

Liebert® MultiLink™

User Manual - Fundamental & Advanced



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How Do You Contact Emerson for Technical Support?

For help on deciding how to set up Liebert MultiLink or any other monitoring product, contact Emerson's Software Technical Applications Support Center at:

UNITED STATES	1 800 222 5877
FRANCE	+33 (0) 1 46 87 51 52
GERMANY	+49 (0) 89 99 19 220
ITALY	+39 (0) 2 98250 324
NETHERLANDS	+31 (0) 475 503333
UNITED KINGDOM	+44 1628403200
EUROPE	+800 11554499
ASIA	+800 11554499
WORLDWIDE	1 614 841 6755
	FAX: 1 614 841 5471
	All Products: http://www.liebert.com
	Liebert MultiLink: http://multilink.liebert.com
	E-mail: liebert.monitoring@emerson.com

1.0 WHAT IS LIEBERT® MULTILINK®?

Emerson developed Liebert MultiLink to protect computers from costly damage such as loss of data resulting from power failures—from single computers to large networks. Liebert MultiLink constantly monitors one or more Liebert Uninterruptible Power Supply (UPS) units, warns computer users of impending power loss and initiates graceful operating system shutdowns when needed.

Liebert MultiLink comes in two versions:

- **Liebert MultiLink Fundamental**—available for download
- **Liebert MultiLink Advanced**—upgrade

The advanced version permits configurable responses to UPS status changes, including support for e-mail, virtual server shutdown and pager notification, executing commands prior to shutdown and silencing alarms. For information on upgrading to Liebert MultiLink Advanced, see **3.3 - Advanced Features**.

1.1 How Does Liebert MultiLink Work?

Liebert MultiLink on a host computer communicates with a Liebert UPS using network or direct cable connections to detect loss of utility power and the status of the UPS battery. For network communications, Liebert MultiLink employs the SNMP protocol and IP addresses. For direct cable connections, Liebert MultiLink uses contact closure, USB or serial communications, depending on the UPS model.

Users have the option of expanding Liebert MultiLink's network capabilities through license upgrades. A license upgrade allows the System Administrator to monitor and control multiple devices—computers powered by the same UPS, other UPSs and even other Liebert MultiLink installations—throughout a network from a single location.

The Liebert MultiLink Network Shutdown License permits the designation of an authorized number of computers as targeted client computers. Liebert MultiLink installed on those targeted clients responds to On Battery and Low Battery notifications from Liebert MultiLink on the host computer.

The Liebert MultiLink Network Administration License allows the configuration and management of many Liebert MultiLink installations over a network. All installations must have the same version of Liebert MultiLink to use this license. Each Liebert MultiLink host can be configured with a password that users must enter before connecting to the system remotely.

Liebert MultiLink uses the SNMP protocol and IP addresses to communicate with targeted client computers (running Liebert MultiLink) using the network—instead of requiring separate, expensive hardware and cables that might run alongside network lines.

Liebert MultiLink permits using a Web browser to view monitoring data for a UPS equipped with a Liebert IntelliSlot® Web/485 Card With Adapter or a Liebert IntelliSlot Web card.

Typical sequence

Liebert MultiLink's responses to a power loss depend on the version of the software, its configuration by the user, installation of any upgrade licenses and the type of connection between the host computer and the UPS. Following is a simplified version of how Liebert MultiLink Advanced might respond to a utility power failure.

- Utility power fails, and the UPS begins powering the computer network. The UPS senses the power loss, triggering Liebert MultiLink to activate timers and issue notifications that utility power has been interrupted. If the timers expire before utility power is returned, Liebert MultiLink can prompt an operating system shutdown, preventing the loss of valuable data as well as damage to computers from a precipitous loss of power.
Depending on configuration by the user, Liebert MultiLink will respond automatically to this UPS event by sending pop-up notifications, e-mails and pager messages, running command-line options, performing an orderly shutdown and keeping a log of all events.
- When utility power is restored, the UPS prompts Liebert MultiLink to cancel the timers and notify targeted computers of the return to normal status.

2.0 WHO CAN BENEFIT FROM LIEBERT® MULTILINK®?

Any computer user—from the person with a single computer to the business with a multiple network system—can protect valuable data using a Liebert UPS and Liebert MultiLink to perform an orderly shutdown of the operating system in the event of utility power failure.

2.1 Configurations

The application can monitor virtually any configuration (see examples in **Figures 1** through **3**):

- Any individual computer with a single Liebert UPS
- Any single network with multiple computers and one or more Liebert UPS units
- Interconnected networks with computers powered by one or more Liebert UPS units

2.2 Connections

Liebert MultiLink works with any of these connections to a Liebert UPS:

- Serial port on your computer (using contact closure or serial communications)
- USB port on your computer
- SNMP card on a network or interconnected networks

A single computer connected by any of those methods can be networked to other computers and, with license upgrades, configured to monitor UPSs connected to those computers. Liebert MultiLink can monitor UPS units over a network that includes any combination of LANs, WANs and any other type of network.

Liebert MultiLink can notify targeted client computers of “On Battery” and “Low Battery” events for coordinated shutdown of the operating system.

2.3 Platforms

Liebert MultiLink functions on multiple platforms. Visit the Liebert MultiLink Web site at <http://multilink.liebert.com> for a list of currently supported platforms.

2.4 Multiple Languages

Users may choose a language for the text displayed in all dialog boxes associated with the Liebert MultiLink service and Viewer, including Liebert MultiLink’s notifications.

Supported languages include:

- English (U.S.)
- French (Canada)
- Spanish
- Chinese (Simplified)
- Japanese

3.0 WHAT IS REQUIRED TO USE LIEBERT® MULTILINK®?

Visit the Liebert MultiLink Web site at <http://multilink.liebert.com> for links to currently supported systems. The Web site always has the most detailed and up-to-date information on system requirements.

3.1 Connecting host computer, UPS and targeted clients

A host computer can be connected to a UPS and to targeted client computers in almost limitless ways. The connections and Liebert MultiLink configurations are constrained only by the UPS model, installed options and upgrade licenses.

1. Contact Closure—direct cable connection between a UPS and a computer
2. USB—direct cable connection between a UPS and a computer
3. Serial Communications—direct cable connection between a UPS and a computer
4. Ethernet/ Intranet/Internet—SNMP protocol and IP addresses
5. Any combination of the connections above, comprising a Local Area Network (LAN) or Wide Area Network (WAN)



NOTE

*Not all connection methods are supported by every operating system. Refer to the notes below and see the operating system sections in **Appendix A - Operating System Details** for additional information.*

- *USB is supported only in Windows and Linux.*
- *Solaris x86 supports only Ethernet/ Intranet/ Internet connections. Solaris x86 does not support contact closure, USB or serial connections.*

3.1.1 MultiLink Basic Notification Source

Computers on a network, such as a LAN or WAN, may be set up to receive notifications from another computer configured to monitor the UPS that is powering the network. For these computers, choose the connection type **MultiLink Basic Notification Source** during setup. This feature requires a Liebert MultiLink Network Shutdown License (see **Table 17**).

These computers must be running Liebert MultiLink. On these computers, Liebert MultiLink is not communicating directly with a UPS but with a Liebert MultiLink installation on another computer. This host computer must be configured to communicate with the UPS as **Contact Closure**, **USB**, **Serial UPS** or **SNMP**, as described in the following sections.

3.1.2 Contact Closure

Contact Closure communications provide basic functions only, supporting these UPS-related events:

- UPS Operating On Battery
- Low Battery
- UPS Returned From Battery (Normal)

For these events, these actions are available: sending pop-up notifications, performing orderly shutdowns and keeping a log of all events. (With Liebert MultiLink Advanced, all actions are available, including e-mail and pager messages and running command-line options.)

3.1.3 USB, Serial or SNMP Connection

Serial, USB and SNMP connections offer access to the full range of Liebert MultiLink's features.

3.1.4 Connection Methods Available by Liebert UPS Model

The following table shows the communications methods available with selected Liebert® UPS models:

Table 1 Communications Method by UPS Model

UPS Model	Local			Network	
	Contact Closure	USB	Serial UPS	MultiLink Basic Notification Source	SNMP
Liebert PSP™	No	✓	No	✓	No
Liebert PSA™	No	✓	No	✓	No
Liebert PSI-XR™/PSI™	✓	✓	No	✓	✓*
Liebert GXT3™	✓	✓	No	✓	✓*
Liebert Nfinity®	✓	No	✓	✓	✓*
Liebert Npower™	✓	No	No	✓	✓*
Liebert NX™	✓	No	No	✓	✓*
Liebert APM™	✓	No	No	✓	✓*
Liebert NXL™	✓	No	No	✓	✓*
Liebert Series 300™	✓	No	No	✓	✓*
Liebert Series 610™	✓	No	No	✓	✓*

* Available when UPS is equipped with SNMP card, such as Intellislot SNMP/Web card

3.2 Requirements for Installing Liebert® MultiLink®

Before beginning installation, review these requirements and follow **Steps 1** through **3** below.

The prospective user must have:

- The Liebert MultiLink software—Advanced or Fundamental; Advanced is available on CD; Fundamental is downloadable at:
<http://multilink.liebert.com>
Visit the Web site or contact your local Emerson representative, value-added reseller, or distributor for information.
- This manual—downloadable from the Liebert MultiLink Web site:
<http://multilink.liebert.com>
- A Liebert UPS linked to a computer.
- For requirements specific to various operating systems, see the Liebert MultiLink Web site, <http://multilink.liebert.com>, or **Appendix A - Operating System Details**.
- A communications link between the UPS and the computer, depending on the type of connection:

Connection Type	Link Between UPS and Computer
Contact Closure	<i>(Same as Serial Communications)</i> <ul style="list-style-type: none"> • A special serial cable—available from Liebert or built with instructions in Appendix B - Making Your Own Liebert® MultiLink® UPS Cable of this manual • An available serial port on the computer protected by the UPS (see Appendix C - Technical Information & Frequently Asked Questions)
USB (if the UPS has a USB port)	<ul style="list-style-type: none"> • A USB cable with a Type A connector on one end (to connect to the computer) and a Type B connector on the other (to connect to the UPS) • An available USB port—or an adapter from the computer's serial port to the Type A connector end of the USB cable—on the computer protected by the UPS
Serial Communications	<i>(Same as Contact Closure)</i> <ul style="list-style-type: none"> • A special serial cable—available from Liebert or built with instructions in Appendix B - Making Your Own Liebert® MultiLink® UPS Cable of this manual • An available serial port on the computer protected by the UPS (see Appendix C - Technical Information & Frequently Asked Questions)
SNMP	<ul style="list-style-type: none"> • Ethernet, Internet or Intranet, utilizing SNMP protocol and IP addresses

- With an SNMP card in the UPS, an available IP port—either 161 and 162 or Liebert-reserved ports 3027 and 3029—depending on your operating system and configuration (see **Appendix C - Technical Information & Frequently Asked Questions**).
- TCP/IP connectivity throughout the network, if the UPS is equipped with an SNMP card or if Liebert MultiLink will monitor or communicate with more than one UPS or computer.

Before beginning installation:

1. Check with your System Administrator about the need to disable certain network software (see **Appendix C - Technical Information & Frequently Asked Questions**).
2. For a serial port connection to the UPS, you will need to buy or make a custom cable. Liebert MultiLink will NOT function properly with an ordinary serial cable connected to the UPS.
 - You may purchase a cable by contacting your local Emerson representative, value-added reseller or distributor (see **Appendix E - Ordering Parts** for part numbers).
 - To make a cable, see **Appendix B - Making Your Own Liebert® MultiLink® UPS Cable**.
3. For configurations in which the source of events is to be a UPS with an SNMP agent, be sure to include the IP address of the computer(s) on which Liebert MultiLink is to be installed in the SNMP agent's list of trap recipients. This speeds notifications about the UPS's condition to the computer.

3.3 Advanced Features

Liebert® MultiLink® comes in two versions: Fundamental (shipped with your UPS) and Advanced (upgrade).

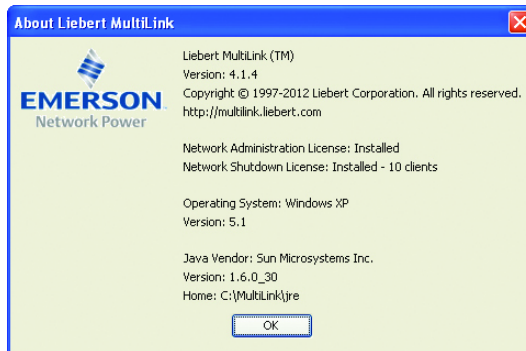
- **Liebert MultiLink Fundamental** allows you to monitor equipment and configure automated shutdown.
- **Liebert MultiLink Advanced** expands your control and monitoring capabilities by adding E-mail, Virtual Server Shutdown and Paging notification of events, Command Execution prior to shutdown and Data Logging for trending. To obtain this upgrade on CD-ROM (part number MLADV), contact your local Emerson representative or distributor.

Advanced features are covered in this manual and identified as such.

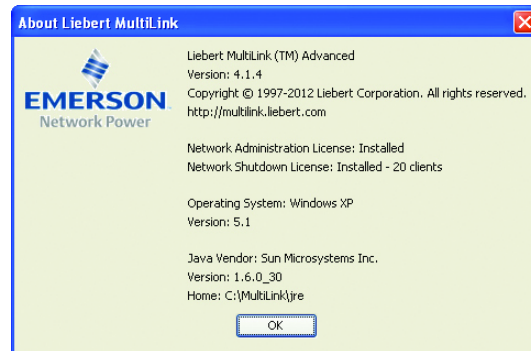
To determine your version of Liebert MultiLink:

- Start the Viewer.
- Click on **Help** in the menu at the top of the window, then on **About**.

Liebert MultiLink Fundamental



Liebert MultiLink Advanced



4.0 LIEBERT® MULTILINK® CONFIGURATIONS

Liebert MultiLink is configured according to the method a computer uses to monitor the status of a UPS, through an SNMP card or by a direct cable connection to a serial or USB port on the computer.

Liebert MultiLink is designed to monitor any part of a network. Its functionality permits it to monitor any Liebert UPS that can be contacted via contact closure, USB cable, serial cable, an Ethernet or the Internet, but the software's functionality does not require networked computers and UPSs.

Configure Liebert MultiLink according to the type of connection between the computer and UPS. The various methods are shown in **Figures 1** through **3**.

4.1 Cable Connection

Figure 1 shows the simplest possible Liebert MultiLink installation. The software can be configured to monitor the UPS, and, if utility power fails or another problem arises, can notify the computer (MultiLink Agent) and personnel about the problem. In the event of a serious power problem, Liebert MultiLink can be configured to prompt the shutdown of the MultiLink Agent's operating system.

Figure 1 Direct cable connection

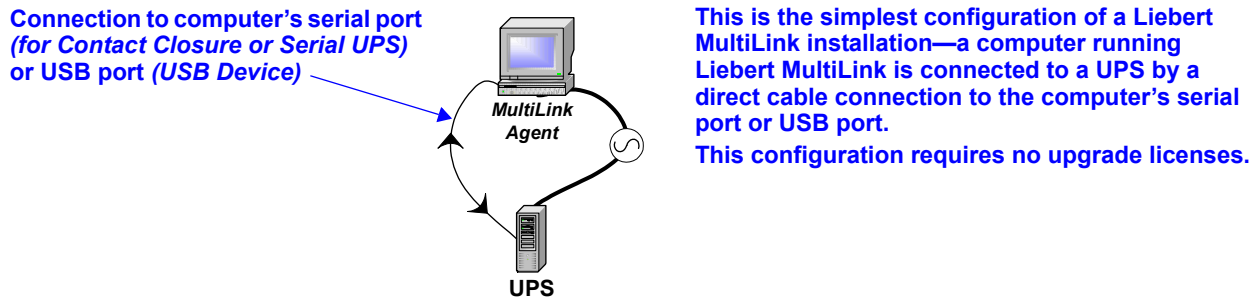
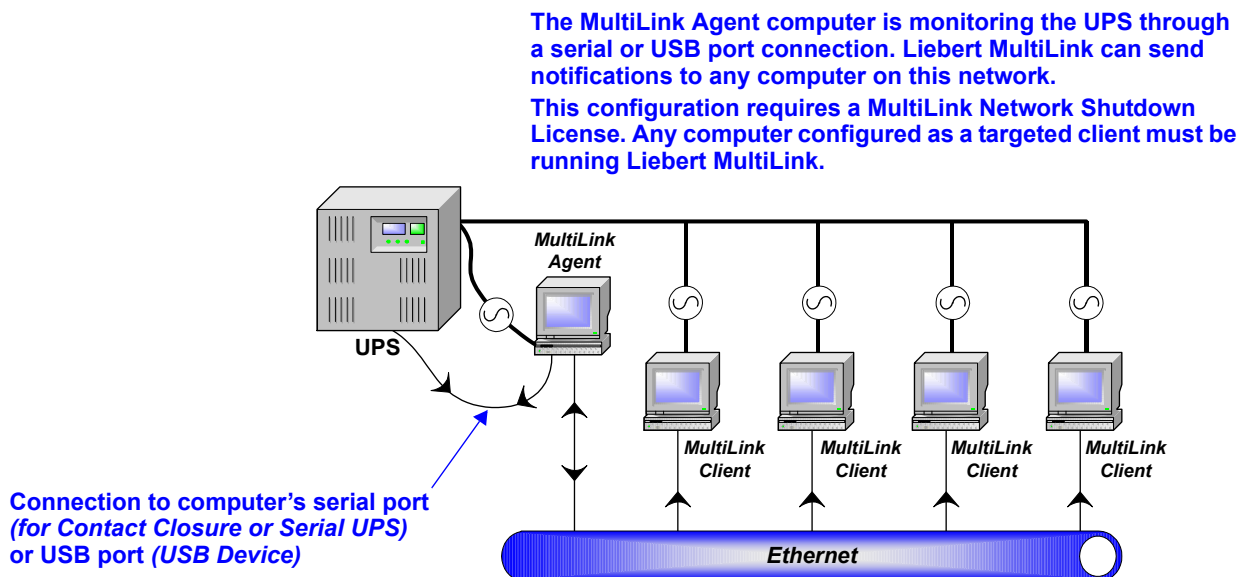


Figure 2 shows the same type of direct cable connection to a computer (MultiLink Agent) on a network. With a contact closure, USB or serial connection, Liebert MultiLink can send notifications to all computers (MultiLink Clients) on a network. (These computers must be running Liebert MultiLink.) With a Liebert MultiLink Network Shutdown License installed on the MultiLink Agent computer, the software can send notifications to the MultiLink Client computers when needed.

Figure 2 UPS connected by cable to one computer on network

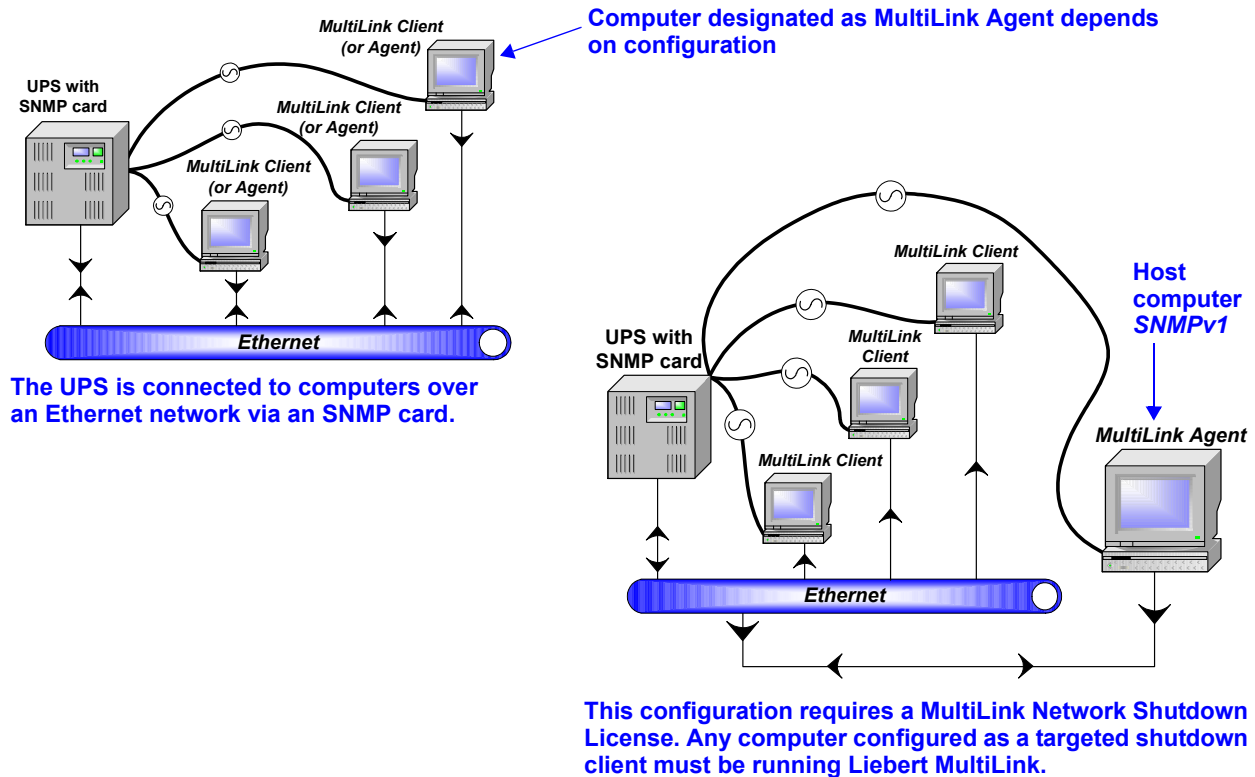


4.2 SNMP Connection

Figure 3 shows examples of two Liebert® MultiLink® configuration options for a UPS with an SNMP connection.

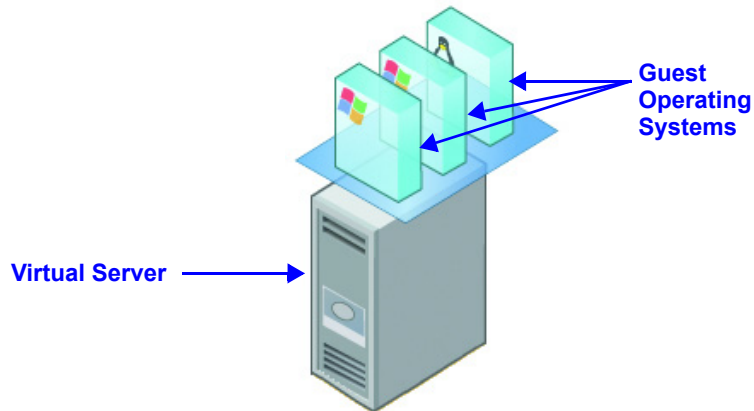
The SNMP card installed in the UPS can be monitored by up to 20 MultiLink Agent computers, or it can notify up to 20 MultiLink Client computers for automated shutdown. (These computers must be running Liebert MultiLink.) With the proper Liebert MultiLink Network Shutdown License installed, MultiLink Agent computers can forward On Battery and Low Battery traps received from the SNMP card to MultiLink Clients being powered by the UPS.

Figure 3 UPS with SNMP card on network

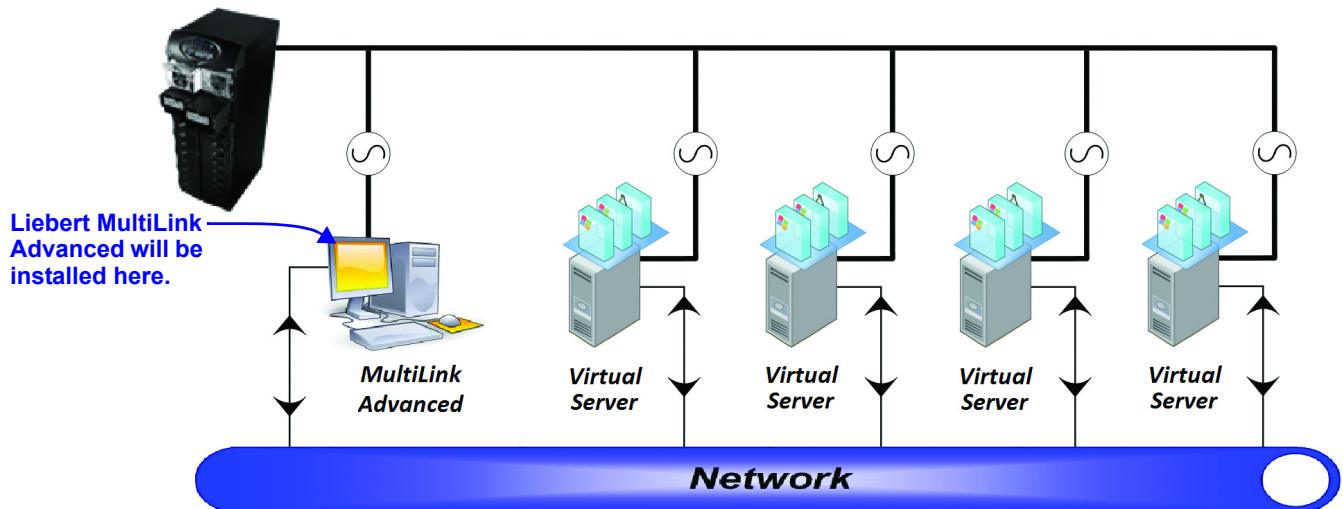


4.3 Virtual Servers

Liebert MultiLink Advanced can be configured to initiate a graceful shutdown of VMware ESXi Hypervisor servers. Such systems consist of a computer and guest operating systems, known as a *virtual server*. See below.



A UPS should be powering the virtual servers and a Windows system. Liebert MultiLink Advanced will be installed on the Windows system monitoring the UPS for events. If an event occurs, then Liebert MultiLink Advanced can execute an action to shut down the virtual servers. See below for a typical system layout. For details, refer to **A.2 VMware Server Shutdown—Liebert® MultiLink™ Advanced for Windows® Only**.



5.0 INSTALLING THE SOFTWARE

Follow these instructions to install Liebert® MultiLink®. Be sure to read any notes on upgrading or reinstalling and multiple installations, as applicable. Some steps vary according to the operating system. For information, see **Appendix A - Operating System Details** before beginning.

5.1 Before Installing Liebert MultiLink

5.1.1 Upgrading or Reinstalling Liebert MultiLink

If you wish to preserve your Liebert MultiLink configuration when upgrading or reinstalling Liebert MultiLink, simply install without removing your present Liebert MultiLink installation. Your configuration files will be incorporated into the new directory. This step varies for some operating systems; refer to **Appendix A - Operating System Details**.

5.1.2 Multiple Installations

For identical installation on multiple computers, the System Administrator may install Liebert MultiLink on one computer, configure that computer and use those settings for subsequent installation on other computers.

Identical installations require that the computers use the same operating system as the original installation and the same version of Liebert MultiLink.

1. Install Liebert MultiLink on one computer as described in **5.2 - Beginning the Installation**, then follow these steps before subsequent installations:
 - a. Make a copy of the Liebert MultiLink distribution in a common location that is accessible to System Administrators who intend to install Liebert MultiLink on similar computers.
 - b. In that common location, create a subdirectory where you will place the configuration files from the initial installation. This new subdirectory can have any name, but using the name **site_cfg** simplifies subsequent installations by allowing automatic detection of the configuration files.
 - c. Copy the configuration files (in the **cfg** subdirectory) from the initial installation into the subdirectory created in **Step b**.
2. Proceed with the second and subsequent installations as described in **5.2 - Beginning the Installation**, starting each installation from the common location described in **Step a** above.

5.1.3 Determine Type of Connection to Define During Installation

A connection may be configured during installation if the proper connections are in place. These settings may be configured or changed after installation, as described in **8.3.3 - Properties - Setup Tab**.

Table 2 provides a quick look at the options available during installation for each type of connection and how to enter comparable setup information in the Properties Setup tab.

Table 2 Setting up a connection - during or after installation

Configure during installation		Configure/change after installation (8.3.3 - Properties - Setup Tab):
Step (Section)	Options to choose	
CONTACT CLOSURE - Monitor a UPS connected to this computer by a contact closure cable		
• Connection type (Section 5.2.2)	Choose Serial port on computer [computer name] .	Choose Contact Closure in Device Type box.
• Source type (Section 5.2.3)	When prompted, specify Contact Closure .	Specify port in Serial Port box.
USB CABLE - Monitor a UPS connected to this computer by a USB cable		
• Connection type (Section 5.2.2)	Choose USB port on computer [computer name] .	Choose USB Device in Device Type box.
• Source type (Section 5.2.4)	(No choice required)	(No choice required)
SERIAL UPS - Monitor a UPS connected to this computer by a serial cable		
• Connection type (Section 5.2.2)	Choose Serial port on computer [computer name] .	Choose Serial UPS in Device Type box.
• Source type (Section 5.2.3)	Specify name of serial port.	Specify port in Serial Port box.
UPS WITH SNMP CARD - Monitor an SNMP-equipped UPS connected to the same network		
• Connection type (Section 5.2.2)	Choose Network to an SNMP UPS or MultiLink on another computer	Choose SNMPv1 Device in Device Type box.
• Source type (Section 5.2.5)	Host & client computers must use same ports. • Choose SNMP source if host computer uses standard ports (161/162) OR • Choose Custom if host computer does NOT use standard ports (161/162)	Host & client computers must use same ports. • Choose 161 in Request Send Port box; choose 162 in Trap Listen Port box. OR • Specify ports in Request Send Port and Trap Listen Port boxes.
MULTILINK BASIC NOTIFICATION SOURCE* - Set up a client computer to receive notifications over a network		
• Connection type (Section 5.2.2)	Choose Network to an SNMP UPS or MultiLink on another computer	Choose MultiLink Basic Notification Source in Device Type box.
• Source type (Section 5.2.5)	Host & client computers must use same ports. • Choose MultiLink source if host computer uses standard ports (3027/3029) OR • Choose Custom if host computer does NOT use standard ports (3027/3029)	Host & client computers must use same ports. • Choose 3027 in Request Send Port box; choose 3029 in Trap Listen Port box. OR • Specify ports in Request Send Port and Trap Listen Port boxes.

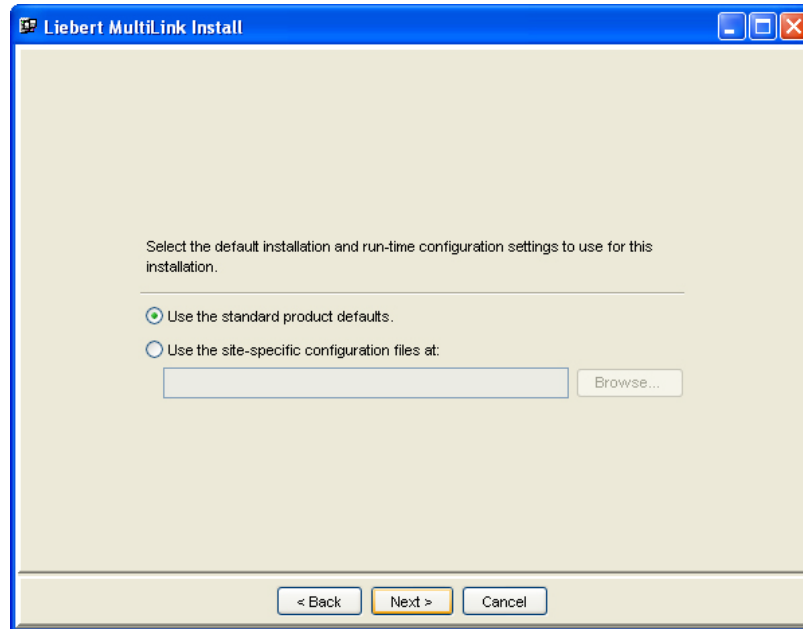
* **Note:** After designating a client computer as a MultiLink Basic Notification Source, add the client computer to the host computer's list of targets (**8.3.6 - Properties - Clients Tab**)

5.2 Beginning the Installation

- Execute the installation file. For detailed instructions, see **Appendix A - Operating System Details**.
- After viewing the Welcome screen, read the Liebert® MultiLink® Software License and the Java license agreements. If you do not accept the terms and conditions, cancel the installation.

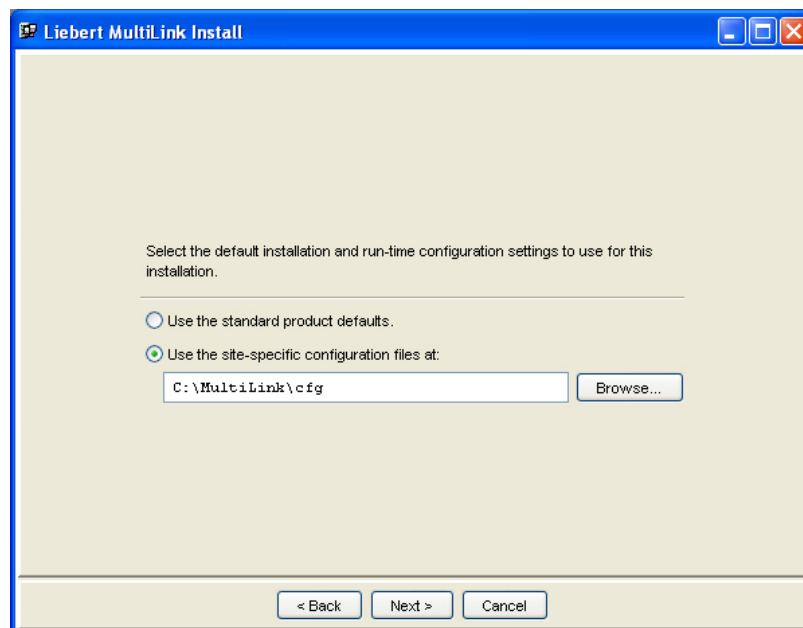
Installation on a Single Computer (or Initial Installation)

- For the initial Liebert MultiLink installation or for installation on a single computer, choose **Use the standard product defaults**, shown below. (These default settings can be altered later.)



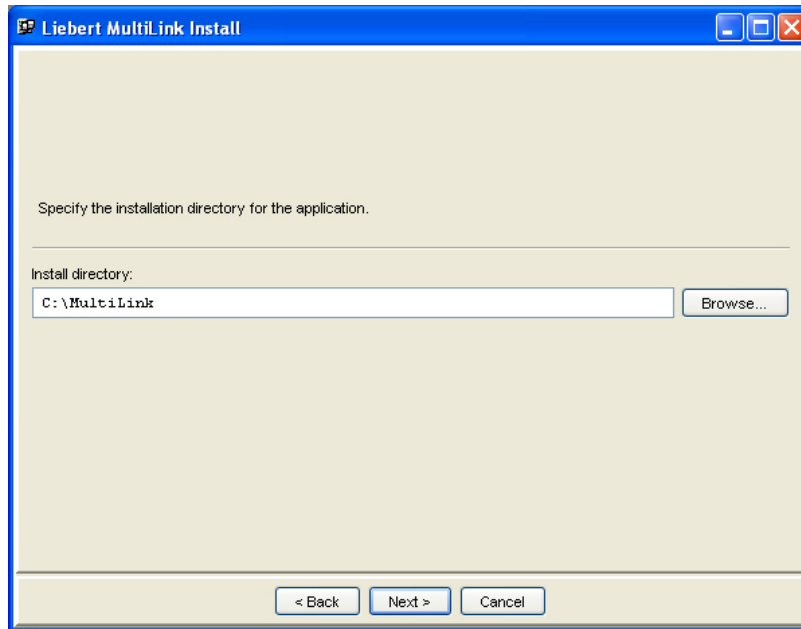
Subsequent Installations

- For subsequent installations, choose **Use the site-specific configuration files at** (subdirectory created in **Step b** in **5.1.2 - Multiple Installations**), as shown below. The text box must display the full path where the configuration files were placed—**cfg** or another directory as specified by the System Administrator. The subdirectory can be entered manually or it can be found by using the **Browse** button.



5.2.1 Specify Installation Directory

The program asks whether to install the application files in the default location—the **MultiLink** folder—or in an alternate location. This step varies for some operating systems; refer to **Appendix A - Operating System Details**.

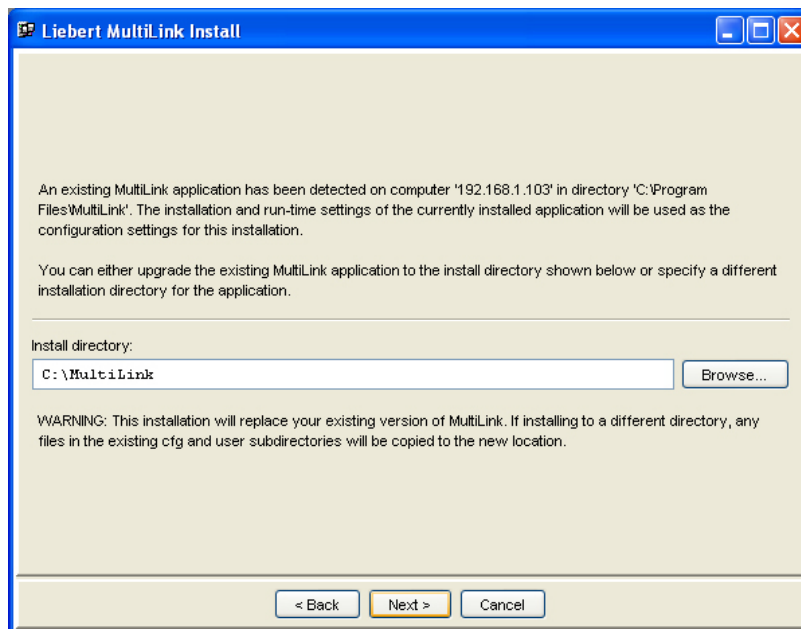


Upgrade or Reinstallation

- If you are upgrading or reinstalling Liebert® MultiLink®, the existing version is detected and Liebert MultiLink will incorporate your existing configuration files into the new installation, bypassing some steps required for an initial installation.

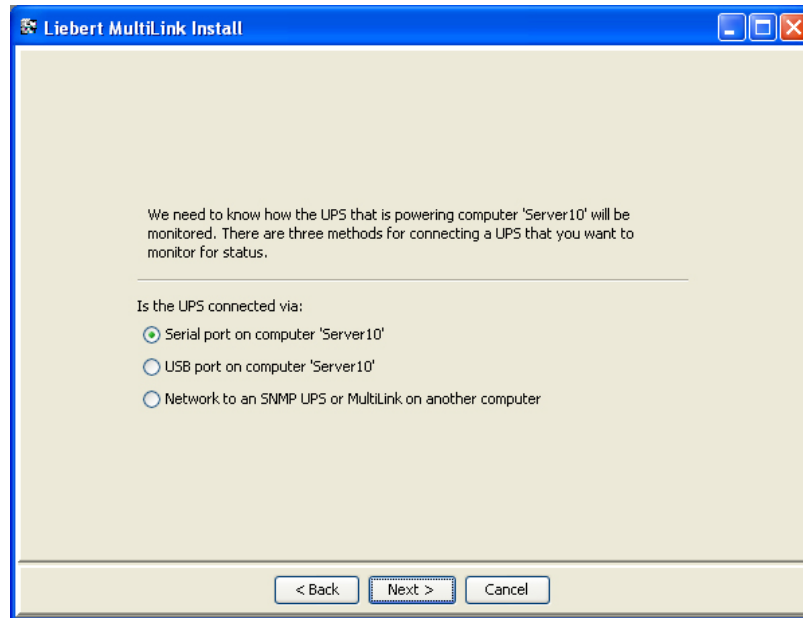
Click the **Next** button and go to **5.2.6 - Restrict or Allow Access to Configuration Settings**.

