FLUKE
networks ™

OptiView™
Workgroup Analyzer

Getting Started Guide

LIMITED WARRANTY & LIMITATION OF LIABILITY

Each Fluke Networks product is warranted to be free from defects in material and workmanship under normal use and service. The warranty period is one year and begins on the date of purchase. Parts, accessories, product repairs and services are warranted for 90 days. This warranty extends only to the original buyer or end-user customer of a Fluke Networks authorized reseller, and does not apply to disposable batteries, cable connector tabs, cable insulation-displacement connectors, or to any product which, in Fluke Networks' opinion, has been misused, altered, neglected, contaminated, or damaged by accident or abnormal conditions of operation or handling. Fluke Networks warrants that software will operate substantially in accordance with its functional specifications for 90 days and that it has been properly recorded on non-defective media. Fluke Networks does not warrant that software will be error free or operate without interruption.

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To obtain warranty service, contact your nearest Fluke Networks authorized service center to obtain return authorization information, then send the product to that service center, with a description of the difficulty, postage and insurance prepaid (FOB Destination). Fluke Networks assumes no risk for damage in transit. Following warranty repair, the product will be returned to Buyer, transportation prepaid (FOB Destination).   If Fluke Networks determines that failure was caused by neglect, misuse, contamination, alteration, accident or abnormal condition of operation or handling, or normal wear and tear of mechanical components, Fluke Networks will provide an estimate of repair costs and obtain authorization before commencing the work. Following repair, the product will be returned to the Buyer transportation prepaid and the Buyer will be billed for the repair and return transportation charges (FOB Shipping Point).

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Cryptix General License

Note

This Cryptix General License only applies to the data encryption software used by the OptiView remote user interface.

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Before You Start

Safety Information

The following symbols are used on the product and in this document:

⊗	NOT FOR CONNECTION TO PUBLIC TELEPHONE SYSTEMS
⚠	PLEASE READ MANUAL FOR SAFETY
CE	COMPLIES WITH EUROPEAN UNION DIRECTIVE
⚡	SHOCK HAZARD
☀	CLASS 1 LASER PRODUCT. DO NOT LOOK INTO LASER
ⓒⓈ us	COMPLIES TO CSA C22.2 No. 950 CANADIAN STANDARDS, AND UL 1950 (US STANDARDS)

The OptiView™ Workgroup Analyzer (hereafter referred to as the "analyzer") complies with:

- Class 1 Laser product 21 CFR 1040.10 & 1040.11, CFR(J)
- CSA C22.2 No 950, and EN60950

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⚠**Warnings**

To avoid possible electric shock or personal injury, follow these guidelines:

- **Do not use this product if it is damaged. Before using the product, inspect the case. Look for cracked or missing plastic. Pay particular attention to the insulation surrounding the connectors.**

- **Do not operate the product around explosive gas, vapor or dust.**

- **No serviceable parts.**

- **This product contains a Class I laser (OptiView™ Workgroup Pro and Pro Gigabit models); looking into the laser port may cause eye damage.**

- **Do not connect a telephone line to this product.**

- **If this product is used in a manner not specified by the manufacturer, the protection provided by the product may be impaired.**

⚠**Cautions**

To avoid possible damage to the analyzer and to the equipment under test, follow these guidelines.

- **Use the proper terminals and cable for all connections.**

Cleaning the Analyzer

Wipe the case with a damp cloth. Do not use organic solvents, acid, or alkali solutions.

Has This Instrument Been Damaged in Shipping?

ATTENTION!

In case of damage, call the carrier at once for inspection, and request an inspection report. ALWAYS NOTIFY THE CARRIER FIRST! Please do not write the factory until you have notified the carrier, since this will delay the claim.

If this precaution is not taken, we cannot assist you in recovering the amount of claim against the carrier.

When the carrier's inspection report is obtained, you may return the instrument and copy of the inspection report to the factory immediately.

Contacting Fluke Networks Sales, Service, and Support Centers

Visit the Fluke Networks contact website at
www.flukenetworks.com/contact. Send email to
support@flukenetworks.com. For operator assistance in the USA, call
1-800-28-FLUKE (1-800-283-5853). To order accessories or get the location of the
nearest Fluke Networks distributor or service center, call:

Anywhere in the world: +1-425-446-4519
Australia: 61 (2) 8850-3333 or 61 (3) 9329-0244
Beijing: 86 (10) 6512-3435
Brazil: 11 3044 1277
Canada: 1-800-36-FLUKE (1-800-363-5853)
Europe: +44 1923 281 300
Hong Kong: 852 2721-3228
Japan: +81-3-3434-0181
Korea: 82 2 539-6311
Singapore: +65-6738-5655
Taiwan: (886) 2-227-83199
USA: 1-800-28-FLUKE (1-800-283-5853)

OptiView™ Analyzer Support

As a registered user, you are entitled to entry level product support, including three
free telephone support incidents during the first 60 days of ownership, access to
the entry level online Knowledge Base library of product operation and application
information, and Web-based trouble ticketing. We will also be sending you Fluke
Networks company and product information updates.

Please take the time to register your analyzer. A registration card is supplied in the
shipping box. You can also register by going to **www.flukenetworks.com**,
clicking on **support**, then clicking on **Registration**. A *Log in* screen is displayed.
Click on **create** to setup an account password if you have not done so before. Then
you will be able to log in using your email address and password. Once logged in,
you can fill out the online registration form by clicking on **Register a product**.

The Analyzer and Accessories

The analyzer is designed for troubleshooting and monitoring Local Area Networks (LANs). It tests all seven OSI layers from the cable to the application layer and everything in between, so problems have nowhere to hide. The analyzer can be used in a stand-alone fashion or mounted in a rack using the optional rackmount kit. There are three models available:

❑ **OptiView™ Workgroup** (standard version) - supports 10/100 Ethernet (10BASE-T and 100BASE-TX) through an RJ-45 jack. Features an additional 10/100 Ethernet RJ-45 jack for out-of-band management, and is RMON/RMON2 compliant.

❑ **OptiView™ Workgroup Pro** - adds to the standard version a 100BASE-FX fiber optic interface, and packet capture.

❑ **OptiView™ Workgroup Pro Gigabit** - adds to the Pro version a fiber 1000BASE-SX interface using a standard GBIC (a 1000BASE-LX or 1000BASE-TX GBIC may be ordered as an option).
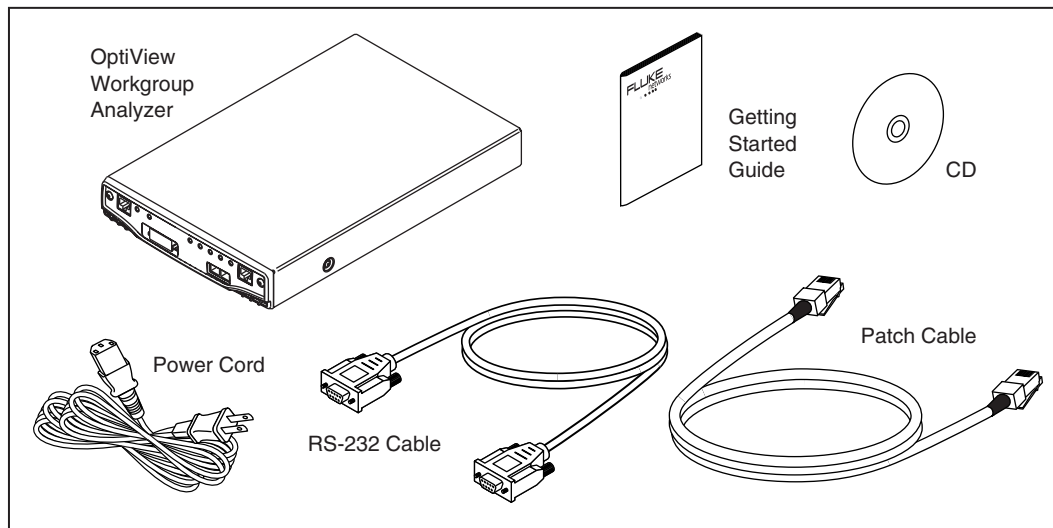
anj01f.eps

Figure 1. The Standard OptiView™ Workgroup Analyzer and Supplied Accessories

Supplied Out of the Box Items

The following equipment is supplied with the OptiView™ Workgroup Analyzer. Model-dependent items are specified in the table.

