement**. The Import RF Measurements wizard is displayed.



- 5 You can choose to import measurements from the network, a site survey file, or both:
 - a If you want to use RF neighborhood information imported from a MAP in the network, click **Yes** next to Network.
 - b If you want to import measurements from a site survey file, click **Yes** next to File, and in the File Format listbox, select **Ekahau**. Then click **Choose** to navigate to the csv file that contains the RF measurement data.
- 6 In the Map Name field, specify the map name.



The map name must match the name specified in the site survey work order, and must be the same map name used in the site survey tool.

- 7 Click **Next**.

The import progress is displayed. When the import is done, check the *Total valid RF measurements found* line in the progress messages.

- If the number is greater than 0, 3WXM successfully imported measurements.
- If the number is 0, no measurements were imported. Try the import again and verify that the map name is correct.

Applying the RF Measurements to the Floor Plan

To apply the RF measurements to the floor plan:

- 1 Under Site Survey in the Task List panel, click **Optimize**.

A wizard appears, listing the progress of the request.

- The *Total number of RF measurements that did not intersect any object* line lists the number of measurements that did not experience attenuation due to an RF obstacle in the path between them.

If the measurements came from a site survey file, they are measurements between the portable AP (LOS point) and the PC running the site survey tool. If the measurements came from MAP radios in the network, they are measurements between MAP radios.

- The *Total number of objects that will be corrected* line indicates the number of measurements that did experience attenuation. For existing RF objects, 3WXM corrects the attenuation to match the results.

For RF obstacles created by 3WXM, the description is **auto-generated** and the obstacle type is **Other**. You can edit these values by selecting the obstacle, clicking the Edit properties icon to open the Modify RF Obstacle wizard, and modifying the values. Click **OK** to close the wizard and save the changes. (See "To use the Create RF Obstacle Dialog box" on page 96. The wizard is the same whether it is labeled Create or Modify.)

- 2 Click **Finish**.

If the imported RSSI values do not match the values predicated by 3WXM, 3WXM looks for an RF obstacle in the plan that might be causing attenuation, and adjusts its attenuation value in the plan so that the predicted RSSI matches the measured RSSI. However, the following should be noted:

- The Optimize feature adjusts attenuation values only if the network plan has an RF obstacle in the line of sight between measurement points (for example, between MAPs that made the measurements). 3WXM does not create an obstacle to account for the RSSI if one does not already exist.
- Only one obstacle between any two measurement points is adjusted, even if there are multiple obstacles between the measurement points.

The measurements reflect how well the measuring MAPs can hear one another, and do not directly measure how well clients can hear the MAPs. For example, if the MAPs are mounted on the ceiling, attenuation of their signals to one another might be less than the attenuation of the same signals when received by clients on desktops in cubicles and offices.

Locating and Fixing Coverage Holes

After you import RF measurements and optimize, you can look for coverage holes by displaying coverage.

Locating a Coverage Hole

To locate a coverage hole:

- 1 Select the RF Planning option in the main 3WXM tool bar.
- 2 Display the floor plan in the Content panel.
- 3 In the Task List panel, click RF Planning.
- 4 In the Show RF coverage using listbox, select how you want to display the coverage:
 - Baseline Association Rate—Coverage is shown based on the MAP radio baseline association rate. The baseline association rate is the typical data rate the radio is expected to support for client associations. (The baseline association rate is specified during planning, on a coverage area basis.)
 - Data Rate—Coverage is shown in colored bands that represent each of the data transmit rates supported by the radio. These rates are standard for each radio type.
 - RSSI—Coverage is shown based on the received signal strength indication (RSSI) of the radio's signal heard by other radios.
- 5 In the Coverage Areas section of the Organizer panel, select the scope for which you want to display coverage. You can display coverage for an individual radio, a specific coverage area, or all coverage areas on the floor.
 - To select multiple contiguous objects, click **Shift** while selecting.
 - To select multiple noncontiguous objects, click **Ctrl** while selecting.

6 On the toolbar, click the radio type for which you want to display coverage:



Displays 802.11a coverage for the selected scope(s).



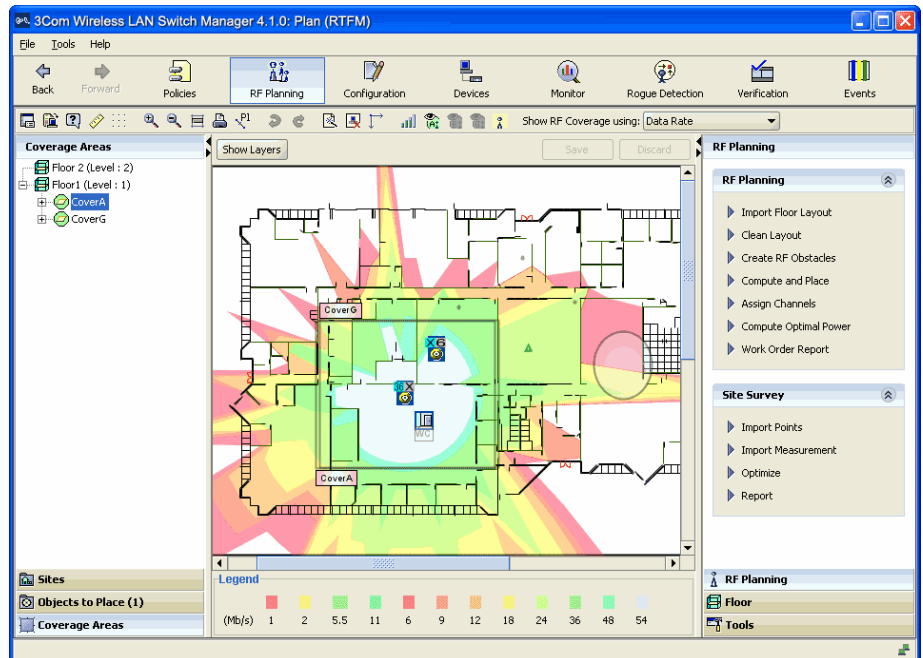
Displays 802.11b coverage for the selected scope(s).