Upgrades will be installed at c:\Multilink or to the current MultiLink directory



5.2.2 Specify the Method of Monitoring the UPS

- Click on the appropriate choice to designate how the UPS powering this computer will be monitored:
 - Serial port on computer [IP address/name]** for either a Serial UPS or Contact Closure cable connection
 - USB port on computer [IP address/name]** for a UPS with a USB cable connection
 - Network to an SNMP UPS or MultiLink on another computer** for a UPS equipped with an SNMP card or for a computer that will be notified by Liebert® MultiLink® on another computer



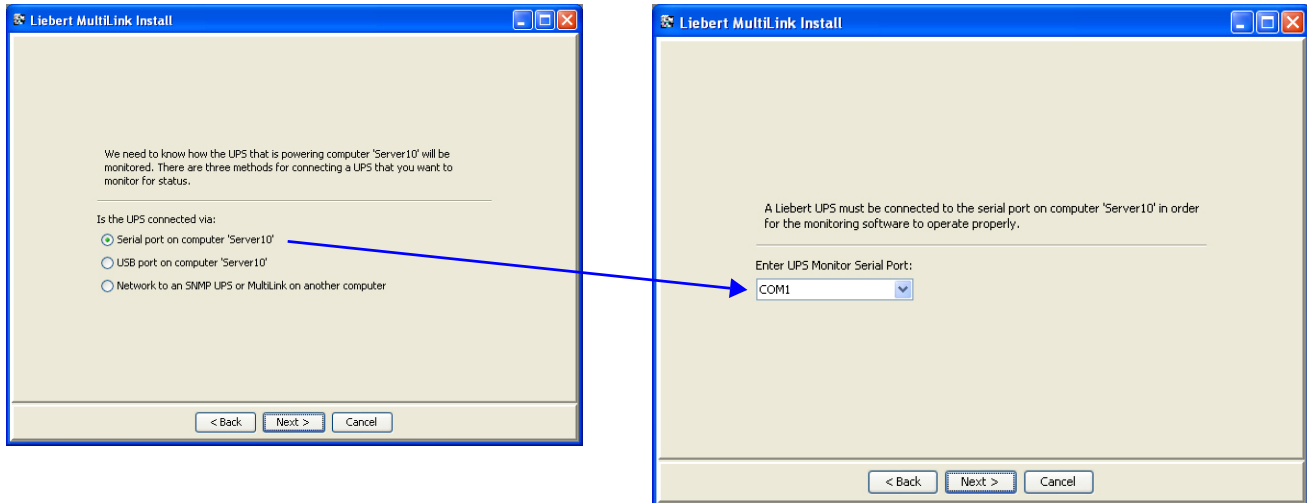
- The next option depends on the connection method selected:

If you selected:	Proceed to:
Serial port on computer [IP address/name]	5.2.3 - Define Serial Port Connection
USB port on computer [IP address/name]	5.2.4 - Define USB Port Connection
Network to an SNMP UPS or Liebert MultiLink on another computer	5.2.5 - Define Network Connection

5.2.3 Define Serial Port Connection

If the connection method you selected is **Serial port on computer [computer name]** (below left and in 5.2.2 - Specify the Method of Monitoring the UPS):

- Specify the serial port of the computer to which the UPS is connected by choosing from the drop-down list of ports, shown below right. If the port you wish to use is not in the drop-down list, type the designation into the box.



For further information, see serial port information for your operating system in **Appendix A - Operating System Details**.



NOTE

*Make sure that the specified port is a serial port on the computer, not on a terminal expander. For a Contact Closure UPS, this port must support the modem control lines shown in **Table 12** in **Appendix B - Making Your Own Liebert® MultiLink® UPS Cable**. For a serial connection UPS, see **Table 11**.*

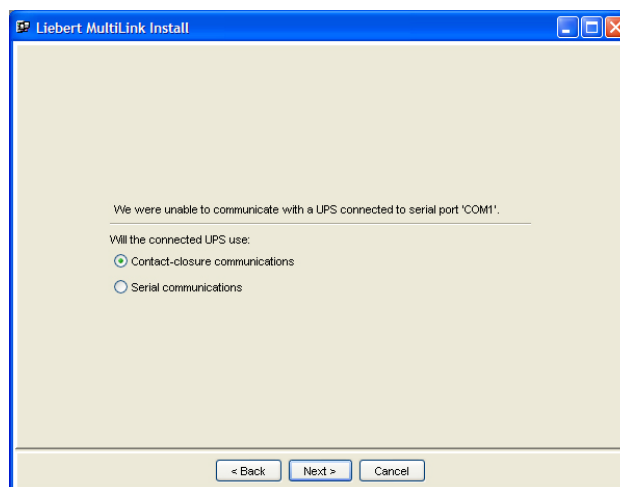
- If the UPS and computer are not yet linked by a cable or if the UPS uses Contact Closure connection, a message window prompts you for the type of connection to be used.

Refer to **3.1 - Connecting host computer, UPS and targeted clients** before making a selection. The two types of connections are:

- Contact-closure communications**—for UPS models, see **Table 1**
- Serial communications**—for UPS models, see **Table 1**

Each type requires a custom cable. These cables can be made or purchased.

- To make a cable, see **Appendix B - Making Your Own Liebert® MultiLink® UPS Cable**.
- To buy a cable, see **Appendix E - Ordering Parts**.

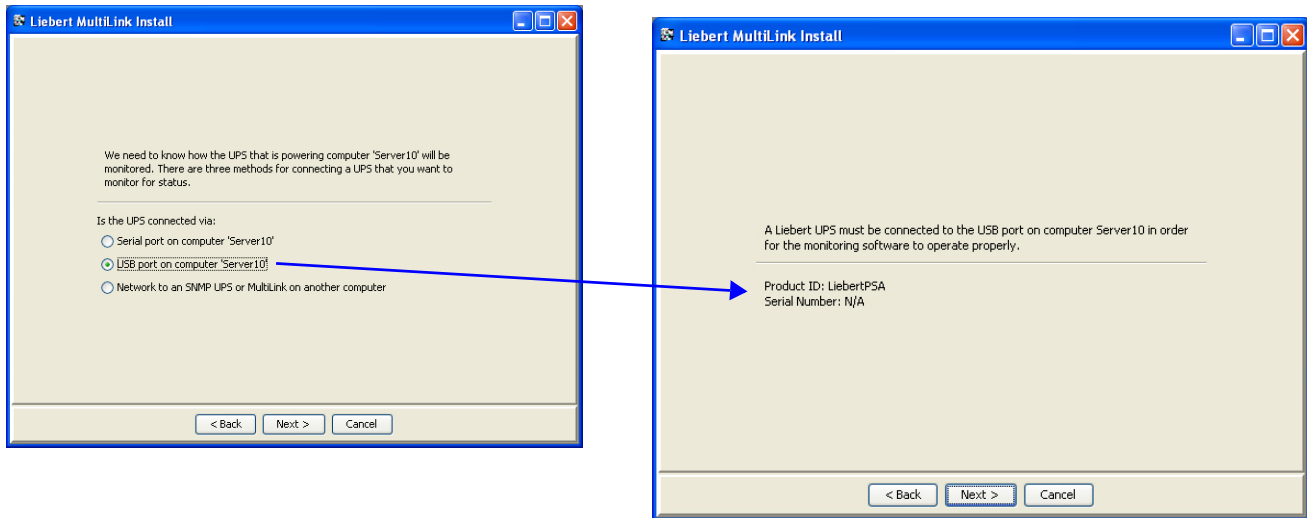


- Proceed to **5.2.6 - Restrict or Allow Access to Configuration Settings**.

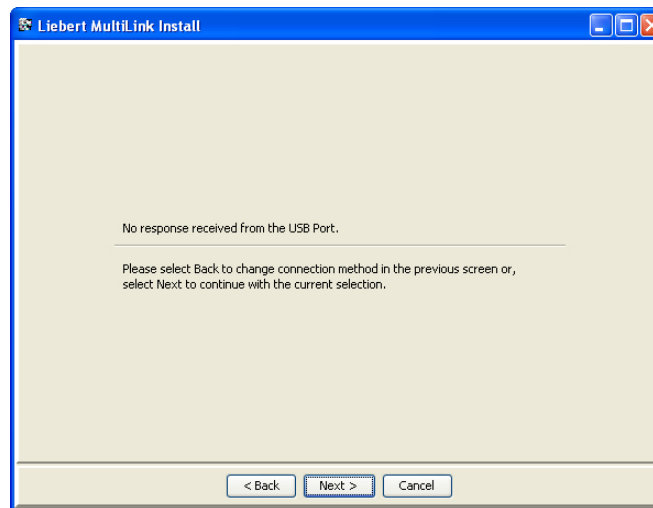
5.2.4 Define USB Port Connection

If the connection method you selected is **USB port on computer [computer name]** (below left and in 5.2.2 - Specify the Method of Monitoring the UPS):

- Review the product information displayed in the next window, then click **Next** (or click **Back** to return to the previous window and choose a different option).



- If the UPS and computer are not yet linked by a cable, a message window presents two options:
 - Click **Back** to return to the previous window. There you may select a different method of connection or connect the USB cable so the device will be detected.
 - Click **Next** to continue installing the software without the device being detected. If you choose this option, you may add the device in the Viewer (see 8.3.3 - Properties - Setup Tab).

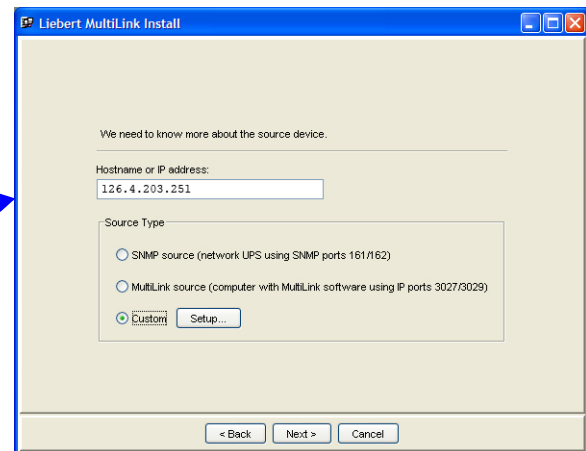
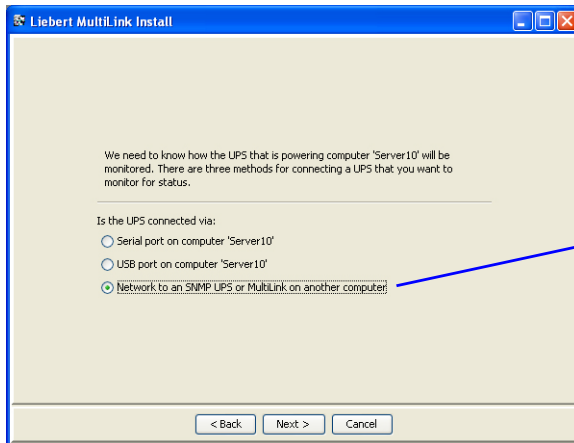


- Proceed to 5.2.6 - Restrict or Allow Access to Configuration Settings.

5.2.5 Define Network Connection

If the connection method you selected is **Network to an SNMP UPS or MultiLink on another computer** (shown below left and in 5.2.2 - Specify the Method of Monitoring the UPS):

- Enter the hostname or IP address of the UPS or computer to be monitored via the network.
- Click on the appropriate **Source Type**, shown below right, choosing from the following options:



Choose: To do this:

SNMP source Specify that this computer uses a network to monitor a UPS equipped with an SNMP card. Choose this option if the host computer uses standard SNMP ports 161 and 162; if other ports are used, choose **Custom** instead.

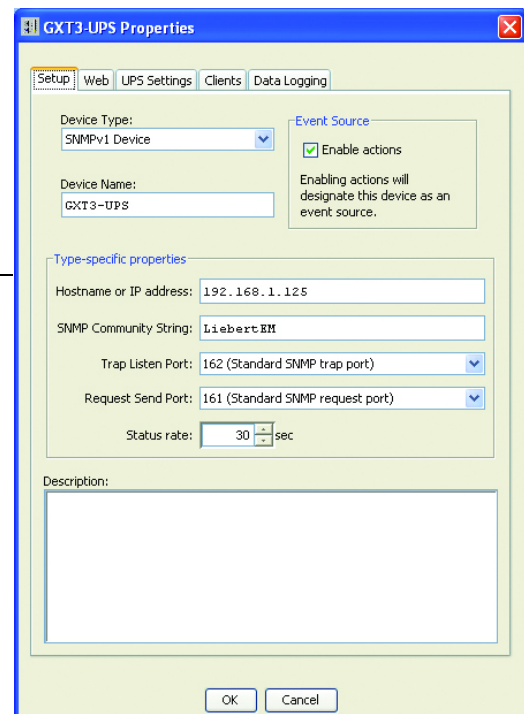
MultiLink source Designate a client computer as a MultiLink Basic Notification Source. The client computer uses a network to receive notifications from Liebert® MultiLink® on a host computer configured to monitor the UPS that is powering the network. Choose this option if the host computer uses standard ports 3027 and 3029; if other ports are used, choose **Custom** instead.

Custom Specify this computer as an **SNMP source** or a **MultiLink source** but with customized options. To choose options that are not standard, such as choosing different ports:

- Click on the **Setup** button after choosing **Custom**. This opens the Device Setup window, shown at right.
- For details on these setup options, see **8.3.3 - Properties - Setup Tab**.

Notes

- For network connections, the host computer and client computers must use the same ports—either 161 and 162 or Emerson-reserved ports 3027 and 3029. For details on how to change the ports after installation, see **8.3.3 - Properties - Setup Tab**.
- After designating a client computer as a MultiLink Basic Notification Source, it must be added to the host computer's list of targets, as described in **8.3.6 - Properties - Clients Tab**.

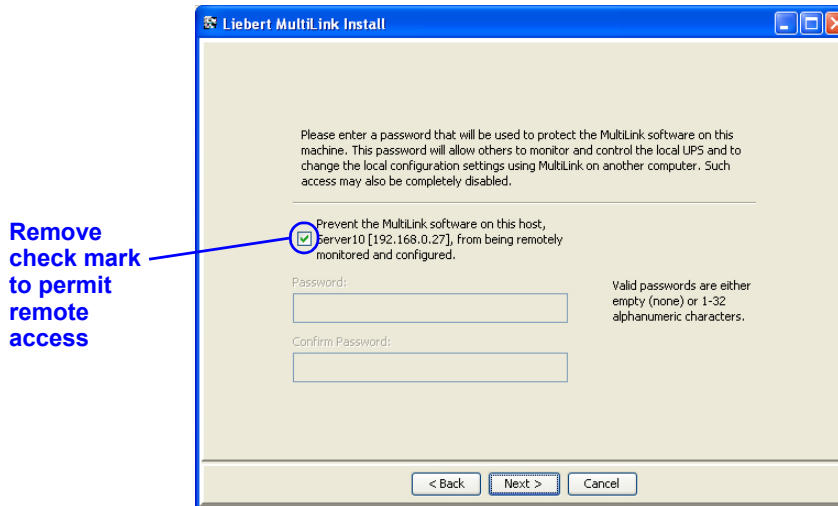


5.2.6 Restrict or Allow Access to Configuration Settings

A password can be used to protect Liebert MultiLink's configuration settings from unauthorized users. By default on most operating systems, Liebert® MultiLink® prevents remote monitoring and configuration.

For variations on this step, refer to **Appendix A - Operating System Details**.

- To permit remote access, remove the check mark from the **Prevent** box shown below.
- Enter up to 32 alphanumeric characters in the **Password** box.
- Type the same password in the **Confirm Password** box.



5.3 Reviewing Settings and Installing the Software

Review the **Install Summary**.

- If the setup configuration is acceptable, click **Install**.
- To alter any settings, click the **Back** button and make the desired changes. Then click **Install**.

A dialog box displays the progress of the installation process, which may take a few minutes.

5.4 Checking Permissions for Multiple Users, if Needed

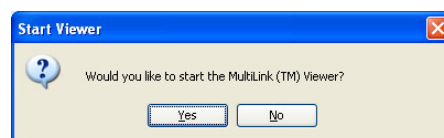
If there are multiple users of the system on which Liebert MultiLink is being installed, the System Administrator should check the permissions on the installed files and modify the permissions as desired. The default permissions may not be appropriate.

The MultiLink Viewer requires full read/write access to the Liebert MultiLink directories and certain files within. It requires administrator (root) privileges to perform functions that start or restart the Liebert MultiLink service.

5.5 Starting the MultiLink Viewer

After installation, Liebert MultiLink asks whether you want to open the MultiLink Viewer. The Viewer shows the status of the UPS and allows you to modify configuration settings. (For details on configuring Liebert MultiLink, see **8.0 - Configuring Liebert® MultiLink® for Your System**.)

- To open the Viewer now, click **Yes** in the dialog box.



6.0 OVERVIEW - MULTILINK VIEWER

This section summarizes the features available with various connections, the functions accessible through the MultiLink Viewer tabs and menus, along with Liebert® MultiLink® notifications and informational icons displayed in the Viewer and in pop-up notifications.

The MultiLink Viewer has these main functions:

- Navigation to a device of interest
- Display of summary status for all devices
- Display of parametric data from a selected device
- Configuration of UPS-related events to send notifications and shutdown messages and to launch scripts
- Testing of event configuration through simulation of an event
- Display of event logs from a selected device

Step-by-step instructions on using these functions are in **7.0 - Viewing UPS Status** and **8.0 - Configuring Liebert® MultiLink® for Your System**.

6.1 Liebert® MultiLink® Features

The type of connection—Contact Closure, USB, Serial UPS, MultiLink Basic Notification Source or SNMP—determines the features available in Liebert MultiLink as shown in **Table 3**.

Whether a function is available depends on the type of UPS and the connection between the UPS and the local host (see **3.1 - Connecting host computer, UPS and targeted clients**).

Table 3 Features Available by Connection Type

Category	Feature	Local			Network	
		Contact Closure	USB	Serial UPS	MultiLink Basic Notification Source	SNMP
Overview Data (Overview tab with UPS selected)	Graphs	No	✓	✓	No	✓
	Parameters	No	No	✓	No	✓
	Info	No	✓	✓	No	✓
	States	✓	✓	✓	✓	✓
Data Categories (Overview tab with UPS selected and expanded)	Battery Group	No	✓	✓	No	✓
	Output Group	No	✓	✓	No	✓
	Bypass Group	No	No	✓	No	✓
	Input Group	No	✓	✓	No	✓
	Hardware Info Group	No	No	✓	No	✓
	Other Group	No	✓	✓	No	✓
	Alarm Group	No	✓	✓	No	✓
UPS Control (Overview tab right-click on UPS for pop-up menu)	Diagnostics—Test Battery	No	No	✓	No	✓
	Output Control—Turn UPS Output Off/On	*	No	✓	No	✓
	UPS Audible Alarm—Silence	No	No	✓	No	✓
UPS Events (Event Configuration tab with UPS selected)	UPS Operating On Battery	✓	✓	✓	✓	✓
	Low Battery	✓	✓	✓	✓	✓
	UPS Output Returned From Battery	✓	✓	✓	✓	✓
	Other Events	None	Partial (see Table 14)	All (see Table 14)	None	All (see Table 14)
Event Actions (Event Configuration tab with UPS selected)	Notify	✓	✓	✓	✓	✓
	E-mail (Advanced**)	✓	✓	✓	✓	✓
	Page (Advanced**)	✓	✓	✓	✓	✓
	Shutdown	✓	✓	✓	✓	✓
	Command (Advanced**)	✓	✓	✓	✓	✓
	Log	✓	✓	✓	✓	✓
	Virtual Server (Advanced**)	✓	✓	✓	✓	✓
	Silence Alarm (Advanced**)	No	No	✓	No	✓
Monitoring Device Events (Event Configuration tab with My Event Actions [or monitoring device] selected)	System Shutdown Commencing	✓	✓	✓	✓	✓
	UPS Monitor Software Started	✓	✓	✓	✓	✓
	UPS Monitor Software Stopped	✓	✓	✓	✓	✓

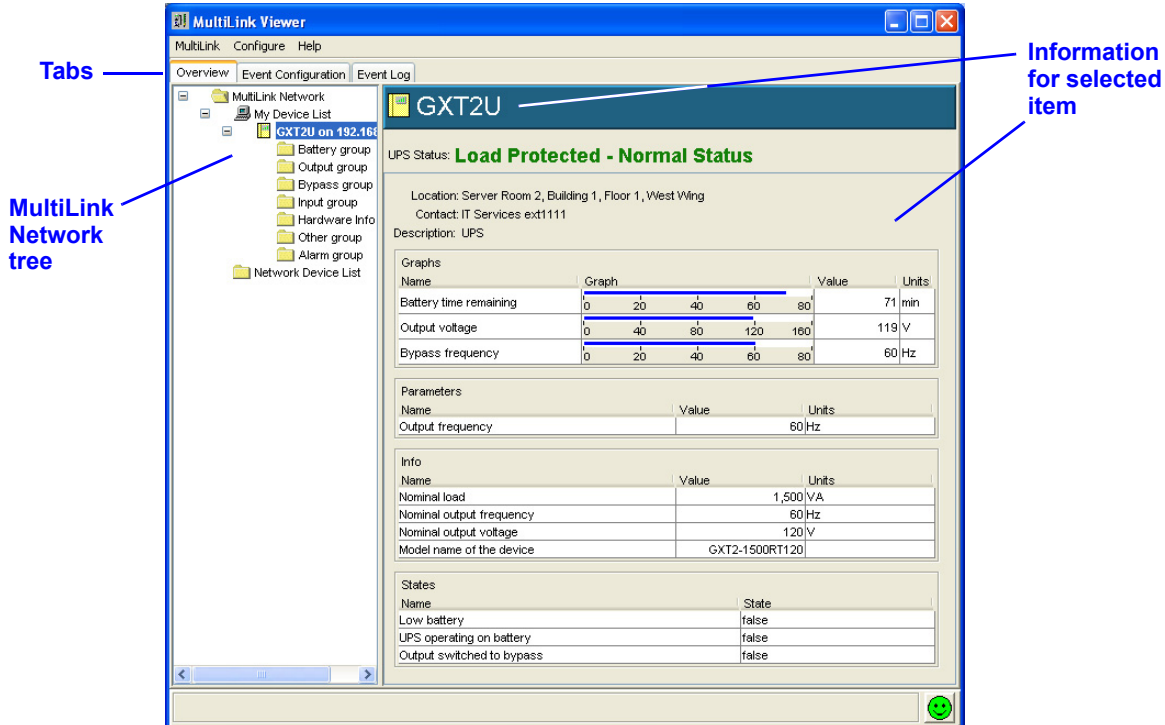
* Some but not all Liebert UPS units support Turn UPS Output Off with Contact Closure connection.

** Available only in Liebert MultiLink Advanced. For purchase information, see **Appendix E - Ordering Parts**.

6.2 Viewer Tabs

The Viewer window has two parts. The left side displays the MultiLink Network as a navigation tree, and the right side shows information about any selected item in the tree.

The Viewer's three tabs—**Overview**, **Event Configuration** and **Event Log**—provide different views of the tree at left. The information at right varies according to the item in the tree that is selected.



The **Overview** tab has two functions: to view the UPS status and to configure the UPS.

The **Event Configuration** tab allows you to set up responses to individual events and test configuration by simulating an event.

The **Event Log** tab displays a list of the most recent UPS events. **Table 4** shows where to find detailed information about each of the Viewer's tabs.

Table 4 Viewer Tabs - Summary

Tab	Function	For a detailed description, see:
Overview	View the status of the UPS	7.1 - Checking UPS Status—Overview Tab
	Configure the MultiLink Network	8.3 - Configuring the UPS Properties—Overview Tab
Event Configuration	Configure responses to UPS-related events	8.5 - Configuring—Event Configuration tab
	Test responses to UPS-related events	8.6 - Testing Responses to Events
Event Log	View the log of UPS-related events	7.2 - Checking UPS Status—Event Log Tab

You may also use a Web browser to view the status of any UPS equipped with a Web-enabled SNMP card. For these devices, the Web browser permits some configuration and testing.

6.3 Viewer Menus

The Viewer also has functions available from three menus: **MultiLink**, **Configure** and **Help**. Each menu has a drop-down list of options that apply to all device components and events.

Table 5 summarizes the options available in the Viewer menus and shows where to learn more about each.

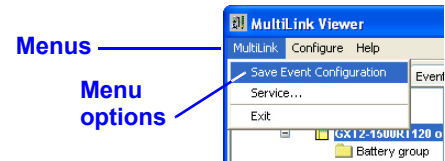


Table 5 Viewer Menu Options - Summary

Menu	Option	Function	For more information, see:
MultiLink	Save Event Configuration	Save changes to Event Actions	8.1.1 - MultiLink Menu - Save Event Configuration
	Service	Start & stop Liebert® MultiLink® service	8.1.2 - MultiLink Menu - Service and 9.1 - Starting or Stopping Liebert MultiLink Service
	Exit	Quit the Viewer	8.1.3 - MultiLink Menu - Exit
Configure	Edit My Device List	Add, delete or alter the configuration of a UPS	8.4.3 - Configure Menu - Edit My Device List
	Edit Network Device List	Add, delete or alter another Liebert MultiLink installation	8.4.4 - Configure Menu - Edit Network Device List
	Address Book	Set up addresses for e-mails and paging	8.4.6 - Configure Menu - Address Book (Liebert® MultiLink® Advanced Only)
	Paging Services	Set up paging service providers	8.4.7 - Configure Menu - Paging Services (Liebert® MultiLink® Advanced Only)
	E-Mail Services	Set up e-mail service providers	8.4.8 - Configure Menu - E-Mail Services (Liebert® MultiLink® Advanced Only)
	Virtual Servers	Set up virtual servers operating within a computer running Liebert MultiLink	8.4.9 - Configure Menu - Virtual Servers (Liebert® MultiLink® Advanced Only)
	Modem	Set up the modem	8.4.10 - Configure Menu - Modem (Liebert® MultiLink® Advanced Only)
	Specify Web Browser	Choose a Web browser for viewing UPS data	8.4.11 - Configure Menu - Specify Web Browser
	Options	Specify some notification and shutdown options	8.4.12 - Configure Menu - Options
	Set Language	Select a language for the Viewer and Liebert MultiLink Service	8.4.13 - Configure Menu - Set Language
	Local Password	Set password for access from another Liebert MultiLink installation	8.4.14 - Configure Menu - Local Password
	Upgrade License	Install an upgrade license	8.4.15 - Configure Menu - Upgrade License
Help	About	Check Liebert MultiLink version	—

6.4 Notifications

When Liebert MultiLink is running, various types of notifications may appear as pop-up or console messages. With Liebert MultiLink Advanced, notifications may also be sent as e-mail or pager messages to selected users. The timing, content and recipients of these notifications are specified for each UPS-related event during configuration (see **8.5 - Configuring—Event Configuration tab**).

6.5 Status Icons

Liebert MultiLink employs graphics to illustrate the status of configured devices, including whether they are operating normally or experiencing any alarms. The icons shown in **Table 6** appear in pop-up notifications and in the MultiLink Viewer:

Table 6 Status icons

Icon	Description
	No problems
	Informational
	Impaired
	Critical

7.0 VIEWING UPS STATUS

This section describes how to use the MultiLink Viewer to check the status of any UPS configured for monitoring and check the log of UPS-related events. Available functions differ according to the type of UPS and the type of connection between the UPS and the monitoring device (see **3.1 - Connecting host computer, UPS and targeted clients**).

For any UPS equipped with a Web-enabled SNMP card, monitoring data may also be viewed with a Web browser. For devices with an SNMP card that does not support HTML, Liebert® MultiLink® displays the data in tabular format.

The Viewer offers a quick summary of the status of the UPS:

- Informational symbols and text indicate the presence of any alarms.
- Graphs and parametric data illustrate the state of a variety of UPS components (not available with Contact Closure connection).
- An event log lists recent events, actions and similar data about the UPS, including its condition.

Two of the Viewer's three tabs provide viewing functions: The **Overview** tab shows the status of the UPS and the **Event Log** displays recent UPS-related events.

Table 7 Viewer Tabs - Checking the UPS Status and Event Log

Tab	Function	For information see:
Overview	View the status of devices monitored by Liebert MultiLink	7.1 - Checking UPS Status—Overview Tab
Event Log	View log files of UPS-related events	7.2 - Checking UPS Status—Event Log Tab

7.1 Checking UPS Status—Overview Tab

The **Overview** tab provides a variety of detailed, graphic views of the status of the UPS.

For instructions on opening the Viewer, see the information for your platform in **Appendix A - Operating System Details**.

- To view the status of the UPS, click on the **Overview** tab.

The screenshot shows the MultiLink Viewer application window. The left-hand navigation tree is expanded, showing the 'MultiLink Network' folder, 'My Device List', and 'GXT2U on 192.168.1.100'. The main display area shows the 'Overview' tab for the 'GXT2U' device. The status is 'Load Protected - Normal Status'. The location is 'Server Room 2, Building 1, Floor 1, West Wing' and the contact is 'IT Services ext1111'. The description is 'UPS'. The 'Graphs' section shows three graphs: 'Battery time remaining' (0 to 80 min), 'Output voltage' (0 to 120 V), and 'Bypass frequency' (0 to 60 Hz). The 'Parameters' section shows 'Output frequency' (60 Hz). The 'Info' section shows 'Nominal load' (1,500 VA), 'Nominal output frequency' (60 Hz), 'Nominal output voltage' (120 V), and 'Model name of the device' (GXT2-1500RT120). The 'States' section shows 'Low battery' (false), 'UPS operating on battery' (false), and 'Output switched to bypass' (false). The bottom right corner of the window shows a green smiley face icon, indicating the most serious condition in the tree.

Overview tab

Collapse or expand the tree

Overall condition of power supply

Icon showing most serious condition in tree

In the example above, the left side of the window shows the **MultiLink Network** tree with either an SNMP or serial connection. Limited group information is available with a Contact Closure connection.

To expand or collapse a folder, click on the symbol to the left of the folder icon.

The lower right corner of the Viewer displays the icon representing the most serious condition existing in the tree. Except when conditions are normal for all monitored devices, the top of the tree also displays the icon denoting the most serious condition. When the navigation tree is expanded, Liebert® MultiLink® displays the icon at each level (see **6.5 - Status Icons** for a legend to interpret the icons).

- To view graphs and parametric data, click on an item in the left side of the window; the associated data appears on the right. It may take a few moments for Liebert® MultiLink® to collect the data. These views do not apply to Contact Closure connections.

The screenshot shows the MultiLink Viewer application window. On the left is a tree view with folders like 'MultiLink Network', 'My Device List', and 'GXT2U on 192.16'. The 'Battery group' is selected. On the right, the 'Battery group' details are shown, including a graph of 'Battery time remaining', a table of 'Battery voltage' and 'Battery current', a 'Parameters' section for 'Low battery warning setting', and a 'States' section for 'Low battery'.

Annotations with arrows point to the following elements:

- Select item in tree**: Points to the 'Battery group' in the left tree view.
- MultiLink menu (to exit)**: Points to the 'MultiLink' menu item in the top menu bar.
- View data for selected item**: Points to the 'Battery group' header in the main content area.
- Graphs**: Points to the 'Battery time remaining' graph.
- Parametric data**: Points to the 'Parameters' section.
- States**: Points to the 'States' section.

This example shows information for the Battery group, the item selected in the tree at left. Each portion of the **MultiLink Network** tree displays similar data.

- To close the Viewer, click on **MultiLink**, then on **Exit**.

7.1.1 Viewing Status With a Web Browser

To use your Web browser to view the status of a UPS equipped with a Web-enabled SNMP card, as shown below, see **8.3.1 - Start Browser**.

The screenshot shows the web interface for an Emerson Network Power IntelliSlot Web Card. The top navigation bar includes 'monitor', 'control', 'configure', 'event log', and 'support'. The 'monitor' tab is active. The main content area displays a summary of the UPS status, including a diagram of the UPS components (INPUT, BYPASS, OUTPUT, BATTERY) and their respective values.

Agent Information:
Uninitialized
Uninitialized
Uninitialized
192.168.1.125

Device Status:
Load Protected:
No Alarms Present

Monitor Categories:
GXT
Summary
Active Alarms
Battery
Bypass
Input
Inverter
Output
Hardware
Configuration
Other

Summary: Updated: July 26, 2012 03:56:46PM

INPUT:
Volts: 115.2 V
Freq: 60.0 Hz

BYPASS:
Volts: 114.5 V
Freq: 60.0 Hz

OUTPUT:
Volts: 120.1 V
Amps: 0.8 A

BATTERY:
Volts: 54.9 V
Charge: 100 %
Time Remaining: 917 min

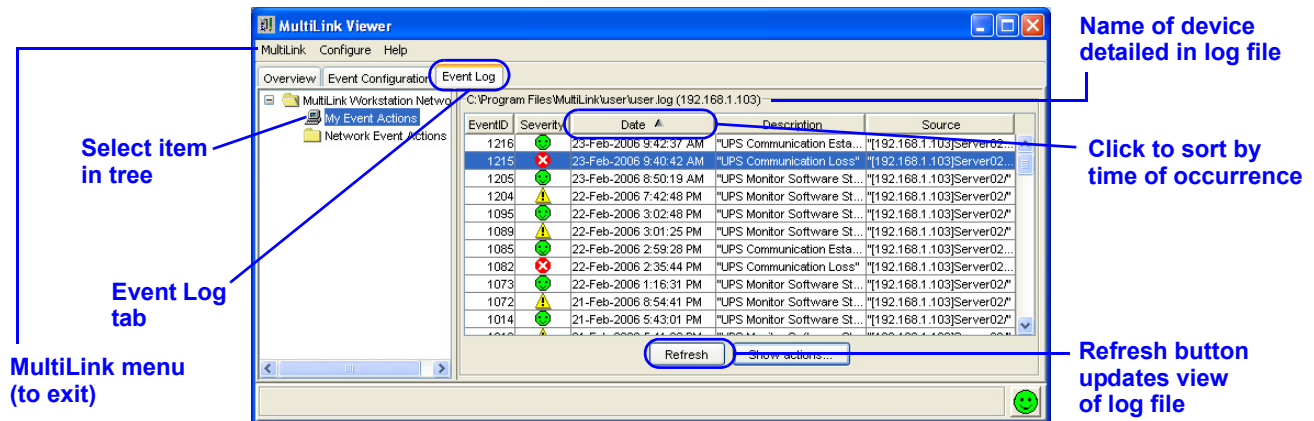
Active Alarms:
No Alarms Present

7.2 Checking UPS Status—Event Log Tab

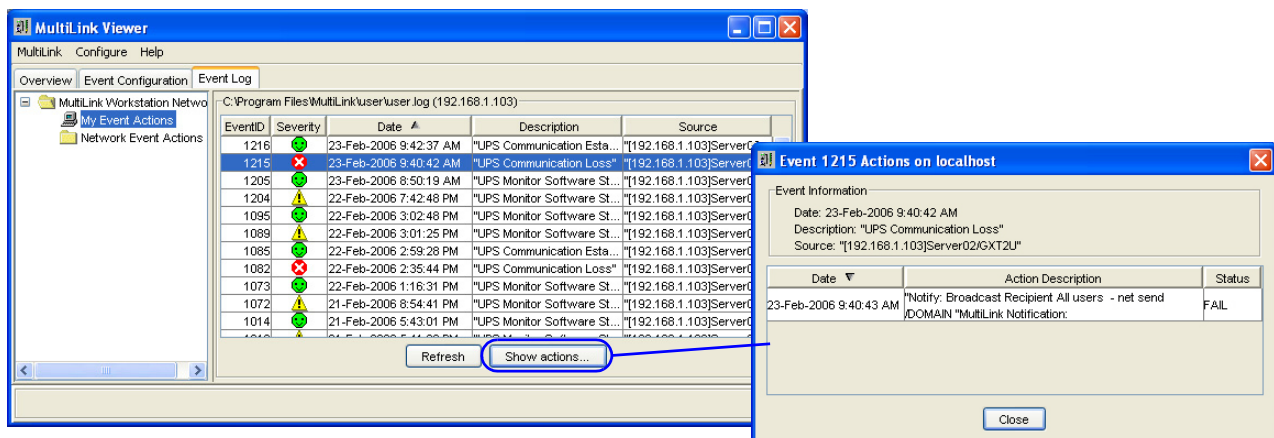
The Event Log tab allows you to view the log file, which contains a list of UPS-related events. The log file is a comma-delimited file (values are separated by commas). Events are listed in order of time of occurrence; new events are added at the end of the log file.

For instructions on opening the Viewer, see the information for your platform in **Appendix A - Operating System Details**.

- Click on the **Event Log** tab to view a list of UPS-related events. If needed, click on the icon to the left of the Multilink Network to expand the view.
- Click on an item in the tree at left, as shown below. At right, the log displays UPS-related events with identifying information:
 - Event ID - a number indicating the order of occurrence
 - Severity - an icon indicating the severity of the event (see **6.5 - Status Icons** for a legend)
 - Date - date and time of occurrence
 - Description - the name of the event (see **Table 14** for a complete list of events)
 - Source - devices involved
- Click on the Date column heading to sort the list in ascending or descending order.



- Clicking on **My Event Actions** displays a log of events from the device designated as your event source. Logs of events pertaining to other Liebert® MultiLink® installations are available under the **Network Event Actions** portion of the tree.
- To display a list of configured actions that occurred as the result of an event, select the event in the list and click on the **Show Actions** button. (The button is grayed-out if no actions occurred.) Click on the **Close** button to return to the Viewer.



- To close the Viewer, click on **MultiLink**, then on **Exit**.

8.0 CONFIGURING LIEBERT® MULTILINK® FOR YOUR SYSTEM

The Viewer offers powerful options for configuring how Liebert MultiLink responds to UPS-related events and notifies computer users of events and pending actions, such as an operating system shutdown. This section details the following functions available through the Viewer to customize Liebert MultiLink's features for your system.

Table 8 Viewer Menu and Tab Options - Configuring the Software

Function	Access Method	For information, see:
Save changes to event actions	MultiLink menu	8.1.1 - MultiLink Menu - Save Event Configuration
Start or stop Liebert MultiLink service		8.1.2 - MultiLink Menu - Service
Exit the Viewer		8.1.3 - MultiLink Menu - Exit
Rename a UPS	Right-click on UPS for Properties (Overview tab)	8.2 - Renaming a UPS
Test battery; turn UPS output on or off; temporarily silence an alarm	Right-click on UPS for UPS Control (Overview tab)	8.3.2 - Review the UPS Control Options
Enable alerts; change UPS connection type or communication ports; change status polling rate	Right-click on UPS for Properties (Overview tab)	8.3.3 - Properties - Setup Tab
Set up Web access for a UPS		8.3.4 - Properties - Web Tab
Change UPS settings: enable audible alarm, battery testing and auto restart		8.3.5 - Properties - UPS Settings Tab
Add MultiLink Network Shutdown Clients		8.3.6 - Properties - Clients Tab
Configure data logging features		8.3.7 - Properties - Data Logging Tab (Liebert® MultiLink® Advanced Only)
Add a local UPS	Configure menu	8.4.3 - Configure Menu - Edit My Device List
Add a network MultiLink installation		8.4.4 - Configure Menu - Edit Network Device List
Enter pager and e-mail recipients in address book (Liebert MultiLink Advanced)		8.4.6 - Configure Menu - Address Book (Liebert® MultiLink® Advanced Only)
Add pager service providers (Liebert MultiLink Advanced)		8.4.7 - Configure Menu - Paging Services (Liebert® MultiLink® Advanced Only)
Add e-mail service providers (Liebert MultiLink Advanced)		8.4.8 - Configure Menu - E-Mail Services (Liebert® MultiLink® Advanced Only)
Virtual Servers (Liebert MultiLink Advanced)		8.4.9 - Configure Menu - Virtual Servers (Liebert® MultiLink® Advanced Only)
Enable and configure modem (Liebert MultiLink Advanced)		8.4.10 - Configure Menu - Modem (Liebert® MultiLink® Advanced Only)
Specify a Web browser to view UPS status		8.4.11 - Configure Menu - Specify Web Browser
Change notification and shutdown options		8.4.12 - Configure Menu - Options
Select a language for the MultiLink Service and Viewer		8.4.13 - Configure Menu - Set Language
Change password or permission for remote configuration		8.4.14 - Configure Menu - Local Password
Install an upgrade license		8.4.15 - Configure Menu - Upgrade License
Set up responses to UPS-related events	Event Configuration tab	8.5 - Configuring—Event Configuration tab
Simulate a UPS-related event to test configuration	Right-click on event for Test Event (Event Configuration tab)	8.6 - Testing Responses to Events
Temporarily disable a UPS-related event	Right-click on event for Disable (Event Configuration tab)	8.7 - Disabling and Re-Enabling an Event
Temporarily disable an event Action	Right-click on Action for Disable (Event Configuration tab)	8.8 - Disabling and Re-Enabling an Action

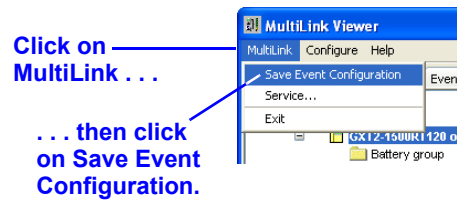
(Each section of this chapter begins with opening the MultiLink Viewer. For help on opening the Viewer, see the information for your platform in **Appendix A - Operating System Details**.)

