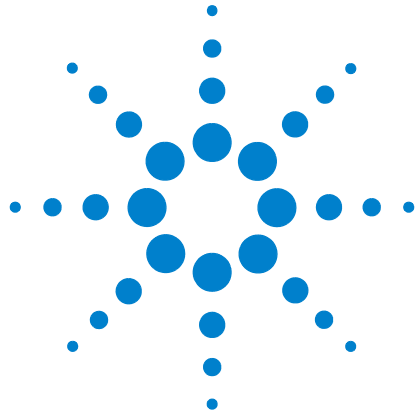




Agilent N2640A WireScope Pro

User's Guide



Agilent Technologies

Notices

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Safety Notices

CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

WARNING

A **WARNING** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a **WARNING** notice until the indicated conditions are fully understood and met.

Safety Symbols

The following symbols on the instrument and in the documentation indicate precautions which must be taken to maintain safe operation of the instrument.

	Direct current (DC)		Off (supply)
	Alternating current (AC)		On (supply)
	Both direct and alternating current		Caution, risk of electric shock
	Three-phase alternating current		Caution, risk of danger (refer to this manual for specific Warning or Caution information)
	Earth (ground) terminal		Caution, hot surface
	Protective conductor terminal		Out position of a bi-stable push control
	Frame or chassis terminal		In position of a bi-stable push control
	Equipotentiality	CAT II 300 V	Category II 300 V over voltage protection
	Equipment protected throughout by double insulation or reinforced insulation		

General Safety Information

WARNING

- Do not use the device if it is damaged. Before you use the device, inspect the casing. Look for cracks or missing plastic. Do not operate the device around explosive gas, vapor, or dust.
 - Always use the device with the cables provided.
 - Observe all markings on the device before establishing any connection.
 - Turn off the device and application system power before connecting to the I/O terminals.
 - When servicing the device, use only the specified replacement parts.
 - Do not operate the device with the cover removed or loosened.
 - Use only the power adapter provided by the manufacturer to avoid any unexpected hazards.
-

CAUTION

- If the device is used in a manner not specified by the manufacturer, the device protection may be impaired.
 - Always use dry cloth to clean the device. Do not use ethyl alcohol or any other volatile liquid to clean the device.
 - Do not permit any blockage of the ventilation holes of the device.
-

Environmental Conditions

This instrument is designed for indoor use and in an area with low condensation. The table below shows the general environmental requirements for this instrument.

Environmental conditions	Requirements
Operating temperature	0 °C to 50 °C
Operating humidity	20% to 85% RH non-condensing
Storage temperature	–20 °C to 70 °C
Storage humidity	5% to 90% RH non-condensing

NOTE

The N2640A WireScope Pro complies with the following safety and EMC requirements.

- IEC 61010-1:2001/EN61010-1:2001 (2nd Edition)
- Canada: CAN/CSA-C22.2 No. 61010-1-04
- USA: ANSI/UL 61010-1:2004
- IEC 61326-2002/EN 61326:1997+A1:1998+A2:2001+A3:2003
- Canada: ICES-001:2004
- Australia/New Zealand: AS/NZS CISPR11:2004

Regulatory Markings

	The CE mark is a registered trademark of the European Community. This CE mark shows that the product complies with all the relevant European Legal Directives.		The C-tick mark is a registered trademark of the Spectrum Management Agency of Australia. This signifies compliance with the Australia EMC Framework regulations under the terms of the Radio Communication Act of 1992.
ICES/NMB-001	ICES/NMB-001 indicates that this ISM device complies with the Canadian ICES-001. Cet appareil ISM est conforme à la norme NMB-001 du Canada.		This instrument complies with the WEEE Directive (2002/96/EC) marking requirement. This affixed product label indicates that you must not discard this electrical or electronic product in domestic household waste.
	The CSA mark is a registered trademark of the Canadian Standards Association.		

Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC

This instrument complies with the WEEE Directive (2002/96/EC) marking requirement. This affixed product label indicates that you must not discard this electrical or electronic product in domestic household waste.

Product Category

With reference to the equipment types in the WEEE directive Annex 1, this instrument is classified as a “Monitoring and Control Instrument” product.

The affixed product label is as shown below.



Do not dispose in domestic household waste

To return this unwanted instrument, contact your nearest Agilent Technologies, or visit:

www.agilent.com/environment/product

for more information.

Declaration of Conformity

 Agilent Technologies	DECLARATION OF CONFORMITY According to ISO/IEC Guide 22 and CEN/CENELEC EN 45014	
---	--	---

Manufacturer's Name: Agilent Technologies International sarl
Manufacturer's Address: Rue de la Gare 29
CH - 1110 Morges
Switzerland

Declares under sole responsibility that the product as originally delivered

Product Name: Wiroscope Pro - Network Performance Analyzer
Product Number: N2645A - Main unit
N2646A - Dual Remote unit
Product Modules: N2644A-...¹⁾ - Smart Probes
N2647SM²⁾ - SM Fiber Probe
N2647MM²⁾ - MM Fiber Probe

complies with the essential requirements of the following applicable European Directives, and carries the CE marking accordingly:

- The Low Voltage Directive 73/23/EEC, amended by 93/68/EEC
- The EMC Directive 89/336/EEC, amended by 93/68/EEC

and conforms with the following product standards:

	Standard	Limit
EMC	IEC 61326:2002 / EN 61326:1997+A1:1998+A2:2001+A3 :2003	
	CISPR 11:1997+A1:1999 / EN 55011:1998+A1:1999	Group 1 Class A
	IEC 61000-4-2:1995+A1:1998+A2 :2000 /	4 kV CD, 8 kV AD
	EN 61000-4-2:1995+A1:1998+A2:2001	
	IEC 61000-4-3:2002+A1:2002 / EN 61000-4-3:2002+A1:2002	3 V/m, 80-1000 MHz
	IEC 61000-4-4:1995+A1 :2000+A2 :2001 /	0.5 kV signal lines, 1 kV power lines
	EN 61000-4-4:1995+A1:2001+A2:2001	
	IEC 61000-4-5:1995+A1:2000 / EN 61000-4-5:1995+A1:2001	0.5 kV line-line, 1 kV line-ground
	IEC 61000-4-6:1995+A1:2000 / EN 61000-4-6:1996+A1:2001	3 V, 0.15-80 MHz
	IEC 61000-4-8:1993+A1:2000 / EN 61000-4-8:1993+A1:2001	30A/m
	IEC 61000-4-11:1994+A1:2000 / EN 61000-4-11:1994+A1:2001	1 cycle/100%
	Canada: ICES/NMB-001:1998	
	Australia/New Zealand: AS/NZS CISPR 11:2002	
Safety	IEC 61010-1:2001 / EN 61010-1:2001	
	Canada: CAN/CSA-C22.2 No. 61010-1:2004	
	USA: UL 61010-1:2004	

Supplementary Information:

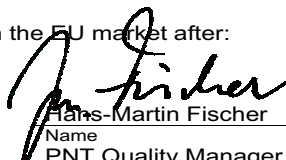
¹⁾ The product number is followed by a 3 digit number to define smart probe modules

²⁾ FDA accession no. 0620567

This DoC applies to above-listed products placed on the EU market after:

2006-September-25

Date


Name
Hans-Martin Fischer
PNT Quality Manager
Agilent Technologies
Title

For further information, please contact your local Agilent Technologies sales office, agent or distributor.

In This Guide...

1 Getting Started

Introduces the WireScope Pro and illustrates its features and controls.

2 Using the WireScope Pro

Describes how to perform basic functions with the WireScope Pro, such as connecting power, installing probes and USB flash drives, downloading software, and working with the WireScope Pro software.

3 Testing Copper Cable

Describes how to set up and run automated test sequences on copper cabling.

4 Testing Fiber Cabling

Describes how to set up and run automated test sequences on optical fiber cabling.

5 Measuring External Noise

Describes the external noise measurement on the WireScope Pro and using external noise mode to measure and report signals from external noise sources.

6 Saving and Viewing Test Results

Describes how to save test results after the WireScope Pro completes a cable test.

7 Cable Testing Reference

Describes the measurement details, calibration, and memory usage of the WireScope Pro in cable testing.

8 Network Testing with the WireScope Pro

Describes how to set up and run network testing with the WireScope Pro.

9 Generating Network Traffic

Describes the network traffic generation using the WireScope Pro.

10 Voice Testing with the WireScope Pro

Describes how to set up and run Voice over IP test on WireScope Pro.

11 Network System Operations

Describes the features and functions of the network system in the WireScope Pro.

12 Network Testing Reference

Describes the various network operations of the WireScope Pro.

13 Specifications

Describes the WireScope Pro and Fiber SmartProbe specifications.

This guide covers the use of the WireScope Pro using software version 4.0.

Note that some systems running on earlier software versions may not provide all of the features described in this guide. Systems running on later software versions may operate differently than described in this guide. Be sure to refer to any user's guide supplements or release notes that came with the unit, or call your nearest Technical Support Center, listed on [page 27](#).

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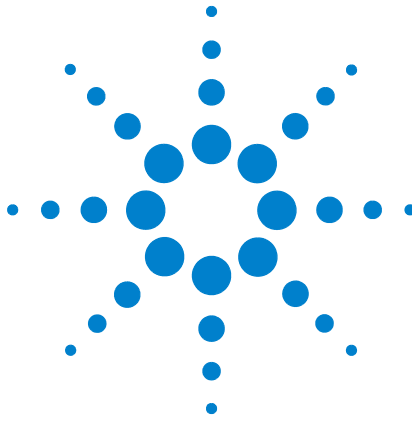
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N2647MM Multimode (850 nm/1300 nm) and N2647SM Singlemode (1310
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This chapter introduces the features and controls of the WireScope Pro and the DualRemote Pro.



Introduction

The WireScope Pro at a Glance

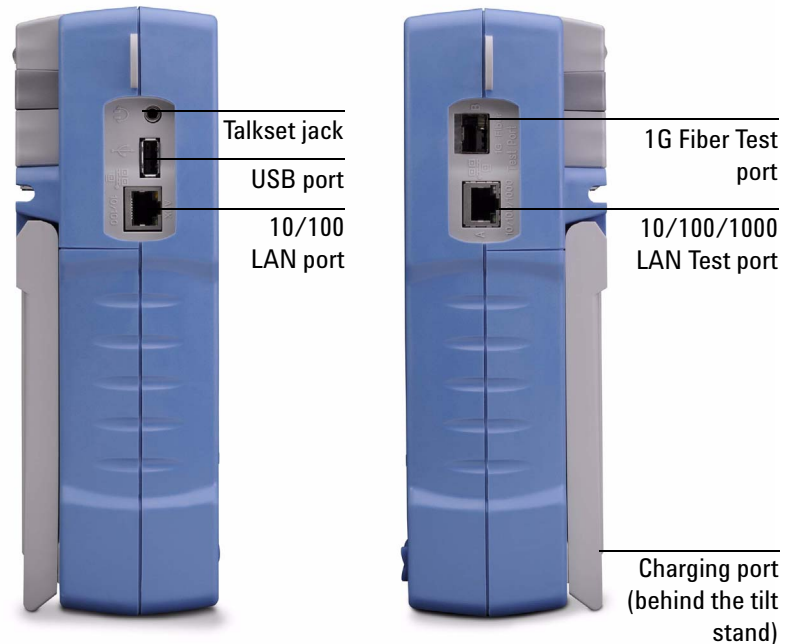


Control Buttons

You can control the WireScope Pro using a combination of front panel and onscreen buttons. The three front panel buttons are at the bottom of the WireScope Pro.

Button	Description
Power	Turns on the unit. Press and hold this button for 4 seconds to turn off the unit.
OK	Executes a selected onscreen action. A dark blue color indicates the selected action on all screens.
Scroll	Scrolls screens that contain long lists.

Ports



The ports on the left of the instrument are for connection to peripherals and controlling devices.

Talkset jack Both the WireScope Pro and DualRemote Pro have talkset jacks to improve coordination within testing teams. Operators can communicate over the cabling under test when not performing testing. The talkset is also useful for optional VoIP testing with live audio. Headsets are included with the kit.

USB port The WireScope Pro has a universal serial bus (USB) interface for high speed communication with PCs and peripherals.

LAN port The 10/100 Mbps LAN (auxiliary port) port on the left of the WireScope Pro allows communication with a PC for Remote Control. Software upgrades and data transfer will be supported in future.

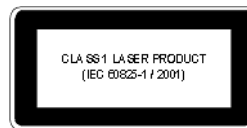
The 10/100/1000 BASE-T copper and 1 Gb fiber SFP ports on the right of the WireScope Pro are Ethernet Network Test ports. All network testing options available on the WireScope Pro use these ports for connecting to the Ethernet link under test.



SmartProbe bay The SmartProbe bay accepts all compatible probes. The WireScope Pro automatically determines what type of probe is attached, selects appropriate screens and modes, and warns of any configuration conflicts.

NOTE

- All laser sources specified in this user's guide are classified as Class 1 according to IEC 60825-1 (2001).
- All laser sources comply with 21 CFR 1040.10 except for deviations pursuant to Laser Notice No. 50, dated 2001-July-26.



System Requirements

Depending on the SmartProbe you are using, the WireScope Pro kit contains everything needed to certify copper cabling to Category 6 or to Category 6A/7.

To certify optical fiber cabling, purchase a set of Fiber SmartProbe (included in the Fiber Professional Certification Kits).

For a list of available SmartProbe, visit
<http://wirescope.comms.agilent.com>

To print reports, archive test results, and download WireScope Pro software upgrades and profiles, a Windows PC is required. The PC must be able to run Windows 2000® or higher and the ScopeData Pro II software.

To transfer files, profiles, and software updates using a USB flash drive, the PC must be equipped with a USB port.

Standard Purchase Items

Verify that you have received the following items with the WireScope Pro. If anything is missing or damaged, please contact the nearest Agilent Sales Office.

- AC/DC power adapter, 12 V, 3.3 A
- 2-Way Talkset Kit
- Cat-6A Channel Probe
- Cat-6A Universal Link Probe
- Soft carry case
- Strap set
- USB flash drive, 1 GB
- Certificate of calibration
- Determining recalibration due date form
- WireScope Pro User's Guide in CD-ROM
- Wirescope Pro release notes
- USB-A cable assembly, 2 m
- Envelope for certificate of calibration

List of Accessories

Type	Agilent part number	Description
Standard	N2640A-100	WireScope Pro Category 6/Class E Certification Kit (Copper cable only)
	N2640A-200	WireScope Pro Category 6A/Class E _A /F Certification Kit (Copper cable only)
	N2642A-130	WireScope Pro Category 6/Class E and Multimode Fiber Certification Kit
	N2642A-140	WireScope Pro Category 6/Class E and Single Mode Fiber Certification Kit
	N2642A-230	WireScope Pro Category 6A/Class E _A /F and Multimode Fiber Certification Kit
	N2642A-240	WireScope Pro Category 6A/Class E _A /F and Single Mode Certification Kit
	N2643A-150	WireScope Pro Category 6/Class E, and Multimode and Single Mode Professional Certification Kit
	N2643A-250	WireScope Pro Category 6A/Class E _A /F, and Multimode and Single Mode Professional Certification Kit
Optional	N2595A-094	Auto lighter DC power adapter
	N2605A-132	Soft carrying case
	N2620A-050	Multimode SFP Transceiver, 1000BASE-SX
	N2620A-051	Single Mode SFP Transceiver, 1000BASE-LX
	N2620A-053	100BASE-FX Media Converter, USB powered
	N2641A-080	Universal AC adapter
	N2641A-090	Replacement accessories bundle (includes stylus and spiral cord, dust caps, screen cover, and hanging straps)
	N2641A-095	256 MB USB flash drive
	N2641A-097	USB 2.0 Type-A to Type-A, 2 meters (pack of 5 cables)
	N2641A-134	Hard carrying case
	N2641A-135	Rechargeable battery pack
	N2641A-300	Class F Precision Calibration SmartProbe
	N2644A-001	Bare Wire SmartProbe
	N2644A-055	ADC Krone High Band A Block SmartProbe
	N2644A-056	ADC Krone High Band B Block SmartProbe
	N2644A-065	Siemon S210 A Block SmartProbe
	N2644A-066	Siemon S210 B Block SmartProbe
	N2644A-069	Systimax 110 A Block SmartProbe
	N2644A-070	Systimax 110 B Block SmartProbe
	N2644A-075	Ortronics 110 A Block SmartProbe

Type	Agilent part number	Description
	N2644A-076	Ortronics 110 B Block SmartProbe
	N2644A-080	Leviton eXtreme 6+ 110 A Block SmartProbe
	N2644A-082	Leviton eXtreme 6+ 110 B Block SmartProbe
	N2644A-100	Category 6A/Class E _A Universal Channel SmartProbe
	N2644A-101	Category 6A/Class E _A Universal Permanent Link SmartProbe
	N2644A-102	Category 6A Cross-Cable Permanent Link SmartProbe
	N2644A-104	Siemon Class F TERA Channel SmartProbe
	N2644A-105	Siemon Class F TERA Permanent Link SmartProbe
	N2644A-106	Nexans Class F TERA Permanent Link SmartProbe
	N2644A-107	GG45 and ARJ45 Class F Channel SmartProbe
	N2644A-110	Leoni/Kerpen EC7 Class F Permanent Link SmartProbe
	N2647MM	Dual-wavelength Multimode Fiber SmartProbe with SC interface
	N2647SM	Dual-wavelength Single Mode Fiber SmartProbe with SC interface
	N2648A-001	Alien crosstalk stimulator, single replacement unit

CAUTION

Use only the 12 V charger or adapter supplied with your WireScope Pro and DualRemote Pro. Using an incompatible charger or adapter may damage your equipment and void its warranty.

For information on the latest optional accessories, visit the Agilent Technologies Web site at <http://wirescope.comms.agilent.com>

Initial Check and Maintenance

External and Battery Power

The WireScope Pro and DualRemote Pro are powered by lithium-ion rechargeable batteries. These batteries contain circuitry that reports their state of charge to the WireScope Pro. The WireScope Pro and DualRemote Pro can also be powered by an external AC/DC power adapter. The WireScope Pro also charges the batteries when the adapter are connected while in use.

A fully charged battery can run the WireScope Pro for 5 to 8 hours before recharging is required. The DualRemote Pro can run longer on a single charge because it does not have an LCD screen. The WireScope Pro is able to last longer on a single charge if the screen brightness is reduced and the Sleep function is enabled.

WARNING

Do not calibrate or operate the WireScope Pro or DualRemote Pro immediately after charging.

If the environment is causing the temperature to rise, move the instrument to a suitable environment. Contact your nearest Technical Support Center if you are in doubt.

Using external power

The following steps guide you on how to power up the WireScope Pro or DualRemote Pro with AC power, or to charge their batteries.

- 1 Use the external AC/DC power adapter (part number N2641A-080).

CAUTION

Use only the external adapter supplied in the WireScope Pro kit. Using other power adapters may damage the instrument and will void its warranty.

- 2 Connect the end of the adapter cable to the charging jack on the side of the unit.
- 3 Plug the body of the adapter into an appropriate AC source.

Removing the Battery

The battery pack are located at the back of the WireScope Pro and DualRemote Pro.

To remove the battery pack, observe the following steps.

- 1** Turn off the WireScope Pro or DualRemote Pro and disconnect the external AC/DC power adapter.
- 2** Fully open the stand on the back of the WireScope Pro or DualRemote Pro.
- 3** Pull the battery release tab toward the bottom and out of the WireScope Pro or DualRemote Pro.

Battery Safety

To avoid the risk of fire, burns, or damage to your battery pack, do not allow metal objects to touch the battery contacts.

The battery pack is suitable for use only with compatible WireScope Pro family devices.

Do not disassemble the battery pack. There are no user serviceable parts inside. Do not dispose of the battery pack in fire or water.

Handle a damaged or leaking battery pack with extreme care. If you come into contact with the electrolyte, wash the exposed area with soap and water. If the electrolyte comes into contact with your eye, flush the eye with water for 15 minutes and seek medical attention.

Do not expose the battery pack to high storage temperatures (above 55 °C).

When discarding a battery pack, contact your local waste disposal provider regarding local restrictions on the disposal or recycling of Lithium Ion batteries.

To obtain a replacement battery pack (part number N2641A-135), contact your local dealer.

Do not charge the battery pack if the ambient temperature is above 40 °C.

WireScope Pro Hardware

The WireScope Pro is enclosed in a rugged case designed to withstand the challenges of a construction environment. A tough skeleton with a molded bumper protects it against damage.

Touch Screen User Interface

A color touch screen simplifies navigation through menus which results in faster operation and reduced training time.

USB Flash Drive

The WireScope Pro stores test results, including plot data, in its internal flash or on a USB flash drive. Using the USB flash drive means more storage capacity and allows you to transfer test data without interrupting the WireScope Pro usage. The data can be uploaded directly to PCs using the USB port.

WireScope Pro Software

Probe Detection

The WireScope Pro software automatically detects which probes are connected to the WireScope Pro and DualRemote Pro, and configures the testing program to match those probes. Conflicts between the installed probes and testing selections generate an error message.

Digital Fault Finding

The WireScope Pro software automatically pinpoints cable fault locations and causes, speeding problem resolution and increasing operator productivity.

Software Upgrades

Software upgrades for the WireScope Pro are available for download from the Agilent Technologies Web site, <http://wirescope.comms.agilent.com/>

Refer to “[Upgrading the WireScope Pro Software](#)” on page 34 and the *ScopeData Pro II User’s Guide* for instructions on downloading software to the WireScope Pro.

The DualRemote Pro uses the same software as the WireScope Pro. The Remote Calibration procedure detects any mismatch in software versions. To upgrade the DualRemote Pro after upgrading the WireScope Pro, perform a calibration. The WireScope Pro will guide you through the procedure for downloading software from the WireScope Pro to the DualRemote Pro.

Standard Warranty

There is a standard one-year limited warranty against defects in materials and workmanship for the WireScope Pro, Dual Remote Pro, and the Fiber SmartProbe. Accessories carries a 90 day warranty. Optional extended warranties for analyzers and accessories are available, as described on the Agilent Technologies Web site, <http://wirescope.comms.agilent.com/>

WireScope Pro SmartProbe

The WireScope Pro uses test probes called SmartProbes to connect to the cabling runs that it certifies. All WireScope Pro test probes plug into the SmartProbe module slot at the top of the WireScope Pro and DualRemote Pro. The WireScope Pro automatically detects any SmartProbe connected to it and configures its interface to the matching parameters.

WireScope Pro Probe Configuration Warnings

The WireScope Pro displays a warning when it detects a potential conflict between the detected probe and any of the test settings. Using an inappropriate probe can affect measurement accuracy. This is especially important for category 6, 6A, and 7 installations.

CAUTION

Never connect the WireScope Pro test probes or test cables to a voltage source, such as a telephone jack. Excessive voltages can damage the WireScope Pro probes and the WireScope Pro, and void its warranty.

Link and Channel SmartProbe

Each WireScope Pro test kit includes SmartProbes for testing copper cabling in both Link and Channel configurations.

Category 6A/Class E_A
Universal Channel
SmartProbe

N2644A-100



Category 6A/Class E_A
Universal Permanent
Link SmartProbe

N2644A-101



Siemon Class F TERA
Channel SmartProbe

N2644A-104



Siemon Class F TERA
Permanent Link
SmartProbe

N2644A-105



Nexans Class F
Permanent Link
SmartProbe

N2644A-106



Link SmartProbes are used to connect to the customer wall plate and telecommunications panel jacks. The WireScope Pro software compensates for the probe transmission characteristics so the test results will not be affected.

Channel SmartProbes are used to connect to the customer's patch cords at the wall plate and telecommunications panel. The WireScope Pro software compensates for the probe's transmission characteristics so the test results will not be affected.

Fiber SmartProbe

The WireScope Pro transforms into an optical fiber power meter, loss meter, and cable length meter for certifying optical fiber cabling when a set of Fiber SmartProbes is installed. Fiber SmartProbes support many network-specific certification tests, including 1000BaseSX and 1000BaseLX. Each Fiber SmartProbe can both transmit and receive, for single-ended or double-ended testing.

Fiber probes are sold in pairs, in these configurations.

- N2647SM - Singlemode 1310 nm and 1550 nm
- N2647MM - Multimode 850 nm and 1300 nm

Multimode Fiber SmartProbe have LED signal sources and a range of 4 km in length for 850 nm and 10 km for 1300 nm.

Singlemode Fiber SmartProbe have Class 1 laser signal sources and a range of 50 km in length.



Singlemode Fiber SmartProbe



Multimode Fiber SmartProbe

For detailed information and specifications of the available Fiber SmartProbe, visit <http://wirescope.comms.agilent.com/>

Cabling Certification and Tests

Cabling Certification Standards

Certification testing with the WireScope Pro is highly automated. An Autotest function coordinates a series of measurements between the WireScope Pro and DualRemote Pro and analyzes the results to determine if the cabling run passes or fails the selected standards.

Copper Cable Testing

The standards for structured twisted pair cabling require that both ends of each cable run be tested to find the worst case performance condition. All certification testing require a two-part test set, consisting of a main unit and a remote unit, each of which has similar test capabilities. One unit tests the cabling run from the telecommunications closet end and the other unit tests from the outlet end.

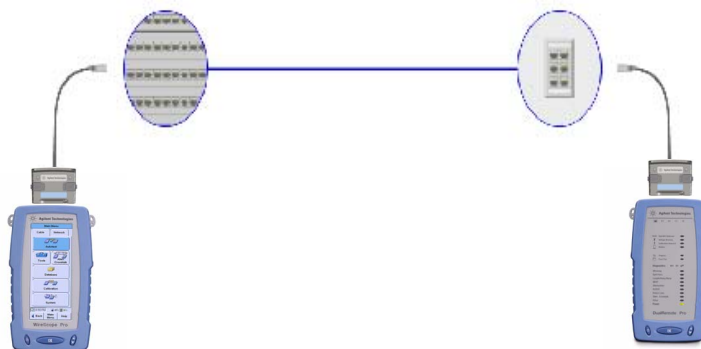
There are two primary considerations when performing cable test.

- Whether the user patch cords are included in the cabling run during the test, if not –Link test configuration; if yes – channel test configuration.
- Which standard should be used (Category or Class).

Link and Channel Tests

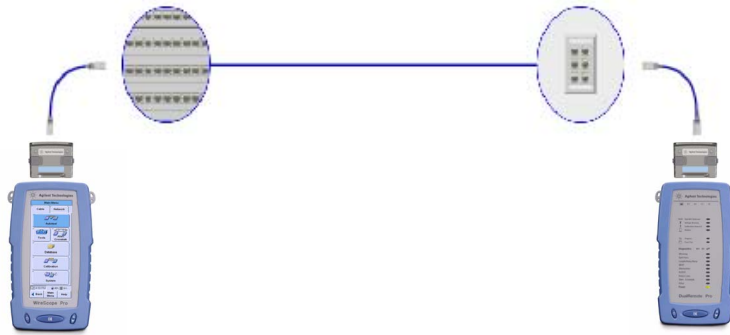
There are two commonly used configurations, **Link** and **Channel**, for certifying copper cabling.

Link configuration



Facilities used by the link configuration are still under construction and therefore do not include user patch cords. Because the link configuration does not include the two additional connections which the patch cords would produce, performance standards for link configuration tests are more stringent. The WireScope Pro and DualRemote Pro are attached to the link under test with special link test probes.

Channel configuration



The channel configuration includes the user patch cords at both ends of the cable run. The pass/fail limits applied when testing with the channel configuration are less stringent than for the link configuration. This is to allow inherent performance degradation in the two additional modular-8 connections.

The WireScope Pro and the DualRemote Pro are attached to the channel under test with special channel probes.

Optical Fiber Cable Testing

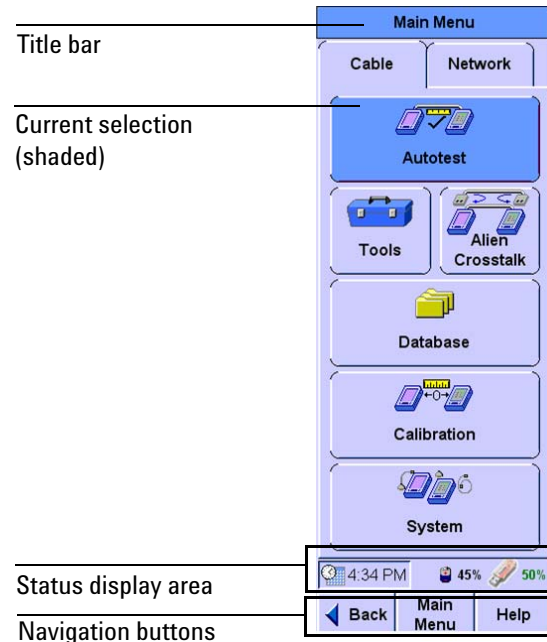
Fiber SmartProbe support many network-specific certification tests, which includes the following.

- Multimode
 - TIA 568A, 568.3, ISO 11801
 - 1000BASE-SX, 1000BASE-LX
 - 100BASE-F, 10BASE-FL, 10BASE-FB,
 - Token Ring
 - ATM-155 (UNI 3.1), ATM-155 SWL, ATM-622, ATM/SONET OC-3, -OC-12
 - FDDI, Fiber Channel-133, 266, 531, 1062
- Singlemode
 - TIA 568A, 568.3, ISO 11801
 - 1000BASE-LX
 - ATM-622, ATM/SONET OC-3, OC-12, OC-48FDDI, Fiber Channel-133, 266, 531, 1062

WireScope Pro User Interface

The WireScope Pro touch screen displays a layout of functions at each stage in the cable certification process.

The Main Menu at a Glance



Title bar

The title bar identifies each screen.

Current selection

The current selection displays the selected onscreen item in a dark blue background. When a screen is displayed, the default selection is shown. If an item is a control button, it will either be highlighted or activated when a selection is pressed.

Status display area

The status display area shows the current time set on the WireScope Pro, talkset status, battery status, and storage status.



AC power icon This icon appears when an external AC/DC power adapter is connected to the WireScope Pro.



Battery charge icon This icon shows the current battery state when the WireScope Pro operates using battery power. The percentage figure is the amount of charge remaining in the battery.

Storage icon The storage icon indicates where test results are saved and shows the available capacity of the USB flash drive or internal flash.



Results are saved to a USB flash drive. In this example, the USB flash drive is 50% full.



Results are saved to internal flash. In this example, the internal flash is 2% full.

Onscreen Buttons

Three navigation buttons are displayed at the bottom of most screens.

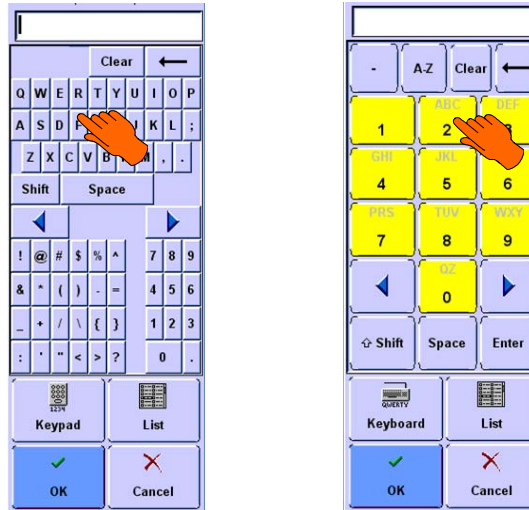


Button	Description
Back	Returns to the previous screen
Main Menu	Opens the Main Menu from any screen
Help	Launches the Help viewer. Refer to “Online Help” on page 22 .

Data Entry Options

When the WireScope Pro testing requires numeric or text entry, a text entry icon denotes fields that accept text. The WireScope Pro provides two ways to type the text.

- Typewriter-style keyboard (left) and telephone-style keypad (right)



By default, the typewriter-style keyboard will be displayed when you press the text entry icon. To switch to telephone-style keypad, press **Keypad** at the bottom of the keyboard.

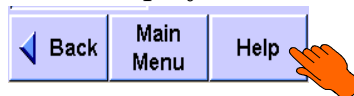
When using the telephone-style keypad, first press the **A-Z** key to type the text. After that, press one of the numbered keys to type the first letter on the key. Press the key twice to type the second letter and press three times to type the third letter.

Some of the keyboard buttons are small, therefore use the stylus provided to allow a more precised control of which buttons to press.

The increase (◀) and decrease (▶) keys changes the current selected field.

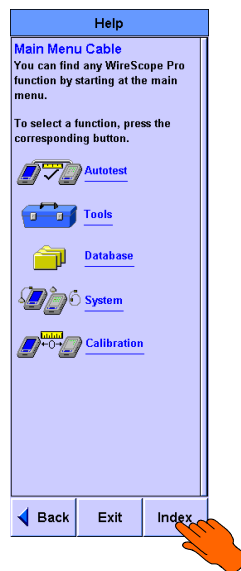
Online Help

Press **Help** at the bottom of the screen to view an extensive online Help system available on the WireScope Pro.



Help screens may contain text, graphics, and hyperlinks to further information. The following buttons are available at the bottom of the Help screen.

Button	Description
Back	Returns to the previous screen.
Exit	Closes the Help viewer.
Index	Opens the Help index window.



The DualRemote Pro

The DualRemote Pro performs the same tests as the WireScope Pro and is controlled by the WireScope Pro. The DualRemote Pro displays information using LED indicators.



Control Buttons

The DualRemote Pro has the same control buttons as the WireScope Pro.

Button	Description
Power	Turns the unit on or off.
OK	Turns off all LEDs except the four Pair Status Indicators after a test. These LEDs (green, red, or orange) show the internal status of the DualRemote Pro to determine whether it is working properly.
Scroll	Scrolls through the diagnostic indications. Refer to “Diagnostics” on page 26

Indicators

Pair status indicators

The pair status indicators turn green or red at the end of a test to show the status of each pair. A red indicator means the associated pair failed the current test.

Warning indicators

The warning indicators denote conditions that might prevent or impair testing.

Hub/NIC Detected

The Hub/NIC Detected indicator denotes that the DualRemote Pro is connected to a hub, switch, or NIC port, instead of directly to the WireScope Pro. This feature will only be applicable in future releases.

Voltage Warning

The Voltage Warning indicator indicates that the DualRemote Pro is connected to a line which has a potentially damaging voltage present. This condition usually occurs when attempting to test a line that is connected to a telephone switch.

CAUTION

If you see the Voltage Warning indicator, **immediately disconnect the DualRemote Pro from the line**. Failure to disconnect from line can permanently damage the DualRemote Pro.

Calibration Required

The Calibration Required indicator means the DualRemote Pro is not calibrated to the WireScope Pro. The automated test sequence will not execute until the calibration is performed.

Battery

The battery indicator shows the current state of the DualRemote Pro battery charge.

- When an external AC/DC power adapter is supplying power to the DualRemote Pro, the Battery indicator is in steady green.

- The LED on the battery pack is red when the battery is being charged.
- The LED on the battery pack is green when the battery is fully charged.
- When no external AC/DC power adapter is connected to the DualRemote Pro, the following indicator is shown.
 - the Battery indicator is dark when the battery is operating normally.
 - the Battery indicator is red when the battery charge is low.

CAUTION

Use only the 12 V charger or adapter supplied with your WireScope Pro and DualRemote Pro. Using any other charger or adapter can damage your instrument and void its warranty.

Test progress and result indicators

Button	Description
Progress	Turns green when a test is in progress or off otherwise.
Pass/Fail	Turns green when the test passes or red when the test fails.
Diagnostics	Provides more detailed information about failing test results.
Wiremap	Turns red when a fault with the cable connections is detected.
Split Pairs	Turns red when a split pair is detected.
Length/Delay/Skew	Turns red when cable length, signal delay, or skew are outside the passing limits.
NEXT	Turns red when near-end pair-to-pair or power sum faults are detected.
Insertion Loss	Turns red when insertion loss is outside passing limits.
ACRF	Turns red when far-end pair-to-pair or power sum faults are detected.
Return Loss	Turns red when the return signal loss exceeds passing limits.
A X Talk	Indicates Alien crosstalk measurement.
Other	Turns red when any other test fails.
Power	Turns green when the DualRemote Pro is powered on.

Technical Support

If you have questions or comments about your WireScope Pro, contact your nearest technical support center as listed in the Agilent Technologies Service Locations Worldwide Web site at <http://www.agilent.com/find/assist>

Before You Call

Try to solve any problems using the WireScope Pro built-in Help system. Refer to “Online Help” on page 22.

When contacting the technical support center, be ready to provide the following information.

- Serial numbers and software version of the WireScope Pro and DualRemote Pro. Refer to “Viewing Software and Hardware Version Information” on page 35.
- Detailed description of the problem, including the exact wording of any error messages and what was done when the error occurred.
- Company name and street address.
- Contact name and telephone number.



2 Using the WireScope Pro

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This chapter describes how to perform basic functions with the WireScope Pro, such as connecting power, installing probes and USB flash drives, downloading software, and working with the WireScope Pro software.



Connecting to Cabling for Certification

The WireScope Pro uses SmartProbes to connect to cabling runs. The WireScope Pro automatically detects which probes are installed in both the WireScope Pro and DualRemote Pro, and selects the matching test parameters.

To connect the WireScope Pro to a cable run, perform the steps below.

- 1 Select the correct probe for the type of cabling to be certified. See [Chapter 3](#), “Testing Copper Cable,” on page 47 or [Chapter 4](#), “Testing Fiber Cabling,” on page 91.
- 2 Insert matching probes in the SmartProbe bays at the top of the WireScope Pro and DualRemote Pro.
- 3 Connect the SmartProbe to the ends of the cable run which is being tested.

SmartProbe

Every WireScope Pro SmartProbe contains a memory chip that keeps track of how many tests have been performed with the probe. This data is helpful to determine when the probe is reaching the end of its useful life.

CAUTION

Never connect any WireScope Pro probe to a voltage source such as a telephone jack. Excessive voltage will damage the WireScope Pro and probe, and void its warranty.

Viewing probe information

You can view detailed information about the probes attached to the WireScope Pro and DualRemote Pro. Refer to “[Viewing Probe Information](#)” on page 54 for copper test probes, or “[Viewing Probe Information](#)” on page 92 for fiber test probes.

Using Talksets

The 2-Way Talkset Kit (N2605A-137) allows operators at opposite ends of a copper cable run to coordinate their efforts. The Talkset Kit is included with the WireScope Pro and Fiber Professional Test Kit, or can be ordered separately.

The following steps guide you on how to use two talksets for communication between the ends of a cable run.

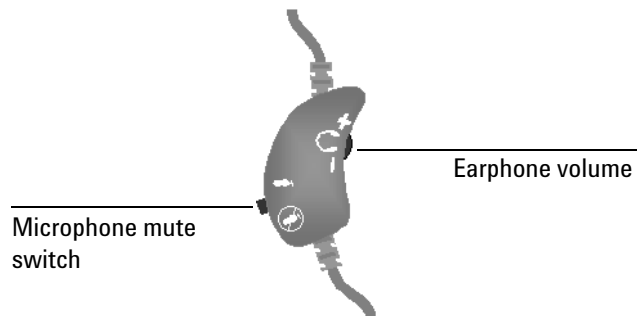
- 1 Insert the first talkset plug into the WireScope Pro talkset jack and the second talkset plug into the DualRemote Pro talkset jack. Refer to “[Talkset jack](#)” on page 3 for the jack location in both the WireScope Pro and DualRemote Pro.
- 2 Connect the WireScope Pro and DualRemote Pro SmartProbe to the ends of a cable run.
- 3 Speak and listen as with any telephone headset.

NOTE

When a test is running, talkset communication is disabled. Wait until the test finishes before speaking.

Talkset Controls

The WireScope Pro talksets have two controls.



- The thumbwheel in the inside curve of the control housing controls the earphone volume.
- The switch on the outside curve of the control housing switches the microphone to mute.

Using USB Flash Drives

The WireScope Pro can use a USB flash drive for storing large amounts of test data, for transferring data to a PC and for installing new software.

Installing USB Flash Drives

To install a USB flash drive, perform the following steps.

- 1 Insert the USB flash drive into the USB port located at the left of the WireScope Pro. Refer to “USB port” on page 3 for the location of the port.
- 2 The WireScope Pro detects the drive and asks if you want to merge the data from the device with the data in the drive.

If you select **No**, the WireScope Pro will continue to use the internal flash.

If you select **Yes**, the data from internal flash is merged with the data in the USB flash drive and all further measurement data is stored in the flash drive.

- 3 After the data has been merged, press **OK** to continue using the WireScope Pro.

Configuring USB Flash Drives

NOTE

If the USB Flash drive gets corrupted and cannot be read by the WireScope Pro, you must reformat it on a PC before attaching it to the WireScope Pro.

The following steps guide you to configure an installed USB flash drive.

- 1 Insert the drive into the USB slot of the WireScope Pro. The Storage window will be displayed.
- 2 On the Storage window, press **Yes**. The Storage Setup screen will be displayed.



- 3 A screen describing the merge procedure will be displayed.
- 4 When the progress bar shows 100%, press **OK**. The WireScope Pro will automatically change the storage location on the System Settings screen to USB flash drive.



Upgrading the WireScope Pro Software

The latest WireScope Pro software is available on the Agilent WireScope Pro Web site.

The following steps guide you on how to download the software.

- 1 Go to <http://wirescope.comms.agilent.com/> using the Web browser.
- 2 Select **N2640A WireScope Pro**, then **Technical Support**, then **Drivers & Software**.
- 3 Click on the link for **WireScope Pro Software**.
- 4 Complete the registration page and follow the instructions.

Refer to the *ScopeData Pro II User's Guide* for instructions on installing the new software in the WireScope Pro and DualRemote Pro.

You can upload the software into the WireScope Pro in two ways.

- Through the USB port. The USB port is only supported on Windows® 98 2nd edition, Windows® ME, Windows® NT, Windows® 2000 and Windows® XP.
- By installing a USB flash drive containing the WireScope Pro software.

Uploading Software from a USB Flash Drive

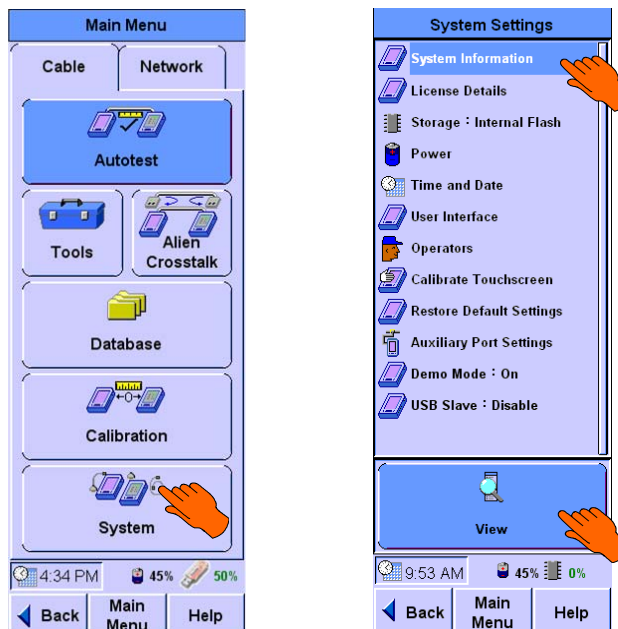
Copy the upgrade image files to the *wsload* directory on the USB flash drive. When you subsequently insert the USB flash drive into the WireScope Pro, you will be prompted to install the software.

The same USB flash drive can be used to upload the software into multiple WireScope Pro units, providing a fast and convenient method of synchronizing the software in all of the WireScope Pro units at a job site without requiring a PC to be present.

Viewing Software and Hardware Version Information

To see the software and hardware revision levels, complete the following steps.

- 1 On the main menu, press the **System** button. The System Settings screen will be displayed.
- 2 On the System Settings screen, select **System Information**, then press the **View** button. The System Information screen will be displayed.



