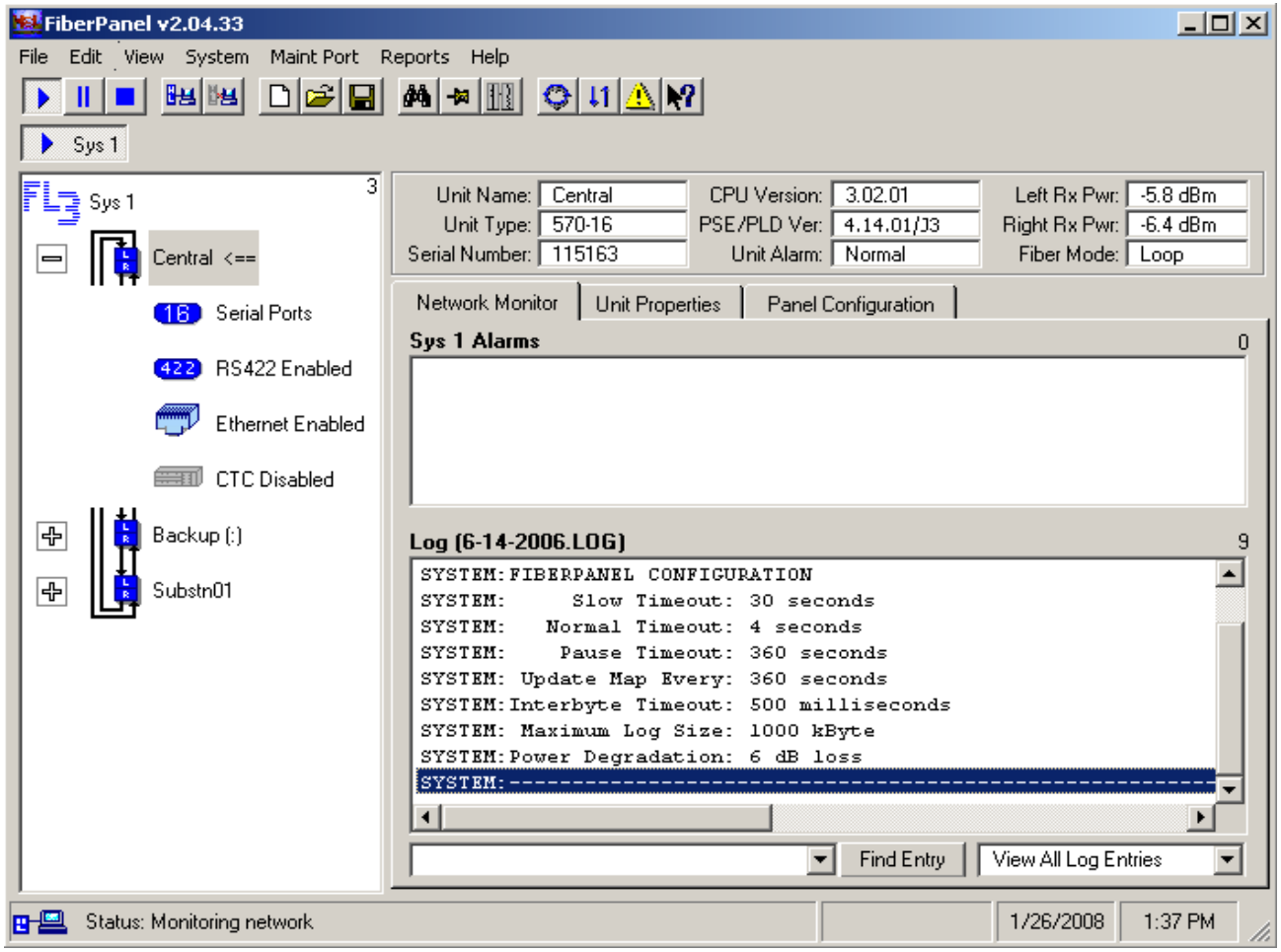
FiberPanel

Network Management Software



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This presentation is best if viewed in full-screen mode.

Use buttons here to navigate this demo

Click **Ctrl+L** to toggle full-screen mode

Click **Ctrl+Q** to exit this demo

Since 1979, H&L Instruments, LLC has been a leader in developing optical instruments and fiberoptic communications equipment. H&L manufactures fiberoptic transceivers used by electric utilities for distribution automation, substation to substation communications and underground secondary network SCADA systems. Our networks are also in use at airports, wind farms, industrial parks, university campuses, entertainment parks and railroads

This presentation introduces the *FiberLoop* network architecture and previews some of the features of H&L Instruments graphical user interface called *FiberPanel*, which is included at no cost with every system.

Please visit our web site, http://www.hlinstruments.com/, for additional information on H&L Instruments and its products.

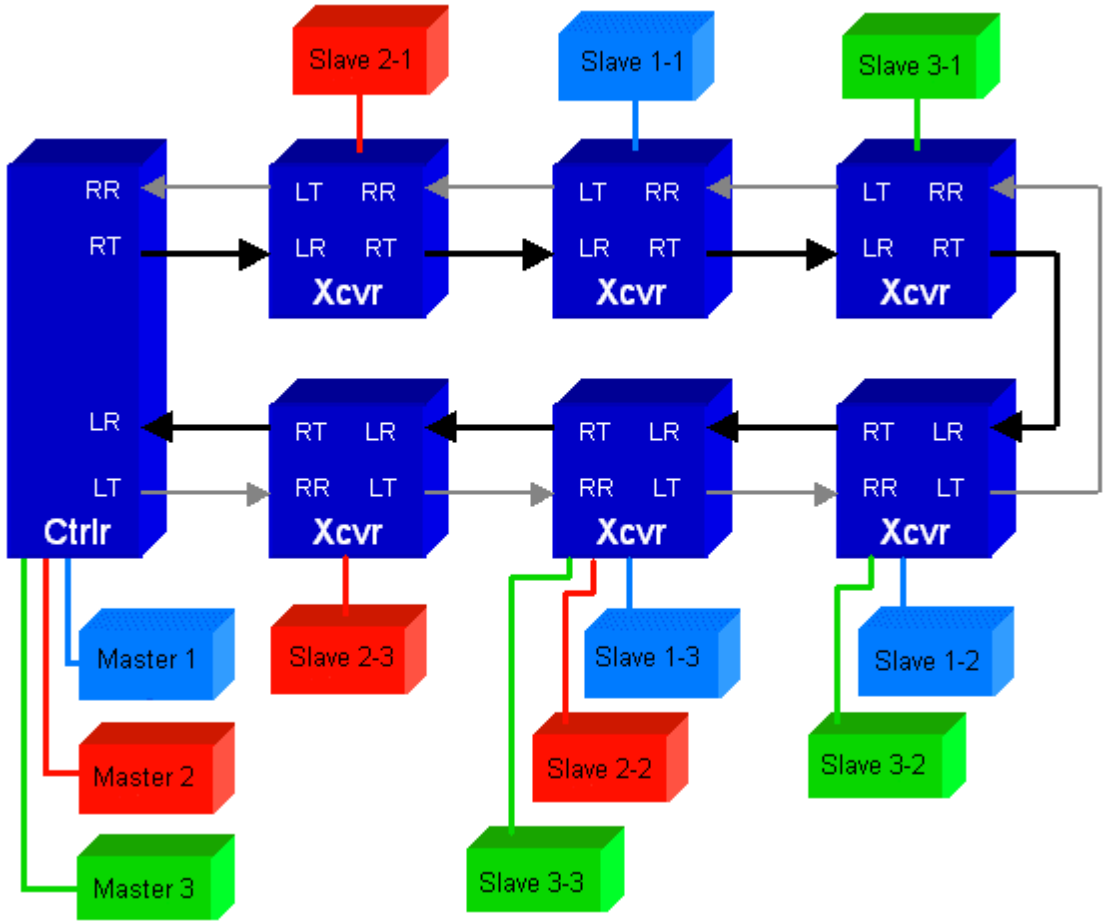
FiberLoop Basics

Before discussing FiberPanel, let's take a quick look at the two H&L Instruments FiberLoop network architectures supported by FiberPanel.

FiberLoop II is our 3rd generation network design. It consists of Model 560 Controllers and 562 Transceivers. The development of the Model 561 combines the features of the head-end controller and field transceiver into one unit.

FiberLoop II provides up to 16 virtual channels (communication paths) between the controller and the transceivers and provides redundant loop fiberoptic protection. Each network element supports up to 16 physical serial ports. All master ports reside on the controller and slave ports on the transceivers operate in a multi-drop configuration.

FiberPanel support and updates for FiberLoop II will continue for the large installed base of FiberLoop II networks.



FiberLoop II
Master/Slave
Network Architecture

FiberLoop Basics (cont)

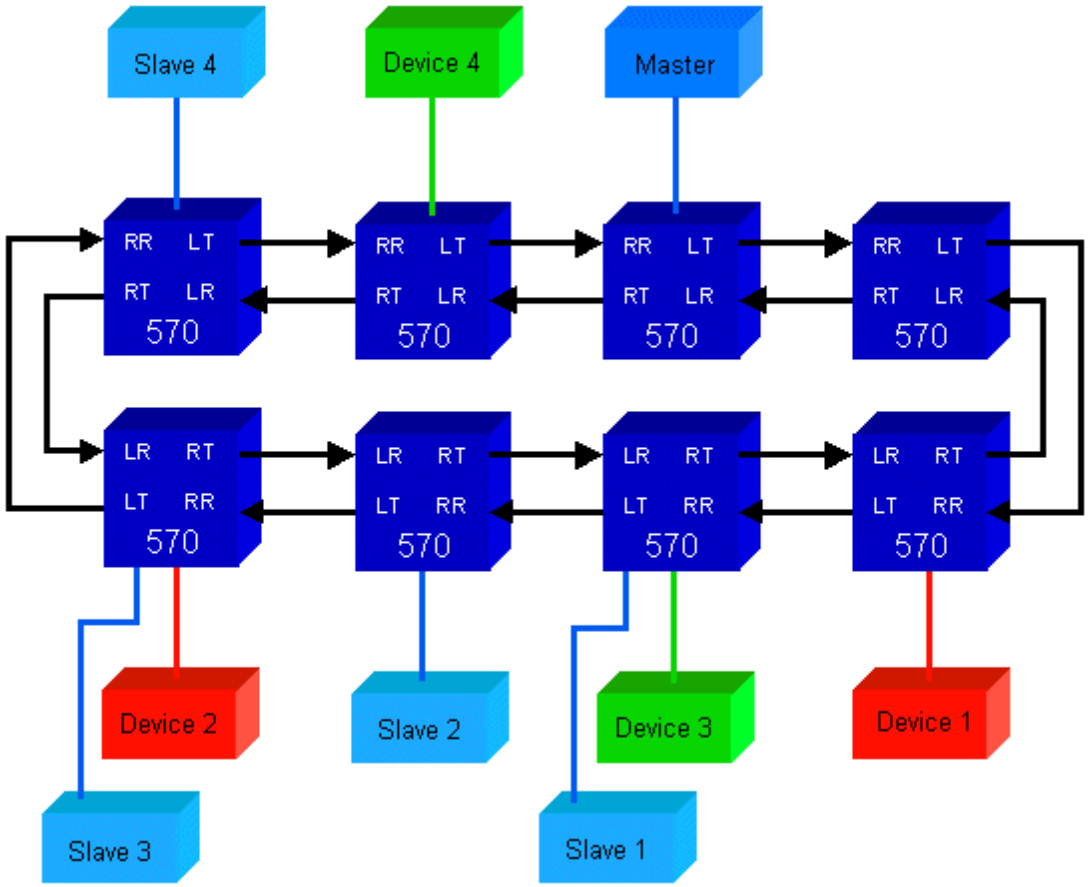
While FiberLoop II provided many features not found in other fiberoptic solutions, a new architecture was needed to support advanced communication schemes such as Ethernet.

FiberLoop III is H&Ls' 4th generation fiberoptic network design. It currently supports RS-232 serial ports, RS-422, RS-485, Ethernet, INCOM, digital orderwire, and analog telephony.

Unlike FiberLoop II, FiberLoop III is a *masterless* network, meaning that there is no master controller, therefore, no single point of failure.