Table 1. Supplied OptiView™ Workgroup Analyzer Items

Item	Description	Model/Part Number
AC power cord	Country specific AC power cord.	284174 North America 769455 UK 769422 Cont. Europe 728771 South Africa 658641 Australia
Getting Started Guide	Provides basic operating information, accessory part numbers, and specifications.	1606384
CD-ROM	OptiView™ Resource CD. Includes user interface software Getting Started Guide (Multiple languages in PDF format), Help file (.CHM), and MIB Browser.	1626397
Female to female DB-9 null modem RS-232 cable	Serial configuration port cable. Used to manually configure the analyzer as opposed to configuring the analyzer through the user interface software.	944806
CAT5 patch cable	Patch cable for connecting the Management port to a 10/100 Ethernet interface	107109
Registration Card	Fluke Networks can serve you best by registering online at www.flukenetworks.com. If you cannot register online, please fill out and return the supplied registration card.	N/A

Table 2. Other Available Accessories

Item	Description	Model/Part Number
OptiView Reporter™	The OptiView Reporter™ application allows you to communicate remotely with an OptiView™ Workgroup Analyzer to generate reports on the network to which the analyzer is connected.	OPV-RPT 1578901
OptiView Protocol Expert™	The Fluke Networks Windows based protocol analyzer for network engineers, LAN administrators, and network technicians who maintain LANs. The application allows you to monitor and decode captured packets on your local network. The application will decode OptiView™ Workgroup Analyzer packet capture files. This application is intended to be installed on a PC that will be running the OptiView Remote User Interface.	OPV-PE/PRO 1627440
OptiView™ Expert Analysis Option	Adds expert analysis to the OptiView Protocol Expert PC application described above. When you purchase this option, you are given a key code that will need to be entered in the OptiView Protocol Expert application's **Tools	Add New Plug-in "Adding a Plug-in"** screen.	OPVS2-EXPT 2139187
OptiView Console™	The Fluke Networks OptiView Console™ application is a Windows software tool for network engineers, LAN administrators, and network technicians who maintain LANs. The application allows you to monitor, map, and troubleshoot LAN segments that could consist of servers, routers, switches, printers, managed hubs, and clients (hosts and other network devices).	NIS-OPV 1593670
19" Rackmount Kit	Rack mount kit for holding one or two OptiView™ Workgroup Analyzers.	OPV-RMK 1606511
DSP-FTK, Fiber Optic Test Kit	The DSP-FTK Fiber Test Kit is used to measure the optical power loss of fiber optic cables. The kit includes an optical power meter (DSP-FOM) and an optical power source (FOS-850/1300). Together these instruments can verify the performance of multimode fiber optic cable.	DSP-FTK /615937
	Simply connect the test kit's RJ-45 connector into the analyzer's 10/100 BASE-TX port, go to the analyzer's **Cable Test** screen and select the **Fiber Test** tab to perform fiber measurements. Refer to the analyzer's Help topic "Fiber Test" for setup procedures.	
	The DSP-FTK Fiber Test Kit is supplied in a hard carrying case with the following:	
	• One (1) DSP-FOM power meter • One (1) FOS-850/1300 power source • One (1) ST-ST singlemode-capable adapter • Two (2) ST-ST jumper cables • User documentation consisting of an instruction sheet and registration card	

Table 2. Other Available Accessories (cont)

OptiView™ WAN Vision	Adds additional WAN Layer 2 and Layer 3 MIB support for Frame Relay, Sonet, ISDN, etc. devices. A license key is provided which must be entered through the OptiView™ user interface (in the **Setup | Options** screen). A 15 day evaluation period is initially given to discover the benefits of this option before purchase. The evaluation period is decremented when WAN information is displayed in the **Tools | Interfaces** screen, with a maximum of one decrement per day.	OPV-WV/2003738
OptiView™ VLAN Vision	Adds off-net discovery of network devices and VLAN support for SNMP manageable switches. Search in the Help for "Supported Switches" topic to learn more about specific devices. A license key is provided which must be entered through the OptiView™ user interface (in the **Setup | Options** screen). A 15 day evaluation period is initially given to discover the benefits of this option before purchase. The evaluation period is decremented when VLAN information is displayed, with a maximum of one decrement per day.	OPV-VLAN/2112468
Hard side transit case	Hard shell transit case for shipping analyzers to remote sites.	OPV-TCASE 1630617
GBIC-SX	850nm, 1000BASE-SX GBIC module used in the OptiView™ Workgroup Pro Gigabit analyzer. Used with multi-mode fiber.	OPV-SX 1586550
GBIC-LX	1300nm, 1000BASE-LX GBIC module used in the OptiView™ Workgroup Pro Gigabit analyzer. Used with single-mode fiber.	OPV-LX 1586605
GBIC-TX	Copper 1000BASE-TX GBIC module used in the OptiView™ Workgroup Pro Gigabit analyzer. This module is used with twisted pair copper.	OPV-TX 1626866
Gold Service Support Package	OptiView Workgroup Analyzer Gold Service Support package.	GOLD-OPVWGA 1619733
Standard to Pro upgrade	Service Center upgrade to change a standard version model into a Pro version model.	OPV-WGA/PROE 1 16283321
Pro to Pro Gigabit upgrade	Service Center upgrade to change a Pro version model into a Pro Gigabit version model.	OPV-WGA/GIGE 1 1628342
Standard to Pro Gigabit upgrade	Service Center upgrade to change a standard version model into a Pro Gigabit version model.	OPV-WGA/GIGE 2 1628339

About the Analyzer

General Specifications

- **Analyzer Interfaces:** 10/100BASE-T (RJ-45), 100BASE-FX (SC fiber), and 1000BASE-X (SX, LX, and TX GBIC)

- **Analyzer LEDs:** Management Link, Power, Link, Utilization, Transmit, Collision, and Errors

- **Test Access:** Active termination to a switch port, switch span port, or a hub

- **Layer 2 Support:** Ethernet

- **Management Port:** 10/100BASE-T (RJ-45)

- **Configuration Port:** Serial RS-232 (9-pin male)

- **Capture Memory:** 64 Mbytes (OptiView™ Workgroup Pro and Pro Gigabit models, does not apply to the Standard model)

A Look at the Analyzer External Connections and LEDs

External Connectors

MANAGEMENT: Remote control interface. Accepts 10BASE-T/100BASE-TX twisted pair copper cable.

1000BASE-X (Pro Gigabit model only): Network analysis interface. Accepts copper and fiber (850nm or 1300nm) 1000BASE-SX/LX/TX GBIC modules. Used with single and multi- mode fiber, and twisted pair copper cable.

100BASE-FX (Pro and Pro Gigabit models only): Network analysis interface. Accepts 100BASE-FX fiber.

10BASE-T/100BASE-TX**:** Network analysis interface. Accepts copper 10BASE-T/100BASE-TX.

LEDs

Management Link (MGMT LINK): Indicates that link has been established on the Management connection (green). Flashing green indicates activity is present.

Power (PWR): Indicates whether the analyzer is Off or On (blue).

Link (LINK): Indicates one of the test interfaces is connected to the network and Link has been established. Blinking red = no link, green = link established via straight-through patch cable, yellow = link established via a cross-over patch cable.

Utilization (UTIL): Indicates the percent of utilization the network under test interface is experiencing (green = 0 - 49%, yellow = 50 - 79%, red = 80 - 100%).

Transmit (XMIT): Indicates analyzer transmit activity (yellow). When the analyzer is first powered on, it will generate transmit activity while trying to identify devices on the network. Ping, Trace Route, Trace Switch Route, and Traffic Generator will cause this LED to flash in proportion to the amount of transmit activity.

Collision (COLSN): Indicates by yellow flashing intensity the amount of Collisions being experienced on the network (yellow).

Error (ERROR): Indicates by red flashing intensity the amount of Errors being experienced on the network (red). The Ethernet layer 2 error types include CRC alignment, undersize, oversize, and jabber errors.

anj03f.eps
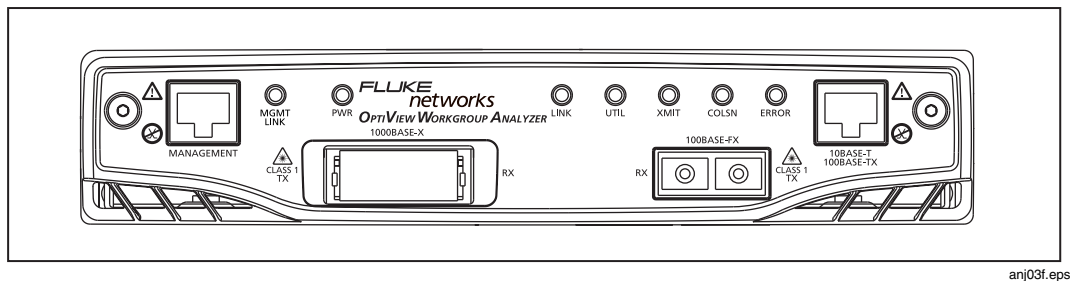
Figure 2. Front View of the Analyzer

Connecting to the Network Under Test (NUT) Interface

Connect a patch cable to either the 10BASE-T/100BASE-TX, 100BASE-FX, or 1000BASE-X connector and connect the other end of the cable to any Ethernet port in the network you want to test. This is considered the network under test (NUT) connection.

Connecting to the Management Port

Use the Management port to manage the analyzer out of band when it is connected to a different network (outside the network under test broadcast domain). In the event that you are unable to communicate with the analyzer through the 10BASE-T/100BASE-TX, 100BASE-FX, or 1000BASE-X (NUT) interface, you can use the Management port to gain access to the analyzer.

The Management port is not a measurement interface. The Management port facilitates remote control. Test functions such as traffic generation, cable testing and active discovery only apply to the network under test interfaces (i.e., 10/100BASE-T, 100BASE-FX, and 1000BASE-X). The Management port is also used to flash new software into the analyzer. Note: Analyzer software updates can only be done through the Management port.