- 3 The System Information screen displays serial numbers, as well as hardware and software revision numbers for all of the key subsystems of your WireScope Pro.

The WireScope and DualRemote tabs each display the following information.

- Serial number
- Software revision number
- Boot revision number
- Hardware revision number

2 Using the WireScope Pro

To view information about the most recently used DualRemote Pro, select the **DualRemote** tab.

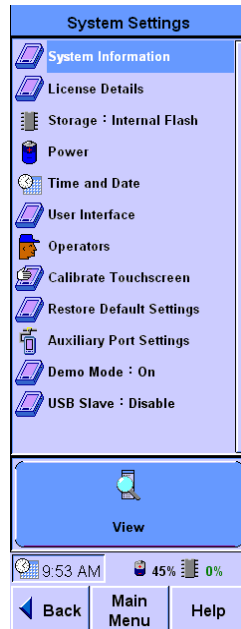


The System Settings Menu

The System Settings screen is a menu of controls for configuring and viewing information about the WireScope Pro.

To open one of the System Settings items, perform the following steps.

- 1 Press **System** on the Main Menu. The System Settings screen will be displayed.
- 2 Select the desired item, then press **Edit** or **View**. (The label on the large button near the bottom of the screen changes with different selections.) The screen for the selected item will be displayed.



System Information Displays information about the WireScope Pro and DualRemote Pro hardware and software revisions.

License Details Enters license details to enable different test features.

Storage Opens a screen to choose the destination for saved test results; either internal flash or USB flash drive.

Power Opens the Battery Status screen which shows the charge state of the batteries in the WireScope Pro and DualRemote Pro.

Time and Date Sets the date and time on the WireScope Pro.

User Interface Sets controls for the following options.

- Selecting length units
- Turning the touch-click sound on or off
- Enabling and configuring the Sleep Timeout function
- Turning the speaker on or off and volume adjustment
- Setting the screen contrast
- Setting the screen brightness

Operators Opens a screen for entering the names and locations of the technicians using the WireScope Pro and DualRemote Pro.

Calibrate Touchscreen Guides you through calibration for the touchscreen. Make sure you have a stylus available before entering this function.

Restore Default Settings Opens a screen to allow you to change all settings back to the default state. It also has optional actions for clearing the operator list, deleting custom limits, and formatting the internal flash.

Demo Mode Turns Demo mode on or off. Demo mode is useful when learning to use the WireScope Pro and does not reflect the actual cable run attached to the WireScope Pro.

USB Slave Opens a screen to allow you to enable or disable USB slave. When enabled, the USB flash drive will not be detected. Otherwise, when it is disabled, the WireScope Pro will be rebooted to resume normal operations.

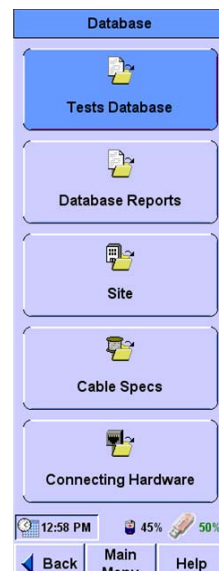
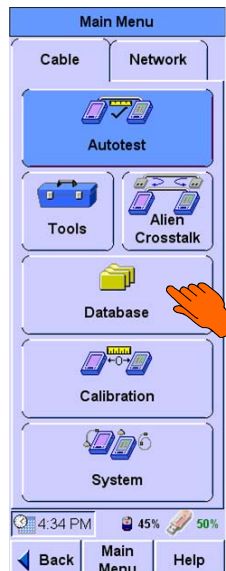
The Database Menu

The Database screen is a menu button that leads to five databases.

- The Tests Database contains saved test results.
- The Database Reports contains summaries of key statistics for saved test results, by site.
- The Site database contains tools for viewing, editing, and creating site configurations.
- The Cable Specs database contains tools for viewing, selecting, and creating cable types by manufacturer.
- The Connecting Hardware database contains tools for viewing, selecting, and creating connector types by manufacturer.

To display the Database screen, perform the following steps.

- 1 On the Main Menu, press **Database**. The Database screen will be displayed.
- 2 To view or edit one of the databases, press its button on the menu.

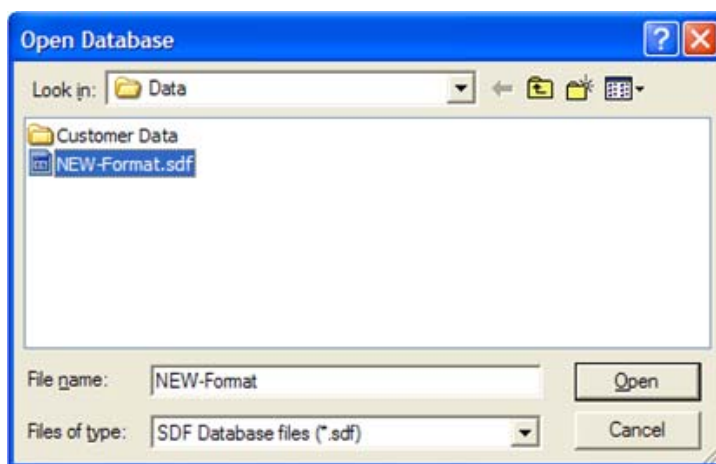


ScopeData Pro II Updates

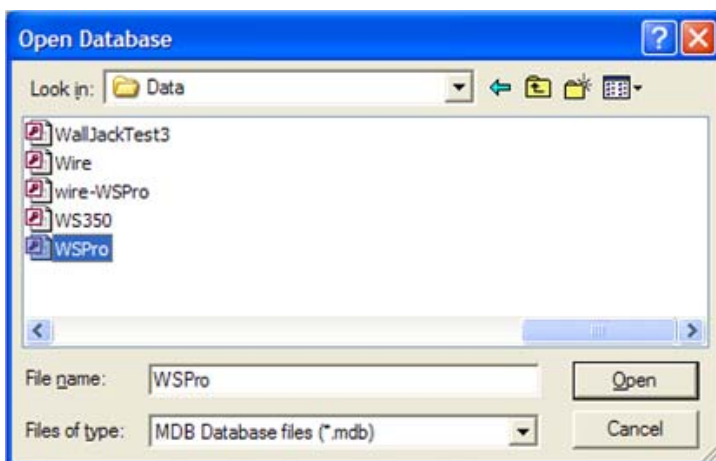
New File Format - SDF

ScopeData Pro II version 2.5.x and higher introduces the new SDF format that reduces the database file size – which contains the test results – to 33% of the previous MDB format.

Creating a new SDF database file



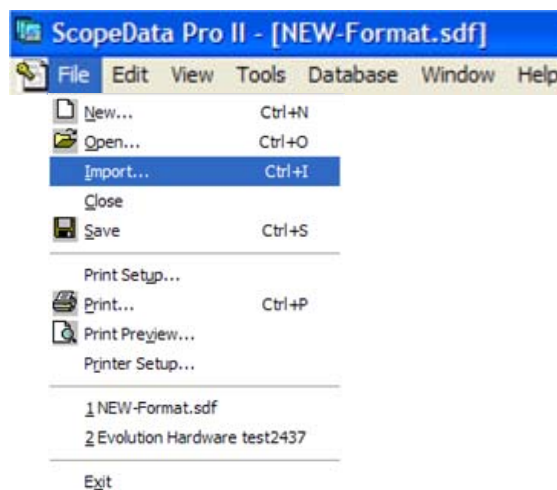
Opening an existing MDB database file



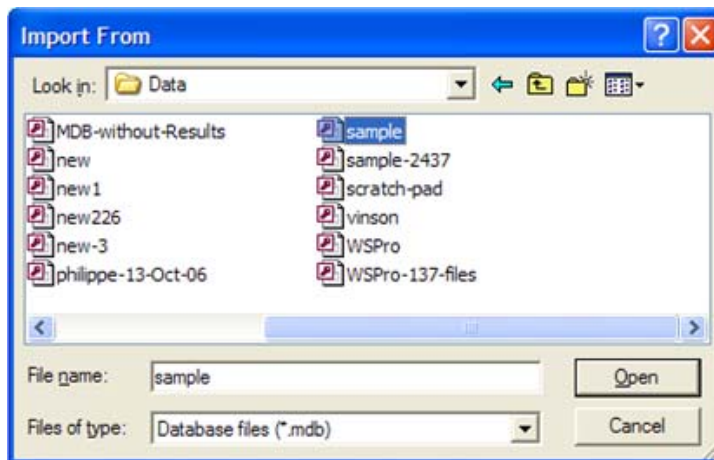
Importing MDB into SDF Format

Import from a MDB database file

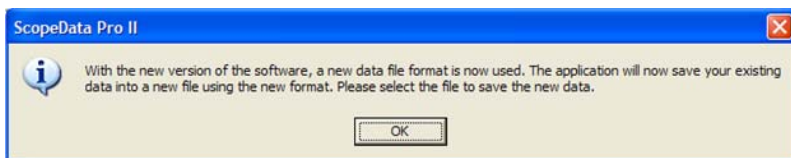
- 1 Click **File** and then **Import...**



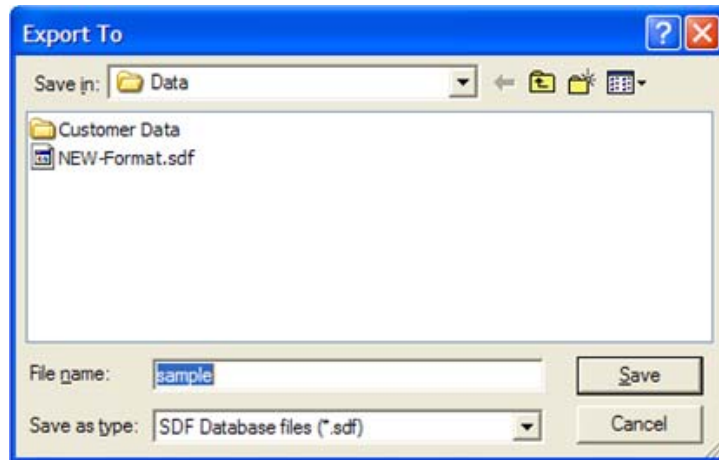
- 2 Select the desired MDB database file to import from.



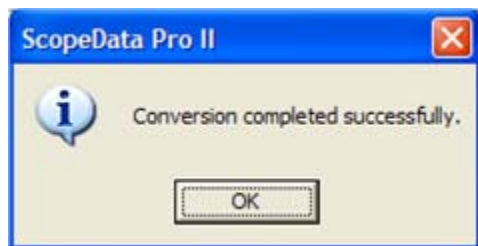
- 3 A prompt message will appear.



- 4 Select the destination file to export to.

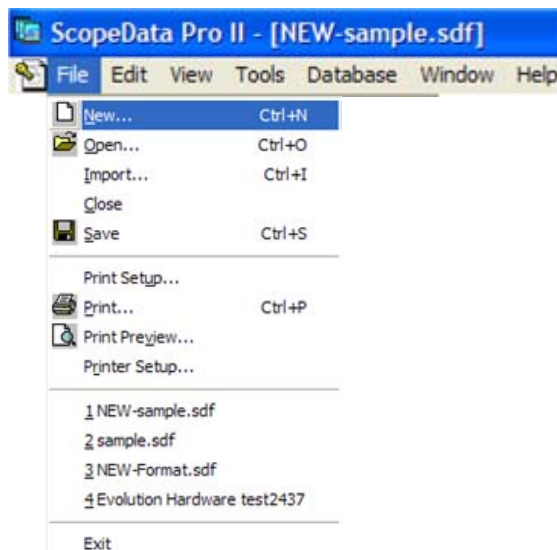


- 5 Another prompt message will appear to inform you that the conversion has been completed successfully.



Creating a New Test Database in the SDF Format

With the new SDF format, you can create new database files in SDF format. Test results will then be in the SDF database which has smaller file sizes.



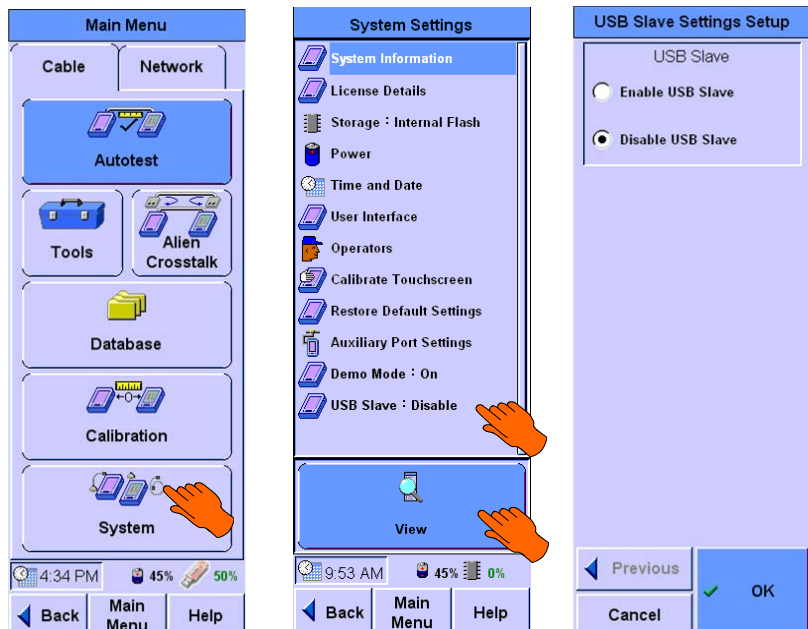
Connection between PC and WireScope Pro via USB

During installation of the ScopeData Pro II version 2.5x or higher, a USB driver directory is created in the same directory as the ScopeData Pro II software.

When prompted for the USB driver, browse to the directory containing ScopeData Pro II or browse from the CDROM version 2.5 or higher.

To connect the WireScope Pro to the PC, you first need to switch the WireScope Pro to USB Slave mode. This can be enabled from the System menu. To connect the WireScope Pro to a PC (as a slave), enable the USB Slave mode. To use a USB flash drive, disable the slave mode.

- 1 On the main menu, press **System**. The System Settings screen will be displayed.
- 2 On the System Settings screen, select **USB Slave: Disable**, then press **Edit**. The USB Slave Settings Setup screen will be displayed.

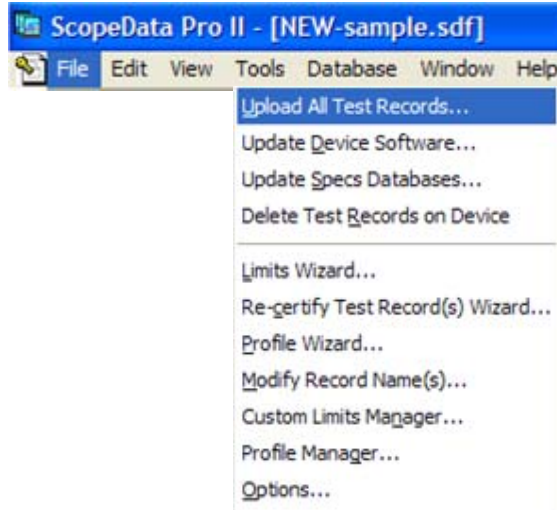


When the WireScope Pro USB Slave is enabled, the USB flash drive will not be detected.

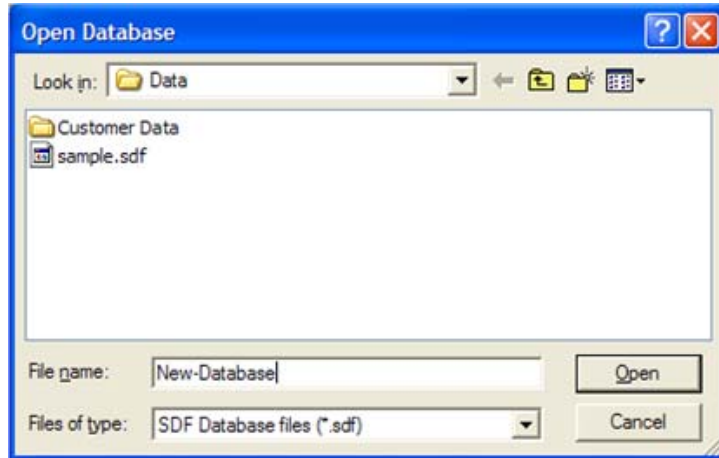
When the USB Slave mode is disabled, the WireScope Pro will be rebooted to resume normal operations.

Uploading Test Results via USB to PC

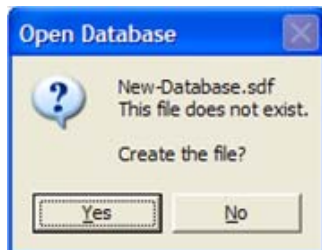
- 1 From the **Tools** menu, select **Upload All Test Records...**



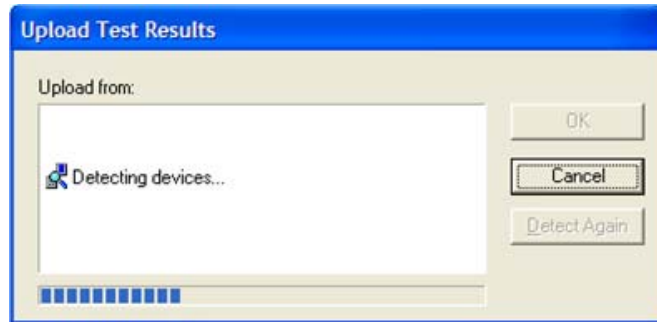
- 2 A window will appear, allowing you to choose which database file to open. When uploading the test records, you can choose to use the new SDF Database. The previous MDB format is also available.



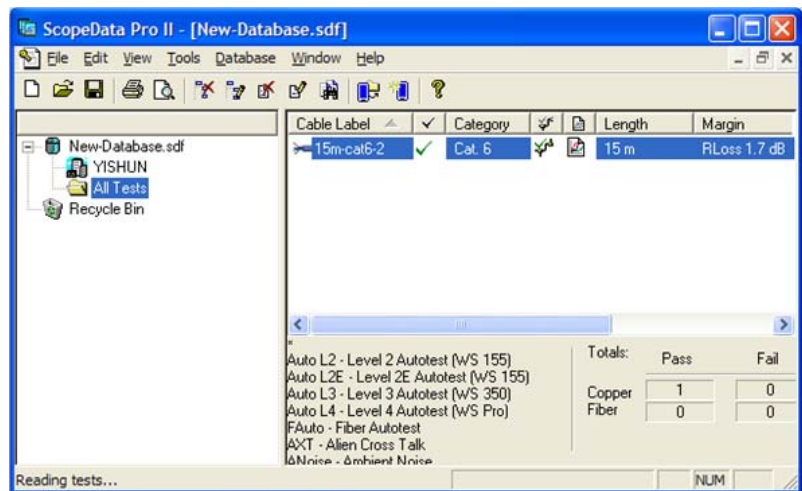
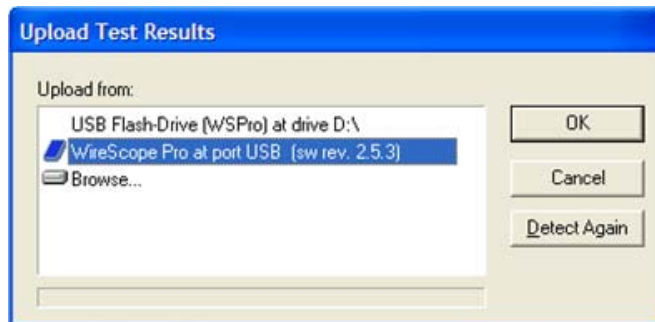
- 3 When choosing a new database, if the chosen database does not exist, the software will prompt you on whether a new file should be created.



- 4 Once the database file is selected, ScopeData Pro II will attempt to discover the WireScope Pro, WireScope 350 or a USB flash drive that contains the test results.



- 5 Choose the item that contains the test results and press **OK** to upload the test results. The ScopeData Pro II will retrieve the information from the selected device.

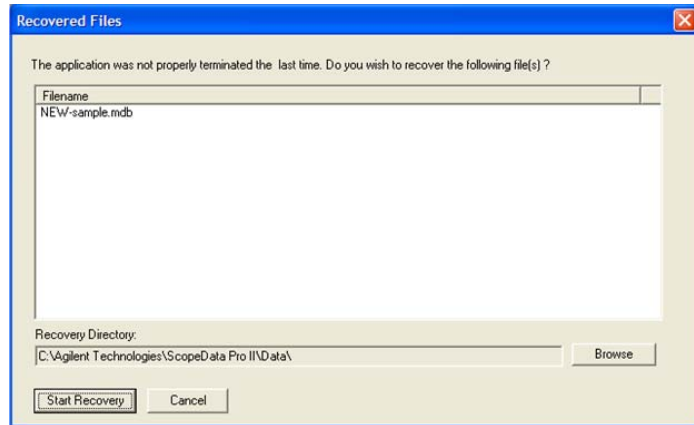


Recovery Feature

If the database file was closed improperly due to abrupt termination of ScopeData Pro II, the software will attempt to recover the database file.

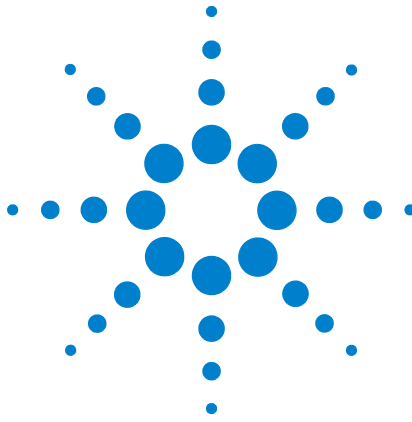
To recover the database file, perform the following steps.

- 1 Click Start Recovery to recover the database file.



- 2 You may choose to recover the database file into the default recovery directory or into another directory.
- 3 Click **OK** to continue.





3 Testing Copper Cable

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This chapter describes how to set up and run automated test sequences on copper cabling.

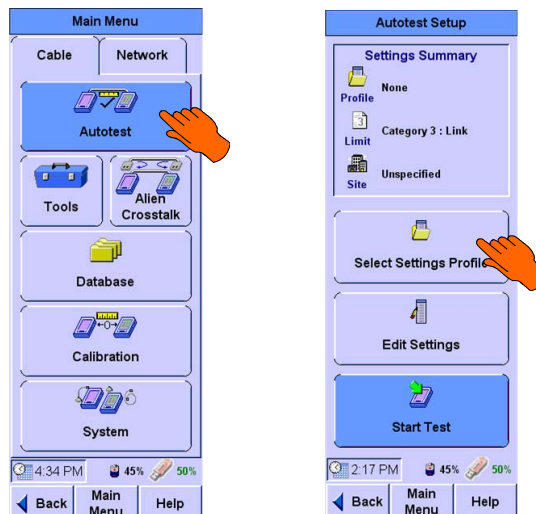


The Autotest Setup

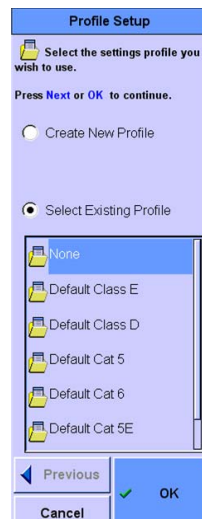
Choosing an Existing Settings Profile

A profile is a predefined locked set of Autotest settings, locked to prevent the user from changing them. Default setting profiles exist for Cat 5, Cat 5E, Cat 6, Class D, and Class E. With an optional license, profiles are also available for Cat 6A, Cat 7, and Class F. Previously defined settings profiles are added to the list of default profiles. To select an existing settings profile, perform the following steps.

- 1 Press **Autotest** on the Main Menu. In the Autotest Setup screen, press **Select Settings Profile**.



- 2 In the Profile Setup screen, select the desired profile. If the scroll bar appears, use  to scroll down and see more stored profiles.



- 3 Press **OK** when done.
- 4 Press **Start Test** to run the automated test sequence.

NOTE

Locked settings are displayed with a padlock icon along the right edge of the Autotest Settings screen, accessible by pressing **Autotest**, then pressing **Edit Settings**. If a locked setting needs to be changed, edit the profile as described below. Please realize that you are violating the existing profile settings selection when doing this.

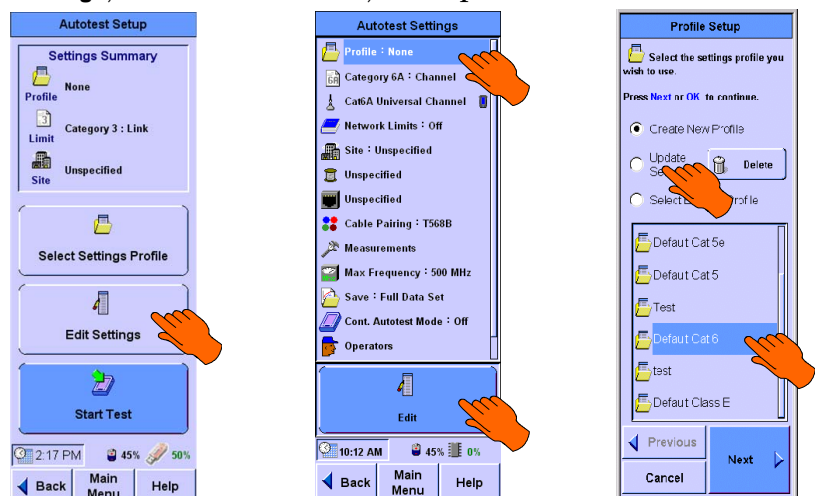
When selecting a profile setting, only the locked settings are set by the selection. Unlocked settings need to be verified as appropriate for the environment being tested.

Editing an Existing Settings Profile to Remove a Lock

Existing profiles, including the Default profiles, can be edited or deleted. It is recommended that you do not edit or delete the Default profiles, as you must reload the software to get them back in their original form to meet the standards. To create a profile similar to a default profile, first select the desired default profile to set the locked settings. Then create a new profile as described in the next section.

The following steps guide you to edit an existing settings profile.

- 1 Press **Autotest**. On the Autotest Settings screen, press **Edit Settings**, then select **Profile**, then press **Edit**.



- 2 On the Profile Setup Screen, select the profile, then select Update Selected, then press **Next**.

- 3 Change the settings that are locked from further editing by selecting the appropriate boxes. The checkmarks toggle with subsequent presses. Then press **Next**. If the Test Probe setting is locked, you will see the screen below, which will prompt you to select the Performance Grade of the probe as well as the Probe Test Count Limit, if desired. Then press **Next**. If the Test Probe setting is not locked you will go directly to the password screen, where you can choose to password protect your profile.

Profile Setup

Select which settings will be locked in the settings profile.
Press **Next** to continue.

- ☒ Limit
- ☒ Network Tests
- ☒ Site
- ☒ Cable
- ☒ Connecting Hardware
- ☒ Test Probe
- ☒ Cable Pairing
- ☒ Measurements
- ☒ Max Frequency
- ☒ Save Ports

Previous Next

Cancel

Profile Setup

You may specify a performance grade, probe test count limit and test probe. If you do so, the WireScope will check to make sure all settings are compatible with the specified performance grade and check that the specified probe is used and its test count is not exceeded.

Performance Grade

☒ Category 6

☐ Check Probe Test Count

Probe Test Count Limit:

Test Probe

☒ Agent: Cat 6

Previous Next

Cancel

- 4 If you choose to password protect your profile, you will be prompted to type a password. Once you are satisfied with your password selection, press **OK** to return to the Autotest Settings screen, where the locks will be shown. If it is password protected, you will now be prompted to type the password in order to modify this profile.

Profile Setup

Do you wish to lock the current profile settings and require a password in order to open and modify any of the settings contained within the profile?
If yes, enter a password for this profile.
Press **OK** to continue.

☐ Yes - Enable Password protector

☒ No - Disable Password protector

Previous OK

Cancel

Profile Setup

This profile has been locked by a password. You must enter the correct password in popup below to open and modify the settings contained within the profile.
Press **Next** to continue.

Enter Password:

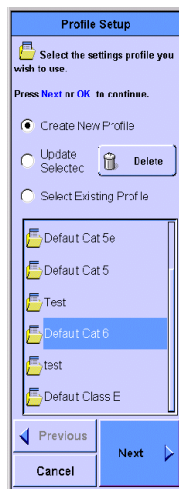
Previous Next

Cancel

Creating a New Settings Profile

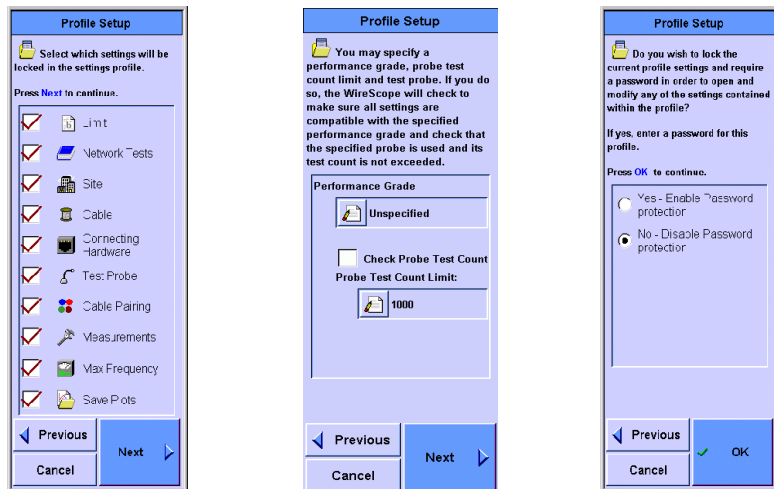
A new profile may be created either directly on the WireScope Pro, or on a PC using ScopeData Pro and subsequently downloaded into the WireScope Pro. To create a settings profile directly on the WireScope Pro, perform the following steps.

- 1 You must configure all the Autotest Settings before creating a new profile. Profiles created on the WireScope Pro uses the existing settings for all the parameters. See the remainder of this section to configure the other settings.
- 2 Press **Autotest**. On the Autotest Settings screen, press **Edit Settings**, then select **Profile**, then press **Edit**.
- 3 On the Profile Setup Screen, select Create New Profile, then press **Next**. Press anywhere in the Profile Name area to display a keyboard to allow you to type the new profile name. After entering the new name, press **OK**, then press **Next**.

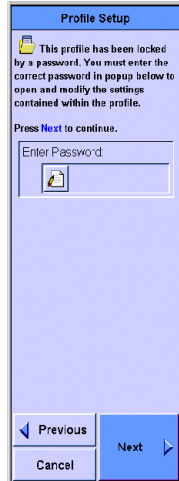


- 4 Change the settings that are locked from further editing by selecting the appropriate boxes. The checkmarks toggle with subsequent selections. Then press **Next**. If the Test Probe setting is locked, you will see the center screen below, which will prompt you to select the Performance Grade of the probe as well as the Probe Test Count Limit, if desired. Then press **Next**. If the Test Probe setting is

not locked you will go directly to the password screen, where you can choose to password protect your profile.



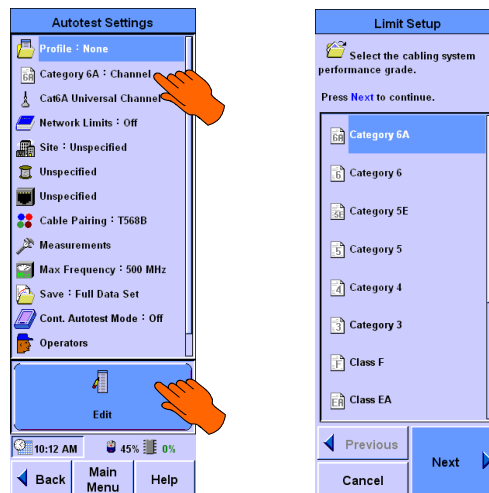
- 5 If you choose to password protect your profile, you will be prompted to type a password. Once you are satisfied with your password selection, press **OK** to return to the Autotest Settings screen, where the locks will be shown. If it is password protected, you will now be prompted to type the password in order to modify this profile.



Setting the Test Limit

The test limit can be set according to several standards. To set the test limit to a certain standard, perform the following steps.

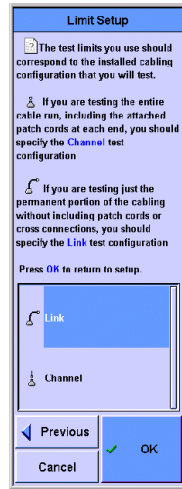
- 1 Press **Autotest** on the Main menu. On the Autotest Setup screen press **Edit Settings**.
- 2 On the Autotest Settings screen, select the second icon from the top of the list that resembles a page with a number or letter superimposed on it. Then press **Edit**. The Limit Setup screen will be displayed.
- 3 On the Limit Setup screen, select the desired cabling system performance grade.



NOTE

The scroll bar on the right of the screen shows the location of the data shown and is not a functional scroll bar. To scroll, use the scroll button at the lower right of the WireScope Pro.

- 4 Press **Next**. The next Limit Setup screen allows you to select Link or Channel test configuration.

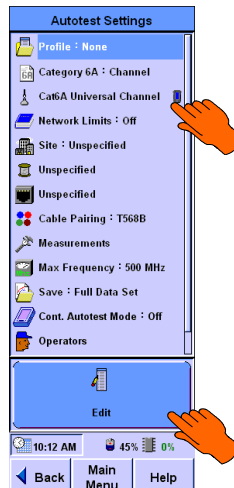


Viewing Probe Information

The WireScope Pro can display details about the probes inserted in it. If the probes are SmartProbe, the information includes the number of tests the probes have performed.

To view detailed information on the probe currently inserted, perform the following steps.

- 1 Press **Autotest** on the Main Menu. The Autotest Setup screen will be displayed. On the Autotest Setup screen, press **Edit Settings**. The Autotest Settings screen shows a menu of parameters and functions.
- 2 Select the name of the probe, then press **View**. The Probe Information screen will be displayed, showing information about the probe inserted in the WireScope Pro.

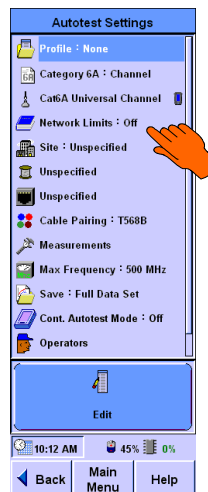


- 3 If you want to check the probe test count before each test, press **Check Probe Test Count** and type the limit to be tested against.
- 4 To view information on the probe installed in the DualRemote Pro, select the DualRemote tab. The Probe Information screen displays information about the probe in the DualRemote Pro after running an Autotest.
- 5 If you want to check the DualRemote Pro probe test count before each test, press **Check Probe Test Count** and type the limit to be tested against.

Setting Network Limits

The WireScope Pro can determine compliance with signal to noise ratio (SNR) requirements for a variety of popular LAN technologies.

- 1 Press **Autotest** on the Main Menu. The Autotest Settings screen will be displayed.
- 2 On the Autotest Setup screen press **Edit Settings**.
- 3 On the Autotest Settings screen press **Network Limits**. Then press **Edit**.



- 4 On the Networks Setup screen, select the technology for which you want to certify the tested cabling. A red

checkmark will appear for each technology selected. **Other** includes a variety of legacy network standards.

Networks Setup

The WireScope Pro can determine compliance with signal to noise ratio (SNR) requirements for a variety of popular LAN technologies.

Check the LAN technologies for which you wish to certify the tested cabling.

Other includes a variety of legacy network standards.

- ☒ 100Base-Tx
- ☒ 1000Base-T
- ☐ 10GBase-T
- ☐ Other

Previous OK Cancel

Entering the Site Name

The site name identifies the group of settings used on a job and can be applied to test records for that site.

To enter the site name, perform the following steps.

- 1 On the Autotest Setup screen, press **Site**, then press **Edit**. The Site Setup screen will be displayed.
- 2 Select **Create a New Site Name**, then press **Next**. (The **OK** button changes to a **Next** button when you select **Create a New Site Name**.) The Site Setup screen will be displayed to allow a new name to be entered for the site.

Autotest Settings

Profile : None

Category 6A : Channel

Cat6A Universal Channel

Network Limits : Off

Site : Unspecified

Unspecified

Unspecified

Cable Pairing : T568B

Measurements

Max Frequency : 500 MHz

Save : Full Data Set

Cont. Autotest Mode : Off

Operators

Edit

10:12 AM 45% 0%

Back Main Menu Help

Site Setup

The WireScope 350 saves a site name with every test report.

Please select or enter the site database you wish to work with.

Press **Next** or **OK** to continue.

☐ Create New Site Name

☐ Edit/View

☒ Select Existing Site

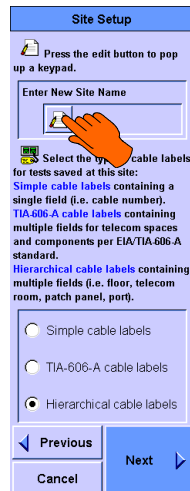
- Unspecified (0)
- do (0)
- agilent (0)

Previous OK Cancel

NOTE

To change the name or labeling format for an existing site, select the site name on the list, then select **Edit/View** and press **Next**.

- 3 Select the icon located under Enter New Site Name panel. The onscreen keyboard will be displayed.



- 4 Press the keyboard keys to type the site name and then press **OK**.

Choosing the Labeling Format

The labeling format specifies the scheme used to label test records for that site. This format is applied to the test report and to labels printed for the job. There are three cable label format options.

- **Simple** has only one field such as 'cable number'. See ["Simple label format"](#) on page 58 for the Simple label format configuration procedure.
- **TIA-606-A** has multiple fields and complies with the TIA-606-A standard. See ["TIA-606-A label format"](#) on page 60 for the TIA-606-A label format configuration procedure.
- **Hierarchical** has multiple fields for designations such as floor, telecom room, patch panel, and port. See ["Hierarchical label format"](#) on page 62 for the Hierarchical label format configuration procedure.

- 1 On the Site Setup screen, press the preferred labeling format, then press **Next**.

Site Setup

Press the edit button to pop up a keypad.

Enter New Site Name

Select the type of cable labels for tests saved at this site:

- Simple cable labels containing a single field (i.e. cable number).
- TIA-606-A cable labels containing multiple fields for telecom spaces and components per EIA/TIA-606-A standard.
- Hierarchical cable labels containing multiple fields (i.e. floor, telecom room, patch panel, port).

☐ Simple cable labels
☐ TIA-606-A cable labels
☒ Hierarchical cable labels

Previous Next
 Cancel

Simple label format

The following steps guide you to configure the simple label format.

- 1 If you want the numbers on the label to increase automatically with each new label and test, select **Enable Auto-Increment** so that a checkmark appears, as shown in the figure below.

Site Setup

Enable Auto-Increment will cause the WireScope to automatically suggest the next sequential cable ID when you save results. If enabled, enter start and end values for each and every hierarchy level. Highlight the level, then enter the values.

☒ Enable Auto-Increment

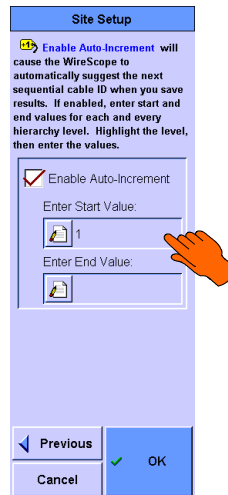
Enter Start Value:

1

Enter End Value:

Previous OK
Cancel

- 2 To set the first number to other than 1, press the **Enter Start Value** field. The onscreen keyboard will be displayed.



Site Setup

Enable Auto-Increment will cause the WireScope to automatically suggest the next sequential cable ID when you save results. If enabled, enter start and end values for each and every hierarchy level. Highlight the level, then enter the values.

☒ **Enable Auto-Increment**

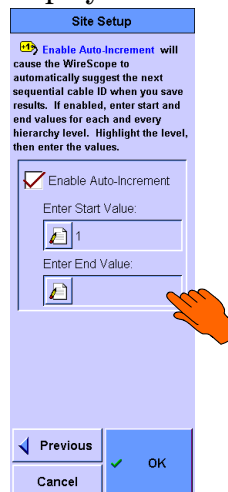
Enter Start Value:

1

Enter End Value:

Previous OK Cancel

- 3 Press the backspace arrow to erase the number on the display panel, then press the number keys to type a new starting number. Press **OK**. The keyboard closes and the new starting number appears in the **Enter Start Value** field.
- 4 To set the number of cable runs to label and test, press the **Enter End Value** field. The onscreen keyboard will be displayed.



Site Setup

Enable Auto-Increment will cause the WireScope to automatically suggest the next sequential cable ID when you save results. If enabled, enter start and end values for each and every hierarchy level. Highlight the level, then enter the values.

☒ **Enable Auto-Increment**

Enter Start Value:

1

Enter End Value:

Previous OK Cancel

- 5 Press the backspace arrow to erase the number in the display, if any, then press the number keys to type a new number. Press **OK**. The keyboard closes and the new ending number appears in the **Enter End Value** field.
- 6 Press **OK**. The Autotest Setup screen will be displayed.

TIA-606-A label format

When you choose the TIA-606-A label format and press **Next**, the following screen will be displayed.

Site Setup

TIA-606-A defines four classes of telecommunications infrastructure.

Select **Class 1** for small installations with all telecom equipment in a single telecom room.

Select **Class 2** for more complex single building installations, including those with equipment in more than one telecom room.

Select **Class 3** for multi-building campuses or sites.

Class 4 systems should be tested as multiple **Class 3** sites.

☐ Class 1

☒ Class 2

☐ Class 3

Previous Next Cancel

There are three formatting options within the TIA-606-A label standard.

- **Class 1** and **Class 2** have fields for Floor, Telecom Room, Panel, and Position.
- **Class 3** has fields for Building, Floor, Telecom Room, Panel, and Position.

The default Auto-Increment and number settings can be used or the settings can be changed using the following procedure.

To configure the TIA-606-A label format, perform the following steps.

- 1 Select **Class 1** or **Class 2** if there is only one building on the site.
Select **Class 3** if the site includes more than one building.
Press **Next**.
The Site Setup screen changes to show the fields in the

label, the Auto-Increment settings, and the start and end values for the field.

Site Setup

Enable Auto-Increment will cause the WireScope to automatically suggest the next sequential cable ID when you save results. If enabled, enter start and end values for each and every hierarchy level. Highlight the level, then enter the values.

Floor
Telecom Room
Panel
Position

☒ Enable Auto-Increment

Enter Start Value:
1

Enter End Value:
2

Previous OK Cancel

- 2 If you want the numbers for any field to increase automatically with each new label and test, then select **Enable Auto-Increment** so that a checkmark appears, as in the figure above.
- 3 To set the beginning number for a field to other than 1, press the **Enter Start Value** field. The onscreen keyboard will be displayed.

Site Setup

Enable Auto-Increment will cause the WireScope to automatically suggest the next sequential cable ID when you save results. If enabled, enter start and end values for each and every hierarchy level. Highlight the level, then enter the values.

Floor
Telecom Room
Panel
Position

☒ Enable Auto-Increment

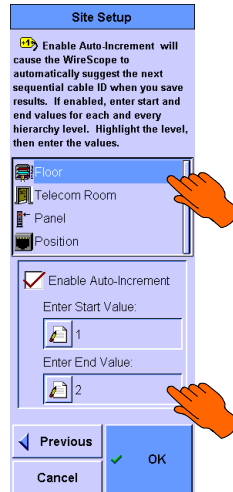
Enter Start Value:
1

Enter End Value:
2

Previous OK Cancel

- 4 Press the backspace arrow to erase the number in the display, then press the number or letter keys to type a new starting value. Press **OK**. The new starting value appears in the **Enter Start Value** field.

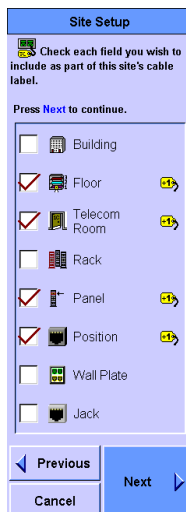
- 5 To set the number of instances of a category (for example, the number of floors), press the **Enter End Value** field. The onscreen keyboard will be displayed.