Up to 128 channels are available to connect all devices in the network. Master/multi-slave (multi-drop), multi-master/multi-slave, point-to-point and Ethernet connections are supported.

We offer a trade-in program to upgrade your current H&L FiberLoop network to FiberLoop III. Contact us for details.



FiberLoop III
Basic Network
Architecture

FiberLoop Basics (cont)

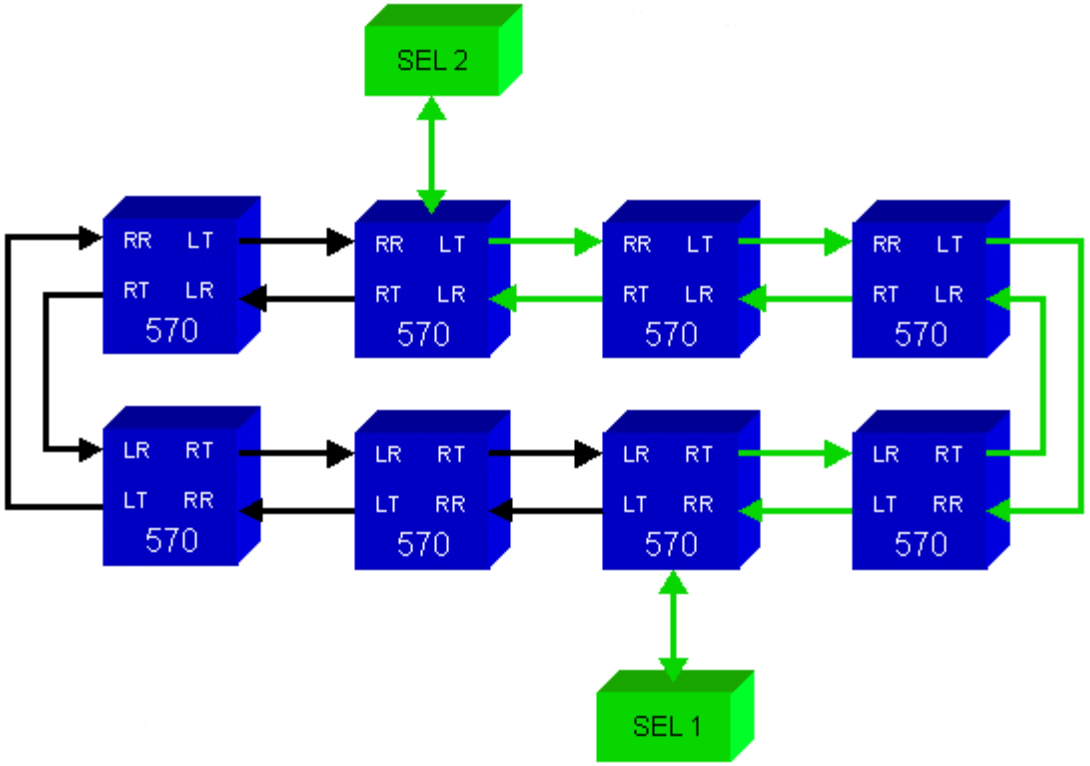
The FiberLoop network provides loop protected, protocol transparent serial and Ethernet transport. At less than 8 milliseconds, independent of the number of nodes in the network, our fault healing times are among the fastest in the industry.

To understand how FiberLoop III provides traffic protection, let's consider a single channel on the network.

In this example, a single point-to-point channel has been setup to allow two Schweitzer Engineering Labs line protection relays to communicate through the network using the SEL Mirrored Bits® protocol.

The traffic route on the fiber is shown in green.

The next slide will show how the traffic reroutes after a fiber path failure.



Normal point-to-point channel operation

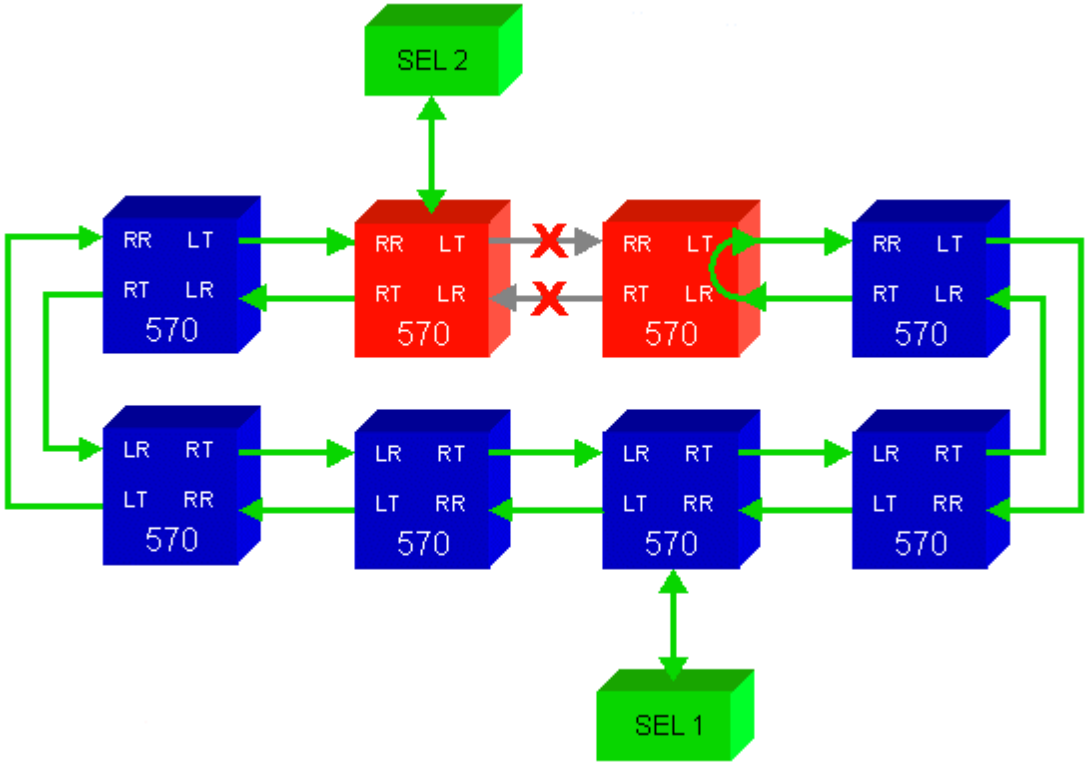
FiberLoop Basics (cont)

When a fiber failure occurs, traffic automatically switches to the alternate fiber route, maintaining the critical communication path between the relays.

Even though we've shown just one channel for clarity, this same protection scheme protects every channel in the network.

NOTE: Our Model 570 is the *only* multi-drop fiberoptic transceiver that reliably supports SEL Mirrored Bits communications. For information on how our FiberLoop III network was recently deployed at the University of California Santa Barbra, visit the Articles section of our web page, www.hlinstruments.com.

Now that you understand how the FiberLoop network operates, let's look at how FiberPanel monitors and manages this network.



Traffic looped back to heal broken fiber

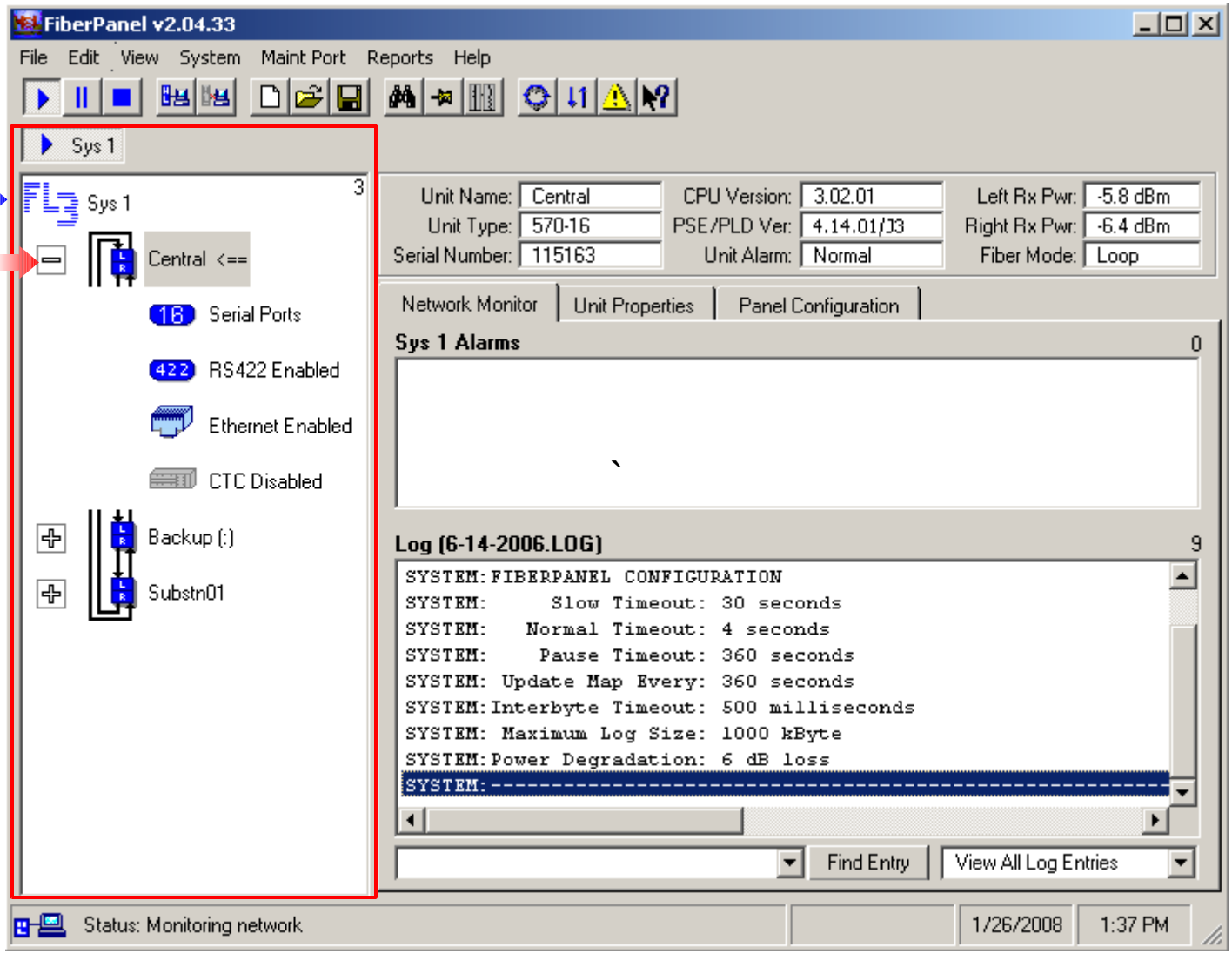
Network Management

Although the FiberLoop network operates without user intervention, there are many network monitoring and management tasks you can perform.

FiberPanel allows you to easily monitor and manage multiple FiberLoop networks from a single Windows 2000/XP PC.

- The *System Map* graphically displays the condition and routing of the fiber network. Active paths are black and inactive paths are gray.

- Expanding a unit shows a summary of the devices installed on that unit.