Acccessing the Analyzer through the Remote User Interface Software

The Remote User Interface software will need to be installed on your PC before you will be able to remotely interface with the analyzer. It is included on the supplied OptiView™ Resource CD.

To view decodes of the packets captured by the analyzer you need to purchase and install the Fluke Networks Protocol Expert. Alternatively, the captured files can, in most cases, be imported into other 3rd party protocol analysis software products.

User Interface Features

- Remotely control any analyzer via the network under test interface (in- band) or via the Ethernet 10/100 Management port (out-of-band)

- Change setup parameters and packet capture filters in remote analyzers (Pro and Pro Gigabit versions only)

- View analyzer measurements remotely (statistics, problem log, discovery results, etc.)

- Update both the user interface software and analyzer firmware from a single downloaded file from www.flukenetworks.com

- Save reports to an HTML file locally on remote controlling PC

- Save packet capture files on the remote controlling PC (Pro and Pro Gigabit versions only)

Using the OptiView Browser™ and Remote User Interface Software

The OptiView Browser™ allows you access to OptiView™ Workgroup and OptiView™ Integrated analyzers through a browsable user interface installed on your PC.

Double-click on an analyzer from this list and the remote user interface is launched. If an analyzer is password protected, you will be prompted to enter a password.

In order for analyzers that are not in the same local network (subnet) to be displayed in the OptiView Browser™ list, you must first configure the Remote Control IP address setting. This is found in the **Setup | Security** screen. The Remote Control IP address should match the IP address of the PC that you intend to run the OptiView™ Workgroup remote user interface software on. Then, the remote OptiView™ Workgroup Analyzer will send its source IP address back to the controlling PC.

www41f.eps
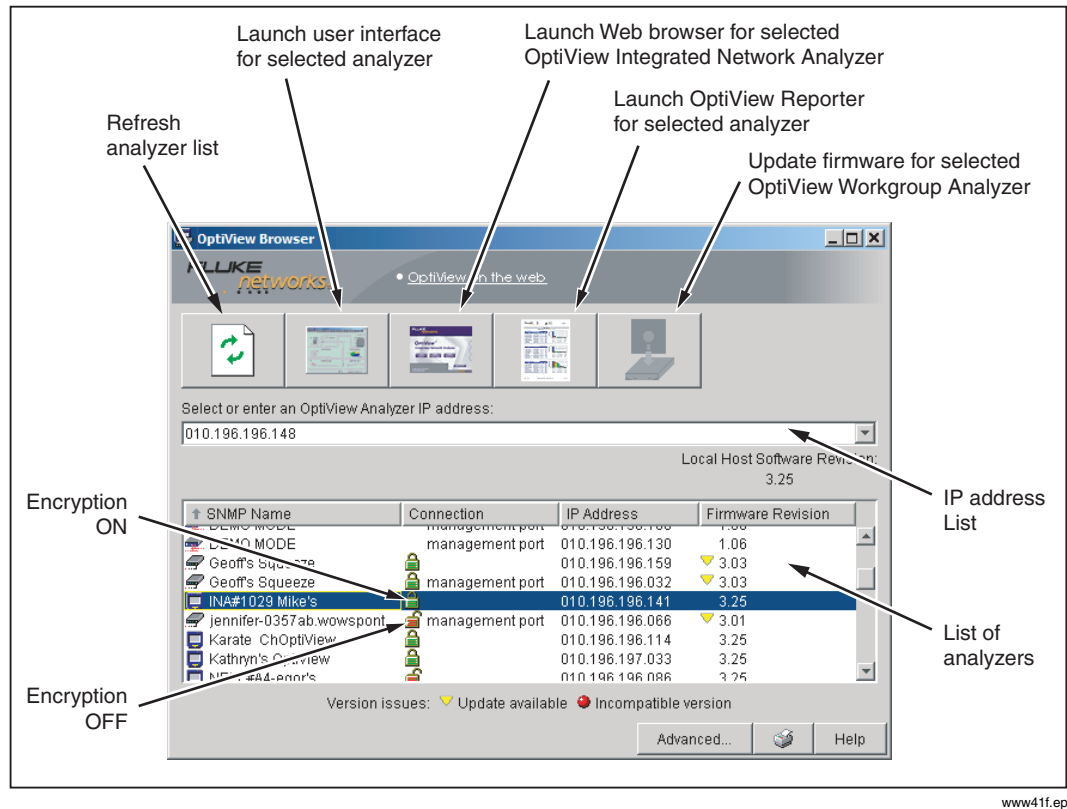
Figure 3. OptiView Browser

Refresh analyzer list

Re-displays the analyzer list with current active analyzers.

Launch user interface for selected analyzer

Launches the user interface software and connects to the selected analyzer. The selected analyzer is highlighted in the OptiView Browser™ device list or the IP address is entered in the OptiView Browser™ IP address field.

Launch Web browser for selected OptiView Integrated Network Analyzer

Enabled only for OptiView™ Integrated Network Analyzers and not for OptiView™ Workgroup Analyzers. Launches the default Web browser on your PC and connects to the home page on the selected OptiView™ Integrated Network Analyzer. From the home page, you can access saved reports and packet capture files located on the hard drive of the OptiView™ Integrated Network Analyzer.

Launch OptiView Reporter for selected analyzer

This button launches the Fluke Networks OptiView Reporter software. The OptiView Reporter™ software is purchased separately. See Table 2 for the part number. This button does not appear on the OptiView Browser until the software is installed on the PC. OptiView Reporter provides you with a simple way to generate a variety of reports based on data obtained from analyzers connected to your network.

Update firmware for selected OptiView™ Workgroup Analyzer

Updates the firmware on the analyzer by downloading from the controlling PC. Perform analyzer firmware updates when the local host software revision is newer than the firmware revision displayed next to the selected analyzer. This button is enabled only when selecting an OptiView™ Workgroup Analyzer through the Management port. It does not apply to OptiView™ Integrated analyzers.

Installing the User Interface Software

The user interface software can be installed on Win98 SE, WinNT 4.0, Win2000, and WinXP operating systems.

To install the user interface software from CD, insert the OptiView™ Resource CD into your PC's CD drive. Autorun will execute and load the CD user interface. If autorun is disabled on your PC, execute the file *Launch.exe* located in the root directory of the CD. Follow the on-screen instructions to complete the installation.

Once the installation is complete, you will be able to launch the OptiView Browser™ from your desktop (see Figure 3), select an analyzer from the OptiView Browser™ list, or enter the IP address of the analyzer, and gain access to valuable network information through the user interface software (see Figure 4).

User Interface Events that will Terminate a Remote Session

The active TCP/IP session between the user interface software and the analyzer can be severed under the following conditions:

- IP parameters are manually changed on the analyzer and **Apply** is selected in the **Management port TCP/IP Settings** screen

Note

The following conditions only apply to the 10/100BASE-T, 100BASE-FX, or 1000BASE-X ports, and not to the Management port.

- **Auto Reconfigure on Network Change** is checked in the **Setup | TCP/IP** screen and the analyzer patch cable is disconnected and reconnected to another jack

- The Ethernet link goes down on the interface due to temporary network outage

- **Rerun Auto Config** is selected in the **Setup | TCP/IP** screen

- If the encryption is changed in the **Setup | Security** screen

- **Find Unused IP and Apply** is selected in the **Setup | TCP/IP** screen

- IP parameters are manually changed and **Apply** is selected in the **Setup | TCP/IP** screen

- **Rerun Cable Test** is selected

- If the Analyzer MAC address is changed in the **Setup | Ethernet** screen

- If **Receive only, do not transmit frames** is selected in the **Setup | Ethernet** screen

In the previous conditions, the popup message "*This user interface and n others may lose connection to the remote OptiView. Proceed anyway?*" with both the **Yes** and **No** buttons displayed. "*n*" refers to the number of remote users.

An Overview of the User Interface Front Page Screen

Launch
Button

After selecting an analyzer from the OptiView Browser™ and launching the user interface, the first screen to appear is the **Front Page** screen shown below. When an analyzer is selected from the OptiView Browser™ list, double-clicking on it or pressing the launch button (figure to the left) will launch the user interface software.

Front Page Screen
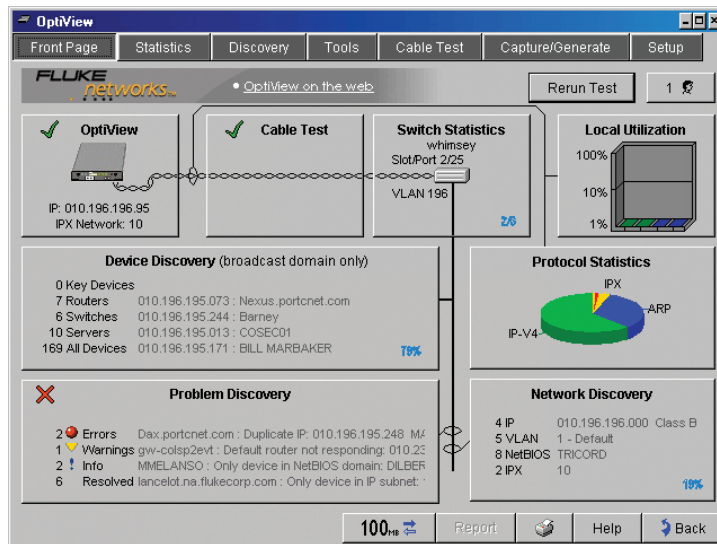
anj42s.bmp

Figure 4. Front Page Screen

The **Front Page** screen is an overview and starting point to monitor and test your network. This screen summarizes the current network by presenting the closest switch (**Switch Statistics** button), any network problems (**Problem Discovery** button), all discovered devices (**Device Discovery** button), and statistics (**Protocol** and **Utilization Statistics** buttons). The health (e.g. state, condition, etc.) of the current network is discovered and problems are displayed if they exist.
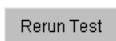
Rerun Test

Rerun Test clears all statistics, discovery information, and reinitiates network device discovery. Cable Test is not rerun. Cable Test is rerun when a cable change is detected, or when link loss occurs.

