

Multi-Net[®] II

**OPERATOR'S
MANUAL**

**NETWORK
MANAGEMENT
FOR SIMULCAST**

Part No. 002-0690-201

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Multi-Net[®] II

Network Management For Simulcast Operator's Manual

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LAND MOBILE PRODUCT WARRANTY

The manufacturer's warranty statement for this product is available from your product supplier or from the E.F. Johnson Company, 299 Johnson Avenue, Box 1249, Waseca, MN 56093-0514. Phone (507) 835-6222.

WARNING

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DO NOT operate the transmitter of a mobile radio when a person outside the vehicle is within one (1) meter of the antenna.

DO NOT operate the transmitter of a stationary radio (base station, repeater or marine radio) when a person is within one (1) meter of the antenna.

DO NOT operate the radio in explosive or flammable atmospheres. The transmitted radio energy could trigger blasting caps or cause an explosion.

DO NOT operate the radio without the proper antenna installed.

DO NOT allow children to operate or play with this equipment.

NOTE: The above warning list is not intended to include all hazards that may be encountered when using this radio.

This device complies with Part 15 of the FCC rules. Operation is subject to the condition that this device does not cause harmful interference. In addition, changes or modification to this equipment not expressly approved by E.F. Johnson Company could void the user's authority to operate this equipment (FCC rules, 47CFR Part 15.19).

SAFETY INFORMATION

Proper operation of this radio will result in user exposure below the Occupational Safety and Health Act and Federal Communication Commission limits.

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SECTION 1 INTRODUCTION

1.1 SCOPE OF MANUAL

This manual covers the functions of HP OpenView and the E.F. Johnson application that are available when logged on with the operator password. Alarms can be monitored and acknowledged, and some program options can be set. Access to a computer running OpenView and the E.F. Johnson application as well as familiarity with Windows® NT and networks are assumed. If menu selections and options are available that are not covered in this manual, consult with the System Manager before using them.

1.2 CONVENTIONS

Menu item selections are written similar to:
Monitor -> Status Legend

This example means to pull down the Monitor menu and select the Status Legend item.

Ctrl+click means to press the Control key (normally labeled Ctrl) while clicking the mouse on the desired location.

Keyboard shortcuts are written similar to:
Ctrl+Alt+Del
Ctrl+S

Press and hold the keys in the order written and then release all keys. Each keyboard key is separated by a + sign. Example: Ctrl+S means press and hold the Ctrl key, press the S key, then release both keys.

1.3 DEFINITION OF TERMS

Multi-Net Signaling - The format of the data messages that are used to control trunking. Data messages contain over-the-air instructions, or update information, about incoming calls and free channels. Multi-Net signaling also provides many enhanced operating features such as unique ID calls and access priority.

Multi-Net System - A trunked radio system that uses E.F. Johnson Multi-Net signaling. Other types of signaling can also be used. A Multi-Net system can be one site or multi-site. Each site uses a different set of channels and radios can be trunked between sites.

Network Management - A computer system that monitors the radio system for significant events. These events are sent to a host computer where they can be responded to manually, or in some cases automatically.

Reverts - Actions that are automatically performed if failures occur. These actions are configured and performed through network management.

Simulcast - A transmission method where several sites that have overlapping coverage areas use the same channels. All sites have a repeater on each channel. All repeaters on the same channel are synchronized so they will transmit the same message at the same time and phase.

Simulcast System - A system whose transmission method is simulcast and whose trunking method is Multi-Net signaling. Simulcast systems are also monitored by network management.

Site - Repeaters and/or other network equipment that is physically located together. Each site includes one computer that is part of the network management system. Sites can be collocated.

Stand-Alone Multi-Net Site - A site that uses Multi-Net signaling, but will not trunk to other sites that use Multi-Net signaling. None of the enhanced operating features provided by Multi-Net signaling are available at these sites.

Trunking - The automatic sharing of channels in a multiple repeater system.

1.4 STARTING THE PROGRAM

1. Turn on the computer and monitor. The computer will boot up and display a Welcome window.
2. Press Ctrl+Alt+Del to log on. Another Welcome window displays.
3. Verify username, enter password, and press return. The HP OpenView log-in window displays.
4. Choose Operator security level, enter the password, and press return. The OpenView application starts, displays its menus, and displays a Home map of the network system.

OpenView is in the startup group and will automatically start when the computer is turned on. To start OpenView while Windows NT is running, the OpenView application is stored in the OpenView Program Group of the Program Manager.

1.5 OVERVIEW OF MANAGING AN E.F. JOHNSON NETWORK

An E.F. Johnson Network is a system that enables remote repeater sites to report significant events to a host computer, where the events can be managed. The host computer runs the HP OpenView program and an E.F. Johnson proprietary application, which together use alarms to report significant events. The alarms are reported to the screen of the host computer by changing the color of map icons and by displaying an entry in an alarm log. The operator can then decide how to respond to the alarms. In addition, the system can be configured to automatically manage some alarms.

Figure 1-1 shows a typical central and remote site. There may be several other remote sites of similar configuration.

The remote sites communicate to the host computer (often located at the central site) via DS0 links (64 K bps). In this diagram, the DS0 link is part of the

microwave link that carries other information between sites. Within a site, network components capable of TCP/IP are connected with 10BaseT Ethernet®. The site/channel computers are also connected by a serial link to MBCs (Message Bridge Cards) in the repeaters and channel controllers. E.F. Johnson proprietary software is used to communicate between the computer and MBC; then, the computers pass the information via TCP/IP to the host computer.

Alarms arrive at the host computer through several means. Computers and routers can be polled by the host computer on a regular basis to determine if the network link is functioning. Routers will send SNMP (Simple Network Management Protocol) trap messages to the host computer when a significant event occurs. The E.F. Johnson proprietary software will send messages to the host computer when significant events occur in repeaters and channel controllers. Repeaters and channel controllers also have IACs (Interface Alarm Cards) that can report external alarms, such as open doors. These alarms are also reported through the E.F. Johnson proprietary software.

Some alarms will correct themselves. For example, if a door opens, an alarm will be received that the door is open. When the door closes, an alarm will be received that the door has closed.

Some alarms can be configured to be managed automatically by the system. These are called Reverts. For example, if a critical alarm reports that one repeater is not working, the system could be configured to automatically shut down all repeaters on that channel. The problem is not corrected, but it is managed. It is not a perfect solution, but it may be the best solution for the circumstances. The critical alarm still exists, in fact more of them exist because more repeaters are not working. However, the system may be more useful without one channel, than with a large hole in the coverage of one channel.

Other alarms will have to be handled manually. If a door opens but does not close and no one is supposed to be at the site, the police may need to be called to go see who is there. If a storm takes out an entire site, some major work will need to be done.