8.1 Using MultiLink Menu Items

8.1.1 MultiLink Menu - Save Event Configuration

Changes to Event Actions must be saved before they will take effect. To do this:

- Click on **MultiLink** at the top of the window, then on **Save Event Configuration**, as shown at right.
If you try to exit the Viewer before saving Event Actions changes, Liebert® MultiLink® will prompt you to do so.



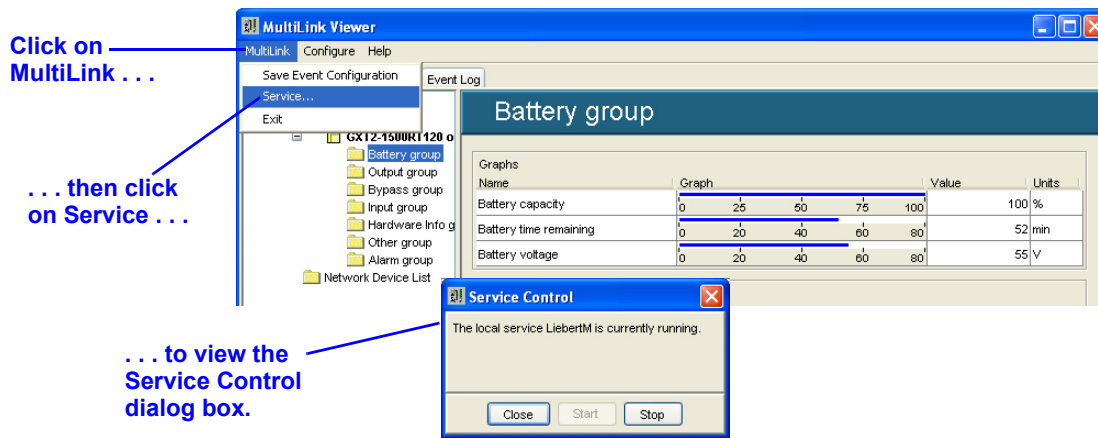
8.1.2 MultiLink Menu - Service

The **Service** menu item allows the System Administrator to verify that the Liebert MultiLink service (daemon) is running or to start or stop the Liebert MultiLink service.

Under normal circumstances, you will not need to start or stop the Liebert MultiLink service manually. Stopping the service means that the software is unable to protect your computer network and data during a power failure. See **9.1 - Starting or Stopping Liebert MultiLink Service** for details.

If you wish to verify that Liebert MultiLink is running:

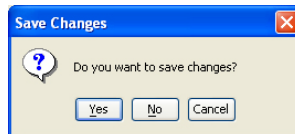
- Click on **MultiLink**, then on **Service**. The **Service Control** window states whether Liebert MultiLink is running.
- Click on **Close** to close the Service Control window.



8.1.3 MultiLink Menu - Exit

To close the MultiLink Viewer:

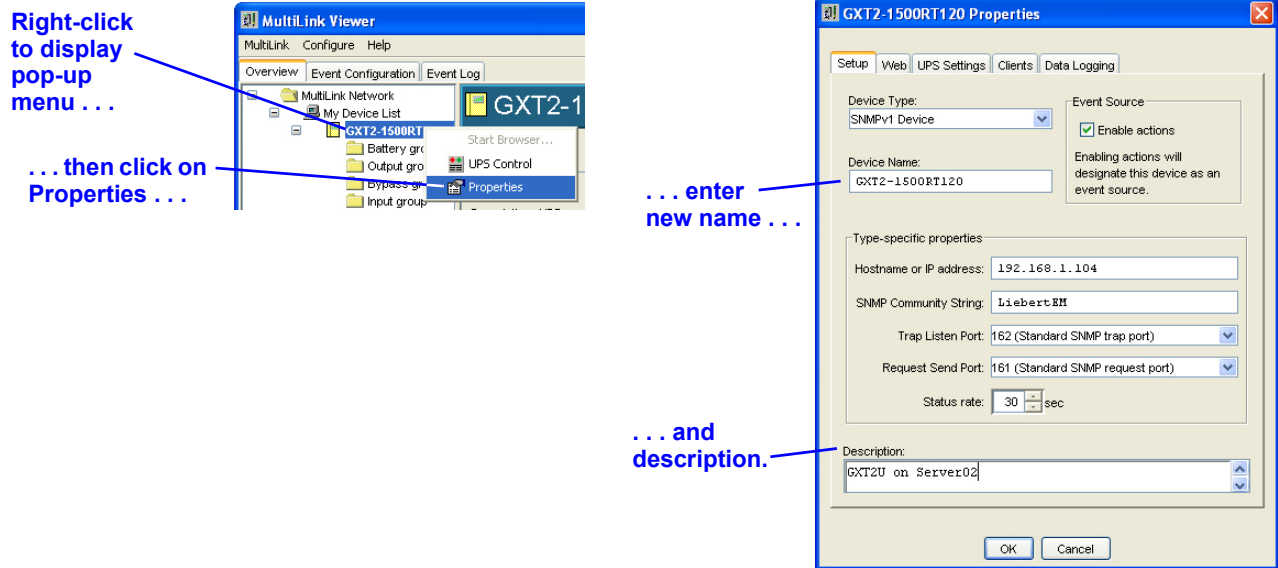
- Click on **MultiLink**, then on **Exit**, as shown at right.
This closes the Viewer, but does not stop Liebert MultiLink's monitoring process; this continues running in the background.
If you have made any changes to Liebert MultiLink's Event Actions that have not been saved, Liebert MultiLink will prompt you to save the changes before closing the Viewer.



8.2 Renaming a UPS

A UPS can be renamed, assisting in troubleshooting when there is more than one UPS on the network.

- Click on the **Overview** tab.
- On the left side of the window, right-click on the UPS to be renamed and choose **Properties** from the pop-up menu.
- In the Properties window, click on the **Setup** tab and enter a descriptive name in the **Device Name** box.
- In the **Description** field, enter any notes about the UPS, such as its location, model and similar information.



For more information on the **Setup** tab in the Properties window, see **8.3.3 - Properties - Setup Tab**.

8.3 Configuring the UPS Properties—Overview Tab

The **Overview** tab allows the System Administrator to set up the configuration of the UPS and to use a Web browser to view parametric data and perform other functions. In the **Overview** tab, using a right-click on the UPS gives access to a pop-up menu with three items:

- Start Browser
- UPS Control
- Properties: Setup, UPS Properties, Clients and Data Logging

8.3.1 Start Browser

For UPS devices with Web-enabled SNMP cards, Liebert® MultiLink® permits viewing UPS data with a Web browser. The Web browser also offers access to some other features, such as UPS control options, battery testing and configuring some UPS functions.

Before you can use the Web browser function, you must specify the Web browser to use (see 8.4.11 - **Configure Menu - Specify Web Browser**) and you must enable Web access for this UPS (see 8.3.4 - **Properties - Web Tab**).

To start the Web browser:

- Click on the **Overview** tab.
- Right-click on the UPS device name to open a pop-up menu, then click on **Start Browser**.
- This opens the Web browser chosen in dialog box, as shown below.

Right-click to display pop-up menu ...

... then click on Start Browser ...

... to open the Web browser and view monitoring data.

The screenshot shows the MultiLink Viewer interface with the Overview tab selected. The context menu for the 'GX12U on 192.168.1.125' device is open, showing 'Start Browser...', 'UPS Control', and 'Properties'. The web browser window displays the Liebert MultiLink web interface, showing agent information, device status, and monitoring data for the UPS.

Agent Information:
Uninitialized
Uninitialized
Uninitialized
192.168.1.125

Device Status:
Load Protected:
No Alarms Present

Monitor Categories:
GXT
Summary
Active Alarms
Battery
Bypass
Input
Inverter
Output
Hardware Configuration
Other

Summary: Updated: July 26, 2012 03:56:46PM

INPUT:
Volts: 115.2 V
Freq: 60.0 Hz

BYPASS:
Volts: 114.5 V
Freq: 60.0 Hz

OUTPUT:
Volts: 120.1 V
Amps: 0.8 A

BATTERY:
Volts: 54.9 V
Charge: 100 %
Time Remaining: 917 min

Active Alarms:
No Alarms Present

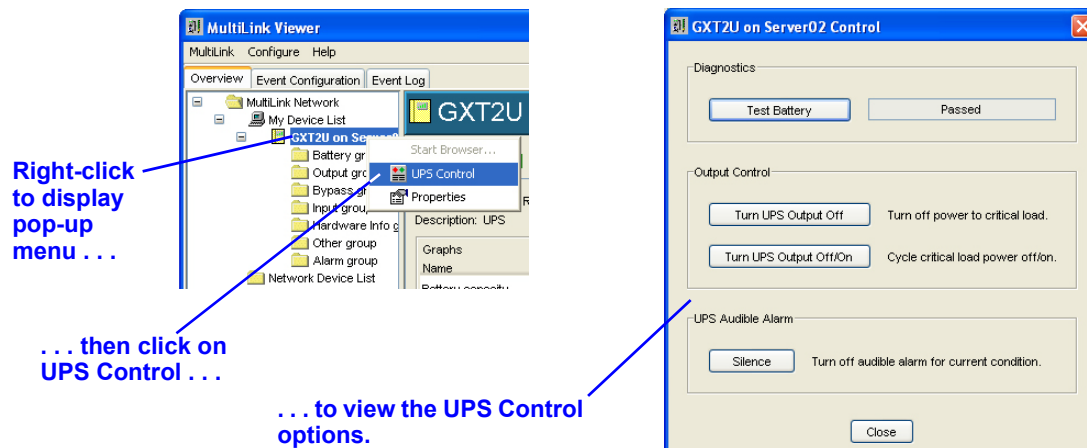
8.3.2 Review the UPS Control Options

For Serial UPS and SNMP communications, Liebert® MultiLink® permits the System Administrator to perform the following UPS control functions:

- Test the UPS battery
- Turn the UPS output off
- Briefly turn the UPS output off and then restore power to the output
- Temporarily silence a UPS alarm

To view the UPS Control options:

- Click on the **Overview** tab.
- Right-click on the UPS device name to open a pop-up menu, then click on **UPS Control**.
- This opens the **UPS Control** dialog box, as shown below.



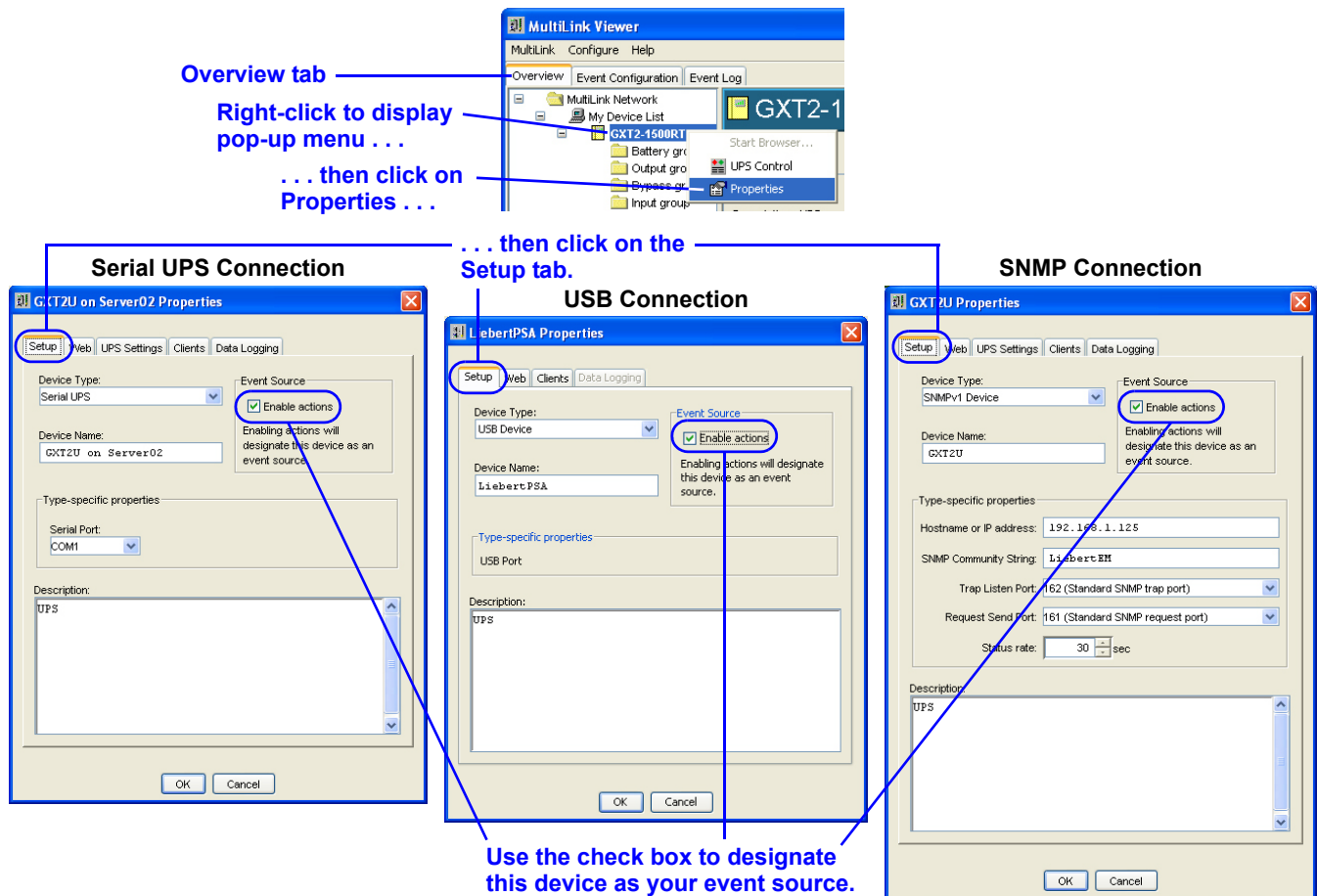
For details on using the UPS Control options, see **9.2 - Using the UPS Control Options—Serial Connection and SNMP**.

UPS models requiring Contact Closure connections offer only one option: **Turn UPS Output Off**. For further information, see **9.3 - Using the UPS Control—Contact Closure**.

8.3.3 Properties - Setup Tab

The **Setup** tab allows you to change the device type, rename the UPS, change the type of connection—serial, USB or SNMP—designate the event source and enter a description of the UPS.

- Click on the **Overview** tab.
- In the left side of the window, right-click on the UPS and choose **Properties** from the pop-up menu. The tabs in the Properties window depend on the type of connection and software version:
 - Contact Closure:** Setup, Web, Clients
 - USB Device/MultiLink Basic Notification Source:** Setup, Web, Clients, Data Logging
 - Serial UPS/SNMPv1 Device:** Setup, Web, UPS Settings, Clients, Data Logging
- Click on the **Setup** tab.



- The **Device Type** box displays the type of connection between the computer and the UPS:
 - Contact Closure**—for example, MultiLink Agent computer in **Figures 1 and 2**
 - USB Device**—MultiLink Agent computer in **Figures 1 and 2**
 - Serial UPS**—MultiLink Agent computer in **Figures 1 and 2**
 - SNMPv1 Device**—MultiLink Agent computer in **Figure 3**
 - MultiLink Basic Notification Source**—MultiLink Client computer in **Figure 3**

See **3.1 - Connecting host computer, UPS and targeted clients**. The software detects the type of connection by sensing the type of UPS and cable connected to the computer.

- The **Device Name** box displays a name for the UPS. This name can be changed by entering a new name in the box.
- The **Enable Actions** check box allows you to designate which UPS in the **My Device List** subfolder is to act as the source of events for the host computer. There can be only one event source for each Liebert® MultiLink® installation. For details, see **8.4.2 - Liebert MultiLink Event Source**.

- The **Type-specific properties** options relate to communications between the UPS and the host computer. These properties vary by connection type; values are automatically detected by Liebert® MultiLink®. The defaults are correct for most installations, but some may be altered if necessary.

Contact Closure and Serial UPS

For Contact Closure and Serial UPS (for example, MultiLink Agent computer in **Figures 1** and **2**), the **Type-specific properties** box has only one option:

- The **Serial Port** box displays the port selected during installation. If it is no longer valid, select a different port by clicking on your choice. You may also enter the name of the port manually. For further information on serial ports, see **Appendix A - Operating System Details**.

USB Device

The **Type-specific properties** box does not provide choices for USB connections.

SNMP connections

For SNMP connections (for example, MultiLink Agent computer in **Figure 3**), you will see these **Type-specific properties**:

- **Hostname or IP address**—identifies the UPS
- **SNMP Community String**—the default is **LiebertEM** (case-sensitive)
- **Trap Listen Port**—usually port **162 (Standard SNMP trap port)** for communicating events (traps) because of SNMP card requirements
- **Request Send Port**—usually port **161 (Standard SNMP request port)** for communicating status (gets) because of SNMP card requirements
- **Status Rate**—Determines how often Liebert MultiLink checks the condition of the UPS.

MultiLink Basic Notification Source

For MultiLink Basic Notification Source connections (for example, MultiLink Client computer in **Figure 3**), you will see these **Type-specific properties**:

- **Hostname or IP address**—identifies another computer (that is running Liebert MultiLink version 4.x or 3.x) acting as a “virtual UPS.” The computer that is acting as the virtual UPS (i.e., the MultiLink Basic Notification Source) must be running Liebert MultiLink version 4.x or 3.x. If you intend to use the MultiLink Basic Notification Source as your event source, Liebert MultiLink (on the virtual UPS computer) must include your IP address in its list of client targets and have the MultiLink Network Shutdown License installed.
- **SNMP Community String**—the default is **LiebertEM** (case-sensitive)
- **Trap Listen Port**—usually port **3029 (Private InterNIC-assigned trap port)** for communicating events (traps). This must be the same trap port used by the host computer.
- **Request Send Port**—usually port **3027 (Private InterNIC-assigned request port)** for communicating status (gets). This must be the same request port used by the host computer.

To finish setting up client computers, add each client to the host computer’s list of targets, as described in **8.3.6 - Properties - Clients Tab**.

(All connection types)

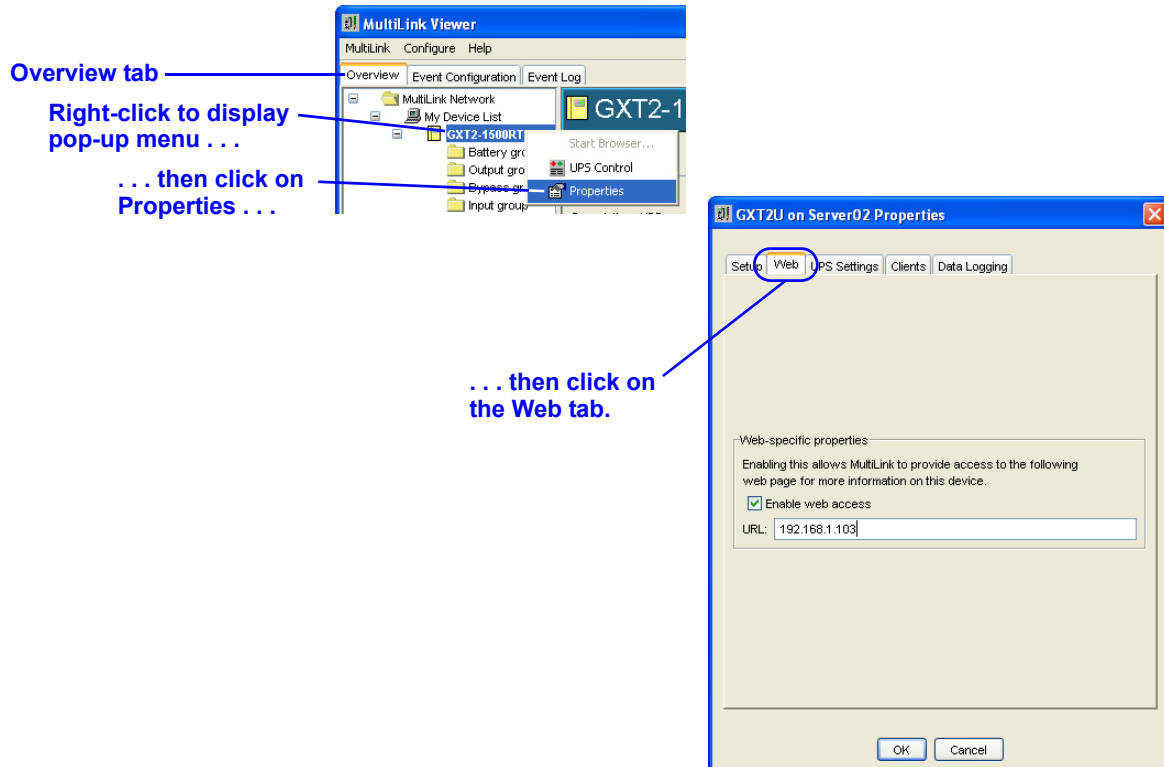
- In the **Description** box, enter a short identifier for the UPS being monitored by Liebert MultiLink. This optional field is helpful if the user has more than one UPS. For example, the description “PSA-Finance Server” might be used for the Liebert PSA UPS powering the finance department’s server.
- When finished, click on the **OK** button to accept the changes. To close the window without saving changes, click on **Cancel**.

8.3.4 Properties - Web Tab

The **Web** tab allows you to set up a UPS for Web access so that you can view its status and perform other functions using your Web browser.

This feature is available for UPS devices with SNMP cards.

- Click on the **Overview** tab.
- In the left side of the window, right-click on the UPS and choose **Properties** from the pop-up menu.
- Click on the **Web** tab.

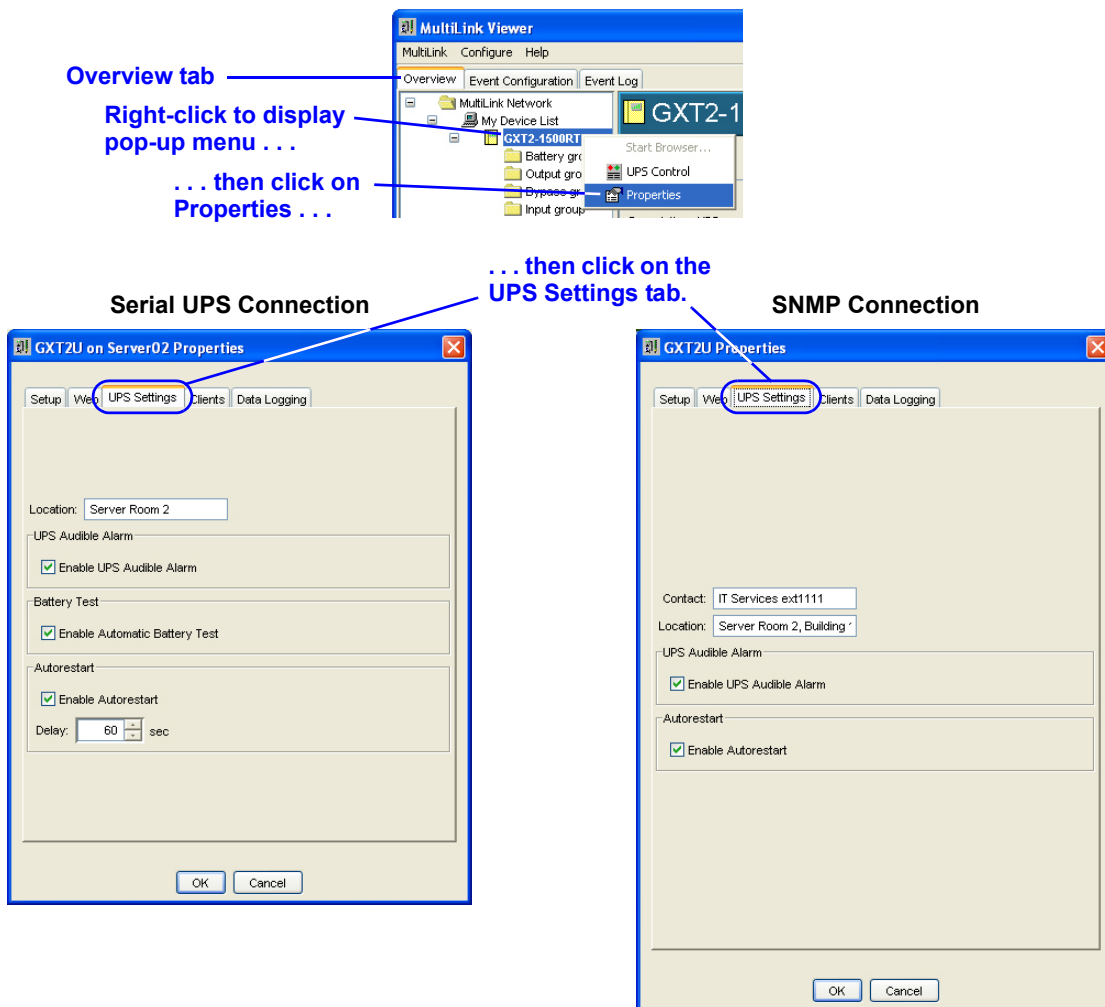


- Place a check mark (✓) in the **Enable Web access** box to allow users to use the Web browser for this UPS.
- Enter the IP address of the UPS in the **URL** box, if needed.

8.3.5 Properties - UPS Settings Tab

The **UPS Settings** tab allows the user to configure certain features of the UPS. For all connection methods, you can record the location of the UPS and enable or disable the UPS audible alarm and automatic restart of the UPS when utility power returns after a power failure. A Serial UPS connection permits an automatic battery test. An SNMP connection allows specification of a contact person for UPS-related events.

- Click on the **Overview** tab.
- In the left side of the window, right-click on the UPS and choose **Properties** from the pop-up menu.
- Click on the **UPS Settings** tab (not available with Contact Closure or MultiLink Basic Notification Source).



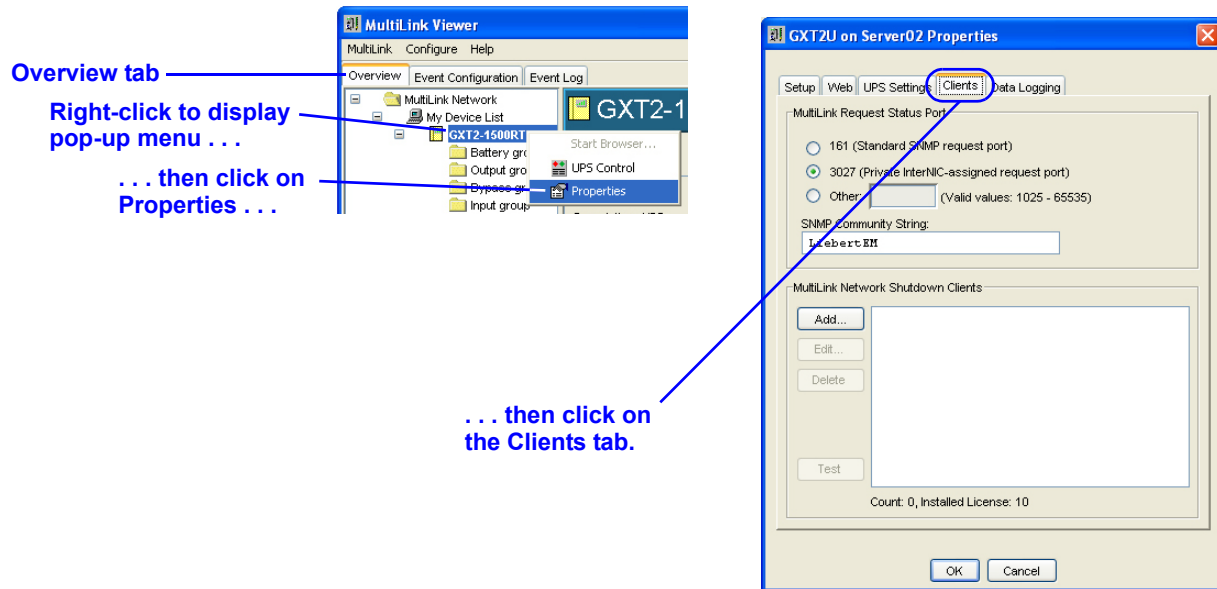
- In the **Contact** box (SNMP connection), enter the name of the person who should be contacted about issues involving this UPS.
- In the **Location** box, enter the physical location of the UPS, for example, “George’s cubicle.” This optional field is helpful if the user has more than one UPS.
- (Certain UPS models only) To allow activation of an alarm when a UPS-related event occurs, click in the **Enable UPS Audible Alarm** box. To deactivate the alarm, clear the check box. This operation prevents the UPS from sounding an audible alarm for any condition. To silence the alarm while an event is occurring, see **9.2.3 - UPS Audible Alarm—Silencing Alarm**.
- (Certain UPS models only) To perform periodic battery tests (Serial UPS), click in the **Enable Automatic Battery Test** box. To disable automatic testing, clear the check box.
- (Certain UPS models only) To automatically restart the UPS after utility power is restored following a loss of input power, place a check mark (✓) in the **Enable Autorestart** check box, then specify the desired time delay in the **Autorestart Delay** box. To disable automatic restarting, clear the check box.

8.3.6 Properties - Clients Tab

The **Clients** tab allows you to designate computers that will receive notification of UPS-related events, such as Low Battery. Before doing so, you must first obtain a MultiLink Network Shutdown License for the appropriate number of clients and install the license on the host computer (see **8.4.15 - Configure Menu - Upgrade License**).

Each targeted client must be running Liebert® MultiLink® 4.x, 3.x or 1.x. For 4.x and 3.x clients, choose the connection type **MultiLink Basic Notification Source** during setup (see **3.1.1 - MultiLink Basic Notification Source** for an overview, **5.2.5 - Define Network Connection** for installation instructions and **8.3.3 - Properties - Setup Tab** for configuration).

- Click on the **Overview** tab.
- Right-click on the UPS device name to open a pop-up menu, then click on **Properties**.
- In the Properties window, click on the **Clients** tab.



The values in the **MultiLink Request Status Port** box relate to communications between the host computer and targeted client computers.

- The default port, 3027, is correct for most applications. Contact Emerson Network Power Technical Support for assistance.

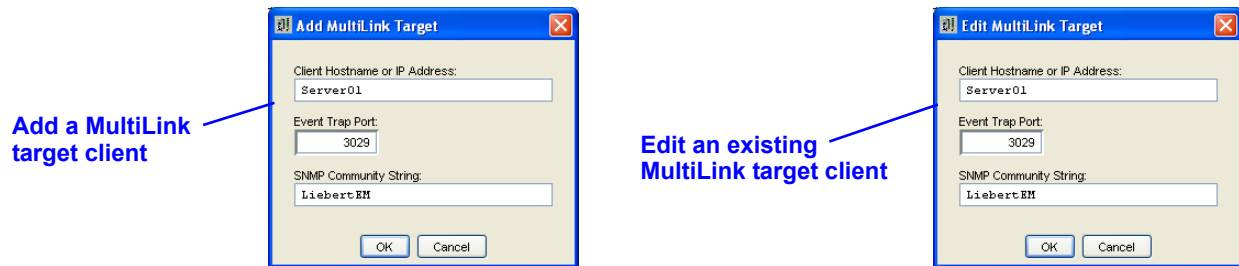
Ensure that all **MultiLink Network Shutdown Clients** are configured to request status from the host computer on the port specified in the **MultiLink Request Status Port** box. The host computer must be running Liebert MultiLink 4.x or 3.x, and all clients must be running Liebert MultiLink 4.x, 3.x or 1.x.

- Check to make sure the entry in the **SNMP Community String** box matches that in your other systems. The default is **LiebertEM** (case-sensitive).

Add a MultiLink Client

The lower portion of the window, **MultiLink Network Shutdown Clients**, allows you to set up targeted clients to receive notification of UPS-related events.

- Click on **Add** to enter a new MultiLink Client.
- To make changes to an existing MultiLink Client, click on the client, then on **Edit**.

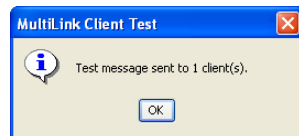


- The targeted client's Hostname or IP address must be correctly entered in the **Client Hostname or IP Address** box.
- Each client must have Liebert® MultiLink® 4.x, 3.x or 1.x installed and must be configured to listen for traps on the port that is configured in the **Event Trap Port** box. Both the host and client computers must use the same pair of ports for traps and requests—for example, both must use ports 162 and 161 *or* both must use ports 3029 and 3027.
- Check to make sure the entry in the **SNMP Community String** box matches that in your other systems. The default is **LiebertEM** (case-sensitive).
- To remove a client from the list, click on the client, then on **Delete**. Liebert MultiLink will not ask for confirmation before deleting the selected client. Click on **Cancel** to close the window without saving the changes.

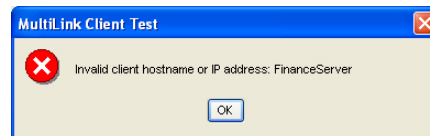
Send a test message to clients

Sending test messages can help determine whether targeted clients are properly set up to receive notifications of UPS-related events. To do so:

- Click on the **Overview** tab, right-click on the UPS device name, click on **Properties**, then on the **Clients** tab.
- Select one or more clients from the **MultiLink Network Shutdown Clients** list and click on the **Test** button. This causes Liebert® MultiLink® to send a test message to each targeted client computer selected.
- To verify that test messages were sent and received, check both the host computer and client computers as follows:
 - a. The host computer will display one of the two messages shown below. If any test messages are sent, a verification similar to the one at left below appears on the computer running Liebert MultiLink, showing the total number of test messages that were sent. This is not an indication that the clients received the messages.



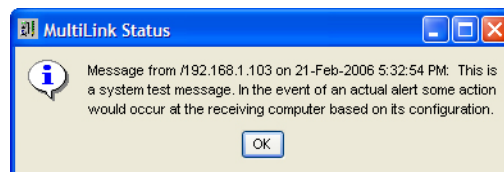
Test message successfully sent



Error message

If any messages are not sent, an error message will appear on the host computer. The error message, above right, indicates that the entry in **Client Hostname or IP Address** is an invalid IP address or is a hostname that cannot be resolved. The selected computer probably is not configured in the Domain Name Service. If it is configured with its associated reverse lookup entry, there might be a problem accessing the name service. Try to ping the name server and correct any problems there. If no problems are found at the server, check the configuration at the client end.

- b. Check all targeted client computers to verify that each received a test message similar to the one shown below.



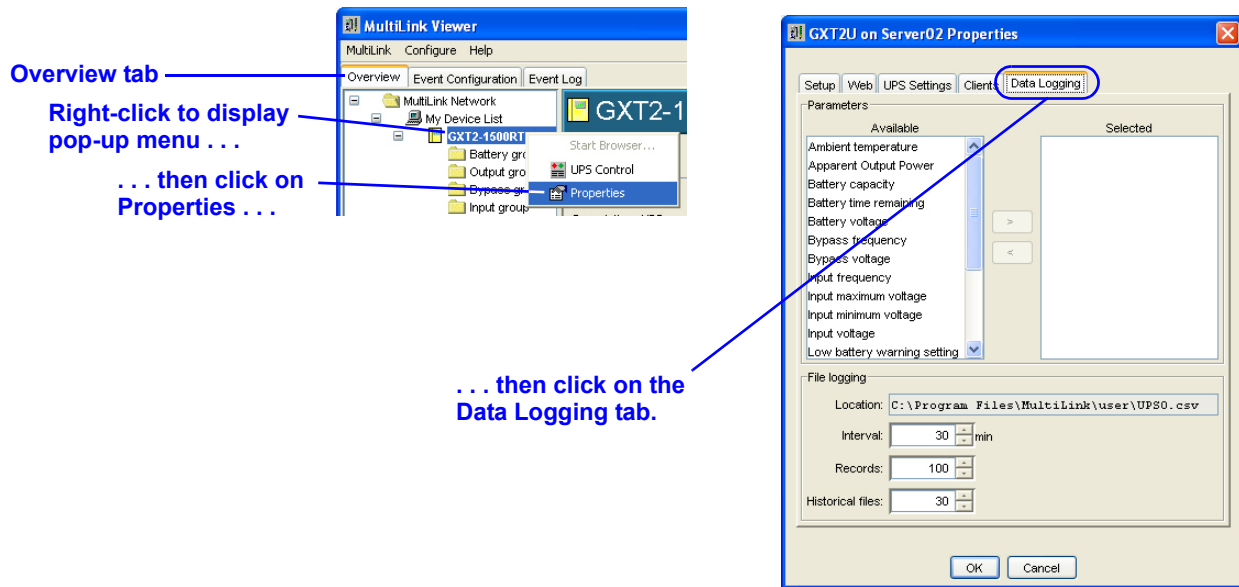
This message should appear within five seconds of being sent. If it does not, compare the time it is displayed with the time on the message. If the lapse is more than 10 seconds, there is a local name service problem. If the message is received within five seconds, the local name service configuration is correct.

If test messages are received in a timely fashion and the entry was a hostname, DNS or other name services are correctly configured.

8.3.7 Properties - Data Logging Tab (Liebert® MultiLink® Advanced Only)

The System Administrator can use the **Data Logging** tab to record the condition of the UPS at fixed intervals. Liebert MultiLink will check the UPS at specified intervals and take a “snapshot” of selected parameters. Each time Liebert MultiLink checks the UPS, the software updates a file containing the parametric data. With this tab, the System Administrator also can regulate the size and number of historical files that will be retained.

- Click on the **Overview** tab.
- Right-click on the UPS device name to open a pop-up menu, then click on **Properties**.
- In the Properties window, click on the **Data Logging** tab (not available with Liebert MultiLink Fundamental or with Contact Closure communication).



- To select UPS parameters that will be checked and recorded in the data log file, click on an item in the **Available** window, then click on the arrow to move that item to the **Selected** window. More than one item can be moved at one time by using standard methods common to your operating system.

Liebert MultiLink will record data about any parameter selected for logging.

- The **Interval** box displays the number of minutes between Liebert MultiLink’s checks of the UPS.
- The **Records** box displays the number of records that will be stored in the data log file.
- The **Historical files** box displays the number of data log files that will be retained.

Liebert MultiLink creates a file in the location specified in the **File Logging** portion of the **Data Logging** tab. The data log is a comma-delimited file that will open with a word-processing or spreadsheet program. **Table 9** below shows an example of data collected.

Table 9 Sample data log file

Time	Battery time remaining	Battery voltage	Output voltage	Battery current	Input frequency	Output current	Output frequency	Input voltage	Low battery warning setting
10/6/2012 13:45	45	55	120	0	60	3	60	121	2
10/6/2012 14:00	45	55	120	0	60	3	60	122	2
10/6/2012 14:15	45	55	120	0	60	3	60	121	2
10/6/2012 14:30	45	55	120	0	60	3	60	122	2
10/6/2012 14:45	45	55	120	0	60	3	60	122	2
10/6/2012 15:00	45	55	120	0	60	3	60	122	2

8.4 Configuring—Configure Menu

The **Configure** menu is integral to setting up Liebert MultiLink's response to various UPS-related events. The **Configure** menu allows you to add and delete UPSs for monitoring, set up the modem, edit your password and install an upgrade license.

8.4.1 Device List Subfolders

The MultiLink Network consists of two subfolders: **My Device List** and **Network Device List**. These subfolders are especially useful in organizing the UPSs and Liebert® MultiLink® installations to be monitored.

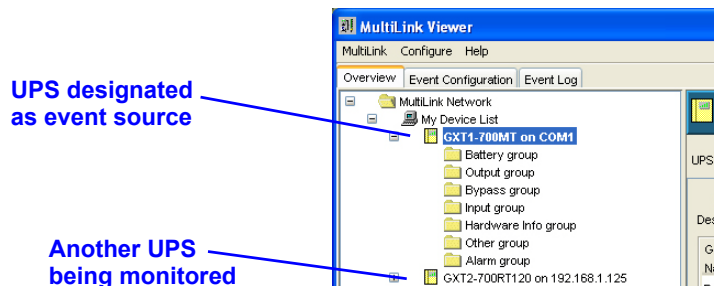
- The **My Device List** subfolder contains the UPS that is powering the host computer and other UPSs being hosted by this computer.
- The **Network Device List** subfolder allows you to add other Liebert MultiLink installations anywhere on your network, enabling the System Administrator to keep tabs on multiple Liebert MultiLink installations and their hosted UPSs from a single location.

8.4.2 Liebert MultiLink Event Source

The UPS designated as a computer's event source is central to Liebert MultiLink's monitoring function. Events affecting the UPS chosen as the event source prompt Liebert MultiLink to issue alerts, shutdown notifications and launch scripts. For details on designating a UPS as your event source, use the **Enable Actions** check box as described in **8.3.3 - Properties - Setup Tab**.