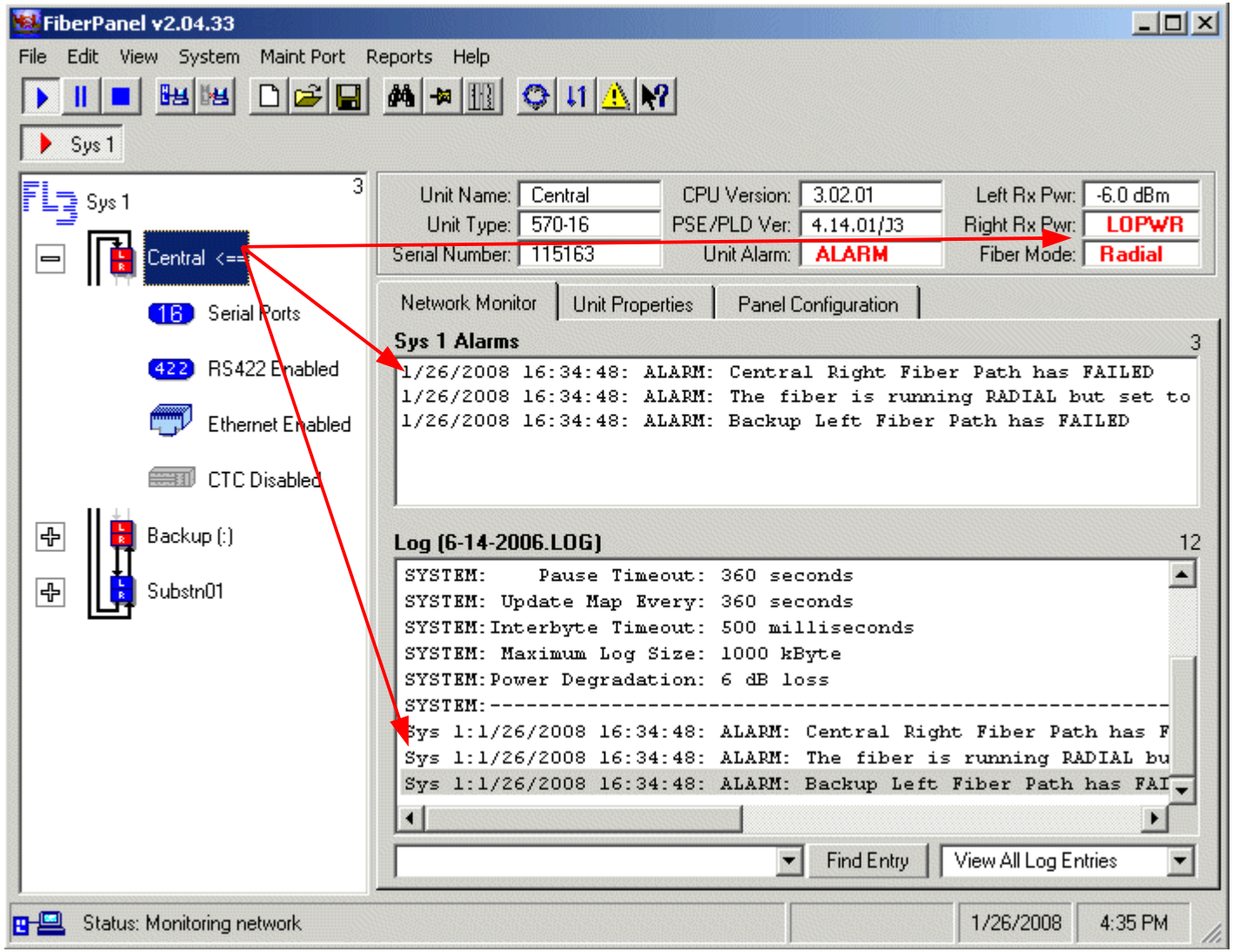


Network Problems

Problems in the network are graphically displayed, alarmed and logged, greatly simplifying troubleshooting and restoration.

In this example, the fiber between Central and Backup has failed as indicated by Rx Loss alarms on each unit. The fiber network automatically switched from *Loop* to *Radial* operation to maintain traffic flow in the network as shown on the *System Map*.

All network events in the *Alarms* window have been saved in the *Log* window (and log file) for later review.



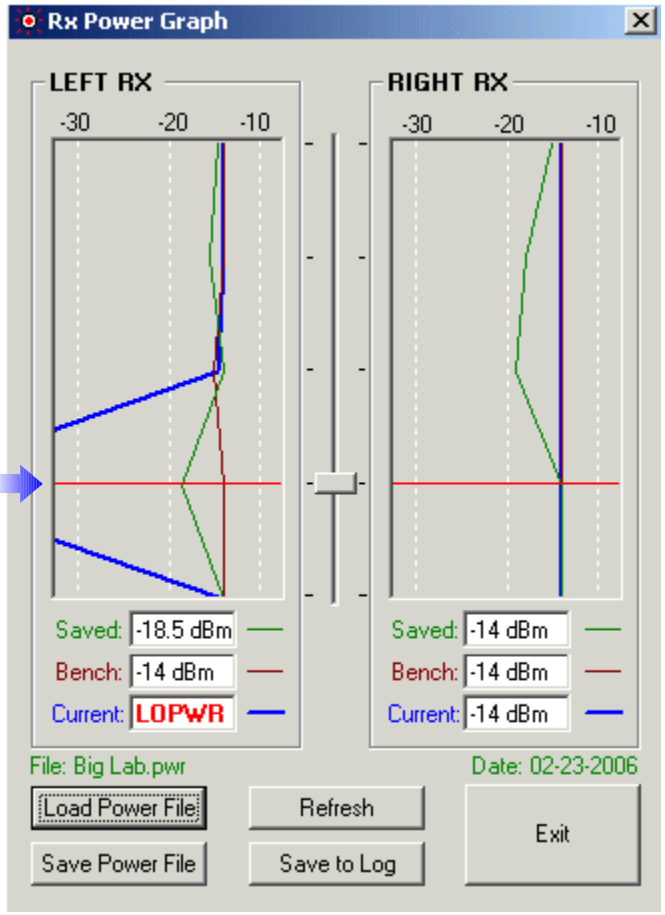
Receive Power Graph

One of the goals of any monitoring system should be to detect problems before they become outages.

FiberPanel incorporates a unique feature that monitors receive optical power on each optical port and compares it to a benchmark value (typically saved at start-up). Should an optical port's receive power drop below a preset threshold, an alarm will be generated notifying the system operator of the problem.

Current, benchmark, and saved receive optical levels can be viewed at any time in the *Receive Power Graph* window. This graph lets you compare optical signal performance and detect degradation before it causes an outage.

- In the example shown, the Left receive optical port on the fourth unit has failed (blue line). Prior to this failure, the saved power plot (green line) showed the power on this port was -18.5 dBm, or 4.5 dB below the benchmark power of -14 dBm (red line). Had maintenance been performed when the 4.5 dB loss was detected, a total fiber failure could have been avoided.



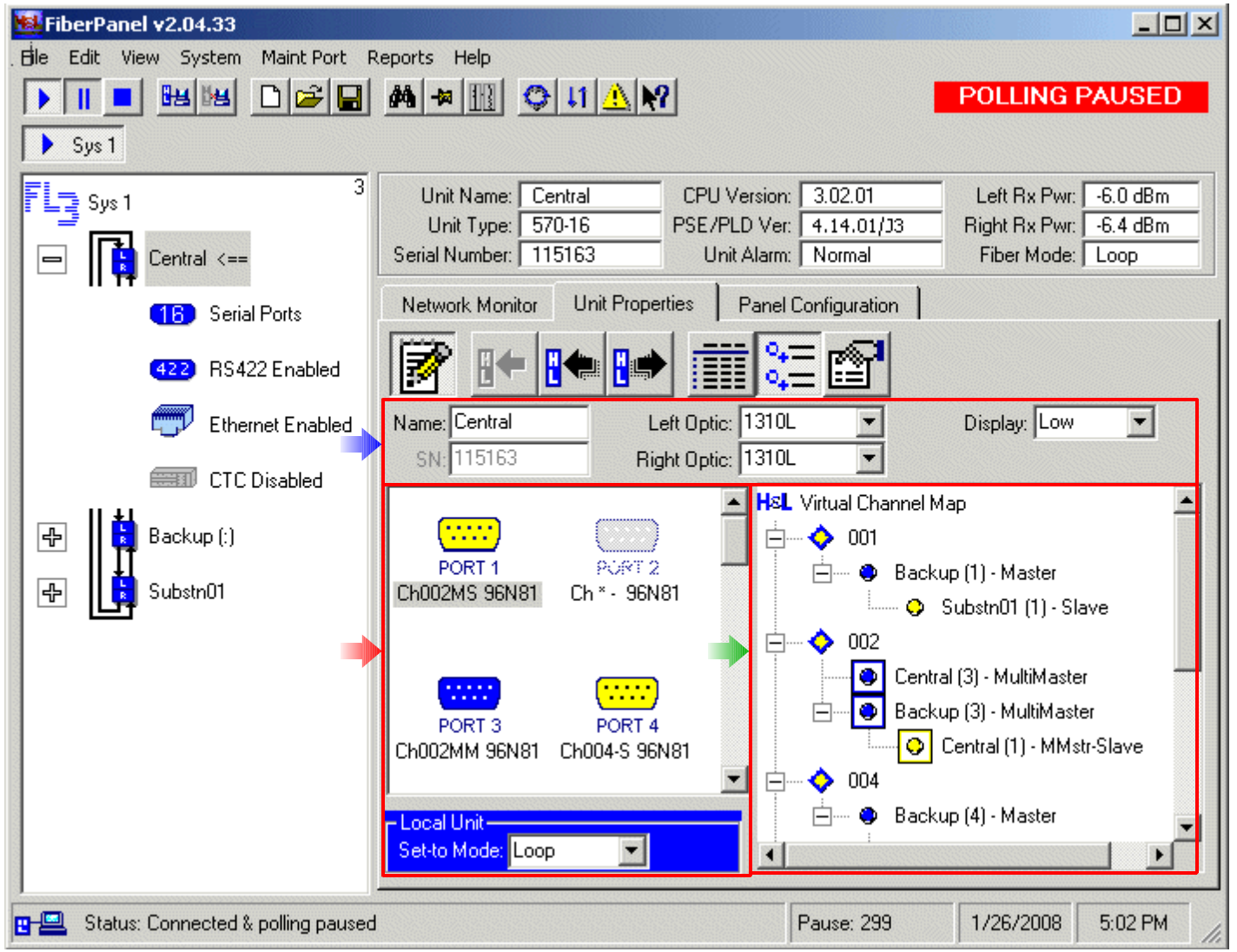
Fiber Power Map

Unit Properties

The *Unit Properties* tab displays properties of the unit selected on the *System Map*.

- Here you can edit the unit's name, enable/disable optical ports, or change the display intensity on the unit.
- The *Device Map* graphically displays the devices on the unit.
- The *Virtual Channel Map* graphically displays each fiber channel's end-points.

Right-click a device icon on either the *Device* or *Virtual Channel Map* to edit its properties.



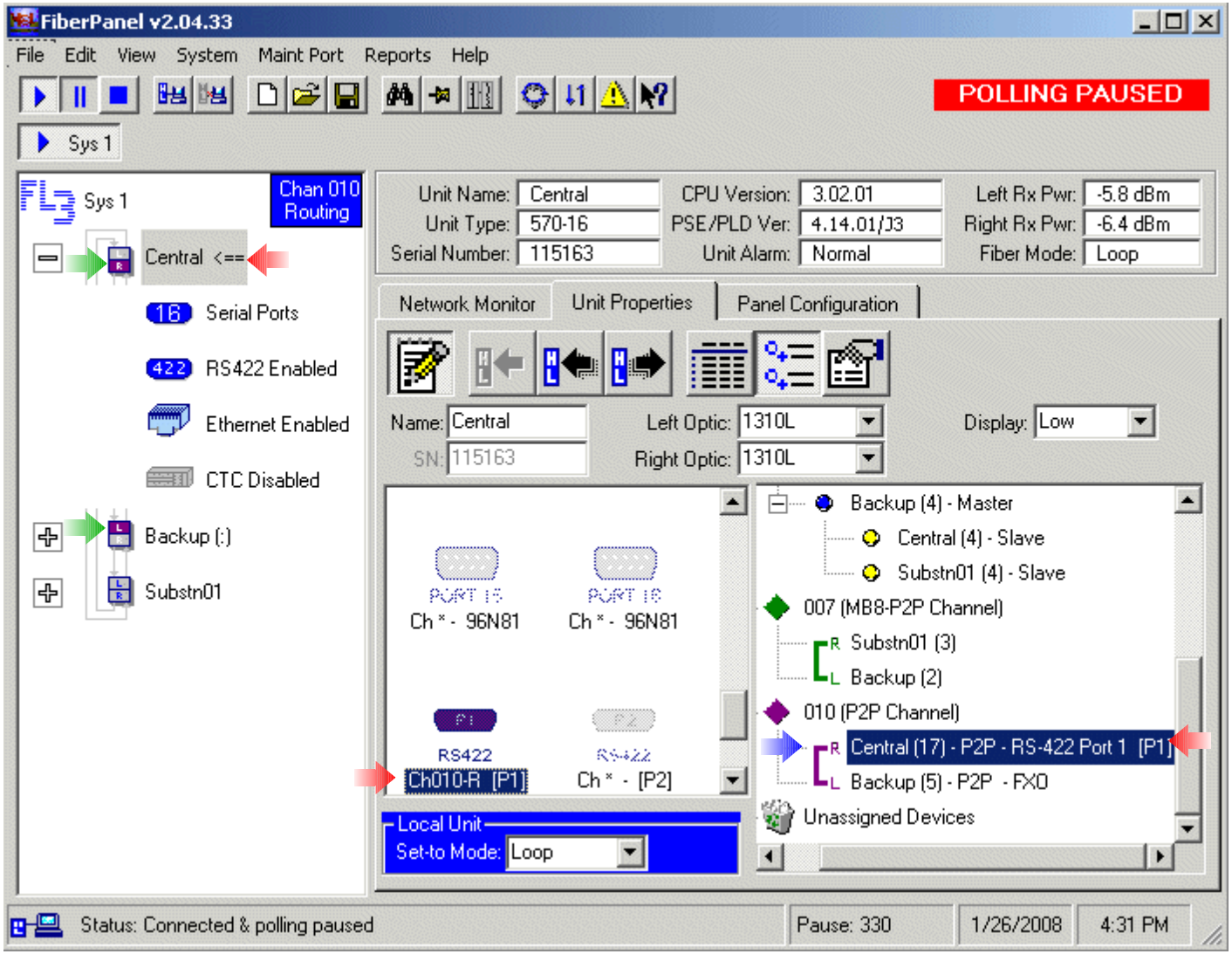
Unit Properties (cont)

Master/Slave and point-to-point channels are easily identified in the *Virtual Channel Map*.