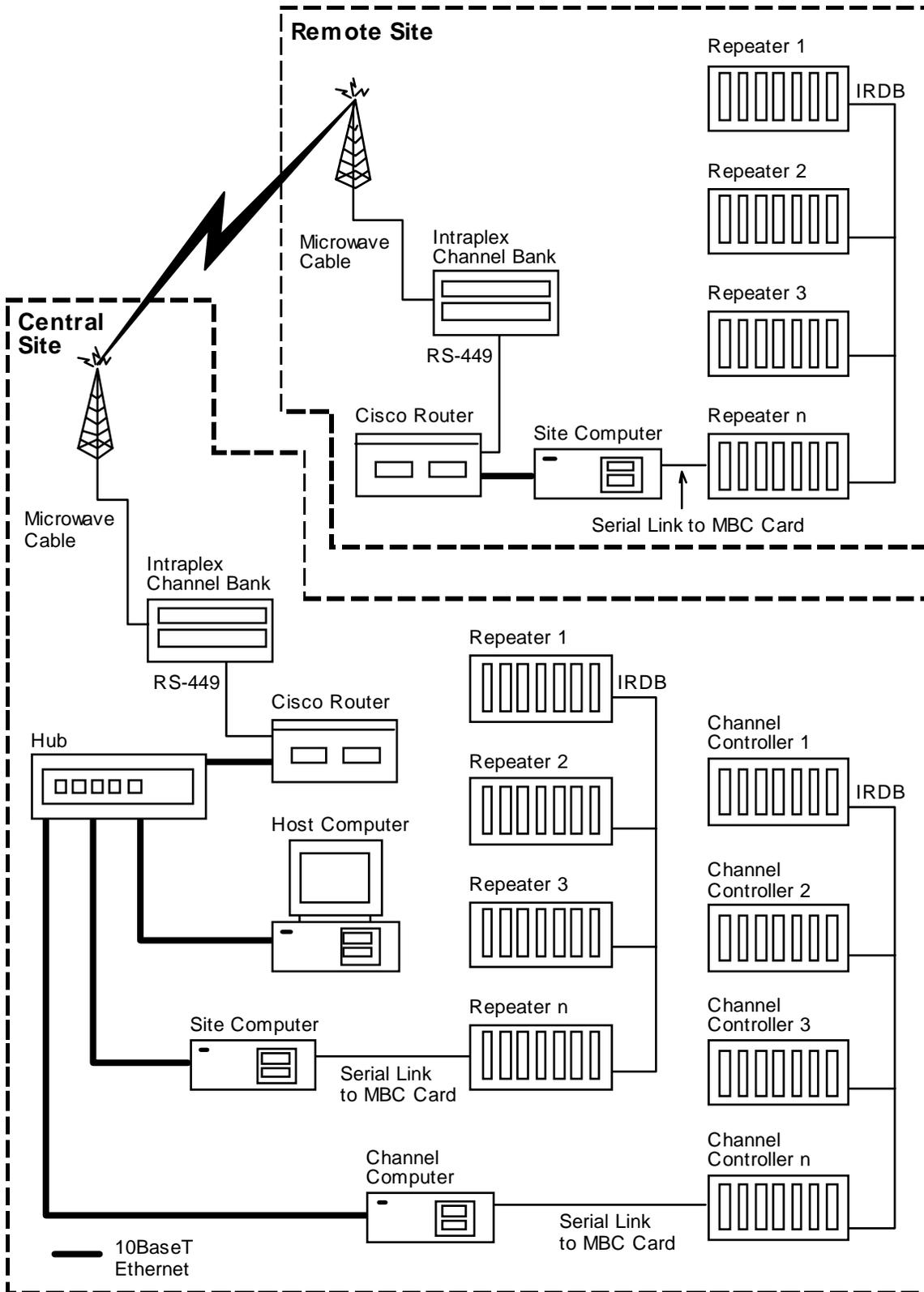


Figure 1-1 BLOCK DIAGRAM OF TYPICAL SYSTEM

SECTION 2 ALARMS

OpenView receives periodic status messages from devices. When a device reports a problem, the operator is notified of an alarm by the following events.

- A beep or sound file plays.
- The Alarm Bell in the toolbar changes color.
- Map icons change color.
- An entry is displayed in the Alarm Log.

2.1 A BEEP OR SOUND FILE PLAYS

Alarm sounds are configurable by the operator. (See Section 5.4.2 Alarm Sound.) Depending on configuration, when an alarm occurs there may be no sound, a simple beep, or a sound from a sound file. Each level of alarm may have a different sound. The sound may occur only once or it may repeat until alarms above a specified status level are acknowledged.

2.2 THE ALARM BELL IN THE TOOLBAR CHANGES COLOR

The Alarm Bell icon in the toolbar will change color to indicate the status of the alarm.

NOTE: If a higher-level alarm exists, the Alarm Bell will not change color, but will stay the color of the highest-level alarm.

To view the color legend, select menu item Monitor -> Status Legend.

Clicking on the Alarm Bell button will display the Alarm Log. The Alarm Log is described later in this section.

2.3 MAP ICONS CHANGE COLOR

When an alarm occurs, maps show the location of the alarm by changing the color of the icons where the alarm occurred. To view the color legend, select menu item Monitor -> Status Legend.

When OpenView starts, a map is displayed. This map is typically the home map and will show a System icon for each system. Double-clicking on a System icon will display a submap that shows Site icons for each site within the system. Double-clicking on a Site icon will display a submap with icons for all monitored devices (repeaters, routers, etc.) at that site.

When the status of a device changes, its icon changes color to indicate the current status. The System and Site icons associated with the device also change color, unless they are already colored for a higher-level alarm. (System and Site icons can be configured to not change color. See Section 5.4.3 Status Propagation.)

To display the Alarm Log for a specific icon, move the cursor over the desired icon, click the right mouse button, and select Alarms. The Alarm Log will show only the alarms for that icon. To have the log show all alarms, click the Alarm Bell in the toolbar.

NOTE: Viewing the alarms of a System or Site icon will only show network-level alarms (not alarms for all devices at that location).

Maps can also be viewed by selecting menu item Window -> Home Submap or Window -> Locate Submap. Specific icons can be located by selecting menu item Window -> Locate Object.

The Home map and parent submap can also be viewed by using the Home and Previous buttons in the toolbar.

Table 2-1 ICON DESCRIPTIONS



EFJ System Icon: This icon represents radio and network equipment that are inter-connected to provide communication capability to a single entity. Double clicking on this icon will display a map of sites within the system.



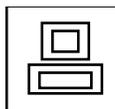
EFJ Site Icon: This icon represents a physical location that has network equipment. Double clicking on this icon will display a map of all network equipment and repeaters located at the site.