Displays 802.11g coverage for the selected scope(s).

You also can show coverage by right-clicking on the scope in the Coverage Areas section, then selecting **Show RF Coverage**.

Coverage for the selected scope(s) is displayed. This example shows 802.11a coverage, by transmit data rate, for the coverage area CoverA.



To hide coverage again, right-click on the scope in the Coverage Areas section and select **Hide RF Coverage**.

Fixing a Coverage Hole

After you import RF measurements, optimize, and display coverage, you can observe any wireless coverage holes in the network. To fix a coverage hole, use any of the following methods:

- Lock the MAPs in place, and use the Compute and Place task to recompute the number of MAPs needed and their recommended placement. If this results in new MAPs being added, install the new MAPs.
- Install new MAPs and add them to the network plan. Using this method, you install the new MAP first, then integrate it into your network plan.

Computing and Placing New MAPs

The procedure for computing and placing new MAPs is the same as the procedure you use for initial planning. Make sure you lock the existing MAPs in place before you compute and place the new MAPs. (See “Computing MAP Placement” on page 136.)

Adding New MAPs that Are Already Installed to the Network Plan

If you installed a new MAP in the network and you want to add it to the network plan, do the following:

- 1 Select the Verification option in the main 3WXM tool bar, click the Network Verification tab, and upload the MAP configuration into 3WXM. (See “Verifying Configuration Changes” on page 363.)
- 2 Select the RF Planning option in the main 3WXM tool bar and display the floor plan in the Content panel.
- 3 In the Coverage Areas section, right-click on the coverage area for which the MAP is providing coverage, and select **Edit Properties**. The Coverage Area Properties dialog appears.
- 4 Click the **Associations** tab.
- 5 Select the MAP in the Available Access Points group box and click the **Add** button to move the MAP to the Current Access Points group box.
- 6 Click **OK** to save the changes and close the dialog box.
- 7 Click on Objects to Place in the Organizer panel.
- 8 Click on the MAP icon, then click on the location where you installed the MAP. The MAP icon moves from the Objects To Place tab to its location on the floor.

A

CHANGING 3WXM PREFERENCES

This chapter discusses how to set 3Com Wireless LAN Switch Manager (3WXM) client preferences. It describes how to reset preferences values and change options for network synchronization, user interface, persistence, tools, certificate management, RF planning, and 3WXM logging.

Overview

You can set 3WXM preferences for a user session on the system on which 3WXM is installed. The preferences you set are valid only for that user on that system.



This chapter describes how to change 3WXM client preferences. To change monitoring service preferences, see "Changing 3WXM Services Preferences" on page 491.

To change 3WXM preferences, in the main 3WXM window, select **Tools > Preferences**.

Resetting Preferences Values

You can reset the preferences values to their default values by doing one of the following:

- To reset the values for a tab, click the tab to display it, and click **Reset**. (Each tab has a **Reset** button.)
- To reset all preferences for all tabs, click **Reset All**.

Changing Network Synchronization Options

By default, 3WXM checks for configuration changes, events, and status changes on WX switches. You can configure checking (also called *polling*) for configuration changes in the network made with the CLI, Web Manager, or another instance of 3WXM.

If you do not enable this option, you still can manually synchronize 3WXM with WX switches using the Devices tab. (Select the Devices option from the toolbar in the main 3WXM window. See “Synchronizing Local and Network Changes” on page 350.)

To change network options

- 1 Select **Tools > Preferences**. The Preferences dialog box appears.
- 2 Click the **Network** tab.
- 3 To set the amount of time that 3WXM waits for a connection to be established to a WX before trying to connect again, specify the timeout (1 to 30 seconds) in the Connect Timeout box. The default is 5 seconds.
- 4 To set the number of times (0 to 5) 3WXM tries to reconnect to the WX after the original attempt, specify the value in the Retry Count box. The default is 3 times.

For example, if the retry count is **3**, 3WXM attempts to establish a connection to a WX four times. If you specify **0**, 3WXM does not attempt to establish a connection if the first attempt is unsuccessful.

- 5 Click **Close** to close the Preferences dialog box, or click another tab to continue making changes.

Changing User Interface Options

You can change the following user interface options:

- Confirmation prompt when closing wizard pages
- Window style for exploring the topological view in the main 3WXM window
- Size of icons in 3WXM
- Placement of the wizard index in wizard dialog boxes

To change 3WXM user interface options:

- 1 Select **Tools > Preferences**. The Preferences dialog box appears.
- 2 Click the **UI** tab.

- 3 To enable a confirmation prompt after you close a wizard, select the **Warn** checkbox.

To disable the confirmation prompt, clear the **Warn** checkbox. By default, if you close a wizard, a pop-up box appears, asking whether you want to close the wizard. (Changes are lost if you close the wizard.)



*If you click **Cancel** to close a wizard, you do not get a confirmation prompt. If you make changes in a wizard and click **Cancel**, all changes are lost. To save changes in a wizard, click **Finish**.*

- 4 Within Window Style, select one of the following:
 - **Single** — Show the view in one window when you explore the topology in the main 3WXM window. This is the default setting.
 - **Multiple** — Show the topology in multiple windows.
- 5 Within Icon Size, select one of the following:
 - **16x16** — Change all icons to 16x16 pixels. This is the default setting.
 - **20x20** — Change all icons to 20x20 pixels.
 - **24x24** — Change all icons to 24x24 pixels.
- 6 Within Show Wizard Index, select one of the following:
 - **On Top** — See the wizard index at the top of wizard dialog boxes. This is the default setting.
 - **On Left** — See the wizard index on the left of wizard dialog boxes.
- 7 Click **Close** to close the Preferences dialog box, or click another tab to continue making changes.

Changing Persistence Options

3WXM can send messages to users who have a network plan open with monitor access when a user with administrator access saves a change to the plan or releases the lock by closing the plan. By default, these messages are enabled with a notification interval of one minute.

To change the plan change notification options:

- 1 Select **Tools > Preferences**. The Preferences dialog box appears.
- 2 Click the **Persistence** tab.
- 3 To disable change notification, clear the **Plan Change Notification** checkbox.
- 4 Click **Close** to close the Preferences dialog box, or click another tab to continue making changes.