- Device 17 on Central is selected in this example. It is using channel 010 as a point-to-point channel to device 5 on Backup.

- Clicking on a device in the *Virtual Channel Map* highlights that device on the *Device Map* and the associated unit on the *System Map*.

- It also changes the colors of the units on the *System Map* to show the normal fiber route used for communications between these devices.



Serial Port Properties

- Device properties are configured by right-clicking the device's icon on the *Device* or *Virtual Channel Map.*

The following example shows the steps required to set up a serial port device.

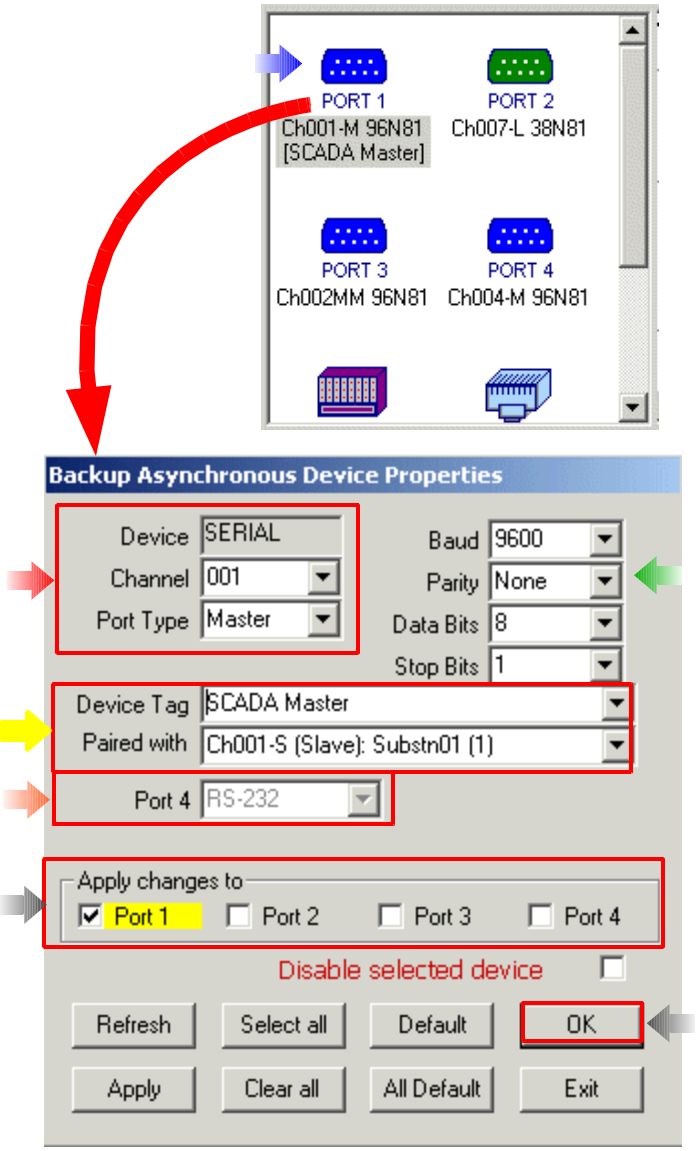
- Define the virtual channel on the fiber and the type of port. Up to 128 virtual channels and master, slave, point-to-point, Mirrored Bits®, multi-master, and multi-master slave ports are available depending on the model ordered.

- Define the serial port's properties.

- Attach a device tag for easy port identification. A list of all ports assigned to the selected virtual channel appears in the Paired with text box.

- Select Port 4's mode of operation, RS-232 or RS-232/RS-485 (more on this on the next slide).

- Select the port or ports to save these settings to and click *OK*.



RS-232/RS-485 on Port 4

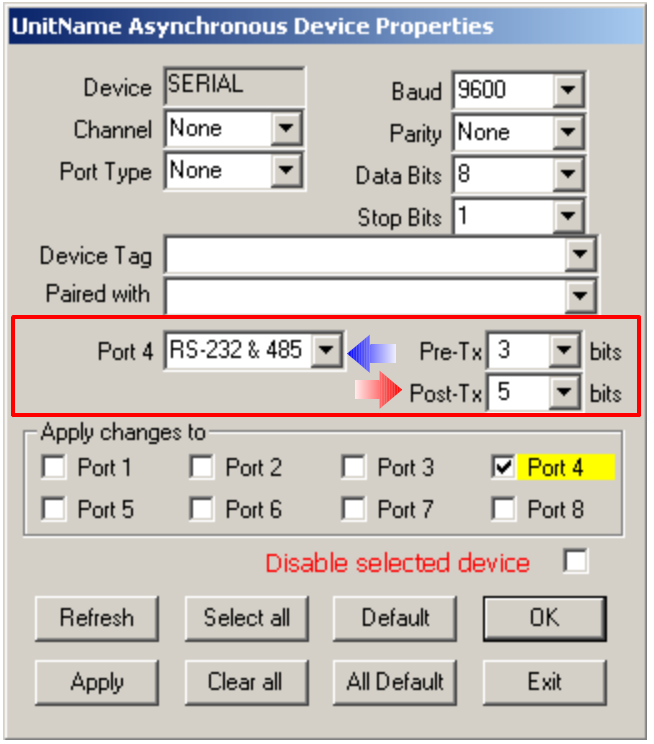
Port 4 is a special port in that it supports both RS-232 and RS-485 communications.

RS-485 is a two-wire standard that allows you to easily connect multiple Intelligent Electronic Devices (IEDs) using a single twisted pair cable and is offered on many devices.

To configure RS-485:

- Select the RS-232/485 option in the port properties window.
- Set the programmable *Pre* and *Post* transmit delay timers allow you to customize the RS-485 interface to match the other devices on the line.

Our RS-485 port is optically isolated to withstand 1500 VRMS and was developed in cooperation with Power Measurements Ltd. We use the same proven circuit that they use in their Ion™ meters.



Power Supply

FiberLoop units feature internal, isolated, transient protected, fused, switched power supplies. They can be ordered to operate on 9-36, 18-75, 125, or 250 Vdc, or 120, 230, 277 Vac. Concerned about heat? **No fans are required to cool our units.** They are also available in a low profile configuration where space is a premium (low profile units do not support Extended I/O or Ethernet).

Model 570 – Low Profile

Virtual Devices

The new concept of *virtual devices* was introduced with FiberLoop III. These devices may be either hardware and/or software based depending on the need.

Ethernet is one such device. Our Ethernet support provides two ports that provide a transparent 10/100BaseT interface that distributes loop protected Ethernet traffic around the FiberLoop network.

Ethernet
E1 Enabled

Model 570 – Normal Profile

Virtual Devices (cont)

Extended I/O provides access to two auxiliary hardware sockets on the FiberLoop III. These sockets support MultiTech universal socket based interfaces and are wired out to the *Extended I/O* socket shown a the right.

Currently available interfaces include SocketSLIC for 2-wire and 4-wire telephone applications, RS-422 (synchronous), Eaton Cutler-Hammer INCOM, and support for Ardax Digital Orderwire.

We can provide custom solutions to fit almost any requirement. Contact us to discuss your needs.

Virtual devices are displayed in the *System*, *Device,* and *Virtual Channel* maps and are configured by simply right-clicking on their icons.

Virtual Devices (cont)

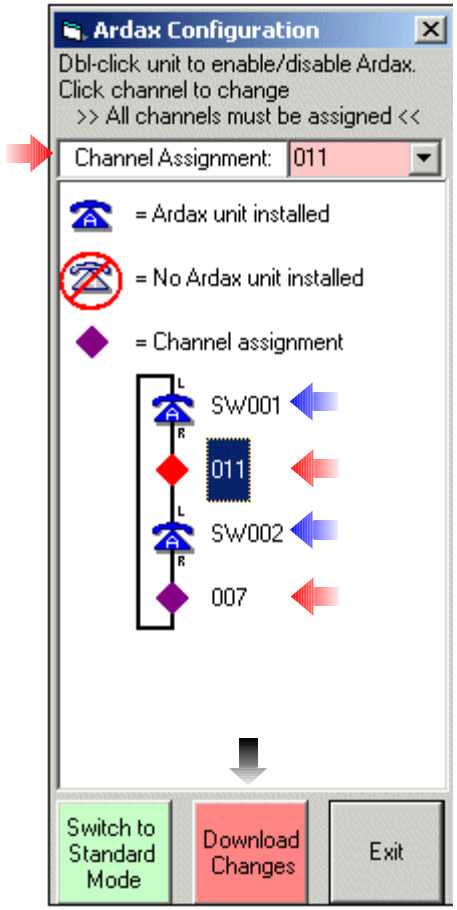
RS-422 and Ardax Digital Order Wire

The RS-422 option available on the *Extended I/O* connection can provide two standard RS-422 synchronous ports. In addition, these ports can be used to drive an Ardax 705203 Digital Orderwire network that provide dial-up telephone service to every node in your system using standard tone dial telephones. It can also provide access to the public switched telephone network.

Configuring the orderwire feature is a snap with our smart configuration map.

Simply follow these steps:

- Enable orderwire on the nodes that have orderwire hardware. Nodes without hardware are automatically bypassed.
- Define the virtual channel that each RS-422 pair will use to communicate between units.
- Click the *Download Changes* button to save the configuration to the network.



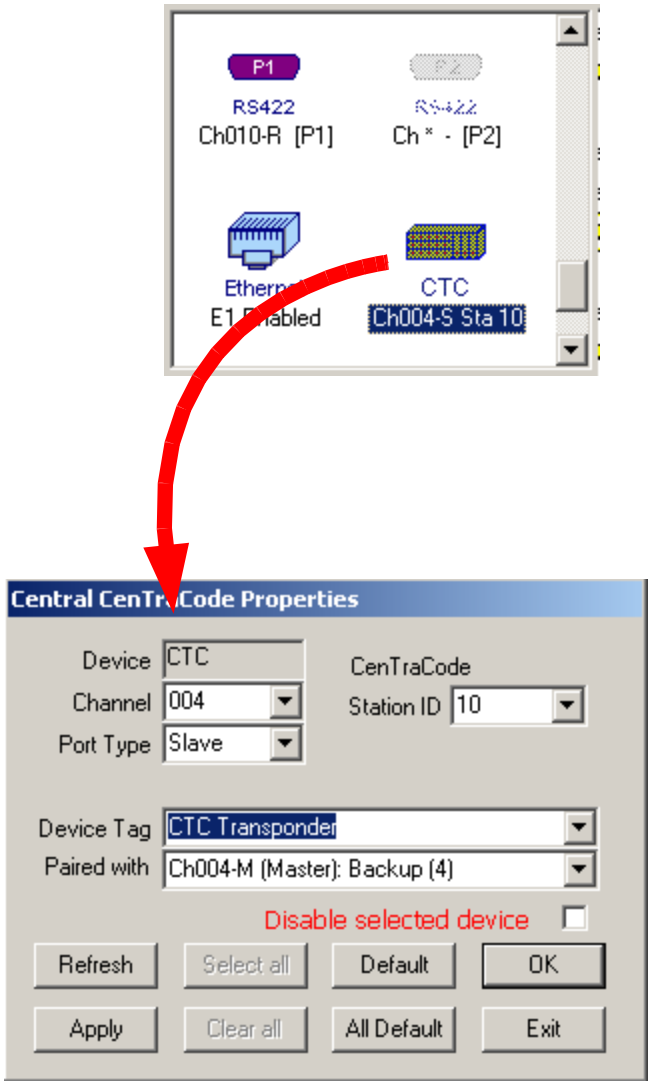
Virtual Devices (cont)

Alstom CenTraCode Transponder

This device is an example of a custom H&L firmware based virtual device.