Cisco 2501: A Cisco 2500-series router is represented by this icon. A router is a network device that routes network traffic between sites (or subnets).



Router: This icon may be used for a router model that does not have its own icon. A router is a network device that routes network traffic between sites (or subnets).



Computer: Site computers and channel computers are represented with this icon. Generically, OpenView calls it a Personal Computer.



EFJ Repeater: This icon represents a single repeater. That is a piece of radio equipment that is capable of receiving and re-transmitting radio frequencies. This icon is also used to represent channel controllers.

2.4 MAP VIEWING OPTIONS

The scale of a map can be changed from the View menu and by clicking the zoom buttons in the toolbar. When a map is first displayed, the default size is 1 to 1 (1:1). Maps can be zoomed to 1/2 normal size (1:2), 1/4 normal size (1:4), or 1/8 normal size (1:8). The zoomed size remains in effect until changed.

If an entire map is not displayed in its window, select menu item View -> Pan to choose the part of the map to view. In the Pan dialog box, a rectangle represents the part of the map that will show in the window. Click on the rectangle and drag it to the desired location. Click "OK" to view the selected area in the map window.

A grid (like graph paper) can be displayed on a map by selecting menu item View -> Show Grid. This menu item then changes to Hide Grid, which is used to turn off the grid display. The horizontal and vertical spacing of the grid lines can be changed by selecting menu item View -> Set Grid.

2.5 AN ENTRY IS DISPLAYED IN THE ALARM LOG

The Alarm Log displays an entry for each alarm. This section describes:

- Accessing the Alarm Log
- Description of the Alarm Log
- Displaying Current or History list
- Acknowledging Alarms
- Displaying selected groups (Filter dialog box)
- Descriptions of the alarms

2.5.1 ACCESSING THE ALARM LOG

Alarm information is displayed in the Alarm Log, which can be accessed in several ways.

- Display all alarms by clicking the Alarm Bell button in the toolbar or selecting menu item Monitor -> Alarm Log.
- Display selected groups of alarms by displaying the Alarm Log, clicking Filter, and selecting desired criteria. (See Section 2.4.5 Displaying selected groups.)

- Display the alarms for a specific icon (system, site, or device) by moving the cursor over the desired icon, clicking the right mouse button, and selecting Alarms. (For displaying maps and icons, see Section 2.3 Map icons change color.) From the Alarm Log, the icon for the device or site that sent the alarm can be found by selecting the alarm entry and clicking the Go To button.

2.5.2 DESCRIPTION OF THE ALARM LOG

The Alarm Log information is displayed in columns, as described below.

Status: A word that describes the alarm level. The alarm level is also indicated by the color of the entry. (See Section 2.5 Color status legend.)

Date: The date the alarm was reported.

Time: The time the alarm was reported.

Description: A description of the fault that caused the alarm. (See Section 6.2 E.F. Johnson alarms.)

Object: The system, site, or device that reported the alarm. The map containing the icon for an entry can be located by selecting an entry and clicking the Go To button.

The widths of the displayed columns can be changed by clicking and dragging the vertical bars (|) in the column headings.

The Alarm Log displays alarm entries in the order they are reported, or by order of severity (as set under menu item Options -> Customize Alarms. See Section 5.4.1 Alarms.).

2.5.3 DISPLAYING CURRENT OR HISTORY LIST

The History/Current button at the bottom of the Alarm Log is a toggle button. When the Current list is displayed, the button will be named History and clicking it will display the History list. Likewise, when the History list is displayed, the button will be named Current and clicking it will display the Current list. The top-right area of the Alarm window will indicate if the Current or History list is being viewed by displaying “Current Display Options”, or “History Display Options”.

Alarm entries will stay in the Current list until they are acknowledged, then OpenView will move the entries to the History list.

2.5.4 ACKNOWLEDGING ALARMS

OpenView receives periodic status messages from devices. When the situation that created a high-level alarm has been corrected, the next status message from the affected device will update the Alarm Log by moving the old entry to the History list and displaying the new entry in the Current list. The color of the Alarm Log entry and the Device, Site, and System icons will also update accordingly.

If a repeater re-starts, its existing alarms will be moved from the Current list to the History list. After re-start, any new alarms will be displayed in the Current list.

To manually acknowledge or “clear” an alarm, click on the alarm entry in the Alarm Log, then click the Acknowledge button. Multiple non-consecutive entries can be selected with Ctrl+click. Multiple consecutive entries can be selected with Shift+click. All alarm entries can be acknowledged at one time by clicking the Acknowledge All button. Acknowledging an alarm moves the log entry from the Current list to the History list.

NOTE: Manually clearing an alarm is considered a change in status to normal level. In many cases, it may be advisable to not manually clear critical alarms, instead let them clear themselves when the problem is corrected (as described above). Manually clearing alarms will return icons to normal color, making the network appear to be working without problems.

2.5.5 DISPLAYING SELECTED GROUPS (FILTER DIALOG BOX)

The Filters button at the bottom of the Alarm Log will display the Alarm Log Filters dialog box, where the alarms to view can be selected. When OK is clicked, the Alarm Log displays only the alarms that were selected. To again display all current alarms, click the Alarm Bell in the toolbar or select menu item Monitor -> Alarm Log.

The top-right area of the Alarm window indicates which alarms are being viewed. When viewing all alarms, this area reads:

Current Display Options
Show All Alarms
All Objects

The first line will read “History Display Options” if the History list is displayed. When viewing alarms filtered with the Alarm drop-down box, the second line will change to the alarm selected to view. When viewing alarms filtered by the Object Type/Object Name drop down boxes, the bottom line will change to the type-name of the selected alarms.

The drop down boxes of the Alarm Log Filters dialog box are described below.

Alarm: Use this drop down box to select the alarm description to view. The Alarm Log will then display alarms that have the selected description. The descriptions listed are the same descriptions used in the Description column of the Alarm Log.

Object Type: Select the type of device from this drop down box. For example, if only alarms from routers are to be viewed, then select “router” from the list.

Object Name: To view only alarms that are from a specific device, select the device’s name in this drop down box. If a device has subcomponents, they can be selected by also entering the Sub(component) or Node numbers. Object names are shown in the Object column of the Alarm Log. The descriptive label that appears below a map icon is not necessarily the Object Name.

Object Status: Use this drop down box to select an alarm level. The Alarm Log will then display only alarms that are of the selected level. Alarm levels are shown in the Status column of the Alarm Log and also by selecting menu item Monitor -> Status Legend.

NOTE: When an icon is selected, its Object Type and Object Name are displayed in the status bar at the bottom of the OpenView window. The format is, object name (object type) in submap name. They also appear in the Describe dialog box (right click on an icon and select Describe). The Object Type is the title of the dialog box and the Object Name is in the Name box.