The UPS added to the **My Device List** subfolder during Liebert MultiLink's installation serves as that computer's event source. The System Administrator can add other UPSs to this subfolder for organizational purposes, but only one UPS may be designated as the computer's event source. The event source designation can be switched to another UPS in the **My Device List** subfolder. You must have administrative privileges to set up or perform these operations.

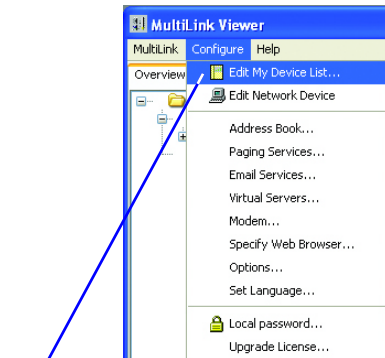
Liebert MultiLink displays the host computer's event source in **bold letters**.



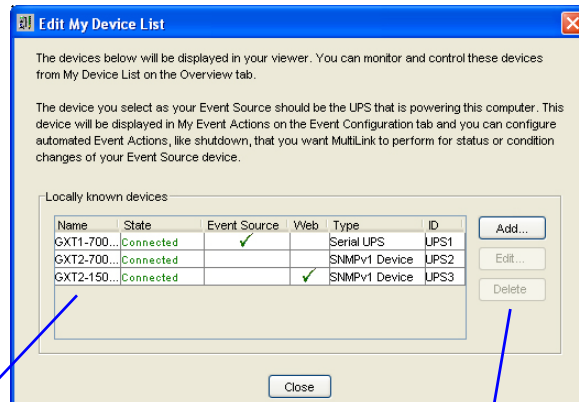
8.4.3 Configure Menu - Edit My Device List

Liebert® MultiLink® allows you to add a UPS, change its configuration or remove it from the **My Device List** subfolder. To do so:

- Click on **Configure**, then on **Edit My Device List**.



Click on **Configure**, then on **Edit My Device List**...



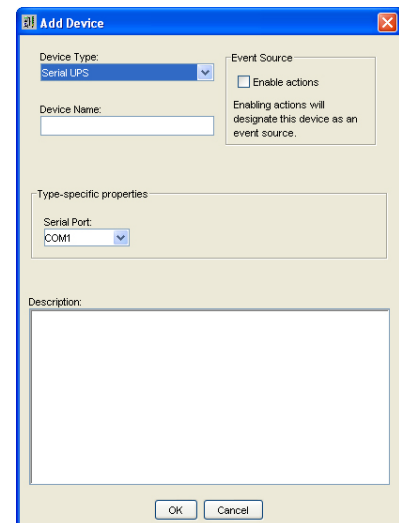
... to view any UPS in your local device list...

... and the controls to add, alter or remove a UPS.

- Add, change or remove a UPS as described in the following sections.

Add a UPS

- In the **Edit My Device List** window, choose **Add** if you wish to include another UPS as a locally known device.
- This window contains the same options as the **Setup** tab in the **Properties** window. Enter the UPS information according to the instructions in **8.3.3 - Properties - Setup Tab**.

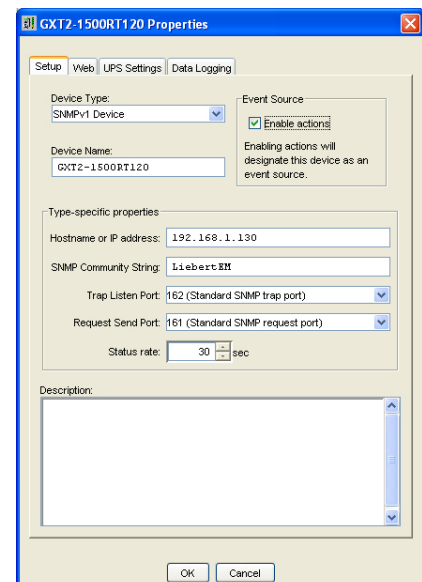


Alter UPS data

- In the **Edit My Device List** window, select the UPS from the list, then click on **Edit** if you wish to alter information about that UPS.
- This window contains the same options as the **Setup** tab in the **Properties** window. Enter the UPS information according to the instructions in **8.3.3 - Properties - Setup Tab**.

Delete a UPS

- In the **Edit My Device List** window, select the UPS from the list, then click on **Delete** if you wish to remove a UPS from the **My Device List** subfolder.
- Liebert MultiLink will ask you to confirm that you wish to delete the UPS. Click on **Yes** to confirm the deletion.

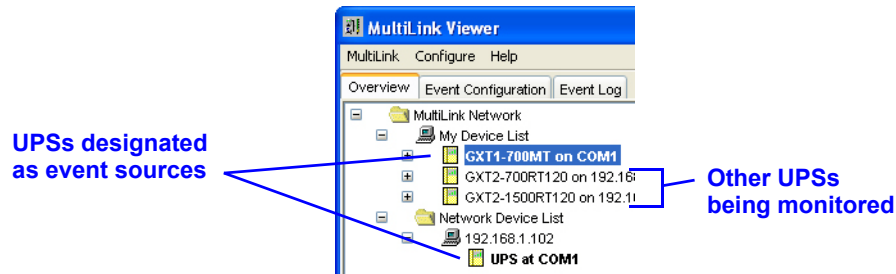


8.4.4 Configure Menu - Edit Network Device List

The **Network Device List** allows you to monitor and configure any UPS hosted by a Liebert® MultiLink® installation on your network from a single location.

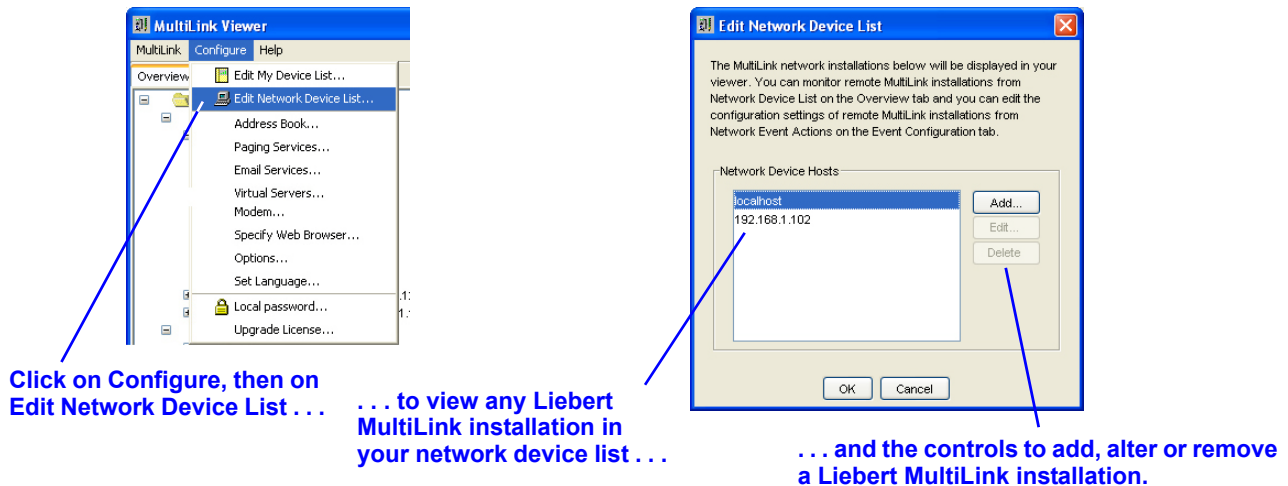
Only Liebert MultiLink installations—a host computer running Liebert MultiLink, including the devices in its **My Device List** subfolder—can be added to the **Network Device List**. Liebert MultiLink dynamically updates all information about any Liebert MultiLink installation in the **Network Device List**, whether changes are made to a UPS from its host computer or from a remote location.

Each Liebert MultiLink installation in the **Network Device List** displays the remote computer's event source in **bold letters**.



The **Edit Network Device List** menu option allows you to add, change or remove a Liebert MultiLink installation. To do this:

- Click on **Configure**, then on **Edit Network Device List**.



- Add, edit or delete a Liebert MultiLink installation as described in the following sections.

Add a Liebert® MultiLink® installation

A MultiLink Network Administration License is required for this procedure. In addition, a Liebert MultiLink installation must permit remote access before it can be monitored or configured by a remote computer (see 8.4.14 - **Configure Menu - Local Password**).

- In the **Edit Network Device List** window, choose **Add** if you wish to include a Liebert MultiLink installation.



- In the **Hostname or IP address** box, enter the host computer's name or IP address.
- In the **Password** box, enter the Liebert MultiLink password for the computer that is being added to the Network Device List. This permits the System Administrator to access the network Liebert MultiLink installation. Checking the **Save password** box prevents a user from having to enter the password on each use.

Alter Liebert MultiLink installation identity or password

- In the **Edit Network Device List** window, select the **Network Device Host** from the list, then click on **Edit** if you wish to alter information about that Liebert MultiLink installation.



- If the computer hostname or IP address has changed, enter the new name or address in the **Hostname or IP address** box.
- If the Liebert MultiLink password has changed, enter the new password in the **Password** boxes. Checking the **Save password** box prevents a user from having to enter the password on each use.

Delete a Liebert MultiLink installation

- In the **Edit Network Device List** window, select the Liebert MultiLink installation from the list, then click on **Delete** to remove a Liebert MultiLink installation from the **Network Device List** subfolder.
- Liebert MultiLink will NOT ask for confirmation that you wish to delete the Liebert MultiLink installation. You can prevent the deletion by clicking **Cancel** at the bottom of the **Edit Network Device List** window.

8.4.5 Reconnect to Remote Host

In the **Overview** tab, using a right-click on a computer in the Network Device List opens a pop-up menu that allows you to reconnect to the computer.

To do this:

- Click on the **Overview** tab.
- Right-click on one of the computers listed in the **Network Device List** to open a pop-up menu, then click on **Reconnect to Remote Host**.
- Liebert MultiLink will attempt to re-establish communications with the selected computer.



8.4.6 Configure Menu - Address Book (Liebert® MultiLink® Advanced Only)

Liebert MultiLink's **Address Book** stores e-mail and pager addresses for easy access when setting up notification of UPS-related events. Once entered, addresses become part of a list. Entries can be selected and copied, saving the work of re-entering the data for multiple Liebert MultiLink functions.

The **Address Book** requires a separate entry for each e-mail and pager address. When making multiple entries for the same person, you must add text to the name to differentiate the entries. For example, you might use the following designations in the name:

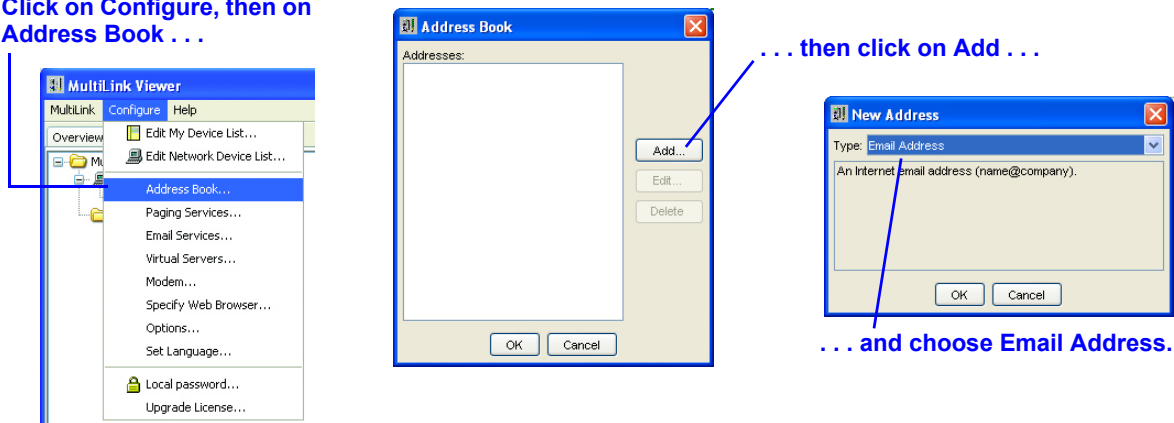
- Smith, Adam (e-mail)
- Smith, Adam (numeric pager)
- Smith, Adam (alphanumeric pager)

Further, to simplify finding a name, use a consistent entry method because names are sorted alphabetically by the first name entered. For example, entering "Adam Smith" will place the name near the top of the **Address Book**, whereas entering "Smith, Adam" places the name near the bottom of the **Address Book**.

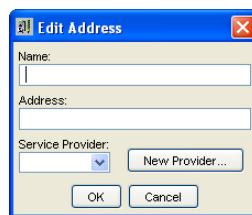
Add an E-mail address

- Click on **Configure**, then on **Address Book**.

Click on **Configure**, then on **Address Book** . . .



- In the Address Book window, click on **Add**.
- In the New Address window, choose **Email Address** from the drop-down list and click **OK**. This opens the Edit Address window, as shown below.

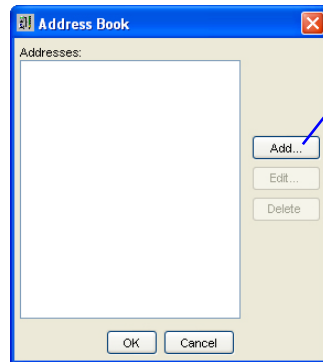
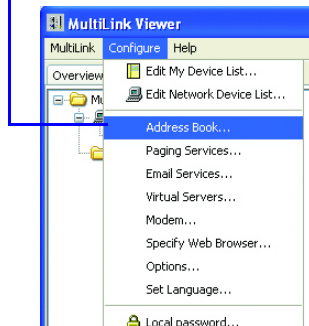


- Enter the person's name in the **Name** box. If the Address Book already contains an entry for this person, you will be prompted to alter the entry. For ease in setting up e-mails, you could use the following designation or a variant—Smith, Adam (e-mail)
- Enter the e-mail address in the **Address** box.
- Choose from the **Service Provider** drop-down list, or click on the **New Provider** button to enter a new service provider.
- Click **OK**.

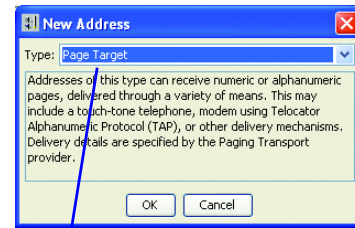
Add a pager address

- Click on **Configure**, then on **Address Book**.

Click on **Configure**, then on **Address Book** . . .

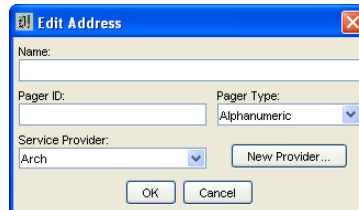


. . . then click on **Add** . . .



. . . and choose **Page Target**.

- In the Address Book window, click on **Add**.
- In the New Address window, choose **Page Target** from the drop-down list and click **OK**. This opens the Edit Address window, as shown below.



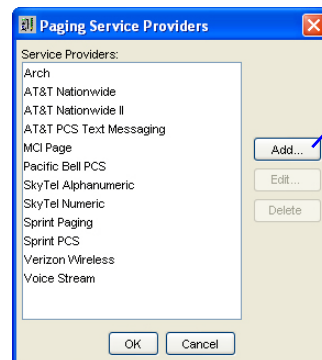
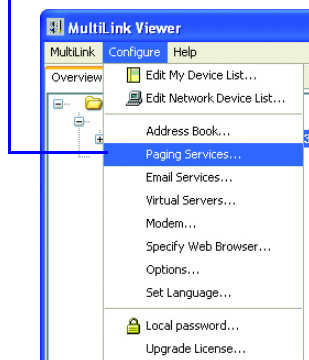
- Enter the person's name and pager ID in the appropriate boxes.
- Select the type of pager (alphanumeric or numeric) from the **Pager Type** drop-down list.
- Choose from the **Service Provider** drop-down list, or click on the **New Provider** button to enter a new service provider.
- Click **OK** to save the changes or click **Cancel** to close the window without saving.

8.4.7 Configure Menu - Paging Services (Liebert® MultiLink® Advanced Only)

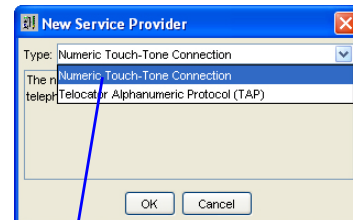
Liebert MultiLink's **Paging Services** store pager service provider information for easy access when setting up notification of UPS-related events. A number of paging services are pre-configured. If a service provider is entered, you may select it from the list, saving the work of re-entering the data for multiple Liebert MultiLink functions. To add a service provider, use the following steps.

- Click on **Configure**, then on **Paging Services**.

Click on **Configure**, then on **Paging Services** . . .



. . . then click on **Add** . . .



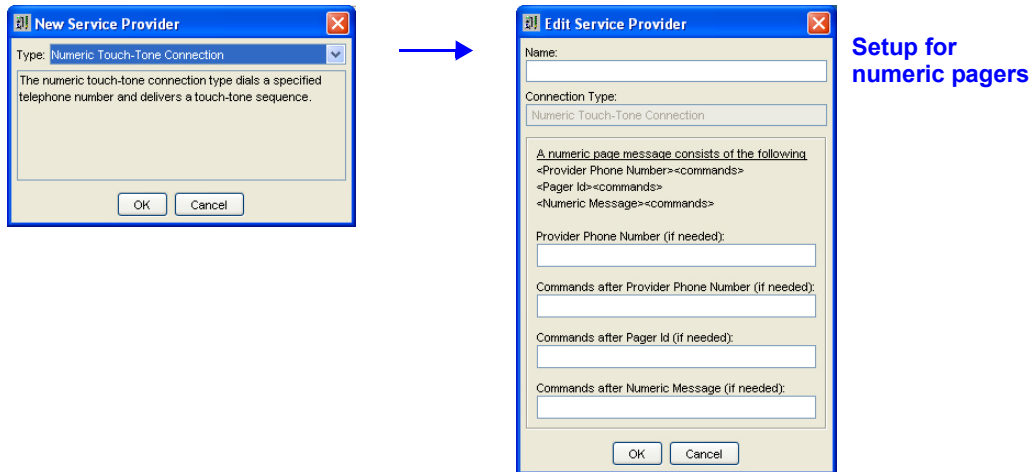
. . . and choose the type of service.

- In the Paging Service Providers window, click on **Add**.
- In the New Service Provider window, choose the type of paging service from the **Type** drop-down menu, either **Telocator Alphanumeric Protocol (TAP)** for alphanumeric pagers or **Numeric**

Touch-Tone Connection for numeric pagers. An alphanumeric pager displays messages containing text and numerals; a numeric pager displays only numerals.

- Click **OK**. This opens the Edit Service Provider window, which varies by type of service.

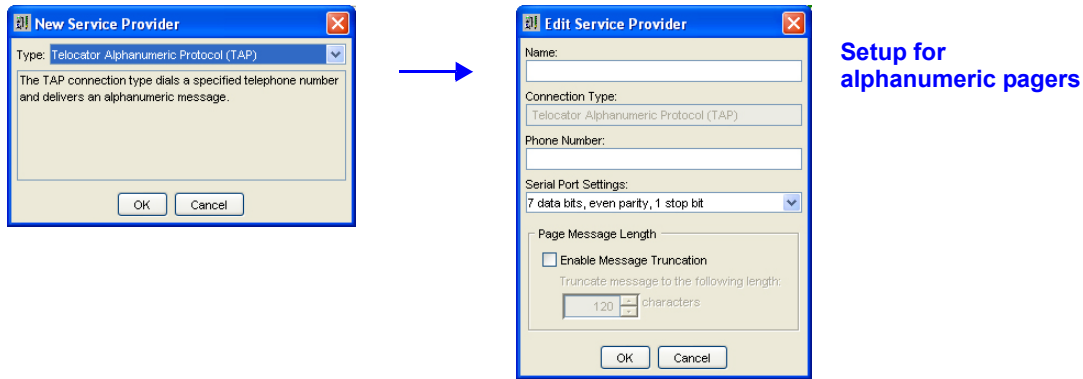
Numeric Touch-Tone Connection



For a numeric pager:

- Enter the service provider's name in the **Name** box.
- The **Connection Type** box displays the choice of Type made in the preceding step.
- Enter the service provider's phone number immediately followed by any touch-tone sequence—such as a comma for a pause—to be delivered in the **Provider Phone Number (if needed)** box. Use this format for the phone number: 1 800-555-1212,,, (note commas for pauses). Do not use parentheses around the area code.
- Enter any commands required to initiate or complete the page in the appropriate boxes: **Commands after Provider Phone Number (if needed)**, **Commands after Pager Id (if needed)** and **Commands after Numeric Message (if needed)**. Check with the pager service provider to determine whether any commands are required.
- Click **OK** to save the changes or click **Cancel** to close the window without saving.

Telocator Alphanumeric Protocol (TAP)



For an alphanumeric pager:

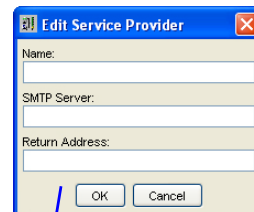
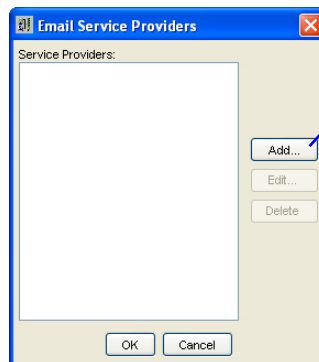
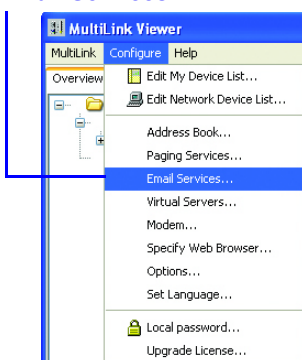
- Enter the service provider's name in the **Name** box.
- The **Connection Type** box displays the choice of Type made in the preceding step.
- Enter the service provider's phone number in the **Phone Number** box in this format: 1 800-555-1212. Do not use parentheses around the area code.
- Choose the appropriate parity/data bits setting from the **Serial Port Settings** drop-down menu.
- Enabling message truncation shortens messages through a particular provider to a specified length. In the Page Message Length box, place a check mark (✓) in the **Enable Message Truncation** box and specify the maximum message length in the **Characters** box.
- Click **OK** to save the changes or click **Cancel** to close the window without saving.

8.4.8 Configure Menu - E-Mail Services (Liebert® MultiLink® Advanced Only)

Liebert MultiLink's **E-mail Services** store e-mail service provider information for easy access when setting up notification of UPS-related events. Once a service provider is entered you may select it from a list, saving the work of re-entering the data for multiple Liebert MultiLink functions.

- Click on **Configure**, then on **Email Services**.

Click on **Configure**, then on **Email Services** . . .



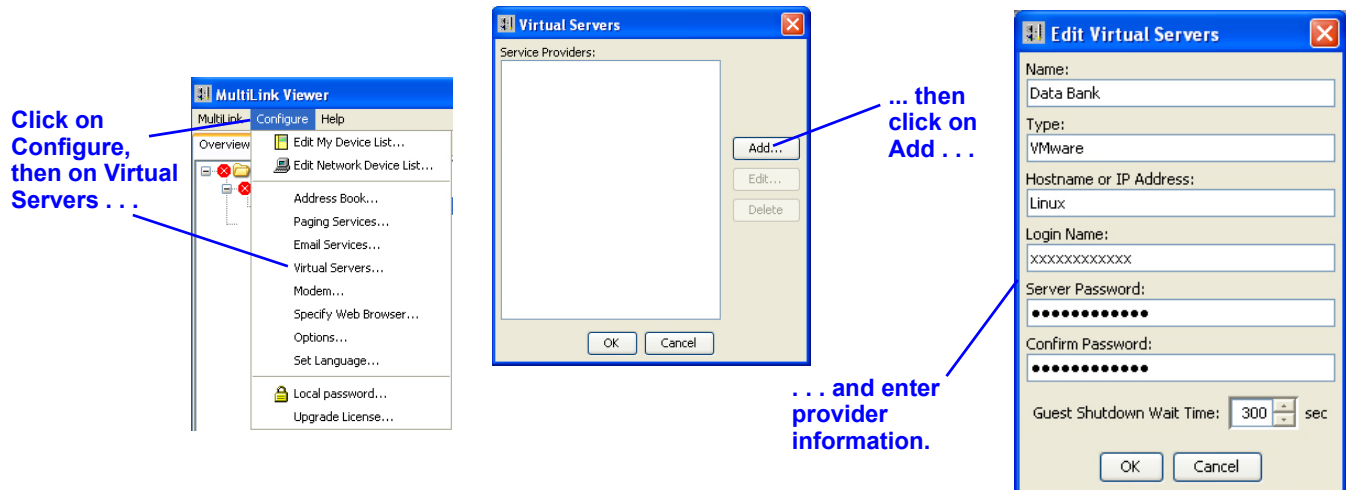
- In the Email Service Providers window, click on **Add**.
- In the Edit Service Provider window, enter the name of the service provider in the **Name** box.
- In the **SMTP Server** box, enter the name of the service provider's mail server, for example:
mail.domain.com
- The **Return Address** box must have an e-mail address for messages to be sent, for example, the e-mail address where the message originated. If identifying information is included in the Return Address, the e-mail address must be enclosed in angle brackets, for example:
smith@domain.com
OR
Joe Smith<smith@domain.com>
- Click **OK** to save the changes or click **Cancel** to close the window without saving.

8.4.9 Configure Menu - Virtual Servers (Liebert® MultiLink® Advanced Only)

Using the Virtual Servers menu item, available only in Liebert MultiLink Advanced for Windows, the System Administrator can set up virtual servers for proper shutdown action in response to an event. This shutdown action will perform an orderly shutdown of the virtual server and the guest operating systems running on the virtual server. Once a virtual server is entered, it will automatically be placed in the Event configuration for Virtual Server. Up to 10 virtual servers can be configured.

To enable Liebert MultiLink to shut down virtual servers:

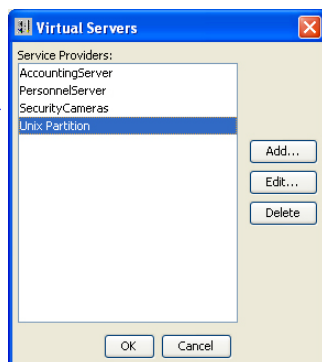
- Click on **Configure**, then on **Virtual Servers**.



- In the Virtual Servers window click on **Add**.
- In the Edit Virtual Servers Window that opens, enter the name of the virtual server in the **Name** box.
- In the **Hostname or IP Address** box, enter the hostname or the IP address of the virtual server being added.
- The **Login Name** box must have a user login for the virtual server that has root privilege.
- The **Server Password** and **Confirm Password** boxes should have the password of the user login in the **Login Name** box.
- The **Guest Shutdown Wait Time** box defines the maximum amount of time the shutdown action will wait for all applications to close before the shutdown will be initiated. Individual system requirements may require extending this timer.
- Click **OK** to save the changes or click **Cancel** to close the window without saving.

To view a list of configured virtual servers or to change any of the configuration information, click on **Configure**, then on **Virtual Servers**. Select the virtual server to be updated and click **Edit**. Edit the information and click **OK** to save the changes or click **Cancel** to close the window without saving.

Select virtual
server to be
updated . . .



Update the virtual server's data

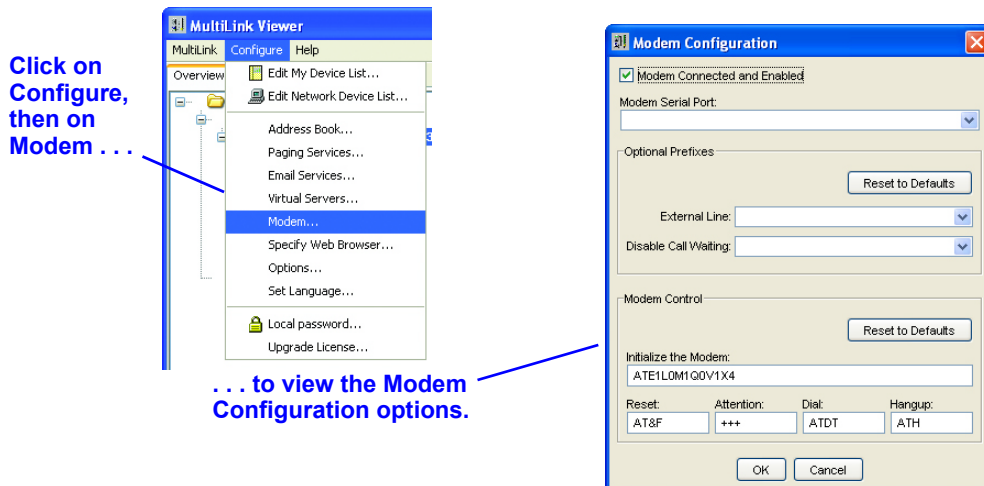
The 'Edit Virtual Servers' dialog box has a title bar with a standard Windows icon and a close button. It contains several input fields: 'Name:' with the value 'Unix Partition'; 'Type:' with the value 'Unix'; 'Hostname or IP Address:' with the value '192.168.1.111'; 'Login Name:' with a masked value 'XXXXXXXXXXXXXXXXXX'; 'Server Password:' with a masked value '.....'; and 'Confirm Password:' with a masked value '.....'. At the bottom, there is a 'Guest Shutdown Wait Time:' field with a value of '300' and a unit of 'sec'. 'OK' and 'Cancel' buttons are at the bottom right.

8.4.10 Configure Menu - Modem (Liebert® MultiLink® Advanced Only)

Using the **Modem** menu item, the System Administrator can set up Liebert MultiLink with the modem commands needed to send pager messages.

To enable Liebert MultiLink to use the modem:

- Click on **Configure**, then on **Modem**.



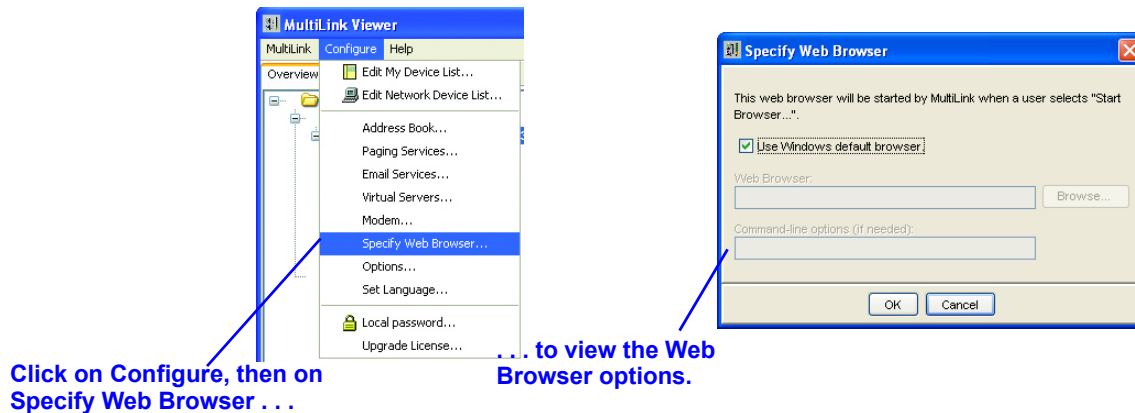
- In the **Modem Configuration** window that opens, place a check mark (✓) in the **Modem Connected and Enabled** box—this is required to use the modem.
- Select the proper **Modem Serial Port** from the drop-down list.
- Enter the required information.
 - a. If your telephone system requires dialing a particular digit, such as 9, to get an outside line, choose from the drop-down list in the **External Line** box or enter the number followed by a comma.
 - b. If the line used by the modem has the call-waiting feature, choose from the drop-down list in the **Disable Call Waiting** box or enter the required code followed by a comma.
 - c. Before Liebert MultiLink can find and utilize the modem, data must be entered in the **Modem Control** boxes. You may change the default values as needed.
 - d. At any time, click on the **Reset to Defaults** button to revert to the factory defaults for this feature.
 - e. Click **OK** to save the changes or click **Cancel** to close the window without saving.

8.4.11 Configure Menu - Specify Web Browser

You may use a Web browser to view the status of any UPS equipped with a Web-enabled SNMP card. For these devices, the Web browser also allows some configuration and testing functions.

To enable use of your Web browser:

- Click on **Configure**, then on **Specify Web Browser**.



- By default, Liebert® MultiLink® will use the computer's default browser, indicated by a check mark (✓) in the **Use Windows default browser** box. To accept this, click **OK**.
- To use a different browser:
 - Remove the check mark (✓) from the **Use Windows default browser** box.
 - Use the **Browse** button to locate the Web browser or enter the full path in the **Web Browser** text box.
 - Enter any required information in the **Command-line options** (if needed) box.
 - Click **OK**.

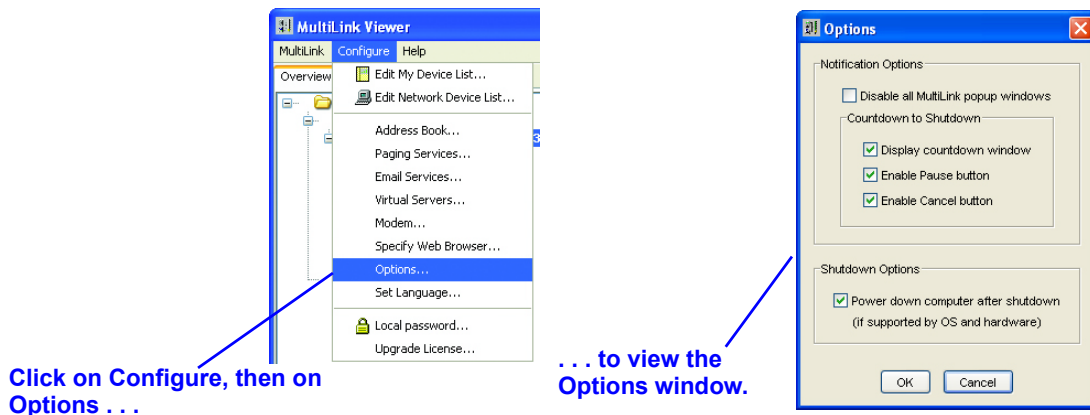
To use the Web browser, you must also enable Web access for each UPS to be monitored. See **8.3.4 - Properties - Web Tab** for details.

8.4.12 Configure Menu - Options

The Options window allows you to control some notification and shutdown actions. You may enable or disable pop-up messages and allow users to interrupt or abort a shutdown. You may also specify whether to power down the computer after a graceful shutdown of the operation system; feature not available for all operating systems.

To change any options:

- Click on **Configure**, then on **Options**.



Notification Options

- By default, Liebert® MultiLink® pop-up messages are enabled, with no check mark (✓) in the **Disable all MultiLink pop-up windows** box. To change this, place a check mark (✓) in the box.
- The Countdown To Shutdown options are available only when Liebert MultiLink pop-up windows are enabled (the default). Place or remove check marks (✓) to set the following options:
 - **Display countdown window** - When this box is checked (the default), it permits display of the MultiLink Countdown to Shutdown window to alert users of an impending shutdown of the operating system.
 - **Enable Pause button** - When this box is checked (the default), it activates the **Pause Shutdown** button on the MultiLink Countdown to Shutdown window. (The **Pause Shutdown** button permits the user to interrupt the countdown, freezing the timer with whatever unelapsed time remains. The shutdown can be resumed at the point the countdown was paused or it can be canceled.)
 - **Enable Cancel button** - When this box is checked (the default), it activates the **Cancel Shutdown** button on the MultiLink Countdown to Shutdown window. (The **Cancel Shutdown** button permits the user to halt the countdown and prevent Liebert MultiLink from shutting down the operating system.)

Shutdown Options

- By default, Liebert MultiLink is configured to power down the computer after an operating system shutdown. To change this setting, remove the check mark (✓) from the **Power down computer after shutdown** box. This option is enabled only on platforms that support a choice of whether to power down the computer after an operating system shutdown.

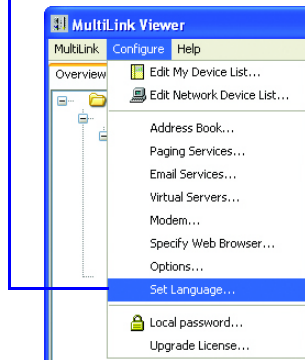
8.4.13 Configure Menu - Set Language

You may specify the language displayed in the Liebert® MultiLink® interface. The Liebert MultiLink service and the Viewer must be restarted after a new language is chosen.

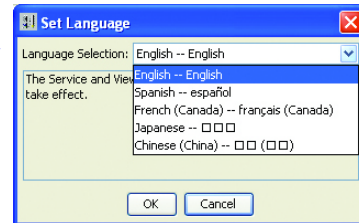
To change the language:

- Click on **Configure**, then on **Set Language**.

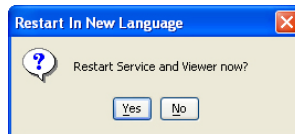
Click on **Configure**, then on **Set Language** . . .



. . . to view the Set Language options.

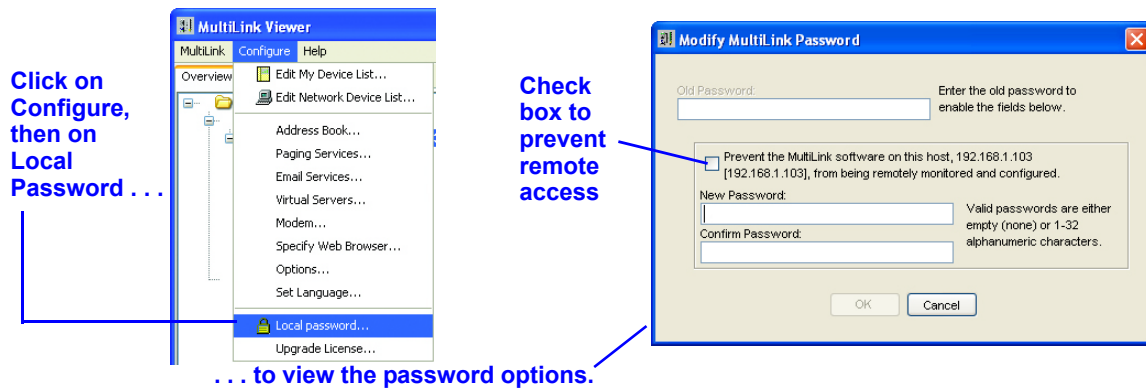


- Select an option from the Language Selection drop-down list, then click **OK**. The next time the Liebert MultiLink service and Viewer are restarted, all text in the MultiLink Viewer and in Liebert MultiLink notifications will appear in the selected language.
- A confirmation dialog box asks whether you wish to restart the Liebert MultiLink service and Viewer now. Click **Yes** to do so. (Or click **No** to return to the Viewer; the language will be changed the next time the Liebert MultiLink service and Viewer are started.)



8.4.14 Configure Menu - Local Password

Using the **Local Password** menu item, the System Administrator can set up security access for Liebert® MultiLink®.



- Click on **Configure**, then on **Local Password**.
- In the Modify MultiLink Password window, enter the current password in the **Old Password** box. This enables the remaining options in the window.
- To prevent remote configuration changes, place a check mark (✓) in the check box. Leaving the check box blank will permit configuration and monitoring from a remote location.
- To change the password, enter up to 32 alphanumeric characters in the **New Password** box.
- Enter the same password in the **Confirm Password** box.

8.4.15 Configure Menu - Upgrade License

Two types of licenses allow you to expand Liebert® MultiLink®'s capabilities, letting you monitor and control an entire network from a single location.

- The **MultiLink Network Shutdown License** (license.key) permits the System Administrator to configure Liebert MultiLink to notify targeted client computers of UPS-related events. All targeted client computers must be running Liebert MultiLink. This license is available for various numbers of computers (see **Table 17** for part numbers).
- The **MultiLink Network Administration License** (license.net) allows the System Administrator to monitor other Liebert MultiLink installations from a single location and add more than one device to the local device list (see **Table 18** for this license part number).