The virtual *CTC transponder* was developed for a railroad customer that wanted the Model 570 transceiver to emulate a CenTraCode RTU so that the transceiver's condition could be monitored by their CenTraCode master.

The virtual CTC transponder is mapped to the same virtual channel used by the master to communicate with the actual RTUs. Each virtual CTC transponder is assigned a unique address and replies to the master when polled. If the 570 fails to reply for any reason, the failure will be detected and alarmed in the CenTraCode master.

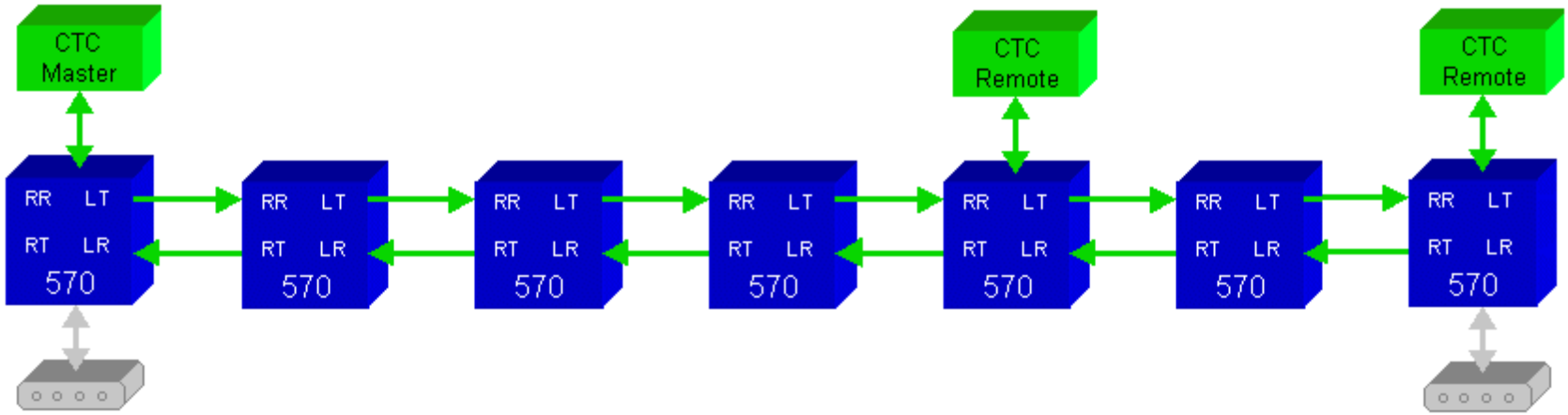


Virtual Devices (cont)
CTC Dial-Around

A railroad customer installed a FiberLoop network in a radial configuration along 50 miles of track right of way. In order to provide redundant route protection for their critical CenTraCode control system, H&L developed a unique dial-around scheme as a fail-over should the main fiber radial fail.

A simplified version of this scheme is shown below. In normal conditions, CTC traffic is routed on the FiberLoop network just like any other traffic in the network, as shown by the green arrows.

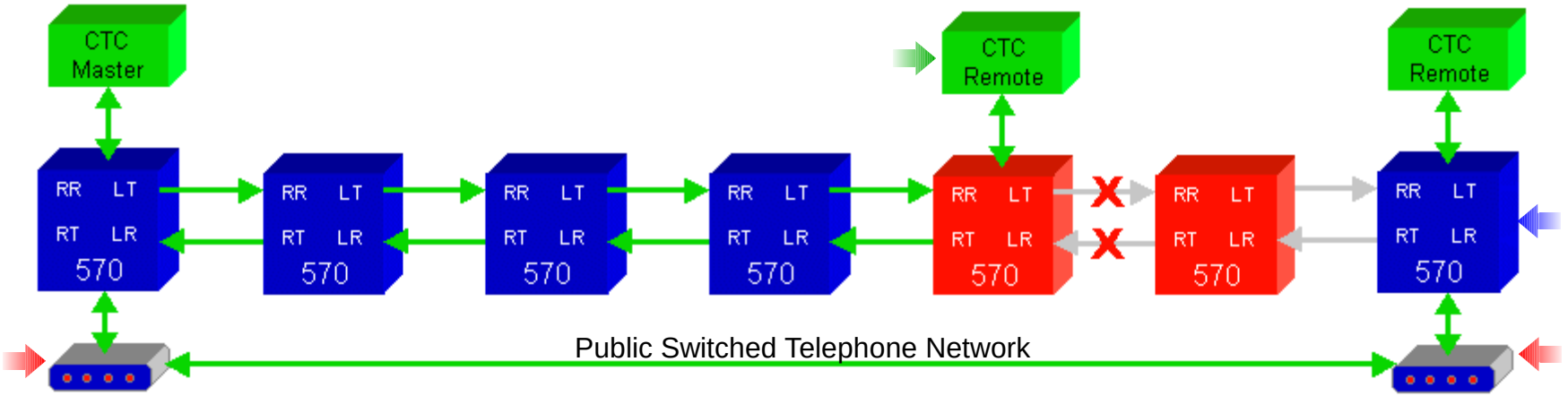
The end FiberLoop units have the *CTC dial-around virtual device* enabled on serial port 3. Standard dial-up modems are connected to this port and to the public switched telephone network. The modems are inactive during normal operations.



Virtual Devices (cont)
CTC Dial-Around (cont)

Should a fiber failure occur that stops CTC traffic from reaching the far end CTC remote, the following occurs:

- The failure is detected by the *CTC dial-around virtual device* on the far end unit
- It automatically calls the modem at the master end, re-establishing the communications path
- Other CTC remotes on the fiber not affected by the outage remain on the FiberLoop network
- Once the fiber route is restored the far end *CTC dial-around device* detects CTC traffic on the fiber and disconnects the modem connection



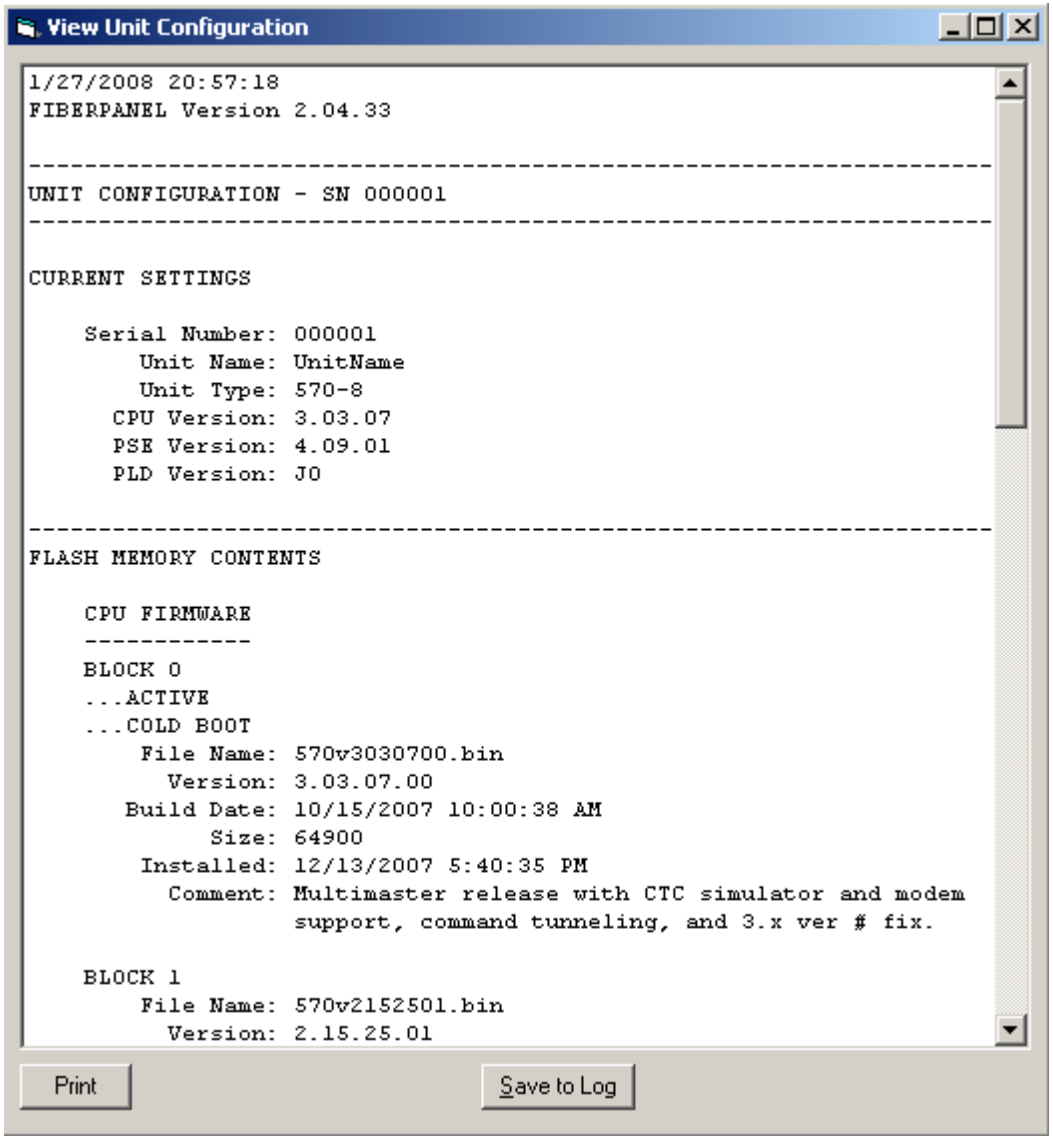
NOTE: This scheme could have also been implemented using any communications method such as radio, TCP/IP, or a DS0 channel.

Reports

FiberPanel provides various configuration and diagnostic reports to help you document, manage, and maintain your FiberLoop network.

The **Unit Configuration** report shown at the right provides a detailed list of firmware versions, flash memory contents, and device configurations in the unit.

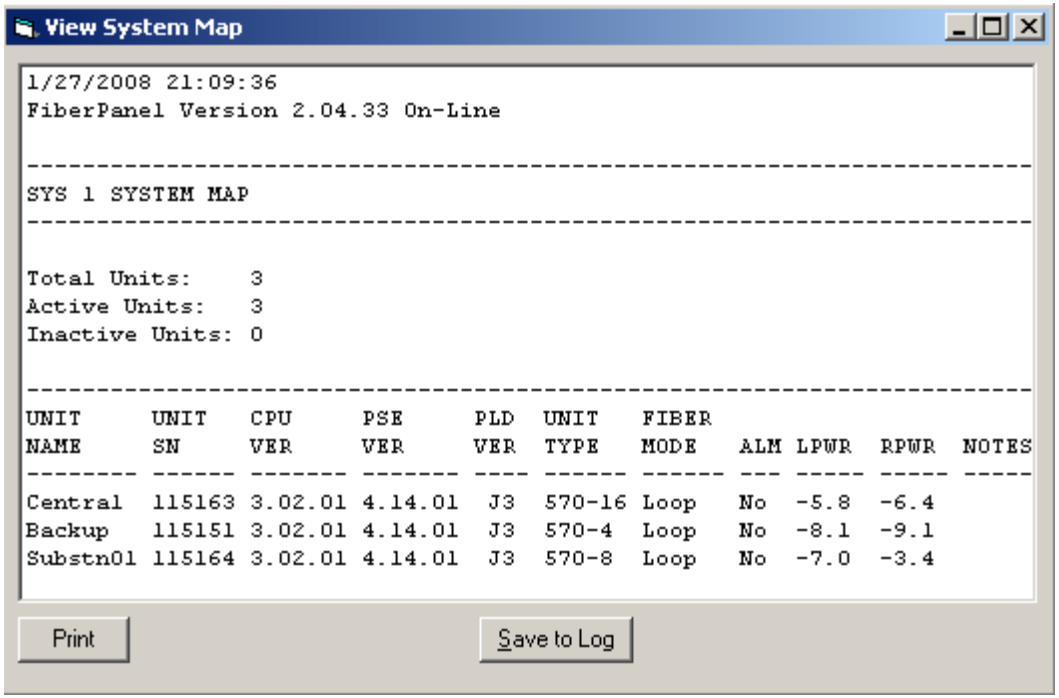
NOTE: All reports can be saved to the system log or printed.