2.5.6 DESCRIPTIONS OF THE ALARMS

Repeaters and channel controllers have IACs (Interface Alarm Cards) that can report external alarms, such as open doors. Each repeater can have different alarms. The descriptions of IAC alarms are found by right clicking a repeater or channel controller icon and then selecting Describe.

Other E.F. Johnson alarm descriptions are listed in Section 6.2 E.F. Johnson alarms.

2.6 COLOR STATUS LEGEND

A legend for icon colors can be seen by selecting menu item Monitor -> Status Legend. Colors for Alarm Log entries are similar. (Computer monitors will vary as to the exact colors seen on the screen.)

Alarm colors are described in Table 2-2. The highest-level alarm is listed first.

NOTE: If a color for a higher priority alarm is already displayed, a lower priority alarm will not change the color of the icon or Alarm Bell.

2.7 ACTIVE REPEATER ALARMS

To view the active alarms for a repeater, right click on a repeater icon and then select Active Alarms. Alternatively, select a repeater icon and then select menu item Repeater -> Active Alarms. A dialog box shows the repeater name and a list of active alarms, including active alarms that have been manually acknowledged from the Alarm Log.

Table 2-2 ICON AND MAP COLORS

Status	Map	Log	Description
Critical	Red	Red	The device is unavailable. It may have stopped operating.
Major	Dark Red	Red	A problem has been reported; there is some degradation of function.
Minor	Orange	Yellow	A condition has been reported that may be degrading functions.
Warning	Yellow	Yellow	An abnormal condition exists that is not causing degradation of function.
Marginal	Mustard	Yellow	A problem has not occurred, but a situation is close to being out of specifications.
Informational	Magenta	Magenta	Information about a situation that may be abnormal.
Disabled	Cyan	Cyan	The device is down.
Unmanaged	Wheat	White	OpenView does not manage the device.
Normal	Green	Green	The device is working properly.
Unknown	Blue	Cyan	OpenView has no information on the status of the device.

SECTION 3 POLLING

Some alarms are the result of polling. OpenView will periodically check all listed devices to see that the network connection is working properly. When a change in status occurs, an alarm is processed.

Polling is controlled through menu item Monitor -> Polling. Controls include stop/start polling, view the polling list, and override default parameters.

View Polling List: Selecting menu item Monitor -> Polling -> View Polling List will display the View Polling List dialog box, which shows the list of devices that OpenView will poll. The list shows the name and address of the polled devices as well as the time interval between polls. At the bottom of the dialog box, the total number of entries is displayed and also whether polling is turned on or off. To remove a device from the list, select the device, and click the Remove button.

The Configure button displays the Configure Device Parameters dialog box that allows default values to be overridden for the selected device. A device must have

an IP address to be polled. Some devices do not have addresses and therefore cannot be polled. <Default> will appear to the right of any section that is using system defaults.

“Interval” defines how frequently a poll will be sent. Alarm Actions are set separately for notification of device down or device up. Device down means that the device polled did not send a response, which indicates a problem. Device up means the device did send a response, which indicates the network connection is working. Select the Severity or alarm level from the drop down list box. Also, select whether the color of the map icons will be updated, whether a sound will be played, and if the alarm should be reported in the log.

Stop/Start Polling: This menu selection toggles to turn polling off and on. When polling is on, the HP OpenView for Windows Professional Suite version of OpenView animates a polling icon in the toolbar.

SECTION 4 RECOVERY (REVERTS)

CAUTION

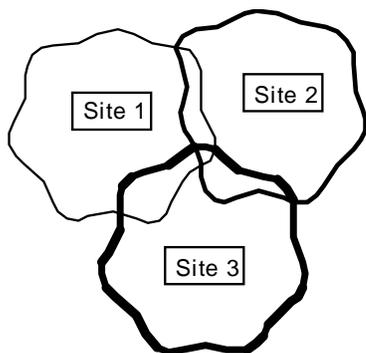
Reverts require extreme caution and knowledge about the radio system. Otherwise, reverts could cause more problems than the initial failure.

Reverts are actions that are performed if failures occur. Automatic actions can be configured and performed through OpenView. If there is a failure, the remaining working pieces need to be reconfigured to provide the best possible coverage for the system's communications needs. By setting up channel reverts and site reverts, OpenView can provide automatic reconfiguration.

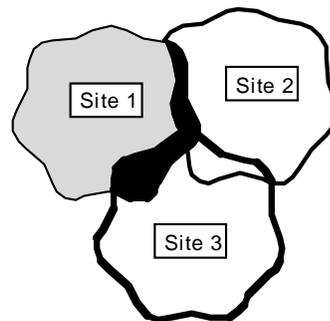
Channel reverts will shut down all repeaters on a channel. Site reverts will shut down individual sites or reconfigure individual sites to stand-alone sites. If a repeater failure can cause both reverts, both reverts will occur.

Some situations will be beyond the scope of automatic reverts. Therefore, it is possible to manually revert channels and sites. Channels and sites are always manually unreverted (returned to normal). Repeaters can also be individually controlled.

Automatic actions are configured by the System Manager.



In a simulcast system, all radios receive the same signal.



If Site 1 is reverted to a stand-alone Multi-Net site, radios in the black area will receive a signal from Site 1 and a different signal from Sites 2 and 3.

4.1 CONSIDER INTERFERENCE PROBLEMS

In a simulcast system, the repeaters in adjacent sites are on the same channel and purposely overlap to fill in weak coverage areas. If one site is reverted to a stand-alone Multi-Net site, the overlapping areas will have interference problems. See Figure 4-1.

Interference problems could be minimized in several ways. Reducing the output power level of the repeaters in Site 1 (Figure 4-1) might decrease the area affected by interference; however, it may also create a hole in the coverage area of the system. Reduced power level may also put more stations in fringe areas.

If only one repeater is not working at Site 1 (Figure 4-1), the channel with the non-working repeater could be shut down. That is, the repeaters in sites 2 and 3 for that channel could be disabled. Except for having one less channel, the system would continue to function as a normal simulcast system.

If a system has enough channels, each site could use different channels and be reverted to a stand-alone Multi-Net site. The benefits of simulcast coverage would be lost, but the holes and fringe areas would be reduced.

There will be trade-off decisions that must be made when equipment fails. Knowing the coverage area of the working repeaters and considering the effects on the whole system will lead towards a configuration that minimizes the loss as much as possible.

Figure 4-1 REVERTED SITES CAN CAUSE INTERFERENCE

4.2 CONSIDER STATUS CHANNEL AND HOME CHANNEL ACCESS

CAUTION

In simulcast systems, communications between radios and repeaters use Multi-Net signaling, as described in the Multi-Net Application Note (Part No. 009-3039-003).