4 🖫

Remote Sessions displays the number of remote users connected to the analyzer. See the Help *Front Page* topic for a complete description.

79% This discovery percent complete indicator appears in the **Front Page** screen's **Device Discovery** and **Network Discovery** buttons while active discovery is running. When active discovery is completed, the discovery percent complete indicator goes away and passive discovery resumes. Every 90 minutes active discovery will re-run. The **Device Discovery** and **Network Discovery** screens display the button ⟦ ! Discovery ACTIVE ⟧ or ⟦ ✓ Discovery COMPLETE ⟧. Press the button to display discovery progress/results information as shown below.

Note

*For smaller networks, the Network Discovery percent complete indicator may display "0%" and then go away. This is because IP subnets have not beed added/configured in the **Setup | Discovery** screen. The time it takes to discover devices on your network is directly proportional to the number of IP addresses enabled in the **Setup | Discovery** screen.*
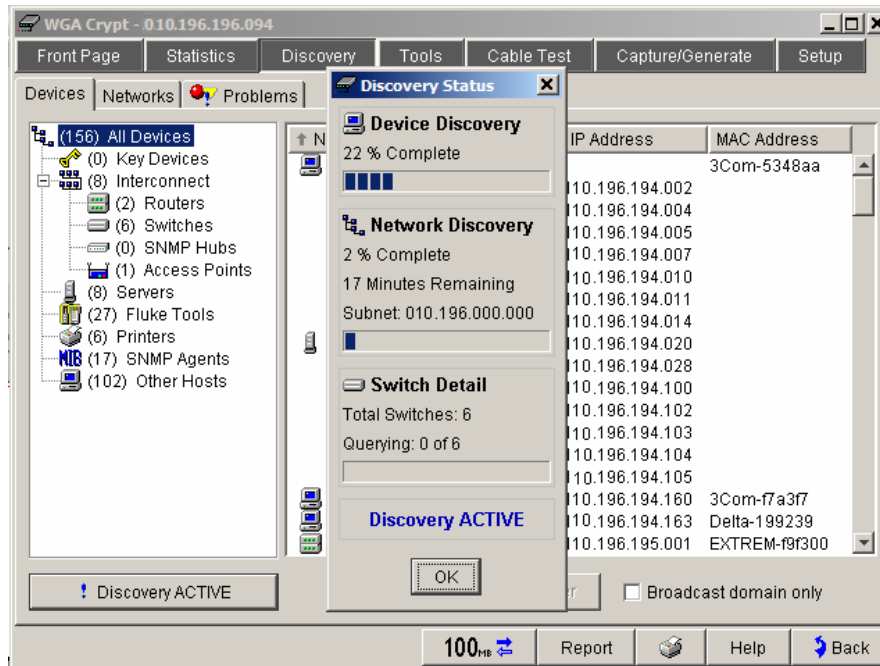
progress2.bmp

Figure 5. Device Discovery Status

The **Discovery Status Bar** is located at the lower-left corner of the analyzer display. Analyzer activity and errors are reported here.

`100ₘₑ ⇄`	This button indicates the link speed, and duplex mode (shown by solid and outlined arrows). In this example it shows a 100 Mbit full duplex connection (two solid arrows). One solid and one outlined arrow represents half duplex. Press this button to go to the **Setup | Ethernet** screen.

`100ₘₑ ✖` This button indicates that **Receive only, do not transmit frames** (silent mode) is turned on in the **Setup \| Ethernet** screen.
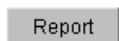
`Report`	This button generates tabular HTML reports on select screens. The reports are stored by default in the user interface installation directory under \Reports. When this button is pressed, you are prompted to specify a filename or to use the default name provided.
`🖨`	This button brings up the Print dialog. You can also add or select a different printer in the Print dialog.
`Help`	This button opens the help system and will display help information on the current screen.
`↩ Back`	When going to a screen using a button with the forward arrow ↩, the **Back** button then returns you to the previous screen.

The **Switch Statistics**, **Local Utilization**, **Device Discovery**, **Protocol Statistics**, **Problem Discovery**, and **Network Discovery** buttons provide information on their respective areas. The combined information provides a blueprint of the network, letting you know how things are going. This information will allow you to quickly dismiss some hypotheses during troubleshooting without "drilling-in." Some buttons show a green check mark (good) or red X (error) to draw your attention to potential problem areas.

The OptiView™ Workgroup Analyzer button represents the configuration status of the analyzer. A green check mark indicates that the analyzer passed self test and obtained a valid IP address for the local network. A red X indicates Self Test failed, or a valid IP address was not found.

If a valid IP address was not found, the analyzer will still be able to analyze traffic for statistics, discovering devices and station names. However, without a valid IP address, the analyzer will not be able to actively discover names. Pressing the OptiView™ Workgroup Analyzer button takes you to the **Setup | TCP/IP** network configuration screen.
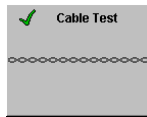
The **Cable Test** button summarizes the status of the twisted-pair or fiber cable:

Green check mark - indicates a valid cable. Length is given for twisted-pair copper wires on the 10/100BASE-TX interface.

Red X - indicates that there is a problem with the cable. Other tests depend upon a functional cable with a successful link. Select this button and view Cable Test details to diagnose a problem with a cable.

Note

Measurable twisted-pair lengths are from 1 meter to 305 meters (approximately 3 feet to 1000 feet).

The correct cable type must be selected for Cable Test to report correct measurements. The cable type is selected on the **Cable Test | Twisted-Pair Detail** screen. The default cable type is UTP 100 Ohm Category 5. A misidentified cable type may cause the measured length to differ from the actual length by up to 15%.
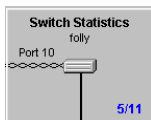
Switch Statistics displays the nearest switch (including slot, port, and VLAN ID if available) discovered by examining the bridge forwarding tables of all the local switches. The progress indicator (shown in the figure to the left) shows 5/11, which indicates the discovery process has queried 5 of the 11 known switches on the network.

When completed, the nearest switch is determined. Also, during this discovery process, the analyzer is looking for any VLAN memberships by searching through all the hosts.
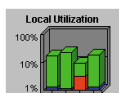
The **Utilization Statistics** button shows network unicast, multicast, broadcast, collisions, and error percent detail for the connected network segment. Pressing this button navigates to the **Utilization** screen where information is provided in both tabular and graphical views.

The **Protocol Statistics** button shows protocol mix information. The analyzer continuously updates the protocol list based on protocols used on the network segment the analyzer is connected to. Pressing this button navigates to the **Statistics | Protocols** screen for more detail.

The **Device Discovery** button summarizes device discovery results for the entire broadcast domain, along with discovered critical network servers. If off-net (VLAN Vision option) discovery is setup (**Setup | Discovery**), this will include discovery results outside the broadcast domain if the **Broadcast domain only** checkbox is unchecked in the **Device Discovery** or **Network Discovery** screens.

Specific address and domain names are displayed. Network interconnect devices and servers are also displayed, along with the total number of hosts. Devices are shown by category and are updated every few seconds. The names and addresses of the devices are provided to aid you in troubleshooting. Pressing this button takes you to the **Discovery | Devices** screen.

The **Network Discovery** button summarizes the network discovery results. IP Subnets, VLANs, NetBIOS Domains, and IPX Networks are shown. Pressing this button takes you to the **Discovery | Networks** screen.

The **Problem Discovery** button summarizes the problem discovery results. Problem Discovery status is conveyed

using graphics and color (red ball for severe problem; yellow triangle for problem or warning; blue exclamation point for informational). This information is continuously updated every few seconds. Pressing this button navigates to the **Discovery | Problems** screen.

Using the Analyzer

Powering the Analyzer On

Plug in the AC line cord to the back of the analyzer and flip the power switch (located above the line cord receptacle) to the On position.

When the analyzer is first powered On, it goes through a complete power-up sequence which includes initializing the processor, memory, and performing a self test.

Verifying the Basic Analyzer Operation

When the analyzer is turned on, a boot sequence occurs, a relay reset sequence is heard, and a self test is run. If the analyzer network under test interface (i.e., 10/100BASE-T, 100BASE-FX, 1000BASE-X) is connected to a network, the Link LED (left-most LED in the group of 5) will come on steady green when link is detected, or flash red if there is no link. A steady yellow Link LED indicates that a crossover cable is being used.