Reports (cont)

The **System Map** report gives you a summary including the unit name, serial number, firmware versions, unit type, fiber mode, alarm status, and optical power levels on each unit in the network.

This report, when saved at system startup, gives you an inventory of the network and a benchmark of the receive optical levels.

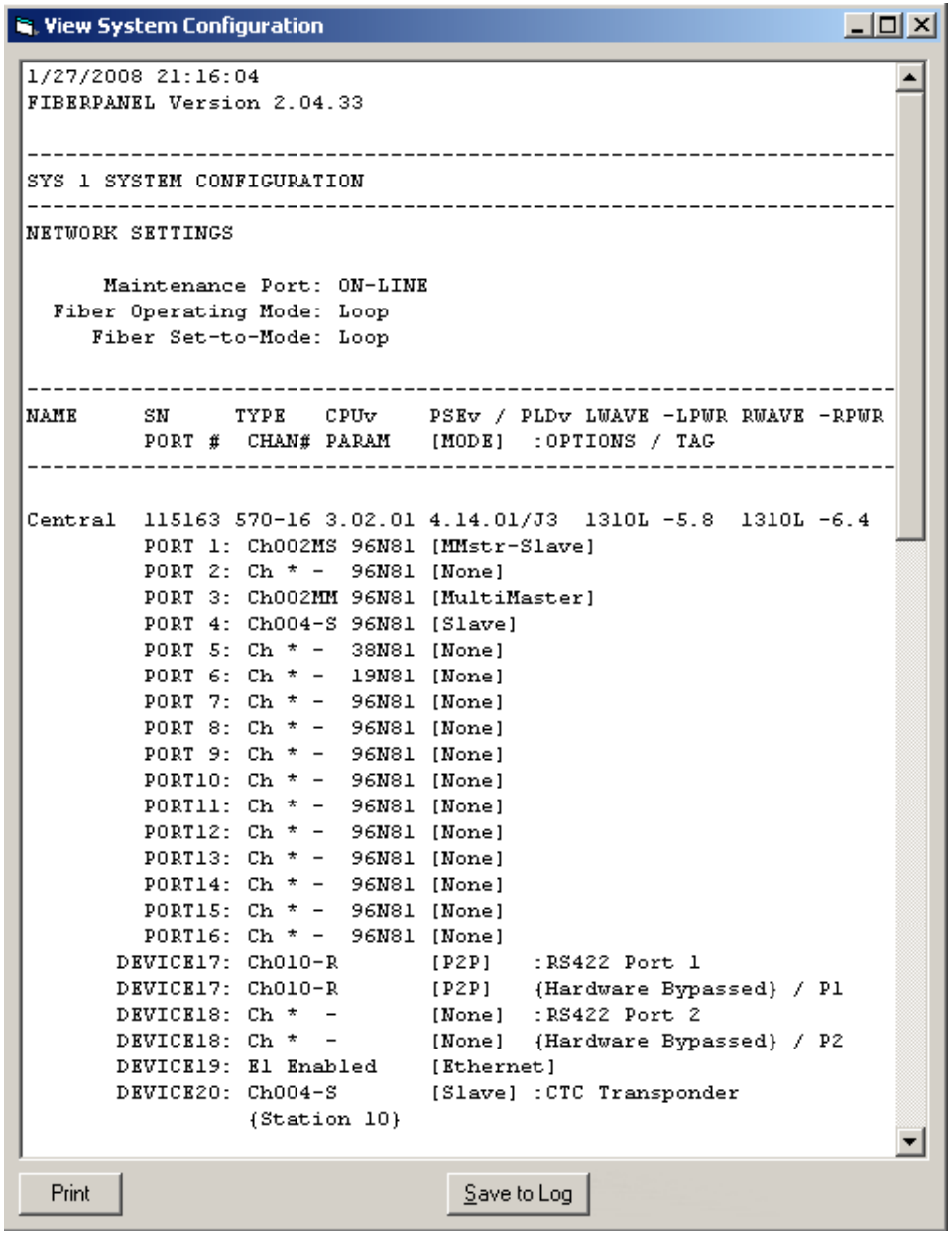


Reports (cont)

The **System Configuration** report provides additional detail on each of the units in the network.

Like the *System Map* report, it provides unit names, serial #s, unit types, firmware versions, and receive optical power on each unit.

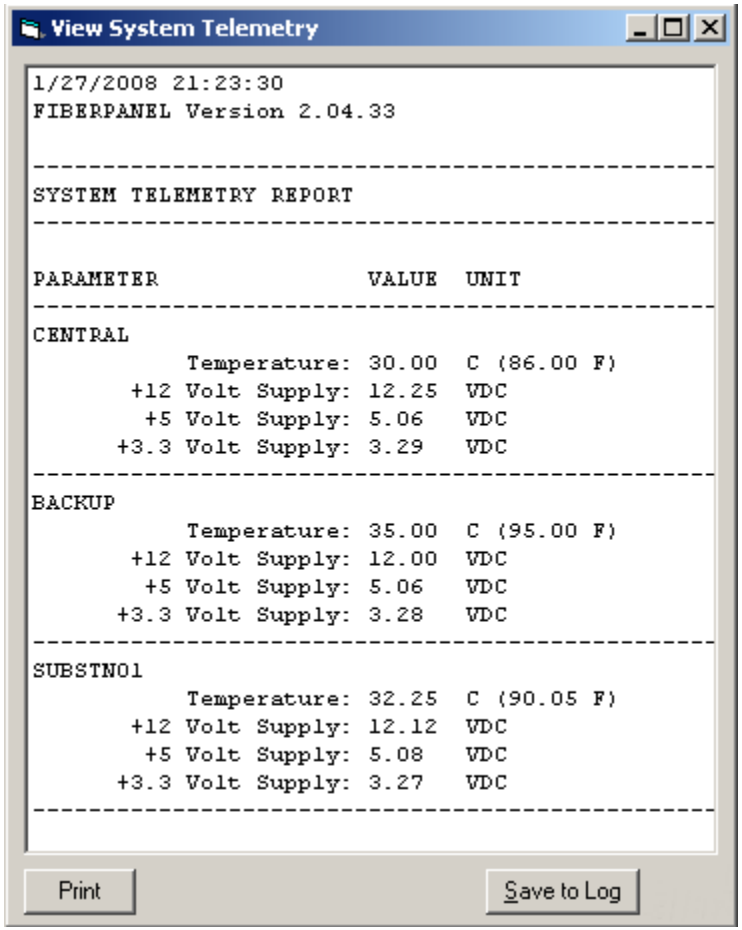
In addition, it provides a detailed list of each serial port and device on each unit, a text based virtual channel map, and a summary of FiberPanel's configuration.



Reports (cont)

The **System Telemetry** report is a diagnostic report that lists the internal temperature and power supply voltages on each unit.

This report can prove invaluable for diagnosing network problems caused by failing or overheating hardware.

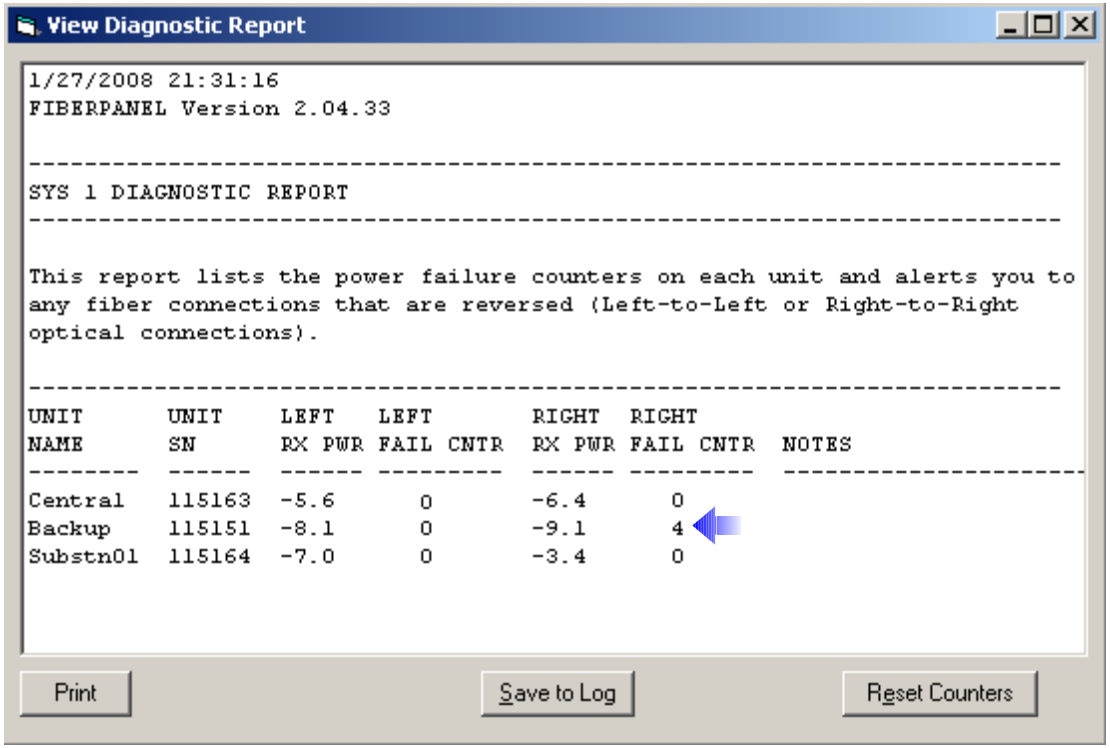


Reports (cont)

The **Diagnostic Report** is a diagnostic report that helps you easily locate intermittent fiber failures.

Bad fiber splices and connectors are the prime cause of intermittent failures. These types of problems are difficult, if not impossible to find because they don't stay in a failed state very long.

- Each unit in a FiberLoop network counts the number of times optical power is lost on each port. Using this report, it is easy to isolate the defective fiber path so maintenance can be performed before a total fiber failure occurs.

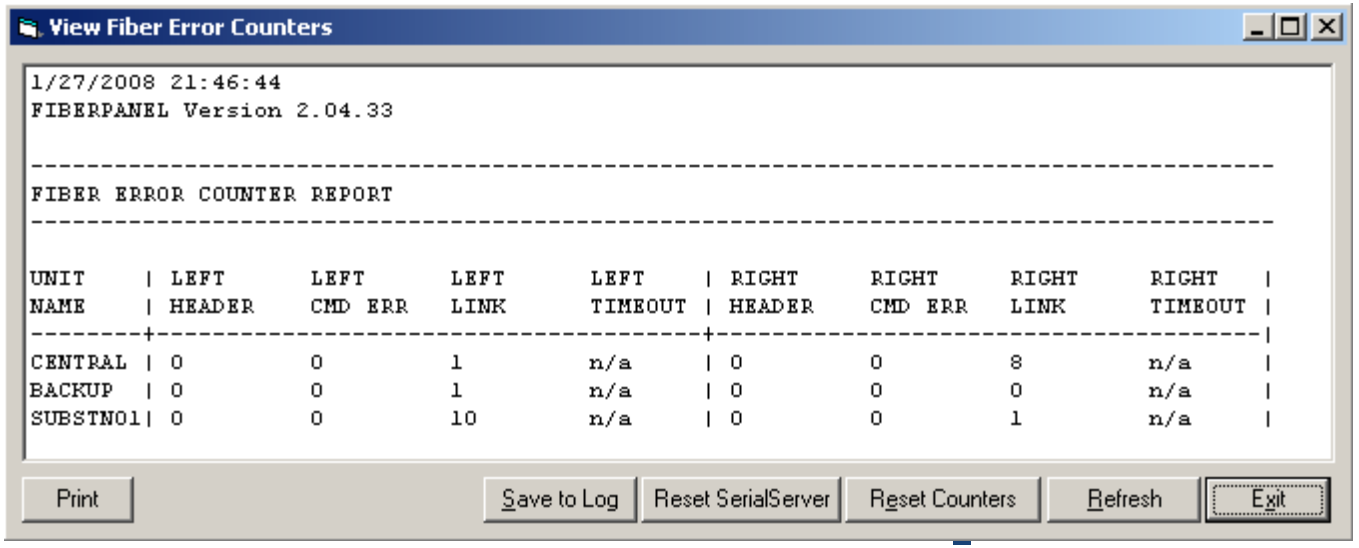


Reports (cont)

The **Fiber Error Counters** report is another diagnostic report that can help you locate subtle fiber errors before they affect system performance.