Changing Tools Options

You can change the Telnet and Web browser applications that start from the 3WXM Tools menu. The default Telnet application is Microsoft Telnet Client. The default Web browser is Microsoft Internet Explorer.

To change tools options:

- 1 Select **Tools > Preferences**. The Preferences dialog box appears.
- 2 Click the **Tools** tab.
- 3 To change the Telnet executable file or location used by 3WXM, type the path of the executable file in the Telnet Executable box.
The default Telnet executable file is C:\WINDOWS\system32\telnet.exe.
You can also click **Browse** to navigate the computer filesystem.
- 4 To change the Web browser executable file or location used by 3WXM, type the path of the executable file in the Browser Executable box.
The default Web browser executable file is C:\Program Files\Internet Explorer\iexplore.exe.
You can also click **Browse** to navigate the computer filesystem.
- 5 Click **Close** to close the Preferences dialog box, or click another tab to continue making changes.

Changing Certificate Management Options

By default, 3WXM does not accept self-signed certificates from WX switches or from the monitoring service. You can change this option in the Preferences dialog box. (For more information about certificate handling, see “Managing Certificates” on page 369 and “Certificate Check” on page 495.)

To change certificate management options:

- 1 Select **Tools > Preferences**. The Preferences dialog box appears.
- 2 Click the **Certificate Handling** tab.
- 3 To automatically accept self-signed certificates, select **Always accept self-signed certificates**.
To clear this option, clear **Always accept self-signed certificates**. By default, this option is disabled. The 3WXM client accepts a certificate only if the certificate is signed by a certificate authority (CA).
- 4 Click **Close** to close the Preferences dialog box, or click another tab to continue making changes.

Changing Options for RF Planning

You can change the following RF planning options:

- Typical transmit power for clients in the 3Com network.
- Color schemes for showing RF information

Configuring the Typical Client's Transmit Power

To change the typical client's transmit power:

- 1 Select **Tools > Preferences**. The Preferences dialog box appears.
- 2 Click the **RF** tab.
- 3 In the Typical Client Tx Power box, specify the typical transmit power (1 to 20 dBm) for clients in the network. The default is 13 dBm, which is a common client transmit power.

If you want to choose the color for an RF technology or obstacle, see "Changing Colors".

Changing Colors

You can change the color schemes for showing the following types of RF information:

- 802.11a channels
- 802.11b and 802.11g channels
- RF obstacles
- Radio transmit data rates
- Receive signal strength (RSSI)
- Signal-to-noise ratio (SNR)
- Client load (number of clients associated with a radio)
- Probability of a rogue device or client being in a specific location

For each scheme, you can change a color using any of the following methods:

- Select a color from a predefined palette.
- Change the hue, saturation, and brightness (HSB) properties of a color.
- Change the red, blue, and green (RGB) properties of a color.

To Change a Color

- 1 Select **Tools > Preferences**. The Preferences dialog box appears.
- 2 Click the **RF** tab.
- 3 Select one of the following tabs:
 - 802.11a Channel Colors
 - 802.11b/g Channel Colors
 - RF Obstacle Colors
 - Data Rate Colors
 - RSSI Band Colors
 - SNR Band Colors
 - Load Band Colors
 - Probability Colors
- 4 Click on the color column for the color you want to change. The Choose Color dialog box appears.

See one of the following sections:

- For more information about using the color palette, see “Defining a Color from the Palette” on page 486.
- For more information about using HSB, see “Defining a Color by Changing HSB Properties” on page 487.
- For more information about using RGB, see “Defining a Color by Changing RGB Properties” on page 488.

Defining a Color from the Palette

- 1 To specify a color using the color palette, click **Swatches** in the Choose Color dialog box.
- 2 From the color palette, click the color you want to see. Repeat until you find the color you want.

In the Preview box, you can see the swatches and text in the color you chose.

The Recent box shows the colors you have chosen so far. Click **Reset** to choose the original predefined color and clear the Recent box.

- 3 Click **OK** to accept the color you last chose. The RF tab in the Preferences dialog box is active.

- 4 Do one of the following:
 - Change another color.
 - Click another Preferences tab.
 - Click **Close** to close the Preferences dialog box.

Defining a Color by Changing HSB Properties

You can define colors by changing the hue, saturation, and brightness (HSB).

- Hue is the color itself (for example, blue, orange, or purple). Hue is measured in degrees (0 to 360 degrees).
- Saturation is the strength of the color. Saturation values are measured in percentages, with 0 percent indicating no color saturation (gray) and 100 percent indicating full saturation.
- Brightness is the amount of light in the color. Brightness is also measured in percentages, with 0 percent indicating black and 100 percent indicating white.

To define a color by changing HSB:

- 1 To specify a color by changing HSB, click **HSB** in the Choose Color dialog box.
- 2 To change the hue value, select the **H** option and do one of the following.
 - In the H box, specify a value between 0 and 360 degrees.
 - Use the slider to specify the hue value.

The color appears in the Preview box. You can also see the RGB equivalent in the R, G, and B boxes next to the slider.

- 3 To change the saturation value, select the **S** option and do one of the following:
 - In the S box, specify a value between 0 and 100 percent.
 - Use the slider to specify the saturation value.
- 4 To change the brightness value, select the **B** option and do one of the following:
 - In the B box, specify a value between 0 and 100 percent.
 - Use the slider to specify the brightness value.

- 5 Click **OK** to accept the color. The RF Planning Options tab in the Preferences dialog box is active.
- 6 Do one of the following:
 - Change another color.
 - Click another Preferences tab.
 - Click **Close** to close the Preferences dialog box.

Defining a Color by Changing RGB Properties

You can define a color by changing red, blue, and green (RGB) color properties.

- 1 To specify a color by changing RGB, click **RGB** in the Choose Color dialog box.
- 2 Use the Red, Green, and Blue sliders to define a color.
You can see a preview of the color in the Preview box.
- 3 Click **OK** to accept the color. The RF Planning Options tab in the Preferences dialog box is active.
- 4 Do one of the following:
 - Change another color.
 - Click another Preferences tab.
 - Click **Close** to close the Preferences dialog box.