- 6 Press the backspace arrow to erase the value in the display, then press the number or letter keys to type a new value. Press **OK**. The keyboard closes and the new ending value appears in the **Enter End Value** field.
- 7 Repeat [step 2](#) through [step 6](#) for all the selected categories.
- 8 Press **OK**. The Autotest Setup screen will be displayed.

Hierarchical label format

When you choose the Hierarchical label format, the following screen will be displayed.



Checkmarks indicate fields that appear in the labels. Yellow tags next to the categories indicate that automatic number increment is enabled for that field.

To configure the hierarchical label format, perform the following steps.

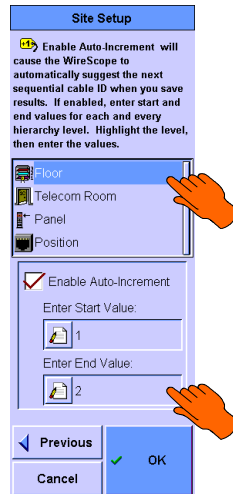
- 1 Choose a category to select it for inclusion in the label or to clear it so it does not appear. When all the desired categories are selected, press **Next**. The Site Setup screen changes to show the selected categories.

The screenshot shows the 'Site Setup' screen. At the top, there is a yellow tag icon and a text box explaining that 'Enable Auto-Increment' will cause the WireScope to automatically suggest the next sequential cable ID when you save results. Below this is a list of categories: 'Floor', 'Telecom Room', 'Panel', and 'Position'. The 'Floor' category is highlighted with a blue background. Below the list, there is a checkbox labeled 'Enable Auto-Increment' which is checked. Underneath the checkbox are two input fields: 'Enter Start Value:' with a value of '1' and 'Enter End Value:' with a value of '2'. At the bottom, there are four buttons: 'Previous' (with a left arrow), 'Cancel', 'OK' (with a green checkmark), and a button with a right arrow.

- 2 If you want the numbers for any field to increase automatically with each new label and test, select the category, then select **Enable Auto-Increment** so that a checkmark appears, as in the figure above.
- 3 To set the starting number for a field to other than 1, select the category name, then press the **Enter Start Value** field. The onscreen keyboard will be displayed.

This screenshot is identical to the previous one, but with two orange arrows added. One arrow points to the 'Floor' category in the list, and the other points to the 'Enter Start Value' input field, which contains the number '1'.

- 4 Press the backspace arrow to erase the number in the display, then press the number or letter keys to type a new starting value. Press **OK**. The new starting value appears in the **Enter Start Value** field.
- 5 To set the number of instances of a category (for example, the number of floors), press the **Enter End Value** field. The onscreen keyboard will be displayed.

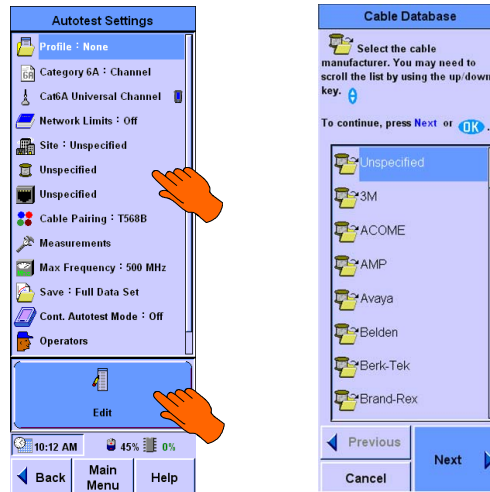


- 6 Press the backspace arrow to erase the value in the display, then press the number or letter keys to type a new value. Press **OK**. The new ending value appears in the **Enter End Value** field.
- 7 Repeat [step 2](#) through [step 6](#) for all the selected categories.
- 8 Press **OK**. The Autotest Setup screen will be displayed.

Choosing the Cable Type

Cables from different manufacturers has different transmission characteristics. The WireScope Pro compensates for those differences if you tell it what cable is used on the job. A grey cable spool icon indicates UTP cabling while a black cable spool icon indicates shielded cabling.

- 1 On the Autotest Setup screen, select the cable spool icon, then press **Edit**. The Cable Setup screen will be displayed.
- 2 Select the cable manufacturer and press **Next**. The Cable Database screen will be displayed.



NOTE

The scroll bar on the right of the screen shows the location of the data and is not a functional scroll bar. To scroll, use the scroll button at the lower right of the WireScope Pro.

- 3 Select a cable on the list and press **OK**. The Autotest Setup screen will be displayed with the selected cable type shown next to the cable spool icon.

Adding a new cable type

If you have a cable which is not in the cable database, you can add a new cable description to the database.

- 1 If the manufacturer is not listed, leave the manufacturer name as **Unspecified**. If the manufacturer is present on the list, select it, then press **Next**. The Cable Database screen is displayed. In either case, you will be shown a list of stored descriptions of cable types. If one of the stored description matches the cable being tested, select it, then press **OK**.
- 2 If no stored description matches the cable being tested, select **Add New Description** and press **Next**. Type the name to be added to the database and press **Next**.

3 Testing Copper Cable

The left screenshot shows the 'Cable Database' screen with the following content:

- Header: Cable Database
- Instruction: Select or enter the cable description. You may need to scroll the list by using the key.
- Legend:
 - Unshielded Cable.
 - Shielded Cable.
 - Multi Mode Fiber.
 - Single Mode Fiber.
- Buttons: Press Next or OK to continue.
- Radio Buttons:
 - Add New Description (selected)
 - Select Existing Description
- List:
 - Unspecified
 - Cat 3 UTP
 - Cat 4 UTP
 - Cat 5 2+2 UTP
- Navigation: Previous, Next, Cancel

The right screenshot shows the 'Cable Database' screen with the following content:

- Header: Cable Database
- Instruction: Enter the cable description.
- Buttons: Press Next to continue.
- Fields:
 - Manufacturer: Unspecified
 - Description: New cable type
 - Cable Type:
 - Copper Cable (selected)
 - Fiber Cable
- Navigation: Previous, Next, Cancel

- 3 Select the cable pair count, cable construction, and impedance (default selections are available) and press **Next**.

The screenshot shows the 'Cable Database' screen with the following content:

- Header: Cable Database
- Instruction: Enter pair count, cable construction, and impedance. Press the edit button to pop up a keypad.
- Buttons: Press Next to continue.
- Form Fields:
 - Cable Pair Count:
 - 1 Pair
 - 2 Pair
 - 3 Pair
 - 4 Pair (selected)
 - Cable Construction:
 - UTP (selected)
 - ScTP
 - STP
 - S/FTP
 - FTP
 - S/STP
 - Impedance: 100 Ohms
- Navigation: Previous, Next, Cancel

- 4 Type the Nominal Velocity of Propagation (NVP) for each pair, if known, or select **Calculate NVP from length**. If you need to calculate NVP from length, attach at least a 50 foot (15 meters) cable to the WireScope Pro with the far end disconnected. Type the measured cable length and press **Calculate**. The NVP, expressed as a percentage of the

speed of light will be shown in the NVP window. Press **Next**.

Cable Database

Enter the nominal velocity of propagation (NVP) for each pair of the cable. NVP is expressed as a percentage of the speed of light through free space.

If you do not know the cable NVP, but have a known length of cable, select **Calculate NVP from Length**.

Press **Next** to continue.

☒ Specify cable's NVP

☐ Calculate NVP from length

Nominal Velocity of Propagation (NVP%)

Pair 1: 72

Pair 2: 72

Pair 3: 72

Pair 4: 72

Previous Next Cancel

Cable Database

Attach a sample of the cable you wish to characterize. Leave the far end of the cable disconnected (i.e. open circuit). Measure the length of the cable using a measuring tape or similar method. The cable must be at least 50 ft or 15 M.

Enter the length of the cable sample and press **Calculate**.

Wire Scope

Cable Length: 80 ft

NVP (%): 87

Calculate

Previous Next Cancel

- 5 Select the target performance grade of the cable, if known, and press **OK**. The Autotest Setup screen will be displayed with the new cable type shown next to the cable spool icon.

Cable Database

Select the target performance grade of this cable.

Press **OK** to continue.

☐ Category 3

☐ Category 4

☐ Category 5

☐ Category 5E

☐ Category 6

☐ Category 6A

☐ Category 7

☒ Unspecified

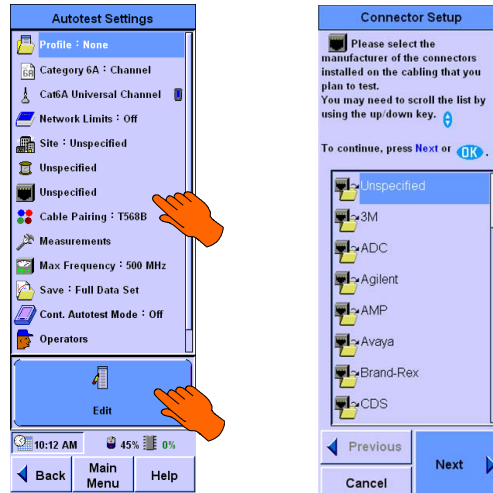
Previous OK Cancel

Choosing the Connector Type

Connectors from different manufacturers have different transmission characteristics. The WireScope Pro compensates for those differences, if you tell it what connectors are used on the job.

- 1 On the Autotest Setup screen, select the connector icon, then press **Edit**. The Connector Setup screen will be displayed.

- 2 Select the manufacturer of the connector, then press **Next**. A list of that manufacturer's connectors will be displayed.



NOTE

The scroll bar on the right of the screen shows the location of the data and is not a functional scroll bar. To scroll, use the scroll button at the lower right of the WireScope Pro.

- 3 Select the name of the connector, then press **OK**. The Autotest Setup screen will be displayed with the selected connector type shown next to the connector icon.

Adding a new connector type

If you have a connector which is not listed in the connector database, you can add a new connector description to the database.

- 1 If the manufacturer is not listed, leave the manufacturer name as **Unspecified**. If the manufacturer is present on the list, select it, then press **Next**. The Connector Setup screen is displayed. In either case, you will be offered stored descriptions of connector types. If one of the stored description matches the connector being tested, select it, then press **OK**.

- 2 If not, select **Add New Description** and press **Next**. Type the name to be added to the database and press **Next**.

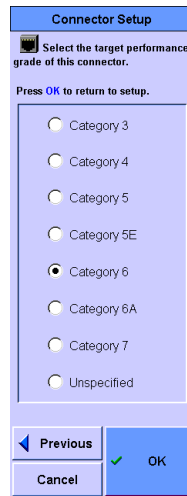
The left screenshot shows the 'Connector Setup' screen with the 'Add New Description' option selected. Below the options is a list of connector types: Unspecified, STP Mod Jack 3, STP Mod Jack 5, STP Mod Jack 5E, STP Mod Jack 6, UTP Mod Jack 3, UTP Mod Jack 5, and UTP Mod Jack 5E. The right screenshot shows the 'Connector Setup' screen with the 'Copper Connector' option selected under 'Connector Type'.

- 3 Select whether the connector is shielded or not and press **Next**.

The screenshot shows the 'Connector Setup' screen with the 'Shield' option. The 'No' radio button is selected.

- 4 Select the performance grade of the connector, if known, and press **OK**. The Autotest Setup screen will be displayed

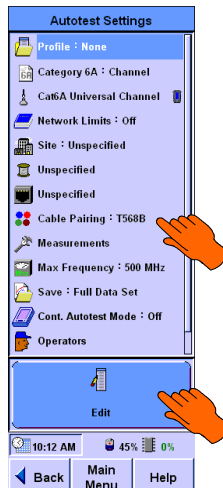
with the new connector type shown next to the connector icon.



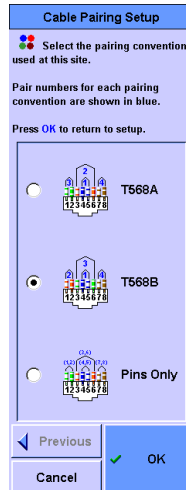
Choosing the Cable Pairing Convention

To identify the correct pair in the test results, the WireScope Pro must be set to the cable pairing convention used. For example, if the 3,6 pair fails a test, it would be “Pair 2” for the T568A pairing, but it would be “Pair 3” for the T568B pairing.

- 1 On the Autotest Setup screen, select **Cable Pairing**, then press **Edit**. The Cable Pairing Setup screen will be displayed.



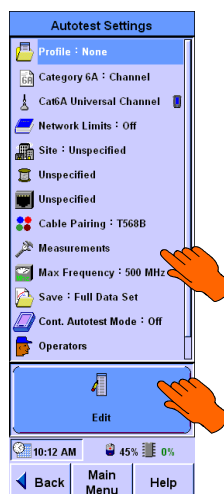
- 2 Select the cable pairing convention used on the job, then press **OK**. The Autotest Setup screen will be displayed with the cable pairing convention named.



Setting the Measurements

Detail of what measurements are used to determine the certification status of your test can be specified in the WireScope Pro. In addition, there are choices for optional features.

- 1 Press **Autotest** on the Main menu. On the Autotest Setup screen, press **Edit Settings**.
- 2 On the Autotest Settings screen, select **Measurements** and press **Edit**.



The first Measurements Setup screen identifies the required measurements for the limits you have selected. It is possible to disable the measurements, but it is not recommended.

Press **Next** to view the optional measurements you may want to add to your test. Add them by selecting the name or box.

Measurements Setup

The following measurements are required to certify the tested cabling to the limits you have selected.

Disabled measurements from this list will be performed and recorded but will not be used when determining certification status.

Press **Next** to continue.

☒ Length	☒ NEXT
☒ Attenuation	☒ Return Loss
☒ ELFEXT	☒ PS NEXT
☒ PS ELFEXT	☒ Delay
☒ Delay Skew	

Previous Next Cancel

Measurements Setup

The following measurements are optional and are not required to certify the cabling to the limits you have selected.

Check any optional measurements that you wish to add to the autotest.

Press **Next** to continue.

☐ ACR-N ☐ PS ACR-N

☐ Resistance

☐ AC COUPLED / POE

Previous Next Cancel

- After you have selected your optional measurements, press **Next** to allow you to enable the test result analysis functions. It is recommended that you choose Manufacturer Specific Compensation when you are performing Category 6 channel testing. Press **Next** when you are done.

Measurements Setup

Check any of the test result analysis functions that you wish to enable.

Margin Checking marks tests which are very close to the test limits as Pass or Fail.

Attenuation Warnings triggers when the measured attenuation is excessive relative to the length of the cable.

☐ Margin Checking

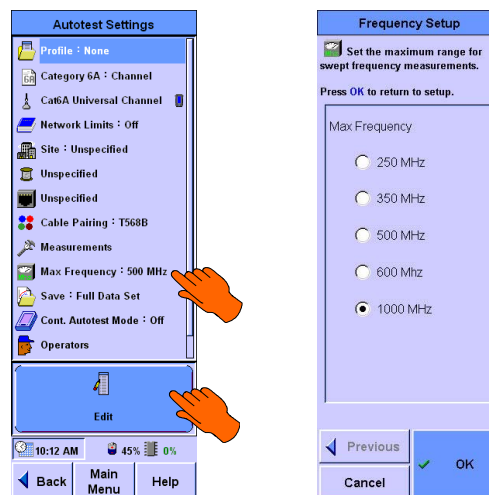
☐ Attenuation Warnings

Previous OK Cancel

Setting the Maximum Frequency

The WireScope Pro allows you to select the maximum range for swept frequency measurements. The choices depend somewhat on the standard selected previously, for example for Category 6, the 100 MHz choice is not available. To set the maximum frequency, perform the following steps.

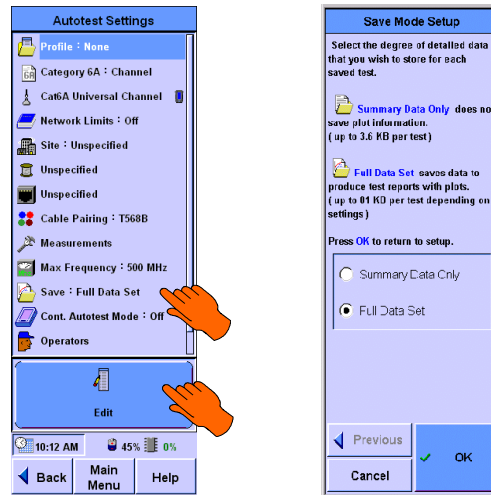
- 1 Press **Autotest** on the Main menu. On the Autotest Setup screen, press **Edit Settings**.
- 2 On the Autotest Settings screen, select **Max Frequency** and press **Edit**. On the Frequency Setup screen, select the maximum frequency for the data to be displayed.



Setting the Plot Storage Requirements

Upon Autotest completion, the entire swept frequency measurement data is stored. You can select to save the full data set, or the summary data only. Summary data is the worst case value for each test and is the minimum requirement for standards compliance. To set the data being stored, perform the following steps.

- 1 Press **Autotest** on the Main menu. On the Autotest Setup screen, press **Edit Settings**.
- 2 On the Autotest Settings screen, select **Save**, then press **Edit** to display the Save Mode Setup screen.
- 3 Select **Summary Data Only** or **Full Data Set** and press **OK**.



NOTE

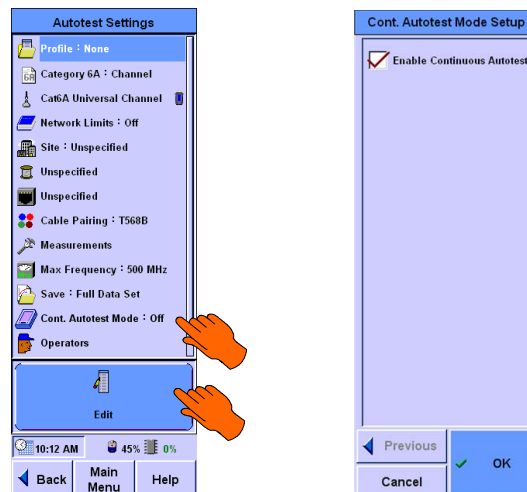
If you save the summary data only, you will not be able to recertify later with the saved data, since the plots will not be part of the stored data used by ScopeData Pro II for recertification.

Setting Continuous Autotest Mode

The WireScope Pro allows continuous autotest in a test environment where multiple points need to be tested. The Continuous Autotest mode can save a significant amount of time by automatically starting an automated test sequence after the WireScope Pro establishes communication with the DualRemote Pro when moving from one test point to the other.

Enabling the Continuous Autotest mode

To enable continuous autotest, select **Continuous Autotest Mode** in the Autotest Settings menu. and press **Edit**.



The WireScope Pro will prompt you to save the first test results and you must press the **Start** button to continue with the second test. From the second test onwards, the WireScope Pro will prompt you to change to the next cable and automatically start testing upon successful communication between the WireScope Pro and DualRemote Pro.

This will continue automatically until on of the following occurs.

- A FAIL result is encountered.
- You press **OK** on the WireScope Pro to terminate.

The file naming convention will automatically follow the Site setup selection, which includes the following.

- Simple Cable Labels
- TIA 606A Cable Labels
- Hierarchical Cable Labels

Setting the Storage Location

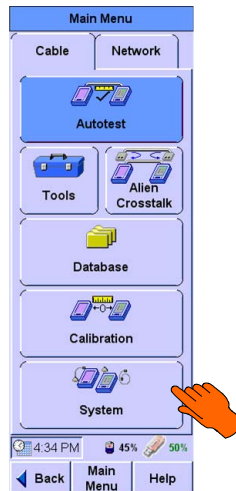
This is the same function as shown in the System Settings screen. When a USB flash drive is inserted, this function will automatically set the storage location to the USB flash drive. See [“Configuring USB Flash Drives”](#) on page 32.

Setting the Operator Names

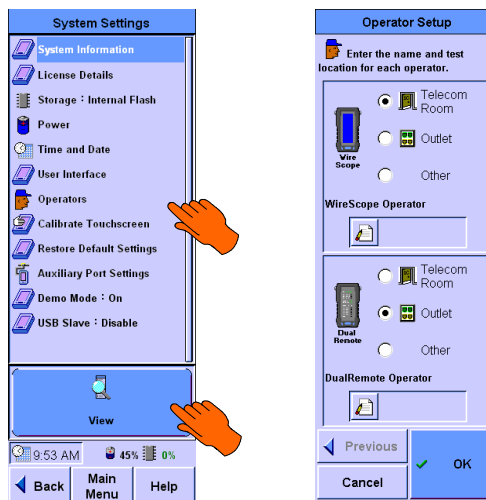
The names of the technicians performing the tests can be entered and will appear on the test report.

Follow the following steps to enter the test technicians' names.

- 1 On the Main Menu, press **System**. The System Settings screen will be displayed.



- 2 Select **Operators**, then press **Edit**. The Operator Setup screen will be displayed. Choose the WireScope Pro unit testing location, either **Telecom Room**, **Outlet**, or **Other**.



- 3 Press the **WireScope Pro Operator** field. The onscreen keyboard will be displayed, with **WireScope Pro Operator** at the top with the keyboard and keypad buttons available. A list of previously entered names will appear if you press the **List** button.

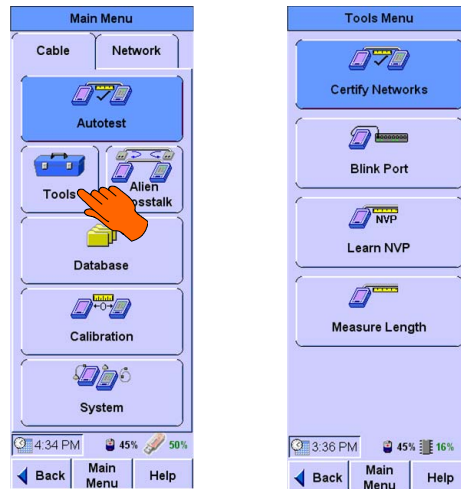
- 4 Pick a name from the list or press the keyboard keys to type the name of the technician using the WireScope Pro, then press **OK**. The technician's name appears in the **WireScope Pro Operator** field on the Operator Setup screen.
- 5 Choose the DualRemote Pro testing location, either **Telecom Room**, **Outlet**, or **Other**.
- 6 Press the **DualRemote Operator** field. The onscreen keyboard will be displayed, with **DualRemote Operator** at the top with the keyboard and keypad buttons available. A list of previously entered names will appear if you press the **List** button.
- 7 Pick a name from the list or press the keyboard keys to type the name of the technician using the DualRemote Pro, then press **OK**. The technician's name appears in the **DualRemote Operator** field on the Operator Setup screen.
- 8 Press **OK**. The System Settings screen will be displayed.

The Tools Menu

The Tools menu includes the following.

- **Certify Networks** allows you to choose standards for certification of the network. See [“Certifying a Network”](#) on page 78.
- **Blink Port** blinks the LED on an Ethernet hub or switch port. This helps locate the far end of a cable which is connected into a live network. See [“Blinking the Port”](#) on page 80.
- **Learn NVP** allows you to determine the NVP of a sample cable. See [“Learning the NVP of a Cable”](#) on page 81.
- **Measure Length** measures the length of each pair of cable defined in Cable Database. See [“Measuring the Cable Length”](#) on page 81.

To open the Tools menu, press **Tools** on the Main Menu. The Tools menu will be displayed.



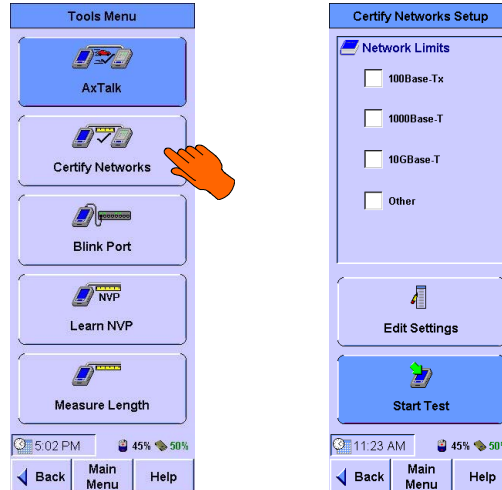
Certifying a Network

The Tools menu includes **Certify Networks**, which lets you test a cable for conformance to different network standards.

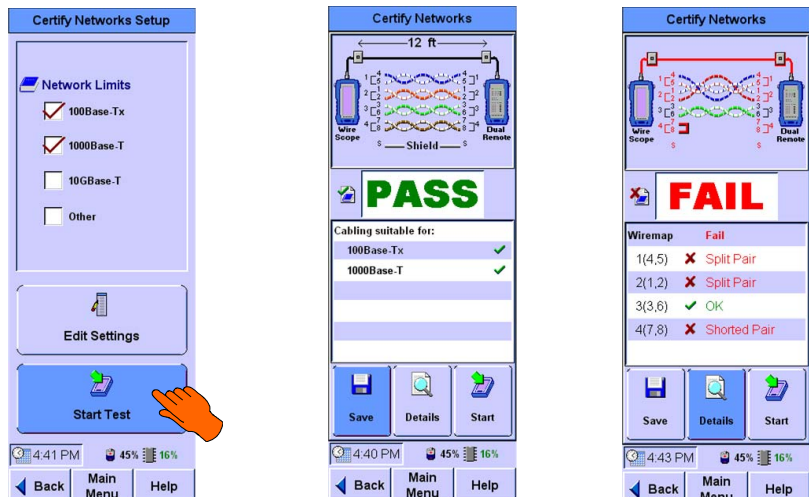
To certify a network, perform the following steps.

- 1 Connect the WireScope Pro and DualRemote Pro to the cable.

- 2 On the Tools menu (See “The Tools Menu” on page 78), press **Certify Networks**. The Certify Networks Setup screen will be displayed.



- 3 Select a standard in the list. A checkmark appears next to each selected standard.
- 4 To test the network, press **Start Test**. The test executes and the WireScope Pro displays a Pass or Fail screen.



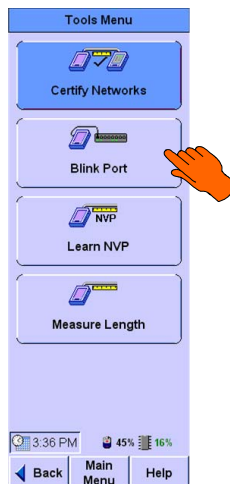
You can save and view details of the test results by pressing **Details**. See “Saving Test Results” on page 119 and “Viewing Result Details” on page 121.

Blinking the Port

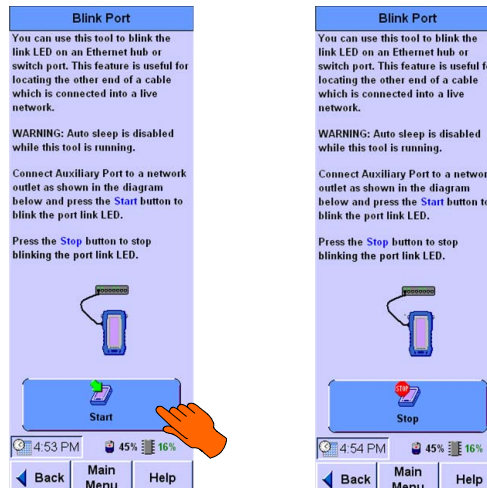
To locate the switch or hub that a cable is connected to, the WireScope Pro can blink the switch or hub port. The technician using the WireScope Pro at the wall plate end of the circuit blinks the indicator on the panel at the hub or switch end.

To blink the port, perform the following steps.

- 1 On the Tools menu (refer to “[The Tools Menu](#)” on page 78), press **Blink Port**. The Blink Port screen will be displayed.



- 2 Press **Start**. The port begins to blink and the **Start** button changes to a **Stop** button.



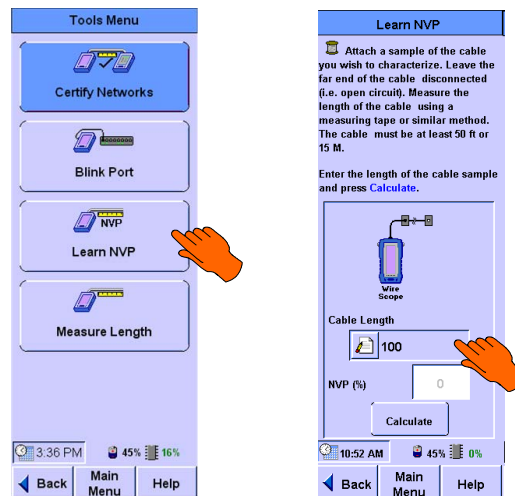
- 3 To stop the blinking, press **Stop**.

Learning the NVP of a Cable

The WireScope Pro can determine the NVP of a cable for certification testing. NVP is expressed as a percentage of the speed of light. You must use a cable sample of at least 50 feet (15 meters) long. Longer cable samples produce more accurate results.

To learn the NVP, perform the following steps.

- 1 Measure the length of the cable sample.
- 2 Connect the cable sample to the WireScope Pro. Do not connect the far end of the cable to the DualRemote Pro.
- 3 On the Tools menu (See “The Tools Menu” on page 78), press **Learn NVP**. The Learn NVP screen will be displayed. Select the Cable Length field. The numeric keyboard will be displayed.



- 4 Press the backspace arrow to erase any value in the number field, then type the length of the cable sample (in feet). Press **OK**. The keyboard closes and the Learn NVP screen displays the new number in the Cable Length field.
- 5 Press **Calculate**. The WireScope Pro calculates the NVP of the cable sample and displays the result in the NVP field.

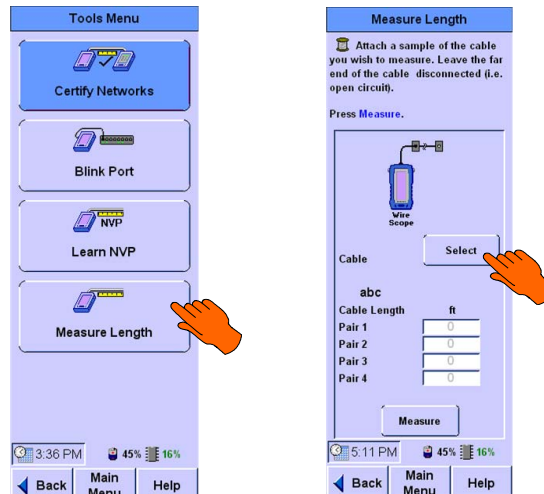
Measuring the Cable Length

The WireScope Pro can measure the length of an attached cable if the cable type is defined in the database.

To measure the cable length, perform the following steps.

- 1 Connect the cable to the WireScope Pro. Do not attach the far end of the cable to the DualRemote Pro.

- On the Tools menu, press **Measure Length**. The Measure Length screen will be displayed. Press **Select**. The Cable Setup screen will be displayed.



- Select the cable manufacturer and press **Next**. The Cable Setup screen will be displayed.

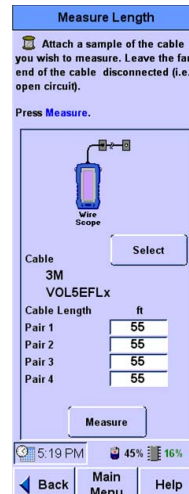
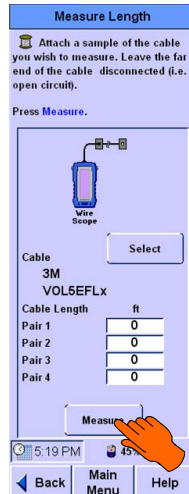


NOTE

The WireScope Pro requires a proper NVP value stored within the cable specifications to accurately measure the cable length. Therefore, select the correct cable type to obtain an accurate result.

- Select a cable from the list and press **OK**. The Measure Length screen will be displayed and the selected cable type is shown.

- 5 Press **Measure**. The WireScope Pro calculates the length of the cable and displays the length of each twisted pair on the Measure Length screen.



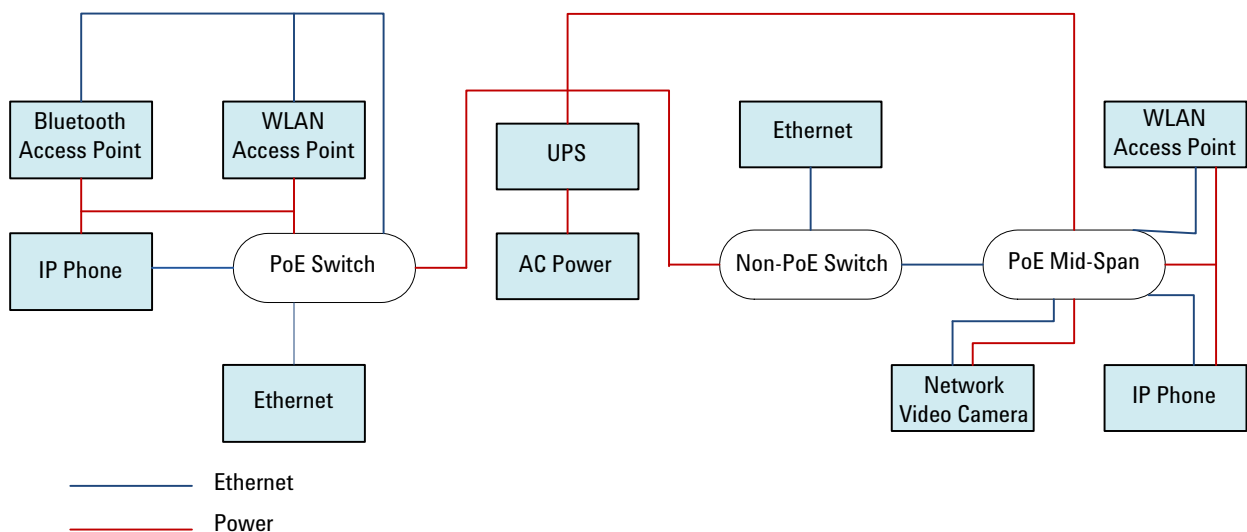
AC Coupled Cabling Test

Testing Cabling in a PoE Environment

Power over Ethernet (PoE) technology describes a system that transmits electrical power along with data to remote devices over standard twisted pair cables. This is typical in an Ethernet environment for powering IP telephones, wireless LAN access points, network cameras and other appliances.

PoE mid-span devices make it possible to apply power over Ethernet links, when the Ethernet switch itself does not support PoE. Such PoE mid-span devices in general provide passive coupling for the Ethernet signals from input to output. They do not contain Ethernet physical layer semiconductor devices to process Ethernet packets. This means that a complete link from Ethernet switch to the end device (a PC for example) must meet the standard based cabling performance specifications in order to ensure a good networking performance.

A similar discussion applies to PoE safe cabling links. Some patch-panels are configurable to make a capacitive coupled link. This means that if DC voltage is applied on one side of the link, it will not appear on the other side. This is necessary in applications where the presence of DC voltage can be harmful to one end of a device. As the capacitive interface is passive, the entire cabling link – including the capacitive patch panel – must meet cabling performance specifications.

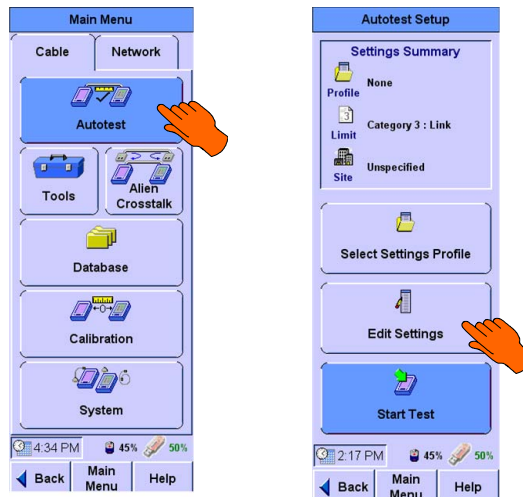


Setting Up the WireScope Pro for AC Coupled/PoE Installation

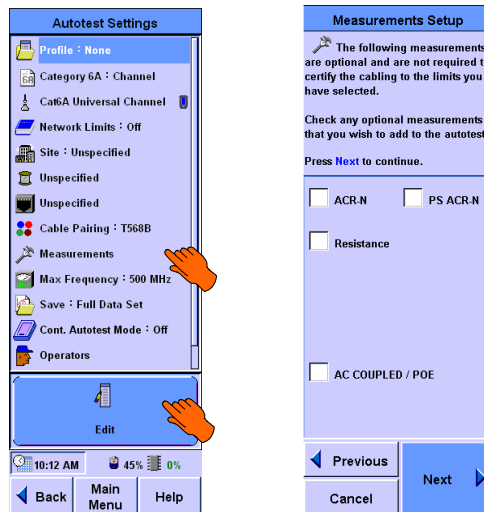
To enable the WireScope Pro to measure cabling in an AC coupled or PoE installation, you have to enable the Auto Detect AC Coupled feature in the Measurements Setup screen on the Autotest Settings menu.

To select the AC coupled test mode, perform the following steps.

- 1 On the Main Menu, press **Autotest**. The Autotest Setup screen will be displayed. Then, press **Edit Settings**.



- 2 Select **Measurements** and press **Edit**. The Measurement Setup screen will be displayed. Press **Next** and select **AC COUPLED/POE** as the optional measurement.



- 3 Press **Next** and then press **OK**. The Autotest Settings screen will be displayed.

- 4 On the Autotest Setup screen, press **Start Test** to begin the test.

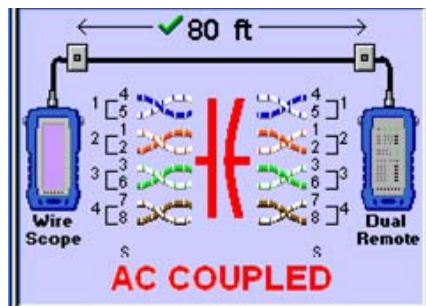
The WireScope Pro automatically detects the type of cabling channel or permanent link during the automated test sequence. This allows testing of both regular (DC coupled) links and AC coupled links without having to toggle the AC coupled testing mode each time.

Test Results

There are three possible configurations that show a valid wiremap.

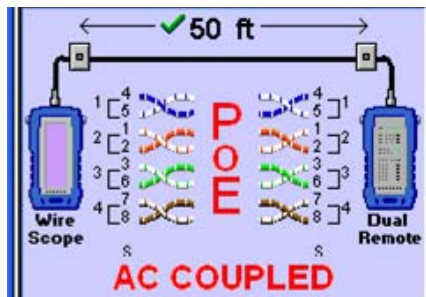
- 1 The POE Patch Panel is part of the channel or permanent link under test.

For this type of cable installation, the WireScope Pro will show a result screen with a wiremap illustration of an AC COUPLED configuration.



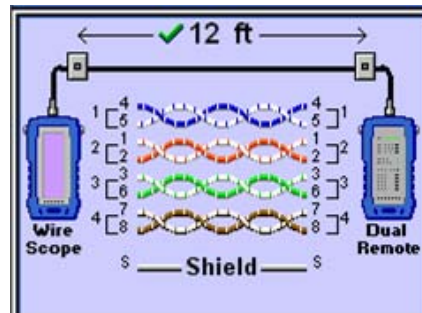
- 2 The PoE Mid-Span Device is part of the channel or permanent link under test.

For this type of cable installation, the WireScope Pro will show a result screen with a wiremap illustration of a PoE Mid Span Device configuration.



3 No PoE

For this type of cable installation, the WireScope Pro results will show a regular wiremap illustration.



Non-Standard Wiremaps

This section describes how to handle non-standard wiremaps.

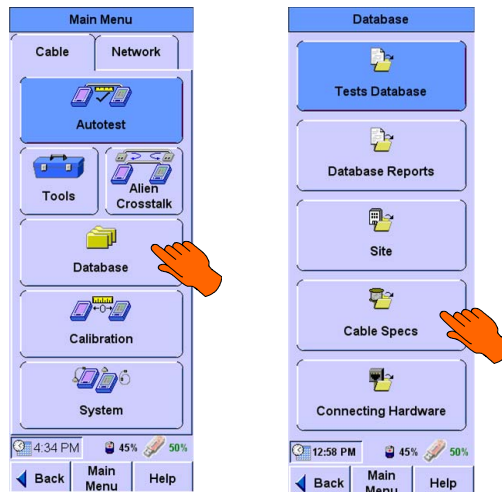
Less than 4 Pairs in a Cable

For applications using cables less than the standard 4 twisted pairs, the WireScope Pro will check for wiremap, return loss, and NEXT by performing a single-ended test.

Selecting and creating a cable with less than 4 pairs

In the Cable Specs Database Menu, you can choose to set up a cable with less than 4 pairs by adding a new cable.

- 1 On the Main Menu, press **Database**. The Database screen will be displayed. Then, press **Cable Specs**.



- 2 On the Cable Specs Database screen, select the cable manufacturer. If the manufacturer name is not in the list, select **Unspecified** and press **Next**.

- 3 Add a new description for the cable and the press **Next**.

Cable Specs Database

Enter the cable description. Select the cable type. Press **Next** to continue.

Manufacturer: Unspecified

Description: [Text Field]

Cable Type: ☒ Copper Cable ☐ Fiber Cable

Previous Next Cancel

Cable Specs Database

Enter pair count, cable construction, and impedance. Press the edit button to pop up a keypad. Select the 1 Pair option for COAX or TWINAX support. Press **Next** to continue.

Cable Pair Count: ☐ 1 Pair ☒ 2 Pair ☐ 3 Pair ☐ 4 Pair

Cable Construction: [Text Field]

Impedance: [Text Field] 100 Ohms

Previous Next Cancel

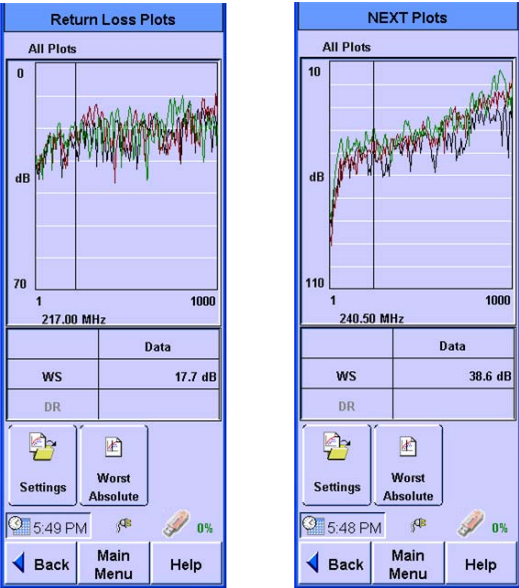
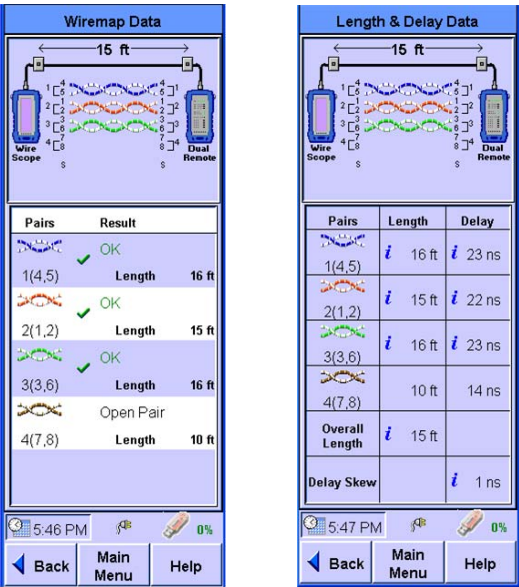
- 4 Select the cable pair count and press **Next**. Then, type the NVP for each pair of the cable. If you do not know the cable NVP but have a known length of cable, select **Calculate NVP from length**. Refer to [“Learning the NVP of a Cable”](#) on page 81.
- 5 After specifying the cable NVP, press **Next**. Select the target performance grade of the cable and press **OK**.