This report lists errors in the fiber transport protocol, including header, command, link, and timeout errors.

Errors on this report are typically caused by low optic power levels and intermittent fiber connections.



H&L Model 570E vs. a managed fiber based Ethernet switch

Many times we're asked about the difference between an Ethernet enabled Model 570 (570E) and a managed Ethernet switch with serial port capabilities. It's important to understand these differences when selecting a fiberoptic multiplexer.

The main, and most important difference, is that a Model 570E is a serial communications multiplexer with Ethernet capabilities, whereas a managed Ethernet switch carries serial packets as part of its Ethernet payload.

To better understand this difference, consider the following:

On the Model 570E, our architecture is based on serial communications. Our network is optimized to provide master/multi-slave, multi-master/multi-slave, point-to-point, and SEL Mirrored Bits® serial communications using our proprietary fiber protocol. The Ethernet port on a Model 570E is simply a data pipe that drops and inserts Ethernet traffic at each node and is transparent to the Ethernet devices connected to it. Because of this, there is little if any need for your IT department to manage the Model 570E and they have the freedom to connect whatever standard switch they deploy in your system.

Managed Ethernet switches are another story. Their architecture is based on IP addressing schemes. Serial ports on these devices typically use IP addresses and IP ports to access the network. This means that serial connections are typically limited to point-to-point connections. These devices do not support continuous streaming serial data such as SEL Mirrored Bits® nor do they support RS-422 *synchronous* connections. Since these are IP based devices your IT department will likely need to specify and manage these devices.

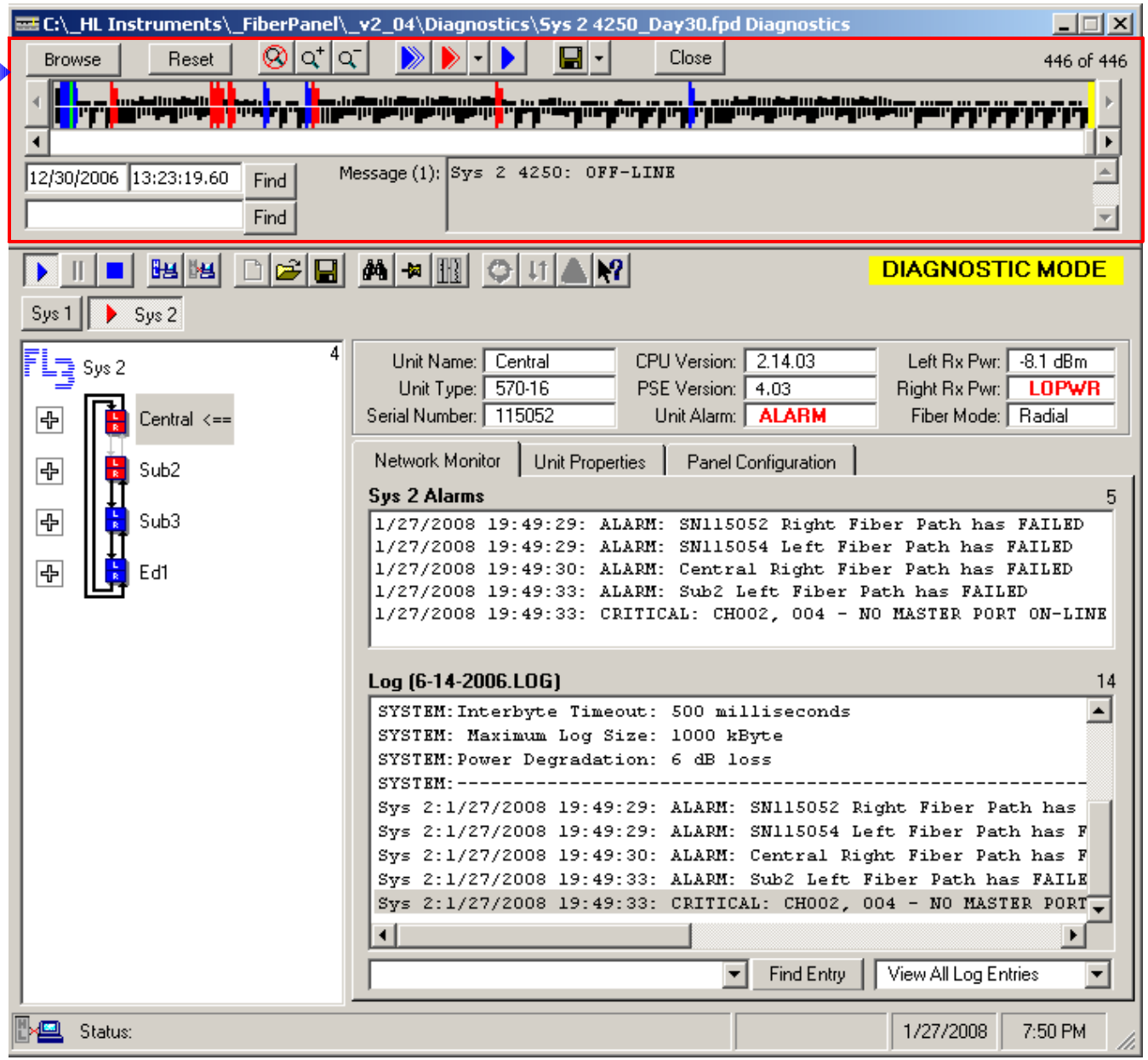
Black Box Recorder

How many times have you wanted to review a network failure but couldn't because there were no records of the event?

This won't happen with FiberPanel because it continually records every maintenance port transaction on every network it monitors.

- The *Black Box Viewer* allows you to retrieve and review this data step by step or replay the system operation starting from any selected point in time. The graphical time-line makes it easy to zero in on events.

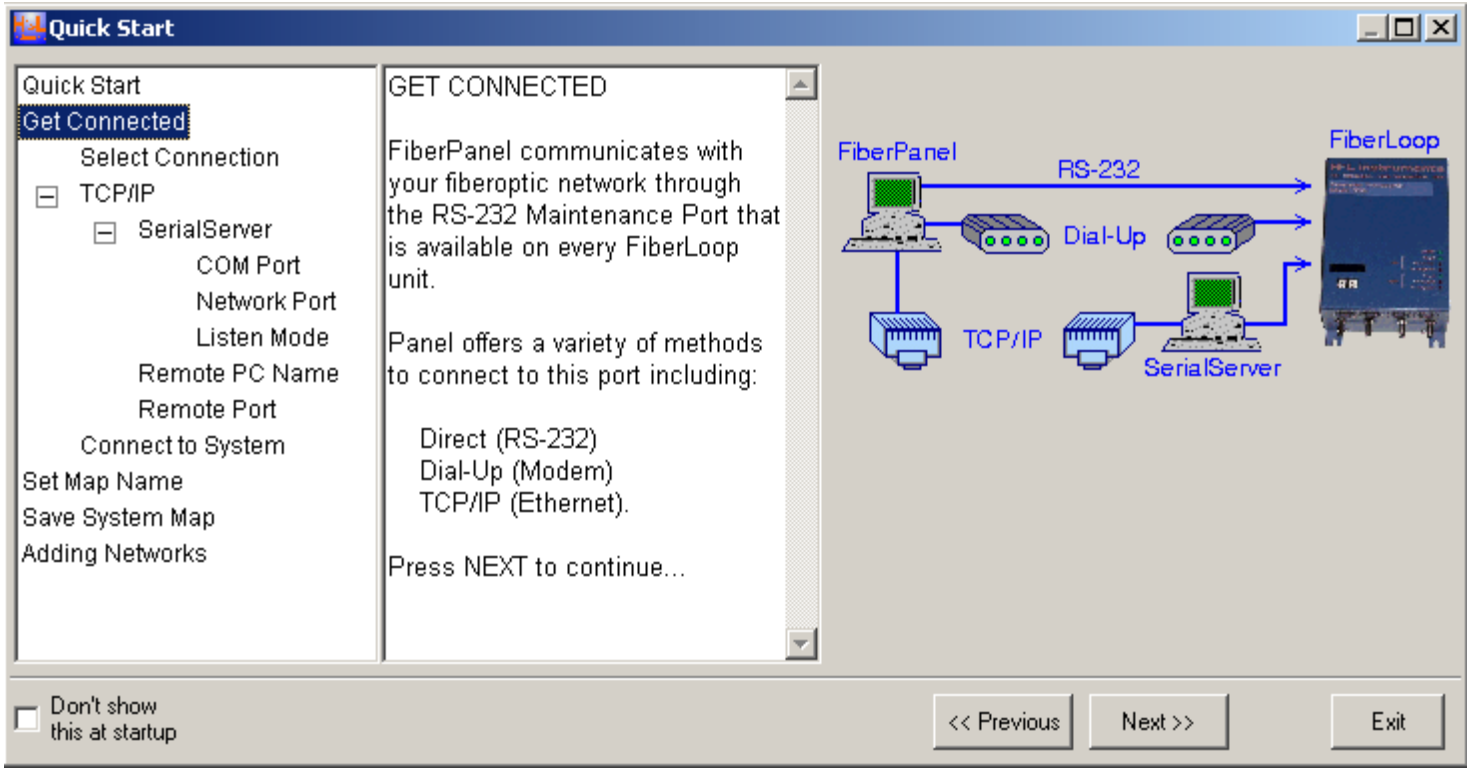
In the unlikely event that you need factory assistance to diagnose a failure, simply use the built-in SMTP server to e-mail us all diagnostic files for evaluation.



Help Features

FiberPanel includes several features to help you quickly learn the program.

When you first open FiberPanel, our interactive *Quick Start* window will step you through the process of connecting FiberPanel to your FiberLoop network.