Changing 3WXM Logging Options

You can change the severity and type of 3WXM events that are logged. By default, the event logging level is set to Critical, and all events are logged.



These log settings apply to log messages generated by 3WXM. They do not apply to log messages generated by WX switches.

To change 3WXM logging options:

- 1 Select **Tools > Preferences**. The Preferences dialog box appears.
- 2 Click the **Logging** tab.

- 3 In the Log Event Level list, select one of the following event levels:
 - **Critical** — A critical condition has occurred that requires immediate resolution.
 - **Warning** — An event that might require attention has occurred.
 - **Info** — Informational messages only. No action is required.
 - **Debug** — All events are shown, including debug messages.



Select the Debug option only if 3Com Technical Support has advised you to do so. Debug-level logging significantly impacts network performance and should only be enabled temporarily to troubleshoot problems, as directed by Technical Support.

- 4 Select one or more of the available event types for 3WXM to log.
- 5 Click **Close** to close the Preferences dialog box, or click another tab to continue making changes.

B

CHANGING 3WXM SERVICES PREFERENCES

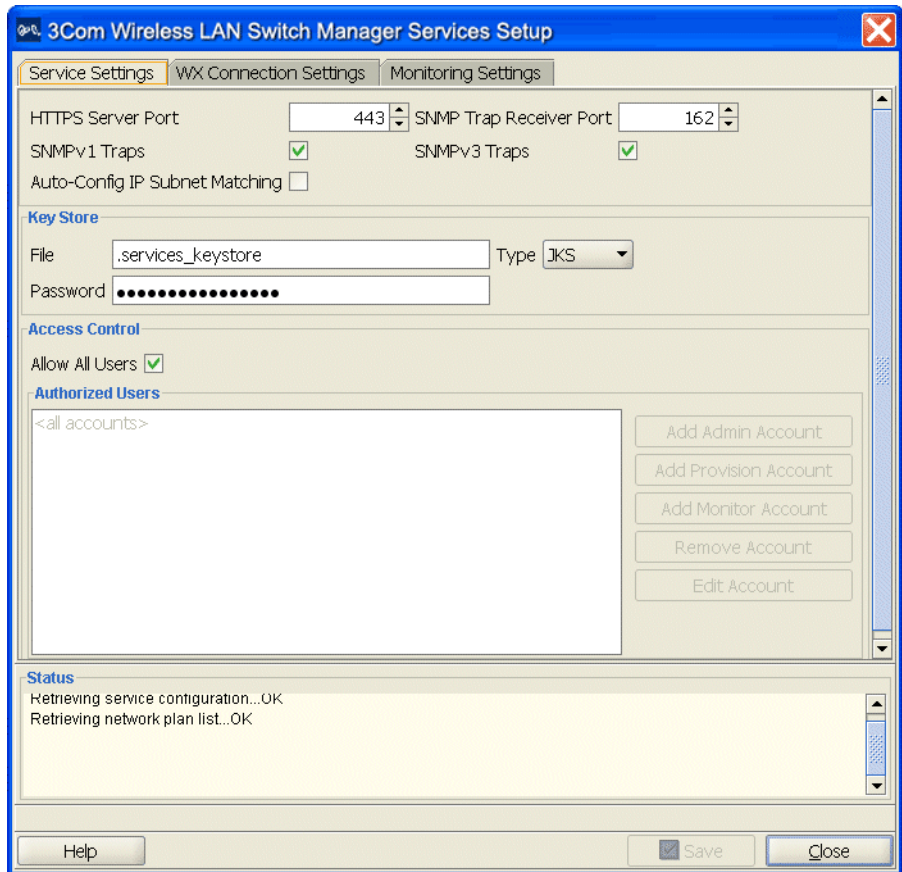
This chapter discusses how to change 3WXM Services preferences.

Overview

To set 3WXM Services preferences, select **Tools > 3WXM Services Setup** from the toolbar in the main 3WXM window. See the following figure on the next page.



This chapter describes how to change monitoring service preferences. To change 3WXM client preferences, see “Changing 3WXM Preferences” on page 481. To configure access control for the 3WXM client, see “Restricting Access to 3WXM” on page 50.



The 3WXM Services Setup window contains a configuration area and a message area at the bottom. When you click **Save** to implement changes you make on one of the window's tabs, the monitoring service verifies the changes. If the changes are valid, the service implements the changes. Otherwise, the service displays error messages and does not implement the changes.

Starting or Stopping the 3WXM Services

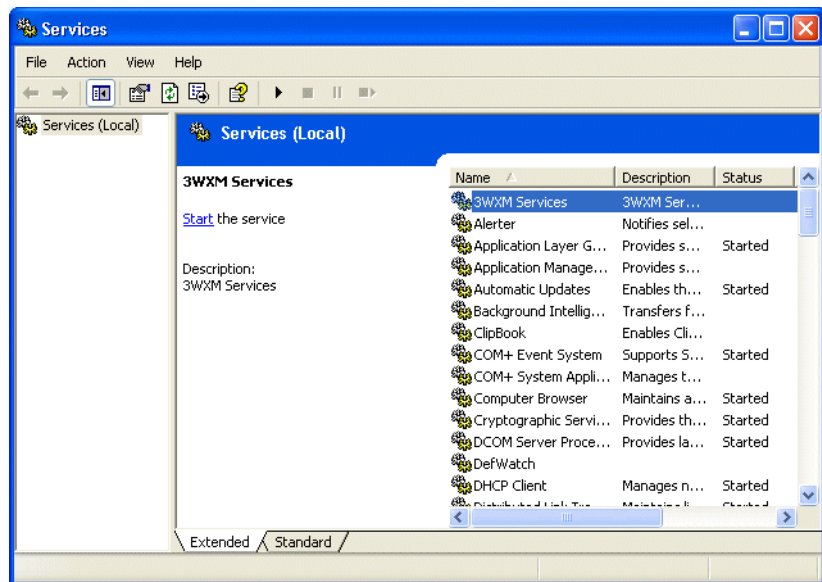


3WXM Services is started automatically when you complete installation and starts automatically whenever you restart your system.