Radios monitor their home channel and the status channel for over-the-air instructions. If there are problems on either channel, radios may not receive their instructions. Therefore, pay special attention to the status channel and home channels when configuring reverts.

Figure 4-2 shows the relationship between repeaters, channels, and sites in Simulcast and Multi-Net systems. Multi-Net descriptions often refer to a single repeater. In a simulcast system, the description would refer to all repeaters on the same channel.

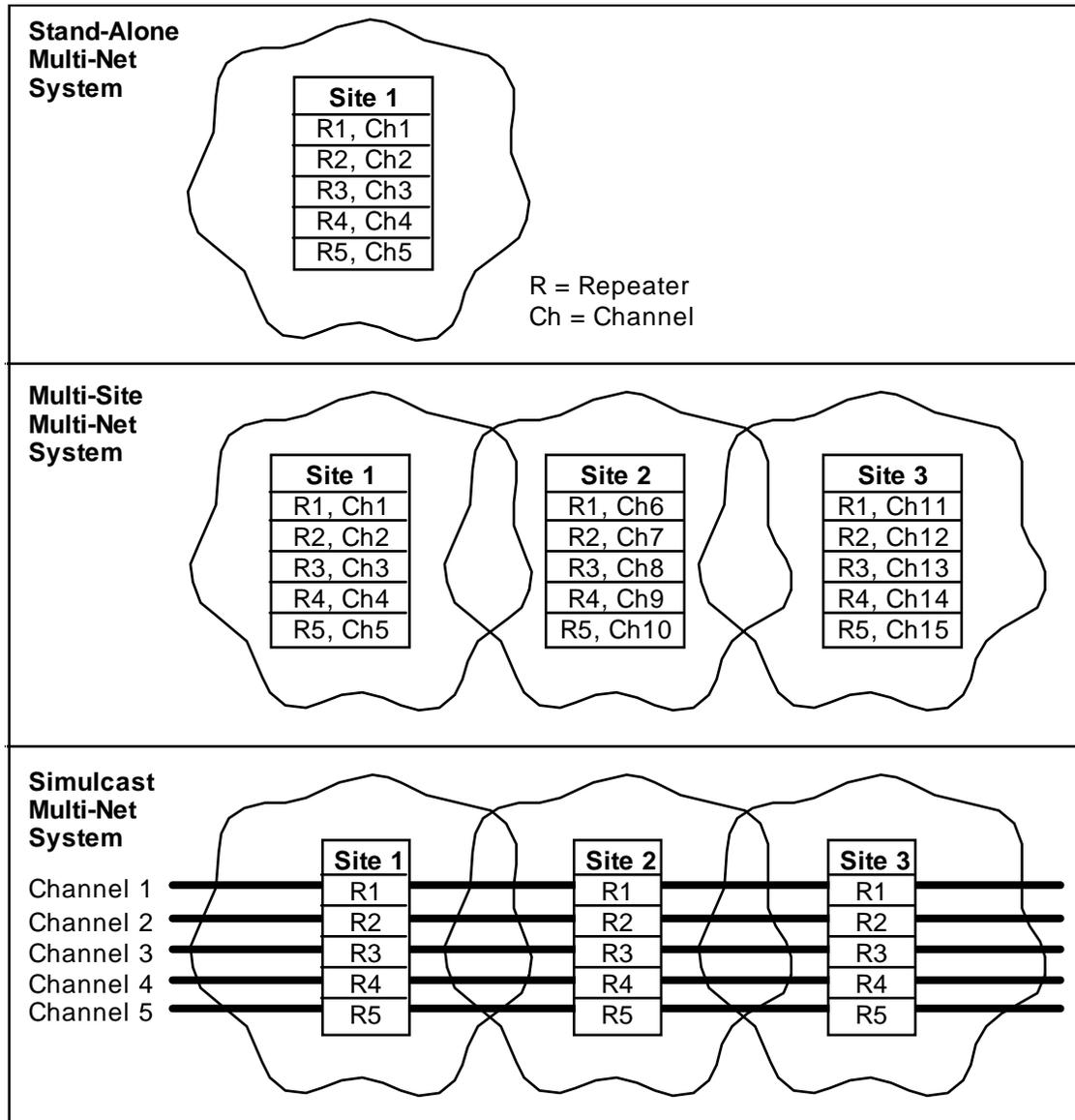


Figure 4-2 RELATIONSHIP OF REPEATERS, CHANNELS, AND SITES

4.3 MANUALLY UNREVERT AND REVERT CHANNELS

CAUTION

Use extreme caution. Consider the effects that changes will have on the entire system.

The revert status of channels can be seen by selecting a System icon and then selecting menu item System -> Channel Revert. A dialog box shows the system name, the total number of channels in the system, and the number of reverted channels. There is also a list of repeater numbers, channel numbers, and their current revert status. If the system has automatically reverted a channel, its status will be Reverted, otherwise the status is Normal.

The system will not automatically unrevert a channel. To unrevert a channel, select the channel in the list and click the UnRevert button. If the problem(s) that caused the revert has not been repaired, the channel will again automatically revert. To manually revert a channel, select the channel in the list and click the Revert button.

To unrevert individual repeaters and keep the channel reverted, select a Repeater icon and then select menu item Repeater -> UnRevert. Repeaters can also be reconfigured by using the Manual Repeater Control dialog box covered in Section 4.7. The channel status will remain reverted and additional alarms on the channel will not revert the channel.

4.4 CHANNEL UNREVERT EXAMPLES

The information in this section is for example only and may or may not apply to a specific system. Each system should be analyzed for other situations that may benefit from automatic reverts.

NOTE: If a channel that has failed repeaters is unreverted, radios that receive data from the sites that have failed repeaters will not hear calls made on the unreverted channel. Remember to consider the condition of home channels and the status channel when unreverting channels.

A simulcast system can be configured to automatically shut down all repeaters that are on a channel that has simulcast failure, repeater failure, or RNT/CIM Channel Problem alarms. Channel reverts are configured by the System Manager. Channels are unreverted using menu item System -> Channel Revert (as described in Section 4.3).

- Low-Usage Area with Failure

If a system has reverted a channel because of a failure at a site in a low-usage area, the channel may be unreverted to provide high-usage areas with all channels. Radios receiving data from the site with the failed repeater will not hear calls made on the unreverted channel.

- Status Channel with Failure

If the status channel is reverted, unreverting it will optimize system response at sites with no failures. Radios in coverage areas with status channel failures will still receive update information on their home channels. No calls will be heard on the status channel from sites with failed repeaters.