Saving Packet Capture Files

The analyzer Pro and Pro Gigabit versions are capable of filtering and capturing data on your network, and storing the data to disk. Packet Capture files can be saved anywhere you have access to disk space. By default they are saved to your computer in the user interface installation directory under the directory \Captures.

Packet Capture files are saved as .CAP files which can be read by Fluke Networks optional OptiView Protocol Expert™ software or by other 3rd party decoder software.

Saving HTML Report Files

The analyzer is capable of creating and saving reports from the **Discovery | Devices**, **Discovery | Networks**, **Discovery | Problems**, **Statistics | Protocols**, **Statistics | Top Hosts**, **Statistics | Top Conversations**, **Tools | SNMP Tables**, **Tools | Interfaces**, **Tools | IPX Services**, **Tools | Trace SwitchRoute**, and **Tools | Ping | Trace Route** screens. By default they are saved as HTML files to your PC in the user interface installation directory under the directory \Reports.

Generating Network Traffic

The **Traffic Generator** screen enables the creation of different traffic loads to stress test the network. The type of protocol, size of packet, number of packets per second, and percent utilization are configurable along with the type of traffic, e.g. Broadcast, Multicast, or to a specific Device. Traffic can be generated to devices on the local network or to devices specified outside of the local network.

See "Traffic Generator" in the analyzer Help for usage.

Testing Network Cables

Cable testing is performed through the 10/100BASE-T jack. Measurable cable lengths are from 1 meter to 305 meters (approximately 3 feet to 1000 feet). The correct cable type must be selected in the **Cable Test** screen to report correct measurements. UTP 100 Ohm Category 5 is the default cable type selected.

It is not necessary to disconnect the far end of the cable for the length to be measured. Cable length can be measured while the cable is connected to nothing, or connected to an active hub, switch, or NIC. A cable is automatically tested when it is connected to the 10/100BASE-T jack on the analyzer and during the power-up sequence. If needed, the cable may be re-tested by pressing the Rerun **Cable Test** button on the **Cable Test** screen, or by simply disconnecting and reconnecting the cable to the analyzer.

Note

*Due to the various manufacturing techniques used by equipment vendors in NICs, hubs and switches, the length shown may be the distance to a connector or cross-connect that is causing a larger signal reflection than the end-equipment. Examining the **Cable Test | Twisted-Pair Detail** screen shows the actual end-length and reflection values. This is not an issue with non-terminated (open) cables.*

Changing the GBIC Module (Pro Gigabit version only)

To remove a GBIC module, press and hold the tabs on the sides of the GBIC module and pull it gently out of the gigabit slot.

To install a GBIC module, make certain the GBIC's "D" shaped connector is aligned with the connector in the gigabit slot.
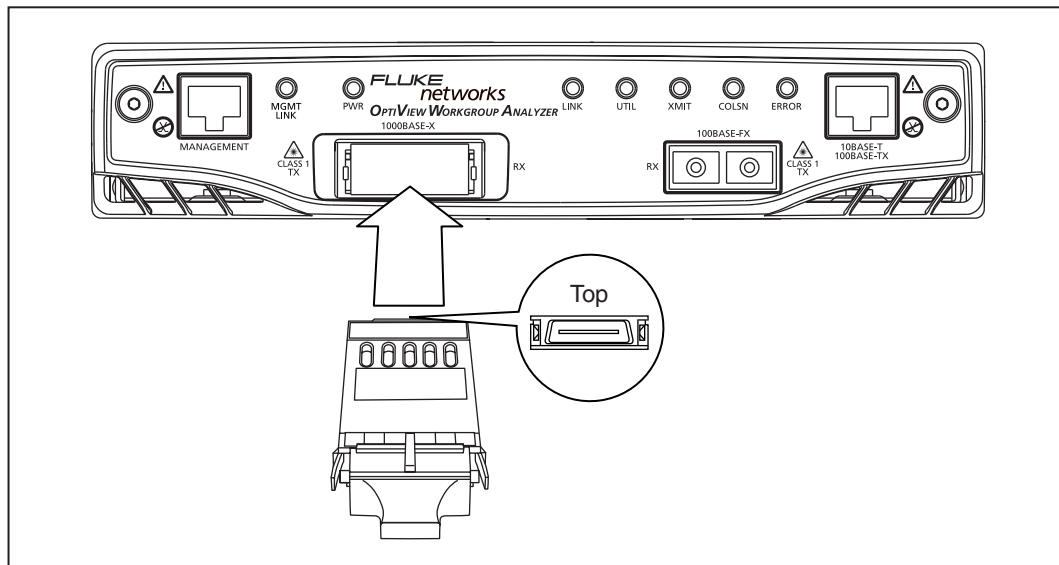
anj02f.eps

Figure 6. Installing a GBIC Module

Note

Though most GBICs are designed to be hot-swappable, i.e., changed with the analyzer power on, it is recommended that the analyzer be powered off prior to changing the GBIC. This will reduce the possibility of damage to the GBIC.

⚠ **Warning**

GBIC modules are Class 1 laser light emitting products. Never look into the GBIC module while it is on, otherwise damage to the eyes, including blindness, can occur.

Configuring the Analyzer through the Serial Configuration Port

In situations where you do not have remote access (through the user interface software) to the analyzer, you may want to configure the analyzer IP address parameters for both the Network-Under-Test and Management ports before connecting the analyzer to a network. The analyzer has a serial configuration port that provides this capability.

To configure the analyzer through the configuration port:

- Connect the supplied RS-232 cable between the analyzer serial configuration port and a serial port on a PC or terminal.

- Run a terminal emulation application on the PC to access the configuration port command line interface.

- Press <Enter> and a prompt will appear that includes the SNMP name of the analyzer. If the analyzer is password protected, a prompt for the password will appear to gain configuration access. If the analyzer is not password protected, configuration access is directly available.

The configuration port, command line interface provides three configuration "modes": Root, Management configuration, and Network configuration. The commands associated with each mode are described below.

Configuration Port Guidelines

- The analyzer serial configuration port communication parameters are fixed to 9600 baud, 8 data bits, no parity, 1 stop bit.

- Commands are case insensitive. Password is case sensitive.

- Parameters that are applied via the configuration port are retained after turning off the power to the analyzer.

- Entering an invalid command will cause a list of available commands to be displayed for the current configuration mode.

- Entering an invalid parameter to a command (where applicable) will cause a command usage message to be displayed.

- Access to change the configuration will timeout after a period of inactivity when password protection is enabled. You will have to enter the correct password to regain configuration access.

Root mode user commands:

"management"	Allows the user to enter "Management" configuration mode.
	This mode allows the user to configure IP parameters for the out-of-band Management port. The text "/Management>" is appended to the prompt while in this mode.
"network"	Allows the user to enter "Network" configuration mode. This mode allows the user to configure IP parameters for the in-band Network-Under-Test (NUT) port. The text "/Network>" is appended to the prompt while in this mode.
"default"	Restores the analyzer configuration parameters back to factory defaults and reboots the analyzer. Password settings are retained.
"password"	Set remote access password (one password for all interfaces). The user is prompted for a password, then again for confirmation. Upon entering a password, password protection will be enabled. If no password is entered, password protection will be disabled. The password is case sensitive, is restricted to 40 characters, and any printable ASCII character can be used (including spaces). If you forget the password, you will need to contact your authorized service center or Fluke Networks product support for procedures. See page 3 for phone numbers.
"productinfo"	Displays analyzer product information.
"remoteipaddr A.B.C.D"	Set the IP address (A.B.C.D) of the PC that will be running the user interface software. The analyzer will then send it's identification to that PC so that the OptiView Browser will display that analyzer for selection. Address is entered in decimal dot notation. See help for more information about setting the Remote PC IP address.
"inspectoripaddr A.B.C.D"	Set the IP address (A.B.C.D) of the PC that will be running the OptiView Console software. The analyzer will then send it's identification to that PC so that the console software can use the analyzer as a data source, receive the problem log from the analyzer and display the analyzer within the "Fluke Tools" device discovery tab.
"exit"	Exits the Root mode if password protection is enabled. The user must enter the correct password to regain configuration access.
"show (user command)"	Displays the current value of an individual setup parameter of interest within the Root mode.
"show all"	Displays the current values of all setup parameters within the Root mode.

Management configuration mode user commands:

"ipaddr A.B.C.D E.F.G.H"	Statically assign the IP address (A.B.C.D) and subnet mask (E.F.G.H) of the Management port. Address and subnet mask are entered in decimal dot notation.
"ipaddr dhcp"	Enable the automatic configuration of the Management port IP parameters via a DHCP server.
"iprouter A.B.C.D"	Statically assign the IP address (A.B.C.D) of the default router on the Management port. Address is entered in decimal dot notation.
"apply"	Applies the changes (if any) made to the Management port configuration. Management port configuration changes do not take effect until this command is entered.
"autoconfig"	Runs the auto configure command which reconfigures the TCP/IP connection.
"exit"	Exits the Management configuration mode. Exiting will discard any Management port configuration changes unless 'apply' is entered.
"show (user command)"	Displays the current value of an individual setup parameter of interest within the Management configuration mode.
"show all"	Displays the current values of all setup parameters within the Management configuration mode.