3Com recommends that all clients that are using 3WXM Services be closed before you stop the services. If a 3WXM client is using a network plan on 3WXM Services when you stop the services, you cannot select objects or options in the client. In this case, to close the client, click the X in the upper right corner of the window or use Task Manager to end the client session.

You can start 3WXM Services from within 3WXM or from Windows Services.

- 1 Display the Services window. Here is an example of the Services window in Windows XP. (The window might look differently on your system.)



- 2 Scroll down and select 3WXM Services.
- 3 Select the Start or Stop option.
- 4 Close the Services window.
- 5 Within 3WXM, enable it to access the service.

Connecting to 3WXM Services



If a firewall is enabled on the host where you install 3WXM Services, 3WXM Services will not be able to communicate with 3WXM client or with WX switches unless the firewall is configured to allow through traffic for the SSL and SNMP ports (443 and 162 by default).

To connect to 3WXM Services

- 1 Start 3WXM client.

Select **Start** -> **Programs** -> **3Com** -> **3WXM** -> **3WXM**. The 3WXM Services Connection dialog appears.

- 2 Enter the IP address or fully-qualified hostname of the machine on which the service is installed.

If the service is installed on the same machine as the one you are using to run 3WXM, enter 127.0.0.1 as the IP address. This is a standard IP loopback address.

- 3 Specify the service port, if different from the port number in the Service Port listbox.



The port number used by 3WXM Services must not be used by another application on the machine where 3WXM Services is installed. If the port number is used by another application, change the port number on 3WXM Services. (See "Changing Service Settings" on page 497.)

- 4 Enter a username and password, if required for access to the service.

Usernames and passwords for accessing 3WXM Services are configured on the Service Settings tab. (See "Changing Service Settings" on page 497.)

- 5 To configure 3WXM client to remember the username and password for 3WXM Services access, select **Remember user name and password**.

- 6 To automatically reopen the network plan that you worked with most recently, leave **Open Network Plan** selected.

If the Open Network Plan option is selected and this is the first time you are accessing the server from this client, 3WXM Services opens a new (blank) network plan.

- 7 Click **Next**.

If the Certificate Check dialog is displayed, click **Accept**. (For more certificate options, see the next section, "Certificate Check".)

If the **Finish** button does not become available, read the last message in the message area of the page to determine why the service could not be reached. Here are common error messages and suggestions for troubleshooting them:

- Unable to connect to address: `ip-addr:tcp-port-number`
Verify that the service is running on the server.
- Connection error for address: `ip-addr:tcp-port-number`
Verify that the service has been started. If the service is running, verify that the certificate on the server is still valid (for example, is not out of date).
- HTTP 403: Forbidden
This message can indicate that the username and password are invalid. Ask the administrator for a username and password.

Certificate Check

When the 3WXM client connects to 3WXM Services, the client checks the certificate presented by 3WXM Services to ensure that the certificate is valid. The certificate is in a key store file on the server.

The default key store file is `.services_keystore`. This file contains a self-signed certificate for 3WXM Services. You can use this certificate if desired or you can configure the service to use a different key store file containing a different certificate. (See "Changing Service Settings" on page 497.)

By default, the 3WXM client does not accept self-signed certificates, even from 3WXM Services. Instead, when 3WXM Services or another device presents a self-signed certificate to the 3WXM client, the Certificate Check dialog box appears on the client. This dialog box displays the certificate information.



The options you select in this dialog box apply to all HTTPS connections with the 3WXM client. For example, the 3WXM client also checks the validity of certificates presented by WX switches, and the settings you select in this dialog affect those connections too.

To complete the connection

- 1 Select one or both of the following options, within 60 seconds after the Certificate Check dialog is displayed:
 - **Always accept self-signed certificates.** — Use this option to configure the 3WXM client to always accept a self-signed certificate from the 3WXM monitoring service and from WX switches.
 - **Install this certificate to validate future connections.** — Use this option to accept the certificate and consider the certificate to be valid for future connections.



When you use this option, the Certificate Check dialog box is not shown again for the certificate, even if the certificate becomes out of date.

- 2 Click **Accept**.

To reject the certificate and refuse the connection, click **Reject**. The 3WXM ends the connection.



The Certificate Check dialog box is redisplayed each time the 3WXM client attempts to establish a connection with 3WXM Services.

Verifying that the 3WXM Client is Receiving Service Data

If you are using a network plan that already contains equipment, use the following procedure to verify that the 3WXM client is receiving data for the equipment.

- 1 Select an object in the Organizer panel, then right-click and select **Monitor**. The Monitor tab appears in the Content panel.
- 2 Wait 60 seconds for 3WXM to retrieve updates from the server, then check the color of the objects for 3Com equipment displayed in the Explore window.
 - If the status color is blue, then 3WXM is not receiving status data from the server yet.
 - If the status color is green, yellow, orange, or red, then 3WXM is receiving status data from the server.

Changing Service Settings

The service settings control the connection parameters, key store information, and access control to 3WXM Services.



The port numbers used by 3WXM Services must not be used by other applications on the machine where the 3WXM Services is installed. If port 443 or 162 is used by another application, change the port number for the monitoring service or for the other application.

To change service settings

- 1 Select **Tools > 3WXM Services Setup**. The 3WXM Services Setup dialog box appears.
- 2 Click the **Service Settings** tab (if not already selected).
- 3 To change the TCP port on which the 3WXM Services listens for requests from 3WXM, type or select the port number in the HTTPS Server Port box. The default is 443.