The status channel can be configured to never revert.

- More Failures Than Channel Revert MIN

If the system has reverted as many channels as it can (as defined by Channel Revert MIN), additional failures on other channels will not cause channel reverts. Channels are reverted in the order that OpenView receives the alarms; however, if Channel Revert MIN is reached and there are more problems, it may be wise to unrevert some channels and revert others.

For Example: A system may revert a home channel; then, a non-home channel has problems but is not reverted because the system has already reverted the number of channels that it is automatically allowed to revert. In this case, the system may work more efficiently if the home channel is manually unreverted and the non-home channel is manually reverted. Radios on the unreverted home channel that receive data from the site with the failed repeater will not receive data from the home channel, but they will still receive data from the status channel.

4.5 MANUALLY UNREVERT AND REVERT SITES

CAUTION

Use extreme caution. Consider the effects that changes will have on the entire system.

To see the revert status of sites, select a System icon and then select menu item System -> Site Revert. A dialog box shows the system name, the total number of sites in the system, and the number of reverted sites. There is also a list of sites and their current revert status. If the system has automatically reverted a site, its status will be Reverted, otherwise the status is Normal.

The system will not automatically unrevert a site. To unrevert a site, select the site in the list and click the UnRevert button. If the problem(s) that caused the revert has not been repaired, the site will again automatically revert. To manually revert a site, select it from the list and click the Revert button. Alternatively, sites can be reverted and unreverted by selecting a Site icon and then selecting menu item Site -> Revert or Site -> UnRevert.

To unrevert individual repeaters and keep the site reverted, select a Repeater icon and then select menu item Repeater -> UnRevert. Repeaters can also be reconfigured by using the Manual Repeater Control dialog box covered in Section 4.7. The site status will remain reverted and additional alarms at the site will not revert the site.

4.6 SITE REVERT EXAMPLE

The information in this section is for example only and may or may not apply to a specific system. Each system should be analyzed for other situations that may benefit from automatic reverts.

If the home channel of an important group of users and the Status Channel both fail at a Site, the site can be automatically reverted and reconfigured to allow communications within the site. If a system has

very large overlap areas, the affected site might be shut down without greatly degrading coverage. However, if shutting down the site would leave large areas inaccessible, reconfiguring the site to a stand-alone Multi-Net site may be a better alternative.

NOTE: Subscriber units on the system will need to have a "backup" system programmed for a stand-alone Multi-Net site. When the fleet map is produced for the subscriber units, the site revert actions and the backup system must be planned together.

CAUTION

Radios monitor their home channel and the status channel for over-the-air instructions. If there are problems on either channel, radios may not receive their instructions. Therefore, pay special attention to the status channel and home channels when configuring reverts.

The following example shows how a 3-site, 10-channel system could be configured for an automatic site revert.

Refer to Figure 4-3. Site 3 has been configured to revert to a stand-alone Multi-Net Site if repeaters 1 and 3 fail. In this system, repeater 1 is the Status Channel. Repeater 3 is the Home Channel for the Group used by a high-priority collection of users. When repeaters 1 and 3 fail, Groups that use channel 3 as the Home Channel have no access to the radio system in the Site 3 coverage area. When the system reverts, Groups that use a backup subscriber unit system will have local access for Site 3; other groups will have no access for Site 3.

When the high-priority users need to use the repeater at Site 3, they will need to change their radios to a backup system that is programmed (in this example) with repeater 8 as the status channel. Repeater 9 is the Home Channel for their Group. Trunked communication will then be available to them within the Site; however, no audio is sent back to the RNT. Therefore, there will be no consoles, unique ID calls, or telco calls from Site 3.

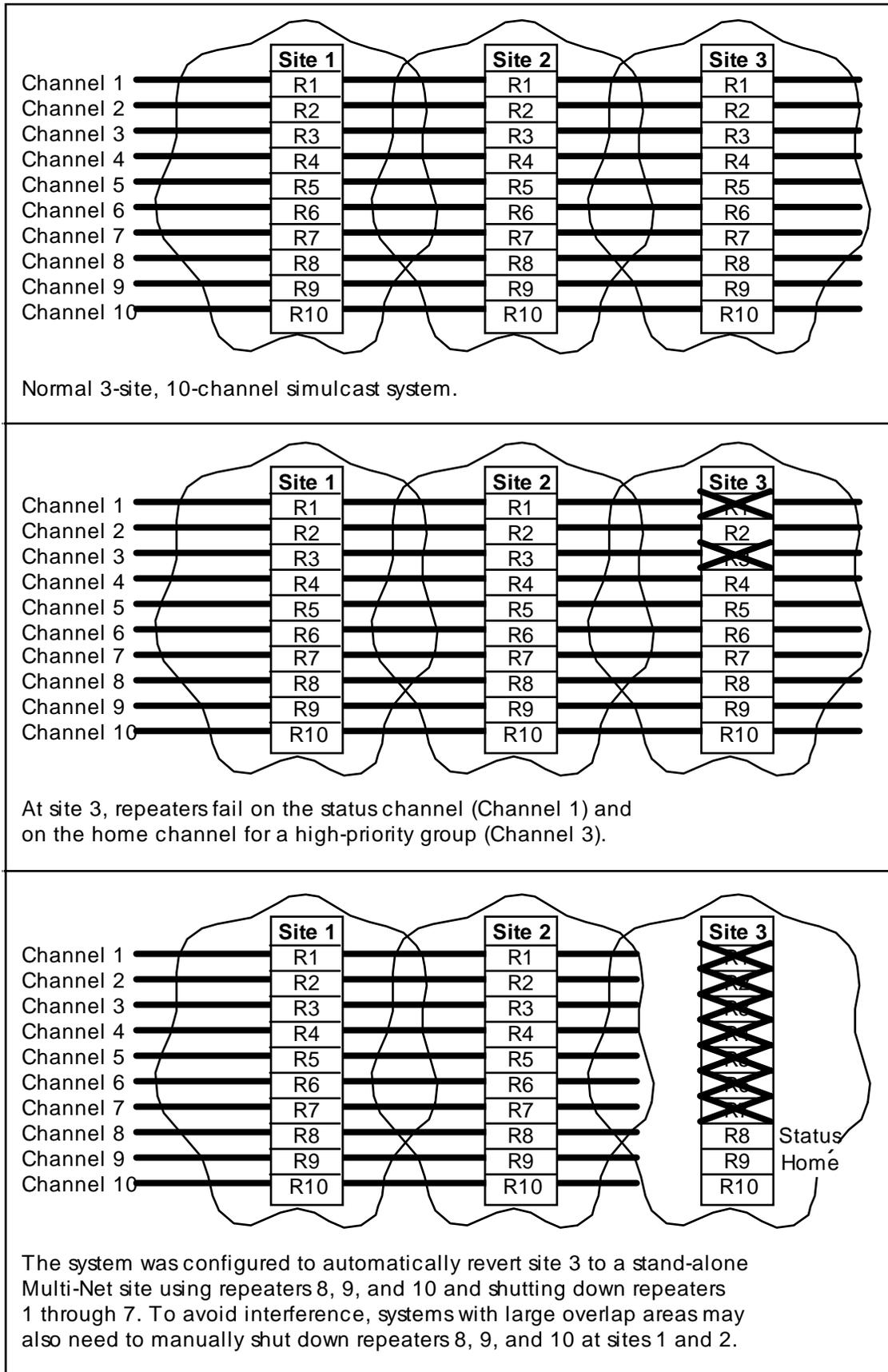


Figure 4-3 SITE 3 IS CONFIGURED TO REVERT TO A STAND-ALONE MULTI-NET SITE.