Test Results

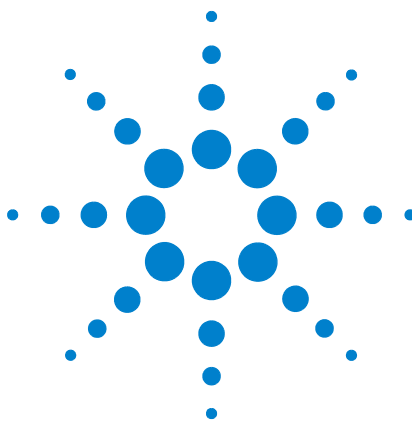
The WireScope Pro will check that the wiremap is correct as per the cable pair count selected. Return loss and NEXT results information will also be shown.

A special profile standard is chosen automatically when a less than 4 pair cable is chosen. Only the wiremap will be checked against the defined cable wiremap, for example, 3 pair, 2 pair, or 1 pair.

Results screen for less than 4 pair testing



For less than 4 pair testing, return loss and length data are given for information only. The cable is not tested against any specific cabling standard.



4 Testing Fiber Cabling

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The Fiber Autotest Settings Menu	106

This chapter describes how to set up and run automated test sequences on optical fiber cabling.

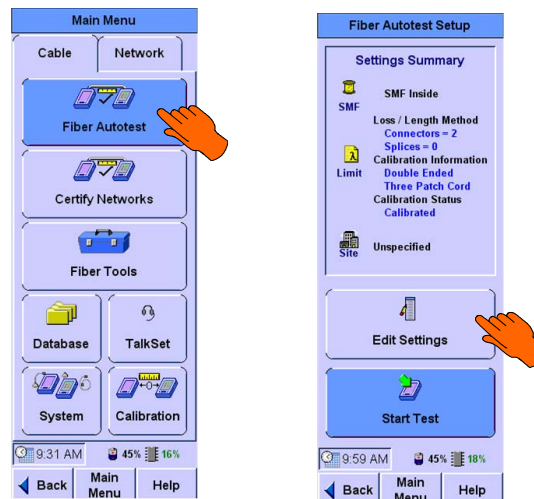


Viewing Probe Information

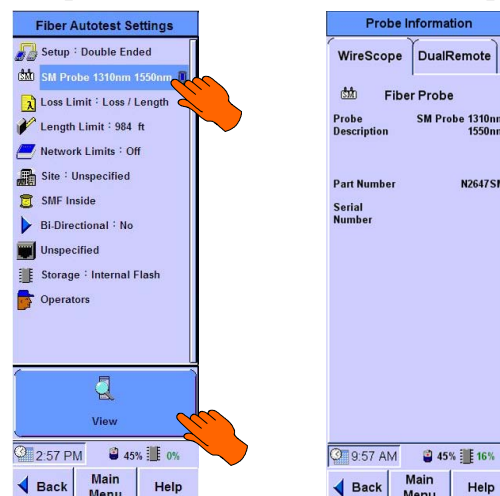
The WireScope Pro can display details about the installed fiber probes.

To view detailed information on the installed probes, perform the following steps.

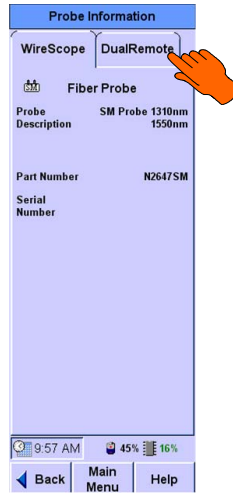
- 1 On the Main Menu, press **Fiber Autotest**. The Fiber Autotest Setup screen will be displayed.
- 2 On the Fiber Autotest Setup screen, press **Edit Settings**. The Fiber Autotest Settings screen will be displayed.



- 3 Select the name of the probe, then press **View**. The Probe Information screen will be displayed with information on the probe installed in the WireScope Pro.



- 4 To view information on the probe installed in the DualRemote Pro, press the **DualRemote** tab. The Probe Information screen displays information about the probe in the DualRemote Pro.



The Fiber Tools Menu

The Fiber Tools menu contains the following.

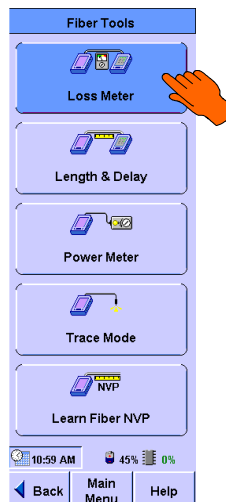
- **Loss Meter** measures continuously and reports the connected fiber cable loss.
- **Length & Delay** measures the length and propagation delay of connected fiber cables.
- **Power Meter** measures the power level reaching the Fiber SmartProbe from a light source connected to the fiber cable.
- **Trace Mode** activates the transmitter on the Fiber SmartProbe to verify that light reaches the other end of a connected cable.
- **Learn Fiber NVP** teaches the WireScope Pro the NVP of a cable sample.

To open the Fiber Tools menu, press **Fiber Tools** on the Main Menu. The Fiber Tools screen will be displayed.

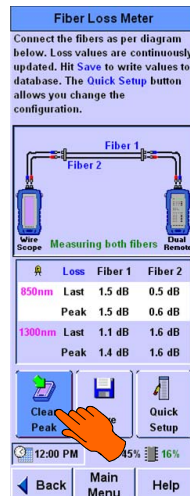
Using the Loss Meter

To use the Loss Meter, perform the following steps.

- 1 On the Fiber Tools menu, press **Loss Meter**. The Fiber Loss Meter screen will be displayed.



- 2 To clear the values in the data table at the center of the screen, press **Clear Peak**.

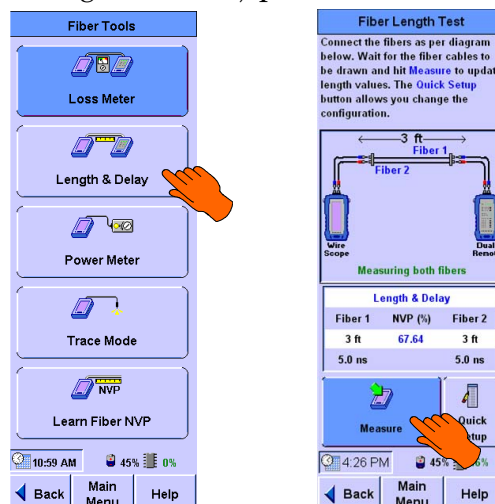


- 3 To write the current data table to the results database, press **Save**.
- 4 To select the test configuration, press **Quick Setup**.

Using the Length and Delay

To use the Length & Delay tool, perform the following steps.

- 1 On the Fiber Tools menu, press **Length & Delay**. The Fiber Length Test screen will be displayed. If a valid fiber connection is present, a **Measure** button appears.
- 2 To begin the test, press **Measure**.



- 3 To select the test configuration or NVP, press **Quick Setup**.

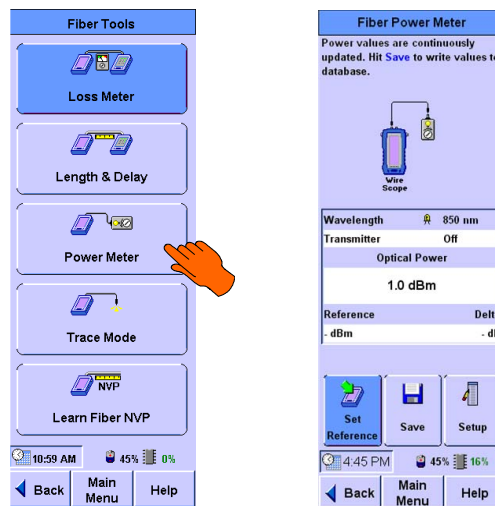
Once there is a valid connection, the length and delay are updated continuously.

Press **Measure** to perform a measurement.

Using the Power Meter

To use the Power Meter, perform the following steps.

- 1 On the Fiber Tools menu, press **Power Meter**. To set the current power value as a reference, press **Set Reference**. The difference is shown in the Delta field. The actual measurement is shown in the Optical Power field.



- 2 To set the current power value as a reference, press **Set Reference**. The difference is shown in the Delta field. The actual measurement is shown in the Optical Power field.
- 3 To write the current data table into the results database, press **Save**.

NOTE

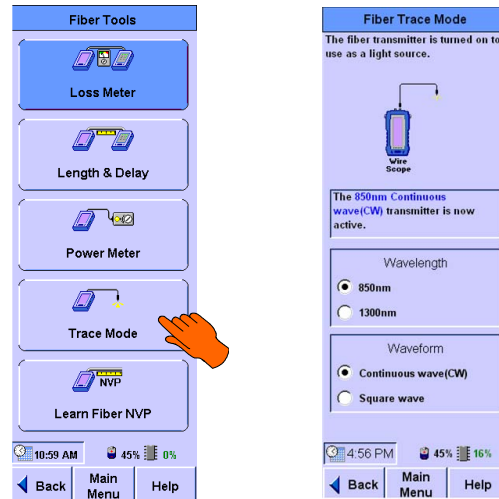
If the transmitter is on, you can measure its transmitting power using a loopback reference fiber.

Using the Trace Mode

To turn on the Fiber SmartProbe transmitter, perform the following steps.

- 1 Connect the fiber to be traced to the Fiber SmartProbe.

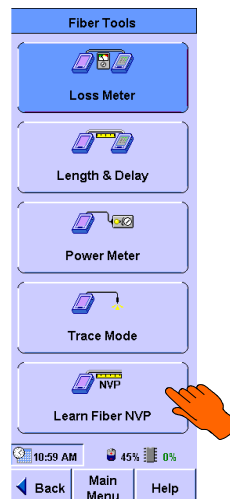
- 2 On the Fiber Tools menu, press **Trace Mode**. The Fiber Trace Mode screen will be displayed and indicates that the transmitter is active.



Using the Learn Fiber NVP

To learn the NVP of a fiber cable sample, perform the following steps.

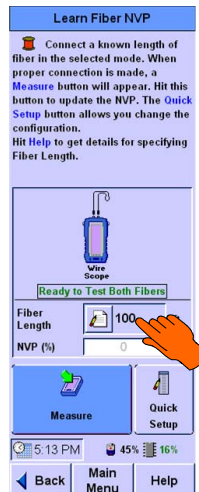
- 1 Connect a known length fiber sample to the Fiber SmartProbe. The sample must be at least 50 foot (15 meters) long.
- 2 On the Fiber Tools menu, press **Learn Fiber NVP**. The Learn Fiber NVP screen will be displayed.



- 3 Press **Quick Setup** to select the cable for single-ended or double-ended test configuration and to provide fiber construction details prior to the test.

Ensure that you select the same type of fiber that you are testing for calibration.

- 4 You may need to calibrate using the test patch cord, depending on which test configuration you choose. If you need to calibrate, use the Calibration tool on the Main Menu.
- 5 Press the Fiber Length field. The numeric keyboard will be displayed.



- When measuring two fibers, type the average length of the two.
- When measuring one fiber length looped back to the WireScope Pro, type the entire length of the fiber.
- Make sure you use the correct length units (feet or meters).

Type the length of the fiber sample and press **OK**.

- 6 Press **Measure** to learn the NVP of the fiber sample. The NVP is displayed in the NVP (%) field of the Learn Fiber NVP screen.

Standards based Calibration and Testing

The WireScope Pro software version 4.0 introduces standards based calibration and testing to help you determine which standard and calibration method that you would like to comply with.

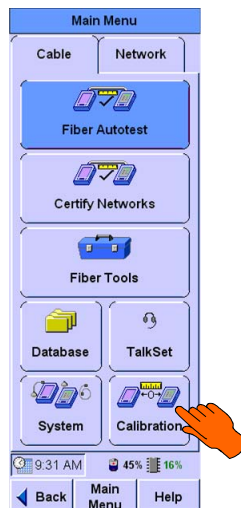
The following standards are available and supported.

- TIA 526-14A (multimode)
- TIA 526-7 (singlemode)
- ISO/IEC 61280-4-1 (multimode)
- ISO/IEC 61280-4-2 (singlemode)
- ISO/IEC 14763-3

Selecting Standard

You start off with calibrating the WireScope Pro, DualRemote Pro, and the Fiber SmartProbe according to the desired standard.

- 1 On the Main Menu, press **Calibration**. The Fiber Calibration screen will be displayed.



- 2 On the Fiber Calibration screen, select the applicable standard.

Fiber Calibration

Select the applicable standard :

- ☒ TIA 526-14A
- ☐ IEC 61280-4-1
- ☐ ISO/IEC 14763-3

◀ Previous Next ▶

Cancel

Multimode
(MM)

Fiber Calibration

Select the applicable standard :

- ☒ TIA 526-7
- ☐ IEC 61280-4-2
- ☐ ISO/IEC 14763-3

◀ Previous Next ▶

Cancel

Singlemode
(SM)

Selecting Calibration Configurations

Select either Double Ended or Single Ended, depending on the cabling structure under test.

Fiber Calibration

Select the calibration configuration and press **Next**.

- ☐ Double Ended
- ☒ Single Ended

One Patch Cord

Two Patch Cord

Three Patch Cord

◀ Previous Next ▶

Cancel

Fiber Calibration

Select the calibration configuration and press **Next**.

- ☒ Double Ended
- ☐ Single Ended

One Patch Cord

Two Patch Cord

Three Patch Cord

◀ Previous Next ▶

Cancel

Selecting Calibration Methods

Select the number of patch cords (jumpers) used in the calibration and testing.

Standards also refer this to Method A, B, C.

- Method A = Two patch cord
- Method B = One patch cord
- Method C = Three patch cord

NOTE

If you select ISO/IEC 14763-3 calibration and measurement method, you must use the reference quality adapters, launch, tail, and calibration cord.

For all Multimode calibration and measurements, mandrels or other mode conditioners are recommended.

Table 4-1 Calibration method

Calibration Method	Measured Power Loss	Limit and Margin (that is: Cable Loss Budget)
Two Patch Cord: With launch and tail fiber directly connected via through-adapter	Fiber cable loss plus one connector insertion loss	Limit = Worst Cable + Connector x 1 Margin = Limit – Power Loss
One Patch Cord: With launch (or tail) fiber used to connect source and power meter	Fiber cable loss plus two connector insertion loss	Limit = Worst Cable + Connector x 2 Margin = Limit – Power Loss
Three Patch Cord: With launch, tail, and reference fiber daisy-chained via through-adapters	Fiber cable loss only	Limit = Worst Cable Margin = Limit – Power Loss

Connecting the Accessories

Connect the appropriate patch cords, adapters, and mandrels to the transmitter (Tx) side (if required for Multimode Fiber)

Double Ended configuration



Connect the Fiber SmartProbe on the WireScope Pro and on the DualRemote Pro using one set of patch cords. Connect the Tx on the WireScope Pro to the receiver (Rx) on the DualRemote Pro and vice versa.



Connect one set of patch cords from the Fiber SmartProbe on the WireScope Pro and DualRemote Pro. Connect the two patch cord together using SC-SC adapter. Connect the Tx on the WireScope Pro to the Rx on the DualRemote Pro and vice versa.



Connect one set of patch cords from the Fiber SmartProbe on the WireScope Pro to the Fiber SmartProbe on the DualRemote Pro. Connect the two sets of patch cords to the third set of patch cords via SC-SC adapter. Connect the Tx on the WireScope Pro to the Rx on the DualRemote Pro and vice versa.

Single Ended configuration



Connect the Fiber SmartProbe on the WireScope Pro using one set of patch cords. Connect the Tx to the Rx on the same Fiber SmartProbe on the WireScope Pro.



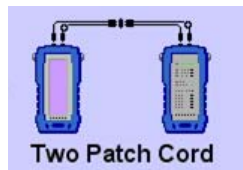
Connect one set of patch cords from the Tx of the WireScope Pro Fiber SmartProbe and another patch cord from the Rx. Connect the two patch cords together using SC-SC adapter with a short loopback patch cord.



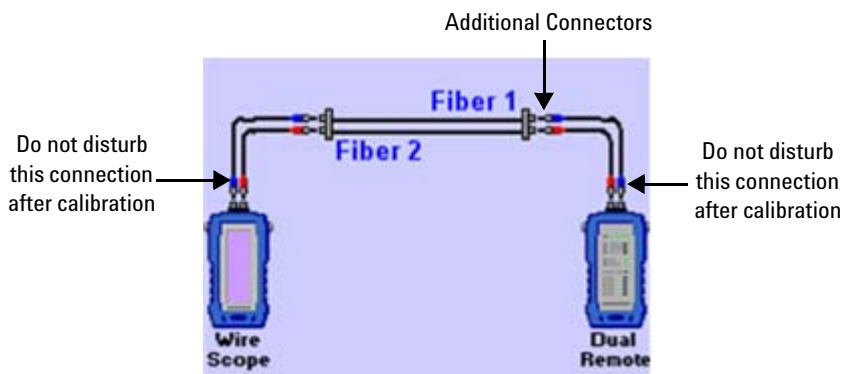
Connect one set of patch cords from the Tx of the WireScope Pro Fiber SmartProbe and another patch cord from the Rx. Connect the two sets of patch cords to the third set of patch cord via SC-SC adapter. On the other end of the fiber chain, connect a short loopback patch cord. Connect the Tx on the WireScope Pro to the Rx on the same Fiber SmartProbe.

Testing and Measurement

Two patch cord method



- 1 Calibrate the fiber connection.
- 2 After calibration, connect the patch cords to the patch panels. Do not disturb the patch cords on the transmitter side of the Fiber SmartProbe. Take note that one set of connectors is not included in the calibration. If additional connectors are added, change the numbers in Loss Limit Setup on the Autotest Settings menu.



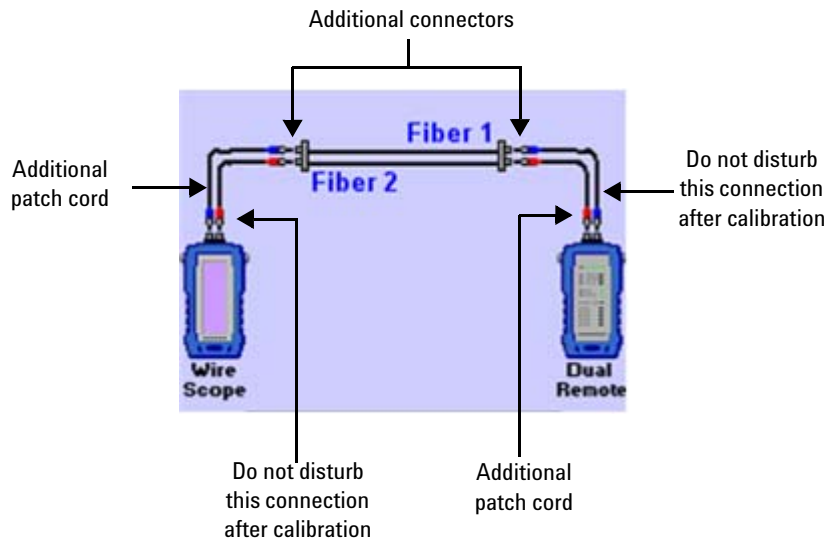
If bidirectional testing is required, enable this mode in the System Settings. See [“The Fiber Autotest Settings Menu”](#) on page 106.

Swap the patch cords at the patch panel end, not the Fiber SmartProbe end.

One patch cord method



- 1 Calibrate the fiber connection.
- 2 After calibration, connect the patch cords to the patch panels. Do not disturb the patch cords on the transmitter side of the Fiber SmartProbe. Take note that two sets of connectors are not included in the calibration. If additional connectors are added, change the numbers in Loss Limit Setup on the Autotest Settings menu.



If bidirectional testing is required, enable this mode in the System Settings. See [“The Fiber Autotest Settings Menu”](#) on page 106.

Swap the patch cords at the patch panel end, not the Fiber SmartProbe end.

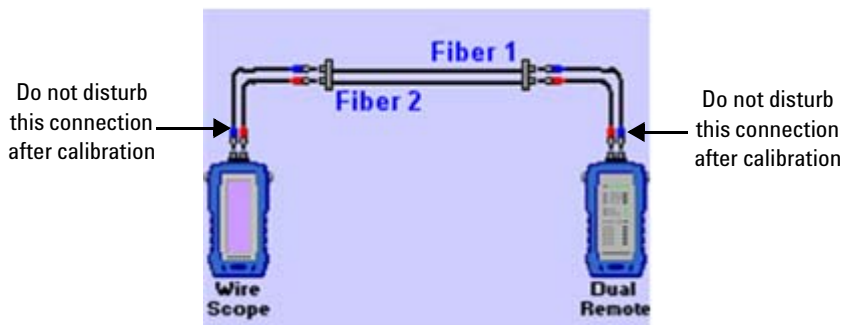
Three patch cord method



NOTE

To comply with ISO/IEC 14763-3 requirements for reference quality launch, tail, and calibration; a third patch cord must be used. The calibration cord is removed after calibration for actual measurement.

- 1 Calibrate the fiber connection.
- 2 After calibration, connect the patch cords to the patch panels. Do not disturb the patch cords on the transmitter side of the Fiber SmartProbe. Take note that all connectors and patch cords are included in the calibration. If additional connectors are added, change the numbers in Loss Limit Setup on the Autotest Settings menu.

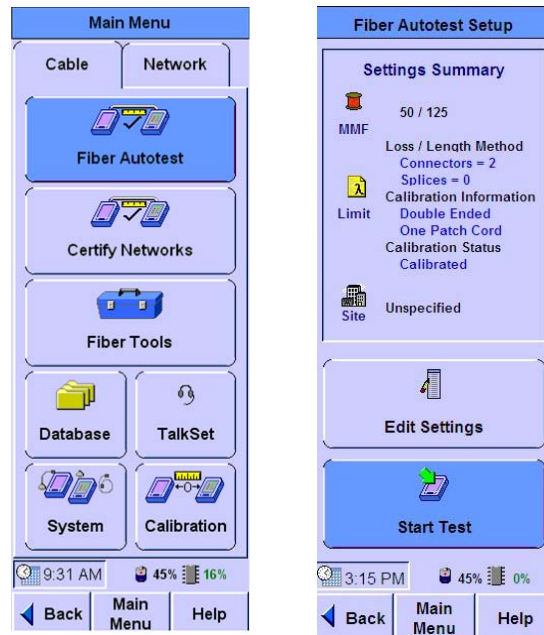


The Fiber Autotest Settings Menu

The Fiber Autotest Settings screen is a menu of controls for configuring and viewing information about the fiber test.

To open one of the Autotest Settings tools, perform the following steps.

- 1 On the Main Menu, press **Fiber Autotest**. The Fiber Autotest Settings screen will be displayed. Then, press **Edit Settings**.



- 2 Select the desired item, then press **Edit** or **View**. (The label on the button at the bottom of the screen changes with different selections.) The selected item screen will be displayed.



Setup Opens a screen to choose Single Ended or Double Ended fiber test configuration. If the configuration is changed, calibration has to be performed.

Probe Details Shows the current SmartProbe connected. For more details, press **View**.

Loss Limit Opens a screen to choose either Overall Budget Limit Method or Loss/Length Limit Method. See “[Loss Limit](#)” on page 108.

Length Limit Opens a screen to choose the maximum length for the automated test sequence to PASS.

Network Limits Opens a screen to choose from a variety of application standards to test, for example, 1000Base (SX, LX, LX10).

Site Labels the name of the site.

Cable Details Labels the type of fiber under test. To change cable setup, press **Edit**.

Modal BW Defines the modal bandwidth of the fiber under test.

Bidirectional Enables bidirectional fiber testing support.

Connector Details Labels the type of connector used. To change connector setup, press **Edit**.

Storage Shows the current storage type; internal flash or USB flash drive.

Operator Enables control for entering the names and locations of the technicians using the WireScope Pro and DualRemote Pro.

Loss Limit

Overall budget method

This method allows you to define and key in a single fixed loss budget for each wavelength.

Loss/Length method

This method accounts for connector loss configured depending on the setup and adds these losses to the fiber cable loss specification scaled by length.

Supporting the ISO/IEC 14763-3 Three Patch Cords Method

The ISO/IEC 14763-3 requires specific patch cords. There are also specific requirements for the Field Calibration Test Cord. The duplex launch or tail cord shall be between 1 m and 5 m in length and is terminated at one end with one or more connectors suitable for the Fiber SmartProbe. It shall also be terminated with one or more reference connectors compatible with the interface of the installed cabling.

The field calibration test cord shall not exceed 2 m in length and terminated on both ends with reference connectors compatible with the interface of the installed cabling.

Mandrels shall also be used in supporting this standard.

The WireScope Pro software version 3.0 or higher supports the ISO/IEC 14763-3 three patch cords method calibration and measurement requirements. Launch and tail cords, and the field calibration test cord are to be ordered separately.

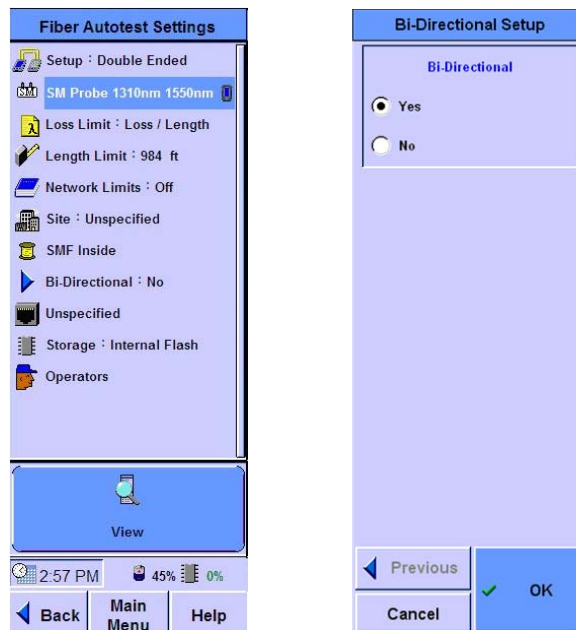
You are recommended to check the compatibility of the field calibration test cord to the intended installed cabling under test.

For a channel test, the connector used in the reference measurement (calibration) is to remain on the launch and tail cord. For a link test, the connectors are to remain on the field calibration test cord. The launch and tail cord are to remain connected to the transmit (Tx) and receive (Rx) end of the Fiber SmartProbe.

Enabling Support for Bidirectional Testing

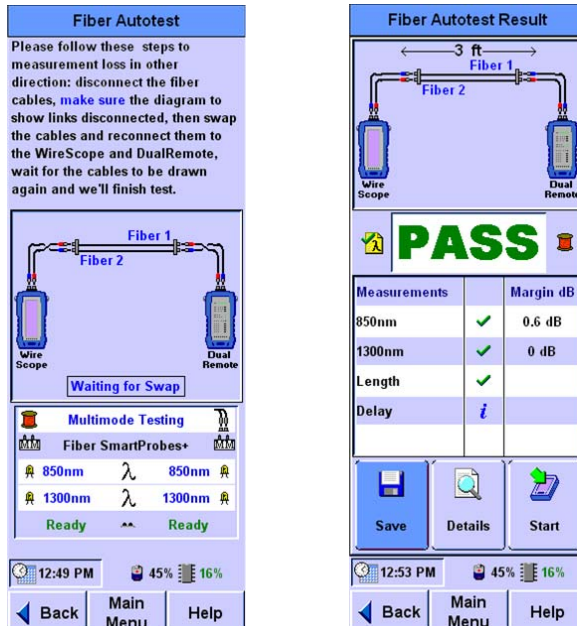
To enable support for bidirectional fiber testing, the WireScope Pro can be configured to automatically prompt you to swap the fiber under test.

The setting can be found in Fiber Autotest Settings from the Fiber Autotest Setup menu.



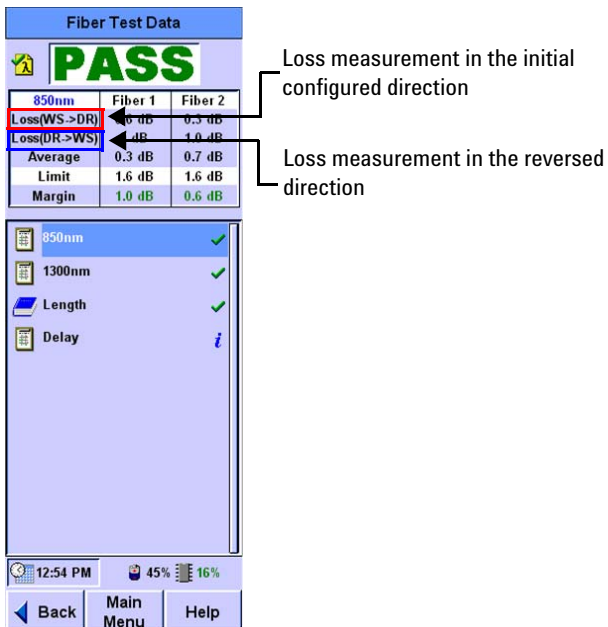
During the test, the WireScope Pro will prompt you to swap the fiber patch cable at the patch panel for bidirectional testing. Once the DualRemote Pro is detected and communication is established, the test will continue automatically.

4 Testing Fiber Cabling



Test results

Press **Details** to view the Fiber Test results. The results of the selected test item in the list will be displayed in the table.





5 Measuring External Noise

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External Noise Sources	112
External Noise Measurements with the WireScope Pro	113
Advantages of Direct Noise Measurements	114
Using the External Noise Mode	115
Settings and Views	115

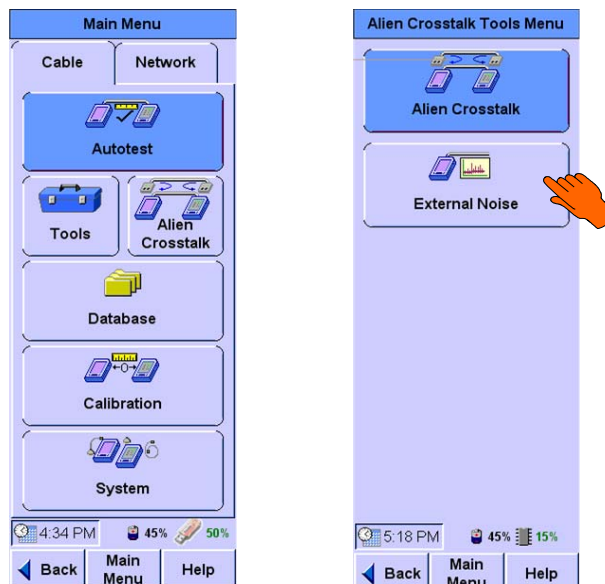
This chapter describes the external noise measurement on the WireScope Pro and using external noise mode to measure and report signals from external noise sources.



Introduction

The WireScope Pro feature set has been enhanced with the capability to measure and report signals from external noise sources. The field tester can provide a continuous monitoring of the external noise sources.

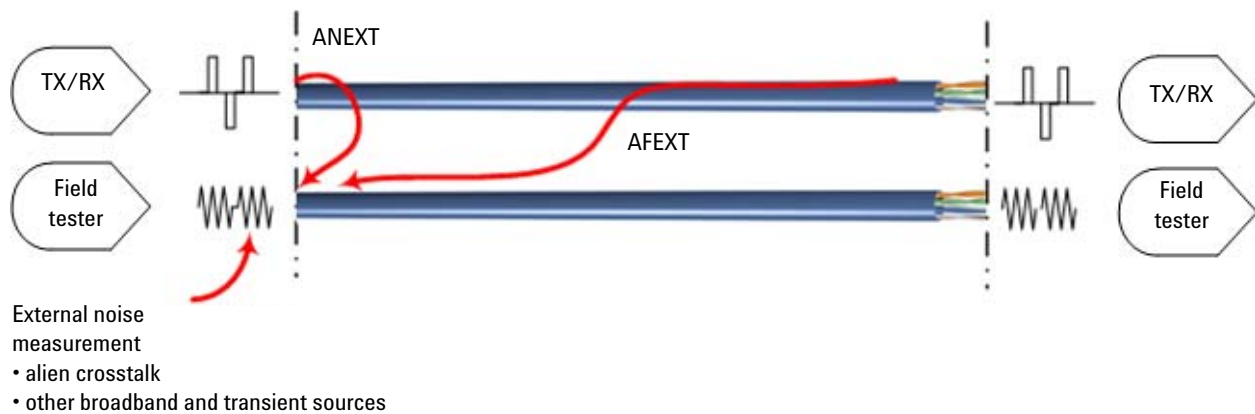
The external noise measurement feature expands the WireScope Pro diagnostic capability and provides direct noise measurements to specific limits. The power spectral density of the noise is displayed in units of dBm/MHz for correlation to the 10GBASE-T Alien Crosstalk noise tolerance specification (referred to as Ambient Noise in version 2.6 or lower).



External Noise Sources

External noise is unwanted electromagnetic interference from sources external to the cabling link under test.

Alien Crosstalk is unwanted signal coupling from a disturbing pair of a 4-pair channel, permanent link, or component to a disturbed pair of another 4-pair channel, permanent link, or component. Alien far-end crosstalk (AFEXT) is the alien crosstalk due to the far-end transmitter at the opposite end of the cabling link. Alien near-end crosstalk (ANEXT) is the alien crosstalk due to the near-end transmitter at the same end of the cabling link. Alien crosstalk is the dominant source of external noise within the 10GBASE-T signal bandwidth.



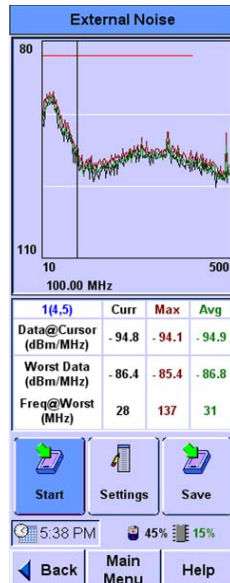
External Noise Measurements with the WireScope Pro

The WireScope Pro includes external noise measurement capability as part of its Alien Crosstalk Toolkit. This tool can be used to display and store external noise measurement data. External noise testing is performed continuously on a selected cable pair or other devices under test, with a refresh rate of less than 3 seconds for each sweep.

With a maximum hold plot, it can capture the worst case of the measured external noise spikes for over long periods of time.

The IEEE Std 802.3an-2006 standard for port type 10GBASE-T defines a receiver alien crosstalk noise tolerance of -141.9 dBm/Hz (-81.9 dBm/MHz). Measurements are compared to the 10GBASE-T limits for quick assessment of possible impact on the performance.

The figure below illustrates the noise measurement screen on the WireScope Pro with 1000BASE-T network traffic on an adjacent cable relative to the 10GBASE-T alien crosstalk noise tolerance limit.



Advantages of Direct Noise Measurements

The distinct advantages of making direct noise measurements of a cabling link are listed below.

- If the network is already operational, it is difficult, and at times impossible, to bring down network links for the purpose of performing alien crosstalk tests. Direct noise measurements allows the alien crosstalk caused by actual network traffic to be measured, as opposed to the alien crosstalk performance measurements using the transmit signal of field instrument.
- It measures without producing any test signals, eliminating the unwanted crosstalk into adjacent 'live' network links.
- In some cases, the RF noise in the environment produced by sources other than the alien crosstalk from adjacent links may cause network performance degradation. This external noise measurement tool includes the effects from such contributors.

- The external noise measurements can be performed over long periods of time; enabling the detection of sporadic surges in RF noise that can cause degradation in network performance.

Using the External Noise Mode

In order to use the external noise measurement feature, the WireScope Pro must be enabled with the appropriate license.

If you have ordered the following package, you will have the external noise measurement feature.

- N2640A-200
- N2642A-230
- N2642A-240
- N2643A-250

The License Details screen from the System Settings menu will also reflect the status.

You can also purchase the license by ordering N2643A-100 from your Agilent Sales Representative. Provide the serial number of your WireScope Pro upon ordering. The N2643A-100 consists of Cat 6A/Class EA/F, Alien Crosstalk as well as the external noise measurement test capability.

To use the external noise mode, you must disconnect the DualRemote Pro from the cable under test.

Settings and Views

In the user interface, you can select to view one of the pairs in the cable under test.

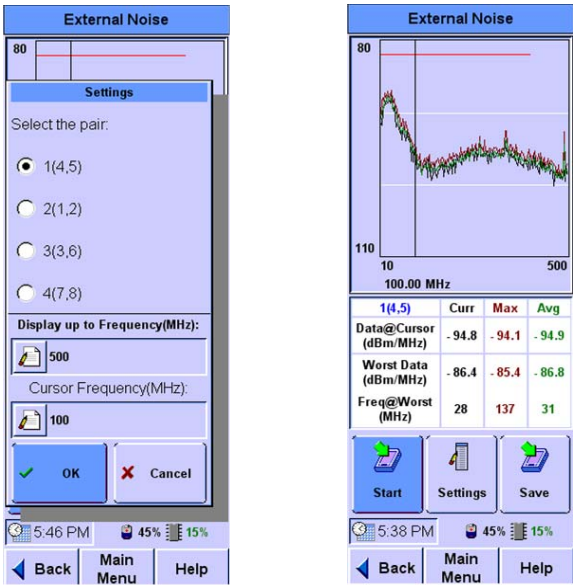
- (4,5)
- (1,2)
- (3,6)
- (7,8)

The display frequency range can be selected between 10 MHz to 500 MHz. The cursor frequency is also limited to the same frequency range shown on the display.

On the plots itself, you can directly press on the desired position or you can scroll through the frequency range by pressing . The red limit line represents the alien crosstalk receiver sensitivity limit as defined by IEEE 802.3an at -141.9 dBm/Hz (-81.9 dBm/MHz)

5 Measuring External Noise

The refresh rate of the frequency domain plot is 3 seconds.





6 Saving and Viewing Test Results

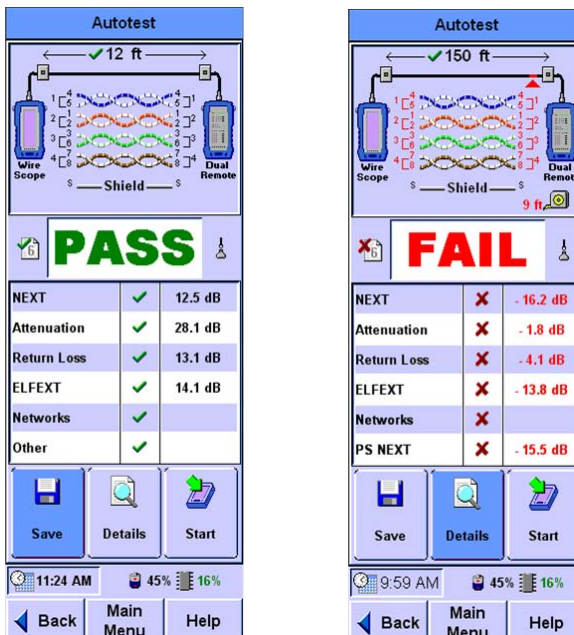
Test Results Display	118
Saving Test Results	119
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Saving the Results	119
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This chapter describes how to save test results after the WireScope Pro completes a cable test.



Test Results Display

When the WireScope Pro completes a test, it displays either a Pass or Fail screen. All the example screens in this chapter are from Category 6 tests; other test result screens are similar.



Both the Pass and Fail screens list the test parameters, with the results of each parameter. On the Fail screen, results of failed test are shown in red.

Saving Test Results

Before saving the test results, choose the storage location.

NOTE

The procedure below show screens from the copper testing configuration. The procedure for fiber testing are essentially the same, but the screens may differ in minor details.

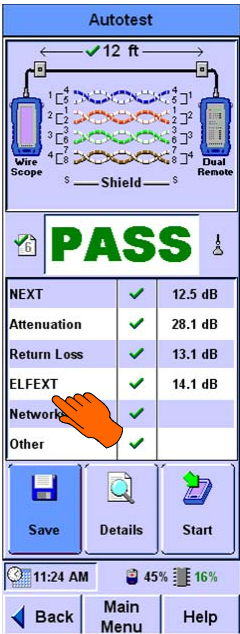
Choosing the Data Storage Location

Test data can be saved to either the WireScope Pro internal flash or into a USB flash drive, if inserted. The data saved in the internal flash will be transferred automatically to the USB flash drive if a USB flash drive is detected.

Saving the Results

The following steps shows you how to save the test results for inclusion in certification reports.

- 1 After completing a test, press **Save** on the Autotest screen. The Save Results screen will be displayed.



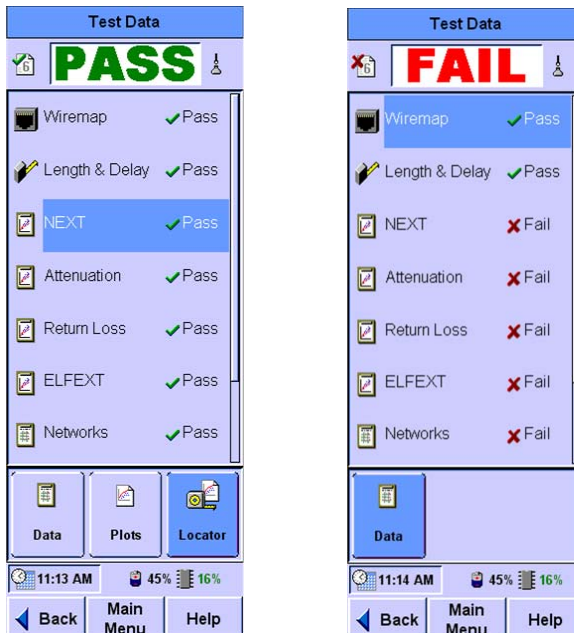
- 2 If the cable ID in the display is wrong, press the backspace arrow to erase it and press the keyboard keys to type in the correct cable ID. For a cable ID with multiple fields, press **Shift**, then **Tab** to move the cursor backward to a prior field or use your stylus or finger to

move the cursor to the desired field. An unshifted **Tab** will move the cursor forward one field.

- 3 When the label is correct, press **Save**. The WireScope Pro saves the results of the test to the chosen storage location. If you have a multiple-field cable ID, there must be a value in every field, including before the first yellow dot and after the last yellow dot.

Viewing Result Details

Press **Details** on the Pass or Fail screen to display the Test Data screen.



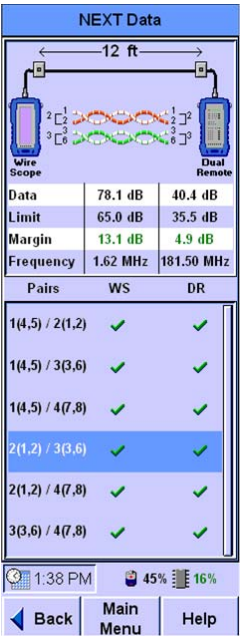
The Test Data screen lists the test items, with their pass or fail status indicated on the right.

The following steps guide you on how to view the detailed test data for one of the test parameters.

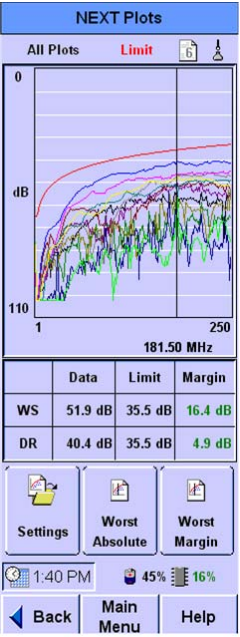
- 1 Select the name of the test parameter.
The Test Data screen displays the buttons available for the selected parameter.

For example, when **NEXT** is selected, the **Data**, **Plots**, and **Locator** buttons are available. If you select **Wiremap**, only the **Data** button is available.