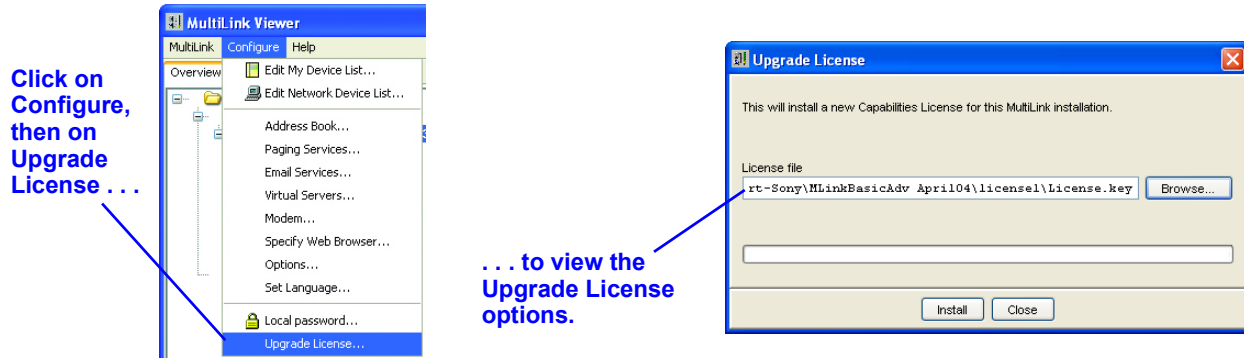
To obtain either license, visit the Liebert MultiLink Web site at <http://multilink.liebert.com> or contact your local Emerson representative, value-added reseller or distributor.

To install the appropriate license, use the **Upgrade License** menu item described below. The licenses may be installed in any order. Note that each computer identified as a targeted client must have Liebert MultiLink installed.

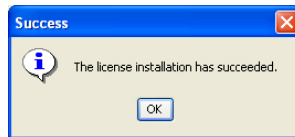
MultiLink Network Shutdown License

To set up a Liebert MultiLink upgrade license that allows you to send notifications to targeted client computers (which must be running Liebert MultiLink):

- Click on **Configure**, then on **Upgrade License**.
- In the **License File** box, enter the name of the appropriate file—**license.key**—with its full path, or click on the **Browse** button to locate the file, which is available from Emerson.



- Click on the **Install** button to begin. A message box appears after successful installation.



- After installing the license, configure the targeted MultiLink Clients as described in **8.3.6 - Properties - Clients Tab**. (Targeted clients must have Liebert MultiLink version 1.x or 3.x installed. If the targeted client is running version 3.x of the software, the **Device Type** for the event source must be **MultiLink Basic Notification Source**. Also, in the **Hostname or IP address** box of the targeted MultiLink Client computer, the hostname of the computer on which the MultiLink Network Shutdown License is installed must be specified. See **3.1 - Connecting host computer, UPS and targeted clients** and **8.3.3 - Properties - Setup Tab**).

MultiLink Network Administration License

To set up a Liebert MultiLink upgrade license:

- Click on **Configure**, then on **Upgrade License**.
- In the **License File** box, enter the name of the appropriate file—**license.net**—with its full path, or click on the **Browse** button to locate the file, which is available from Emerson.
- Click on the **Install** button. A message box appears after successful installation.
- After installing the license, you may add any Liebert MultiLink installation on the network to the Viewer device lists for monitoring and configuration (see **8.4.3 - Configure Menu - Edit My Device List** and **8.4.4 - Configure Menu - Edit Network Device List**).

8.5 Configuring—Event Configuration tab

The **Event Configuration** tab allows you to set up Liebert MultiLink's response to UPS-related events such as Utility Failed and Low Battery.

8.5.1 Overview of Configuring Event Actions

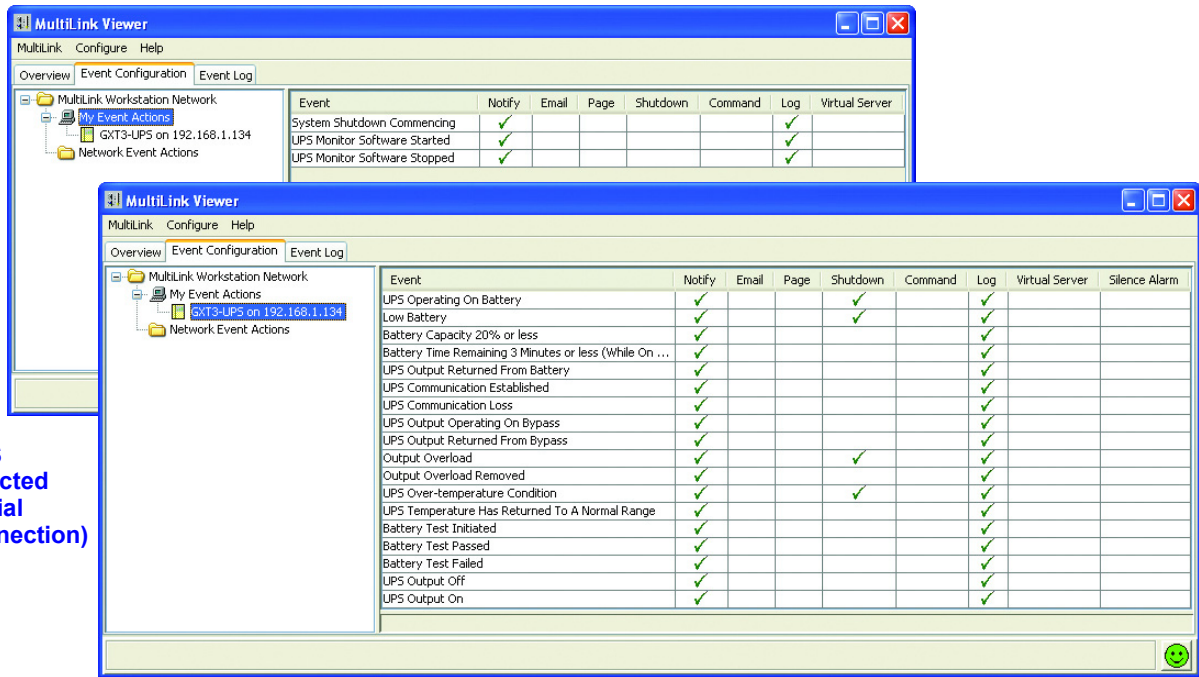
Types of Events

Events may be configured for the Local Host and for the UPS. Each device displays a different list of Events in the right side of the window, as shown below.

SCREENS SHOW LIEBERT MULTILINK ADVANCED

My Event
Actions
selected

UPS
selected
(serial
connection)



A Contact Closure connection between the UPS and the computer supports only three events: UPS Operating On Battery, Low Battery, UPS Output Returned From Battery (Normal).

See **Appendix D - List of Events** for a complete list of events for the Local Host (**Table 13**) and for the UPS (**Table 14**).

Types of Actions

The following Actions may be configured for any Event:

Table 10 Actions Available for Configuration

Action	Description	For details, see:
Notify	Broadcast messages (pop-up or console) about UPS-related events	8.5.2 - Event Actions - Notify
E-mail (Liebert® MultiLink® Advanced Only)	Send e-mail messages	8.5.3 - Event Actions - E-Mail (Liebert® MultiLink® Advanced Only)
Page (Liebert MultiLink Advanced Only)	Send messages to targeted clients' telephone pagers	8.5.4 - Event Actions - Page (Liebert® MultiLink® Advanced Only)
Shutdown	Shut down this computer	8.5.5 - Event Actions - Shutdown
Command (Liebert MultiLink Advanced Only)	Run commands	8.5.6 - Event Actions - Command (Liebert® MultiLink® Advanced Only)
Log	Make records of UPS-related events and actions	8.5.7 - Event Actions - Log
Virtual Server (Liebert MultiLink Advanced Only)	Shut down virtual servers	8.5.8 - Event Actions - Virtual Server (Liebert® MultiLink® Advanced Only)
Silence Alarm* (Liebert MultiLink Advanced Only)	Turn off a UPS' warning alarm (such as for maintenance or repair)	8.5.9 - Event Actions - Silence Alarm (Liebert® MultiLink® Advanced Only)

*Silence Alarm Action available with serial connection only

Configuring the Timing of Actions

Configuring the timing of Actions may be the most important aspect of setting up Liebert® MultiLink®. This feature allows you to specify how quickly Liebert MultiLink performs such actions as sending notifications, launching scripts and shutting down the operating system.

Appropriate times will vary according to the type of UPS in service, the Event and Action being configured and the number of computers being powered by the UPS.

Setting Up Event Actions

- Click on the **Event Configuration** tab.
- Click on the device name in the left side of the window.
- To enable an action for any event, click in the box to the right of the Event and under the Action. This highlights the Event row and outlines the selected Action. It also reveals the configuration settings for the Action.
- Next, click in the **Enable** box (beneath the list of events). This places a check mark (✓) in the box beneath the selected Action.

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Events

Actions

Event Configuration tab

Device name

Enable box

Selected Action (outlined)

Event	Notify	Email	Page	Shutdown	Command	Log	Virtual
UPS Operating On Battery	✓	✓	✓	✓	✓	✓	✓
Low Battery	✓			✓		✓	
Battery Capacity 20% or less	✓					✓	
Battery Time Remaining 3 Minutes or less (While ...)	✓					✓	
UPS Output Returned From Battery	✓					✓	
UPS Communication Established	✓					✓	
UPS Communication Loss	✓					✓	
UPS Output Operating On Bypass	✓					✓	

Enable Email Action: ☒

Initial Delay: 0 min 0 sec

Repeat Count: 0 Repeat Interval: 0 min 0 sec

Email Subject: MultiLink Notification

Message:

Include Advice: ☒

The example above shows how to enable a Notify Action for UPS Operating On Battery.

Testing Configuration Settings

After configuring the responses to a UPS-related event, you may test your settings by simulating the event, as described in **8.6 - Testing Responses to Events**.

Temporarily Disabling an Event

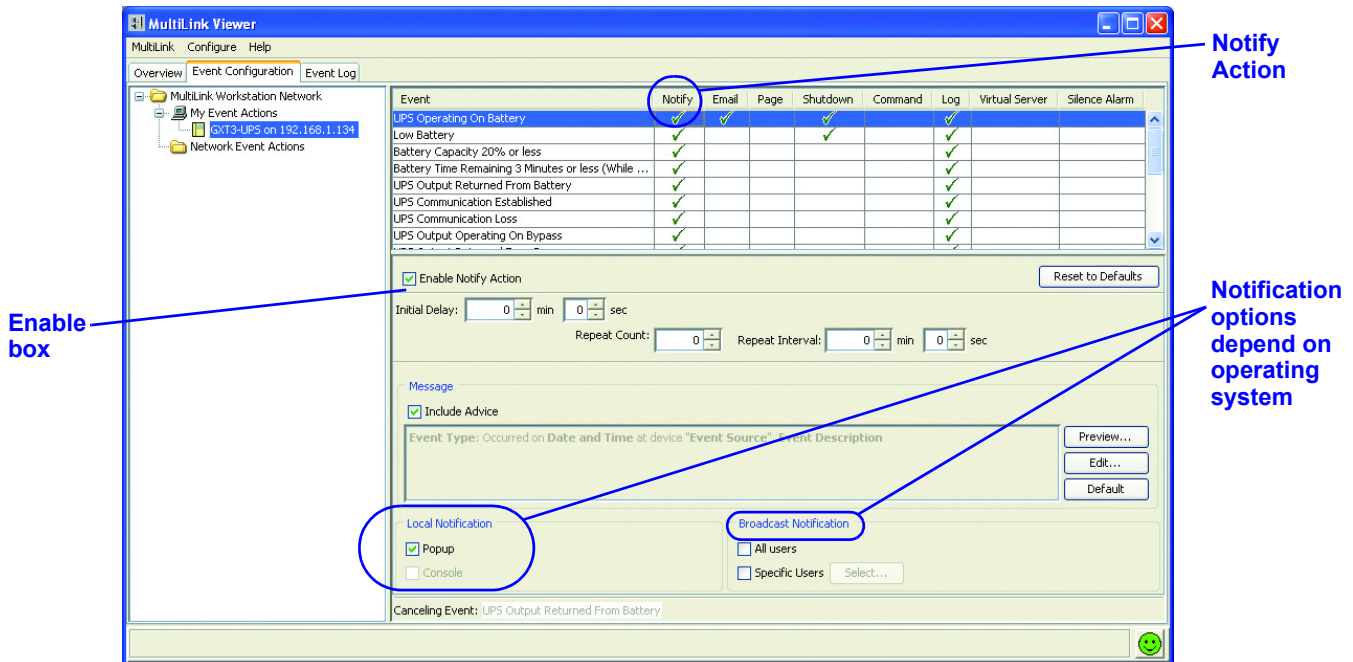
At any time, you may deactivate an event. When the event is re-enabled, all configuration settings remain as last saved. For details, see **8.7 - Disabling and Re-Enabling an Event**.

Configuration Steps

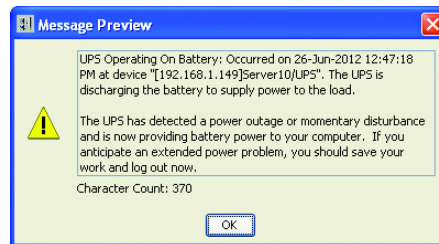
The following sections detail the options available for each Action. The Actions and Events available depend on the connection method and device type, but the steps are the same for all types.

8.5.2 Event Actions - Notify

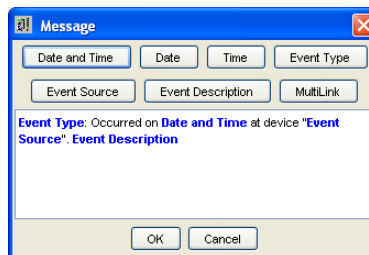
The **Notify** feature automatically generates messages (pop-up or console) about UPS-related events that appear on specified computer users' screens.



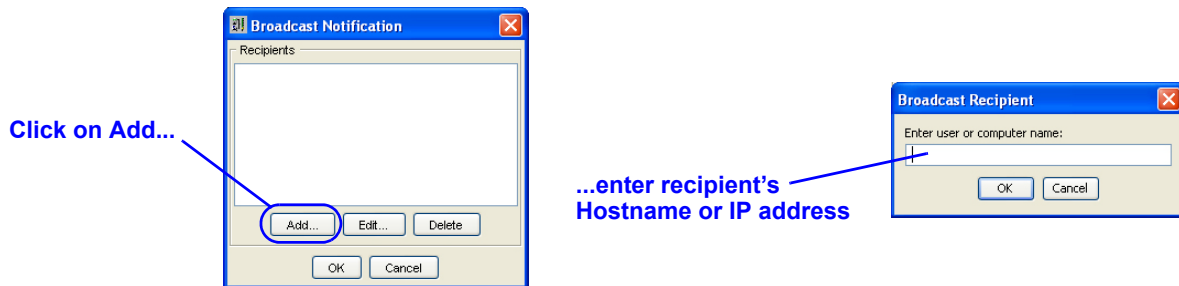
- Check (✓) the **Enable Notify Action** box. This is required for the action to operate.
- The **Initial Delay** displays the time lapse between an event's occurrence and when the notification message is sent. The **Repeat Count** box shows how many times Liebert® MultiLink® will send a message at intervals specified in the **Repeat Interval** box.
For example, to start sending a notification 15 seconds after the Event occurs and then every 30 seconds for a total of 5 times:
 - **Initial Delay** = 15 sec
 - **Repeat Count** = 5
 - **Repeat Interval** = 30 sec
- Default messages have been set up for all events. These messages state the type of event, the time it occurred, the device involved and a description of the event. To view a message as it will appear on users' screens, click on the **Preview** button.



- To alter a message, click on the **Edit** button and enter the desired text in the Message window, as shown below.



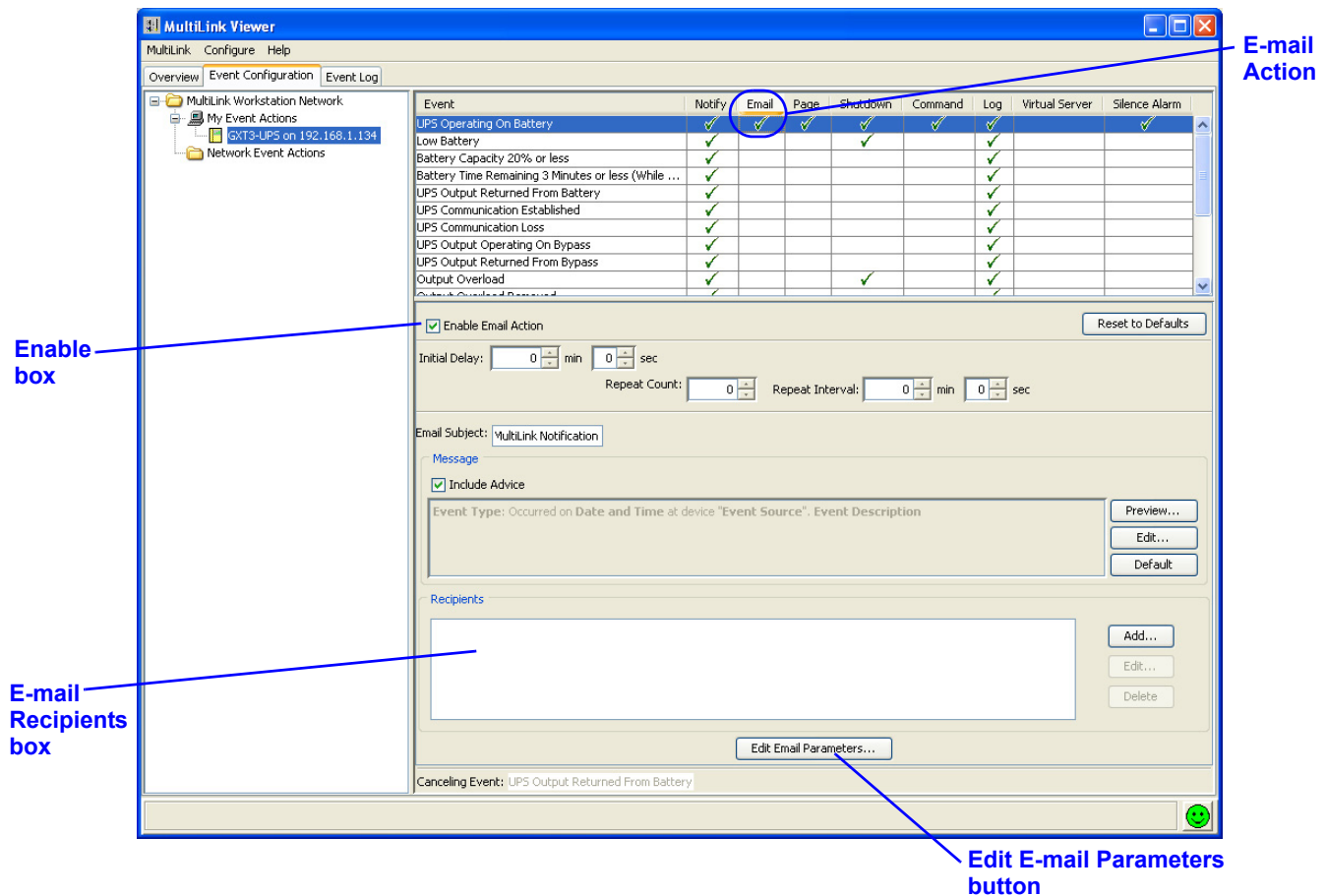
- Buttons at the top of the **Message** window insert linked text that prompts Liebert® MultiLink® to describe the event. Text also may be typed into the **Message** window. To restore the default message at any time, click on **Default**.
- Checking the **Include Advice** box inserts text into the message that will advise computer users to begin taking certain actions. For example: "Save your work and log out now as system shutdown will begin shortly. The UPS is running out of battery capacity and minimal battery backup runtime remains."
- The **Local Notification** option may send messages by pop-up or to the operating system console. These options vary by operating system. For information, see **Appendix A - Operating System Details**.
- The **Broadcast Notification** box allows you to specify message recipients as **All Users** or **Specific Users**. (This feature is not available on all operating systems; see **Appendix A - Operating System Details**.) To choose specific users to receive the message, click on **Specific Users**, then on **Select** to open the Broadcast Notification window.



- In the Broadcast Notification window, click on the **Add** button to enter the Hostname or IP address of recipients.
- Once entered, a recipient's Hostname or IP address can be changed by using the **Edit** button or removed by using the **Delete** button on the Broadcast Notification window.
- The **Canceling Event** will abort all actions initiated by Liebert MultiLink in response to the event being configured. See **Table 14** for a list of Events with default canceling events.
- At any time, click on the **Reset to Defaults** button to revert to the factory defaults for this feature.
- To save settings, click on the **MultiLink** menu at the top of the window, then click on **Save Event Configuration**.

8.5.3 Event Actions - E-Mail (Liebert® MultiLink® Advanced Only)

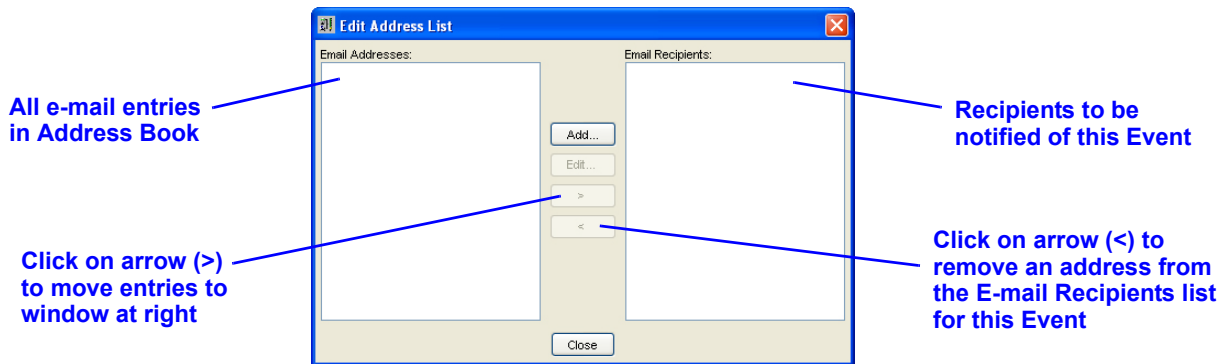
The **E-mail** feature automatically sends e-mail messages about UPS-related events.



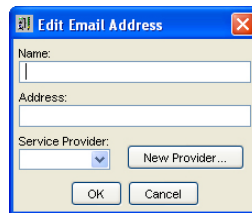
To configure the **E-mail** action:

- Check (✓) the **Enable E-mail Action** box. This is required for the action to operate.
- The **Initial Delay** displays the time lapse between an event's occurrence and when the e-mail is sent.
- The **Repeat Count** box shows how many times Liebert MultiLink will send a particular e-mail at intervals specified in the **Repeat Interval** box.
- Check to make sure a subject is specified in the **E-mail Subject** box. By default, the subject is "MultiLink Notification." This can be changed by entering a new subject.
- Default messages have been set up for all events. These e-mails state the type of event, the time it occurred, the device where it occurred and a description of the event. To view the text as it will appear in a recipient's e-mail message, click on the **Preview** button.
- To alter a message, click on the **Edit** button and enter the desired text. Buttons at the top of the **Message** window insert linked text that prompts Liebert MultiLink to describe the event. Text also may be typed into the **Message** window. To restore the default message at any time, click on **Default**.
- Checking the **Include Advice** box inserts text into the message that will advise computer users to begin taking certain actions. For example: "Save your work and log out now as system shutdown will begin shortly. The UPS is running out of battery capacity and minimal battery backup runtime remains."

- The message will be sent to all e-mail addresses in the **Recipients** box. Addresses may be added, altered or deleted by using the **Add**, **Edit** and **Delete** buttons as appropriate.
 - To **Add** an e-mail address to the recipients list:
 - Click on the **Add** button—this opens the **Edit Address List** window.



- Select an address on the left side of the window by clicking on it—this highlights the address.
 - Use the arrow (>) between the windows to move the name to the **E-mail Recipients** window at right.
 - Click on **Close**—the new address appears in the **Recipients** box. (New e-mail addresses can be added to the Address Book from this window by clicking on **Add** and entering the information as described above.)
- To **Edit** a recipient's e-mail address:
 - Highlight the address in the **Recipients** box in the main window (**Event Configuration** tab with the **E-mail** action highlighted).
 - Click on the **Edit** button—this opens the **Edit E-mail Address** window, shown below.

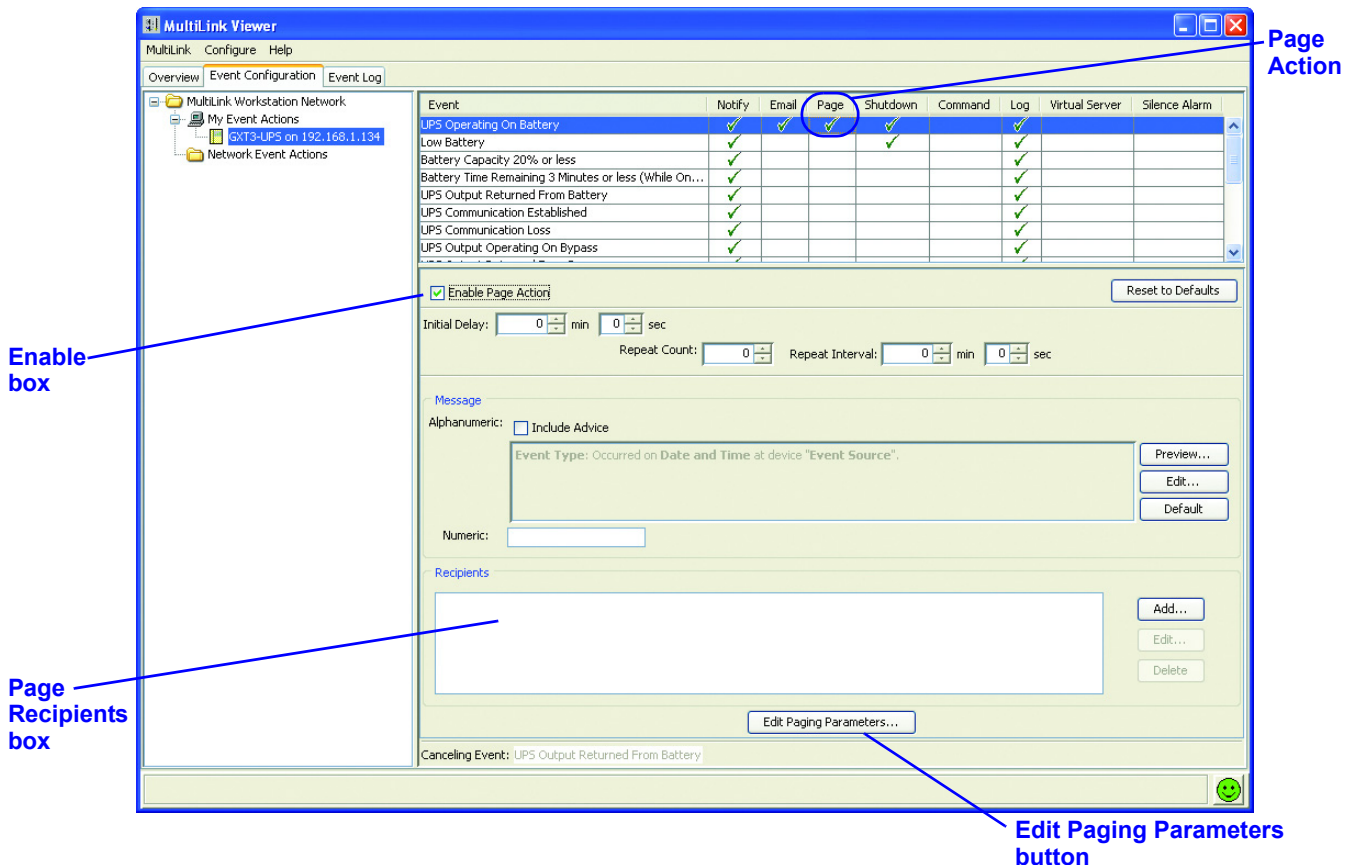


- Update the person's name and e-mail address as needed.
 - To update the person's service provider, choose from the **Service Provider** drop-down menu or click on the **New Provider** button to enter a new provider.
 - Click on **OK**.
- To **Delete** a recipient from the list:
 - Highlight the address in the **Recipients** box in the main window (**Event Configuration** tab with the **E-mail** action highlighted).
 - Click on the **Delete** button. The address is deleted from the e-mail recipients list.

An alternate method of removing a recipient is to open the **Edit Address List** window, highlight the address to be removed from the recipients listing and click on the < arrow.
- The **Edit E-mail Parameters** button gives you access to an address book with e-mail addresses and service providers. For details, see:
 - 8.4.6 - Configure Menu - Address Book (Liebert® MultiLink® Advanced Only)** and
 - 8.4.8 - Configure Menu - E-Mail Services (Liebert® MultiLink® Advanced Only).**
 - The **Canceling Event** will abort all actions initiated by Liebert® MultiLink® in response to the event being configured. See **Table 14** for a list of Events with default canceling events.
 - At any time, click on the **Reset to Defaults** button to revert to the factory defaults for this feature.
 - To save settings, click on the **MultiLink** menu at the top of the window, then click on **Save Event Configuration**.

8.5.4 Event Actions - Page (Liebert® MultiLink® Advanced Only)

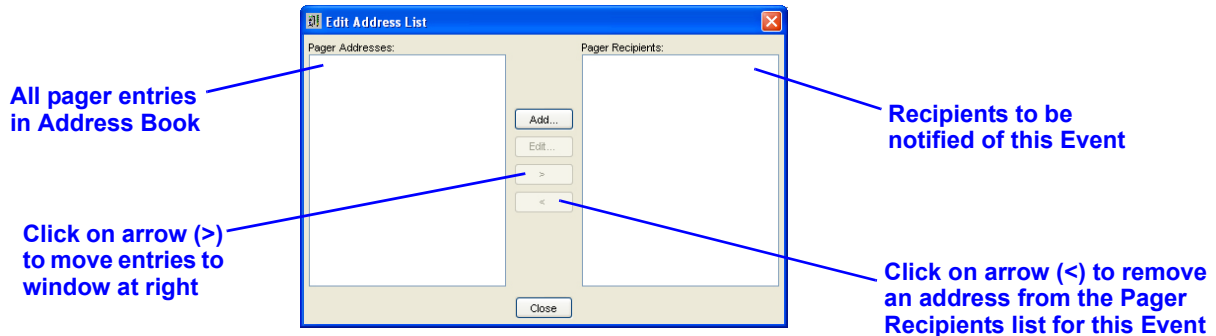
The **Page** feature allows the System Administrator to automatically send numeric and alphanumeric telephone pager messages to personnel in response to UPS-related events.



To configure the **Page** action:

- Ensure the modem is configured. (See 8.4.10 - Configure Menu - Modem (Liebert® MultiLink® Advanced Only).)
- Check (✓) the **Enable Page Action** box. This is required for the action to operate.
- The **Initial Delay** displays the time lapse in minutes and seconds between an event's occurrence and when the paging function is activated.
- The **Repeat Count** box shows how many times Liebert MultiLink will send the page at intervals specified in minutes and seconds in the **Repeat Interval** box.
- The **Message** box allows you to specify the content of both types of messages: alphanumeric and numeric. The type of pager is set up for each pager address as alphanumeric or numeric paging—see 8.4.7 - Configure Menu - Paging Services (Liebert® MultiLink® Advanced Only). To specify the content of messages in the **Message** box:
 - a. Alphanumeric default messages have been set up for all events. The message displayed in the **Alphanumeric** box will be sent to all recipients set up for alphanumeric pagers. Note that some paging services limit the length of messages that can be sent. These messages state the type of event, the time it occurred, the device where it occurred and a description of the event. To view an alphanumeric message as it will appear on users' pagers, click on the **Preview** button. To alter an alphanumeric message, click on the **Edit** button and enter the desired text. Buttons at the top of the **Message** window insert linked text that prompts Liebert MultiLink to describe the event. Text also may be typed into the **Message** window. To restore the default message at any time, click on **Default**. Checking the **Include Advice** box inserts text into the message that will advise computer users to begin taking certain actions. For example: "Save your work and log out now as system shutdown will begin shortly. The UPS is running out of battery capacity and minimal battery backup runtime remains."

- b. To enter a numeric message, enter the appropriate digits in the **Numeric** box. This message will be sent to all recipients set up for numeric pagers.
- The message will be sent to all pager addresses in the **Recipients** box. Addresses may be added, altered or deleted by using the **Add**, **Edit** and **Delete** buttons as appropriate.
 - a. To **Add** a pager address to the recipients list for this Event:
 - 1. Click on the **Add** button—this opens the **Edit Address List** window.

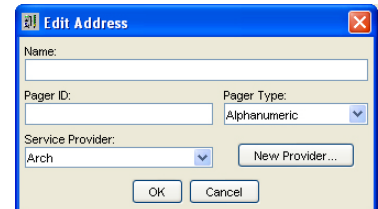


- 2. Select an address from the **Pager Addresses** box on the left side of the window by clicking on it—this highlights the address.
 - 3. Use the arrow (>) between the windows to move the name to the **Pager Recipients** box.
 - 4. Click on **Close**—the new address appears in the **Recipients** box.
- b. To **Edit** a recipient's pager address:
 - 1. Highlight the address in the **Recipients** box in the main window (**Event Configuration** tab with the **Page** action highlighted).
 - 2. Click on the **Edit** button—this opens the **Edit Pager Address** window, as shown at right.
 - 3. Update the person's name and **Pager ID** as needed. The **Pager ID** is the unique method paging service providers use to connect to a pager. Some paging service providers use a unique phone number as the **Pager ID**; others use a common phone number and an identifying number.

For services using a unique phone number, enter the pager-specific phone number in the **Pager ID** box and leave the **Service Provider** phone number blank.

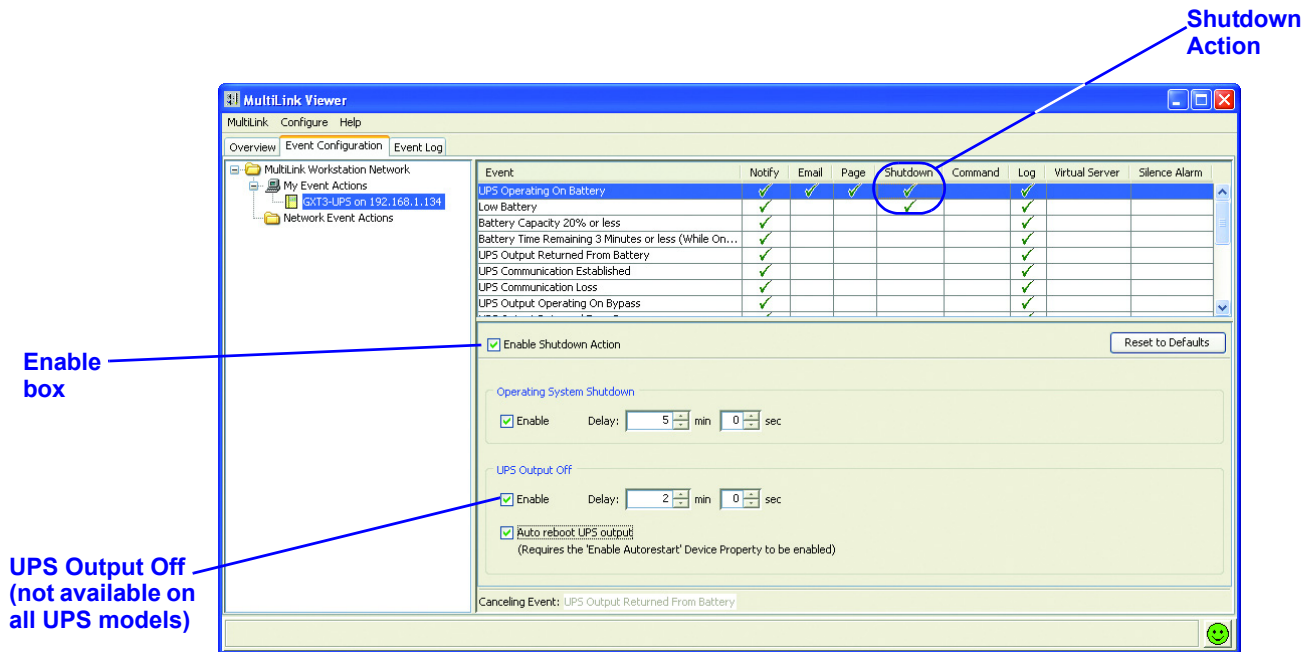
For services using a common phone number, enter the specific ID in the **Pager ID** box and the common phone number in the **Service Provider** configuration.
 - 4. Choose the paging method—numeric or alphanumeric—from the **Pager Type** drop-down menu.
 - 5. To update the person's service provider, choose from the **Service Provider** drop-down menu or click on the **New Provider** button to enter a new provider.
 - 6. Click on **OK**.
- c. To **Delete** a recipient from the list:
 - 1. Highlight the address in the **Recipients** box in the main window (**Event Configuration** tab with the **Page** action highlighted).
 - 2. Click on the **Delete** button. The address is deleted from the page **Recipients** box.

An alternate method of removing a recipient is to open the **Edit Address List** window, highlight the address to be deleted from the recipients listing and click on the < arrow.
- The **Edit Paging Parameters** button gives you access to an address book with pager addresses and service providers. For details, see:
 - 8.4.6 - Configure Menu - Address Book (Liebert® MultiLink® Advanced Only) and
 - 8.4.8 - Configure Menu - E-Mail Services (Liebert® MultiLink® Advanced Only).
- The **Canceling Event** will abort all actions initiated by Liebert® MultiLink® in response to the event being configured. See **Table 14** for a list of Events with default canceling events.
- At any time, click on the **Reset to Defaults** button to revert to the factory defaults for this feature.
- To save settings, click on the **MultiLink** menu at the top of the window, then click on **Save Event Configuration**.



8.5.5 Event Actions - Shutdown

The **Shutdown** feature allows the orderly shutdown of the operating system and the UPS in response to certain events, such as Low Battery.



To configure the **Shutdown** action:

- Check (✓) the **Enable Shutdown Action** box. This is required for the action to operate.
- In the **Operating System Shutdown** area, check the **Enable** box to permit Liebert® MultiLink® to perform an orderly shutdown of the operating system. Use the arrows in the **Delay** boxes to specify the time lapse between an event's occurrence and when the shutdown begins.
- The System Administrator can use the **UPS Output Off** feature to set up Liebert MultiLink to shut down the UPS after shutting down the host computer's operating system. This feature is available only on certain UPS models. (A special cable may be required to support this feature on Contact Closure connections.)
 - To set up the **UPS Output Off** feature, click on the **Enable** box,
 - Use the related **Delay** boxes to specify an additional delay (above and beyond the "Operating System Shutdown" delay) prior to turning off the UPS output.



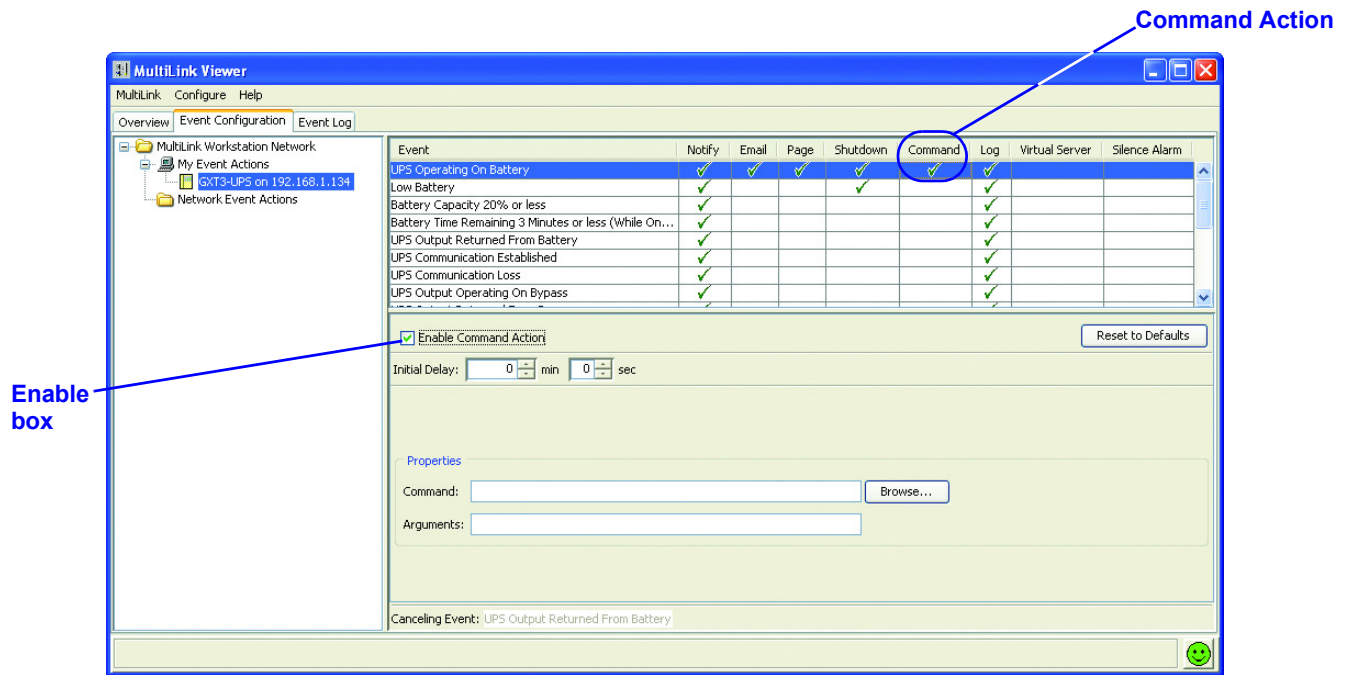
NOTE

*Because the **Canceling Event** does not halt the **UPS Output Off** portion of the **Shutdown** action, Emerson strongly advises against enabling the **UPS Output Off** action if the **Operating System Shutdown** action is not enabled.*

- Enabling **Auto reboot UPS output** causes the UPS to restore power to the load (after a brief delay) after the output power has been turned off as a result of selecting the **Enable** check box. These features induce a controlled cycling of power to the critical load, eliminating the need to reset the UPS manually. This option is not available with Contact Closure.
- **Note:** Input power to the UPS must be present before UPS output power can be restored. If the output has been turned off during a utility outage, the UPS output power will not be turned on until the input utility is restored.
- The **Canceling Event** will abort all actions initiated by Liebert MultiLink in response to the event being configured, except **UPS Output Off** (see NOTE above). See **Table 14** for a list of Events with default canceling events.
- At any time, click on the **Reset to Defaults** button to revert to the factory defaults for this feature.
- To save settings, click on the **MultiLink** menu at the top of the window, then click on **Save Event Configuration**.