Network configuration mode user commands:

"ipaddr A.B.C.D E.F.G.H"	Statically assign the IP address (A.B.C.D) and subnet mask (E.F.G.H) of the Network port. Address and subnet mask are entered in decimal dot notation.
"iprouter A.B.C.D"	Statically assign the IP address (A.B.C.D) of the default router on the Network port. Address is entered in decimal dot notation.
"ippridns A.B.C.D"	Statically assign the IP address (A.B.C.D) of the primary Domain Name Server (DNS) on the Network port. Address is entered in decimal dot notation.
"ipsecdns A.B.C.D"	Statically assign the IP address (A.B.C.D) of the secondary DNS on the Network port. Address is entered in decimal dot notation.
"apply"	Applies the changes (if any) made to the Network port configuration. Network port configuration changes do not take effect until this command is entered.
"exit"	Exits the Network configuration mode. Exiting will discard any Network port configuration changes unless 'apply' is entered.
"show (user command)"	Displays the current value of an individual setup parameter of interest within the Network configuration mode.
"show all"	Displays the current values of all setup parameters within the Network configuration mode.

Setting the Remote Control PC IP Address

Set this field to specify an offnet PC running the OptiView Browser™ remote user interface software. When this field is set, the analyzer will send its identification back to the specified PC running the remote user interface software. Set this field to *<none>*, *<last connected>*, or manually enter the IP address of the remote PC that will be running the OptiView**™** Browser remote user interface software. *<last connected>* is the last remote session to terminate from the analyzer, and that PC's IP address is saved into this field.

This address is configured in the **Setup | Security** screen. Optionally, this address can be configured through the RS-232 configuration port. This is done so that analyzers that are placed on network segments other than the one the controlling PC is on will still automatically show up in the OptiView Browser™ list of available analyzers.

Setting the OptiView Console Address

The Fluke Networks OptiView Console™ application is a Windows 2000™ and Windows XP™ software tool for network engineers, LAN administrators, and network technicians who maintain LANs (Local Area Networks). The application allows you to monitor, map, and troubleshoot a LAN segment that could consist of servers, routers, switches, printers, managed hubs, and clients (hosts and other network devices).

The OptiView Console™ field is used to enhance the interoperability of the analyzer and the OptiView Console™ product. The address you enter should be the IP address of the machine running the OptiView Console™ program. The analyzer will send packets to this address when it is connected to the network, or when the IP address of the analyzer changes.

These packets assist the OptiView Console™ product in keeping its information current. OptiView Console™ maintains a special list of all Fluke Networks' products that are connected to the network and can even be used to launch a user interface session on any OptiView™ Workgroup Analyzer. An OptiView™ analyzer can be used as an agent for the OptiView Console™.

OptiView Console™ is purchased separately. A 30 day evaluation copy can be downloaded from www.flukenetworks.com.

Setting the Analyzer IP Address on the Network Under Test Interface

The Network Under Test Interface represents the 10/100-BASE-T, 100BASE-FX, and 1000BASE-X ports. It does not include the Management port. To set the IP address of the Network Under Test Interface, select **Setup | TCP/IP**. Refer to the analyzer Help on configuring this screen.

Setting the Analyzer IP Address on the Management Port

Select **Setup | Management Port** and either configure using DHCP, or enter the IP address manually.

Setting Up the Analyzer Security

The **Setup | Security** screen provides analyzer security settings for packet capture, remote access, and SNMP configuration.

Note

*The **Setup | Ethernet** screen allows you to select **Receive only, do not transmit frames**, which turns off the analyzer transmit capability, thus putting it on the network in silent mode. Turning off the analyzer transmit capability disables actively querying devices for name resolving and other active tests such as Ping.*

*The analyzer's MAC address can also be changed in the **Setup | Ethernet** screen for testing switch forwarding tables or ARP caches.*

Setting the Analyzer Name

The **OptiView Analyzer Name** field allows you to change the default analyzer name as seen by the network. This is especially useful when multiple analyzers are connected to your network.

Setting Password Control, Feature Selection

The **Security** screen enables/disables packet capture and access for remote users. If packet capture and traffic generation are enabled with a password, you will be prompted to supply a password before any packet capture will occur. This also applies when a remote user password is enabled and you are trying to remotely access the analyzer.
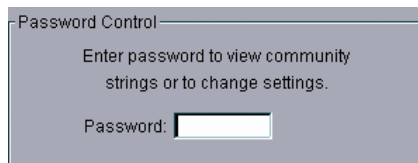
Setting a Password: Press the **Create Password** button. Enter a password in the Enter new password window as shown in Figure 7. The password is case sensitive, has maximum length of 40 characters, and any printable ASCII character can be used (including spaces). Once a password has been entered, it must be re-entered in the **Confirm new password** field. Select **OK** for the password to be accepted.
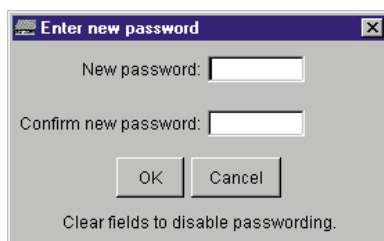
ahq18s.tif

Figure 7. Password Dialog

Once a password has been set, the password is required to return to the screen as shown in Figure 8.

ahq19s.tif

Figure 8. Password Control Dialog

Fields that are secure are displayed with "*" until the password is entered.

Clearing a Password: To clear a password, the existing password must be entered. Press the **Change Password** button and select **OK** to clear the password.

Note

If the password is forgotten, contact your authorized service center or Fluke Networks product support for procedures. See page 3 for contact phone numbers.

Setting Data Encryption

Setting data encryption allows data being sent to and from a remote user interface to be encrypted. The analyzer data encryption uses the AES 128 bit encryption algorithm. You may enter the encryption key in Hex or ASCII. Both enter a 128 bit encryption key. Anything less than 128 bits will be padded with 0's. ASCII is provided to allow an easier method of remembering the encryption key.

To set the data encryption, in the **Setup | Security** screen, press the
 Remote Control Encryption Settings... button. The **Remote Control Encryption Settings** dialog is displayed as shown below.

anj60s.bmp

Figure 9. Remote Control Encryption Settings Dialog

Warning

The encryption can be set from a remote UI, but should only be done from a PC connected directly to the analyzer to prevent unauthorized detection of the encryption key while it is being set. What this means is, a remote UI could be capturing packets while another remote UI is setting the data encryption, and capture the encryption key. That is why we recommend setting the encryption on the analyzer. To set the encryption on the analyzer directly, connect the analyzer to the PC NIC card using cable.

Once the encryption key has been set on an analyzer, each user trying to open a remote UI session with that analyzer will be prompted to first enter the encryption key.

Note

Once a remote PC has successfully opened a remote UI by entering the encryption key, that PC will remember the encryption key and it will not have to be re-entered.

Setting Up the SNMP Community Strings

The **MIB II Read community string**, **RMON2 Read community string,** and **RMON2 Read/Write community string** fields controls other clients from accessing the MIB II and RMON agent information on the OptiView™ Pro and Pro Gigabit analyzers.

The field labeled **Strings used to query other SNMP agents** is used by the analyzer to interrogate discovered SNMP agents within devices on the attached network.

Note

Strings used to query other SNMP agents can have multiple entries, each separated by a space. The order in which they are entered is the order in which they are sent to the device.

*If you have inadvertently changed the default values, select the **Default** button to restore the default community strings.*

Deleting the SNMP community strings will prevent the analyzer from using SNMP in an active discovery.

Restoring the OptiView™ Workgroup Analyzer Default Configuration

This task is performed through the Serial Configuration Port. Follow the instructions outlined in the section "Configuring the Analyzer through the Serial Configuration Port" and enter the command "default". The default command will restore all factory default settings and reboot the analyzer. If there was a password enabled prior to entering the command, the same password is retained after rebooting.

Installing Options

Analyzer options that are purchased separately, such as the WAN Vision or VLAN Vision option, require you to enter a unique key code in the **Setup | Options** screen. This unique 16-digit key code is given to you when you purchase the option.

To activate a purchased option, go to the **Setup | Options** screen and press the **Change Key** button. Enter the key code in the Enter New Option Key popup, and press **OK**.