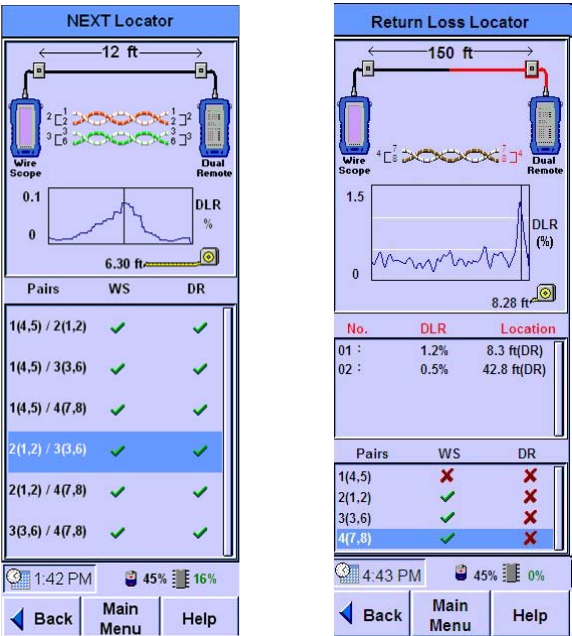
- To view the Data screen for the selected test parameter, press **Data**. The Data screen will be displayed.



- To view the Plots screen for the selected test parameter (if the Plots button is present), press **Plots**. The Plots screen will be displayed.



- To view the Locator screen for the selected test parameter (if the Locator button is present), press **Locator**. The Locator screen will be displayed.

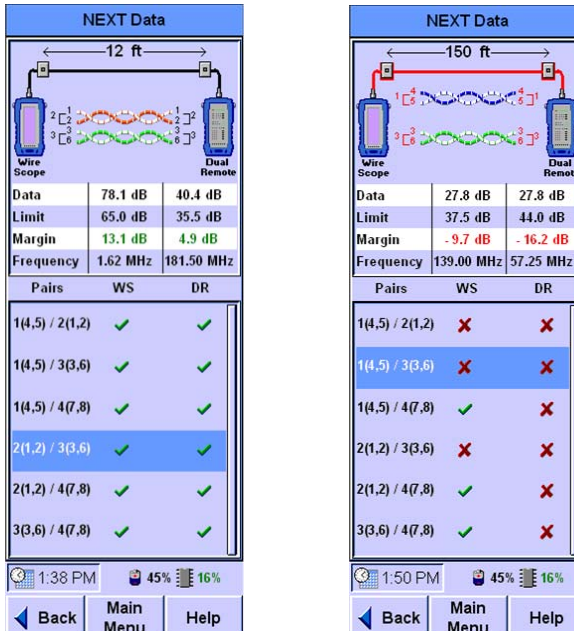


Interpreting Test Results in Detail Screens

The various test detail screens present test data in different formats, as explained below.

Data screen

The Data screen shows details of the selected test parameter results.

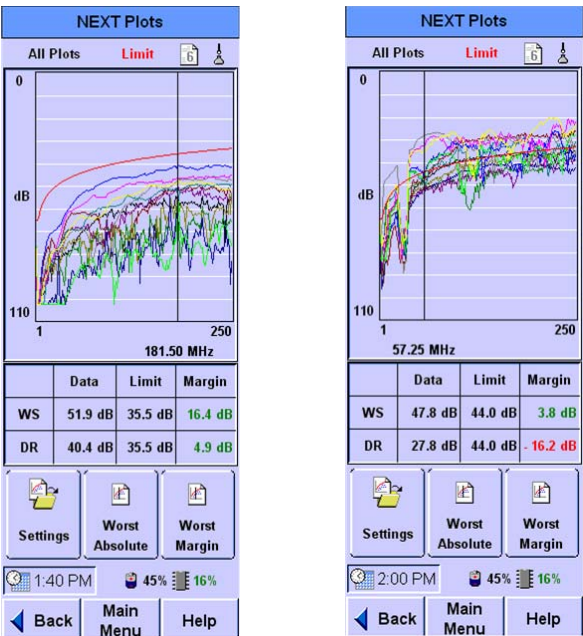


The examples above show data for a test that passes on the left, and data for a test that fails on the right. The data included depends on which parameter is selected. Refer to [step 1](#) of “Viewing Result Details” on page 121.

The Data screen shown above includes a list that displays details of the test results for two twisted pairs of copper cable. To view the results for a different set of twisted pairs, select it in the list.

Plots screen

The Plots screen displays test results as plots on a graph.



The examples above show the plot for a test that passes on the left, and the plot for a test that fails on the right. A smooth red line on the plot indicates the limit boundary between passing and failing.

On plots for tests that pass, press **Worst Margin** to place a vertical line on the plot at the frequency where the test results come closest to the pass or fail limit boundary. On plots for tests that fail, press **Worst Margin** to place a line at the frequency where the results exceed the acceptable limits at the maximum.

You can move the cursor around the plot screen by pressing on the area you want to see and then using to fine tune the location. The frequency of the cursor and the values corresponding to the cursor location is shown in the chart below.

The chart below the plot shows detailed results of the current location of the cursor at the WireScope Pro and the DualRemote Pro, and the limits for each test parameter, as listed below.

Data The worst case of the test results at the cursor location.

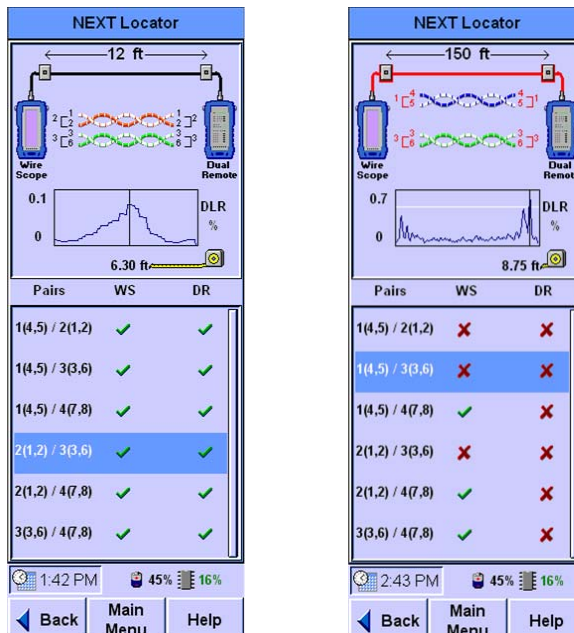
Limit The pass limit, set when the test standard is chosen at the cursor location.

Margin The difference between the Data value and the Limit value at the cursor location.

The plots are color coded for different wire pairs. The plot lines displayed can be changed by pressing **Settings** and selecting All Plots, All Local Plots, All Remote Plots, Worst Case Plot, or Select Single Plot. You can also choose to show plots to 250 MHz, 350 MHz, 500 MHz, 600 MHz, or 1000 MHz (assuming the test was run at the frequency selected). See “Setting the Maximum Frequency” on page 73.

Locator screen

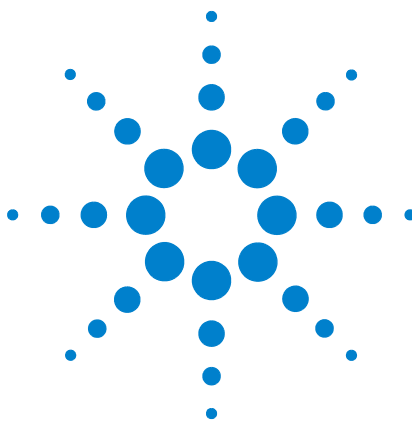
The Locator screen aids in finding faults on the tested cable.



The examples above show the Locator screen for a passing test, on the left screen, and a failing test, on the right screen. Note the difference in the plots. The failing result shows a peak where the failure occurs. The measuring tape icon shows a measurement of where the failure occurs. It will be placed on the right-hand side of the screen if it is showing the distance from the DualRemote Pro. If there is more than one peak, you can press the plot area near the peak and fine tune the location using  to find the exact distance to the peak. By default, the distance shown is how far away the worst test result is from the WireScope Pro or DualRemote Pro. To see the locator results for different sets of twisted pair cables, press them on the list.

NOTE

Failures occurring near the ends of a cable run are usually due to termination errors such as a bad crimp. Failures occurring far from the ends of a cable run are usually due to a fault with the cable itself.



7 Cable Testing Reference

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This chapter describes the measurement details, calibration, and memory usage of the WireScope Pro in cable testing.



Measurements

The WireScope Pro performs the following cable tests.

Wiremap

Wiremap testing checks for proper continuity and termination of cables. The test identifies the following faults.

- Short circuit
- Open circuit
- Reversed pairs
- Transposed pairs
- Split pairs
- Shield continuity faults

Length

Length measurements determine the electrical length of cable runs up to 100 m (328 feet), at NVP > 0.6. Accurate length measurements require accurate NVP settings. Choosing a cable type from the WireScope Pro database automatically loads the NVP settings, or the NVP for a cable sample can be measured. Refer to [“Learning the NVP of a Cable”](#) on page 81.

Table 7-1 Length measurement specifications

Accuracy	± 1 m (3.3 feet)
Resolution	0.5 m (1.6 feet) at NVP = 0.7
Minimum distance	0 m (0 feet)
Maximum distance	100 m (328 feet)

Propagation Delay and Skew

The Propagation Delay test measures the one-way propagation delay over each pair of the tested cable run. Skew is the difference in propagation delay between the pairs with the longest and shortest delay in a cable.

Table 7-2 Propagation delay and skew measurement specifications

Accuracy	± 6 ns
Resolution	± 1 ns
Minimum delay	0 ns
Maximum delay	1,100 ns
Delay skew	The difference in nanoseconds (ns) between the longest and shortest measured propagation delay among the four pairs of a single cable run

Near-end Crosstalk (NEXT)

NEXT measures near-end coupling between pairs in the tested cable run, at both ends of the cable connection for over 6-pair combinations.

Table 7-3 NEXT measurement specifications

Frequency range	1 – 1000 MHz
Frequency step sizes	125 kHz, 250 kHz, 500 kHz, 1 MHz, 2.5 MHz, set automatically based on selected standards
Resolution	0.1 dB
Dynamic range	90 dB
Baseline accuracy	TIA Level IV requirement

Insertion Loss

Insertion loss measures the decrease in signal strength over the length of all pairs in a cable.

Table 7-4 Insertion loss measurement specifications

Frequency range	1 – 1000 MHz
Frequency step sizes	125 kHz, 250 kHz, 500 kHz, 1 MHz, 2.5 MHz, set automatically based on selected standards
Resolution	0.1 dB
Dynamic range	60 dB
Baseline accuracy	TIA Level IV requirement

Attenuation to Crosstalk Ratio Far End (ACR-F)

ACR-F measures far-end coupling between pairs in the tested cable, for all pair combinations.

Table 7-5 ACR-F measurement specifications

Frequency range	1 – 1000 MHz
Frequency step sizes	125 kHz, 250 kHz, 500 kHz, 1 MHz, 2.5 MHz, set automatically based on selected standards
Resolution	0.1 dB
Dynamic range	90 dB
Baseline accuracy	TIA Level IV requirement

Attenuation to Crosstalk Ratio Near End (ACR-N)

The ratio of the measured attenuation and the near-end crosstalk at each frequency point.

Power Sum NEXT (PSNEXT)

Computed for each cable pair by calculating a power sum total of the pair-to-pair NEXT from three other pairs.

Power Sum ACR-F (PS ACR-F)

Computed for each cable pair by calculating a power sum total of the pair-to-pair ACR-F from three other pairs.

Power Sum ACR-N (PS ACR-N)

The ratio of the measured attenuation and the computed power sum near-end crosstalk at each frequency point.

Resistance

The DC loop resistance for each pair in the tested cable run.

Table 7-6 Resistance measurement specifications

Range	5 – 1,000 Ω
Accuracy	$\pm 5\%$
Resolution	1 Ω

Calibration

Measurement Calibration

Remote calibration

Remote calibration establishes a common zero reference for the WireScope Pro and its associated DualRemote Pro. There is no need to calibrate the WireScope Pro with the DualRemote Pro before a copper cabling measurement.

However, you must perform this calibration under the following conditions.

- When you are using a different DualRemote Pro from the one originally shipped with the WireScope Pro.
- After upgrading the software of the WireScope Pro.
- Before any fiber measurements, except for the power meter function.

The WireScope Pro stores the serial number of the DualRemote Pro that it has been calibrated with. Before each measurement, the WireScope Pro checks the serial number of the DualRemote Pro to which the WireScope Pro is connected. If the WireScope Pro does not have the remote calibration data stored for the detected DualRemote Pro, a warning appears, asking you to perform a calibration.

Environmental calibration (Internal)

Environmental calibration compensates for the effects of ambient temperature and voltage variations. The WireScope Pro and DualRemote Pro uses internal calibration paths to connect the signal source and measurement circuits, establishing a local calibration reference before each measurement. No operator involvement is required.

Touch-Screen Calibration

If it seems that the WireScope Pro is not responding correctly to taps on the touch screen, you may need to calibrate the touch screen to bring it into alignment with the underlying display.

The following steps guides you on how to calibrate the touch screen.

- 1 Ensure that you have the stylus available.

- 2 On the Main Menu, press **System**. The System Settings screen will be displayed.
- 3 On the System Settings screen, press **Calibrate Touch Screen**, then press **Edit**. A Calibration screen will be displayed.
- 4 Using the stylus, press the screen as directed by the onscreen instructions.

When the calibration is completed, the System Settings screen will be displayed.

User Performed Calibration

The WireScope Pro is designed to optimize operator efficiency. There is no need to perform a calibration between the WireScope Pro and DualRemote Pro before every measurement.

Nevertheless, it is a good practice to perform a calibration between the WireScope Pro and the DualRemote Pro just you start a job for the day.

Conditions where such calibration is mandatory are listed below.

- 1 After a software upgrade or downgrade on the WireScope Pro and DualRemote Pro.
- 2 Using a different pairing of the WireScope Pro and DualRemote Pro not originally shipped as a pair or previously calibrated as a pair.
- 3 Transiting from Category 7 |Class F test to a lower performance category.
- 4 Transiting from lower performance categories to Category 7 |Class F test.
- 5 Before any fiber measurements except power meter function.

Category 6 and 6A | Class E and EA

The Category 6A SmartProbe covers the performance category from Category 6A or lower. These are universal RJ45 shielded connectors and can be used for both shielded and unshielded cables.

To perform a user calibration, observe and execute the following steps.

- 1 Connect a N2644A-101 Category 6A/Class EA Permanent Link SmartProbe to the WireScope Pro and a N2644A-100

Category 6A/ Class EA Channel SmartProbe to the DualRemote Pro.

- 2 Connect the RJ-45 connector of the Category 6A/Class EA Permanent Link SmartProbe to the RJ-45 jack of Category 6A/Class EA Channel SmartProbe on the DualRemote Pro.
- 3 Follow the instructions in the Calibration screen on the Main Menu.

Class F measurements

The ISO/IEC Class F measurements are done using vendor specific SmartProbe. Calibrations can be done generically using the N2641A-300 Class F Precision Calibration SmartProbe. This calibration SmartProbe connects the WireScope Pro and the DualRemote Pro together end-to-end.

Follow the onscreen instructions in the Calibrate function on the Main Menu.

This applies to measurements using the following types of Class F vendor specific connectors and the model numbers of the corresponding Agilent WireScope Pro Class F SmartProbe.

Table 7-7 Type of Class F connectors and model number

Class F – Siemon Tera (Permanent Link and Channel)	N2644A-105 and N2644A-104
Class F – Nexans, GG45 (Permanent Link)	N2644A-106
Class F - ARJ-45HS (Channel)	N2644A-107
Class F – Leoni/Kerpen (Permanent Link)	N2644A-110

Memory Requirements

The amount of memory that each test result takes up depends on the options that you set before starting the test. Generally, if you save plots with each test, test result files are larger than if you omit plots.

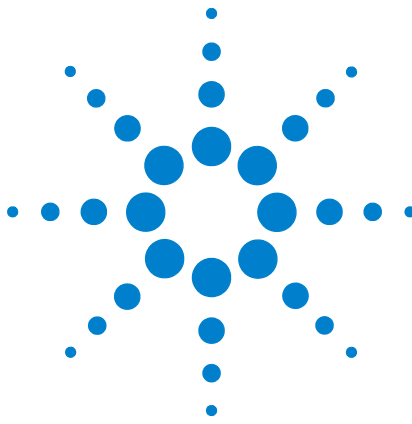
The WireScope Pro allocates approximately 16 MB of internal flash memory for test result storage. The exact amount of memory available depends on the size of the WireScope Pro software.

The following table lists approximate record storage capacities for the internal flash when configured for a 64 MB and for a 256 MB removable USB flash drive and for comparison, a 1 GB flash drive.

All sizes of USB flash drives will work as additional storage.

Table 7-8 Saved test capacities

Autotest configuration	Capacity (Number of records)		
	Internal flash 64 MB (16 MB usable for results)	USB flash drive 256 MB	USB flash drive 1 GB
Category 6/6A/7 summary only	4,800	77,500	310,000
Category 6/6A/7 with full plot data (1 GHz)	160	2,600	10,300



8 Network Testing with the WireScope Pro

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This chapter describes the network test options available in the WireScope Pro.



Network Testing Overview

The WireScope Pro network testing features allow you to create a list of key network resources and evaluate their performance. Active Discovery and detailed metrics allow you to troubleshoot problems and pinpoint network bottlenecks.

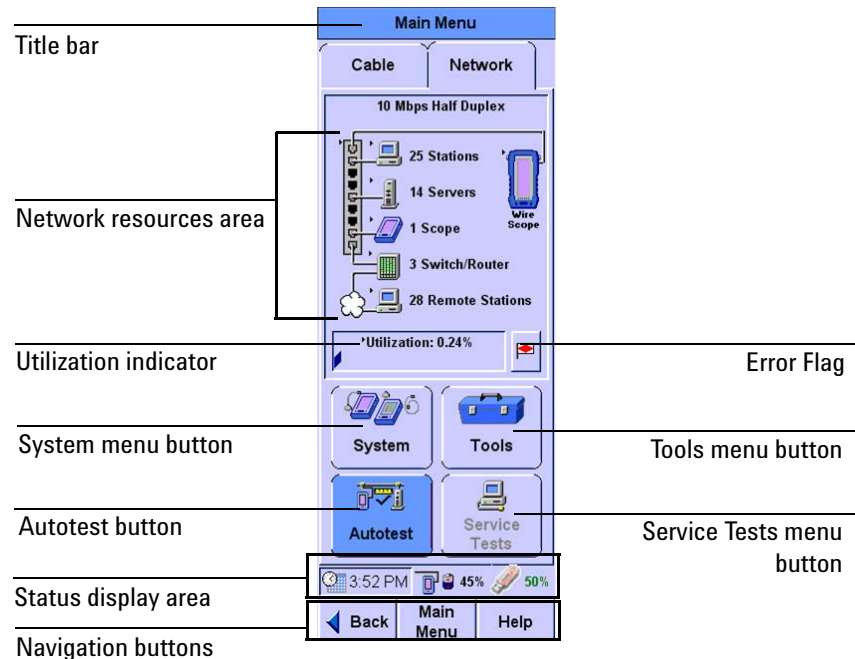
The following steps describe the general procedure for performing network analysis testing using the WireScope Pro.

- 1 Power on the WireScope Pro.
- 2 Connect to the network-under-test. Refer to [“Connecting to the Network”](#) on page 140.

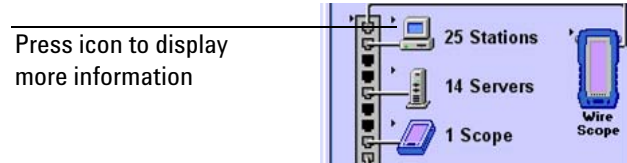
The WireScope Pro automatically starts to poll the network and locate the devices. Refer to [“Examining the Network”](#) on page 141.

- 3 View the details on the detected network resources. Refer to [“Detailed List”](#) on page 142.
- 4 Perform an Autotest on any or all desired resources. Refer to [“Running an Autotest”](#) on page 143.
- 5 Select any device on the network to perform additional testing, such as the followings.
 - Ping test; refer to [“Performing a Ping Test”](#) on page 150.
 - TraceRoute test; refer to [“Tracing a Route through the Network”](#) on page 152.
 - SNMP Queries; refer to [“Performing SNMP Queries”](#) on page 154.
- 6 Save the test results before performing other tests or functions.

The Main Menu at a Glance



Network resource area shows all detected network resources. The WireScope Pro performs an Auto Discovery of network resources. Resource icons shown with a black triangle icon can be pressed to display more information.



Error flag shows unacknowledged error in the error log.

Utilization indicator shows the current network usage. Press this indicator to display more statistics.

System menu button access to the System menu.

Tools menu button access to the Tools menu.

Service test button access to the Voice over IP and IPTV Test menu.

Autotest button access to the Network Autotest Setup screen.

Connecting to the Network

Follow these steps to connect the WireScope Pro to perform a network test.

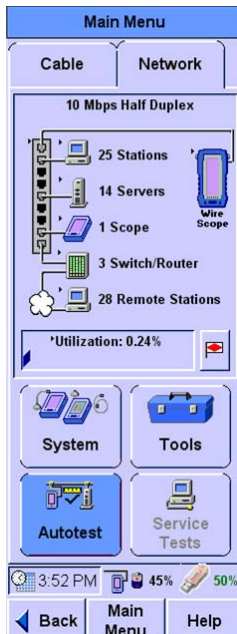
- 1 Connect the cable to the WireScope Pro network port. If you want to perform a test on the fiber link, connect the cable on the SFP port.
- 2 Use the front panel touchscreen and control buttons to operate the WireScope Pro. When performing test with the WireScope Pro, use the following operating tips.
 - a Select the items on the screen by pressing them with your finger, or with a stylus, or by scrolling the highlight bar using .
 - b Many screens have a list of items that you can navigate using . Press  up or down to scroll through the list of items.
 - c Selected items are highlighted in dark blue. Most screens have a default selected item.
 - d Execute a selected item by pressing the onscreen button or by pressing .
- 3 To return to the Main Menu screen at any time, press **Main Menu** at the bottom of the display.
- 4 To return to the previous screen, press **Back** at the bottom of the display.

Examining the Network

Network Overview

The WireScope Pro will start the Auto Discovery process on the network upon power-on.

The network resources area on the Main Menu screen will show a list of detected network devices.



Detailed List

- 1 To view a detailed list of network resources, press any category in the network resources area. A triangle besides the icon indicates that a detailed list is available for that category.

Press icon to display more information



- 2 Use  to select the items in the list. The **Collapse List** or **Expand List** button is renamed **View** when the highlight is on a particular station. Press **View** to display the details of the selected item. A red 'X' symbol indicates that the device was not present the last time it was checked.



- 3 Press **Back** or **Main Menu** to return to the Main Menu screen.

Running an Autotest

This section describes how to run an Autotest on the network using the WireScope Pro. The WireScope Pro can store Autotest *suites* that define which network elements to test.

- 1 On the Main Menu screen, (refer to “[Network Overview](#)” on page 141), press **Autotest** to display the Network Autotest Setup screen.



- 2 To save this Autotest suite or load a previously-stored suite, press **Suite**.
- 3 Select a stored suite from the list or select **Create New**, then press **Next**. You can select **<Default>** to reload the default suite.

- 4 If you select **Create New**, you will be prompted to type a new name.
 - a On the Network Autotest Setup screen, press **Iterations** to select the number of times to run the test.

Autotest Iterations

Enter the number of times the test should be run.

Iterations

1

If you are running more than one test, enter the interval to wait between iterations.

Interval

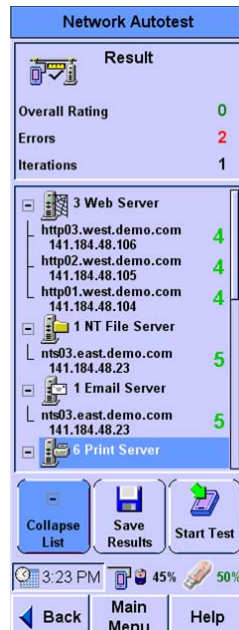
2 Minutes

Previous Cancel OK

- b Type in the number of times to run the test in the Iterations text box.
 - c Type in the time in minutes to wait between tests in the Interval text box.
 - d When done, press **OK**.
- 5 On the Network Autotest Setup screen, press **Delete** and **Add** to remove or insert elements from the resources list. You can also press **Add** to create new network resources.
- 6 To change an item on the resources list, select the item and press **Edit**. You will be able to set new details for that network resource.

For more details, refer to [Chapter 12](#), “Network Performance Autotest,” on page 230.

- 7 Once the test setup has completed, press **Start Test** on the Network Autotest Setup screen. The test will begin.



- 8 To stop the test at any time, press **Stop Test**.
- 9 To view the network element results, select the element from the list and press **Details**.
- 10 Press **Save Results** to store the test data on the USB flash drive.

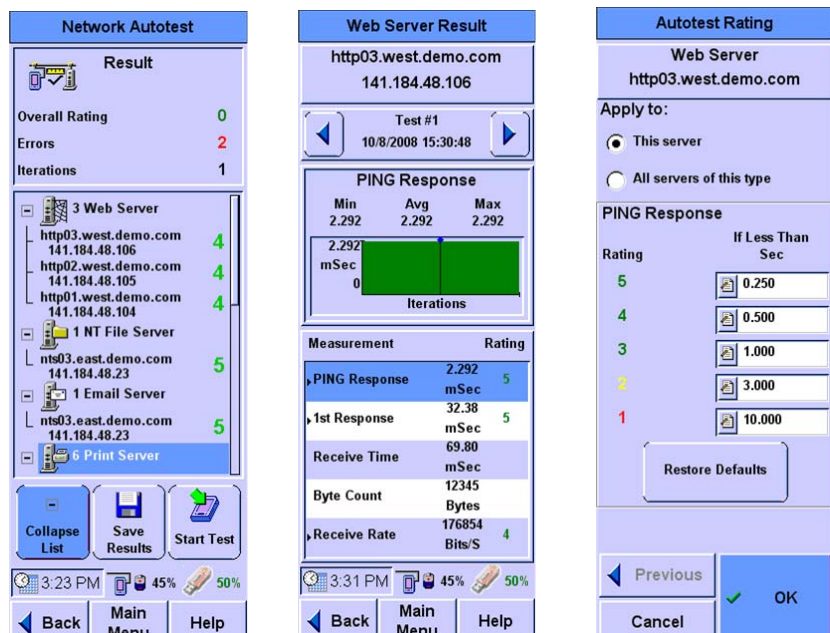
The next section shows how the metrics used to derive the ratings can be changed.

Changing the Autotest Metrics

The WireScope Pro provides a measure of service speed and efficiency by emulating a client device in the network. A rating of the service is provided by making a request for service to a key device and comparing the results to reasonable expectations. However, the default numbers used to determine the rating may not apply to the network-under-test.

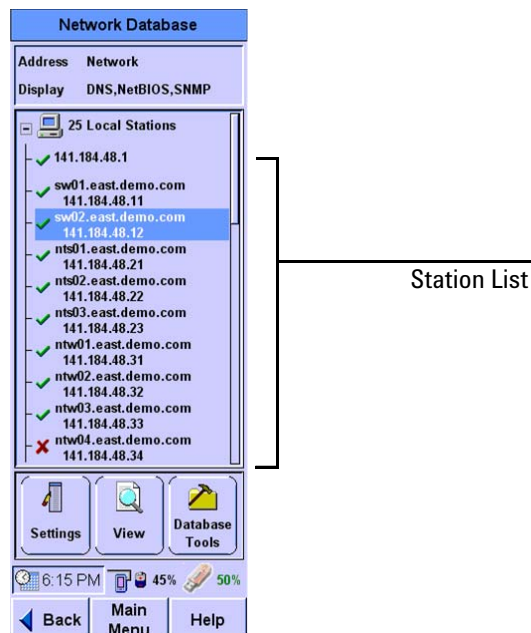
For example, you may know that the connection to the available domain name server is over a slow link and this link cannot be upgraded.

Consequently, it may be more important to have a test that is less sensitive but provides meaningful results that can be compared over time. The WireScope Pro rating can be changed. After you have run the test and received a result, shown in the left figure below, you can press on the server address to highlight it and press **Details**. The screen shown in the middle provides the measured results of the test. If you press twice on the measurement item, you can change the rating scale to whatever values you choose as shown on the right figure below. This can be done for all measurements with ratings.



Using the Stations List

- 1 When a network resource on the Main Menu is shown with a black triangle, press the network resource to display the Network Database screen. The Station List includes all the available station in the network.

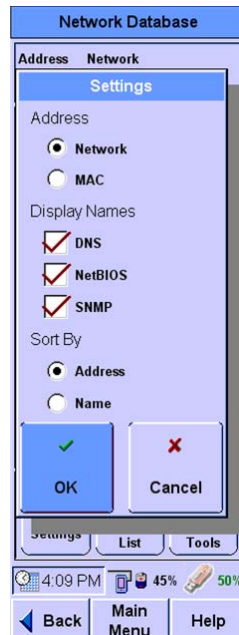


- 2 Use  to navigate through the items on the Station List.
- 3 Press **Expand List** or **Collapse List** to expand or collapse the Station List respectively.

NOTE

The Collapse List, Expand List, and View functions are accessible by pressing the same button. The button label will change according to the current context. Refer to "[Viewing Details and Statistics](#)" on page 149 for a description of the View function.

- 4 Press **Settings** to sort the Station List by address or name and select the information to be displayed.



- 5 Press **Database Tools** to update, erase, load, or save the Stations List or delete a resource from the Stations List.

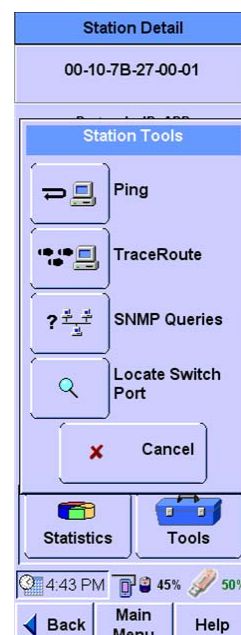
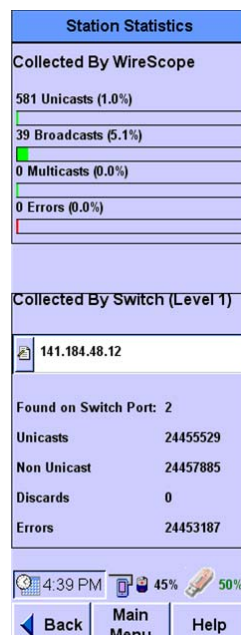


Viewing Details and Statistics

- 1 Select a station on the Station List and then press **View**.



- 2 Press **Statistics** on the Station Detail screen to view the statistics about the station.
- 3 On the Station Detail screen, press **Tools** to display a list of test tools that can be used on the selected station. These tools are describe further in the following sections.



NOTE

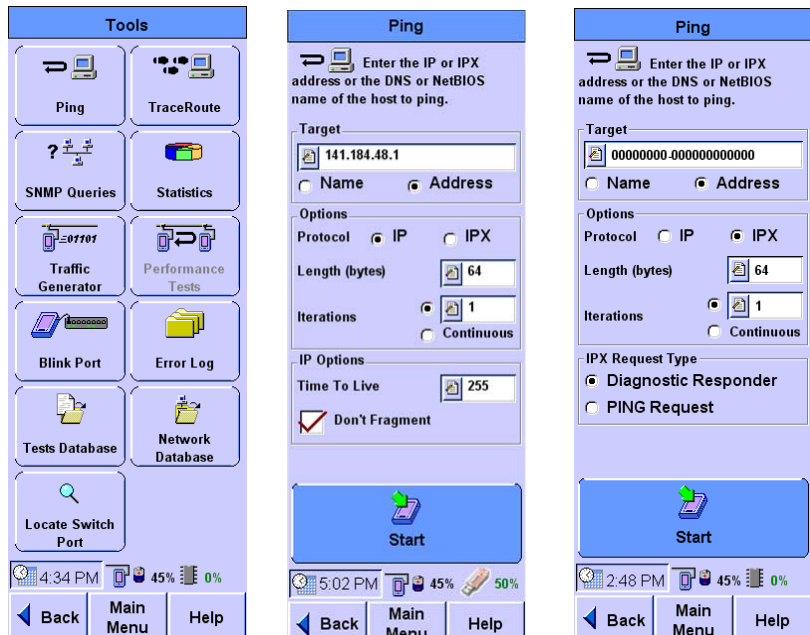
The tools displayed on the Station Tools list will vary depending on the station you are viewing. Not all tools are available for every type of station.

Performing a Ping Test

The Ping test allows you to check if communications can be established with a particular remote node. The WireScope Pro “pings” a remote node by sending a request message. If the remote device is active and reachable, it will respond.

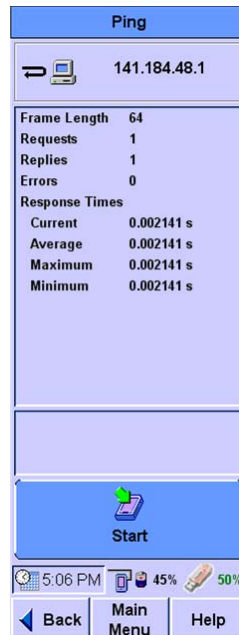
The following steps describe how to run a Ping test.

- 1 On the Main Menu screen, press **Tools** to display the menu of the available network testing tools.
- 2 Press **Ping** to display the Ping screen.



- 3 Enter the device to ping in the Target box. You can choose to type in the device name or address.
- 4 For the ping options, you either select **IP** or **IPX**, type in the length of the ping in bytes, and set a fixed number of iterations for the ping or allow it to run continuously.
- 5 Type in the Time To Live value and select whether fragmentation is allowed in the IP Options panel. If **IPX** is selected, choose the IPX request type, which is either **Diagnostic Responder** or **PING Request**.

- 6 Press **Start** to begin the ping test. The Ping Results screen will be displayed.



- 7 Observe the results of the Ping test.

The screen will show the frame length you selected, the number of requests (pings) sent, and number of replies received. The data on the response times are also displayed.

- 8 To run the test again, press **Start**.

Tracing a Route through the Network

The TraceRoute test allows you to determine the path to a particular device through the network. The WireScope Pro sends data packets over the network and returns to the routers on the path and count the time it took for each hop.

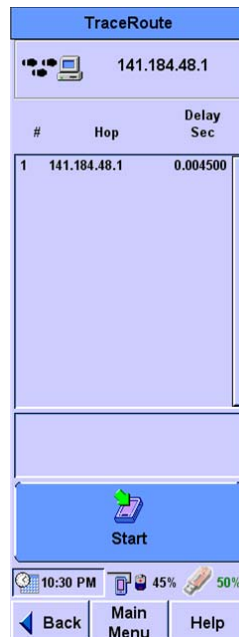
The following steps describe how to run a TraceRoute test.

- 1 On the Main Menu screen, press **Tools** to display the menu of the available network testing tools.
- 2 Press **TraceRoute** to display the TraceRoute screen.



- 3 Enter the device to be traced in the Target box. You can choose to type in the device name or address.
- 4 Select the maximum number of hops to be reported.

- 5 Press **Start** to begin the TraceRoute test. The TraceRoute Results screen will be displayed.



- 6 Observe the results of the TraceRoute test.

The screen will show the number and address of each hop. In addition, the delay (in seconds) of each hop is shown. The delay is cumulative, but since each termination is measured individually, an anomaly may exist where an intermediate time is greater than a subsequent time due to network performance.

- 7 To run the test again, press **Start**.

Performing SNMP Queries

The Simple Network Management Protocol (SNMP) Queries tool allows you to send a query to the Management Information Database (MIB) and retrieve the available information for that host.

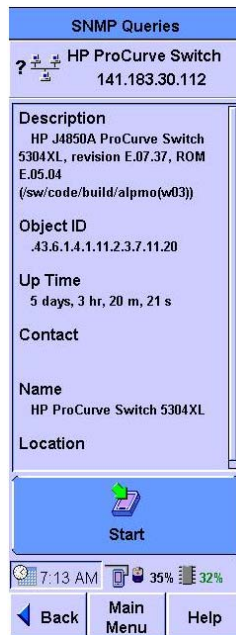
The following steps describe how to run SNMP Queries.

- 1 On the Main Menu screen, press **Tools** to display the menu of the available network testing tools.
- 2 Press **SNMP Queries** to display the SNMP Queries screen.



- 3 Enter the device to be queried in the Target box. You can choose to type in the device name or address.
- 4 **SNMP Settings** allows you to add the SNMP communities and ports to the default “public” community and default port 161 respectively.

- 5 Press **Start** to begin the SNMP Queries test.
The SNMP Queries Results screen will be displayed.



- 6 Observe the returned information on the SNMP Queries results screen.

The screen will show the description, ID, and other information as returned by the remote host.

- 7 To run the test again, press **Start**.

Autotest of HTTP and FTP Servers with User Authentication

This section describes how to enable and configure user authentication for the Autotest of HTTP and FTP servers according to RFC 2617.

The WireScope Pro can be configured to perform an Autotest on the web and FTP servers that has basic authentication enabled according to the RFC 2617. You are required to type in the user name and password during the setup. The WireScope Pro HTTP and FTP Autotest can interpret the HTTP server response codes such as 401 and reports transfer rates after successful downloads, or error messages on failure conditions.

The HTTP Autotest supports the download of the following file types: *.TXT, *.CSV, *.ZIP, *.PDF, *.EXE, *.HTML, *.ASPX, *.JSPX, *.XML, *.BIN, *.WMA, *.MP3, *.WMV, *.MPEG, *.MPG, and *.MOV.

Setting up a HTTP Server

The following steps describe how to set up a HTTP server.

- 1 On the Main Menu, press **Autotest** to display the Network Autotest Setup screen.
 - If the HTTP server to be tested is in the list of the available servers, select the server, and press **Edit**.



- If the server to be tested is not in the list, perform the following steps.
 - a Press **Add** to add a new server to the Autotest suite.
 - b Select **Create New**. Press **Next**.
 - c From the list of available server types, select **Web Server**. Press **Next**.
 - d Type the URL of the server. Press **Next**.

The image displays three sequential screenshots of the software's configuration windows:

- Autotest Setup:** This window prompts the user to "Select the server that you wish to test or create a new test if the server is not listed." It features three radio buttons: "Create New" (selected), "Add All", and "Add Selected". Below these, a list titled "Untested Servers:" shows "1 NT File Server" with a sub-entry "nts03.east.demo.com 141.184.48.23". Navigation buttons at the bottom include "Previous", "Next", and "Cancel".
- Autotest Setup:** This window prompts the user to "Select the type of server that you wish to test." It contains a scrollable list of server types: "Web Server", "NT File Server", "NFS Server", "FTP Server", "Novell Server", "Email Server", "Print Server", "DNS Server", "WINS Server", "DHCP Server", "Primary DC", "Backup DC", and "Router". "Web Server" is highlighted. Navigation buttons at the bottom include "Previous", "Next", and "Cancel".
- Web Server Setup:** This window prompts the user to "Enter the URL for the page to retrieve from the server." It provides examples: "http://www.scope.com/index.htm", "www.scope.com/index.htm", and "www.scope.com". Below the examples is a text input field labeled "URL" with a small icon to its left. Navigation buttons at the bottom include "Previous", "Next", and "Cancel".

- 2 The Web Server Setup screen will be displayed.
 - Select **Use Proxy Server**, if necessary, and type in the proxy server address or URL.
 - If the server to be tested requires the client to send the authentication information, select **Enable** in the Authentication panel and type in the **User Name** and **Password**.

Press **Next**.



The image shows a 'Web Server Setup' dialog box with a light blue header and a white body. The header contains the title 'Web Server Setup'. Below the header, there is a text instruction: 'To use a proxy server, check 'Use Proxy Server' and enter the port number and the address or name of the proxy server.' The dialog is divided into two main sections: 'Proxy Server' and 'Authentication'. In the 'Proxy Server' section, there is a checkbox labeled 'Use Proxy Server'. Below it, there is a text input field with a small icon to its left. Underneath the input field, there are two radio buttons: 'Name' (which is selected) and 'Address'. Below the radio buttons, there is a 'Port' label followed by a text input field containing the number '80'. In the 'Authentication' section, there is a checkbox labeled 'Enable' which is checked. Below this, there are two text input fields: 'User Name' and 'Password', each with a small icon to its left. At the bottom of the dialog, there are three buttons: 'Previous' (with a left arrow), 'Next' (with a right arrow), and 'Cancel'.

- 3 You can set the performance rating thresholds for the individual measurements such as Name Lookup, PING Response, 1st Response, and Receive Rate. This function is also applicable for the Autotest of other server types, but the measurements are different for each server type.
- 4 Press **OK**.
- 5 Press **Start Test** to begin the test.

Setting up a FTP Server

The following steps describe how to set up a FTP server.

- 1 If the FTP server under test is in the list of the available servers, select it, and press **Edit**.
- 2 If the server to be tested is not in the list, perform the following steps.
 - a Press **Add** to add a new server to the Autotest suite. Select **Create New**.
 - b Select **FTP server** in the list.
 - c Type in the information for the server. Press **Next**.
 - d Select the file operations information. Separate directory or filename can be specified for Read and Write Read Delete operations. Press **Next**.

The figure consists of three screenshots from the 'Network Autotest Setup' application, illustrating the steps to add a new FTP server.

First Screenshot (Main Setup): Shows the 'Network Autotest Setup' window. The 'Suite' is set to '<Default>' and 'Iterations' is '1 Time'. A list of servers is shown, including '3 Web Server' and '1 NT File Server'. The 'Add' button is highlighted.

Second Screenshot (FTP Server Setup - Address): Shows the 'FTP Server Setup' window. The 'Server' section has '0.0.0.0' entered in the 'Address' field. The 'User' section has 'User Name' and 'Password' fields. The 'Port' is set to '21'. The 'Active Mode' checkbox is checked. The 'Next' button is highlighted.

Third Screenshot (FTP Server Setup - File Operations): Shows the 'FTP Server Setup' window. The 'File' section has 'No File Access' selected. The 'Write Read Delete' option is selected. The 'Next' button is highlighted.

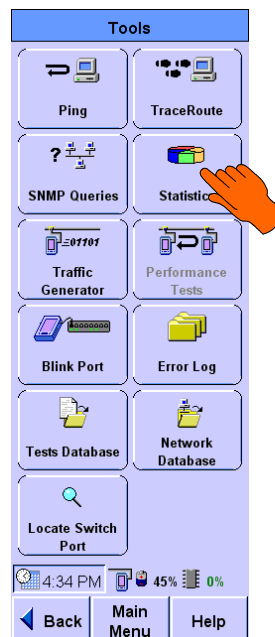
- 3 The performance rating thresholds of the measurements used to calculate the server rating can be viewed or changed. Press **Edit** to change the values. Then press **OK**.
- 4 Press **Start Test** to begin the test.

Viewing Statistics

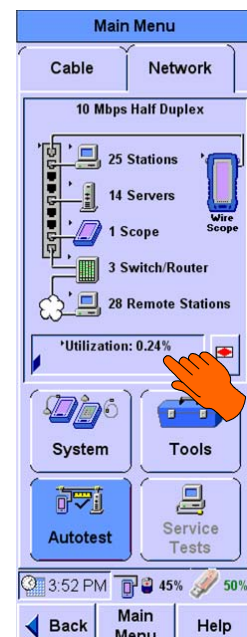
The WireScope Pro can view various network parameters and display the network performance statistics.

The following steps describe how to use the WireScope Pro Statistics tool.