CAUTION: *When you click **Save**, all instances of the 3WXM client lose connection with the service and will need to reconnect on the new port number. The HTTPS port number is automatically updated for the 3WXM client you are using and your connection is automatically restored. Other clients will need to use the Monitor Service Select wizard to change the service port and reconnect.*

- 4 The change the UDP port on which 3WXM Services listens for SNMP traps, type or select the port number in the HTTPS Server Port box. The default is 162.
- 5 To enable 3WXM Services to receive traps, select one or both of the following trap types:
 - SNMP V1 Traps
 - SNMP V3 Traps



You also must add 3WXM Services as a notification target on each WX switch. 3WXM Services does not start listening for SNMP notifications from a WX switch until you add 3WXM Services as an SNMP notification target to the switch. (To configure 3WXM Services as a switch's notification target, see "Configuring a Notification Target" on page 191).

- 6 To enable 3WXM to reuse a switch configuration to replace an old switch with a new one, select Auto-Config IP Subnet Matching.

(For more information about this option, see “Replacing a Switch and Reusing its Configuration” on page 342.)

- 7 To change the name of the key store file that contains the encryption keys the 3WXM Services uses for authentication with 3WXM, edit the name in the File box. The default name is `.services_keystore`.
- 8 To change the password that protects access to the key store file, edit the value in the Password box.
- 9 To specify the file type for the key store file, select one of the following:
 - **PKCS12** — Public-Key Cryptography Standard number 12, the standard format used by Unix machines.
 - **JKS** — Java Key Store, a format used by Java platforms and applications.
- 10 To restrict access to 3WXM Services to specific users “Restricting Access to 3WXM” on page 50.
- 11 Click another tab to configure more settings or click **Close** to close the 3WXM Services Setup dialog box.

Changing WX Connection Settings

The WX connection settings control the timeout and retries for connections with monitored WX switches, and the types of certificates the service will accept from the WX switches.

- 1 Select **Tools > 3WXM Services Setup**. The 3WXM Services Setup dialog box appears.
- 2 Click the **WXs Connection Settings** tab.
- 3 To change the number of seconds 3WXM Services waits for a TCP connection with a WX switch to reach the Connect stage, type or select the value in the Connect Timeout box. You can specify from 1 to 30 seconds. The default is 15 seconds.
- 4 To change the number of times 3WXM Services will reattempt to query a WX switch, if 3WXM Services does not receive a reply to the first query attempt within the connect timeout, type or select the value in the Retry Count box. You can specify from 0 to 5 retries. The default is 5 retries.
- 5 To prevent 3WXM Services from accepting all types of certificates from the WX switches it monitors, click **Accept all certificates** to disable the option.

By default, 3WXM Services accepts certificates from WX switches regardless of whether they are generated by a certificate authority (CA) or they are self-signed certificates. When you disable this option, the **Accept self-signed certificates** option remains enabled.

- 6 To prevent 3WXM Services from accepting self-signed certificates from the WX switches it monitors, click **Accept self-signed certificates** to disable the option.

When both the **Accept all certificates** and **Accept self-signed certificates** options are disabled, 3WXM Services accepts only-CA generated certificates.

- 7 To specify a key store filename and a password to protect access to that file:
 - a Enter the filename in the File box.
 - b To change the file type for the key store file, select one of the following:
 - **PKCS12** — Public-Key Cryptography Standard number 12, the standard format used by Unix machines.
 - **JKS** — Java Key Store, a format used by Java platforms and applications.
 - c Enter the password in the Password box.

When both the **Accept all certificates** and **Accept self-signed certificates** options are disabled, and you specify a key store file, the 3WXM Services accepts a certificate from a WX switch only if the public key information for that certificate is in the key store file.

- 8 Click **Save** to save the changes or **Cancel** to cancel the changes.
- 9 Click another tab to configure more settings or click **Close** to close the 3WXM Services Setup dialog box.

Changing Monitoring Settings

By default, status monitoring and monitoring of WX notifications is enabled. Status monitoring supplies data for the Explore and Status Summary windows of the Monitor tab. SNMP notifications (traps) generated by WX switches supply data for the Client Monitor, RF Monitor, and RF Trends windows. Table 63 lists the source of the data for each window in the Monitor tab and for the Performance Statistics window.

Table 63 Sources of Monitor Data

3WXM Client Display	Data Source	Default
Event tab	3WXM client, for 3WXM client messages	Enabled
	3WXM Services, for monitoring service messages	Enabled
	Enable log monitoring option, for WX switch messages	Enabled
Monitor tab — Explore window	Status monitoring of WX switches 3WXM Services	Enabled
Monitor tab — Status Summary window	Status monitoring of WX switches by 3WXM Services	Enabled
Monitor tab — Client Monitor window	Enable client session collection option	Disabled
Monitor tab— RF Monitor window	Status monitoring of WX switches by 3WXM Services (Does not apply to the Activity tab at the bottom of the window)	Enabled
Monitor tab — RF Trends window	Collect radio activity traps	Disabled
	Enable RF trending option	Enabled
Rogue Detection tab	Enable Rogue Detection option, which activates polling and uses SNMP traps received by 3WXM Services from monitored WX switches	Enabled
Performance Monitoring window	Statistics data received by 3WXM client directly from managed WX switches. 3WXM Services does not provide this data.	Enabled



The monitoring options require SNMP traps to be enabled on the monitored WX switches and also require 3WXM Services to be configured as a notification target (trap receiver) for each of the switches.



The data for some reports also requires monitoring options to be enabled. For information, see the descriptions for each report in “Generating Reports” on page 383.

To change monitoring settings

To change monitoring settings, use the following procedure.

- 1 Select **Tools > 3WXM Services Setup**. The 3WXM Services Setup dialog box appears.
- 2 Click the **Monitoring Settings** tab.
- 3 To change the number of minutes between status queries from 3WXM Services to the WX switches it monitors, change the value in the Polling interval box. You can specify from 1 to 60 minutes. The default is 5 minutes.
- 4 To change settings for monitoring of the log buffers on WX switches:
 - a Select **Enable log monitoring**. This option is enabled by default.
 - b To change the number of minutes between queries of the WX switches' log buffers, change the value in the Polling interval box. You can specify from 1 to 60 minutes. The default is 5 minutes.
 - c To change the maximum number of log entries 3WXM Services stores for an individual WX switch, change the value in the entries per WX box. You can specify from 1000 to 5000 entries, in increments of 100. The default is 1000 entries.
- 5 To enable data collection for client sessions, select **Enable client session collection**. This option is disabled by default.