The **Setup | Options** screen displays current installed options that are enabled or have an evaluation period. The evaluation period is decremented each time you access that feature. Multiple accesses within a 24 hour period are counted as a single "trial day."
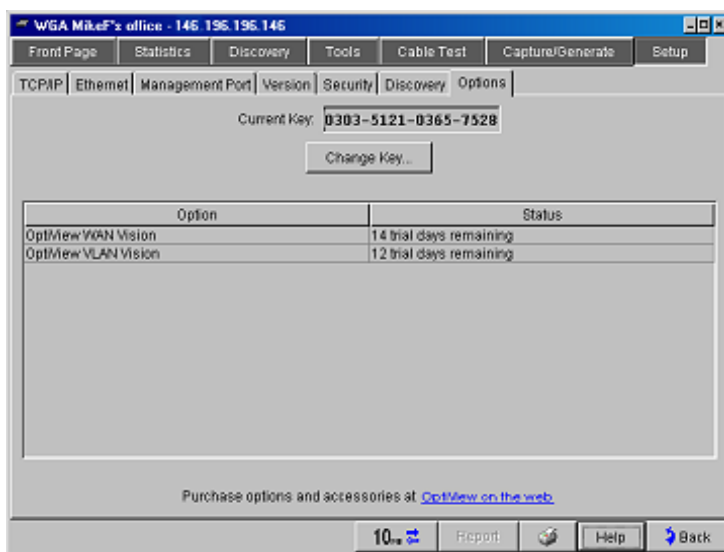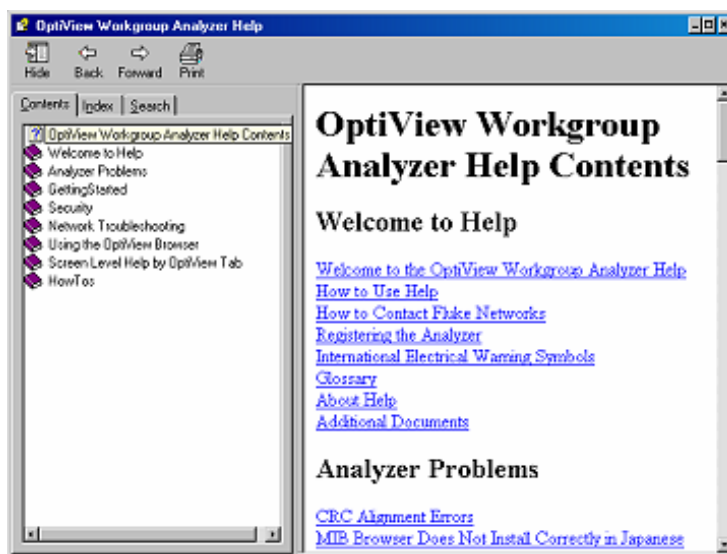

ahq51s.bmp

Figure 10. Options Screen

Using the Built-in Help System

Accessing and Navigating the Help System

Help   The help system is an integral part of the analyzer. Help can be accessed by selecting the **Help** button located on the bottom-right of the user interface screen.

anj07s.bmp

Figure 11. The Help Screen

When the Help is launched, the current screen topic is displayed. You can also select a topic from the Contents (left pane), choose an Index entry, or perform a full text Search on any analyzer help topic or term.

ahq48s.tif

Figure 12. Help Navigation Tabs

Press the **Back** and **Forward** buttons to move to and from previous viewed topics.

The **Hide** button collapses the left pane of the Help screen giving you more room to view Help topics. The **Hide** button is replaced by the **Show** button. The **Show** button expands the left pane of the Help screen.

The **Print** button allows you to either print the selected topic or print the selected heading and all subtopics.

Changing the Default Help Language

The Help is displayed by default in English. The Help language can be changed in the **Setup | Version** screen. Simply select the language from the Help **Language** drop-down list.
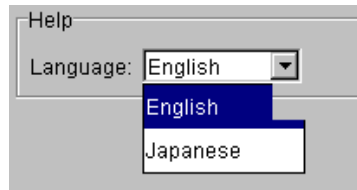
ahq49s.tif

Figure 13. Selecting the Help Language

Accessing the Online Documentation

This Getting Started Guide and Help are provided in electronic format on CD-ROM. The CD-ROM user interface guides you to the documentation and language to view them in.

Updating the OptiView Workgroup Analyzer Firmware

Note

To be notified when new software becomes available for your analyzer, or to access technical support/knowledge base information via the web, please register your product at http://support.flukenetworks.com.

From time to time, software improvements are being made to the analyzer. The software update involves two steps; first to update the user interface software on the PC, then to individually update the firmware in each of your OptiView Workgroup Analyzers to match the software version running on your PC.

You can obtain the latest version of software by visiting www.flukenetworks.com and downloading the file to the PC that you intend to use to control your analyzers. This software is supplied to you on the OptiView Resource CD that was shipped with your analyzer. To obtain additional CD copies or to get newer versions supplied to you on a CD rather than downloading from our web site, see the section on Contacting Fluke Networks Sales, Service, and Support Centers to make that request.

Software Update Procedure

### Step One – Update the PC User Interface Software

Run the *Launch.exe* file on the OptiView Resource CD or within the download directory on your PC. The Install Shield program will guide you through the steps that will install a new user interface on your PC or will update an existing user interface.

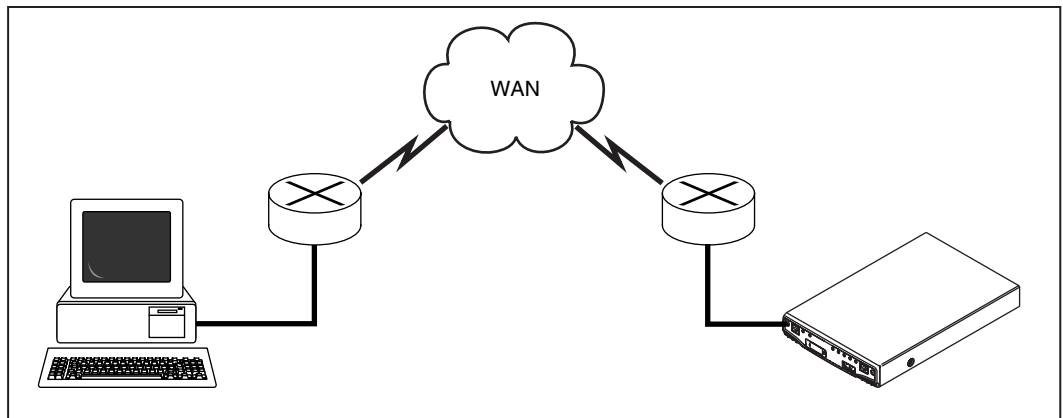### Step Two – Connect to the Analyzer via the Management Port
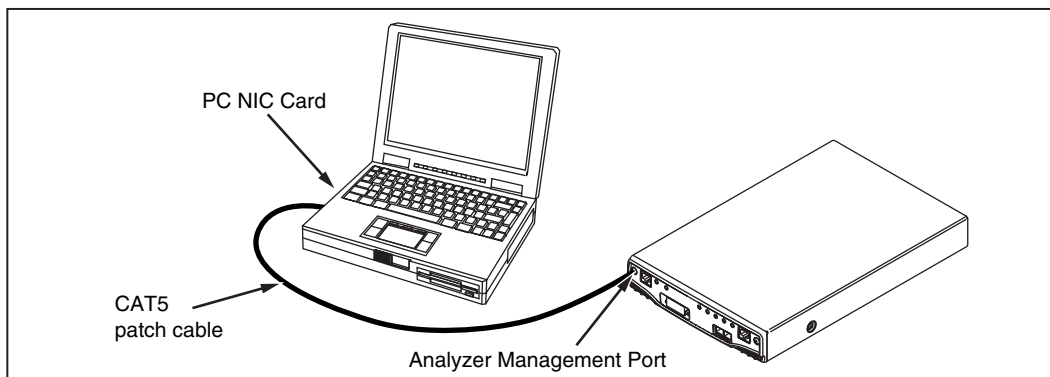
anj04f.eps

Figure 14. Direct Management Port Connection
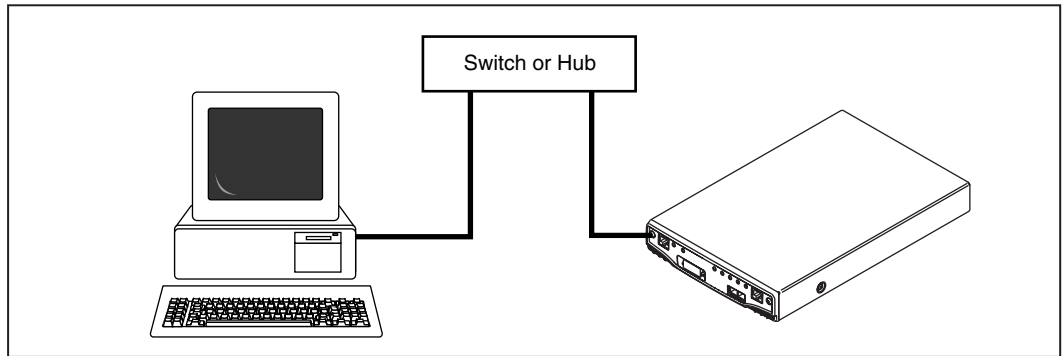
anj05f.eps