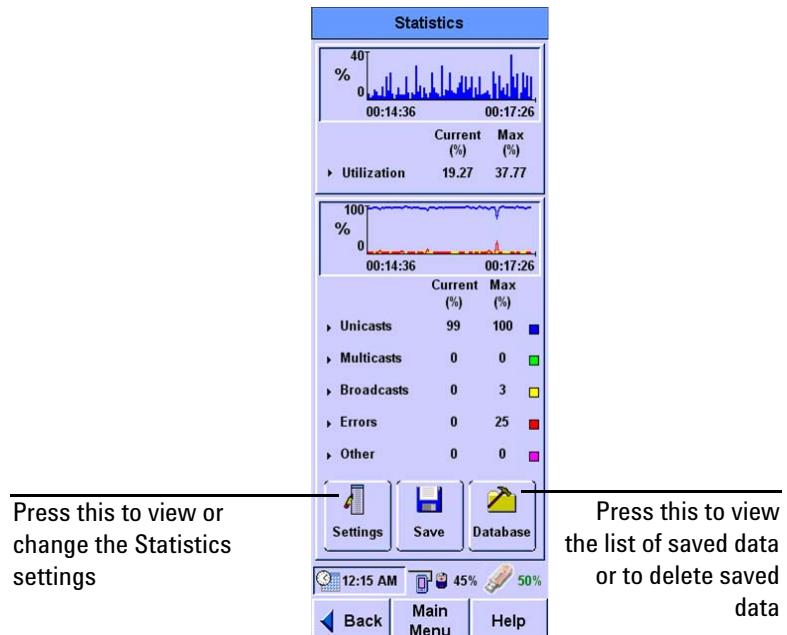
- 1 Press **Tools** on the Main Menu screen to display the Tools menu or use the shortcut from the Main Menu screen by pressing **Utilization Indicator**.



Or



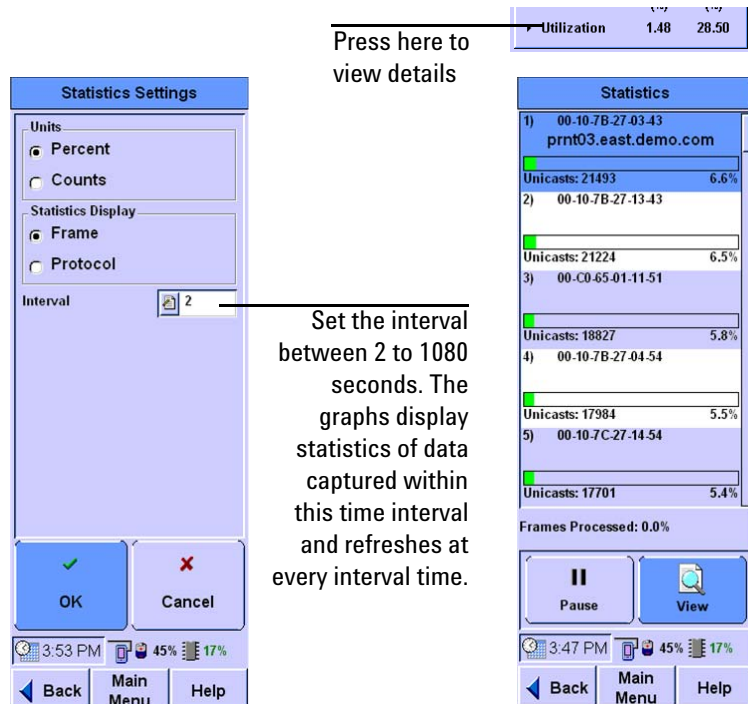
- 2 Press **Statistics** to display the Statistics screen.



The screen shows the network utilization and other traffic data such as frame counters and protocol counters.

- 3 To view any additional details, press any item shown with a black triangle.
- Press **Unicasts**, **Multicasts**, or **Broadcasts** to view the top talkers for that frame type.
 - Press **Errors** to view a breakdown of the types of errors detected on the network.
 - Press **Others** to view a breakdown of **Collisions**, **Unprocessed**, and **Flow Control** packets.

- 4 Press **Settings** on the Statistics screen to switch between Percent and Counts for units, Frame and Protocol for statistics display, and to set the display interval in seconds.



- 5 Press **Utilization** on the Statistics screen to view the top talkers (most active devices) on the network.

Saving and Retrieving Statistics Data

The Statistics Data can be saved by pressing **Save** on the main screen of the statistics tools. Press **Database** to view a list of saved statistics data.

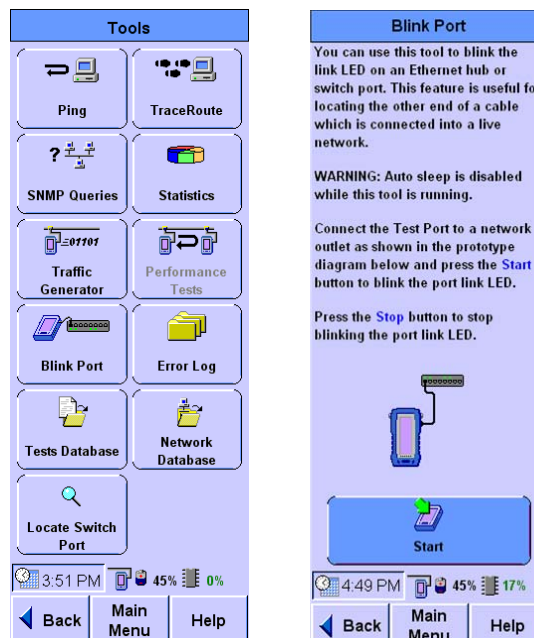
To retrieve the saved data tables, you can either access the USB flash drive or via the WireScope Pro configured as a web server. Refer to [Chapter 11](#), “Remote Control,” on page 217 on how to configure the WireScope Pro as a web server.

Locating a Port with Blink Port

You can use the WireScope Pro test port, located at the side of the WireScope Pro, to locate a network connection port on a hub or switch. The WireScope Pro will toggle on and off the port link indicator, causing it to blink.

The following steps describe how to use the Blink Port feature on the WireScope Pro.

- 1 Connect the WireScope Pro to the remote end of the circuit hub you want to locate. For example, connect the WireScope Pro at the network wall circuit.
- 2 Press **Tools** on the Main Menu screen to display the Tools menu.



- 3 Press **Blink Port** on the tools menu to display the Blink Port screen.
- 4 Press **Start** to begin blinking the port.
- 5 Observe the hub or switch and note which port link indicator is blinking. That will be the port for the tested circuit.
- 6 Press **Stop** on the Blink Port screen to stop the blink.

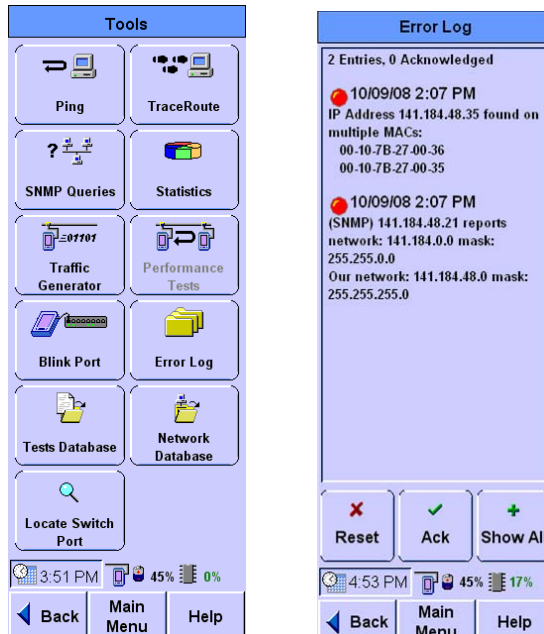
Viewing the Error Log

The WireScope Pro error log tracks and displays any network problem that is detected by the WireScope Pro. The possible errors that the WireScope Pro can detect are listed below.

- Duplicate IP (same IP on multiple MAC)
- RIPv1 bad network
- Bad network mask
- RIPv2 bad network mask
- SNMP bad network mask
- DHCP bad network mask
- DHCP duplicate IP (offered IP already in use)
- Bad DNS Server
- Bad WINS Server
- Bad router (not responding)

The following steps describe how to use the Error Log feature on the WireScope Pro.

- 1 On the Main Menu screen, press **Tools** to display the Tools menu.
- 2 Press **Error Log** to display the Error Log screen. You can also press the shortcut flag icon on the Main Menu to get to this screen.



- 3 Observe the errors listed in the log.
- 4 Press **Show All** to expand the error list and view all errors that were previously acknowledged.
- 5 Press **Ack** to acknowledge the errors without clearing the log.
- 6 Press **Reset** to clear the log.

Using the Test Database

The WireScope Pro allows the Tools, Autotest and Performance and Service Test results to be stored for later review or download from the web server. You can recall previously stored test data using the Tests Database tool.

The following steps describes how to view and delete stored tests.

- 1 On the Main Menu screen, press **Tools** to display the Tools menu.
- 2 On the Tools menu, press **Tests Database**. The Network Test Database screen will be displayed.



Directories for each type of test results saved appear in the Network Test Database screen.

The number before the directory name indicates the number of stored files in the directory.

- 3 Select the directory and press the + sign or press **Expand List** to display the stored test results in the selected folder.
- 4 Select the test results file, then press **View** to display the detailed test results.
- 5 Select the test results file and press **Delete** to delete a stored test.

Using the Network Database

The WireScope Pro allows you to store network topologies for later review and download (refer to “[Using the Stations List](#)” on page 147). You can recall previously stored network data using the Network Database tool.

The following steps describe how to recall and delete stored network data.

- 1 Press **Tools** on the Main Menu screen to display the Tools menu.
- 2 On the Tools menu, press **Network Database** to display the Network Database screen.

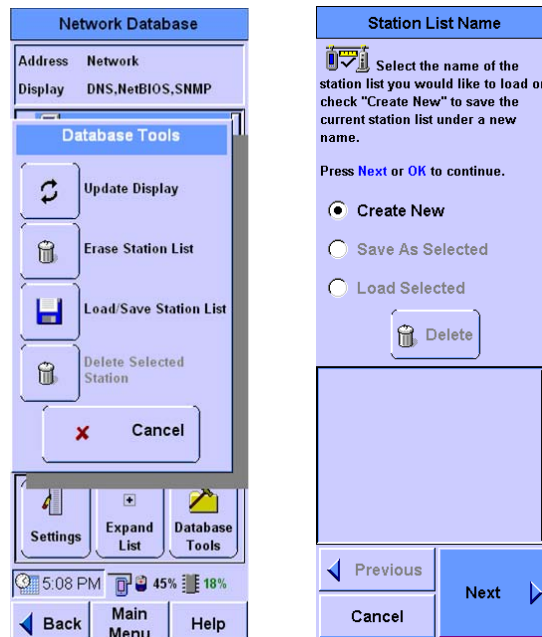


- 3 The network resources are displayed in a list. Use  or a stylus to select the desired resource.
- 4 Press **Expand List** or **Collapse List** to show the items under the selected resource type.
- 5 When a network resource is selected, press **View** to display the detailed information.

NOTE

The Collapse List, Expand List, and View functions are accessible by pressing the same button. The button label will change according to the current context.

- 6 To access the Database Tools menu, press **Database Tools**.
- 7 To save the current network or to load previously stored network data, press **Load/Save Station List**.



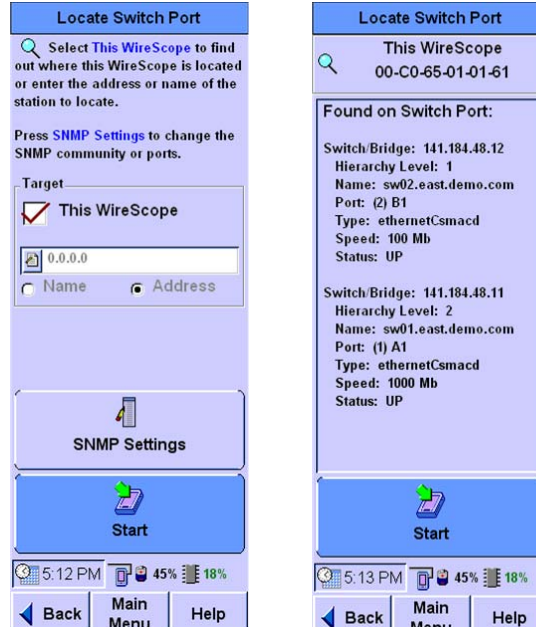
- 8 Use the buttons on the Station List Name screen to store the current network data, load stored data, or delete stored data. If you are storing data, you will be prompted to type in a name for the data file.

Locating Switch Ports

The WireScope Pro allows you to identify any address on the network or the switch ports accessed by the WireScope Pro. The WireScope Pro will only locate switches in the same subnet. Therefore, knowledge of the correct community string and port is essential.

The following steps describe how to operate the Locate Switch Port tool.

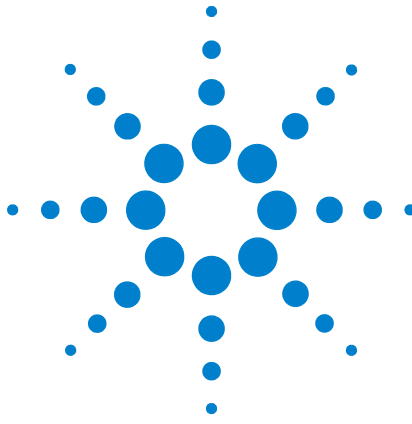
- 1 On the Main Menu, press **Tools** to display the Tools menu.
- 2 On the Tools menu, press **Locate Switch Port** to display the Locate Switch Port screen.
- 3 In the Target panel, select **This WireScope Pro** or type in the name or address of the device to be located.
- 4 Press **SNMP Settings** to add SNMP communities and ports to the default “public” community and default port 161 respectively or to change those setup for Auto Discovery.
- 5 Press **Start** to run the test. The results will be displayed.



- 6 Use  to scroll through the list if necessary.

NOTE

The order of the information presented is not useful and should not be used in interpreting the list.



9 Generating Network Traffic

Network Traffic Generator [172](#)

This chapter describes the network traffic generation using the WireScope Pro.



Network Traffic Generator

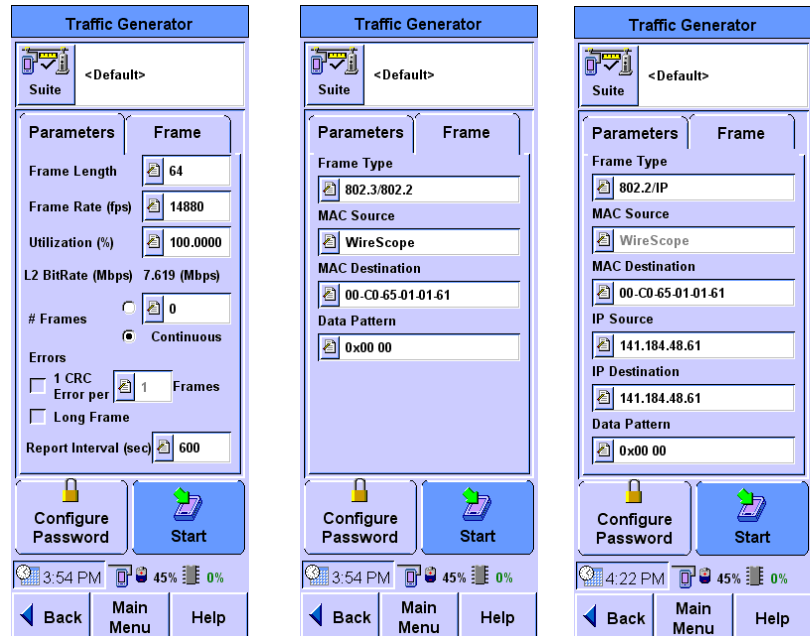
The WireScope Pro Traffic Generator can be used to create network traffic to induce stress into the network and to observe how the network traffic reacts under different loads.

The following procedure describes how to use the Traffic Generator.

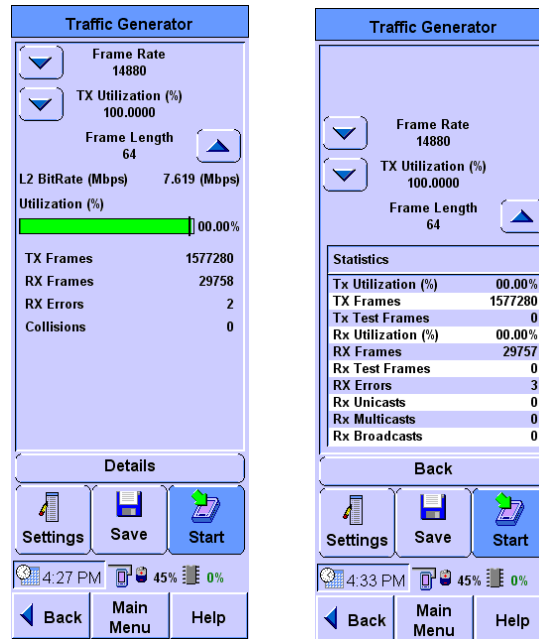
- 1 Press **Tools** on the Main Menu screen to display the Tools menu.



- 2 Press **Traffic Generator** to display the Traffic Generator screen. To prevent network disruption or unauthorized usage for security purposes, a password may be configured.



- 3 On the **Parameters** tab, the desired traffic characteristics can be configured. Press each parameter box (for example, Frame Length, Frame Rate, and so forth), and type in the desired value using the onscreen keypad. Refer to [Chapter 12](#), “Traffic Generator,” on page 264 for details on these parameters.
- 4 To inject errors into the generated traffic, select the type of error desired (CRC Error or Long Frame). Refer to [Chapter 12](#), “Traffic Generator,” on page 264 for further details on these errors.
- 5 To configure the frame characteristics of the traffic, press the **Frame** tab.
- 6 Press on the box to choose from the list or type in the Frame Type, MAC source, and MAC Destination using the onscreen keyboard. Note that if you select an IP frame type, there will be additional selections for IP Source and IP Destination. Refer to [Chapter 12](#), “Traffic Generator,” on page 264 for further details on these parameters.
- 7 Press **Start** to begin the traffic generation. The Traffic Generator summary screen will be displayed. Press **Details** to view more detailed results of the traffic generation.



You can adjust the Frame Rate, TX Utilization and Frame Length using the up and down arrow buttons. You can also inject one or more errors by pressing **Settings**.

- 8 Observe the traffic statistics. For more information on the results, refer to [Chapter 12](#), “Traffic Generator,” on page 264.
- 9 If you want to change the traffic parameters, press **Back** to return to the **Parameters** and **Frame** tabs. To restart the test, press **Start**.



10

Voice Testing with the WireScope Pro

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Running the Test	182
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This chapter describes how the WireScope Pro measures and tests the performance of voice over IP (VoIP) networks.



Voice Testing Overview

The Voice Service Quality Testing feature for the WireScope Pro gives you analysis options for VoIP environments that traditional tests do not. The options are listed below.

- Accessing, managing, and running voice quality tests end-to-end across widely deployed voice networks
- Testing VoIP network components such as routers, gateways, PBXs, and switches
- Comparing VoIP quality directly with the existing toll quality networks
- Testing VoIP systems to gather end-to-end voice quality information
- Augmenting other traditional telephony test suites such as the Transmission Impairment Measurement Set (TIMS)
- Measuring fundamental voice quality metrics such as delay, jitter, and Mean Opinion Score (MOS)

Supported Protocols

The VoIP test feature supports Session Initiation Protocol (SIP), RFC 3261, which requires license Option N2620A-030 or N2620A-03E.

Refer to [Chapter 11](#), “License Details,” on page 195 for more information on activating this feature.

How the WireScope Pro Tests Voice Quality

The WireScope Pro VoIP test feature does the followings to test the voice quality and measure the audio circuit characteristics.

- The WireScope Pro VoIP test feature places and answers one telephone call at a time to establish a voice connection. This voice connection (including the transmission media and equipment of which it is comprised of) becomes the network-under-test. The WireScope Pro Voice Quality Analysis software works like a telephone or other telephony device positioned at the ends of voice circuits.
- Once the WireScope Pro VoIP test feature has established a call, it transmits audio RTP packets into the network and measures the effect of the transmitted packets when they travel through the network-under-test.

Test Port Settings

The WireScope Pro VoIP Service Quality Testing feature can connect to the network using IP Over Ethernet (IPoE). The settings are available in the Network Settings screen, as described in [Chapter 11](#), “Network Settings,” on page 203.

Audio Codec Support

For measurement results which are representative of the end user experience when testing a VoIP service, you need to use an appropriate codec. The WireScope Pro supports the following codecs.

- G.711 A-law
- G.711 μ -law
- G.721
- G.723.1
- G.726 with 32 kbit/s,
- G.726 with 16, 24, and 40 kbit/s
- G.729A, G.729B

WireScope Pro as the Caller

If the WireScope Pro is configured as the caller, it uses the audio codec according to the user-defined media negotiation on the SIP screen of the SIP test. These screens can be displayed by pressing **Settings** on the main screen of the test.

To configure the WireScope Pro as the caller, clear the **Auto Answer Incoming Call** check box.

If you do not select **Headset Call**, a *.wav* file with a length of 40 s will be used. This file is certified by the VoIP consortium.

If you choose a codec from the G.721 or G.726 family, the **G.726 Stream Properties** panel will be available for the following configuration.

- A-law or μ -law
- Little or Big for Endian panel

Press **OK** to return to the **SIP Setting** screen where additional settings can be made and where the test can be started.

WireScope Pro as the Callee

The WireScope Pro supports all available codecs when it is configured as the callee. The audio codec used is defined during the media negotiation between the caller and callee.

To configure the WireScope Pro as the callee, select the **Auto Answer Incoming Call** check box on the SIP screen of the SIP test. These screens can be displayed by pressing **Settings** in the main screen of the test.

The suitable codec is selected according to the order of preference of supported audio codecs in the incoming *SIP INVITE* message. For example, if the caller provides the following sequence of supported codecs: G.723.1 – G.729 – G.711 A-law – G.711 μ -law, then the WireScope Pro, as the callee, will select codec G.723.1 in the *SIP RESPONSE* message returned to the caller.

If no common codec is found between the caller and callee based on the media information in the incoming *SIP INVITE* message, the WireScope Pro will return the message *488 Media Not Supported* to the caller side.

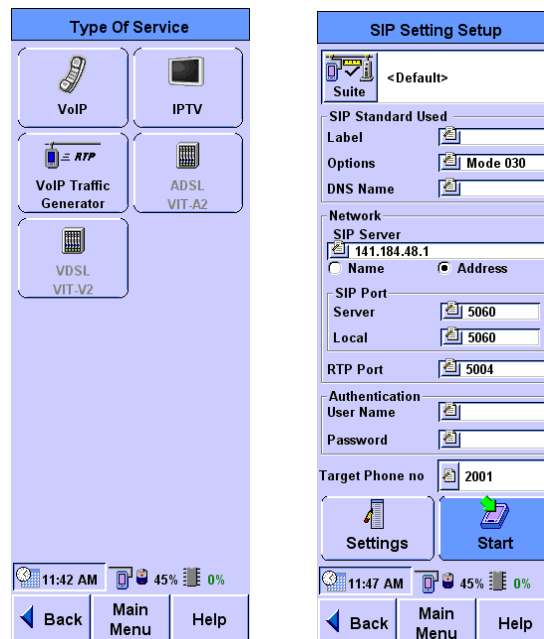
In callee mode, choose the preferred stream properties for the G.721 or G.726 codec family in the **G.726 Stream Properties**. The setting is used only if the caller and callee negotiate a codec from the G.721 or G.726 family, otherwise it is disregarded.

Starting a SIP Voice Test

This section describes how to run a SIP VoIP Test on the network using the WireScope Pro.

Settings the SIP Voice Test Setup

- 1 On Main Menu screen, press **Service Tests**.
- 2 On the Type Of Service screen, press **VoIP**. The SIP Setting Setup screen will be displayed with the configurable parameters.



- 3 The current settings can be saved or the previous settings can be retrieved via the Suite screen by pressing **Suite** on the left hand top corner of the SIP Setting Setup screen. To configure additional settings, press **Settings**.

NOTE

The user name for authentication with the SIP server may not have the same unique ID or phone number used for the SIP phone call or test.

SIP

Phone

Codec Type G.711 U Law 1

G.726 Stream Properties 2

☐ U Law ☒ A Law

Endian

☐ Little ☒ Big

Phone Number 2005 3

4 ☐ Auto Answer Incoming Call

5 ☐ Headset Call

6 ☒ Register

7 ☐ KeepAlive

Session Interval 300 8

Min-SE Interval 300 9

Refresher UAC 10

Options

Proxy Server 11

12 ☐ Ignore Delay in MOS

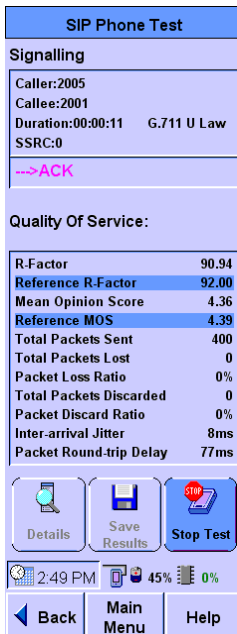
Previous Next Cancel

- | | |
|----|--|
| 1 | The codec to be used for the data transfer. |
| 2 | The properties for codecs from the G.721 or G.726 field family. |
| 3 | The phone number that the WireScope Pro registers as its own. |
| 4 | If selected, the WireScope Pro will auto answer incoming call. |
| 5 | If selected, headsets call for live audio will be enabled. |
| 6 | If selected, the WireScope Pro registers the phone number with Registrars or SIP server. Otherwise, the WireScope Pro directly calls the IP address specified in the SIP Server panel on the SIP Setting screen. |
| 7 | If selected, the WireScope Pro allows the end point to send or answer reinvite, and configures the associated session interval, min-SE interval, and refresher. |
| 8 | The maximum time allowed between session refresh requests in a dialog before the session time-out. |
| 9 | The minimum value, also called the minimum timer, that can be set for the session interval. |
| 10 | The entity (for example, UAC and UAS) which initiates reinvites. |
| 11 | The domain name for the proxy server. |

-
- 12 The option to select whether to ignore the round-trip delay when calculating MOS. This may make it easier to reconcile the MOS measurements from different devices (if VoIP option 030 is selected).
-

Running the Test

When **Start** is pressed in the SIP Setting screen, the WireScope Pro checks if the Register check box on the SIP Setting Setup screen is selected. If yes, the WireScope Pro registers with the registrar or SIP Server using the user-defined options on the SIP setting screen, before placing a call or sending an invite message.



If Register is not selected, the WireScope Pro will call the IP address specified in the SIP Server panel directly.

The SIP call is made to the number set in Target Phone no with the user-defined audio codec as specified on the SIP Setting Setup screen. After the SIP signaling completes, data flows across the network and the measurement statistics appear in the SIP Phone Test Details Window screen.

The test results can be saved to the USB flash drive by pressing **Save Results**.

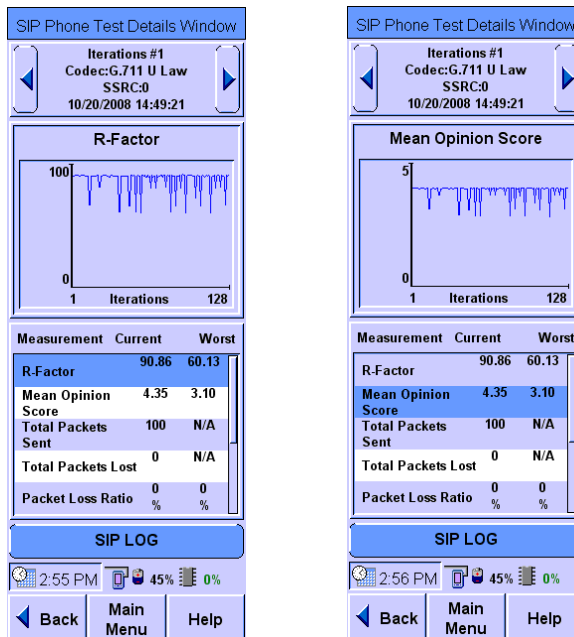
If the sender changes its Synchronization Source (SSRC) identifier, you will be asked whether to ignore this change.

- If you choose **Yes** to ignore the SSRC change, the call will stop.
- If you choose **No** to not ignore the SSRC change, the following steps will be performed.
 - a** The WireScope Pro adds the new SSRC to the members and senders tables.
 - b** The WireScope Pro validates the new SSRC, as described in RFC 3550.
 - If the new SSRC is valid, the WireScope Pro terminates the current session and starts gathering statistics for the new session. The old SSRC is removed from the members and senders tables.
 - If the new SSRC is not valid, the WireScope Pro continues to gather statistics for the original session, if this has not timed out.

Once the test stops, press **Details** to view the SIP signaling log. The graphical plots of the VoIP test results with respect to time can also be viewed offline. For further information, refer to [“Interpreting Results”](#) on page 184.

Interpreting Results

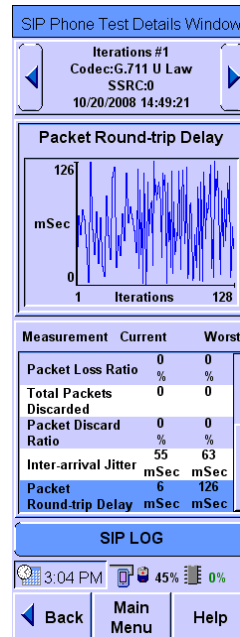
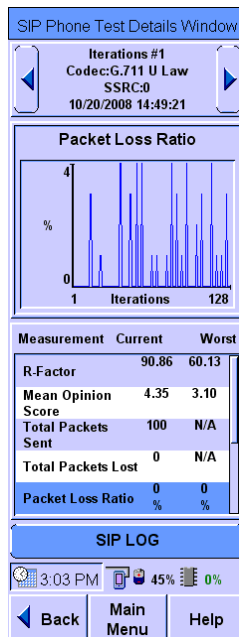
The statistics measured are plotted in a graphical format. The graph is plotted offline, with the timing information displayed as iterations (in intervals of 500 ms) on the X-axis, and R-Factor, MOS, Packet Loss Ratio, Packet Round-trip delay, or Inter-arrival Jitter values on the Y-axis.



Each iteration shown is based on the RTCP message exchanged during the VoIP test.

- The Inter-arrival Jitter, Total Packet Loss, and Packet Loss Ratio are based on the received RTP packets. Packet Round-trip Delay is based on the RTCP packet information.
- R-Factor and MOS are based on Inter-arrival Jitter, Total Packet Loss, Packet Loss Ratio, and Packet Round-trip Delay. If no RTCP packet is sent, then the Packet Round-trip Delay will be set to zero.
- Total Packets Sent is the number of the packets sent from the WireScope Pro.
- Total Packet Lost is based on Cumulative Number of Packets Lost in RFC1889/3550.
- Packet Loss Ratio is based on Fraction Lost in RFC 1889/3550.

- Total Packets Discarded are the number of packets dropped at the receiving side if there are errors in the RTP header information.
- Packet Discard Ratio is the discarded packet ratio for each RTCP interval.



Simultaneous Traffic Generation during VoIP Testing

The VoIP systems can respond to increasing traffic load by degrading the Quality of Service (QoS). By generating the background traffic during a VoIP test, the WireScope Pro identifies the bandwidth and latency issues that do not appear with single point-to-point VoIP calls.

Configuring Traffic Generation During VoIP Testing

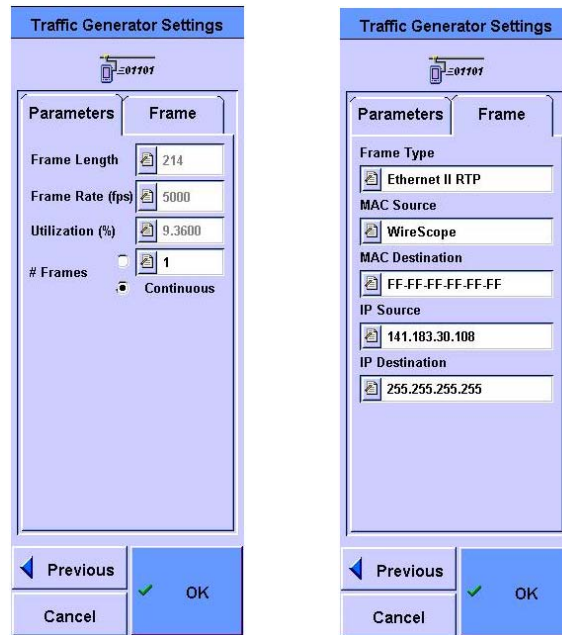
- 1 Press **Next** to configure the settings for the background traffic after completing the other settings (SIP Port, RTP Port, Codec Type, and so forth) in the SIP screen.
- 2 Select **Traffic Generator** to generate background traffic during the VoIP test.



- 3 Set the number of calls to be simulated in the Traffic Generator Settings panel.

The traffic load associated with each call is determined by the VoIP settings, that is, it is equivalent to the traffic generated by the VoIP test call. A minimum of one call and a maximum of 1000 calls are possible.

- 4 Press **OK**.
- 5 The Traffic Generator Settings has two tabs, Parameters and Frame.



The Parameters tab settings are automatically set by the WireScope Pro based on the chosen amount of background traffic and the parameters of the VoIP test call, such as the codec used. On the # Frames field, specify if a continuous background traffic generation is desired or if only a limited number of frames are to be generated.

On the Frame tab, choose whether the MAC source address for the simulated traffic is the WireScope Pro itself, or 16, 128, or 256 stations. If you choose to simulate multiple stations, the amount of traffic generated – specified by the number of calls – will be distributed among the number of stations selected.

6 Press OK.

NOTE

The VoIP testing with the WireScope Pro can be done in the following ways.

- Calling a hardware or software SIP phone
- Calling a WireScope Pro from a SIP phone
- Calling between two WireScope Pro

If you are calling between two WireScope Pro, repeat the configuration steps described here for both WireScope Pro, depending on the desired test scenario and traffic loading.

7 If you are calling between two WireScope Pro, start the callee first, then the caller.

8 Press **Start** to start the test.

To observe the impact of the network traffic on the VoIP quality, use the arrow keys to increase or decrease the amount of background traffic generated on the Test Port while the test is running.

Press **Stop Test** on either the WireScope Pro or hang up the SIP phone to finish the test.

Press **Details** to observe the test results.

Press **Save Results** to store the test results in the USB flash drive.

How to Save and Retrieve Results

The WireScope Pro VoIP test results are saved into the USB flash drive.

You can recall previously stored test data by using the Tests Database tool. This section describes how to recall and delete stored tests. Press **Tools** on the Main Menu screen to display the Tools menu. On the Tools menu, press **Tests Database**.

The WireScope Pro VoIP test results are stored in the SIP Phone Test Results directory. The number before the directory name indicates the number of stored files in the directory.

Select the directory and press the + sign, or press **Expand List**.

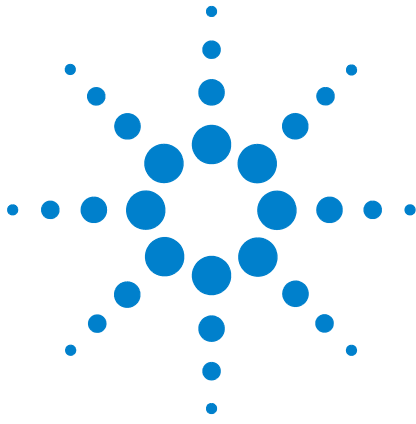
To display the detailed test results, select the desired test results directory and press **View**.

To delete a stored test, select the test results directory and press **Delete**.

The VoIP Test results can also be retrieved from the WireScope Pro when its web server is enabled. The results are available in *.csv*, HTML or JAVA format. Refer to [“Remote Control”](#) on page 217.

Downloading and Viewing Results with a Web Browser

You can view the results in HTML table or graphical form in a browser, or download them as a *.csv* file, as described in [“Network Database”](#) on page 227.



11 Network System Operations

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This chapter describes various system operations of the WireScope Pro when it is in network test mode.



The Status Display Area



The status display area shows the status of the following parameters.

Clock display



The clock shows the time of the day. It can be set in the **Time and Date** section from the System Settings menu. Refer to [“Time and Date Setup” on page 199](#).

Network connection status



The WireScope Pro icon displays the network connection of the WireScope Pro. If a red ‘X’ is shown on the connection, it indicates that the WireScope Pro is not connected to the network.

Power or battery display



AC power icon: This icon appears when an external AC/DC power adapter is connected to the WireScope Pro.



Battery charge icon: This icon indicates the current battery state when the WireScope Pro operates using battery power. The number next to the icon shows the percentage of full battery charge.

Storage status



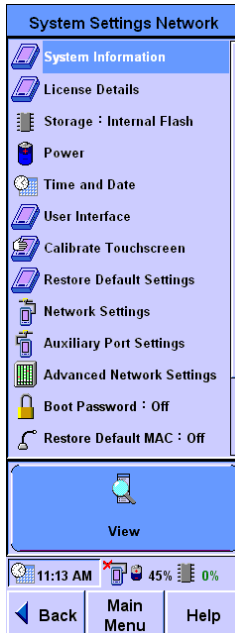
This icon indicates the status of the USB flash drive and the percentage of storage available in it. In this example, the USB flash drive is 50% full.



This icon indicates that the USB flash drive is not installed and the internal flash is used. In this example, the internal flash is 16% full.

The System Menu

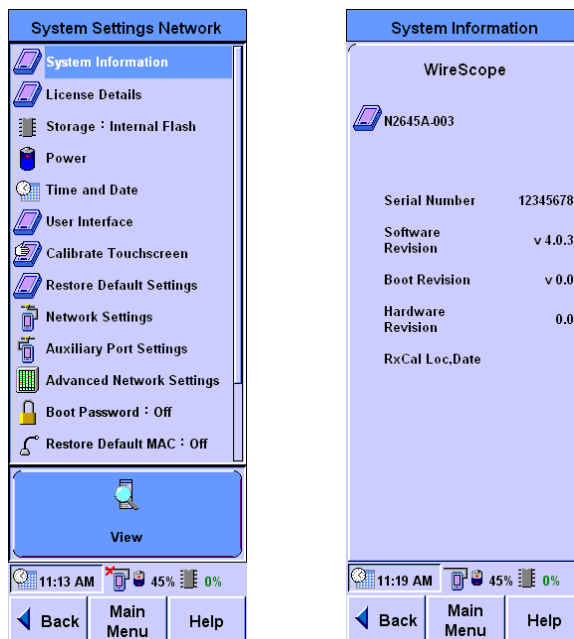
Press **System** on the Main Menu screen to display the WireScope Pro System Settings Network menu.



To access the other items not shown on the screen, use the  button.

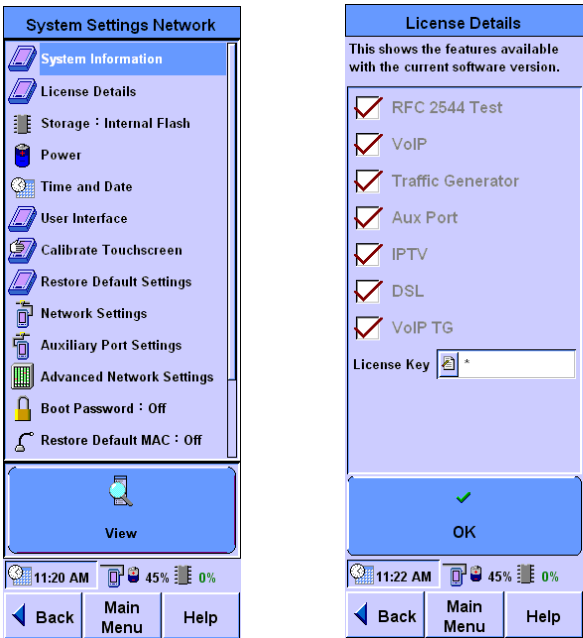
System Information

The System Information screen lists the WireScope Pro serial number, software, and hardware revision numbers. Press **System Information**, then press **View** on System Settings Network menu to display the System Information screen.



License Details

The License Details screen lists the features available in the current version of the software. Select **License Details** on the System Settings Network menu and press **Edit**. The License Details screen will be displayed with all the available features.



To acquire a license key for a new option, contact your nearest technical support center or your Agilent Sales representative.

NOTE

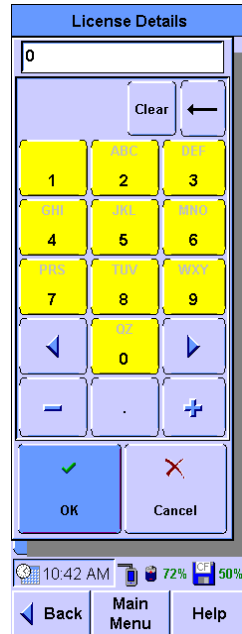
Each license number matches the serial number of the instrument bought.

You need a valid license key to enable an option on the WireScope Pro. The license key is preinstalled for the test options you bought with the WireScope Pro.

If you bought a license to upgrade the WireScope Pro, you will have to manually type in the license key.

To type in the license key, perform the following steps.

- 1 Press on the **License Key** box. Then press **Clear** on the onscreen keypad to clear the number on the display panel.

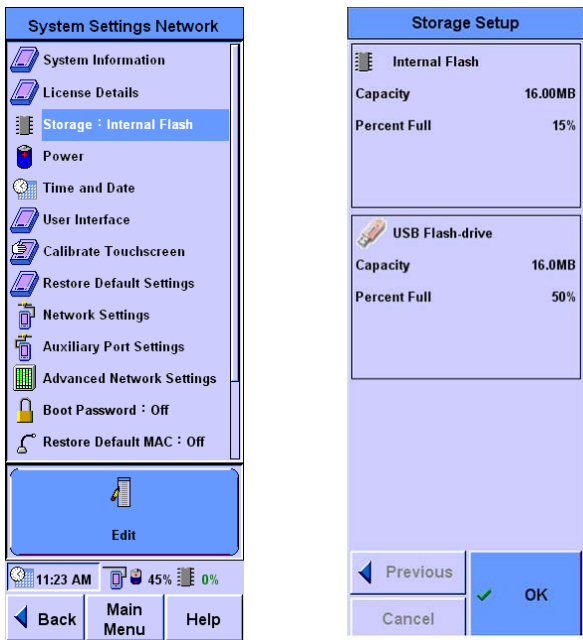


- 2 Type in the license key and press **OK**.
- 3 Press **OK** on the License Details screen.

If the license key is accepted, the option for that license will become active.

Storage Setup

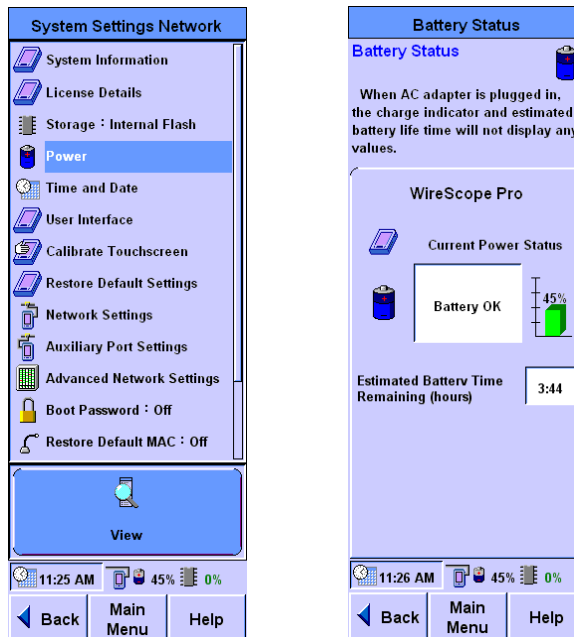
The Storage Setup screen allows you to view the total capacity and percentage of usage of the USB flash drive and internal flash. Select **Storage** on the System Settings Network menu and press **Edit**.



Press **OK** to return to the System Settings Network menu screen.