8.5.6 Event Actions - Command (Liebert® MultiLink® Advanced Only)

The **Command** feature allows the System Administrator to control applications that have command-line options, for example, to save files or close an application.



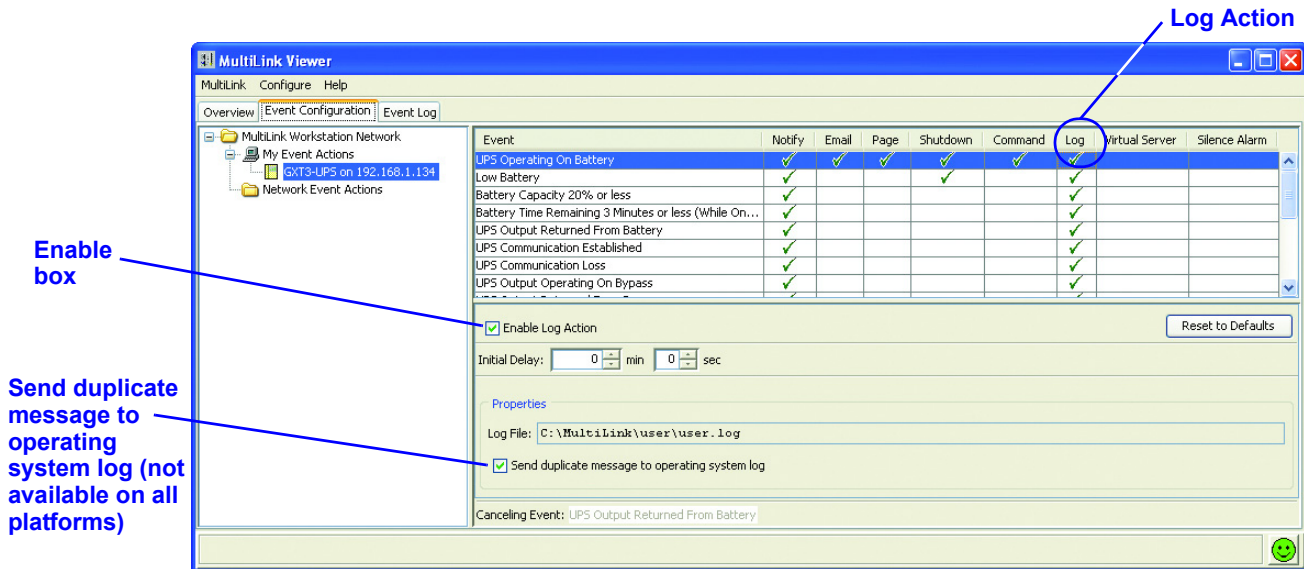
To configure the **Command** action:

- Check (✓) the **Enable Command Action** box. This is required for the action to operate.
- Use the arrows in the **Initial Delay** boxes to specify the time lapse between an event's occurrence and when the command is executed.
- In the **Properties** line, specify a command by either typing it in the **Command** box or by clicking on the **Browse** button and locating the appropriate file.
- In the **Arguments** box, enter any arguments required for the command to function properly. Once entered, arguments will remain in the **Arguments** box until deleted. If inappropriate arguments are displayed, be sure to delete them.
- The **Canceling Event** will abort all actions initiated by Liebert MultiLink in response to the event being configured. See **Table 14** for a list of Events with default canceling events.
- At any time, click on the **Reset to Defaults** button to revert to the factory defaults for this feature.
- To save settings, click on the **MultiLink** menu at the top of the window, then click on **Save Event Configuration**.

8.5.7 Event Actions - Log

Liebert® MultiLink® will create a file—**user.log**—documenting the occurrence of UPS-related events and Liebert MultiLink's actions in response to those events.

To view the log file, click on the **Event Log** tab in the MultiLink Viewer.



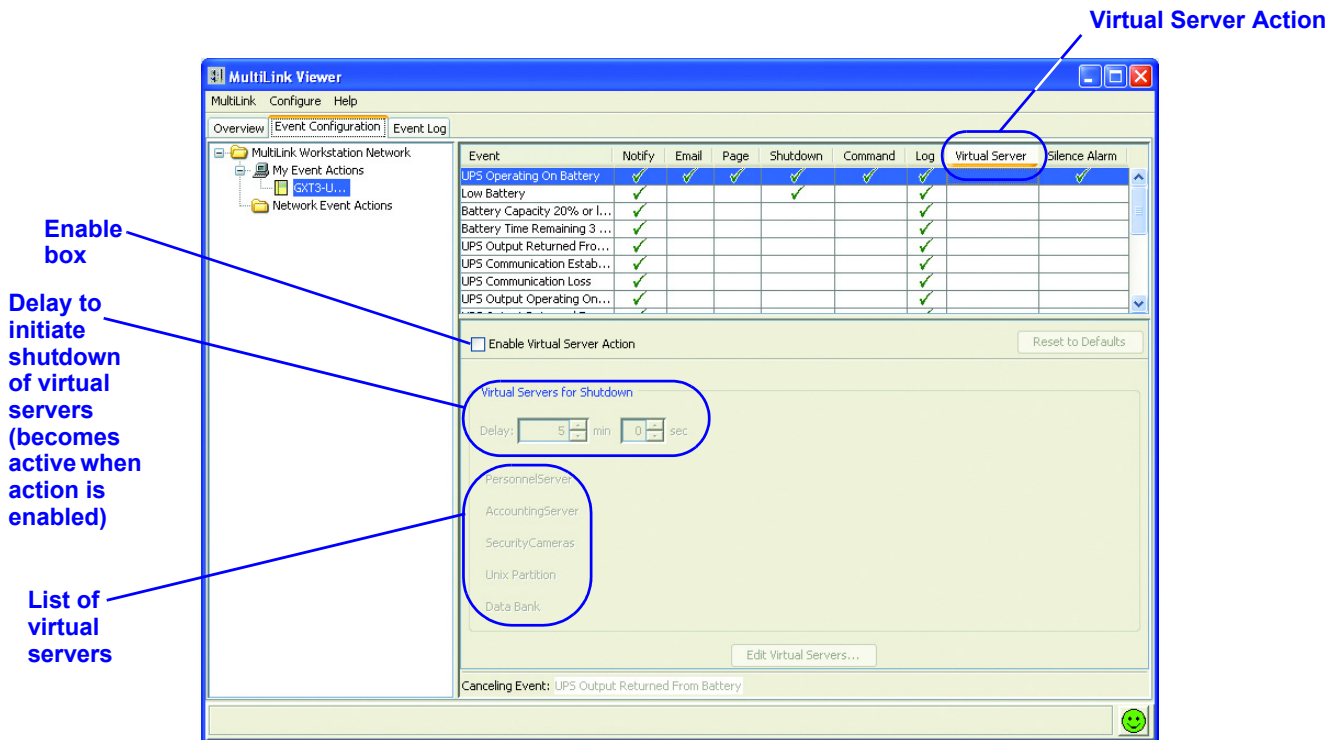
To configure the **Log** action:

- Check (✓) the **Enable Log Action** box. This is required for the action to operate.
- Use the arrows in the **Initial Delay** boxes to specify the time lapse between an event's occurrence and when the event log is created.
- The event log's file name with its full path appears in the **Log File** portion of the **Properties** section. The log's default file size is 1 MB and will hold thousands of records.
- On some platforms, Liebert MultiLink offers the option of sending duplicate log entries to the operating system log. (This feature is not available on all operating systems; see **Appendix A - Operating System Details**.)
- There is no canceling event for the **Log** action.
- At any time, click on the **Reset to Defaults** button to revert to the factory defaults for this feature.
- To save settings, click on the **MultiLink** menu at the top of the window, then click on **Save Event Configuration**.

The log file, user.log, is a comma-delimited file (values are separated by commas). The file's contents can be imported into an external application, such as a spreadsheet, database, text editor, or word processing program.

8.5.8 Event Actions - Virtual Server (Liebert® MultiLink® Advanced Only)

The Virtual Server feature, available only in Liebert MultiLink Advanced for Windows, allows the orderly shutdown of virtual servers and their guest operating systems in response to certain events, such as On Battery.

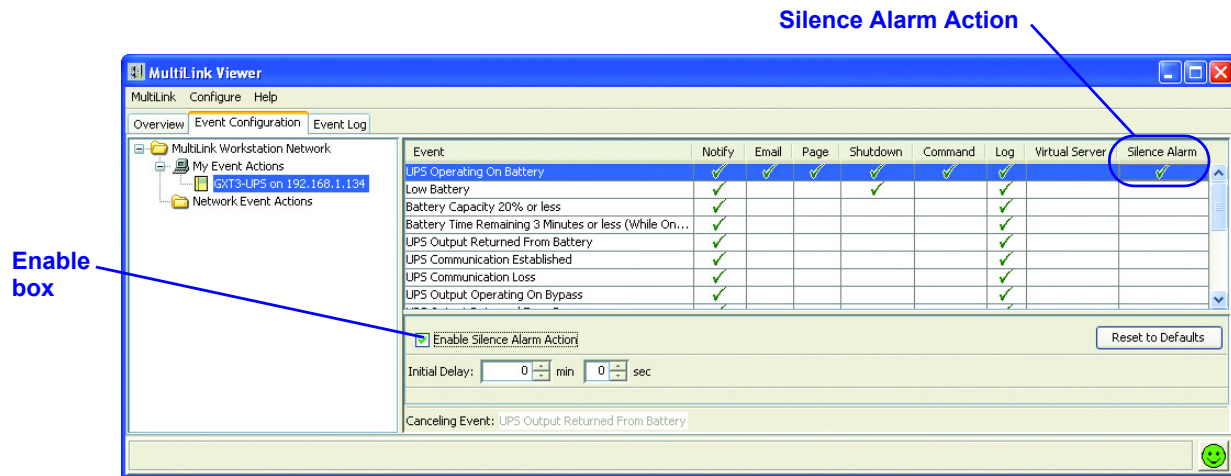


To configure the Virtual Server action:

- Check the **Enable Virtual Server Action** box. This is required for the action to operate.
- In the **Virtual Servers for Shutdown** area, use the arrows in the **Delay** boxes to specify the interval between an event's occurrence and the beginning of the shutdown.
- All configured virtual servers are listed. To edit this list, refer to **8.4.9 - Configure Menu - Virtual Servers (Liebert® MultiLink® Advanced Only)**.
- At any time, click on the **Reset to Defaults** button to revert to the factory defaults for this feature.
- To save settings, click on the **MultiLink** menu at the top of the window, then click on **Save Event Configuration**.

8.5.9 Event Actions - Silence Alarm (Liebert® MultiLink® Advanced Only)

The **Silence Alarm** action turns off the audible alarm at the UPS for the selected Event. This might be useful for such events as maintenance, testing and similar activities.



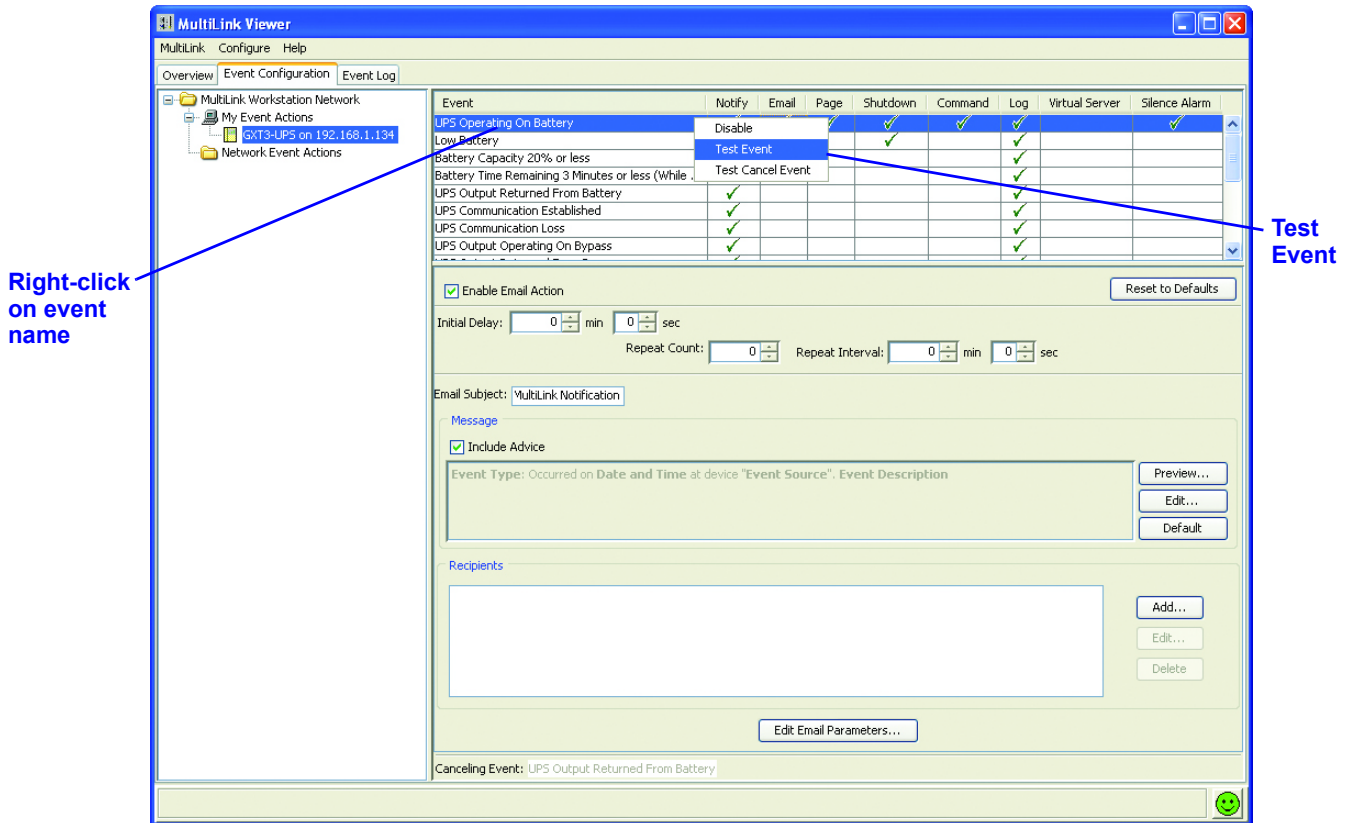
- Check (✓) the **Enable Silence Alarm Action** box. This is required for the action to operate.
- Use the arrows in the **Initial Delay** boxes to specify the time lapse between an event's occurrence and when the **Silence Alarm** action occurs.
- There is no canceling event for the **Silence Alarm** action.
- At any time, click on the **Reset to Defaults** button to revert to the factory defaults for this feature.
- To save settings, click on the **MultiLink** menu at the top of the window, then click on **Save Event Configuration**.

8.6 Testing Responses to Events

Liebert MultiLink's testing feature allows you to simulate a UPS-related event and verify the responses configured for that event. Care should be taken in preparing for any testing because, unless it is canceled, the simulation will complete all configured actions on the host computer, including shutting down the operating system. In this simulation, however, targeted client computers will not receive notifications.

To perform a test:

- Ensure that you have saved all changes to the event configuration. If you have not saved changes to the event configuration, the test will fail. To save changes, click on the **MultiLink** menu and then on **Save Event Configuration**.
- Click on the **Event Configuration** tab.
- Right-click on the name of the event you want to test.
- In the pop-up menu that appears, click on **Test Event**.



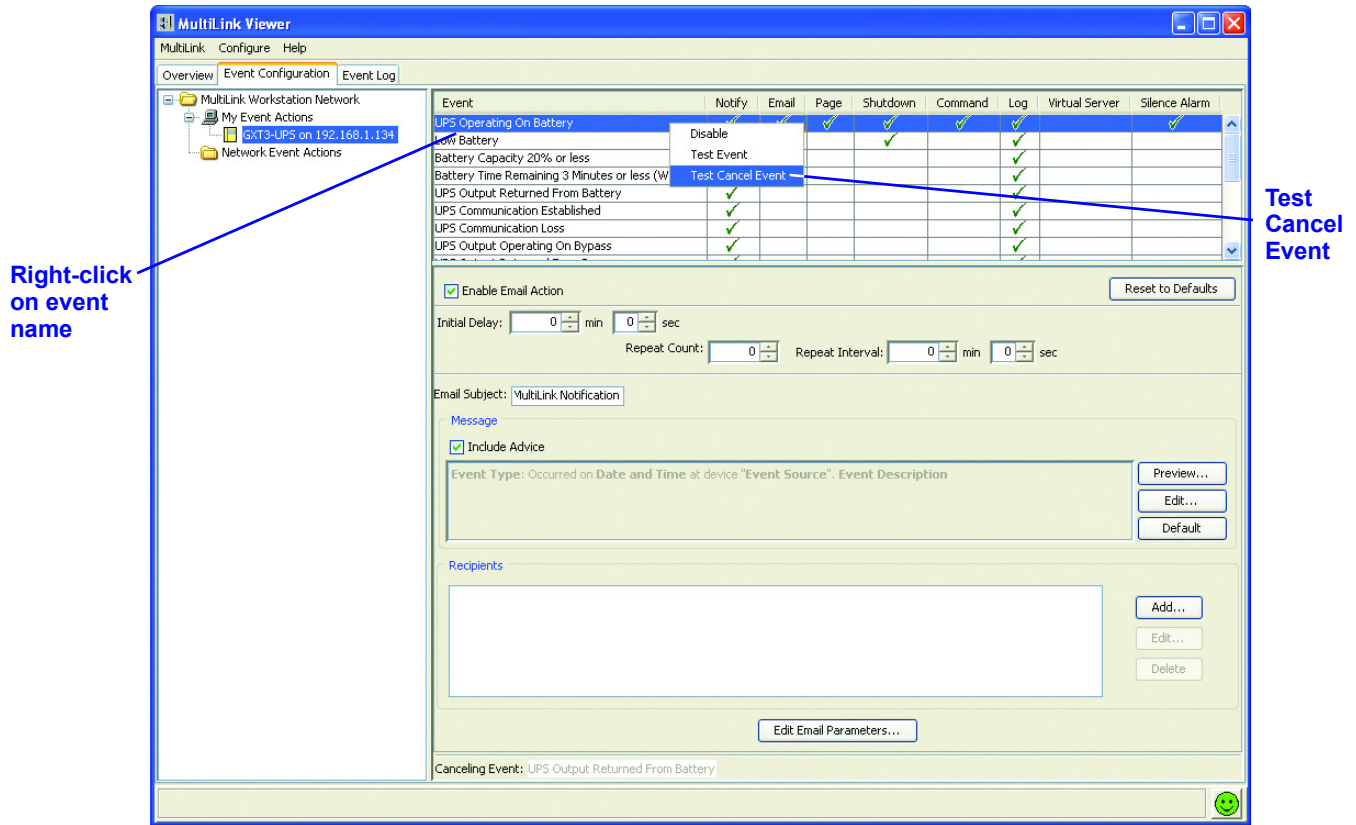
For example, if you are testing the **UPS Operating On Battery** event, the following occurs:

- If the **Notify** action is enabled, the configured notification occurs on the host computer.
- If the **Shutdown** action is enabled, a shutdown timer begins.
- If this timer expires before you cancel the test, the operating system is shut down.

Canceling an event simulation

To cancel event testing:

- Click on the **Event Configuration** tab.
- Right-click on the name of the event.
- In the pop-up menu that appears, click on **Test Cancel Event**.



8.7 Disabling and Re-Enabling an Event

Liebert® MultiLink® allows you to temporarily deactivate a UPS-related event but retain all configuration settings for that event. This may be helpful to prevent unwanted interruptions at certain times. Record any disabled events so they can be re-enabled, allowing Liebert MultiLink to monitor the UPS properly.



NOTE

In Liebert MultiLink Fundamental, some actions are grayed-out because they are not available: Email, Page, Command, Virtual Server and Silence Alarm. This does NOT affect the function of the other actions: Notify, Shutdown and Log.

8.7.1 Disable an Event

To disable an event:

- Click on the **Event Configuration** tab.
- Right-click on the name of the event you want to disable.
- In the pop-up menu that appears, click on **Disable**. The event and all its actions are grayed-out.

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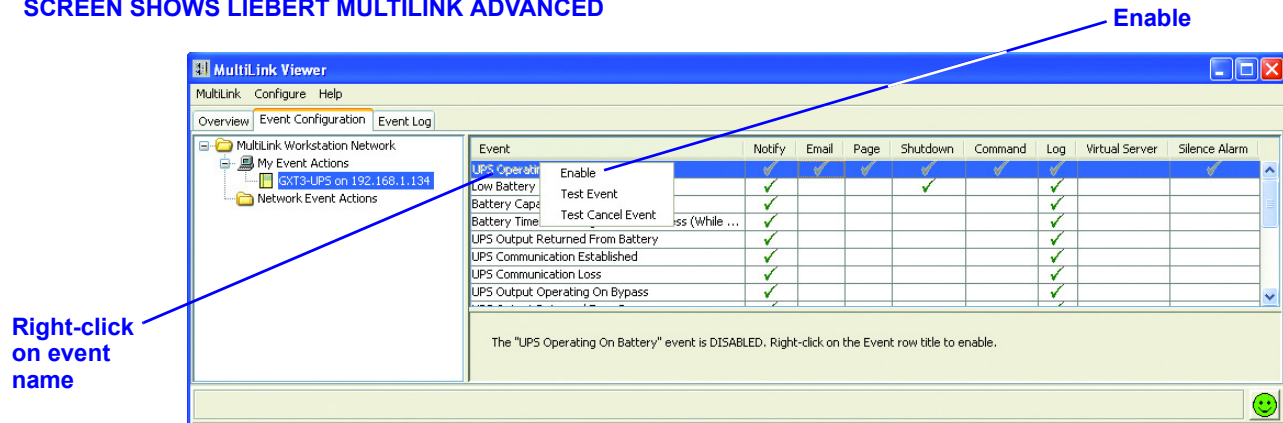
The screenshot shows the MultiLink Viewer application window. The 'Event Configuration' tab is active. On the left, a tree view shows 'MultiLink Workstation Network' with 'My Event Actions' and 'Network Event Actions'. The 'Network Event Actions' folder is expanded, showing a list of events. The 'UPS Output Returned From Battery' event is selected, and a right-click context menu is open over it. The menu options are 'Disable', 'Test Event', and 'Test Cancel Event'. The 'Disable' option is highlighted. A blue arrow points from the text 'Right-click on event name' to the event name in the list. Another blue arrow points from the text 'Disable' to the 'Disable' menu option. The main panel shows the configuration for the selected event, including 'Enable Email Action', 'Initial Delay', 'Repeat Count', 'Repeat Interval', 'Email Subject', 'Message', 'Include Advice', and 'Recipients'. The status bar at the bottom indicates 'Canceling Event: UPS Output Returned From Battery'.

8.7.2 Re-Enable an Event

To re-enable an event:

- Click on the **Event Configuration** tab.
- Right-click on the name of the event.
- In the pop-up menu that appears, click on **Enable**.

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8.8 Disabling and Re-Enabling an Action

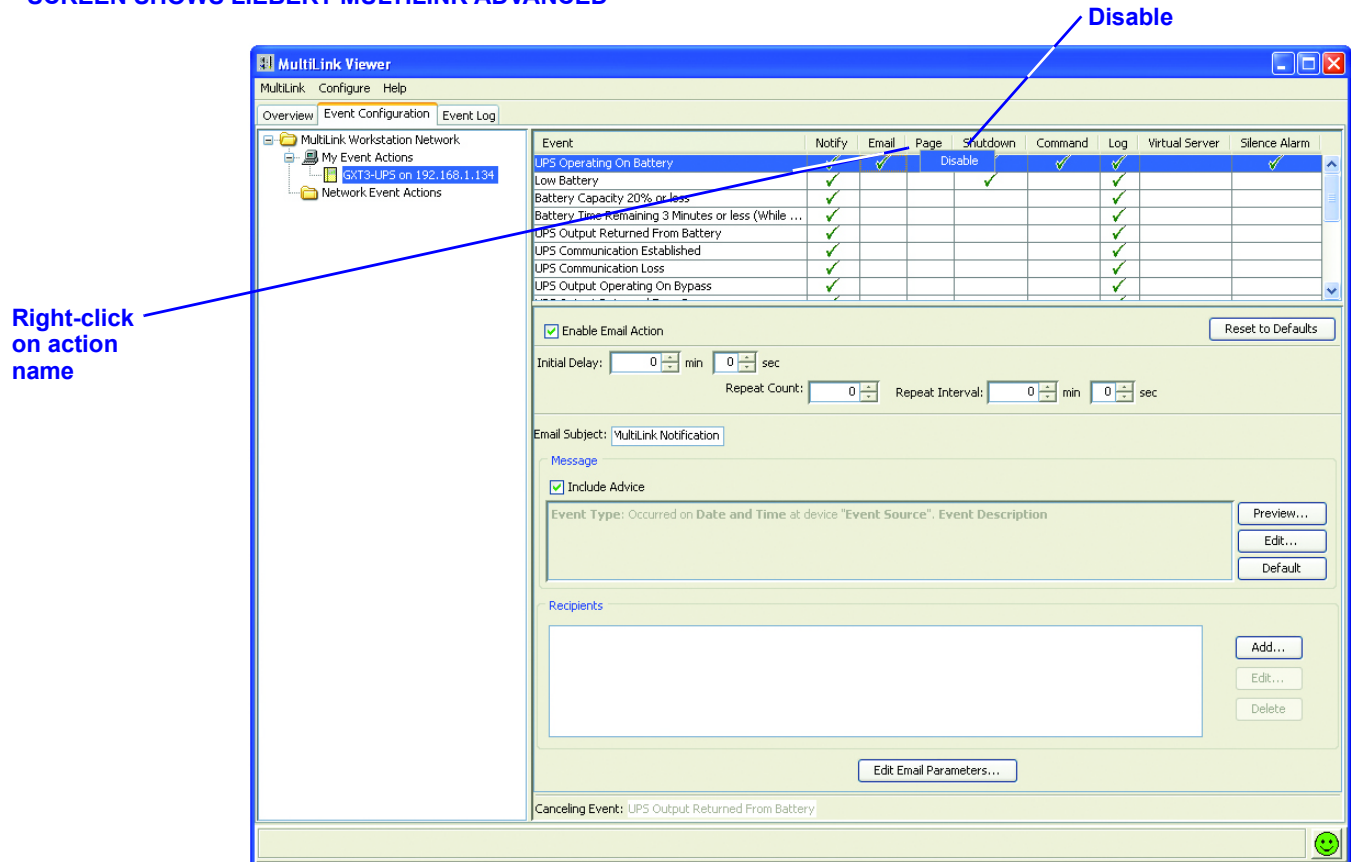
Liebert® MultiLink® allows temporary disabling of an action without deleting configuration settings for that action. This may be helpful to prevent unwanted interruptions at certain times. Record any disabled actions so they can be re-enabled, allowing Liebert MultiLink to monitor the UPS properly.

8.8.1 Disable an Action

To disable an action:

- Click on the **Event Configuration** tab.
- Right-click on the name of the action you want to disable. You must right-click at the top of the column.
- In the pop-up menu that appears, click on **Disable**. The action is grayed-out.

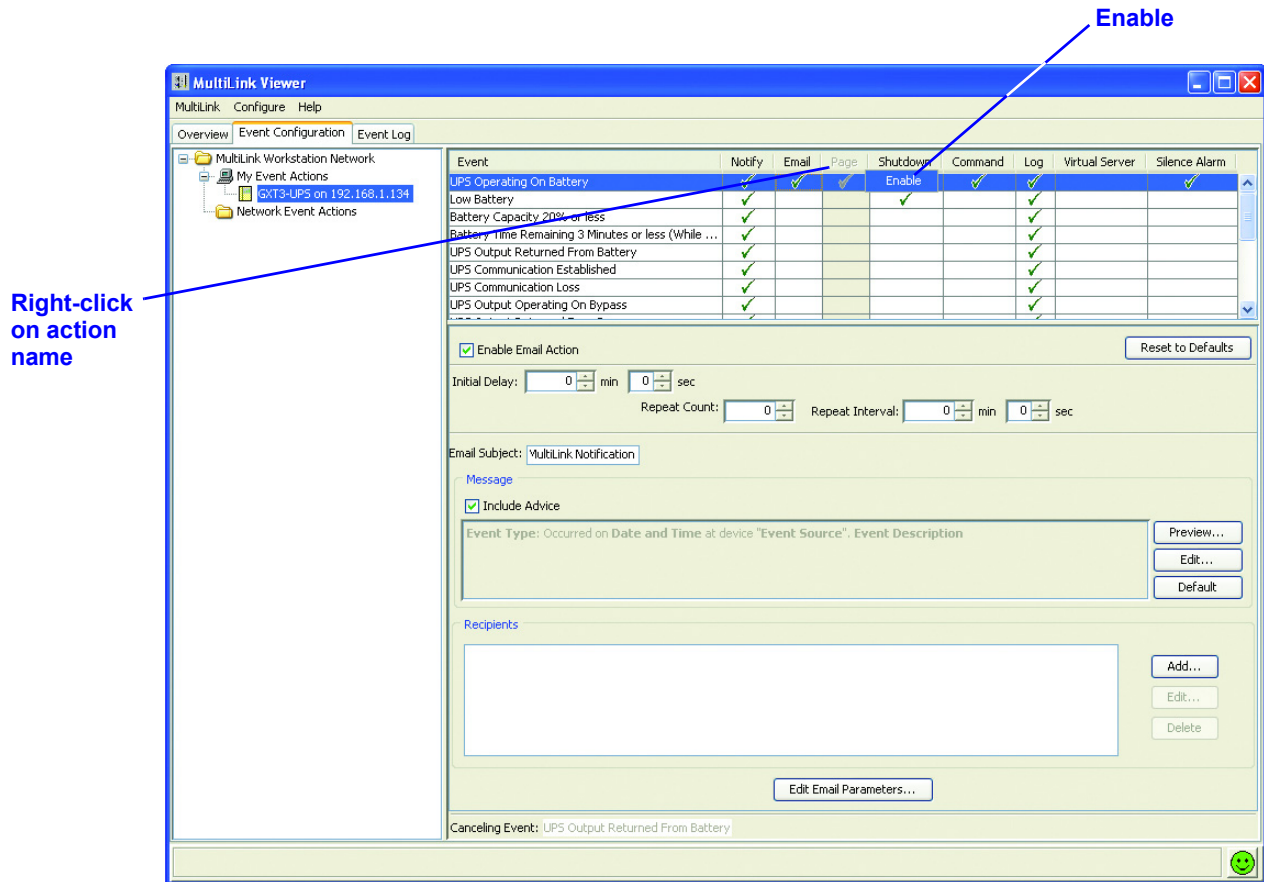
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8.8.2 Re-Enable an Action

To re-enable an action:

- Click on the **Event Configuration** tab.
- Right-click on the name of the action.
- In the pop-up menu that appears, click on **Enable**.



NOTE

For an action to be enabled, it must be available in your version of Liebert MultiLink. Liebert MultiLink Fundamental does NOT support these actions: Email, Page, Command, Virtual Server and Silence Alarm. The actions can be enabled only in Liebert® MultiLink® Advanced.

8.8.3 Actions Not Available in Liebert® MultiLink® Fundamental

Certain actions are not available in Liebert MultiLink Fundamental: Email, Page, Command, Virtual Server and Silence Alarm. Moving your cursor over an unavailable action prompts a message similar to the one in the yellow box shown in the Viewer window below. Attempting to disable an action that is not available results in a message similar to the text below the Event window in the Viewer:

SCREEN SHOWS LIEBERT MULTILINK FUNDAMENTAL

This message appears on mouse-over if an event is not available in your version of Liebert MultiLink

This message appears if you attempt to disable an event that is not available in your version of Liebert MultiLink

Event	Notify	Email	Page	Shutdown	Command	Log	Virtual Server
System Shutdown Commencing	✓	✗	✗	✗	✗	✓	✗
UPS Monitor Software Checksum	✓	✓	✗	✗	✗	✓	✗
DISABLED - Upgrade to MultiLink Advanced to enable this event action.	✓	✗	✗	✗	✗	✓	✗

The "Email" action is DISABLED. Upgrade to MultiLink Advanced to enable this event action.

9.0 RUNNING LIEBERT® MULTILINK®

After installation, the Liebert MultiLink service (daemon) begins running in the background, protecting your system from data loss. It continues running constantly unless stopped through the **Service** option on the Viewer's **MultiLink** menu. The same option allows you to resume running Liebert MultiLink service without having to restart the computer.

The installation modifies the computer so that Liebert MultiLink automatically begins running each time the computer is started up and remains running in the background unless stopped through the Viewer's **MultiLink** menu.

To ensure that both Liebert MultiLink and the UPS are performing optimally, Liebert MultiLink permits the System Administrator to test the UPS battery, turn the UPS output on or off and temporarily silence a UPS alarm.

9.1 Starting or Stopping Liebert MultiLink Service

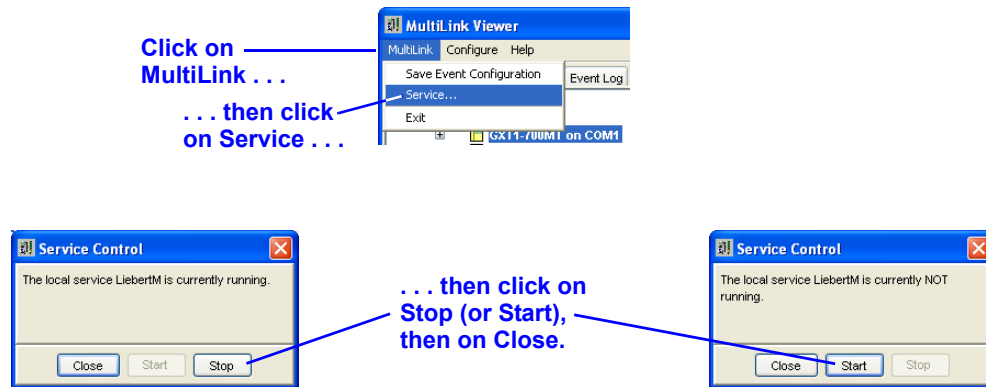
Under normal circumstances, you will not need to start or stop Liebert MultiLink service. Stopping Liebert MultiLink means that the software is unable to protect your computer network and data during a power failure.

If you wish to verify that Liebert MultiLink is running:

- Click on **MultiLink**, then on **Service**. The **Service Control** window states whether Liebert MultiLink is running.

To stop Liebert MultiLink service or to restart Liebert MultiLink later, perform the step above, then:

- Click on **Stop** to shut down the Liebert MultiLink service, or click on **Start** to restart Liebert MultiLink. Only one of these buttons is active at any time (the other button is grayed-out).
- Click on **Close** to close the window. Again, stopping Liebert MultiLink prevents the software from protecting your computer network and data during a power failure.



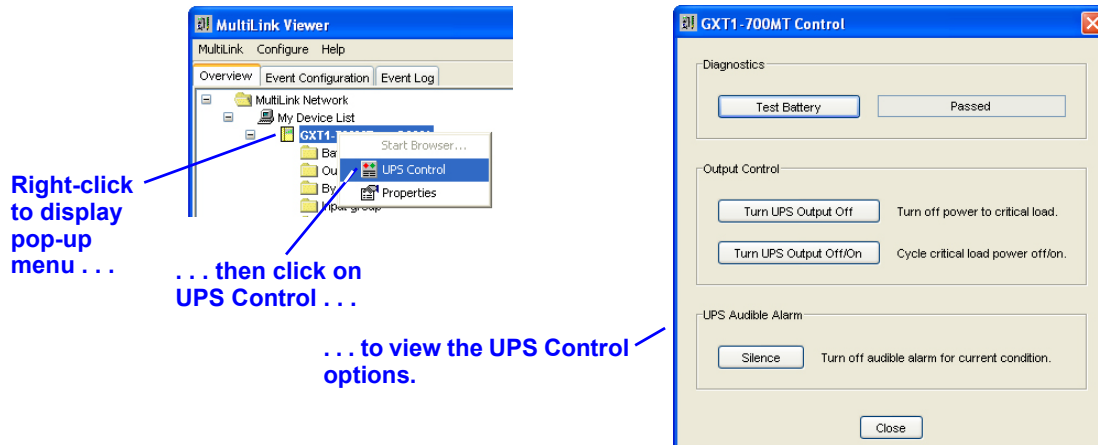
9.2 Using the UPS Control Options—Serial Connection and SNMP

Liebert® MultiLink® permits the System Administrator to perform the following UPS control functions:

- Test the UPS battery
- Turn the UPS output off
- Briefly turn the UPS output off and then restore power to the output
- Temporarily silence a UPS alarm

To use these options in the UPS Control dialog box:

- Click on the **Overview** tab.
- Right-click on the UPS device name to open a pop-up menu, then click on **UPS Control**.



9.2.1 Diagnostics—Testing the Battery

- Click on the **Test Battery** button to determine the condition of the UPS battery. When the test is complete, the box displays the status: **Passed** or **Failed**.
(To enable automatic testing of the UPS battery, use the **Enable Automatic Battery Test** box—see 8.3.5 - **Properties - UPS Settings Tab**).

9.2.2 Output Control—Controlling UPS Output

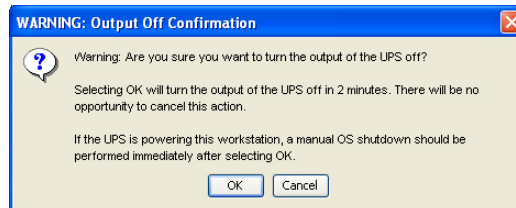
- To turn off power from the UPS to the critical load, click on the **Turn UPS Output Off** button.



WARNING

Turning the UPS output off is not recommended. All loads plugged into the UPS will lose power within two (2) minutes. This may require a manual shutdown of your computer network.

Before turning off the UPS output, Liebert MultiLink will ask for confirmation that you wish to do so.



- To cycle the UPS output (i.e., turn UPS output power off, then return output power following a brief delay), click on the **Turn UPS Output Off/On** button in the **UPS Control** window.
(To automatically restart the UPS after utility power is restored, use the **Auto Restart** box—see 8.3.5 - **Properties - UPS Settings Tab**).

9.2.3 UPS Audible Alarm—Silencing Alarm

- When the UPS sounds an alarm as a result of an event or a condition, the alarm can be temporarily silenced by clicking on the **Silence** button. This button permits the UPS to sound an alarm the next time an event or a condition occurs. (To disable the alarm for all conditions and events, use the **Enable UPS Audible Alarm** box—see 8.3.5 - **Properties - UPS Settings Tab**).

9.3 Using the UPS Control—Contact Closure

The UPS Control in the Contact Closure setup permits you to turn off the UPS output. This feature requires a special cable and is available only on certain UPS models. Contact Emerson Technical Support for information.