The Polling Interval is 5 minutes and cannot be changed.

- 6 To enable RF data collection, select **Enable RF trending**. This option is enabled by default.



The Polling Interval is 5 minutes and cannot be changed.

- d To change the threshold for a threshold crossing alert (TCA), change the value in the Low SNR, Max clients per AP, or Max Receiver Adjustment listbox:

- Low SNR specifies how low the signal-to-noise ratio (SNR) can be for a radio without triggering a TCA. You can specify from 0 to 60 decibels (dB). The default is 20 dB.
- Max clients per AP specifies the maximum number of clients that can be associated with a MAP without triggering a TCA. You can specify from 5 to 50 clients. The default is 30 clients.
- Max Receiver Adjustment specifies the maximum amount a radio's hearing sensitivity can increase without triggering a TCA. You can specify from 0 to 20 decibels (dB). The default is 6 dB.

When a TCA is triggered, the alert is displayed as a red flag in the link view of the Explore window of the Monitor tab. You can click on the object for more information. In addition, the corresponding data column in the RF Trends window of the Monitor tab turns red.

- 7 To enable 3WXM Services to track rogue detection and countermeasures information, select **Enable Rogue Detection**. This option is enabled by default.
- 8 Click **Save** to save the changes or **Cancel** to cancel the changes.
- 9 Click another tab to configure more settings or click **Close** to close the 3WXM Services Setup dialog box.

Accessing the 3WXM Services Log

You can access the 3WXM Services log through a web browser. To access the 3WXM Services log, type the following in the Address or Location field of your browser:

`https://ip-addr`

The *ip-addr* is the IP address of the machine on which the service is installed. The default TCP port number is 443. To access the service from the same machine on which it is installed, use IP address 127.0.0.1 (the loopback address).

Managing Network Plans

3WXM Services regularly backs up network plans, at configurable intervals. In addition to these regular backups, you can create a backup at any time.

You can create a backup from within 3WXM or at a command line. From within 3WXM, you also can change the settings for automatic backups.

To manage backups, use the Backup/Restore dialog. To access this dialog, select **Tools > 3WXM Backup/Restore** from the menu bar in the main 3WXM window.

The backups that already exist for the network plan are listed. Backups that are automatically created by 3WXM do not have names, and their type is Automatic. Backups that you create do have names, and their type is Manual. Only the backups for the currently open plan are listed.

By default, backups created automatically by 3WXM are stored in the following location:

3WXM\backup\auto\plan_name

Backups created by you are stored in the following location by default:

3WXM\backup>manual\plan_name

3WXM zips the backup files and assigns them unique names. You can assign a name to a backup that you create. However, this name does not appear in the backup directory. To select a plan based on the name you assign, use the Backup/Restore dialog.

Backing Up a Plan

To immediately create a backup

- 1 Access the Backup/Restore dialog.
- 2 Click **Create Backup**. The Backup Name dialog appears.
- 3 Type a name for the backup and click **OK**.

The status is displayed in the Status window. When the backup is complete, it appears in the list of backups. (If you do not see the backup, scroll to the bottom of the list.)

- 4 Click **Close** to close the dialog.

Changing Backup Settings

To change settings for automatic backups

- 1 Access the Backup/Restore dialog.
- 2 To change how often 3WXM automatically backs up network plans, select **Hourly** or **Daily** from the Backup interval drop-down list.
If you select Daily, specify the time to create the backup.
- 3 To change the maximum number of backup copies 3WXM will keep for a plan, change the number in the Number of backup copies box.
- 4 Click **Save**.
- 5 Click **Close** to close the dialog.

Restoring a Plan from a Backup

To restore a plan from a backup

- 1 Access the Backup/Restore dialog.
- 2 Click on the backup you want to restore.
- 3 Click **Restore**.
- 4 Click **Close** to close the dialog.

Copying a Plan Backup from One Server to Another

You can copy a plan to another server by copying that plan's backup file to the other server, then restoring the plan on the other server from the backup.

To copy a network plan backup from one server to another

- 1 Access the Backup/Restore dialog.
- 2 Click on the backup you want to transfer.
- 3 Click **Transfer**. The Transfer Backup dialog appears.
- 4 Select the destination:
 - **Server**—Activates the boxes in the Server area of the dialog. This option allows you to copy the backup to another host. Go to step 5.
 - **File**—Activates the box in the File area of the dialog. This option allows you to save a copy of the backup in another folder. For example, if 3Com Technical Support requests a copy of the backup for troubleshooting, this option enables you to save the backup to a location from which your FTP application can access the file. Go to step 13.

- 5 Type the IP address of the host where the other instance of 3WXM Services is installed.
3WXM Services must be running on the host to which you want to transfer the backup.
- 6 If the port on which the other instance of 3WXM Services listens for traffic from 3WXM is different from the default, edit the number in the Service Port box to match.
- 7 Type the username and password required by the other instance of 3WXM Services.
- 8 Click **Next**.
The status is displayed in the Status window. Click **Close** to close the dialog.
- 9 On the other server (the one to which you copied the backup), access the Backup/Restore dialog.
- 10 Select the backup and click **Restore**.
- 11 Click **Close** to close the dialog.
- 12 Select **File > Save** from the menu bar in the main 3WXM window to save the plan. This completes the procedure.
- 13 To change the destination path, click on the path. The Select dialog appears.
- 14 Navigate to the new destination, then click **Select**.
- 15 Click **Next**.
The status is displayed in the Status window. Click **Close** to close the dialog. This completes the procedure.

Deleting a Plan Backup

- To delete a plan backup
- 1 Access the Backup/Restore dialog.
 - 2 Click on the backup you want to delete.
 - 3 Click **Delete**.
 - 4 Click **Close** to close the dialog.

C

OBTAINING SUPPORT FOR YOUR PRODUCT

Register Your Product

Warranty and other service benefits start from the date of purchase, so it is important to register your product quickly to ensure you get full use of the warranty and other service benefits available to you.