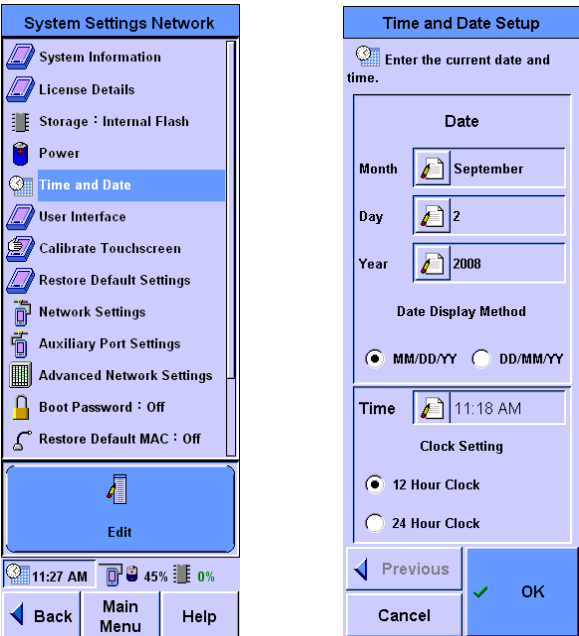
Battery Status

The Power selection displays the current battery status. Select **Power** on the System Settings Network menu and press **View** to display the Battery Status screen. The display also shows the estimated battery time remaining.



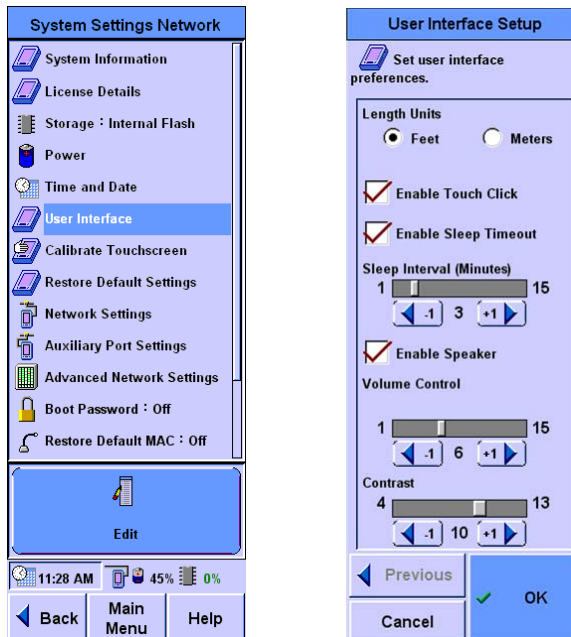
Time and Date Setup

The Time and Date Setup screen allows you to set the Month, Day, Year, and Time as well as the display method for the date setting. To set the time and date on the WireScope Pro, select **Time and Date** on the System Settings Network menu, then press **Edit**. The Time and Date Setup will be displayed.



User Interface Setup

The User Interface Setup screen allows you to set the preferred user interface. Select **User Interface** on the System Settings Menu and press **Edit**. The User Interface Setup screen will be displayed.

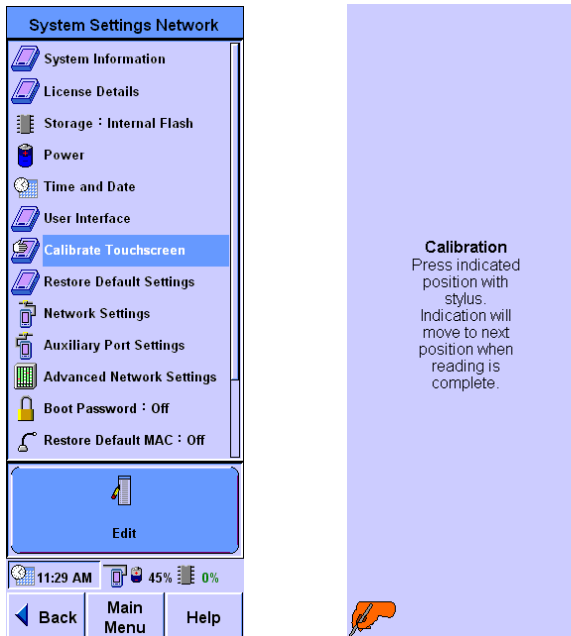


The following options can be set.

Option	Description	Setting range
Enable Touch Click	Enables touch click on the screen.	On or off
Enable Sleep Timeout	Enables sleep timeout. A touch on the screen will wake the screen. When enabled, the Sleep Interval setting bar is displayed.	On or off
Sleep Interval (minutes)	Sets the sleep interval. This determines how long without a screen touch or button press until the unit goes to sleep.	1 to 15 minutes
Enable Speaker	Enables the speaker volume.	On or off
Volume Control	Sets the volume range.	1 to 15
Contrast	Sets the screen contrast.	4 to 13

Touchscreen Calibration

The Calibration Touchscreen selection allows you to calibrate the touch screen to bring it into alignment with the underlying display. If the WireScope Pro is not responding correctly to taps on the touch screen, you may need to perform the calibration.



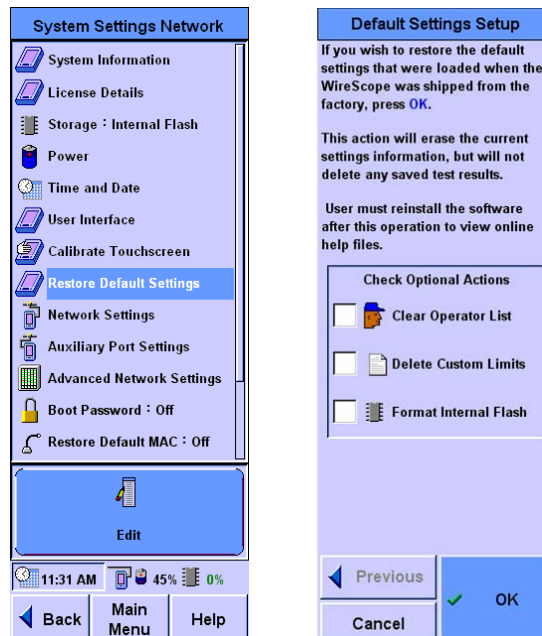
To calibrate the touch screen, perform the following steps.

- 1 Ensure that you have the stylus available.
- 2 On the System Settings Network screen, select **Calibrate Touch Screen**, then press **Edit**. The Calibration screen will be displayed.
- 3 Using the stylus, press the screen as directed by the onscreen instructions. Since the coordinate readings are very sensitive, you should tap on the exact point of the screen as indicated by the drawing of the stylus.
- 4 When the calibration has completed, the WireScope Pro will return to the System Settings Network screen.

Restore Default Settings

The Restore Default Settings is done when you want to delete user-configured system settings or before upgrading the software. The following procedure describes how to restore the WireScope Pro to the configuration values that were set when your WireScope Pro was shipped from the factory.

- 1 On the System Settings Network screen, select **Restore Default Settings** and press **Edit**. The Default Settings screen will be displayed.



- 2 If you want to clear the data in the operator list, custom limits, internal flash, and return to the default settings and profiles of the WireScope Pro, select the **Clear Operator List**, **Delete Custom Limits**, or **Format Internal Flash** check box respectively.
- 3 Press **OK** to restore the factory default settings.
- 4 As this action will erase all current settings, you are asked to confirm before proceeding. In the subsequent confirmation dialog box, press **Yes** to accept the resets or **No** to cancel the resets and return to the System Settings screen.
- 5 If the **Format Internal Flash** option is selected, you must reinstall the WireScope Pro software.

Refer to the *WireScope Pro Upgrade Utility Manual* for details on how to upgrade or reinstall.

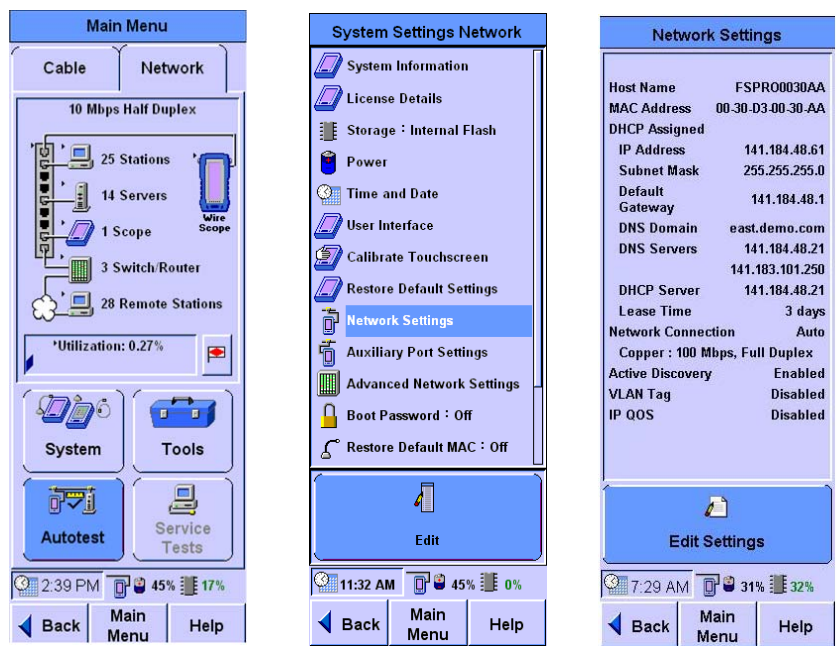
Network Settings

The Network Settings screen shows a summary of the network configuration.

NOTE

For the Network Settings of the WireScope Pro with VoIP Option, refer to [Chapter 10](#), “Voice Testing with the WireScope Pro,” on page 175.

To access the Network Settings screen, press the WireScope Pro icon on the Main Menu screen or press **System**. Select **Network Settings** and then press **Edit**.



The following information is displayed on the Network Settings screen.

- Host Name (WireScope Pro name, which by default is FSPRO plus the last three hexadecimal bytes of the MAC address, but it can be changed to any desired name)
- MAC address of the WireScope Pro (This is a factory setting that identifies the WireScope Pro uniquely among all Ethernet devices)
- DHCP assigned information (or manually assigned)

- Network Connection (Auto or Manual)
- Active Discovery (Enabled or Disabled)
- VLAN (Enabled or Disabled)
- IP QoS (Enabled or Disabled)

To change any of the settings, press **Edit Settings**.

The first Network Settings Setup screen allows you to select the addressing mode.

The image shows two side-by-side screenshots of network configuration screens. The left screen, titled 'Network Settings Setup', has a header bar with the same title. Below the header, it says 'For IP, WireScope could either use DHCP or manual configurations.' There is a 'Suite' dropdown menu currently set to '<Default>'. Below this are two radio buttons: 'Use DHCP' (selected) and 'Manually Configure'. Under 'Manually Configure', there are input fields for 'IP Address' (0.0.0.0), 'Subnet Mask' (0.0.0.0), 'Default Gateway' (0.0.0.0), and 'MAC Address' (00-00-00-00-00-00). At the bottom are 'Previous', 'Next', and 'Cancel' buttons. The right screen, titled 'Test Port Settings Suite', has a header bar with the same title. It features two radio buttons: 'Create New' and 'Load Selected' (selected). Below them is a 'Delete' button with a trash icon. A large list box below contains '<Default>'. At the bottom are 'Previous', 'OK' (with a green checkmark), and 'Cancel' buttons.

If you want to save this Network Settings suite or load a previously stored suite, press **Suite**. Select a stored suite from the list or select **Create New**, then press **Next**. You can select **<Default>** if you want to reload the default suite. If you select **Create New**, you will be prompted to type in a new name.

CAUTION

MAC address modification is not advisable. If a modification is unavoidable, the changes should be done with extreme care so that it will not conflict with any MAC address that is in use.

MAC Address The MAC address of the WireScope Pro. Usually it contains a value set in the factory. But this field can be used to change the MAC address if this is necessary for a specific case or to meet the security requirements.

The MAC address can be reset to the factory default on the next power-on as described in [“Restoring the Default MAC Address”](#) on page 216.

IP settings The IP settings of the WireScope Pro. You can select DHCP to automatically configure the WireScope Pro when connected to the network, or manually configure the IP address, gateway, subnet mask, and other settings by selecting **Manually Configure**. If you choose to manually configure the IP settings, you have to at least type in a valid IP address and subnet mask.

- IP Address – This value uniquely identifies the WireScope Pro in the TCP/IP network.
- Subnet mask – This value is combined with the IP Address to define the subnet of the WireScope Pro.
- Default gateway – This is the default gateway (router) that the WireScope Pro will use to communicate with devices on other subnets.

Press **Next** when done to access the second Network Settings Setup screen.

The second Network Settings Setup screen allows you to change the Host Name, DNS Domain, DNS Servers address, and WINS Servers address.

Network Settings Setup

Set the parameters used for name lookups in NetBIOS and DNS

NOTE: If DHCP is used, it may provide some of these items.

Host Name
FSPR000000

DNS Domain

DNS Servers
0.0.0.0
0.0.0.0
0.0.0.0

WINS Servers
0.0.0.0
0.0.0.0

Previous Next Cancel

Host Name This name will be used to identify the WireScope Pro in NetBIOS and the WireScope Pro protocols. The default name is FSPRO followed by the last 3 hexadecimal digits of the MAC Address. It may be changed to any desired name.

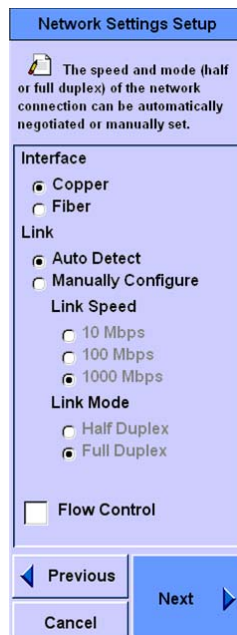
DNS and NetBIOS settings This name refers to the devices on the network. In the DNS, the WireScope Pro request the DNS servers to convert the name to an IP address. When the NetBIOS names are used, the WireScope Pro request the WINS servers to convert the name to an IP address. The DNS domain and the DNS and WINS servers can be learned through DHCP and you can enter the address manually. If you type in a DNS domain, it will be used in place of the DHCP supplied value. If you type in the DNS or WINS servers address, they will be used in preference over the DHCP supplied values.

When done, press **Next** to access the third Network Settings Setup screen.

The third Network Settings Setup screen allows you to set the speed and mode of the network connections.

Interface This option allows you to select whether to use fibre interface or copper interface.

Link This option is used set the network connection speed and mode. Since the network hardware may function at a variety of speeds and modes, the WireScope Pro has the ability to auto-negotiate its speed and mode when it is connected to the network. The auto negotiation attempts to configure the devices for the fastest network connection supported. If necessary, you can manually set the WireScope Pro for 10, 100 or 1000 Mbps and full or half duplex mode (For Gigabit ethernet, only full duplex mode is available). This may be used for instance to prove that a 10/100 switch can properly support the 10 Mbps speed.



Network Settings Setup

The speed and mode (half or full duplex) of the network connection can be automatically negotiated or manually set.

Interface

- ☒ Copper
- ☐ Fiber

Link

- ☒ Auto Detect
- ☐ Manually Configure

Link Speed

- ☐ 10 Mbps
- ☐ 100 Mbps
- ☒ 1000 Mbps

Link Mode

- ☐ Half Duplex
- ☒ Full Duplex

☐ Flow Control

Previous Next

Cancel

Flow Control (enable or disable) This option allows you to enable or disable the flow control. If flow control is enabled, the WireScope Pro will transmit flow control packets (XON and XOFF frames) based on the MAC FIFO fullness.

When done, press **Next** to access the fourth Network Settings Setup screen.

VLAN support This option allows you to configure the WireScope Pro to support C-VLAN (IEEE 802.1q) and P-VLAN (IEEE 802.1ad) tagging frames.

Network Settings Setup

WireScope can be configured to support C-VLAN (802.1q) and P-VLAN (802.1ad) frames. The P-TPID can also be configured in order for the WireScope to interpret P-VLAN frames even if P-VLAN feature is disabled.

NOTE: If P-VLAN is enabled, the DUT's must handle 1526-byte packets.

☐ C-VLAN Tag

C-VLAN Identifier:

C-VLAN Priority:

☐ P-VLAN Tag

P-VLAN Identifier:

P-VLAN Priority:

P-VLAN TPID (Hex):

Previous Next Cancel

Enable C-VLAN to allow sending and receiving of Q-tagged frames. Set the appropriate C-VLAN Identifier and C-VLAN Priority values. These values are dependent on the C-VLAN setting of the network-under-test. Q-tagging is normally used to group different host traffic in enterprise networks as if these hosts are on a single LAN even if they are geographically separated from each other.

Enable P-VLAN to allow sending and receiving of AD-tagged frames (also known as Stacked VLAN). Set the appropriate P-VLAN Identifier and P-VLAN Priority values. These values are dependent on the P-VLAN setting of the network-under-test. AD-tagging is normally used in the service provider network to separate different client traffic. Set a 4 hexadecimal digit value for the P-VLAN Tag Protocol ID (TPID) when testing on the service provider network. This value will be used by the WireScope Pro as the TPID field to be inserted and stripped when enabling P-VLAN support. This field indicates that the packet is a P-VLAN packet in the service provider network. This field is dependent on the P-VLAN settings of the service provider, so you should set this value appropriately. It can be set even if P-VLAN is not enabled to indicate to the WireScope Pro that the packet is a P-VLAN packet and should be interpreted as such by the device.

When done, press **Next** to access the last Network Settings Setup screen.

Active Discovery (enable or disable) When the WireScope Pro is attached to a switch port, it only sees the broadcast traffic and the traffic targeted for the WireScope Pro. When the Active Discovery is enabled, the WireScope Pro requests information from devices on the network to increase the amount of information the WireScope Pro can learn from the network.

NOTE

Active Discovery will affect the network and, in some cases, will trigger some alarms. Use at your own risk. For a list of the activity, please refer to [Chapter 12, “Active Discovery Process,”](#) on page 228.

Erase Station List (enable or disable) The WireScope Pro automatically discovers stations on the network which it is connected to and shows these stations on the main screen. You can refresh this station list by removing and reconnecting the physical link (for example, fiber or copper cable) when the Erase Station List feature is enabled.

IP QOS (enable or disable) The WireScope Pro will send IP packets with the IP TOS field set if QoS is enabled. You can select to use either IP TOS or IP Differential Service field

(DSCP). If IP TOS is used, you can set the IP Priority along with TOS Value. If DSCP is used, you can set the DSCP value to be used in the IP Packets.

When done, press **OK**.

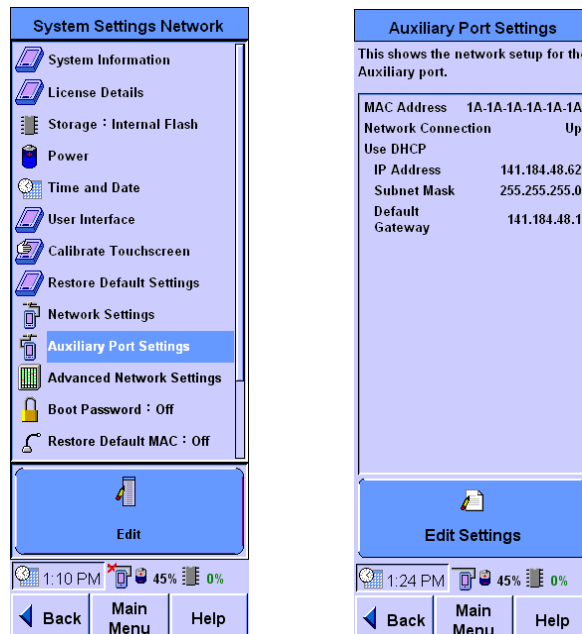
Auxiliary Port Settings

The auxiliary port of the WireScope Pro provides an additional 10/100 Mbps Ethernet interface. It allows you to remotely control and access the WireScope Pro through a network different from the network-under-test.

The auxiliary port is available for use if the Auxiliary Port license is activated.

The auxiliary port cannot be used for network performance testing or with the troubleshooting tools available for the RJ45 and SFP Gigabit Ethernet test ports.

To view the status of the auxiliary port or to make any changes, select **Auxiliary Port Settings** under the System Settings Network menu and press **Edit**. The Auxiliary Port Settings screen will be displayed.



The screen shows the link status of the auxiliary port and the MAC address, IP address, subnet mask, and default gateway configured for the port.

To change the network settings of the auxiliary port, press **Edit Settings** and the Auxiliary Port Setup screen will be displayed.

Auxiliary Port Setup

The network settings for the Auxiliary port can use DHCP or manual configurations.

Link

MAC Address
1A-1A-1A-1A-1A-1A

☐ **VLAN Tag**

VLAN ID: 0
VLAN Priority: 0

☒ **Use DHCP**
☐ **Manually Configure**

IP Address
0.0.0.0

Subnet Mask
0.0.0.0

Default Gateway
0.0.0.0

Previous Next Cancel

Auxiliary Port Setup

Host Name
FSPROCCCCC

DNS Domain

DNS Servers
0.0.0.0
0.0.0.0
0.0.0.0

WINS Servers
0.0.0.0
0.0.0.0

Previous OK Cancel

CAUTION

MAC address modification is not advisable. If a modification is unavoidable, the changes should be done with extreme care so that it will not conflict with any MAC address that is in use.

- **MAC Address** - The **MAC Address** panel of the WireScope Pro usually contains a value set in the factory. But this field can be used to change the MAC address if this is necessary for a specific case or to meet the security requirements.

The MAC address can be reset to the factory default on the next boot-up by enabling the option in **Restore Default MAC** on the System Settings Network menu.

- To configure the auxiliary port to use VLAN tagging, select the **VLAN Tag** check box and type in the VLAN ID and VLAN Priority value according to the parameters of the network and service that the auxiliary port is connected to.

NOTE

The WireScope Pro supports only one default gateway. If you need to configure the test and auxiliary ports in different subnets and the gateways to these subnets are different, add the interface and gateway for accessing the second remote network to the routing table, as described in ["Advanced Network Settings"](#) on page 213.

You can select **Use DHCP** to automatically configure the WireScope Pro when connected to the network or select **Manually Configure** to manually configure the IP details. If you choose to manually configure the IP settings, you have to at least type in a valid IP address and subnet mask.

- IP Address – This value uniquely identifies the WireScope Pro in the TCP/IP network.
- Subnet mask – This value is combined with the IP Address to define the subnet mask of the WireScope Pro.
- Default gateway – This is the default gateway (router) the WireScope Pro will use to communicate with devices on other subnets.

Press **Next** to proceed to the network client settings, which allows you to specify the Host Name, DNS Domain, DNS Servers address, and WINS Servers address. Press **OK** to finish the Auxiliary Port setup.

If you make any changes, a window will appear requesting you to restart the WireScope Pro for the new settings to take effect.

Advanced Network Settings

The Advance Network Settings allows you to view, add, and delete new routes to the WireScope Pro network routing table.

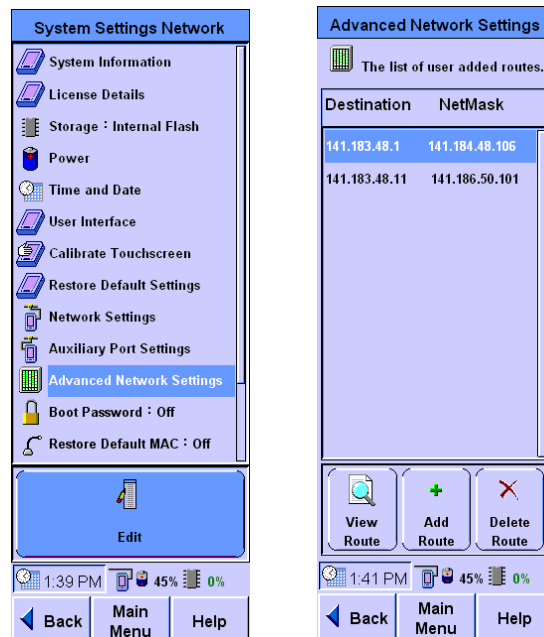
You can use routes in the WireScope Pro routing table to access a network which would be unreachable if the test port and the auxiliary port is using the same gateway, for example, to remotely control the WireScope Pro from a separate subnet.

Before adding routes to the routing table, you need to know the following details.

- The default gateway address of the WireScope Pro access port.
- The subnet IP address of the WireScope Pro access port.

The following procedure describes how to add routes to the routing table.

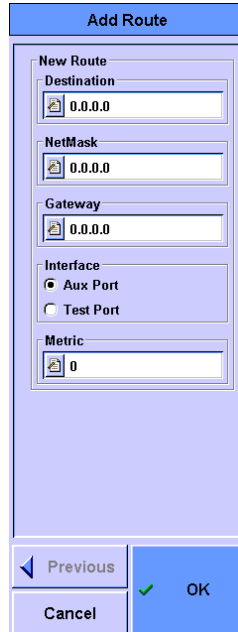
- 1 On the System Settings Network screen, select **Advanced Network Settings** and press **Edit**. The Advanced Network Settings screen will be displayed.



- 2 The Advanced Network Settings screen shows all the currently configured routes. To view the details for a

particular route, select the route and then press **View Route**.

- 3 To add a new route to the routing table, press **Add Route**.



The 'Add Route' dialog box is a vertical window with a blue title bar. It contains several input fields and a section for interface selection. The fields are labeled 'Destination', 'NetMask', 'Gateway', 'Interface', and 'Metric'. Each field has a small icon to its left. The 'Interface' section has two radio buttons: 'Aux Port' (selected) and 'Test Port'. At the bottom, there are three buttons: 'Previous' (with a left arrow), 'Cancel', and 'OK' (with a green checkmark).

Add Route	
New Route	
Destination	0.0.0.0
NetMask	0.0.0.0
Gateway	0.0.0.0
Interface	☒ Aux Port ☐ Test Port
Metric	0
Previous Cancel OK	

- 4 Fill in the details of the new route in the Add Route screen.

- 5 Press **OK**. The route will be added to the route list.

To verify if the new route is valid, select the route and press **View** to see the route details.

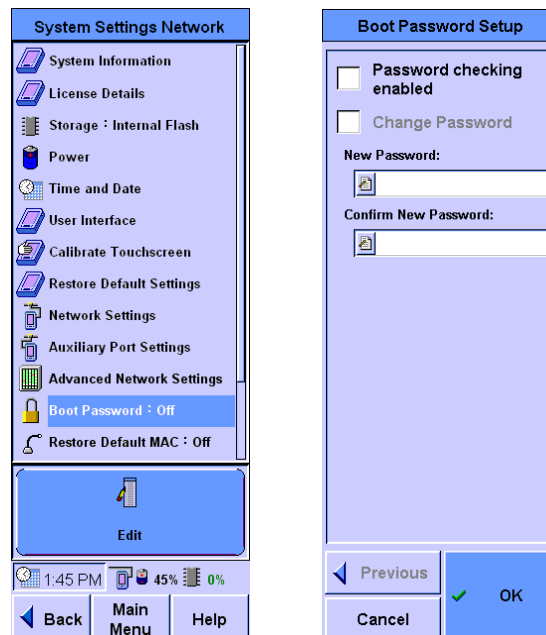
To delete a route, select the route from the list and press **Delete Route**.

Boot Password

To protect the WireScope Pro from unauthorized use, you can set a password that must be typed in before the WireScope Pro powers up. By default, the WireScope Pro has no password protection.

To enable the boot password, perform the following steps.

- 1 On the System Settings Network menu, select **Boot Password.** and press **Edit.**

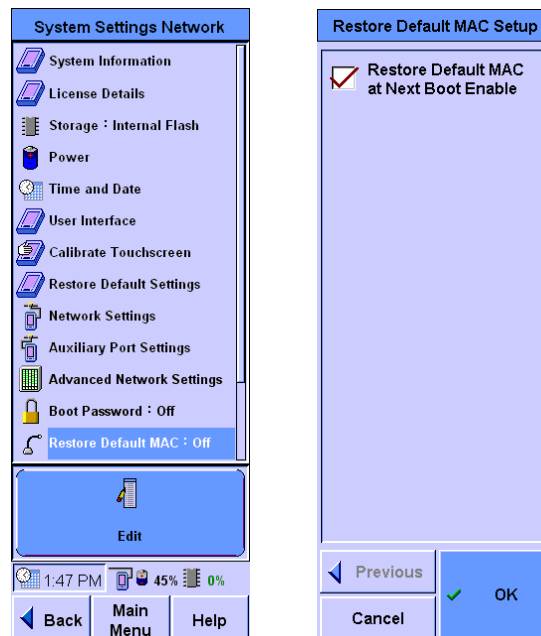


- 2 To enable the password, select **Password checking enabled.**
- 3 If you want to set a new password or change the existing password, perform the following steps.
 - a Select **Change Password.**
 - b Type in the password in the **New Password** and **Confirm New Password** fields.
- 4 Press **OK.**

Restoring the Default MAC Address

If the MAC address of the WireScope Pro is unknown, and you want to restore it to the original hardware MAC address, perform the following steps.

- 1 On the System Settings Network menu, select **Restore Default MAC** and press **Edit**. The Restore Default MAC Setup screen will be displayed.



- 2 To restore the hardware MAC address, select **Restore Default MAC at Next Boot Enable**.

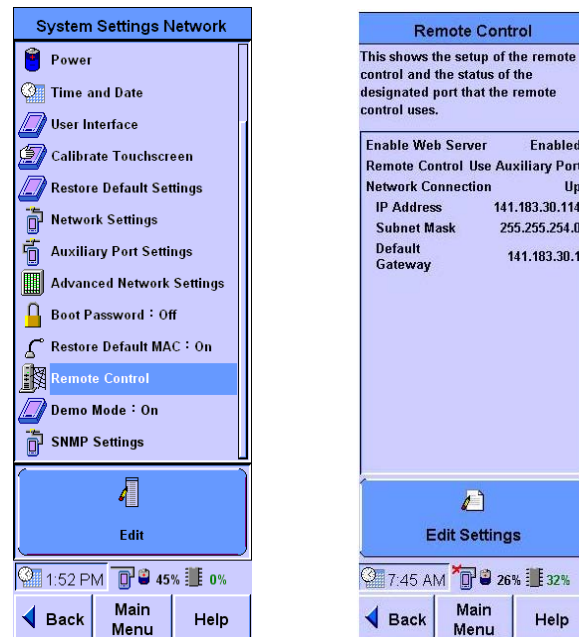
If you do not want to restore the MAC address on the next power-up, make sure this check box is not selected.

Remote Control

The WireScope Pro can be controlled via a web interface. This can be done using the standard test port on the right side of the WireScope Pro or with the auxiliary port on the left side of the WireScope Pro if you have purchased the license for the auxiliary port.

For both methods, the latest WireScope Pro Remote Control utility has to be installed. This can be found in the CD-ROM supplied. You can also download the installer from the web by visiting www.wirescope.com

On the System Settings Network menu, select **Remote Control** and press **Edit**. The Remote Control screen will be displayed



This screen shows the status of the web server and the remote control (the port used by the remote control application). It also shows the IP address, subnet mask, and default gateway of the designated port.

This screen can also indicate whether the link for the remote control is working.

Enabling and Setting the Remote Control Web Server

To enable or disable the web server for remote control, press **Edit Settings** on the Remote Control screen. If you have an auxiliary port, you can choose whether to use the test port or the auxiliary port (if available) for remote control. Refer to [“Auxiliary Port Settings”](#) on page 210.

Remote Control Setup

The remote control is used to monitor and control the FrameScope from anywhere on the network.

To provide extra security for the web server, a user name and password may be entered and the port used by a browser to connect to the FrameScope can be changed.

☒ Use Test Port
☐ Use Auxiliary Port
☒ Enable Web Server

User Name

Password

Port

If the port used for remote control is changed, you will have to restart the WireScope Pro for the change to take effect.

You can choose to increase the web access security by adding a user name and password.

You can also change the default port number (80). If you change the port number, then you will need to specify the port number to access the WireScope Pro. For example, if the WireScope Pro address is 209.6.108.253, the URL would be *http://209.6.108.253*. If Port 8080 is used, the URL would be *http://209.6.108.253:8080*

Whenever the Remote Control settings are changed, the WireScope Pro must restart before the new settings can be used.

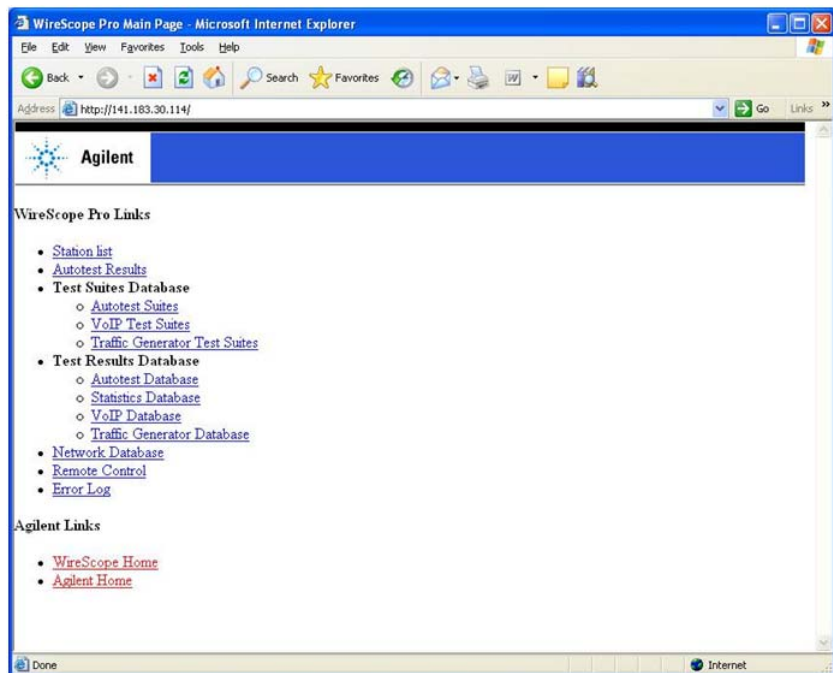
Starting Remote Control

The WireScope Pro Remote Control can be invoked by either using the WireScope Pro Remote Host or from the WireScope Pro Web Page hosted by the WireScope Pro.

The WireScope Pro Remote Host can be launched from the Windows Start menu or from the web page on the WireScope Pro, by pressing the **Remote Control** link.



Or

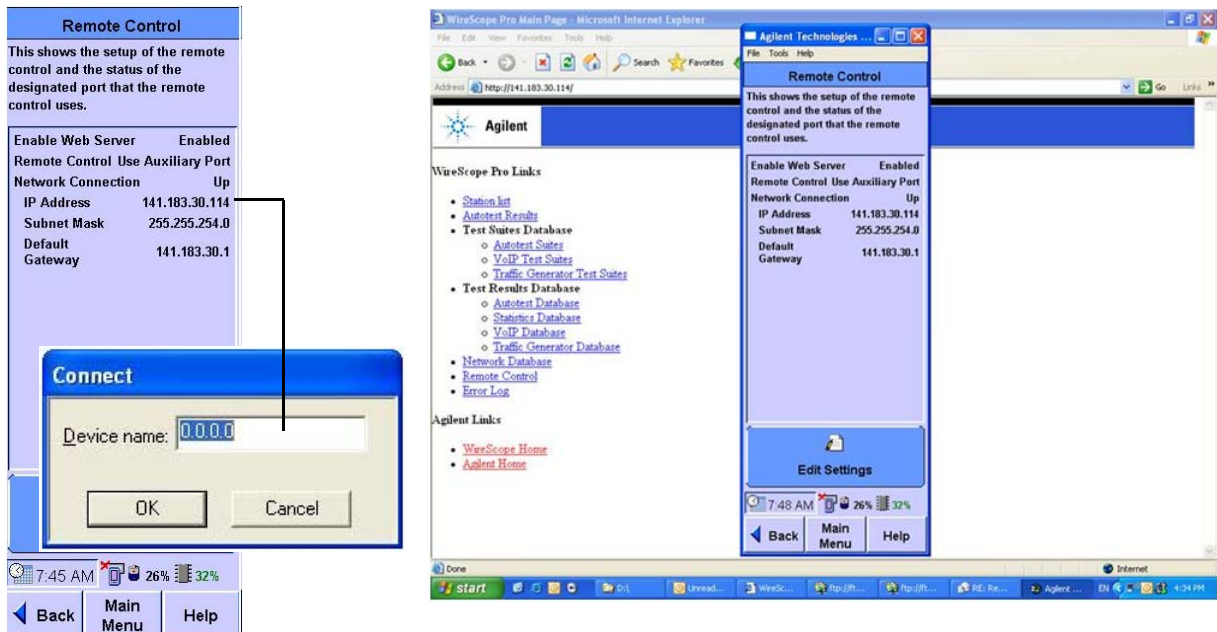


For the WireScope Pro Remote Control Client to work correctly, the following changes need to be done in the Internet Explorer settings.

- 1 In the Internet Options found in either Control Panel or Tools, edit the Security settings.
- 2 Select Internet and press **Custom Level**.
- 3 Search for "Initialize and script ActiveX controls not marked as safe". Select **Enable** and press **OK**.

11 Network System Operations

Once the Remote Host is running, you need to type in the IP address of the WireScope Pro to be controlled. This IP address of the WireScope Pro can be obtained from the Remote Control Settings screen on the WireScope Pro.



Once the remote host connects to the WireScope Pro, the WireScope Pro screen can be viewed in the Remote Host Control application as shown above. You can now control the WireScope Pro with the PC mouse.

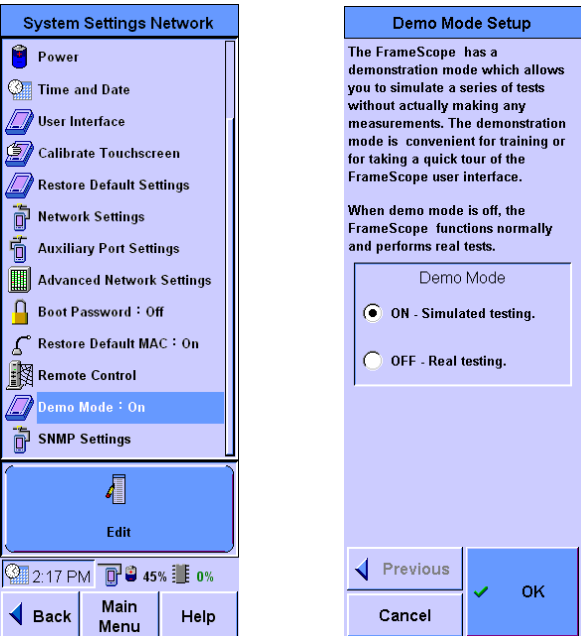
Demo Mode

The WireScope Pro can be set to Demo mode for training or demonstration purposes. The Demo mode provides a network consisting of several stations, servers, a router, two switches or bridges, and five SNMP agents. All functions can be shown in Demo mode without connecting to a live network. Automated test sequences of all functions are simulated.

NOTE

Make sure that the DHCP is set in the network settings to ensure that the demo mode is working properly.

The Demo mode can be enabled or disabled by selecting **Demo Mode** on the System Settings Network menu and then pressing **Edit**. On the Demo Mode Setup screen, select whether to turn on or off the Demo mode in the Demo Mode panel. Press **OK** when done.



SNMP Settings

The WireScope Pro uses the default community “public” and the default port 161 for SNMP access. You may expand the SNMP communities and port numbers for use when performing the Active Discovery, SNMP Queries, and Locate Switch Port tool. Select **SNMP Settings** on the System Settings Network screen and press **Edit**. Type in the additional information and press **OK**.

System Settings Network

- Power
- Time and Date
- User Interface
- Calibrate Touchscreen
- Restore Default Settings
- Network Settings
- Auxiliary Port Settings
- Advanced Network Settings
- Boot Password : Off
- Restore Default MAC : On
- Remote Control
- Demo Mode : On
- SNMP Settings**

Edit

2:18 PM 45% 0%

Back Main Menu Help

SNMP Settings

Enter the SNMP communities and port numbers to use during active discovery, SNMP queries and the Locate Switch Port tool.

The default community “public” and default port 161 will be used first and then the communities and ports listed here will be tried.

Community

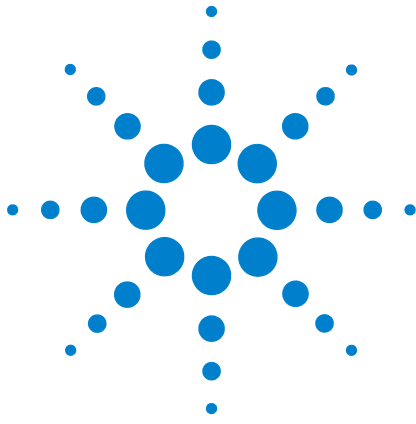
1.
2.
3.

Port

1.
2.

Previous OK

Cancel



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This chapter describes the various network operations of the WireScope Pro.

Network Connection

The WireScope Pro constantly checks for a network connection. When the WireScope Pro detects that it has been plugged into a network device, it does the following.

- Listens for a link pulse or traffic to determine which cable pairs are being used to transmit and receive. If this operation fails, a dialog box pops up to inform you of the error and the WireScope Pro continues to listen for a link. This condition usually means that the network device is not turned on or the connection from the WireScope Pro to the device is faulty.
- Auto-negotiates wire speed and mode (optional). You can manually set the speed and mode (half-duplex or full-duplex) through the Network Settings wizard. The wire speed and mode are displayed in the network map on the Main Menu screen and on the Network Settings screen.
- Uses DHCP to obtain the following parameters (optional).
 - IP address
 - IP subnet mask
 - Default gateway
 - DNS server
 - NetBIOS node type
 - NetBIOS name server (WINS)

You can manually set these parameters through the Network Settings wizard. These parameters are displayed on the Network Settings screen. If DHCP fails, a dialog box pops up to inform you and ask if DHCP should be retried or if the WireScope Pro should give up. DHCP may fail if the DHCP server is not accessible from the WireScope Pro connection point or if the DHCP server security is configured to deny access for unknown devices.

- Test the Default Gateway and the DNS and WINS servers. If any of these devices are not working, an error will be recorded in the Error Log. The Default Gateway is tested by performing an ARP for its MAC address. The DNS and WINS servers are tested by looking up the host name of the WireScope Pro.

When all of this has finished, the WireScope Pro is ready to monitor the network and perform network testing.

Network Database

The WireScope Pro listens to the network traffic and actively interrogates network devices to learn about attached hosts, servers, switches and routers. This information is stored in the Network Database. The database may be saved to or retrieved from the USB flash drive or may be uploaded to a PC through the web interface.

Station List

The Network Database is organized into the following groups where each station is listed by name, if known, and address.

Local Stations Lists stations with any of the following.

- IP addresses on the same subnet as the WireScope Pro
- IPX addresses in the same broadcast domain
- MAC address, but no IP or IPX address

Remote Stations Lists stations with any of the following.

- IP addresses not on the same subnet as the WireScope Pro
- IPX addresses on the other side of a router

Servers Lists stations that supply services and is grouped by service.

Routers Lists stations that advertise routing capabilities or transmit traffic from remote stations.

Switches/Bridges Lists stations which support bridge MIBs through SNMP.

Scopes Lists other WireScope Pro found.

SNMP Agents Lists stations which are running SNMP agents.

The operator can get more information on any device by selecting it from one of these lists.

Device Details

The Network Database includes details learned about each device. The detailed information includes the following, where appropriate.

- DNS, NetBIOS and SNMP system name
- MAC address
- Network addresses: IP and IPX
- Services provided by the device (DHCP, DNS, and so forth)
- Protocols used by the device (IP, IPX, and so forth)

While the device details are displayed, the following statistics pertaining to the device are also available by pressing the **Statistics** button.

- Unicasts, where % is the percentage of all unicasts
- Broadcasts, where % is the percentage of all broadcasts
- Multicasts, where % is the percentage of all multicasts
- Errors, where % is the percentage of all errors

The WireScope Pro detailed view provides the following set of tools.

- Ping
- Locate Switch Port
- TraceRoute (IP only)
- SNMP Queries (IP only)
- Performance Tests (loopback tests)

Active Discovery Process

The actions of the Active Discovery Query order for the WireScope Pro are listed below.