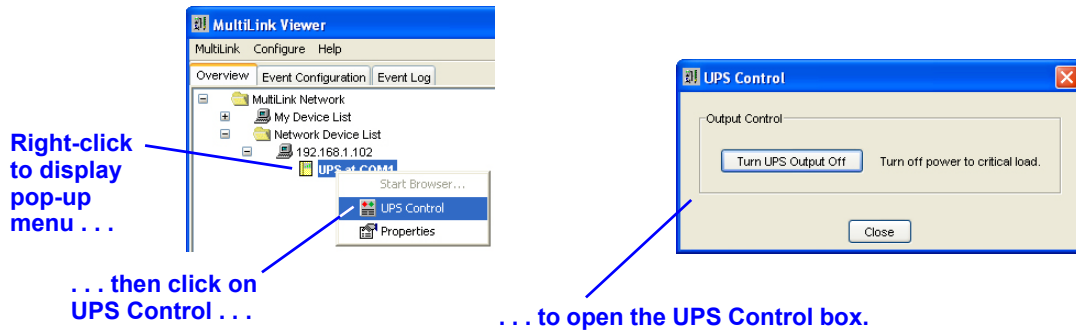


WARNING

Turning the UPS output off is not recommended. All loads plugged into the UPS will lose power within two (2) minutes. This may require a manual shutdown of your computer network.

To open the UPS Control dialog box and turn off the UPS output:

- Click on the **Overview** tab.
- Right-click on the UPS device name to open a pop-up menu, then click on **UPS Control**.



- To turn off power to the critical load, click on the **Turn UPS Output Off** button.

10.0 LIEBERT® MULTILINK® RESPONSE TO UPS EVENTS—TYPICAL SEQUENCE

Liebert MultiLink constantly monitors the UPS and performs actions as specified in the configuration settings for each event (see **8.5 - Configuring—Event Configuration tab**).

Notification may appear on the screen in the form of a graphic (dialog box, or pop-up) or as text (console message).

Most events will be documented in the log file; some will trigger execution of a script or other program through the **Command** action, for example, to save files and close certain applications (available in Liebert MultiLink Advanced only); and some will begin an orderly shutdown of the operating system.

This section describes typical sequences for the following events:

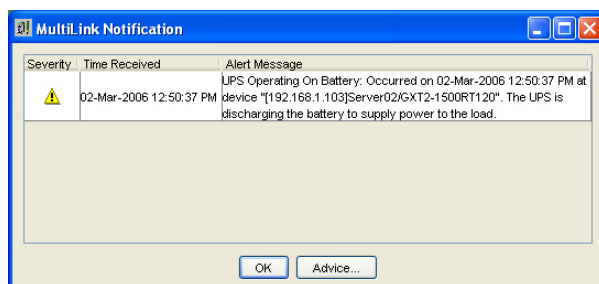
- **On Battery** - utility power has failed and the UPS is supplying power to the computer
- **Low Battery** - power drain has reduced the reserves of the UPS to a low level

Some notification and shutdown features may be altered, as described in **8.4.12 - Configure Menu - Options**. For a complete list of events, see **Appendix D - List of Events**.

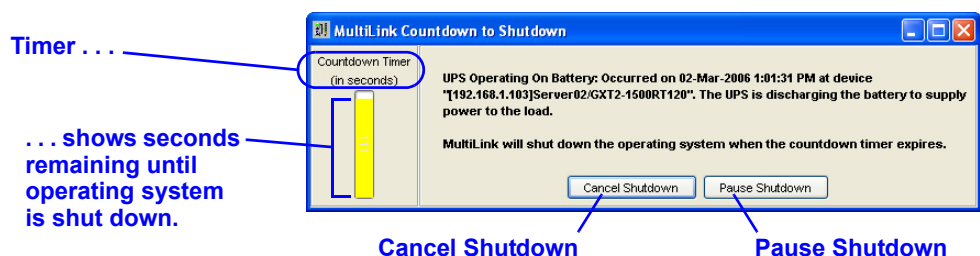
UPS Operating On Battery

When Liebert® MultiLink® detects a **UPS Operating On Battery** event, the following occurs:

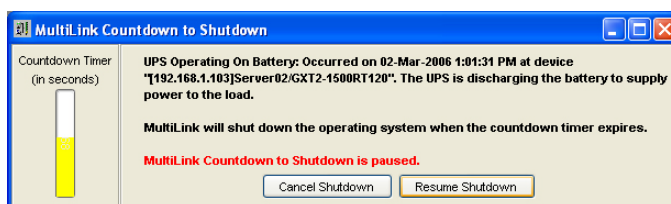
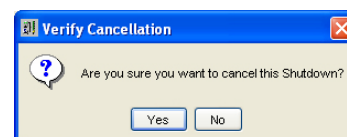
1. A UPS Alert is displayed.



2. If the **Command** action (available in Liebert MultiLink Advanced only) is enabled:
 - A timer starts that may lead to executing a command that the user or System Administrator has written to perform site-specific operations for applications that have command-line options.
 - If this timer expires—the duration specified during configuration—the script is executed.
 - To cancel the **Command** action manually, open the MultiLink Viewer, select the **Event Configuration** tab and remove the check mark (✓) from the **Enable Command Action** box. Click on **MultiLink**, then on **Save**.
3. If the **Shutdown** action is enabled:
 - A shutdown timer begins when **UPS Operating On Battery** occurs. The timer's duration is specified during configuration.
 - If this timer expires before the canceling event **UPS Output Returned From Battery** occurs, the operating system is shut down.
 - Liebert MultiLink notifies the user that a shutdown is impending.
 - When two minutes remain on the shutdown timer, the **MultiLink Countdown to Shutdown** box opens.



- Clicking on **Cancel Shutdown** overrides the configuration settings and prevents the operating system from being shut down. A dialog box asks for confirmation before the shutdown is canceled.
- Clicking on the **Pause Shutdown** button suspends the shutdown process, including the timer. A dialog box confirms that the shutdown is paused and offers the options of canceling the shutdown or resuming the countdown toward an orderly shutdown of the operating system.

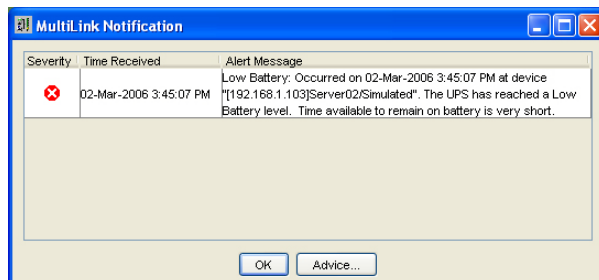


Low Battery

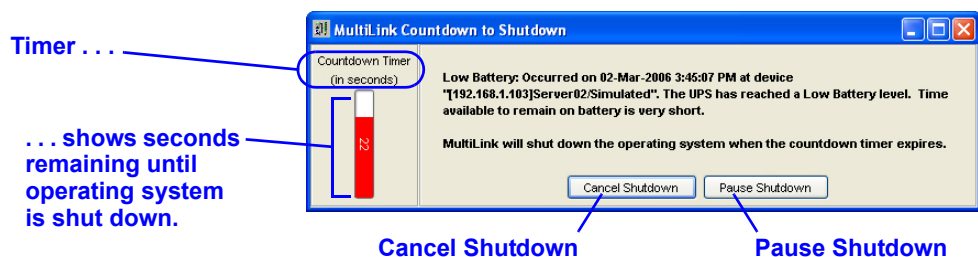
The **Low Battery** event functions as a safety net, prompting an orderly shutdown of the operating system before power is lost. The **Low Battery** event will override a longer on-battery timer. Timers for this event typically are set for much shorter times than for other UPS-related events.

When Liebert® MultiLink® detects a **Low Battery** event:

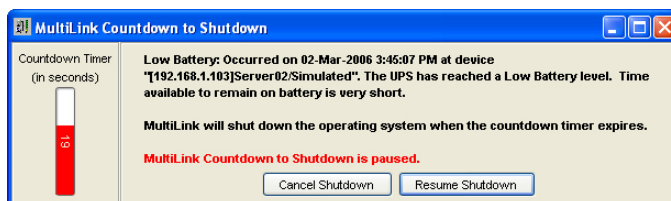
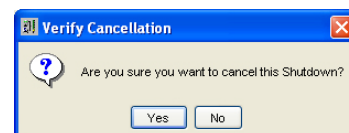
1. It displays a **UPS Alert**.



2. If the **Command** action (available in Liebert MultiLink Advanced only) is enabled:
 - A timer starts that may lead to executing a command that the user or System Administrator has written to perform site-specific operations for applications that have command-line options.
 - If this timer expires—the duration specified during configuration—the script is executed.
 - To cancel the **Command** action manually, open the MultiLink Viewer, select the **Event Configuration** tab and remove the check mark (✓) from the **Enable Command Action** box. Click on **MultiLink**, then on **Save**.
3. If the **Shutdown** action is enabled:
 - A shutdown timer begins when **Low Battery** occurs. The timer's duration is specified during configuration.
 - If this timer expires before the canceling event **UPS Output Returned From Battery** occurs, the operating system is shut down.
 - Liebert MultiLink notifies the user that a shutdown is impending.
 - When two minutes remain on the shutdown timer, the **MultiLink Countdown to Shutdown** box opens.



- Clicking on **Cancel Shutdown** overrides the configuration settings and prevents the operating system from being shut down. A dialog box asks for confirmation before the shutdown is canceled.
- Clicking on the **Pause Shutdown** button suspends the shutdown process, including the timer. A dialog box confirms that the shutdown is paused and offers the options of canceling the shutdown or resuming the countdown toward an orderly shutdown of the operating system.



11.0 UNINSTALLING LIEBERT® MULTILINK® FROM YOUR SYSTEM

To remove Liebert MultiLink from your network, run the uninstall program that came with Liebert MultiLink. For details, see **Appendix A - Operating System Details**.

12.0 LIEBERT SOFTWARE PROGRAM LICENSE AGREEMENT

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MultiLink[®] Software License revision January 10, 2003

APPENDIX A - OPERATING SYSTEM DETAILS

For details on your operating system, see:

Operating System	Refer to:
Microsoft® Windows®	A.1 - Windows®
Oracle™ Solaris™	A.3 - Oracle® Solaris™
	A.4 - OpenSolaris x86
Linux®	A.5 - Linux
Hewlett Packard® HP-UX®	A.6 - Hewlett Packard® HP-UX™
IBM® AIX®	A.7 - IBM® AIX™



NOTE

*These requirements should be adequate for the simplest Liebert® MultiLink® installation—a single workstation connected to a UPS by serial port connection (see **Figure 1**). More complex configurations may require additional processor speed, disk space or RAM—especially if you plan to use Liebert MultiLink on a network with multiple copies of Liebert MultiLink communicating with one another.*

A.1 WINDOWS[®]

A.1.1 Platform-Specific Requirements

In addition to the general requirements listed in **3.0 - What is Required to Use Liebert[®] MultiLink[®]**?, prospective Liebert MultiLink users must also have these minimal requirements:

- Windows 7, XP, Vista, Server 2003 or Server 2008
- x86/x86-64 processor
- Memory requirements
 - 1 GB of RAM—Windows 7, Windows Vista, Server 2008
 - 512 MB of RAM—Server 2003, XP Professional
- A display adapter configured for at least 256 colors
- A mouse or other pointing device
- TCP/IP network protocol

A.1.2 Installation Notes

Pre-Installation Checklist

1. If you are not using an SNMP hardware card with your UPS, then Liebert MultiLink can use its default port settings of 3029/3027, and there is no need to disable the SNMP service.
If you are using an SNMP hardware card with your UPS, there can be a conflict with the SNMP ports used. Liebert MultiLink must take ownership of ports 162/161 to communicate with the SNMP-enabled UPS. In this case, the Windows SNMP services (if running) will cause a conflict. If you are using an SNMP hardware card, you must disable the SNMP services. To check these services:
 - Run the Computer Management application by pressing the **Start** button, then clicking on **Programs, Administrative Tools**, and finally **Computer Management**.
 - Expand the **Services and Applications** item in the tree and then click on **Services**.If the services named **SNMP Service** and **SNMP Trap Service** are not present or are shown as not running (blank status) and Disabled, you may proceed. Otherwise, these services must be stopped and/or disabled before you can install Liebert MultiLink.
2. Installation requires Administrative privileges.

Serial Port Selection

The preconfigured serial ports are COM1 through COM4. You may select one of these or enter another as appropriate.

A.1.3 Notes on Running Liebert® MultiLink®

Starting Liebert MultiLink Applications

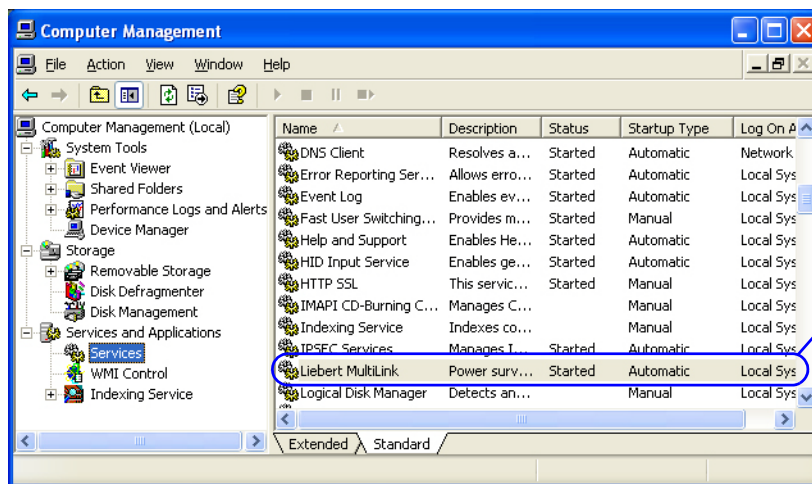
During installation, a shortcut for the MultiLink Viewer is created in the Programs folder in the Start menu of the user performing the installation.

To execute the program, click on the **Start** button, then on **Programs** and finally on the **MultiLink Viewer** shortcut.

Verify Liebert MultiLink is Running

When operating properly, Liebert MultiLink is running constantly in the background. To verify that it is doing so:

- Right-click on **My Computer** to open a pop-up menu, then click on **Manage** to open the Computer Management window as shown below. In that window, click on **Services and Applications**, then on **Services**. If the Liebert MultiLink service is running, **Liebert MultiLink** appears in the list with a status of **Started**.



Appearance in window with status of Started shows Liebert MultiLink service is running

Identifying a Computer's IP address

There are several ways to determine a computer's IP address. Use the one you are familiar with or the applicable method below.

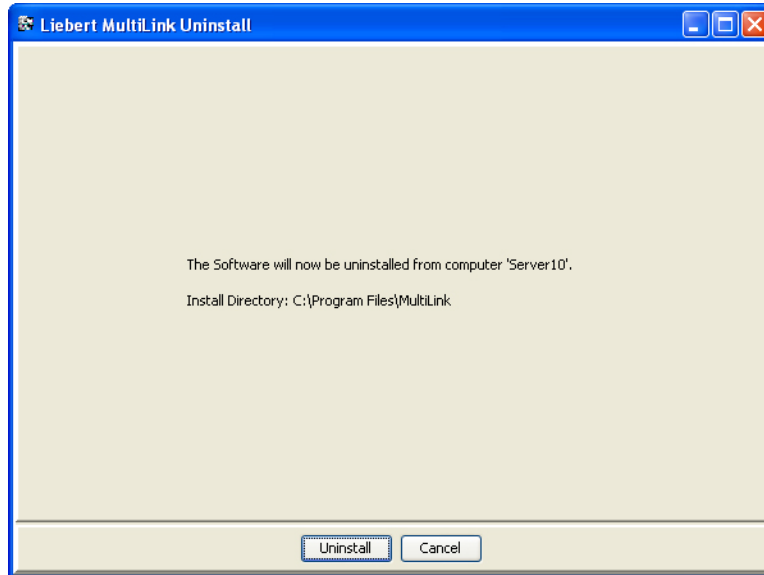
1. Start a Command Prompt window.
2. At the prompt enter:

```
ipconfig /all | more
```
3. Execute the command by pressing the Enter key.
4. The screen will display the IP address. If the computer has more than one network adapter, the IP address will be the numbers associated with the active Network Interface Card.

A.1.4 Uninstalling Liebert® MultiLink®

To remove the Liebert MultiLink software from your computer, use the Control Panel's **Add or Remove Programs** applet:

- Close the MultiLink Viewer—the uninstall process will fail if the Viewer is open.
- Click on the **Start** button, then on **Control Panel**.
- Double-click **Add or Remove Programs** in the Control Panel.
- Highlight **Liebert MultiLink** in the Add or Remove Programs window, then click the **Change/Remove** button. This opens the following window.



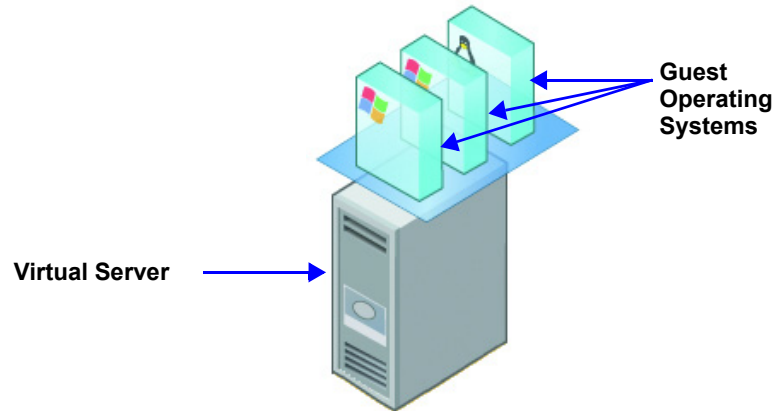
- Click the **Uninstall** button.
- A message asks you to confirm that you want to uninstall the software. Click **Yes** to begin removing the software.
- A message box appears when the process is completed.

The uninstall process stops the Liebert MultiLink service and removes all Liebert MultiLink files from the hard drive.

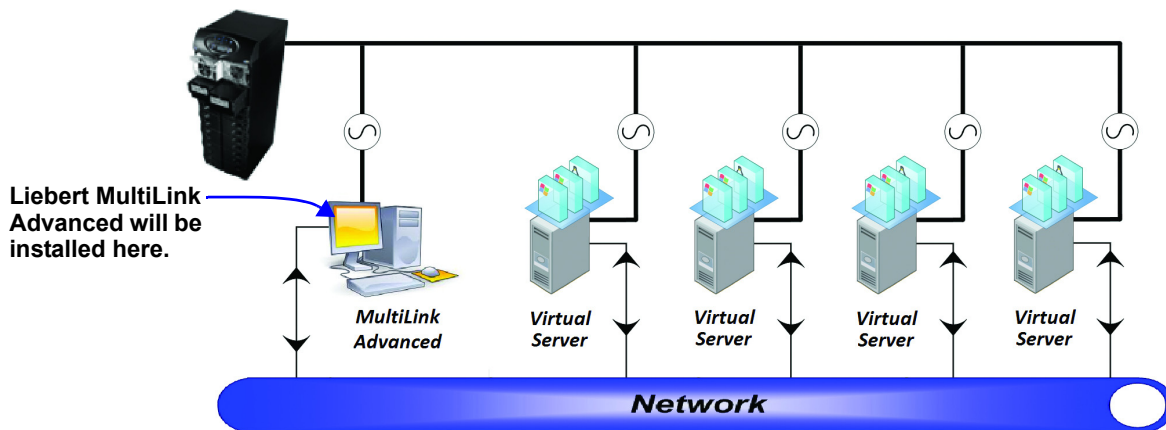
A.2 VMWARE SERVER SHUTDOWN—LIEBERT® MULTILINK™ ADVANCED FOR WINDOWS® ONLY

Liebert MultiLink Advanced can be configured to carry out a graceful shut down of VMware ESXi Hypervisor servers.

Such systems consist of a computer and guest operating systems, known as virtual servers. See below.



A UPS should be powering the virtual servers and a Windows system. Liebert MultiLink Advanced will be installed on the Windows system monitoring the UPS for events. If an event occurs, then Liebert MultiLink Advanced can execute an action to shut down the virtual servers. See below for a typical system layout.



System Requirements

MultiLink System

- Windows operating system supported by MultiLink Advanced version 4.2 or greater
- MultiLink Advanced 4.2 or greater installed on a separate physical machine other than a guest OS on a VMware server
- Microsoft Windows PowerShell v2.0 or later
- VMware vSphere PowerCLI v5.0 or later
- MultiLink communicating with the UPS
- PowerShell script must be set to as a trusted certificate

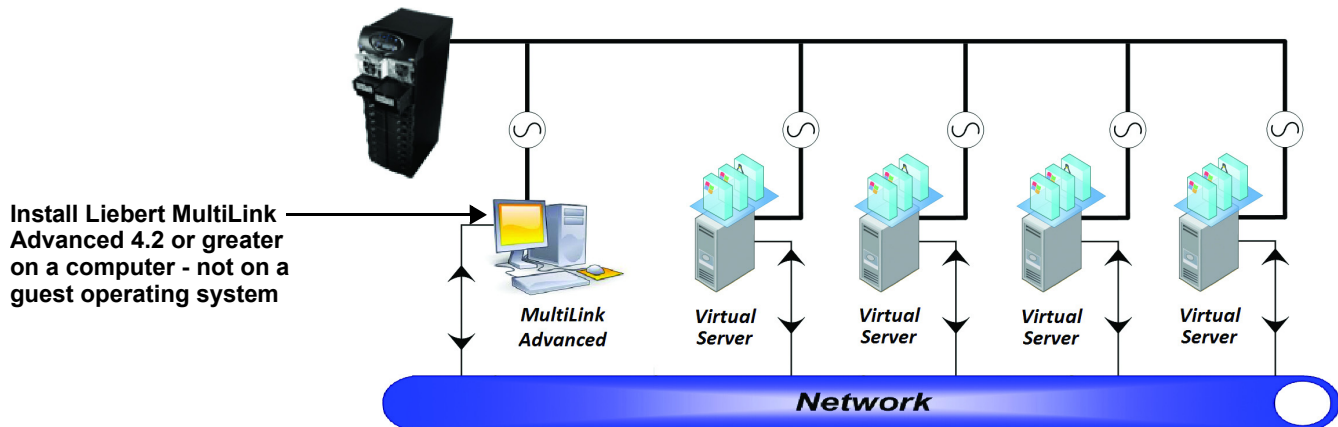
Virtual Server

- VMware ESXi v4.1 or v5.0 Hypervisor server
- vSphere license (system) installed
- VMware tools installed on each guest OS
- Login to vSphere with root privilege

Installation and Setup

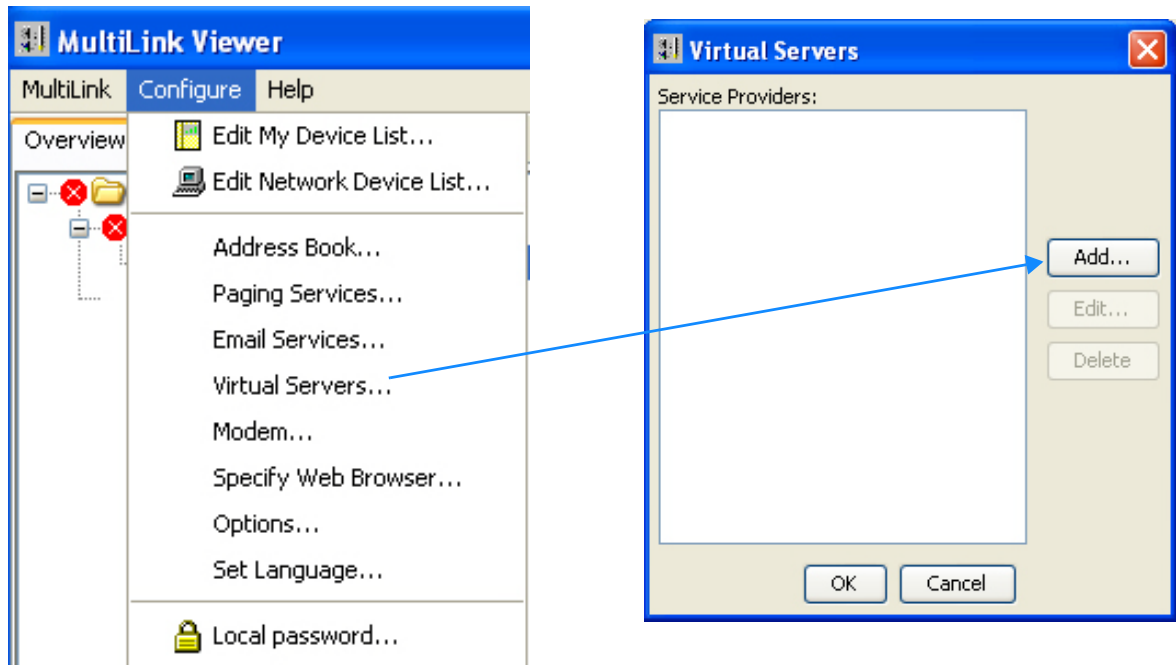
The following installation and setup directions are the recommended setup for a typical installation. The steps listed below provide details for installation by an installer with a working understanding and knowledge of Microsoft Windows and VMware ESXi. See **README_VM.txt** for detailed information about setting up and configuring a virtual server shutdown. The Liebert MultiLink Windows installation placed the file in Liebert MultiLink's installation directory.

1. Install Liebert MultiLink Advanced 4.2 or greater on a physical machine (not on a guest OS on a virtual server). This will be the Liebert MultiLink System.



2. Verify that Liebert MultiLink is communicating with the UPS.
3. On the Liebert MultiLink System, install Microsoft Windows PowerShell v2.0. This is a standard component in the Windows 7, Windows Server 2008 R2, and later operating systems although it is an optional feature that may need to be added to your machine. Computers running Windows XP and Vista may be upgraded by downloading and installing the Windows Management Framework. For more information on this, see <http://support.microsoft.com/kb/968929>.
4. Install VMware vSphere PowerCLI on the MultiLink computer. The PowerCLI distributions may be downloaded from the VMware Download Center.
5. On the Liebert MultiLink System, start a Windows PowerShell command window. A shortcut for this may be found at **Start>Programs>Accessories>Windows PowerShell**.
 - a. Change the PowerShell script execution policy to RemoteSigned to permit running scripts on this machine. For security, Liebert has provided a signed script for this purpose so the execution policy may be set to something other than Restricted (the default).
 - b. Run the following command in the Windows PowerShell command window:
`Set-ExecutionPolicy RemoteSigned`
 - c. For more information about this policy, use the `Get-Help about_Signing` command.
6. On each virtual server, configure a user who is a member of the root group for Liebert MultiLink to use for shutting down that server. You will later need to configure the same user name and password within Liebert MultiLink.
7. Each guest operating system that Liebert MultiLink should shut down should have the appropriate VMware Tools installed. If these are present, Liebert MultiLink will perform a normal shutdown of the guest OS on that VMware Server. If VMware Tools is not installed in a particular guest OS, Liebert MultiLink will perform a forced shutdown of that guest operating system.

8. In the MultiLink Viewer, under the Configure menu option, select **Virtual Servers** and then click **Add...** to add virtual servers.



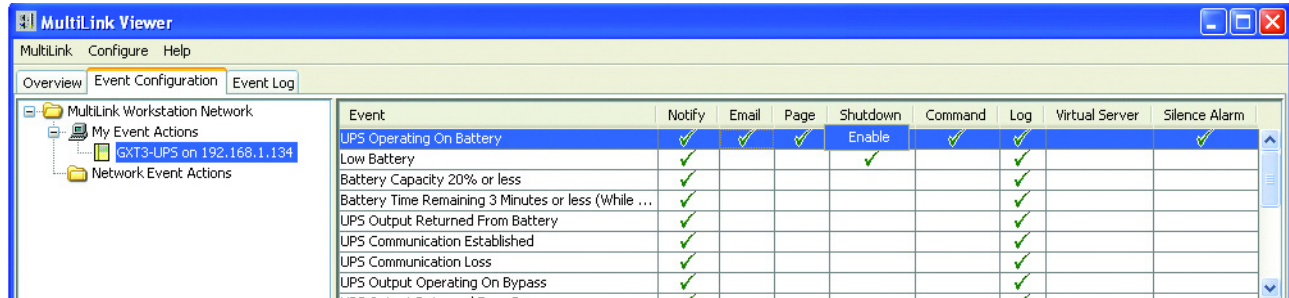
9. Enter the following information for each virtual server that Liebert MultiLink will shut down:
- Name—A descriptive name of the server
 - Type—Type of virtual server, for example, VMware
 - Hostname or IP Address
 - Login Name—virtual server user, must be a member of the root group in the VMware Server
 - Server Password
 - Guest Shutdown Wait Time—This box sets the maximum amount of time the shutdown action will wait for all applications to close before the shutdown will be initiated. Individual system requirements may require extending this timer.

 The 'Edit Virtual Servers' dialog box contains the following fields and controls:

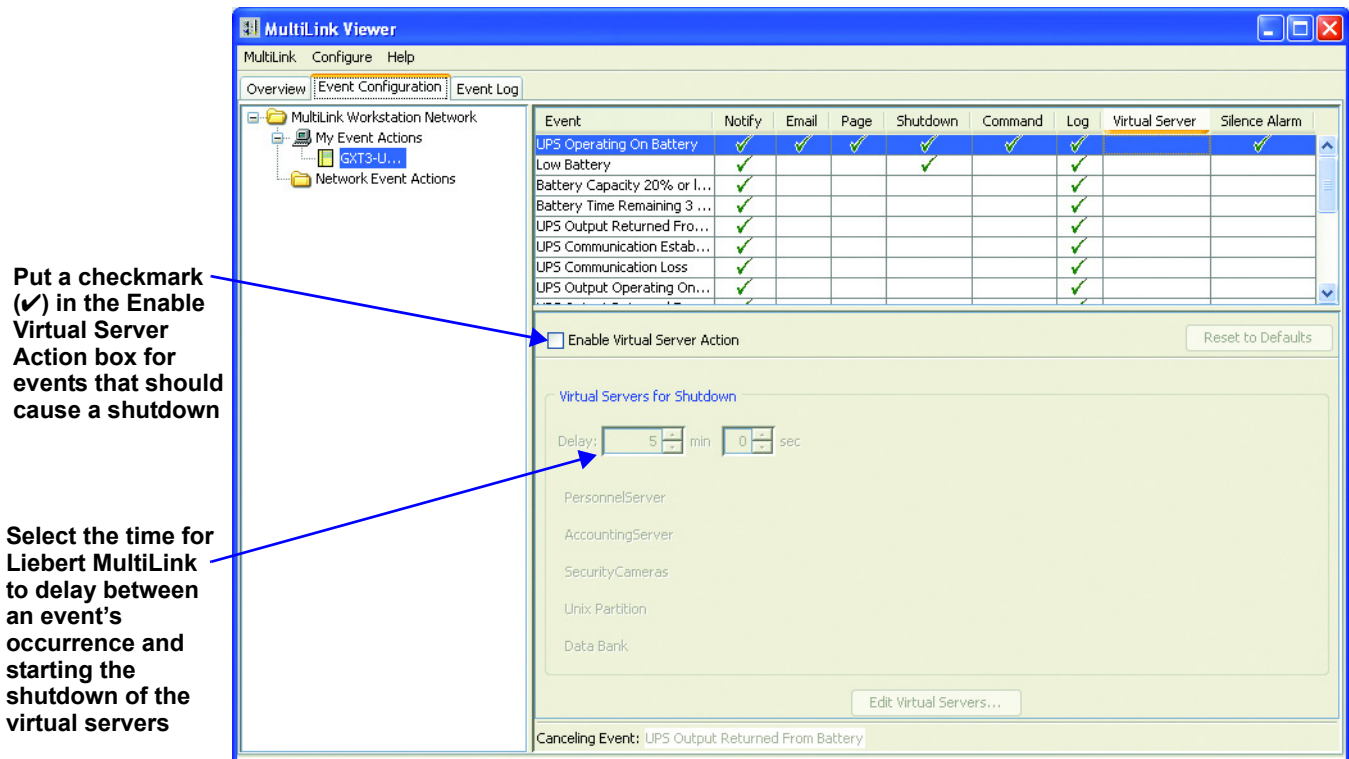
- Name:** Text box containing 'Data Bank'.
- Type:** Text box containing 'VMware'.
- Hostname or IP Address:** Text box containing 'Linux'.
- Login Name:** Text box containing 'xxxxxxxxxx'.
- Server Password:** Password text box with masked characters (dots).
- Confirm Password:** Password text box with masked characters (dots).
- Guest Shutdown Wait Time:** Spin box set to '300' with 'sec' unit.
- Buttons:** 'OK' and 'Cancel' buttons at the bottom.

10. Repeat the Virtual Server configuration for each virtual server that Liebert MultiLink will shutdown (maximum of 10 servers).

11. Select Event Configuration for the event source in MultiLink.



12. Put a checkmark (✓) in **Enable Virtual Server Action** for each Event that a shutdown should be performed for.



13. Use the **Virtual Servers for Shutdown Delay** to set the time between an event's occurrence and when Liebert MultiLink begins shutting down the virtual servers.

14. Make sure the operating system shutdown delay for the shutdown event is set with enough of a delay to allow the shutdown of the guest operating systems of the virtual servers.

15. Save settings, click on the **MultiLink** menu at the top of the window, then click on **Save Event Configuration**.

Finish any additional configurations in Liebert MultiLink.

Schedule a time to place the UPS on battery and test the entire Liebert MultiLink system to verify the shutdown of the VMware servers.

A.3 ORACLE[®] SOLARIS[™]

A.3.1 Platform-Specific Requirements

In addition to the general requirements listed in **3.0 - What is Required to Use Liebert[®] MultiLink[®]**?, prospective Liebert MultiLink users must also have these minimal requirements:

- Oracle Solaris version 9, 10 or 11 on an UltraSPARC processor
- Appropriate patches applied to operating system. For patches required to run Java 1.6, see:
<http://www.oracle.com/technetwork/server-storage/solaris11/downloads/index.html>
- 100 MB of free disk space (during installation, the **/tmp** partition must have 150 MB free)
- 512 MB of RAM
- Common Desktop Environment or Oracle OpenWindows (X Window System)
- A mouse or other pointing device
- TCP/IP network protocol

A.3.2 Installation Notes

Pre-Installation Checklist

Comply with the following requirements, then return to **5.1 - Before Installing Liebert MultiLink**.

1. During installation you must be logged in as “root.”
2. If using a serial port connection to the UPS, use the `pmadm` utility to disable `ttymon` from monitoring the port. To disable `ttymon`, you must perform the following command:

```
pmadm -l
```

This command lists the **PMTAG** and **SVCTAG** for each port. You will substitute the values of these tags in the following command:

```
pmadm -d -p {PMTAG} -s {SVCTAG}
```
3. If you are using an SNMP card, check for SNMP daemons. Execute the command

```
ps -ef | grep -i snmp
```

. If the processes `snmpdx` or `snmpdm` are running, they must be disabled before you can install Liebert MultiLink.

If you are not using an SNMP hardware card with your UPS, then Liebert MultiLink can use its default port settings of 3029/3027, and there is no need to disable the SNMP daemons.
4. Make sure the Liebert MultiLink distribution file has execute permission (`chmod +x <file>`), then execute it.

Alternate to /tmp during installation

If you do not have enough disk space in the **/tmp** partition to meet the requirement specified in **A.3.1 - Platform-Specific Requirements**, you may specify an alternate location when starting the installation. For example, to use **/home/tmp**, start the install with the following command:

```
./ML_40_001_Solaris.bin /home/tmp
```

Serial Port Selection

The preconfigured serial ports are `/dev/term/a` and `/dev/term/b`. You may select one of these or enter another as appropriate.

Post-Installation Notes

The Liebert MultiLink installation program places the script `LiebertM` in the `/etc/init.d` directory. It also creates `K30LiebertM` and `S90LiebertM` links in the `/etc/rc1.d` and `/etc/rc2.d` directories.

A.3.3 Notes on Running Liebert MultiLink

If running the Common Desktop Environment (CDE), all users meant to receive pop-up messages must allow access to their desktop. This can be accomplished by adding the following command to a common logon script (e.g., `/etc/profile`)—see the CDE documentation or `xhost` man page for more information about the desktop security mechanism:

```
/usr/openwin/bin/xhost +`hostname`
```

Note: The characters surrounding `hostname` are the grave accent (```) that is usually found on the same keyboard key as the tilde (`~`).

Starting Liebert® MultiLink™ Applications

During installation, shell scripts are created in the product installation directory tree (e.g., /opt/MultiLink). These scripts may be used to execute these Liebert MultiLink applications:

- bin/Viewer—Viewer
- Uninstall—Uninstall Liebert MultiLink

For convenience, you may want to add the bin subdirectory to your PATH.

Verify Liebert MultiLink is Running

When operating properly, Liebert MultiLink is running constantly in the background. To verify that it is doing so, use /etc/init.d/LiebertM status to get a list of the active Liebert MultiLink processes.

Identifying a Computer's IP Address

Run the following command:

```
hostname
```

You will next see output similar to this:

```
frodo
```

The result of this command will show your machine name. In this example, the machine name is frodo. Then run the following command:

```
more /etc/hosts
```

You will next see output similar to this:

```
127.0.0.1 localhost
10.0.0.10 frodo
10.0.0.11 bilbo
```

The result of this command will list one or more entries of IP address and name pairs. In this example:

The IP address for machine name frodo is 10.0.0.10

The IP address for machine name bilbo is 10.0.0.11

A.3.4 Uninstalling Liebert MultiLink

- You must log in as “root.”
- Close the MultiLink Viewer—the uninstall process will fail if the Viewer is open.
- Go to the directory where the Liebert MultiLink files are located (e.g., /opt/MultiLink) and run Uninstall.
- A confirmation box asks if you are sure you want to uninstall the software.
- Pressing the **Yes** button will begin removing the software.
- A message box appears when the process is completed. The uninstall process stops Liebert MultiLink services that are running and removes all Liebert MultiLink files from the hard drive.

A.4 OPENSOLARIS X86

A.4.1 Platform-Specific Requirements

In addition to the general requirements listed in **3.0 - What is Required to Use Liebert® MultiLink®**?, prospective Liebert MultiLink users must also meet these minimal requirements:

- OpenSolaris version 10 on x86 processor
- Appropriate patches applied to operating system. Appropriate patches required to run Java 1.6.0_16.
- SUNWscp:
<http://pkg.opensolaris.org/release/en/search.shtml?token=whoami&action=Search>
 To install it, execute the following command in command prompt:
`pfexec pkg install SUNWscp`
- 100 MB of free disk space (during installation, the /tmp partition must have 150 MB free)
- 512 MB of RAM
- X Window System with Gnome desktop environment
- A mouse or other pointing device
- TCP/IP network protocol

A.4.2 Installation Notes

Pre-Installation Checklist

Comply with the following requirements, then return to **5.1 - Before Installing Liebert MultiLink**.

- During installation you must be logged in as “root.”
- If you are using an SNMP card, check for SNMP daemons. Execute the command `ps -ef | grep -i snmp`. If the processes `snmpdx` or `snmpdm` are running, they must be disabled before Liebert MultiLink can be installed.
- Make sure the Liebert MultiLink distribution file has execute permission (`chmod +x <file>`), then execute it.

Alternate to /tmp during installation

If you do not have enough disk space in the **/tmp** partition to meet the requirement specified in **A.3.1 - Platform-Specific Requirements**, you may specify an alternate location when starting the installation. For example, to use **/home/tmp**, start the install with the following command:

```
./ML_40_001_Solaris_x86.bin /home/tmp
```

Post-Installation Notes

The Liebert MultiLink installation program places the script `LiebertM` in the `/etc/init.d` directory. It also creates `K30LiebertM` and `S90LiebertM` links in the `/etc/rc1.d` and `/etc/rc2.d` directories.

A.4.3 Notes on Running Liebert MultiLink

If running the Common Desktop Environment (CDE), all users meant to receive pop-up messages must allow access to their desktop. This can be accomplished by adding the following command to a common logon script (e.g., `/etc/profile`)-see the CDE documentation or `xhost` man page for more information about the desktop security mechanism: `/usr/openwin/bin/xhost +`hostname``



NOTE

The characters surrounding hostname are the grave accent (`) that is usually found on the same keyboard key as the tilde (~).

Starting Liebert® MultiLink™ Applications

During installation, shell scripts are created in the product installation directory tree (e.g., /opt/MultiLink). These scripts may be used to execute these Liebert MultiLink applications:

```
bin/Viewer-Viewer
Uninstall-Uninstall Liebert MultiLink
```

For convenience, you may want to add the bin subdirectory to your PATH.