Warranty and other service benefits are enabled through product registration. Register your product at <http://eSupport.3com.com/>. 3Com eSupport services are based on accounts that you create or have authorization to access. First time users must apply for a user name and password that provides access to a number of eSupport features including Product Registration, Repair Services, and Service Request. If you have trouble registering your product, please contact 3Com Global Services for assistance.

Purchase Value-Added Services

To enhance response times or extend warranty benefits, contact 3Com or your authorized 3Com reseller. Value-added services like 3Com ExpressSM and GuardianSM can include 24x7 telephone Technical Support, software upgrades, onsite assistance or advance hardware replacement.

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Contact your authorized 3Com reseller or 3Com for a complete list of the value-added services available in your area.

**Troubleshoot
Online**

You will find support tools posted on the 3Com web site at <http://www.3com.com/>

3Com Knowledgebase helps you troubleshoot 3Com products. This query-based interactive tool is located at <http://knowledgebase.3com.com> and contains thousands of technical solutions written by 3Com support engineers.

**Access Software
Downloads**

Software Updates are the bug fix / maintenance releases for the version of software initially purchased with the product. In order to access these Software Updates you must first register your product on the 3Com web site at <http://eSupport.3com.com/>

First time users will need to apply for a user name and password. A link to software downloads can be found at <http://eSupport.3com.com/>, or under the Product Support heading at <http://www.3com.com/>

Software Upgrades are the software releases that follow the software version included with your original product. In order to access upgrades and related documentation you must first purchase a service contract from 3Com or your reseller.

**Telephone
Technical Support
and Repair**

To enable telephone support and other service benefits, you must first register your product at <http://eSupport.3com.com/>

Warranty and other service benefits start from the date of purchase, so it is important to register your product quickly to ensure you get full use of the warranty and other service benefits available to you.

When you contact 3Com for assistance, please have the following information ready:

- Product model name, part number, and serial number
- Proof of purchase, if you have not pre-registered your product
- A list of system hardware and software, including revision level
- Diagnostic error messages
- Details about recent configuration changes, if applicable

To send a product directly to 3Com for repair, you must first obtain a return authorization number (RMA). Products sent to 3Com, without authorization numbers clearly marked on the outside of the package, will be returned to the sender unopened, at the sender's expense. If your product is registered and under warranty, you can obtain an RMA number online at <http://eSupport.3com.com/>. First time users will need to apply for a user name and password.

Contact Us

3Com offers telephone, e-mail and internet access to Technical Support and repair services. To access these services for your region, use the appropriate telephone number, URL or e-mail address from the list below.

Telephone numbers are correct at the time of publication. Find a current directory of contact information posted on the 3Com web site at <http://csoweb4.3com.com/contactus/>

Country	Telephone Number	Country	Telephone Number
Asia, Pacific Rim Telephone Technical Support and Repair			
Australia	1 800 678 515	Philippines	1235 61 266 2602 or
Hong Kong	800 933 486		1800 1 888 9469
India	+61 2 9424 5179 or	P.R. of China	800 810 3033
	000800 650 1111	Singapore	800 6161 463
Indonesia	001 803 61009	S. Korea	080 333 3308
Japan	00531 616 439 or	Taiwan	00801 611 261
	03 3507 5984	Thailand	001 800 611 2000
Malaysia	1800 801 777		
New Zealand	0800 446 398		
Pakistan	+61 2 9937 5083		
You can also obtain support in this region using the following e-mail: apr_technical_support@3com.com			
Or request a repair authorization number (RMA) by fax using this number:			+ 65 543 6348
Europe, Middle East, and Africa Telephone Technical Support and Repair			
From anywhere in these regions, call:	+44 (0)1442 435529		

Country	Telephone Number	Country	Telephone Number
From the following countries, you may use the numbers shown:			
Austria	01 7956 7124	Luxembourg	342 0808128
Belgium	070 700 770	Netherlands	0900 777 7737
Denmark	7010 7289	Norway	815 33 047
Finland	01080 2783	Poland	00800 441 1357
France	0825 809 622	Portugal	707 200 123
Germany	01805 404 747	South Africa	0800 995 014
Hungary	06800 12813	Spain	9 021 60455
Ireland	1407 3387	Sweden	07711 14453
Israel	1800 945 3794	Switzerland	08488 50112
Italy	199 161346	U.K.	0870 909 3266

You can also obtain support in this region using the following URL:

<http://emea.3com.com/support/email.html>

Latin America Telephone Technical Support and Repair

Antigua	1 800 988 2112	Guatemala	AT&T +800 998 2112
Argentina	0 810 444 3COM	Haiti	57 1 657 0888
Aruba	1 800 998 2112	Honduras	AT&T +800 998 2112
Bahamas	1 800 998 2112	Jamaica	1 800 998 2112
Barbados	1 800 998 2112	Martinique	571 657 0888
Belize	52 5 201 0010	Mexico	01 800 849CARE
Bermuda	1 800 998 2112	Nicaragua	AT&T +800 998 2112
Bonaire	1 800 998 2112	Panama	AT&T +800 998 2112
Brazil	0800 13 3COM	Paraguay	54 11 4894 1888
Cayman	1 800 998 2112	Peru	AT&T +800 998 2112
Chile	AT&T +800 998 2112	Puerto Rico	1 800 998 2112
Colombia	AT&T +800 998 2112	Salvador	AT&T +800 998 2112
Costa Rica	AT&T +800 998 2112	Trinidad and Tobago	1 800 998 2112
Curacao	1 800 998 2112	Uruguay	AT&T +800 998 2112
Ecuador	AT&T +800 998 2112	Venezuela	AT&T +800 998 2112
Dominican Republic	AT&T +800 998 2112	Virgin Islands	57 1 657 0888

You can also obtain support in this region using the following:

Spanish speakers, enter the URL:

<http://lat.3com.com/lat/support/form.html>

Portuguese speakers, enter the URL:

<http://lat.3com.com/br/support/form.html>

English speakers in Latin America should send e-mail to:

lat_support_anc@3com.com

US and Canada Telephone Technical Support and Repair

1 800 876 3266

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