Figure 15. LAN Management Port Connection

anj06f.eps

Figure 16. Remote Management Port Connection

Step Three – Run the User Interface Software

In the case of figure 15 and 16 above, when you launch the user interface software (an icon is placed on your desktop), the analyzer will automatically be listed in the OptiView Browser™ list box (see figure 17). In the case of figure 16, you will have to type the IP address of the Management port into the OptiView Browser™ or previously configured the "Remote Control PC address" in the **Setup | Security** screen when connected to that analyzer.
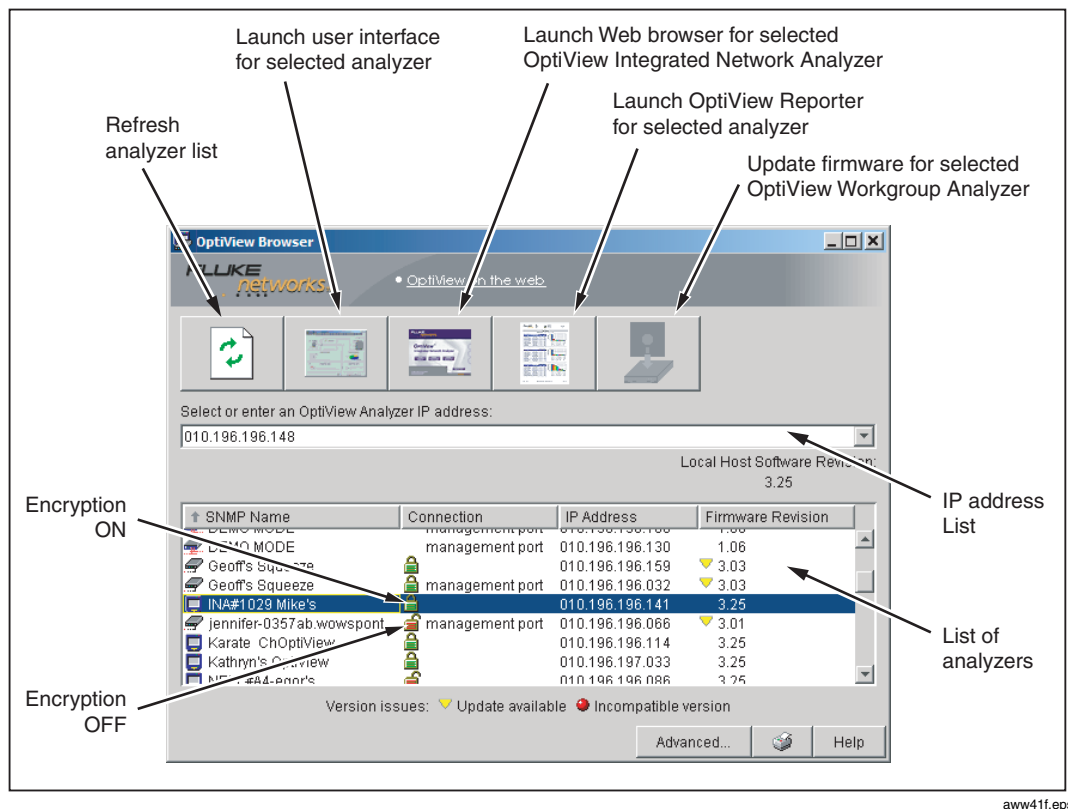
aww41f.eps

Figure 17. The Initial OptiView Browser Screen

Note the Local Host Software Revision number. This number should match the Firmware Revision numbers displayed for each analyzer. If the firmware revision displayed is a lower number than the local host software revision number, select that analyzer and click on the update firmware button (rightmost on the button bar). The software will begin its update process of the firmware on the selected analyzer.

Note

The Connection type has to show "management port" for the update firmware button to be enabled. You cannot update the analyzer's firmware through a network measurement interface, only through the Management port.

You cannot update OptiView™ Integrated Network analyzers using this method. See the software update procedure for OptiView™ Integrated Network analyzers in the Getting Started manual supplied with them.

Once the user interface software is finished flashing new firmware into your analyzer, the Update Complete dialog box will be presented. Select **OK** and continue updating all of the OptiView™ Workgroup Analyzers in this manner until all of the firmware revisions match the host software revision number.

Troubleshooting Your Analyzer

Before Calling Technical Support

Before calling technical support, you can perform these basic analyzer troubleshooting steps to pinpoint many problems:

Do you suspect the analyzer has locked up?

If yes, completely power-down the analyzer.

Unexpected IP Discovery or Tools results?

Does the analyzer have a valid IP address? Look at the **Front Page** screen **OptiView** button and see if a valid IP has been configured. Also, see if the Auto Configure capability in the **Setup | TCP/IP** screen has been disabled. If an IP address has been manually entered, it may not be within the local subnet.

Are you connected to the network?

- Link light should be on solid green or amber if Link exists.
- Some activity on Transmit LED and/or Utilization LED should be seen.
- Go to **Setup | Ethernet** screen. An active interface should be indicated.
- Confirm that Cable Test passed. Try a different cable if necessary.

Does the analyzer pass self test?

Connect to the Management Port and go to the **Setup | Self Test** screen and press Run Self Test. All tests need to pass.

Does Cable Test pass?

A network connection can not be made if cable test does not pass. Look at the **Front Page** screen **Cable Test** button and see if there is a red X or green check mark in the button. A red X could indicate a faulty cable. If there is a red X, press the **Cable Test** button and go to the **Cable Test | Overview** and **Twisted- Pair Detail** screens to test the cable.

Safety and General Specifications

Table 3. General Specifications

Weight	1.7 kilograms (3.8 lbs)
Dimensions	4.1 x 21.1 x 32.8 cm (1.6 x 8.3 x 12.9 in), one half of a standard 19 inch rack mount width
AC input	85 to 265 VAC; 47/63 Hz; 25 watts
Network Analysis Interface	10/100BASE-T, (RJ-45), 100BASE-FX (SC fiber), 1000BASE-X (SX-GBIC, LX-GBIC and TX-GBIC)
Network Analysis interface LEDs	Link, Utilization, Transmit, Collision, Errors
Capture Memory	64 Mbytes (OptiView™ Workgroup Pro and Pro Gigabit models)
Serial Configuration Port	Serial RS-232 (9-pin male)
Management Port	10/100BASE-T (RJ-45) Ethernet
Shock and vibration	Meets requirements of MIL-PRF-28800F for Class 3 equipment
Laser	Class 1 Laser Product, complies with 21 CFR 1040.10 & 1040.11, CFR(J)
Operating Temperature	10°C to 30°C (50°F to 86°F) with up to 95% Relative Humidity
	10°C to 40°C (50°F to 104°F) with up to 75% Relative Humidity
	Non-Operating Temperature-20°C to +60°C (-4°F to +140°F)
Connection to public telephone network	The analyzer network interfaces are NOT FOR CONNECTION TO PUBLIC TELEPHONE SYSTEMS. The analyzer should only be connected to the public phone network through regulatory agency compliant modem devices.
Safety	℅℠ᵤₛ Complies with CSA C22.2 No. 950 Canadian standards, and UL 1950 (US standards).
	C€ Complies with European Union directive EN60950.
EMC	C€ Complies with EN61326 Class A.

Supported Network Standards

Table 4. Supported Network Standards

LAN Interfaces	IEEE 10BASE-T, IEEE 100BASE-TX, IEEE 100BASE-F, IEEE 1000BASE-X (RFCs: 1213, 1231, 1239, 1285, 1315, 1493, 1512, 1513, 1643, 1757, 2021, 2108, 2115, 2127, 2495, 2496, 2515, 2558)
IETF RFCs Supported	1493, 1512, 1513, 1643 (STD0050), 1748, 1749, 2011, 2012, 2013, 2021, 2108, 2115, 2819 (STD0059)

Cable Type Specification

> *Note*
>
> *Cable tests are functional when connected to a live cable with data link signal present. Measurement stimuli are kept to a safe level that will not damage attached network devices.*

Unshielded Twisted Pair LAN cables (100 and 120 Ohm UTP category 3, 4, 5, 5E, and 6 ISO/IEC Class C and D)

Foil-screened Twisted Pair cables (100 and 120 Ohm ScTP category 3, 4, 5, and 6 ISO/IEC Class C and D)

Cable Length

Table 5. Cable Length, Resolution 0.1m (1 ft.)

Open or shorted	1 to 305m (3 ft. to 1000 ft.)	+/- [2% of reading + 0.3 m (1 ft.)]
Terminated with greater than or equal to 15% reflection	1 to 153m (3 ft. to 500 ft.)	+/- [5% of reading + 0.3 m (1 ft.)]

> *Note*
>
> *Length accuracy is dependent upon the cable type selected in the **Cable Test | Twisted-Pair Detail** screen with its ideal NVP (nominal velocity of propagation) matching the NVP of the cable under test.*

Characteristic Impedance:

50 to 150 Ohms, cables 3-5 m (10-16 ft.) +/- (5 Ohms +10%)
50 to 150 Ohms, cables >5 m (16 ft.)   +/- (5 Ohms +5%)

Resolution: 1 Ohm

Receive Level:

100 to 5000mVp-p, +/- 5%

Resolution: 10mV

Datalink Signal:

500mVp-p to 4000mVp-p

Measuring Terminated Cables

The analyzer is able to analyze individual twisted-pairs of a cable that are terminated into most equipment vendors' Ethernet ports (such as on a hub, switch or NIC).

Fault Tolerance

The RJ-45 10/100BASE-T Ethernet connection that is on the analyzer is designed to withstand a maximum of 100 volts.

GBIC Identification:

Identifies and operates with the following GBIC module types per SFF Document Number SFF-8053, Gigabit Interface Converter, Rev. 5.4: LX (1300nm), SX (850nm), TX (copper twisted pair).