Verify Liebert MultiLink is Running

When operating properly, Liebert MultiLink is running constantly in the background. To verify that it is doing so, use /etc/init.d/LiebertM status to get a list of the active Liebert MultiLink processes.

Identifying a Computer's IP Address

Run the following command:

```
hostname
```

You will next see output similar to this:

```
frodo
```

The result of this command will show your machine name. In this example, the machine name is frodo. Then run the following command:

```
more /etc/hosts
```

You will next see output similar to this:

```
127.0.0.1 localhost
10.0.0.10 frodo
10.0.0.11 bilbo
```

The result of this command will list one or more entries of IP address and name pairs. In this example:

The IP address for machine name frodo is 10.0.0.10

The IP address for machine name bilbo is 10.0.0.11

A.4.4 Uninstalling Liebert MultiLink

- You must log in as “root.”
- Close the MultiLink Viewer—the uninstall process will fail if the Viewer is open.
- Go to the directory where the Liebert MultiLink files are located (e.g., /opt/MultiLink) and run Uninstall.
- A confirmation box asks if you are sure you want to uninstall the software.
- Pressing the **Yes** button will begin removing the software.
- A message box appears when the process is completed. The uninstall process stops Liebert MultiLink services that are running and removes all Liebert MultiLink files from the hard drive.

A.5 LINUX

A.5.1 Platform-Specific Requirements

In addition to the general requirements listed in **3.0 - What is Required to Use Liebert® MultiLink®?**, prospective Liebert MultiLink users must also have these minimal requirements:

- A Linux distribution with a version 2.6.27 or later kernel running on a x86 / x86_64 processor. Use `uname -r` to determine the version of your kernel and note that, in most cases, this will be different from the version of your Linux distribution.
- The following packages of shared libraries, in 32-bit form, must be installed for Liebert MultiLink to run properly.
 - glibc (usually `/lib/libc.so.6`), version 2.9 or later
 - libstdc++ (usually `/usr/lib/libstdc++.so.6`), version 3.4 or later
 - libXext (usually `/usr/lib/libXext.so.6`)
 - libXi (usually `/usr/lib/libXi.so.6`)
 - libXtst (usually `/usr/lib/libXtst.so.6`)
- A Linux distribution that manages services (daemons) using the System V method. This uses an `init.d` directory and several `rc?.d` directories located either in `/etc/rc.d` or just `/etc` (e.g., `/etc/rc.d/init.d`).
- 100 MB of free disk space (during installation, the `/tmp` partition must have 150 MB free)
- 512 MB of RAM for a 32-bit Linux, 1 GB of RAM for a 64-bit Linux
- X Window System with either the KDE or Gnome desktop environment
- A mouse or other pointing device
- TCP/IP network protocol

Most recent popular Linux distributions meet these requirements. Liebert MultiLink has been tested on:

- Red Hat® Enterprise Linux 6.3
- SuSE Linux Enterprise 11

Liebert MultiLink has been tested with both KDE and Gnome desktop environments.

A.5.2 Installation Notes

Pre-Installation Checklist

Comply with the following requirements, then return to **5.1 - Before Installing Liebert MultiLink**.

1. During installation you must be logged in as “root.”
2. If using a serial port connection to the UPS, you must disable `getty` or `ttymon` from monitoring that port. These services may be started during initialization via entries in `/etc/inittab` or startup scripts located in `/etc/rc.d` depending on your particular Linux distribution. Liebert MultiLink will not function properly if it is using the same serial port as one of these processes. Consult the documentation for your Linux distribution for more information on how to disable `getty`/`ttymon` on the UPS serial port.
3. If you are using an SNMP card, check for SNMP daemons. Execute the command `ps -ef | grep -i snmp`. If the process `snmpd` is running, it must be disabled before you can install Liebert MultiLink. Consult the documentation for your Linux distribution for more information on how to uninstall SNMP.
If you are not using an SNMP hardware card with your UPS, Liebert MultiLink can use its default port settings of 3029/3027, and there is no need to disable the SNMP daemons.
4. Make sure the Liebert MultiLink distribution file has execute permission (`chmod +x <file>`), then execute it.

Alternate to /tmp during installation

If you do not have enough disk space in the `/tmp` partition to meet the requirement specified in **A.5.1 - Platform-Specific Requirements**, you may specify an alternate location when starting the installation. For example, to use `/home/tmp`, start the install with the following command:

```
ML_42_1_Linux_x86.bin /home/tmp
```

Serial Port Selection

The preconfigured serial ports are `/dev/ttyS0` and `/dev/ttyS1`. You may select one of these or enter another as appropriate.

Note: Be careful to not pick the port used by the serial mouse, if your system has one.

Post-Installation Notes

The Liebert® MultiLink® installation program places the script `LiebertM` in the `/etc/rc.d/init.d` (or `/etc/init.d`) directory. It also creates `K30LiebertM` and `S90LiebertM` links in several of the `/etc/rc.d/rc?.d` (or `/etc/rc?.d`) directories.

A.5.3 Notes on Running Liebert MultiLink

If running an X Window system window manager, all users meant to receive pop-up messages must allow access to their desktop. This can be accomplished by adding the following command to a common logon script (e.g., `/etc/profile`)—see the xhost documentation for more information about the desktop security mechanism:

```
/usr/bin/xhost +`hostname`
```

Note: the characters surrounding `hostname` are the grave accent (```) that is usually found on the same keyboard key as the tilde (`~`).

Starting Liebert MultiLink Applications

During installation, shell scripts are created in the product installation directory tree (e.g., `/opt/MultiLink`). These scripts may be used to execute these Liebert MultiLink applications:

- `bin/Viewer`—Viewer
- `Uninstall`—Uninstall Liebert MultiLink

For convenience, you may want to add the `bin` subdirectory to your `PATH`.

Verify Liebert MultiLink is Running

When operating properly, Liebert MultiLink is running constantly in the background. To verify that it is doing so, use `/etc/rc.d/init.d/LiebertM status` to get a list of the active Liebert MultiLink processes.

Identifying a Computer's IP Address

Run the following command in a shell session:

```
ifconfig
```

In the output from this command, you can see the machine's IPv4 address following “inet addr:” within the section associated with your network interface (e.g., `eth1`).

Name Resolution

Liebert MultiLink must be able to resolve the computer's hostname to its IP address in order to function properly. This means that the computer must be properly configured for a DNS server or the file `/etc/hosts` contains an appropriate record for the hostname. If this is not done, the installation will fail with an “Initialization Error.”

A.5.4 Uninstalling Liebert MultiLink

- You must log in as “root.”
- Close the MultiLink Viewer—the uninstall process will fail if the Viewer is open.
- Go to the directory where the Liebert MultiLink files are located (e.g., `/opt/MultiLink`) and run `Uninstall`.
- A confirmation box asks if you are sure you want to uninstall the software.
- Pressing the **Yes** button will begin removing the software.
- A message box appears when the process is completed. The uninstall process stops Liebert MultiLink services that are running and removes all Liebert MultiLink files from the hard drive.

A.6 HEWLETT PACKARD® HP-UX™

A.6.1 Platform-Specific Requirements

In addition to the general requirements listed in **3.0 - What is Required to Use Liebert® MultiLink®?**, prospective Liebert MultiLink users must also have these minimal requirements:

- HP-UX 11 or 11i
- Appropriate patches applied to operating system. For patches required to run Java 1.4.2, see: <http://www.hp.com/products1/unix/java/patches/index.html>
- Common Desktop Environment (X Window System)
- TCP/IP network protocol
- 100 MB of free disk space on the partition where Liebert MultiLink will be installed (during installation, the /tmp directory must have 200 MB free)
- A mouse or other pointing device
- 512 MB of RAM
- A minimum of 90 threads per process. This is the kernel parameter `max_thread_proc`, which can be viewed or modified using SAM.
- HP recommends mid-range N class and low-end L-class systems and PA-8500-based workstations to obtain optimal performance when running Java applications. The recommended minimum system for running Java applications is a PA-RISC 2.0 system or a PA-RISC 1.1 system with a floating-point coprocessor. For information on setting important system parameters required for correct execution of Java programs, go to <http://www.hp.com/go/JAVA>

A.6.2 Installation Notes

Pre-Installation Checklist

Comply with the following requirements, then return to **5.1 - Before Installing Liebert MultiLink**.

1. During installation you must be logged in as “root.”
2. If using a serial port connection to the UPS, use the SAM utility to disable `getty` or `uugetty` at system startup from monitoring the port where you are connecting the UPS. Optionally, you can delete or comment the following line (or similar) from the `/etc/inittab` file:


```
ttpl:234:respawn:/usr/sbin/getty -h tty0p1 9600
```
3. If you are using an SNMP card, check for SNMP daemons. Execute the command `ps -ef | grep -i snmp`. If the processes `snmpd` or `snmpdm` are running, they must be disabled before you can install Liebert MultiLink.
If you are not using an SNMP hardware card with your UPS, Liebert MultiLink can use its default port settings of 3029/3027, and there is no need to disable the SNMP daemons.
4. Make sure the Liebert MultiLink distribution file has execute permission (`chmod +x <file>`), then execute it.

Alternate to /tmp during installation

If you do not have enough disk space in the `/tmp` partition to meet the requirement specified in **A.6.1 - Platform-Specific Requirements**, you may specify an alternate location when starting the installation. For example, to use `/home/tmp`, start the install with the following command:

```
./ML_36_003_HP-UX.bin /home/tmp
```

Serial Port Selection

The preconfigured serial ports are `/dev/tty0p0` and `/dev/tty1p0`. You may select one of these or enter another as appropriate.

Post-Installation Notes

The Liebert MultiLink installation program places the script `LiebertM` in the `/sbin/init.d` directory. It also creates `K300LiebertM` and `S900LiebertM` links in the `/sbin/rc1.d` and `/sbin/rc2.d` directories.

A.6.3 Notes on Running Liebert® MultiLink®

If running the Common Desktop Environment (CDE), all users meant to receive pop-up messages must allow access to their desktop. This can be accomplished by adding the following command to a common logon script (e.g., `/etc/profile`)—see the CDE documentation or `xhost` man page for more information about the desktop security mechanism:

```
/usr/bin/X11/xhost +`hostname`
```

Note: The characters surrounding `hostname` are the grave accent (```) that is usually found on the same keyboard key as the tilde (`~`).

Starting Liebert MultiLink Applications

During installation, shell scripts are created in the product installation directory tree (e.g., `/opt/MultiLink`). These scripts may be used to execute these Liebert MultiLink applications:

- `bin/Viewer`—Viewer
- `Uninstall`—Uninstall Liebert MultiLink

For convenience, you may want to add the `bin` subdirectory to your `PATH`.

Verify Liebert MultiLink is Running

When operating properly, Liebert MultiLink is running constantly in the background. To verify that it is doing so, use `/sbin/init.d/LiebertM status` to get a list of the active Liebert MultiLink processes.

Identifying a Computer's IP Address

Run the following command:

```
hostname
```

You will next see output similar to this:

```
frodo
```

The result of this command will show your machine name. In this example, the machine name is `frodo`. Then run the following command:

```
more /etc/hosts
```

You will next see output similar to this:

```
127.0.0.1 localhost
10.0.0.10 frodo
10.0.0.11 bilbo
```

The result of this command will list one or more entries of IP address and name pairs. In this example:

The IP address for machine name `frodo` is `10.0.0.10`

The IP address for machine name `bilbo` is `10.0.0.11`

A.6.4 Uninstalling Liebert MultiLink

- You must log in as “root.”
- Close the MultiLink Viewer—the uninstall process will fail if the Viewer is open.
- Go to the directory where the Liebert MultiLink files are located (e.g., `/opt/MultiLink`) and run `Uninstall`.
- A confirmation box asks if you are sure you want to uninstall the software.
- Pressing the **Yes** button will begin removing the software.
- A message box appears when the process is completed. The uninstall process stops Liebert MultiLink services that are running and removes all Liebert MultiLink files from the hard drive.

A.7 IBM® AIX™

A.7.1 Platform-Specific Requirements

In addition to the general requirements listed in **3.0 - What is Required to Use Liebert® MultiLink®?**, prospective Liebert MultiLink users must also have these minimal requirements:

- AIX 5.1 or later for RISC System/6000
- Appropriate “fixes” applied to operating system For specific fixes that need to be installed to run Java 1.4.1 applications on AIX, see the Java 1.4.1 for AIX download area at:
<http://www-106.ibm.com/developerworks/java/jdk/index.html>
- Common Desktop Environment (X Window System)
- TCP/IP network protocol
- 100 MB of free disk space on the partition where Liebert MultiLink will be installed (during installation, the /tmp directory must have 150 MB free)
- A mouse or other pointing device
- 512 MB of RAM

A.7.2 Installation Notes

Pre-Installation Checklist

Comply with the following requirements, then return to **5.1 - Before Installing Liebert MultiLink.**

1. During installation you must be logged in as “root.”
2. If using a serial port connection to the UPS, use the SMIT utility to disable getty at system startup from monitoring the port where you are connecting the UPS.
3. If you are using an SNMP card, check for SNMP daemons. Execute the command
`ps -ef | grep -i snmp`. If the process `snmpd` (or similar) is running, it must be disabled before you can install Liebert MultiLink.
If you are not using an SNMP hardware card with your UPS, Liebert MultiLink can use its default port settings of 3029/3027, and there is no need to disable the SNMP daemons.
4. Make sure the Liebert MultiLink distribution file has execute permission (`chmod +x <file>`), then execute it.

Alternate to /tmp during installation

If you do not have enough disk space in the **/tmp** partition to meet the requirement specified in **A.7.1 - Platform-Specific Requirements**, you may specify an alternate location when starting the installation. For example, to use **/home/tmp**, start the install with the following command:

```
./ML_36_003_AIX.bin /home/tmp
```

Serial Port Selection

The preconfigured serial ports are `/dev/tty0` and `/dev/tty1`. You may select one of these or enter another as appropriate.

Post-Installation Notes

The Liebert MultiLink installation program places the script `LiebertM` in the `/usr/sbin` directory and modifies the `/etc/rc.tcpip` file to execute this script.

A.7.3 Notes on Running Liebert® MultiLink®

If running the Common Desktop Environment (CDE), all users meant to receive pop-up messages must allow access to their desktop. This can be accomplished by adding the following command to a common logon script (e.g., `/etc/profile`)—see the CDE documentation or `xhost` man page for more information about the desktop security mechanism:

```
/usr/bin/X11/xhost +`hostname`
```

Note: The characters surrounding `hostname` are the grave accent (```) that is usually found on the same keyboard key as the tilde (`~`).

Starting Liebert MultiLink Applications

During installation, shell scripts are created in the product installation directory tree (e.g., `/opt/MultiLink`). These scripts may be used to execute these Liebert MultiLink applications:

- `bin/Viewer`—Viewer
- `Uninstall`—Uninstall Liebert MultiLink

For convenience, you may want to add the `bin` subdirectory to your `PATH`.

Verify Liebert MultiLink is Running

When operating properly, Liebert MultiLink is running constantly in the background. To verify that it is doing so, use `/usr/sbin/LiebertM status` to get a list of the active Liebert MultiLink processes.

Identifying a Computer's IP Address

Run the following command:

```
hostname
```

You will next see output similar to this:

```
frodo
```

The result of this command will show your machine name. In this example, the machine name is `frodo`. Then run the following command:

```
more /etc/hosts
```

You will next see output similar to this:

```
127.0.0.1 localhost
10.0.0.10 frodo
10.0.0.11 bilbo
```

The result of this command will list one or more entries of IP address and name pairs. In this example:

The IP address for machine name `frodo` is `10.0.0.10`

The IP address for machine name `bilbo` is `10.0.0.11`

A.7.4 Uninstalling Liebert MultiLink

- You must log in as “root.”
- Close the MultiLink Viewer—the uninstall process will fail if the Viewer is open.
- Go to the directory where the Liebert MultiLink files are located (e.g., `/opt/MultiLink`) and run `Uninstall`.
- A confirmation box asks if you are sure you want to uninstall the software.
- Pressing the **Yes** button will begin removing the software.
- A message box appears when the process is completed. The uninstall process stops Liebert MultiLink services that are running and removes all Liebert MultiLink files from the hard drive.

APPENDIX B - MAKING YOUR OWN LIEBERT® MULTILINK® UPS CABLE

The UPS and monitoring computer can be connected in either of two ways: serial connection or contact closure. A serial connection cable permits access to Liebert MultiLink's complete functionality, but may be used only for those UPS models listed in **Table 1**. Any other UPS model must use contact closure.

Liebert MultiLink requires a custom cable. The software will NOT function properly with ordinary serial cables. Proper cables can be purchased from Emerson or made with readily available materials.

To make your own cable, follow the instructions in this section. With the exception of **Step 5**, the instructions are identical for both the serial connection cable and the contact closure cable. (You may purchase a Liebert MultiLink UPS cable by contacting your local Emerson representative, value-added reseller or distributor. See **Table 15** for part numbers.)

You should prepare and attach the cable **before** installing Liebert MultiLink so that the system will be ready to use the software.

B.1 MATERIALS YOU WILL NEED

- Two connectors, one with pins, the other with sockets, either DB25 or DB9
- RJ11 or RJ12 cable
- Two connectors, RJ11 or RJ12, depending on the cable being used

B.2 INSTRUCTIONS

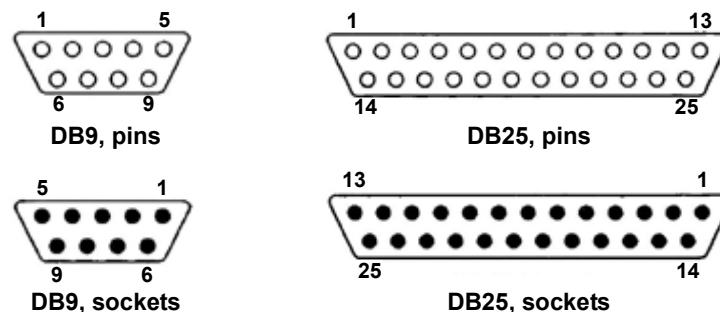
Follow these directions to build the cable:

1. Determine the connector your UPS needs

Examine your UPS.

- Does it have a 9-socket or 25-socket connector?
This connector should be a socket or pin connector and look similar to one of the diagrams below. You will need to obtain a corresponding pin or socket connector.
- The diagrams in **Figure 4 - Serial Port Connectors** will help determine the type of connector you have. The circles denote pins and the dots denote sockets.

Figure 4 Serial Port Connectors



2. Determine the connector your computer needs

Examine your computer.

- Does it have a 9-pin or 25-pin connector?
- Is the connector a pin or socket type? (A pin connector has protruding pins; a socket connector has holes.)
- If the UPS has a socket connector, the cable connector must have pins and vice versa.
- The diagrams in **Figure 4 - Serial Port Connectors** will help determine the type of connector you have. The circles denote pins and the dots denote sockets.

3. Determine the length of the cable you need

Measure the distance between the UPS and the computer. The cable must be long enough to reach each machine's connector and to go around obstructions. Keep the cable as short as possible, preferably less than 25 feet. Do not lay the cable near electromagnetic interference sources such as AC power lines, fluorescent lights and induction motors.

4. Buy the parts

The parts are available at most electronics stores or large computer stores as well as through mail-order companies. The following illustration shows some of the parts you may need.



5. Assemble the UPS and computer connectors

Assemble the UPS and computer connectors according to the appropriate table below—a serial communication cable is connected according to **Table 11**; a contact closure communication cable is connected according to **Table 12**. The face of the connector has a number assigned to each hole or pin.

Table 11 Serial Communication

UPS Interface Port		Comments	Computer Interface Port
DB9 SOCKETS	DB9 PINS		DB9 SOCKET
Liebert NX Only	All Other UPS Models		
3	2		2
2	3		3
5	5		5
Hood Shield	Hood Shield	USE CABLE SHIELD - Shield connected on one side only	Not connected

Table 12 Contact Closure Communication

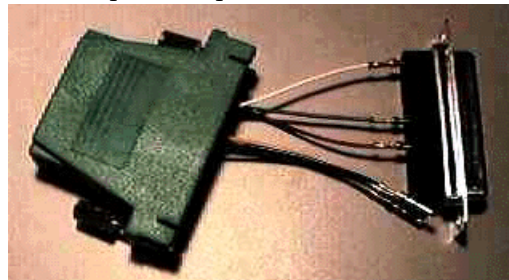
UPS Interface Port			Wire Color	Computer Interface Port		
DB25	DB9	Function		Signal	DB9	DB25
16	9	ON Battery	Red	<<<TX	3	2
17	8	ON Battery	Green	RX>>>	2	3
11	1	LOW Battery	Black	<<<RTS	7	4
9	7	LOW Battery	Yellow	DCD>>>	1	8
7	5	UPS Ground	If cable has shield, connect shield at UPS		Not connected	Not connected
19	4	UPS Off	Must NOT be connected		Not connected	Not connected



NOTE

Unlisted pins and sockets are not connected.

The following picture shows a possible pin-wire insertion for a connector.



6. Assemble the connector housing and connect the cable to it

7. Connect the cable to the computer and UPS

APPENDIX C - TECHNICAL INFORMATION & FREQUENTLY ASKED QUESTIONS

1. What is a DHCP server?

DHCP is the acronym for Dynamic Host Configuration Protocol. This protocol allows IP addresses to be allocated dynamically when computers are connected to a network. This protocol is often used to remotely grant an IP address to a computer for a limited time (typically a few days). See RFC-1541 for more detailed information. (RFCs are *Request For Comment* documents that set forth regulations on how communication occurs on the Internet. These documents are controlled by the Internet Engineering Task Force (IETF) and are available for viewing at the IETF Web site.)

2. How do I identify possible TCP/IP port conflicts when using a UPS equipped with an SNMP card? How do I resolve the conflict?

TCP/IP port conflicts with ports 161 and 162 can be resolved by stopping SNMP services or daemons from running. This product does not support running the “monitor” or the “shutdown-client” on the same machine as a Network Management System (NMS).

For the proper procedure to stop the SNMP services or daemons, see **How Do You Contact Emerson for Technical Support?** on **page 1** to get assistance.

3. What is a service or a daemon?

Both are processes initiated at boot time that require no user intervention to start and run. Some platforms, such as Windows NT, call them *services*; Unix terms them *daemons*. They also continue to run after the user logs off the computer.

4. Why do I see the screen flash when the UPS goes to on-battery or returns to normal?

The flash is caused by display of an empty script window (windows that are devoid of text).

5. Should I use IP addresses or hostnames to configure Liebert® MultiLink®?

Liebert MultiLink uses IP addresses to route alerts and notifications. It utilizes name service lookup to translate between IP addresses and hostnames. The hostnames are more easily understood by computer users who see them in notification messages and in the user log.

In general, notification messages should appear within five seconds of the triggering event. Slower display of notification messages might be caused by DNS configuration problems. If this is suspected, follow the steps in **Send a test message to clients** in **8.3.6 - Properties - Clients Tab** to send a test message.

If slow display of messages is a persistent problem, Emerson suggests using IP addresses instead of hostnames. However, if TCP/IP addresses are dynamically assigned on your network, you may have to use hostnames.

APPENDIX D - LIST OF EVENTS

D.1 EVENTS FOR LOCAL HOST

The table below shows all **Events** that appear in the Viewer's **Event Configuration** tab when **My Event Actions** is selected (see 8.5 - **Configuring—Event Configuration** tab).

Table 13 Events from Event Configuration tab with My Event Actions selected

Event	Description	Advice	Severity
System Shutdown Commencing	The operating system has been instructed to begin an orderly shutdown.	The operating system has been instructed to shutdown by the Liebert® MultiLink® event manager. Typically this occurs when the UPS is on battery, and an unattended orderly shutdown of the operating system needs to take place in order to avoid data corruption during a complete loss of power.	Critical
UPS Monitor Software Started	The Liebert MultiLink background service/daemon has started.	The software that constantly monitors the UPS and protects your computer has started. This is the background portion of the software, and is not normally visible.	Informational
UPS Monitor Software Stopped	The communication service/daemon was stopped by a user, the operating system, or by the Liebert MultiLink software.	The software that constantly monitors the UPS and protects your computer has been stopped. This is the background portion of the software, and is not normally visible.	Impaired

D.2 EVENTS FOR UPS

The table below shows UPS-related events that might appear in the Viewer's **Event Configuration** tab, depending on the communication method used and the UPS model selected in the Viewer (see **8.5 - Configuring—Event Configuration tab**).

- Contact Closure supports only the first three events in the table below.
- USB communication supports a subset of events in the table below, depending on the UPS model.
- The Advice portion is displayed when you click on the **Advice** button on a Liebert® MultiLink® pop-up notification.
- Liebert MultiLink has three **Severity** levels: Informational, Impaired and Critical.

Table 14 Events from Event Configuration tab with UPS selected

Event	Description	Advice	Severity
Events supported by all device types			
UPS Operating On Battery	The UPS is discharging the battery to supply power to the load.	The UPS has detected a power outage or momentary disturbance and is now providing battery power to your computer. If you anticipate an extended power problem, you should save your work and log out now.	Impaired
Low Battery	The UPS has reached a Low Battery level. Time available to remain on battery is very short.	Save your work and log out now as system shutdown will begin shortly. The UPS is running out of battery capacity and minimal battery backup runtime remains.	Critical
UPS Output Returned From Battery	The UPS has returned from an abnormal utility input condition.	The UPS is receiving good utility power and is in the normal mode of operation. You may continue working.	Informational
Weak Battery Condition (certain UPS models only)	The UPS has reported that the battery is in a weak condition (with utility present). This is a contact closure event only.	The UPS is reporting a weak battery condition which indicates there currently is little capacity left in the battery, or there is possibly a bad battery. If this condition persists, the UPS battery may need to be replaced. If you need further assistance, please call Emerson Technical Support.	Impaired
Events not supported by contact closure			
UPS Communication Established	The Liebert MultiLink software has established communications via the serial port. This could be from the starting of the service, or a reestablishment of communication after an interruption.	The Liebert MultiLink software has established communication with the UPS and is now monitoring status. This could be from the starting of the service, or a reestablishment of communication after an interruption.	Informational
UPS Communication Loss	An unexpected loss of communications with the UPS via the serial port.	Please verify that Liebert MultiLink is correctly configured and that the physical connection between the computer (or server) and UPS is properly installed. If you need further assistance, please call Emerson Technical Support.	Critical
UPS Output Operating On Bypass	The load has transferred to bypass and is unprotected.	The UPS is on bypass and will be unable to power your load in the event of a power failure. When a UPS experiences an internal failure, the load is switched to bypass as a protective measure. The UPS may have been manually switched to bypass by a user. If a non-user initiated bypass condition occurred, you should investigate the condition of the UPS.	Impaired
Battery Fully Charged	The UPS has reported that the battery is fully charged.	The UPS battery is fully charged. You now have the maximum amount of battery runtime available for any future power outages.	Informational
Battery Capacity XX% or less	User defined event. The battery capacity is equal to or fallen below the defined level. This event is enabled only when operating on battery.	The battery capacity has fallen below a user-defined level. Depending on where this level is, you will want to take appropriate action such as saving your work and logging off. The Battery Capacity level notification is user configurable and can be modified in the "Event Configuration" tab in Liebert MultiLink.	Impaired

Table 14 Events from Event Configuration tab with UPS selected

Event	Description	Advice	Severity
Battery Time Remaining XXX Minutes or less (While On Battery)	User defined event. The battery time remaining has fallen at or below the defined level. This event is enabled only when operating on battery.	The battery runtime remaining has fallen below a user-defined level. Depending on where this level is set, you will want to take appropriate action such as saving your work and logging off. The Battery Time Remaining notification is user configurable and can be modified in the "Event Configuration" tab in Liebert® MultiLink®.	Impaired
UPS Over-temperature Condition	The temperature of the UPS internal components is operating above the normal temperature range.	If this condition persists, the UPS will shut off without further warning. Save your work and log out now. Check to be sure that ventilation openings to the UPS are not blocked and that the temperature outside the UPS does not exceed the maximum value listed in the manual for your unit. Some UPS models have air filters, which may be clogged. Also, be sure that the UPS is not overloaded.	Critical
UPS Output In Boost Mode	The UPS has reported it is in boost mode. Boost mode is the correction of output voltage during low input utility conditions.	To conserve battery power your UPS corrects an under voltage condition by using a boost circuit. If this under voltage condition is persistent and the UPS continually operates in boost mode and you do not experience intermittent power failures, you may be experiencing an extended brownout. It is acceptable for the UPS to operate constantly in this state.	Informational
Input Voltage High	The input voltage is higher than the nominal range of the UPS.	Your UPS will correct this problem, however if this condition is persistent, it may be indicative of a utility problem.	Informational
Output Voltage High	The output voltage is higher than the nominal range of the UPS.	The output voltage is higher than the nominal range of the UPS. This condition is serious and needs to be investigated further.	Impaired
Output Voltage Low	The output voltage is lower than the nominal range of the UPS.	The output voltage is lower than the nominal range of the UPS. This condition needs to be investigated further.	Impaired
Battery Charger Failed	The battery charger in the UPS has failed.	The UPS has been designed to detect potential problems. The battery charging circuit of the UPS is not working and the UPS should be replaced or serviced immediately.	Critical
Output Overload	The output load has exceeded the capacity of the UPS.	The size of the load on the UPS is greater than the rating on the UPS. If the UPS experiences a power failure, it will be unable to continue powering the load. Review equipment which may have been recently plugged into the UPS and remove any non-critical items. You may also need a larger capacity UPS to handle your current requirements.	Critical
Bypass Power Out Of Tolerance	The bypass input power is out of the usable range in terms of frequency or voltage.	The utility voltage or frequency is not adequate to support your load on the bypass circuit. Do not switch to bypass until utility power returns to normal.	Impaired
Output Overload Removed	The load has returned to within the output limits of the UPS.	The size of the load being powered by the UPS is now within the acceptable range of the UPS. If you have taken steps to correct an overload condition, you have been successful. If you are frequently receiving this notification along with an Output Overload warning, you should confirm the UPS is only powering intended equipment and that an unauthorized device has not been connected to the UPS.	Informational
Bypass Power Returned To Normal	The bypass input voltage has returned to a usable range in terms of frequency or voltage.	The utility voltage and frequency are now adequate to support your load on the bypass circuit. It is safe to switch to bypass power if required.	Informational
Battery Test Initiated	The UPS has initiated a test of the battery system.	The UPS is beginning a test of the battery. Some UPS models automatically start a test of the battery on a period basis. The battery test can also be manually initiated by the Liebert MultiLink software.	Informational

Table 14 Events from Event Configuration tab with UPS selected

Event	Description	Advice	Severity
Battery Test Failed	The UPS has failed a test of the connected battery.	The UPS finished a test of the battery and found a problem with the battery. It is possible that the UPS battery is failing, in which it should be replaced as soon as possible. If the battery was recently discharged, you may wish to allow it to recharge for 12 hours and try the test again to verify the results.	Critical
UPS Diagnostic Test Failed	The UPS has failed an internal diagnostic test.	The UPS diagnostic test has found a problem. Further inspection of the UPS by a qualified individual should be conducted as soon as possible.	Critical
Battery Test Passed	The UPS has performed a test of the connected battery and reported the result as "passed".	The UPS finished a test of the battery and has not found any problems. No additional steps are required at this time. The battery test should be run on a periodic basis to ensure the battery is in good condition.	Informational
UPS Diagnostic Test Passed	The UPS has performed an internal test and reported the result as "passed".	The UPS finished a test of its electronics and has not found any problems. No additional steps are required at this time.	Informational
Replace Battery	The UPS has determined that the battery needs to be replaced.	The UPS has been designed to detect potential problems. The UPS has detected a bad battery and the battery should be replaced as soon as possible.	Critical
Input Frequency Is Out Of Range	The input frequency is out of the nominal range of the UPS.	Your UPS will correct this problem, however if this condition is persistent, it may be indicative of a utility problem.	Informational
UPS Output Returned From Bypass	The output load has returned to the UPS from bypass and is now protected.	The UPS is no longer on bypass and has returned to normal mode of operation.	Informational
UPS Output Returned From Boost Mode	The UPS output has returned from boost mode. Boost mode is the correction of output voltage during low input utility conditions.	The utility voltage is within a normal range and the UPS is no longer operating on the boost circuit.	Informational
UPS Output In Buck Mode	The UPS has reported it is in buck mode. Buck mode is the correction of output voltage during high input utility conditions.	To conserve battery power your UPS corrects an over voltage condition by using a buck circuit. If this over voltage condition is persistent and the UPS continually operates in buck mode, it may be indicative of a utility problem.	Informational
UPS Output Returned From Buck Mode	The UPS output has returned from buck mode. Buck mode is the correction of output voltage during high input utility conditions.	The utility voltage is within a normal range and the UPS is no longer operating on the buck circuit.	Informational
UPS Temperature Has Returned To A Normal Range	The temperature of the UPS internal components has returned to a normal operating range.	Internal components of the UPS have returned to a normal operating temperature.	Informational
Input Voltage Returned From High To Normal Range	The input voltage has returned from high to the nominal operating range.	The utility voltage is now within a normal range and is supplying the UPS with adequate power.	Informational
Output Voltage Returned From High To Normal Range	The output voltage has returned from high to the nominal operating range of the UPS.	The output voltage has returned to the nominal operating range of the UPS and is supplying voltage that will properly support the load.	Informational
Input Frequency Returned To Normal Range	The input frequency has returned to the nominal range of the UPS.	The utility frequency is now within a normal range and can be utilized by the UPS.	Informational
UPS Diagnostic Test Initiated	UPS diagnostic test initiated.	The UPS is performing a self-test of its electronics. The result will be issued shortly.	Informational

Table 14 Events from Event Configuration tab with UPS selected

Event	Description	Advice	Severity
Ambient Over-temperature	The ambient temperature inside the UPS has reached a higher level than is recommended.	If the air temperature inside the UPS goes above the maximum level, this alarm will occur. Ensure that the UPS has adequate ventilation and that environmental conditions where the UPS is located have not changed adversely. Check to see that the ventilation openings in the UPS are not blocked and that there is adequate clearance around the unit.	Critical
UPS Returned From Ambient Over-temperature	The ambient temperature inside the UPS has returned within the normal operating level.	The internal air temperature of the UPS has returned to the normal range.	Informational
Power Module Failed	A power module in the UPS is in a failed state and needs to be replaced.	The UPS has been designed to detect potential problems. A power module connected to the UPS has failed and the UPS has taken the module offline. This may prevent the UPS from working properly, as capacity/redundancy may have been lost. The power module should be replaced.	Critical
Battery Module Failed	A battery module in the UPS is in a failed state and needs to be replaced.	The UPS has been designed to detect potential problems. A battery connected to the UPS has failed and the UPS has taken the module offline. This may prevent the UPS from working properly. The battery module should be replaced.	Critical
Internal UPS Communication Loss	Communication between UPS internal components has failed.	The internal components within the UPS are not communicating properly. There is something wrong inside the UPS that needs to be investigated.	Critical
Internal UPS Communication Restored	Communication between UPS internal components has been restored and is operating properly.	The internal components within the UPS are communicating normally now. No further action is required at this time. If you need further assistance, please call Emerson Technical Support.	Informational
Main Control Failed	The UPS main control has failed and the unit is operating on redundant control.	The UPS has been designed to detect potential problems. The main control module of the UPS has failed. The UPS is fully functional, however system redundancy has been compromised. We recommend replacing the module to restore redundancy of the controls.	Impaired
Maximum Load Exceeded	The UPS maximum load setting has been exceeded.	This alarm is to annunciate when the UPS load has exceeded a user-defined level. This level can be set for many reasons, one of which is to ensure that additional unauthorized load is not added to the UPS which can decrease available battery runtime. This alarm may not necessarily indicate an overload condition.	Impaired
Maximum Load Returned To Normal	The UPS load has receded below the maximum load setting.	The UPS load level has returned below the user-defined level.	Informational
Redundant Control Failed	The UPS redundant control has failed and the unit is operating on main control.	The UPS has been designed to detect potential problems. The redundant control module of the UPS has failed. The UPS is fully functional, however system redundancy has been compromised. We recommend replacing the module to restore redundancy of the controls.	Impaired

Table 14 Events from Event Configuration tab with UPS selected

Event	Description	Advice	Severity
UPS Power Not Redundant	The UPS is not operating in a redundant power module configuration based on the user-selectable redundancy setting.	Redundant mode is when your UPS has one or more power modules installed than is necessary to operate the current load. The UPS is currently no longer in redundant mode. While the UPS is fully rated to protect the current load, you no longer have redundant-level protection. This condition could have occurred because load has been added beyond intended levels or because a power module was removed from the system. To operate in a redundant mode, review load requirements and either replace power modules or add additional power modules.	Impaired
UPS Returned To Power Redundant	The UPS is now operating in a redundant power module configuration based on the user-selectable redundancy setting.	Redundant power modules permit the UPS to continue operating when one or more modules have failed.	Informational
Transformer Over-temperature Condition	The temperature of the UPS internal transformer is operating above the normal temperature range.	If this condition persists, the UPS will shut off without further warning. Save your work and log out now. Check to be sure that ventilation openings to the UPS are not blocked and that the temperature outside the UPS does not exceed the maximum value listed in the manual for your unit. Some UPS models have air filters, which may be clogged. Also, be sure that the UPS is not overloaded.	Critical
Transformer Temperature Has Returned To A Normal Range	The temperature of the UPS internal transformer has returned to operating in the normal temperature range.	The transformer component in the UPS has returned to a normal operating temperature.	Informational
UPS User Interface Failed	The UPS user interface (display) has failed.	The UPS has been designed to detect potential problems. The front panel of the UPS is not working properly, however the UPS continues to protect your equipment. You may continue to monitor the system status with the Liebert® MultiLink® software. We recommend replacing the display.	Impaired
Battery Test Cannot Be Performed	The battery diagnostic test cannot be performed either because it is inhibited or there is a system problem.	The battery diagnostic test cannot be performed if the UPS is currently on battery power, or if there is some other unknown system problem. Verify the state of the UPS and try the test again.	Informational
UPS Diagnostic Test Cannot Be Performed	The UPS diagnostic test cannot be performed either because it is inhibited or there is a system problem.	The diagnostic self test cannot be performed. This may be due to some unknown system problem. Verify the state of the UPS and try the test again.	Informational
Output Voltage Returned From Low To Normal Range	The output voltage has returned from low to the nominal operating range of the UPS.	The output voltage has returned to the nominal operating range of the UPS and is supplying voltage that will properly support the load.	Informational
UPS Output is off	The UPS output is off, the load is not supplied with power.	The UPS output has been turned off. There is no power to the load. To receive this message, this computer must be receiving power from a source other than the UPS, otherwise this event will never occur.	Critical
UPS Output is on	The UPS output has been turned on, the load is now supplied with power.	The UPS output has been turned on. There is power to the load. To receive this message, this computer must have been signalled to turn its output on, otherwise this event will never occur.	Informational

APPENDIX E - ORDERING PARTS

The tables below list part numbers for items available from Emerson Network Power®. To obtain any item, visit the Liebert® MultiLink® Web site at <http://multilink.liebert.com> or contact your local Emerson representative, value-added reseller or distributor.

Table 15 Cables to Connect UPS and Computer

Part Number	Description
MLADPT	Liebert MultiLink Standard Contact Closure adapters for UPSs equipped with DB9 ports

Table 16 Liebert MultiLink Software on CD-ROM

Part Number	Description
MLADV	Liebert MultiLink Advanced, Single User

Table 17 Liebert MultiLink Network Shutdown Licenses

Part Number	Description
MLLKB	Liebert MultiLink License Kit—5 Computers
MLLKC	Liebert MultiLink License Kit—10 Computers
MLLKD	Liebert MultiLink License Kit—20 Computers
MLLKG	Liebert MultiLink License Kit—100 Computers
MLLKU	Liebert MultiLink License Kit—Unrestricted

Table 18 Liebert MultiLink Network Administration License

Part Number	Description
MLLNA	Liebert MultiLink Network Administration License

Ensuring The High Availability Of Mission-Critical Data And Applications.

Emerson Network Power, a business of Emerson (NYSE:EMR), is the global leader in enabling *Business-Critical Continuity™* from grid to chip for telecommunication networks, data centers, health care and industrial facilities. Emerson Network Power provides innovative solutions and expertise in areas including AC and DC power and precision cooling systems, embedded computing and power, integrated racks and enclosures, power switching and controls, infrastructure management, and connectivity. All solutions are supported globally by local Emerson Network Power service technicians. Liebert AC power, precision cooling and monitoring products and services from Emerson Network Power deliver Efficiency Without Compromise™ by helping customers optimize their data center infrastructure to reduce costs and deliver high availability.

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