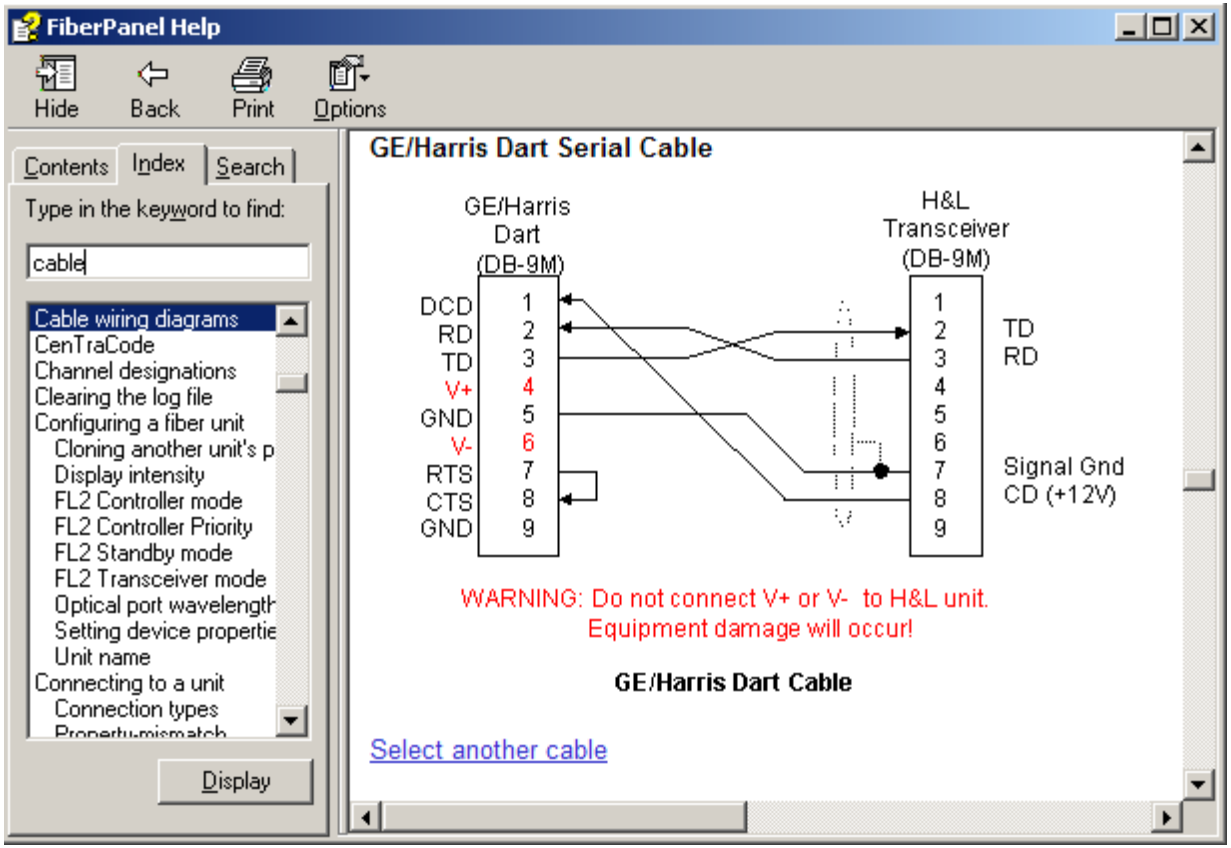


Help Features (cont)

For detailed instructions and helpful “how-to”s, consult our *On-line Help* file.

Here, we explain each option and guide you though the various tasks associated with managing a FiberLoop network.

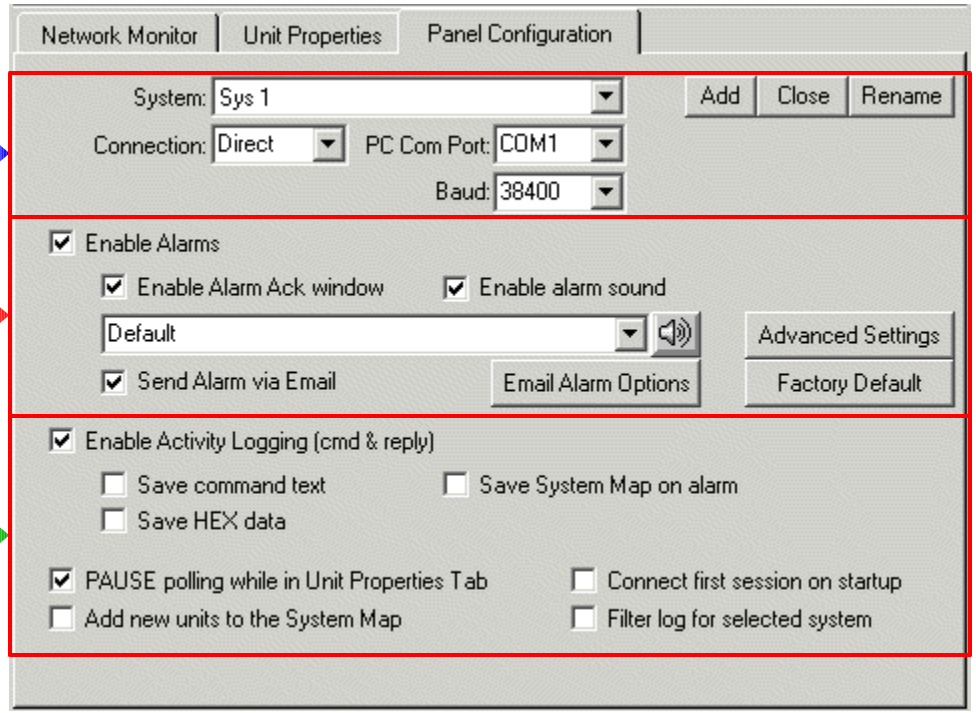
Also included in on-line help is a comprehensive cable wiring diagram section that contains cable schematics for many of RTUs and IEDs on the market. We regularly update this section as new devices are interfaced to FiberLoop transceivers.



FiberPanel Configuration

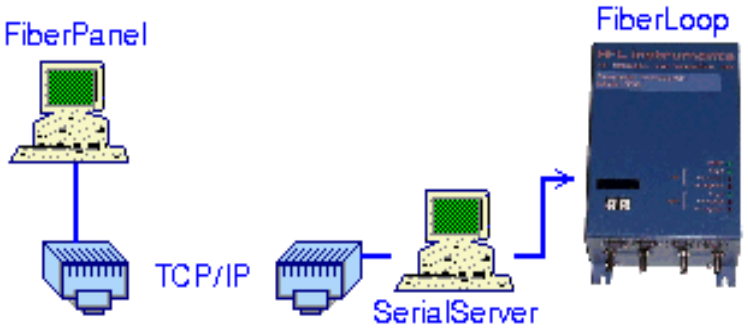
The *Panel Configuration* tab allows you to select various options in the panel program.

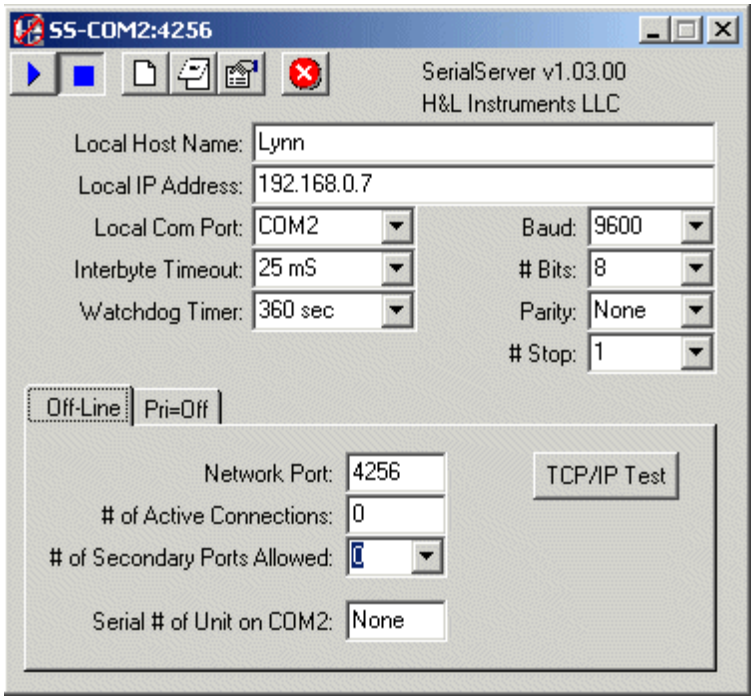
- Manage up to 16 separate FiberLoops by defining the system name and connection method for each network here. Serial, modem, and TCP/IP connections are available.
- Configure alarm options, alarm e-mail notification processing, and advanced options here.
- Configure activity logging and other features here.



SerialServer

FiberPanel ships with *SerialServer*, a custom TCP/IP serial port server that allows you to access a remote FiberLoop system via your corporate network or the Internet.





SerialServer allows FiberPanel to run on a remote PC and access a serial port on a computer located at the FiberLoop site over your TCP/IP network. It supports one primary connection and up to four secondary (monitor only) connections. Password protected login is available.

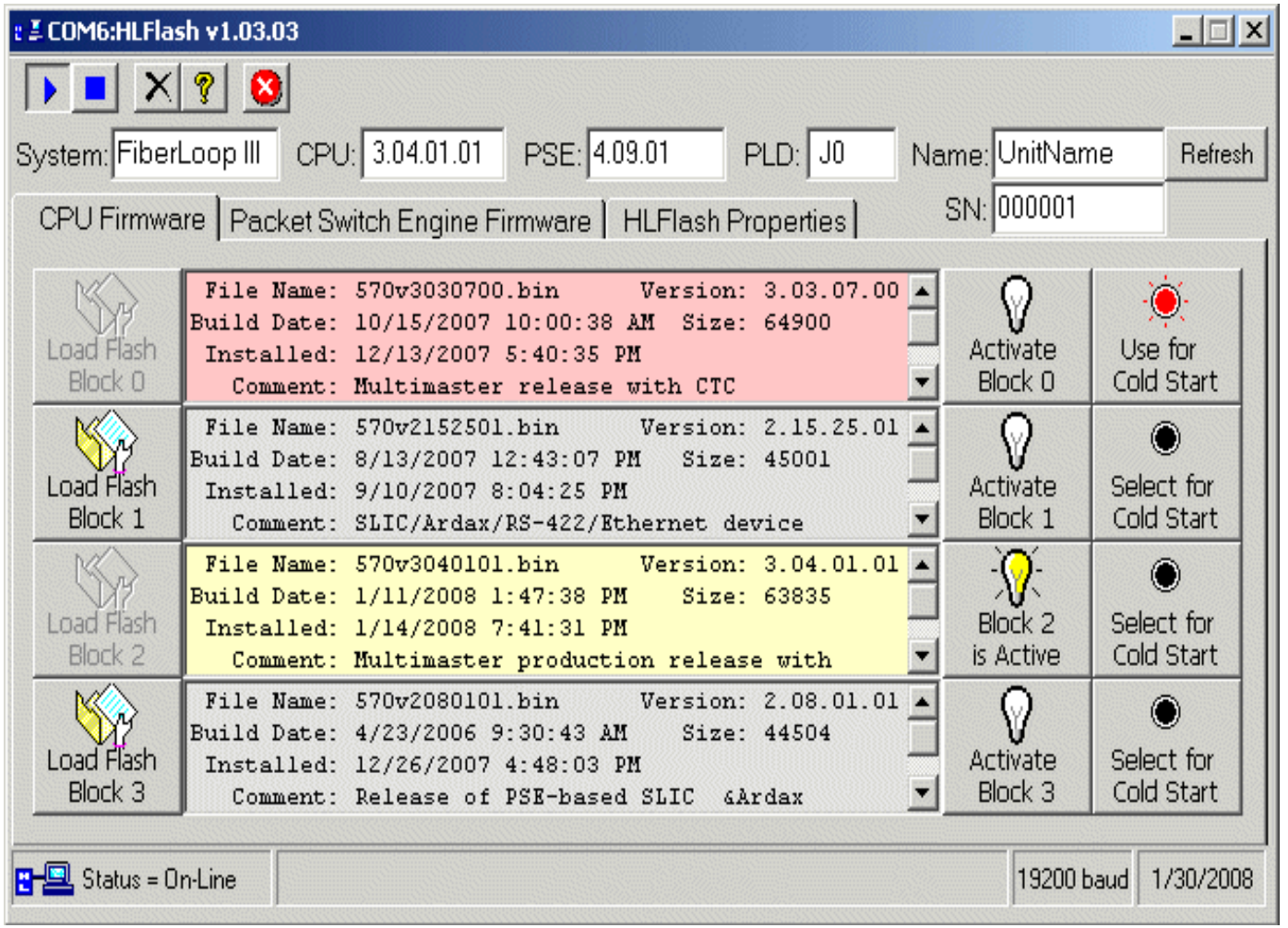
Third-party Ethernet/Serial Port servers are also supported, eliminating the need for a dedicated PC on-site.

HLFlash

HLFlash, another program that ships with FiberPanel, provides flash memory management for all H&L products.

This simple interface allows you to load up to four CPU and two Packet Switch Engine (PSE) firmware versions onto your FiberLoop unit then select which version is active and which version is used for cold boot.

The active/cold boot feature allows you to activate new firmware and reset back to an older version by cycling power should a problem occur with the new firmware (highly unlikely).



Thank you for considering H&L Instruments products for your fiberoptic network needs.

As you can see, we offer a full range of fiberoptic network options.

If you don't find what you need, call us at 1-603-964-1818.
We would be happy to discuss your unique requirements.

Please visit our Web site for additional information on our products.

To exit Acrobat®, use **Ctrl+Q.** To exit the demo in your browser use the **Back** button, or use **Ctrl+W** to close the browser tab.