4.7 PERFORM MANUAL REPEATER CONTROL

CAUTION

Use extreme caution. Consider the effects that changes will have on the entire system.

Since each system has a unique installation and unique propagation patterns, some situations will be beyond the scope of automatic reverts. Therefore, it is possible to manually set the repeater mode and power level for each repeater and also set if the repeater is on the Status Channel. Repeater control is done by selecting a System icon and then selecting menu item System -> Manual Repeater Control. The Manual Repeater Control dialog box will appear.

This dialog box shows the name of the system and a list of all sites/repeaters within the system. The repeaters can be shown/hidden by clicking the +/- button next to the site name or by double clicking the site name. For each repeater, the mode, power level, and whether the repeater is on the Status Channel are shown.

The Current column shows if the information is “True” or “False”. True indicates the conditions at the present time. False indicates that there is a communication problem with the repeater, so current information is unavailable.

To make changes, select the repeater to change, select the desired options, and then click either the Set Mode button, the Set Power button, or the Set Mode and Set Power button. The repeater will be reprogrammed and the dialog box will be updated accordingly.

- Repeater Mode

This section is used to select the trunking method of the repeater and whether the repeater is on the Status Channel.

Disabled: The repeater will be shut down. It will not transmit or receive in any mode.

Stand-Alone Multi-Net: The repeater will use Multi-Net signaling, but will not communicate with any other radio sites (Multi-Net sites or other sites) within the system. The enhanced operating features provided by Multi-Net signaling will not be available.

Simulcast Channel Control: Select this option if the “repeater” is part of the channel controller in a simulcast system. A channel controller makes several simulcast remote repeaters look like one repeater to the RNT (Radio Network Terminal, which controls the operating features of the radio system).

Simulcast Remote Repeater: Select this option for any repeater that is part of a simulcast system. A simulcast system has several sites. Each site in a system has the same channels and the channel audio is rebroadcast at each site.

Status Channel: An x in this box designates that the repeater is on the Status Channel. The Status Channel transmits update information for all calls. There is only one Status Channel in a simulcast system. Although, a site configured as a separate stand-alone site may have a different Status Channel.

- Power Level

Select the desired transmit power level.

4.8 REPEATER MENU

Repeaters can also be controlled by selecting a repeater icon from the map and then selecting a function from the Repeater menu. The following functions are available.

Active Alarms: To view the active alarms for a repeater, select a repeater icon and then select menu item Repeater -> Active Alarms. A dialog box shows the repeater name and a list of active alarms, including active alarms that have been manually acknowledged from the Alarm Log.

Restart: A repeater can be restarted by selecting a repeater icon on a map, and then selecting menu item Repeater -> Restart.

Revert: To revert a repeater, select a repeater icon on a map, and then select menu item Repeater -> Revert. The repeater will be reverted to the configuration set in the Revert Action Configuration dialog box (a system manager function).

UnRevert: To unrevert a repeater, select a repeater icon on a map, and then select menu item Repeater -> UnRevert. Unrevert returns the repeater to the configuration set in the EFJ Repeater Description dialog box (a system manager function).

SECTION 5 OPENVIEW OPTIONS

5.1 LOG IN AND LOG OUT

Menu item Options -> Log Out disables access to all OpenView functions except menu items Options -> Log In and Help. To regain access, select menu item Options -> Log In and enter the required password.

5.2 PROTECT/UNPROTECT MAP

Maps are protected to avoid accidental changes. To unprotect the maps, select menu item Options -> Unprotect Map and enter the required password. When maps are unprotected, an operator can open new maps by selecting menu item File -> Open. To protect maps, select menu item Options -> Protect Map and enter a password. Verify the password by entering it again in the next box. This menu item is a toggle between unprotecting and protecting maps.

5.3 CUSTOMIZING OPENVIEW

OpenView may be customized by selecting menu item Options -> Customize HP OpenView.

These options should only be changed under the direction of the System Manager.

5.4 CUSTOMIZING ALARMS

Alarm processing may be customized by selecting menu item Options -> Customize Alarms.

5.4.1 ALARMS

Frequency: The default is 0 seconds. OpenView reports all alarms from E.F. Johnson components (such as repeaters) to the Alarm Log and updates the color of the icons. If set to a higher value, identical alarms that are received within the time frame will not be reported. After the time frame has expired, notification of the alarm resumes.

Delete after: The default is 7 days. OpenView will automatically delete History Alarm Log entries that are more than 7 days old. The deletion will take place when OpenView is started or at midnight if OpenView is running.

Sort by: The default is "Time". The entries in the Alarm Log will be displayed in reverse chronological order (newest at the top of the list). Selecting "Status" will display the entries according to severity (most severe or highest status level at the top of the list) and according to time within each alarm level.

5.4.2 ALARM SOUND

Select Disable Sounds, Sound Once, or Repeat.

Disable Sounds: No sounds will be heard when alarms are displayed.

Sound Once: The alarm sound will sound once when an alarm is displayed.

Repeat: The alarm sound will be repeated until the alarm clears. A time interval (Every __ minutes) between 0 and 999 can be set to define how often the sound is repeated. The "For status" entry sets which level of alarms will receive the repeated sound. For example if set to "Major", only major and critical alarms will have repeated sounds; all other alarms will sound only once. (See Section 2.5 Color status legend.)

By default the alarm sound will be the system beep. For a system that is capable of playing sound files, sound files can be associated with each alarm through the Sound dialog in the Windows Control Panel.

5.4.3 STATUS PROPAGATION

Maps are linked hierarchically. The top level is a System map, the middle level contains Site maps, and the bottom level contains Devices maps. This option defines if alarms are shown on maps that are at a higher hierarchical level than where the alarm occurred.

The default is “Pass status up all levels”.

Pass status up all levels: With this setting, an alarm will be passed to all higher hierarchical maps to display a colored icon for alarm notification. For example, if a device reports an alarm, the following icons will change color 1) the Device icon, 2) the Site icon where the device is located, and 3) the System icon. (If there is already a higher level alarm at the site and system level, the icon will remain the color of the highest alarm.)

Pass status up one level: Alarms will only be passed up one level in the hierarchy. With this setting, a System level map will not show that a Device level map has an alarm.

Do not pass status up: The alarm will only show on the map where the alarm occurred.

5.4.4 ALARM FORWARDING

Alarms can be forwarded to another console. This should only be set under the instructions of a System Manager.

SECTION 6 TROUBLESHOOTING

6.1 PING

6.1.1 PING TROUBLESHOOTING TECHNIQUES

Ping (packet Internet groper) sends a message to a device and waits for a response. The response will indicate that the network connection is working or that a problem was detected. The ping messages and responses are ICMP (Internet Control Message Protocol) echo messages and their replies.

If the device pinged does not respond, there could be a problem in several areas. Figure 6-1 shows the path of a ping from the host computer to a site computer. If the site computer does not respond, trying to ping the other addresses may show that the problem is somewhere between the host computer and the site computer.

To verify that the IP stack in the current device is functioning properly, ping address 127.0.0.1. (The current device is the device that sends the ping message.)

6.1.2 PING PROGRAM OPERATION

Ping is controlled by moving the cursor over the desired map icon, clicking the right mouse button, and selecting Ping. Alternatively, select a map icon and then select menu item Monitor -> Ping.

The Ping window is used to start/stop pings and set ping options. The bottom of the window shows the number of pings sent, the number of pings received, and the percentage of data lost. These numbers are reset to zero when a ping is started.

Start/Stop pings: This is a toggle operation that is selected by clicking the menu item Start or Stop, in the Ping window. Alternatively, click on the hexagon (stop-sign shaped) red (for stop) or green (for start) button.

If a response is received from the device, a message similar to the following will appear in the Ping window.

```
reply from 100.100.103.2: sequence = 0 round-trip time = 30 ms
```

```
round-trip min/avg/max = 30/30/30 ms
```

The first line includes the network address of the pinged device (100.100.103.2), the number of the ping (sequence = 0), and the time it took between when the ping was sent and the response was received (round-trip time = 30 ms). If the continuous option has been selected, the sequence number will increase for each ping.

The second line shows the minimum, average, and maximum times for round-trip.

If a device is pinged and no response is received, a message similar to the following will appear in the Ping window.

```
1 packet transmitted,  
0 packets received 100% packet loss
```

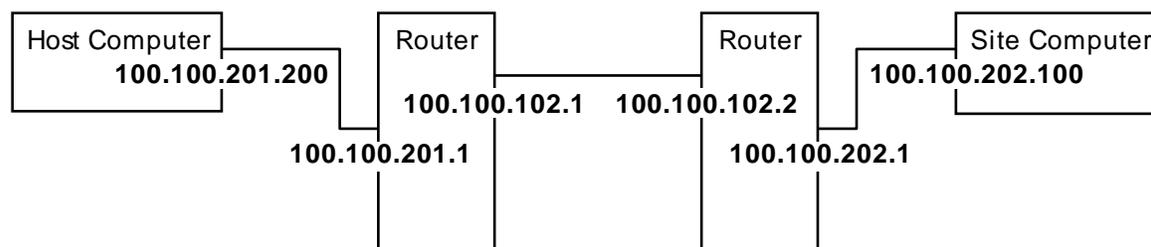


Figure 6-1 TROUBLESHOOT BY PINGING SEVERAL IP ADDRESSES

Ping Options: Customize pings by selecting Options in the Ping window menu. If Continuous Operation is unselected (default), selecting Start ping will ping the device once. If Continuous Operation is selected, selecting Start ping will repeatedly ping the device until Stop ping is selected. Ping time out is set in milliseconds and defines the amount of time OpenView will wait for a response from the pinged device.

6.2 E.F. JOHNSON ALARMS

6.2.1 REPEATER GENERATED ALARMS

Repeater in Test Mode	IAC Input 1
IAC Input 2	IAC Input 3
IAC Input 4	Reserved (5)
Reserved (6)	Reserved (7)
Reserved (8)	MAC Processor
HSDB Processor	IRDB Cable
RNT/CIM Channel Problem*	TIC Processor
SMC Processor	VNC
AC Power Fail	Battery Power Fail
Power Supply Thermal	Fan 1 Current
Fan 2 Current	IAC Mismatch
GPS 1 PPS	SMC Link
No A/D Samples	GPS 10 MHz
Repeater in Setup State	RF Shutdown (several modes)
RF Half Power Mode	Thermal Sense in RF Portion
RF Finals 1 and 2	RF Finals 3 and 4
RF VSWR	Normal Synthesizer Tx Lock
Normal Synthesizer Rx Lock	HS Synthesizer Tx Lock
HS Synthesizer Rx Lock	RF Quarter Power
Repeater Disabled	

* Consoles will not receive audio from the affected channel. The channel will still be operating, unless it was shut down by an automatic channel revert.

6.2.2 SITE/CHANNEL COMPUTER GENERATED ALARMS

SCS in Test Mode	SIB Link Alarm
Simulcast Failure	Repeater Failure
Site Reverted	Unable to Configure Repeater
Unconfigured Repeater	

6.2.3 HOST COMPUTER GENERATED ALARMS (FOR THE SITE/CHANNEL COMPUTERS)

HC-SCS Network Link Established
HC-SCS Network Link Lost
HC-SCS Connection Attempt Failed

6.2.4 HOST COMPUTER GENERATED ALARMS (FOR THE REPEATERS)

Repeater Restarted
SMC Configuration Finished
SMC Configuration Failed
Repeater Configuration Finished
Calibration Write Failed
Calibration Write Finished

6.2.5 HOST COMPUTER GENERATED ALARMS (FOR A SYSTEM)

Channel Reverted
Channel Unreverted

6.3 MNEMONICS

A/D - Analog to Digital
CIM - Channel Interface Module
GPS - Global Positioning System
HC - Host Computer
HSDB - High-Speed Data Bus
IAC - Interface Alarm Card
IP - Internet Protocol
IRDB - Inter-Repeater Data Bus
MAC - Main Audio Card
MBC - Message Bridge Card
PPS - Pulse Per Second
RNT - Radio Network Terminal
SCS - Site Controller Station or Site/Channel computer
SIB - Serial Interface Bus
SMC - Simulcast Modulation Card
SNMP - Simple Network Management Protocol
TCP - Transmission Control Protocol
TIC - Telephone Interface Card
VNC - Viking Network Controller