- Every 60 seconds
 - Get the SNMP name and bridge information
- Done once
 - Broadcast PING
- Every 600 seconds
 - Broadcast a DHCP discover message
- Every 60 seconds

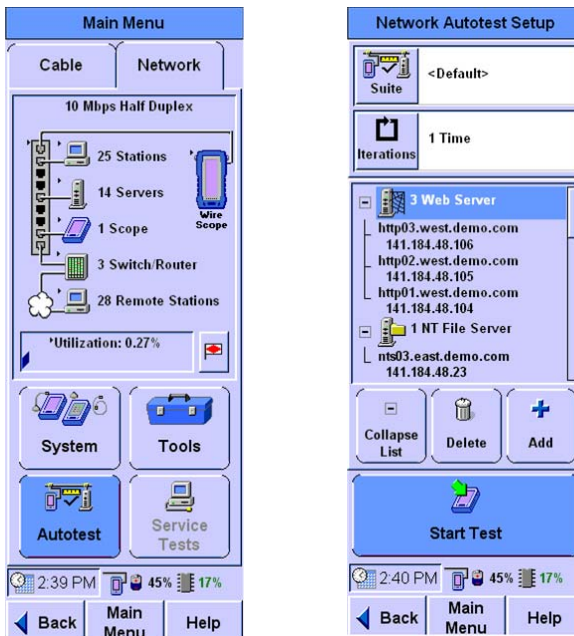
- Broadcast a WireScope Pro announcement (UDP to or from port 52341)
- Broadcast the RIP v1 and v2 routing table requests.
- Every 300 seconds
 - Sends an ARP for each IP address in the subnet range
 - For every ARP response received, send an ICMP echo request
- Every 300 seconds
 - Reset IP services
- Every 30 seconds (and whenever a new IP address is learned)
 - Discover IP services
 - 1 Discover the Domain Controller.
 - 2 Discover the Domain Browsers.
 - 3 For each IP station in the station list which has yet to be probed, the following steps are observed.
 - a Query the DNS servers to get the hostname for the IP address.
 - b Perform an ARP query on the IP address.
 - c Initiate a TCP connection to the LPD port to check for an IP printer server.
 - d Use SNMP to request the system name.
 - e Use SNMP to request the subnet mask.
 - f Start a TCP connection to the HTTP port to check for a web server.
 - 4 For each MAC in the station list, the following step is observed.
 - a Mark any MAC that has more than one IP address associated, where one of which is marked as remote and as router.
- Every 60 Seconds
 - Broadcast an IPX SAP Request

Network Performance Autotest

The Network Performance Autotest is used to measure connectivity and response time of important network resources. Each network resource is tested using target specific access methods to communicate with these resources. The test results are compared to predefined metrics and rated on a scale of one to five, with five indicating the best performance and one indicating the worst performance. The criteria for the ratings can be adjusted to be able to view fluctuations in performance tuned to the best possible performance of the resource.

Autotest Setup

Press **Autotest** on the Main Menu screen to display the Network Autotest Setup screen.



The Autotest contains a suite of tests that can verify multiple features on multiple devices. Each test within the Autotest suite verifies a specific feature on a specific device. For instance, one device may act as both a DHCP server and a DNS server. An Autotest suite used to test this device would contain a DHCP server test and a DNS server test for this device. The same Autotest suite can also contain tests for other devices.

The Default Autotest Suite

The WireScope Pro boots up with the **<Default>** suite selected. When the **<Default>** suite is selected, the WireScope Pro automatically creates an Autotest suite from the servers listed in the Network Database.

Editing Tests

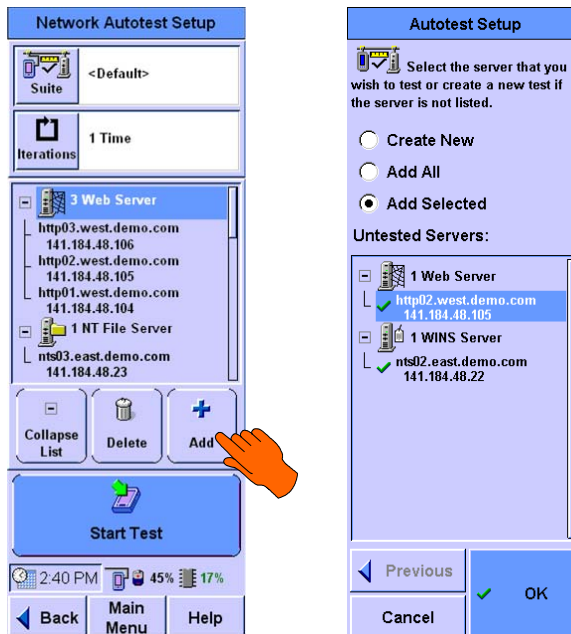
Each test has parameters that specify the test behavior and coverage. For instance, there is a well-known port for web servers to listen on, but a web server may have been configured to listen at a different port. So, the port number is provided as a parameter with the well-known port number as the default. User names and passwords are also included as parameters for tests that can provide extra coverage by logging in to a server. The extra coverage may include reading a file or retrieving an e-mail. A new test can be configured with minimal effort as each server has a default test that can be performed without providing any set up information. After selecting a specific name or address, the **Edit** button starts up a wizard which allows the test parameters to be modified. For more information, see the description of each test in the following section.

Deleting Tests

The **Delete** button operates on the selected test or test heading. A selected test is removed from the Autotest suite when the **Delete** button is pressed. If a heading such as **6 Print Server** is selected and the **Delete** button is pressed, all of the print server tests will be removed from the suite.

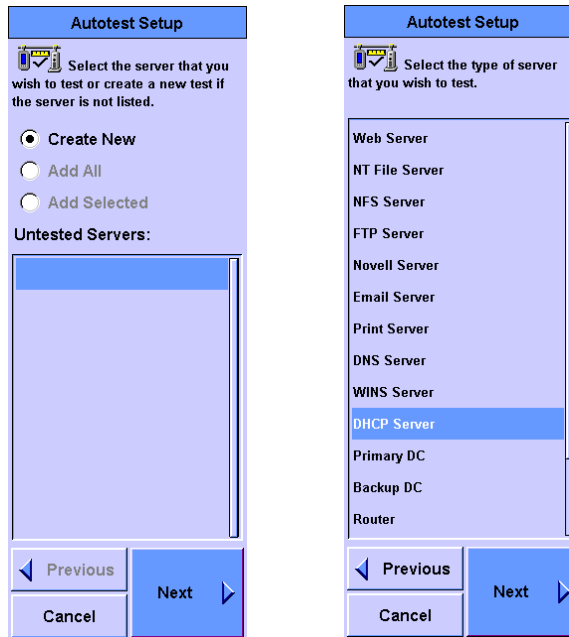
Adding Tests

The **Add** button will start up a wizard which is used to add tests to the test suite.



If the Network Database contains devices with features not covered by any test in the test suite, tests for these features will be listed under **Untested Servers**. Select the test and press **OK** to add one of these tests to the Autotest suite. Press **Add All** and then press **OK** to add all of these tests to the Autotest suite.

Another way to add a test to the Autotest suite is to select **Create New** and press **Next**.



- 1 A list of test types will be displayed on the next screen.
The list is longer than the screen can show. You can access the other entries by using .
- 2 Select the type of test and press **Next**.
- 3 Specific test parameters may be edited on the next screen as discussed under each test heading.

Web Server

The Web Server test verifies that the server is accessible and measures the download time of the first HTTP access operation.

Test setup

The first setup screen allows you to type in the URL of the web server to test. The second setup screen provides an option to request and name a proxy server. The last setup screen provides a list of the measurements performed during the test. Any of the thresholds used to rate the performance of each of these measurements can be viewed and modified by selecting it from this list and pressing **Edit**.

The figure shows three sequential screenshots of the 'Web Server Setup' dialog box:

- First Screenshot:** The 'URL' field is empty. Examples provided are `http://www.scope.com/index.htm`, `www.scope.com/index.htm`, and `www.scope.com`. Navigation buttons at the bottom are 'Previous', 'Next', and 'Cancel'.
- Second Screenshot:** The 'Proxy Server' section is active. The 'Use Proxy Server' checkbox is unchecked. The 'Name' radio button is selected. The 'Port' is set to 80. The 'Authentication' section has 'Enable' checked. The 'User Name' is 'http Test' and the 'Password' is masked. Navigation buttons at the bottom are 'Previous', 'Next', and 'Cancel'.
- Third Screenshot:** The 'Measurements' section is active. It lists 'Name Lookup', 'PING Response', '1st Response', and 'Receive Rate'. An 'Edit' button is at the bottom. Navigation buttons at the bottom are 'Previous', 'Next', 'Cancel', and 'OK'.

The measurements taken during this test are listed below.

Name Lookup The request or response time for converting a name into an address.

PING Response The time it takes to perform an ICMP Echo test on the server.

1st Response The time it takes to acknowledge the GET command.

Receive Rate The rate in bytes per second for the download of the first data in response to the get command.

Examples of modifying the measurement rates are shown below.

The image displays two side-by-side screenshots of the 'Web Server Setup' dialog box, illustrating different measurement rate configurations.

Left Screenshot: 1st Response

Rating	If Less Than Seconds
5	0.250
4	0.500
3	1.000
2	3.000
1	10.000

Buttons: Restore Defaults, OK, Cancel, Previous, OK (with green checkmark), Cancel.

Right Screenshot: Receive Rate

Rating	If More Than Bits/S
5	800000.000
4	80000.000
3	8000.000
2	800.000
1	80.000

Buttons: Restore Defaults, OK, Cancel, Previous, OK (with green checkmark), Cancel.

NT File Server and NFS Server

The File Server tests provide the following basic operations.

- Check server availability by logging in to the server or a partial log in if a user name and password are required for log in but have not been provided by you.
- The following operations are optional. If any of these operations is requested, you must type the full path name to the file (or directory) on the server.
 - Log in to the server.
 - Read from an existing file.
 - Write to, read from, and delete a file.

Test setup

The first File Server setup screen requests a name or address as well as login information needed to access the server.

NT File Server Setup

Enter the address of the NT file server

Server
0.0.0.0
☐ Name ☒ Address

(Optional) Enter a user name and password to allow file accesses.

User
User Name
Password

Previous Next Cancel

NFS Server Setup

Enter the address of the NFS server

Server
0.0.0.0
☐ Name ☒ Address

(Optional) Enter a user ID or group ID and password to allow file accesses.

User
UID
GID
Machine

Previous Next Cancel

Include domain name in the **User Name** entry, for example:
abc@agilent.com.sg

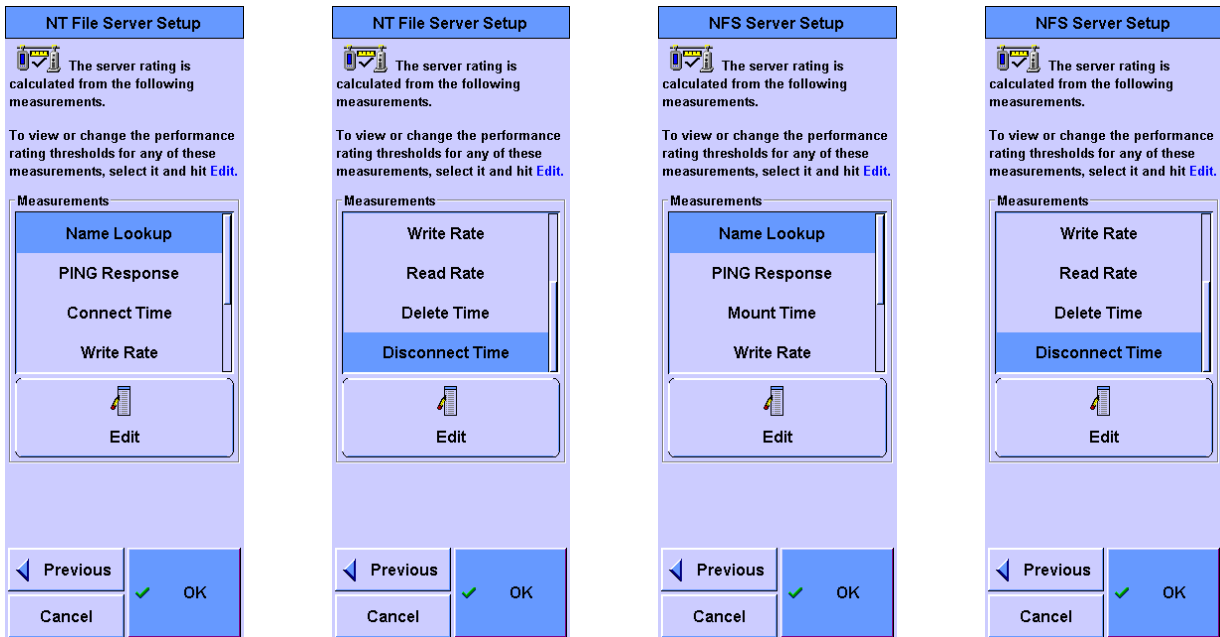
The next setup screen allows selection of the file actions to be tested. If the **Read** or **Write Read Delete** option is chosen, you will need to type the name of the file, the directory where the file will be read from or write to, and an additional file size value for **Write Read Delete** option.

The image shows two side-by-side screenshots of network testing setup screens. Both screens have a light blue background and a title bar at the top.

NT File Server Setup: The title bar is blue with white text. Below it, there is a folder icon and text: "(Optional) Enter a file name, directory and file size. Choose 'Read' to read from an existing file. Choose 'Write/Read/Delete' to write a test file, read it back and delete it." Below this is an example: "Example: To access file fstest.txt in directory 'test' on file share 'share', enter Directory: share File Name: test/fstest.txt". There are three radio buttons: "No File Access", "Read" (selected), and "Write Read Delete". Below the radio buttons are two text input fields: "Directory" (containing "share") and "File" (containing "fstest.txt"). At the bottom are three buttons: "Previous", "Next", and "Cancel".

NFS Server Setup: The title bar is blue with white text. Below it, there is a folder icon and text: "(Optional) Enter a file name, directory and file size. Choose 'Read' to read from an existing file. Choose 'Write/Read/Delete' to write a test file, read it back and delete it." Below this are three radio buttons: "No File Access", "Read", and "Write Read Delete" (selected). Below the radio buttons are three text input fields: "Directory" (empty), "File" (containing "fstest.txt"), and "File Size" (containing "10240"). At the bottom are three buttons: "Previous", "Next", and "Cancel".

The last setup screen provides a list of the measurements performed during the test. Any of the thresholds used to rate the performance of each of these measurements can be viewed and modified by selecting it from this list and pressing **Edit**. Note that the scroll bar on the right of the screen only shows the location of the screen. Use the  button to scroll through the list. The time responses are modified as shown in the DHCP server.



The measurements taken during this test are listed below.

Name Lookup The request or response time for converting a name into an address.

PING Response The time it takes to perform an ICMP Echo test on the server.

Connect Time/Mount Time The time it takes to connect to the NT file server, or mount the NFS server.

Write Rate The bytes per second rating of the write operation.

Read Rate The bytes per second rating of the read operation.

Delete Time The time it takes to delete the file.

Disconnect Time The time it takes to disconnect from the file server.

Examples of modifying the measurement rates and time are shown below.

NT File Server Setup

Write Rate
If More Than Bits/S

Rating	
5	800000.000
4	80000.000
3	8000.000
2	800.000
1	80.000

Restore Defaults

Apply to:

☒ This server

☐ All servers of this type

OK Cancel

Previous OK Cancel

NFS Server Setup

Delete Time
If Less Than Seconds

Rating	
5	0.250
4	0.500
3	1.000
2	3.000
1	10.000

Restore Defaults

Apply to:

☒ This server

☐ All servers of this type

OK Cancel

Previous OK Cancel

FTP Server

The FTP Server Test allows users to test the designated server in three ways.

- No File Access
- Read
- Write Read Delete

The name look-up time, connect time, disconnect time, read time, read rate, write time, write rate, and file size results are presented accordingly.

Test setup

If the FTP server under test is not detected by Active Discovery, then it can be manually added. You can type the user name and password to access the FTP server. If anonymous login is used, leave the name and password fields blank.

The screenshot shows the 'FTP Server Setup' dialog box. It contains fields for 'Server' (with a dropdown showing '141.183.30.99' and radio buttons for 'Name' and 'Address'), 'User' (with 'User Name' and 'Password' fields), 'Use Proxy Server' (checked), 'Proxy Name' (with a dropdown showing 'proxy-server'), 'Port' (with a dropdown showing '21'), and 'Active Mode' (checked). At the bottom are 'Previous', 'Next', and 'Cancel' buttons. Three horizontal lines with arrows point from text annotations to specific fields: the first line points to the 'User Name' and 'Password' fields; the second line points to the 'Proxy Name' dropdown; the third line points to the 'Active Mode' checkbox.

User User Name user Password ☒ Use Proxy Server	If required, type user name and password here. For anonymous login, leave these fields blank.
proxy-server Port 21	If required, type the name of the proxy server and port number here.
☒ Active Mode	If Active FTP transaction mode is used, select this box. Clear this box for Passive transaction mode.

Type the name of the proxy server and port if required. Both Active and Passive FTP transaction modes are supported. Press **Next** to continue the setup.

Three types of tests are available.

FTP Server Setup

(Optional) Enter a file name, directory and file size. Choose 'Read' to read from an existing file. Choose 'Write/Read/Delete' to write a test file, read it back and delete it. Choose "Big File" if you have to write or read files of size MByte range.

File

☒ No File Access
☐ Read
☐ Write Read Delete

Read

Directory

File

Write

Directory

File

File Size

☐ Big File

Previous Next Cancel

Directory to be read from

Name of file to be read

Directory to be upload to

Name of file to be upload

File size to be uploaded (in MB)

No File Access This mode locates the FTP server, connects, and then disconnects from server.

Parameters tested for No File Access are Name Look-up, Tests Connect and Disconnect Time.

Read This mode tests the FTP server by reading a file specified by the users which is found on the FTP server.

Parameters tested for Read are, Name Lookup, Connect Time, Read Time, Read Rate and Disconnect Time.

Write Read Delete This mode uploads a test file generated by the WireScope Pro to the FTP server under test. The test then reads back the test file and the WireScope Pro deletes the file it uploaded. You can select the default file size or any size from 1000 bytes.

Alternatively, you can select the Big File option to specify file sizes in Mega Bytes. A file up to 1000 MB can be uploaded, read back and deleted.

Measurement parameters and ratings can be viewed and modified accordingly. The measurements taken during this test are listed below.

Name Lookup The request or response time for converting a name into an address.

PING Response The time it takes to perform an ICMP Echo test on the server.

Connect Time The time it takes to connect to the NT file server or to mount the NFS server.

Write Rate The bytes/s rate of the write operation.

Read Rate The bytes/s rate of the read operation.

Delete Time The time it takes to delete the file.

Disconnect Time The time it takes to disconnect from the file server.

Examples of modifying the measurement rates and time are shown below.

FTP Server Setup

The server rating is calculated from the following measurements.

To view or change the performance rating thresholds for any of these measurements, select it and hit [Edit](#).

Measurements

Name Lookup
PING Response
Connect Time
Write Rate

Edit

Previous OK Cancel

FTP Server Setup

Name Lookup
If Less Than Seconds

Rating	Seconds
5	0.250
4	0.500
3	1.000
2	3.000
1	10.000

Restore Defaults

Apply to:

☒ This server

☐ All servers of this type

OK Cancel

Previous OK Cancel

Novell Server

The Novell Server allows you to add and test a Novell-based server.

Test setup

If the Novell server under test is not detected by Active Discovery, then it can be manually added. The first setup screen allows you to type the name or the address of the server. The next setup screen provides a list of the measurements performed during the test. Any of the thresholds used to rate the performance of each of these measurements can be viewed and modified by selecting it from the list and pressing **Edit**.

The image shows two sequential screenshots of the 'Novell Server Setup' dialog box. The left screenshot displays the 'Server' input field with a placeholder address '00000000.000000000000' and radio buttons for 'Name' and 'Address'. The right screenshot displays the 'Measurements' list with 'Name Lookup' and 'PING Response' selected, and an 'Edit' button.

The measurements taken during this test are listed below.

Name Lookup The request or response time for converting a name into an address.

PING Response The time it takes to perform an ICMP Echo test on the server.

E-mail Server

The E-mail Server test verifies that the e-mail server is accessible and measures the access time and download rate of the e-mail.

Test setup

The first setup screen allows you to type the name or address of the e-mail server and the user name and password, if needed. The second setup screen allows you to set the operations to be tested and the send and receive methods as well as the ports used. Default port addresses are provided.

The last setup screen provides a list of the measurements performed during the test. Any of the thresholds used to rate the performance of each of these measurements can be viewed and modified by selecting it from this list and pressing **Edit**.

Email Server Setup

Enter the address of the e-Mail server

Server

0.0.0.0

☐ Name ☒ Address

(Optional) Enter a user name, password and mailbox to allow mail access.

User

User Name

Password

Previous Next Cancel

Email Server Setup

Email

☒ No Operation
☐ Log In Only
☐ Send & Receive Mail

Send Method

SMTP Port 25

Receive Method

☒ POP3 Port 110
☐ SMTP Port 25

Previous Next Cancel

NOTE

If the e-mail server and e-mail domain names differ, the entry for User Name has to include its domain name. For example, if the e-mail server name is *pop3.agilent.com.sg* and the e-mail domain name is *agilent.com.sg*, type *abc@agilent.com.sg* in the User Name field.

The measurements taken during this test are listed below.

Email Server Setup

The server rating is calculated from the following measurements.

To view or change the performance rating thresholds for any of these measurements, select it and hit [Edit](#).

Measurements

Name Lookup

PING Response

Write Time

Relay Time

Edit

Previous OK Cancel

Email Server Setup

The server rating is calculated from the following measurements.

To view or change the performance rating thresholds for any of these measurements, select it and hit [Edit](#).

Measurements

PING Response

Write Time

Relay Time

Read Time

Edit

Previous OK Cancel

Name Lookup The request or response time for converting a name into an address.

PING Response The time it takes to perform an ICMP Echo test on the server.

Write Time The time it takes to write to the server.

Relay Time The time it takes to relay through the server and be available to read.

Read Time The time it takes to read the e-mail using either POP3 or SMTP.

These times can be modified by selecting the measurement and pressing **Edit**.

Print Server

The Print Server lets you to add and test a Print Server.

Test setup

If the Print Server under test is not detected by Active Discovery, then it can be manually added. The first setup screen allows you to type the name or the address of the server. The next setup screen provides a list of the measurements performed during the test. Any of the thresholds used to rate the performance of each of these measurements can be viewed and modified by selecting it from the list and pressing **Edit**.

The image shows two sequential screenshots of the 'Print Server Setup' dialog box. The left screenshot is the first step, titled 'Print Server Setup', with a subtitle 'Enter the address of the Print Server'. It features a 'Server' label, a text input field containing '0.0.0.0', and two radio buttons labeled 'Name' and 'Address', with 'Address' being selected. At the bottom are 'Previous', 'Next', and 'Cancel' buttons. The right screenshot is the second step, also titled 'Print Server Setup', with a subtitle 'The server rating is calculated from the following measurements.' and a note: 'To view or change the performance rating thresholds for any of these measurements, select it and hit Edit.' Below this is a 'Measurements' section containing a list with 'Name Lookup' and 'PING Response', followed by an 'Edit' button with a pencil icon. At the bottom are 'Previous', 'OK' (with a green checkmark), and 'Cancel' buttons.

The measurements taken during this test are listed below.

Name Lookup The request or response time for converting a name into an address.

PING Response The time it takes to perform an ICMP Echo test on the server.

DNS Server

The DNS Server test verifies that the server can look up a name or an IP address.

Test setup

The first setup screen allows you to type the IP address of the DNS server under test and the name or address that will be sent to the DNS server in the request. If no name or address is provided, the DNS server will look up its own address and return a name.

The last setup screen provides a list of the measurements performed during the test. Any of the thresholds used to rate the performance of each of these measurements can be viewed and modified by selecting it from this list and pressing **Edit**.

The figure shows two screenshots of the 'DNS Server Setup' screen. The left screenshot is the initial setup screen, and the right screenshot is the final setup screen.

Left Screenshot (Initial Setup):

- Title: DNS Server Setup
- Instruction: Enter the address of the DNS server
- Field: Server (0.0.0.0)
- Instruction: (Optional) Enter a fully qualified DNS name or an IP address which the server will look up.
- Example: www.agilent.com, 192.006.143.010
- Field: Name/Address to Look Up (Name selected)
- Buttons: Previous, Next, Cancel

Right Screenshot (Final Setup):

- Title: DNS Server Setup
- Instruction: The server rating is calculated from the following measurements.
- Instruction: To view or change the performance rating thresholds for any of these measurements, select it and hit **Edit**.
- Section: Measurements
 - PING Response
 - Server Response
 - Edit button
- Buttons: Previous, OK, Cancel

The measurements taken during this test are listed below.

PING Response The time it takes to perform an ICMP Echo test on the server.

Server Response The request or response time for converting a name or address into an address or name.

WINS Server (NetBIOS Name Server)

The WINS Server test verifies that the server can convert a name to an IP address.

Test setup

The first setup screen allows you to type the IP address of the WINS server under test and to type the name that will be sent to the WINS server in the request.

The last setup screen provides a list of the measurements performed during the test. Any of the thresholds used to rate the performance of each of these measurements can be viewed and modified by selecting it from this list and pressing **Edit**.

The image displays two sequential screenshots of the 'WINS Server Setup' dialog box.

Left Screenshot (Initial Setup): The dialog has a title bar 'WINS Server Setup'. Below the title bar is a message: 'Enter the address of the WINS server'. There is a 'Server' label and a text input field containing '0.0.0.0'. Below this is an optional field: '(Optional) Enter the name which will be looked up by the server.' with a 'Name to Look Up' label and an empty text input field. At the bottom are three buttons: 'Previous' (disabled), 'Next' (active), and 'Cancel'.

Right Screenshot (Final Setup): The dialog has the same title bar. The message now says: 'The server rating is calculated from the following measurements.' Below this is a note: 'To view or change the performance rating thresholds for any of these measurements, select it and hit Edit.' There is a 'Measurements' section with a list box containing 'PING Response' and 'Server Response'. Below the list box is an 'Edit' button with a pencil icon. At the bottom are four buttons: 'Previous' (disabled), 'Next' (disabled), 'Cancel' (disabled), and 'OK' (active, with a green checkmark).

The measurements taken during this test are listed below.

PING Response The time it takes to perform an ICMP Echo test on the server.

Server Response The request or response time for converting a name into an address.

DHCP Server

The DHCP Server test verifies that the DHCP server responds to a request for an IP address and other optional items. If any optional information is requested, the server response will be checked for all of the requested information.

Test setup

The first test setup screen allows you to type the IP address of the DHCP Server under test. All DHCP responses received during this test are compared against this address to verify that responses are being received from this server. The next setup screen allows you to specify which optional items should be requested from the DHCP Server. The last setup screen provides a list of the measurements performed during this test.

Any of the thresholds used to rate the performance of each of these measurements can be viewed and modified by selecting it from this list and pressing **Edit**.

The figure shows three sequential screenshots of the DHCP Server Setup dialog box:

- First Screenshot:** The title is "DHCP Server Setup". It contains the instruction "Enter the address of the DHCP server". Below this is a text box labeled "Server" containing the IP address "141.183.48.1". At the bottom are buttons for "Previous", "Next", and "Cancel".
- Second Screenshot:** The title is "DHCP Server Setup". It contains the instruction "Select the parameters which should be requested from the server." Below this is a list of optional parameters, each with a checkbox:
 - ☐ Subnet Mask
 - ☐ Default Gateway
 - ☐ DNS Domain
 - ☐ DNS Server
 - ☐ WINS Server
 - ☐ NetBIOS Node Type
 - ☐ NetBIOS Scope
 - ☐ SMTP Server
 - ☐ POP3 Server
 - ☐ Web Server
 At the bottom are buttons for "Previous", "Next", and "Cancel".
- Third Screenshot:** The title is "DHCP Server Setup". It contains the instruction "The server rating is calculated from the following measurements." Below this is a section titled "Measurements" which lists:
 - PING Response
 - Server Response
 Below the list is an "Edit" button. At the bottom are buttons for "Previous", "Next", "Cancel", and "OK".

The measurements taken during this test are listed below.

PING Response The time it takes to perform an ICMP Echo test on the server.

Server Response The total time to negotiate for an IP address from the DHCP Server.

Examples of modifying the measurement rates and time are shown below.

DHCP Server Setup

PING Response
If Less Than Seconds

Rating	Seconds
5	0.250
4	0.500
3	1.000
2	3.000
1	10.000

Restore Defaults

Apply to:

☒ This server

☐ All servers of this type

OK Cancel

Previous OK Cancel

DHCP Server Setup

Server Response
If Less Than Seconds

Rating	Seconds
5	0.250
4	0.500
3	1.000
2	3.000
1	10.000

Restore Defaults

Apply to:

☒ This server

☐ All servers of this type

OK Cancel

Previous OK Cancel

Primary Domain Controller

This function test the Primary Domain Controller (PDC) which manages the security for its local domain.

Test setup

If the PDC under test is not detected by Active Discovery, then it can be manually added. The first setup screen allows you to type the name or address of the PDC under test. The next setup screen provides a list of the measurements performed during the test. Any of the thresholds used to rate the performance of each of these measurements can be viewed and modified by selecting it from the list and pressing **Edit**.

The image shows two screenshots of the 'Primary DC Setup' dialog box. The left screenshot is the first screen, titled 'Primary DC Setup', with a subtitle 'Enter the address of the Primary Domain Controller'. It features a 'Server' section with a text box containing '0.0.0.0' and two radio buttons labeled 'Name' and 'Address', with 'Address' selected. At the bottom are 'Previous', 'Next', and 'Cancel' buttons. The right screenshot is the second screen, also titled 'Primary DC Setup', with a subtitle 'The server rating is calculated from the following measurements.' It includes a message: 'To view or change the performance rating thresholds for any of these measurements, select it and hit Edit.' Below this is a 'Measurements' list containing 'Name Lookup' and 'PING Response'. An 'Edit' button is located below the list. At the bottom are 'Previous', 'Next', 'Cancel', and 'OK' buttons.

The measurements taken during this test are listed below.

Name Lookup The request or response time for converting a name into an address.

PING Response The time it takes to perform an ICMP Echo test on the server.

Backup Domain Controller

This function test the Backup Domain Controller (BDC) which acts as a backup for the PDC and provides fault tolerance.

Test setup

If the BDC under test is not detected by Active Discovery, then it can be manually added. The first setup screen allows you to type the name or address of the BDC under test. The next setup screen provides a list of the measurements performed during the test. Any of the thresholds used to rate the performance of each of these measurements can be viewed and modified by selecting it from the list and pressing **Edit**.

The image displays two sequential screenshots of the 'Backup DC Setup' wizard.

Left Screenshot: The title bar is 'Backup DC Setup'. Below the title bar is a text box with the prompt 'Enter the address of the Backup Domain Controller'. Below this is a 'Server' section with a text box containing '0.0.0.0'. Below the text box are two radio buttons: 'Name' (unselected) and 'Address' (selected). At the bottom are three buttons: 'Previous', 'Next', and 'Cancel'.

Right Screenshot: The title bar is 'Backup DC Setup'. Below the title bar is a text box with the prompt 'The server rating is calculated from the following measurements.' Below this is a text box with the prompt 'To view or change the performance rating thresholds for any of these measurements, select it and hit Edit.' Below this is a 'Measurements' section with a list box containing 'Name Lookup' and 'PING Response'. Below the list box is an 'Edit' button. At the bottom are four buttons: 'Previous', 'Next', 'Cancel', and 'OK'.

The measurements taken during this test are listed below.

Name Lookup The request or response time for converting a name into an address.

PING Response The time it takes to perform an ICMP Echo test on the server.

Router

This test verifies that the Router is accessible and is in working condition.

Test setup

If the Router under test is not detected by Active Discovery, then it can be manually added. The first setup screen allows you to type the name or address of the Router under test. The next setup screen provides a list of the measurements performed during the test. Any of the thresholds used to rate the performance of each of these measurements can be viewed and modified by selecting it from the list and pressing **Edit**.

The image displays two screenshots of the 'Router Setup' interface. The left screenshot shows the initial setup screen where the user enters the address of the router. It includes a text input field with '0.0.0.0' and radio buttons for 'Name' and 'Address'. The right screenshot shows the next screen, which lists the measurements performed during the test: 'Name Lookup' and 'PING Response'. There is an 'Edit' button next to the 'PING Response' measurement. Both screens have 'Previous', 'Next', and 'Cancel' buttons at the bottom.

The measurements taken during this test are listed below.

Name Lookup The request or response time for converting a name into an address.

PING Response The time it takes to perform an ICMP Echo test on the server.

SNMP Agent

This function tests the SNMP Agent which report activities of devices such as workstation, switches, and routers to the console that oversees the network.

Test setup

If the SNMP Agent under test is not detected by Active Discovery, then it can be manually added. The first setup screen allows you to type the name or address of the SNMP Agent under test. The next setup screen provides a list of the measurements performed during the test. Any of the thresholds used to rate the performance of each of these measurements can be viewed and modified by selecting it from the list and pressing **Edit**.

The figure shows two screenshots of the 'SNMP Agent Setup' dialog box. The left screenshot shows the 'Server' field with '0.0.0.0' and the 'Address' radio button selected. The right screenshot shows the 'Measurements' list with 'Name Lookup' and 'PING Response' selected, and an 'Edit' button below them.

The measurements taken during this test are listed below.

Name Lookup The request or response time for converting a name into an address.

PING Response The time it takes to perform an ICMP Echo test on the server.

Workstation

This test verifies that the named device is accessible and measures the name lookup time and the ping response time.

Test setup

The first setup screen allows you to type the name or address of the device to be tested. The next setup screen provides a list of the measurements performed during the test. Any of the thresholds used to rate the performance of each of these measurements can be viewed and modified by selecting it from this list and pressing **Edit**.

The figure shows two screenshots of the 'Workstation Setup' dialog box. The left screenshot displays the 'Server' field with the value '0.0.0.0' and two radio buttons: 'Name' and 'Address'. The 'Address' radio button is selected. The right screenshot shows the 'Measurements' section with a list containing 'Name Lookup' and 'PING Response'. Below the list is an 'Edit' button. Both screenshots have 'Previous', 'Next', and 'Cancel' buttons at the bottom.

The measurements taken during all these tests are listed below.

Name Lookup The request or response time for converting a name into an address.

PING Response The time it takes to perform an ICMP Echo test on the device.

TCP Test

This function test the Transmission Control Protocol (TCP) of a certain port on the server.

Test setup

The first setup screen allows you to type the name or address of the device under test. The TCP Port number to be tested needs to be entered as well.

The next setup screen provides a list of the measurements performed during the test. Any of the thresholds used to rate the performance of each of these measurements can be viewed and modified by selecting it from this list and pressing **Edit**.

The image displays two screenshots of the TCP Setup dialog boxes. The left screenshot shows the 'Enter the address of the Server' screen. It has a title bar 'TCP Setup' and a server icon. Below the icon is a text box 'Enter the address of the Server'. There is a 'Server' section with a text box containing '0.0.0.0' and radio buttons for 'Name' and 'Address'. Below this is a text box 'Enter the TCP port number. For example: FTP Control: 21, Telnet: 23, HTTP (web): 80'. There is a 'TCP Port' section with a text box containing '0'. At the bottom are 'Previous', 'Next', and 'Cancel' buttons. The right screenshot shows the 'Measurements' screen. It has a title bar 'TCP Setup' and a server icon. Below the icon is a text box 'The server rating is calculated from the following measurements.' and another text box 'To view or change the performance rating thresholds for any of these measurements, select it and hit Edit.' Below this is a 'Measurements' section with a list of measurements: 'Name Lookup', 'PING Response', and 'Server Response'. There is an 'Edit' button with a server icon. At the bottom are 'Previous', 'Next', 'Cancel', and 'OK' buttons.

The measurements taken during all these tests are listed below.

Name Lookup The request or response time for converting a name into an address.

PING Response The time it takes to perform an ICMP Echo test on the device.

Server Response The total time for negotiating for an IP address from the DHCP Server

Running Autotest

Once all the necessary editing, deleting and adding is done, you can run the test by simply pressing **Start Test** on the Network Autotest Setup screen. The WireScope Pro will then test each listed server and list out the rating level of each server or display a red 'X' if the server is not working. The five level rating scale is listed below.

- 5 – Excellent
- 4 – Good
- 3 – Fair
- 2 – Poor
- 1 – Bad

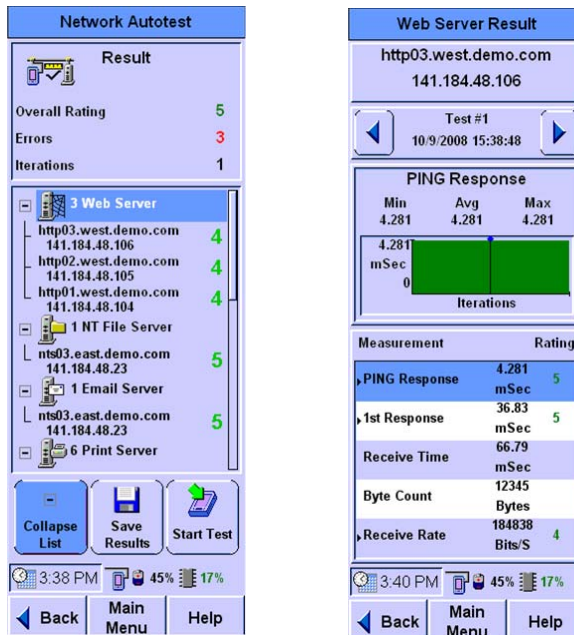
The rating threshold values can be viewed or modified from the **Edit** menu in the measurement setup screen.



Autotest Results

While the test is running, the overall status of each server test is displayed. As each test completes, it is given a performance metric. When all of the tests are completed, the overall performance metric is calculated and presented. Details of each test result can be viewed. For example, a web server test may require a DNS lookup, a PING response, a

first response, and a page read operation. The status and time for each of these operations is presented in a detailed view.



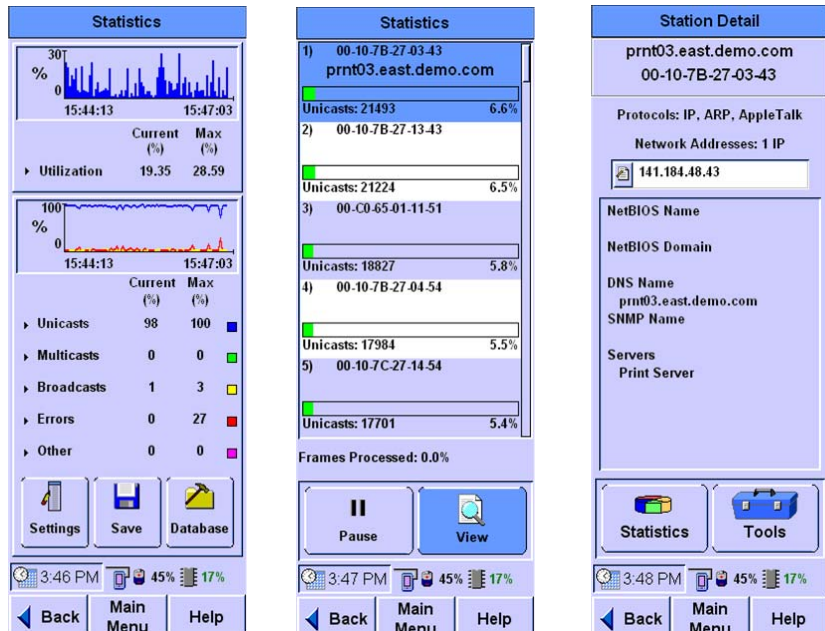
The Autotest may be left running in a loop with a programmable delay between each iteration of the automated test sequence. This feature may be used to find problems that may only occur at certain times of the day. In this case, the response time for each test are recorded and the current, average, minimum, and maximum response time for each test are displayed after the test. When the automated test sequence finishes, the response time for any test can be plotted.

Statistics

The first view of the statistics provides the overall network health. The operator can drill down into the statistics to get more detailed information. Some of the more detailed information is gathered by software that may not have enough bandwidth to process 100% of the frames. So, a value is presented for the percentage of frames processed in these cases. Refer to “[Viewing Statistics](#)” on page 160 on how to view the statistics.

Overall Statistics

The current and maximum values of each statistic are displayed. Graphs of each statistic are also displayed in strip charts. The interval at which the graph is updated is programmable so that the graph can cover the last 5 minutes in detail and up to the last 24 hours with less details. The operator can obtain more information about any of these statistics by selecting it.



Utilization The Utilization values are displayed as percentage of total network bandwidth. Press this statistic to display a list of Top Transmitters.

Unicasts The number of unicast frames or the percentage of the utilization used up by unicast frames. Press this statistic to display a list of Top Unicast Transmitters.

Multicasts The number of multicast frames or the percentage of the utilization used up by multicast frames. Press this statistic to display a list of Top Multicast Transmitters. Press any of the Top Transmitters to display the Station Detail screen for that station.

Broadcasts The number of broadcast frames or the percentage of the utilization used up by broadcast frames. Press this statistic to display a list of Top Broadcast Transmitters. Press any of the Top Transmitters to display the Station Detail screen for that station.

Errors The number of frames with errors or the percentage of the utilization used up by frames with errors. Press this statistic to display the Error Mix. Press on one of the Error Mix to display a list of the Top Transmitter of that error type. Press any of the Top Transmitters to display the Station Detail screen for that station.

Others The collisions, unprocessed frames, and flow control frames. Press this statistic to display the number collisions, unprocessed frames, and flow control frames or the percentage of the utilization used by these three parameters.

Top Transmitters

A list of stations, sorted by a specific statistic is displayed. The statistic used for sorting is set when the list is created. For instance, if you enter the Top Transmitters by pressing the Jabbers statistic in the Statistics screen, the Top Jabber Transmitters will be displayed. Press any of the Top Transmitters to display the Station Detail screen for that station.

Error Mix

Long Frames This refers to any frame over 1522 bytes with a valid CRC and alignment. Press this statistic to display the Top Long Frame Transmitters.

Short Frames This refers to any frame under 64 bytes long with a valid CRC and alignment. Press this statistic to display the Top Short Frame Transmitters.

Jabbers This refers to any frame over 1522 bytes with a CRC or alignment error. Press this statistic to display the Top Jabber Transmitters.

CRC/Alignment Errors This refers to any valid sized frame with a CRC or alignment error. Press this statistic to display the Top Transmitters with an invalid CRC or alignment.

Protocol Mix

Selecting the protocol option will display the Top Transmitters of that protocol. Press any of the Top Transmitters to display the Station Detail screen for that station. The Top Transmitters are listed below.

- IP
- IPX
- ARP
- RARP
- Banyan
- DECnet
- SNA
- AppleTalk
- NetBIOS
- Spanning Tree
- Other

Saving and Retrieving Statistics Data

The Statistics Data can be saved on the main screen of the statistics function. You can view a list of statistics data saved by pressing **Database**.

To retrieve the saved data tables, you can either access the USB flash drive using a USB flash drive reader or via the WireScope Pro configured as a web server. Refer to "[Remote Control](#)" on page 217.

Network Tools

Ping

The Ping tool is used to verify access to devices on a network. The current, minimum, maximum, and average response times are displayed along with a count for the number of times there was no response.

This tool may run in IP or IPX mode. The IP Ping sends ICMP Echo frames to the target device. The IPX Ping can use either Diagnostic Responder or Ping frames.

The operator may alter the following parameters.

Target device address The target device may be selected from a list or entered as a name or address. If an IP device is specified by a name, DNS and WINS are used to translate the name into an IP address. Names in IPX mode are translated using the SAP protocol.

Frame size The length of the frame, in bytes, including the FCS.

Number of frames The number of frames to send. If Continuous is selected, the WireScope Pro sends frames until the tool is stopped.

Time to Live (IP only) The maximum number of routers to traverse to the target device.

Don't Fragment (IP only) The option which sets the Don't Fragment flag in the IP frame. This flag tells routers along the path that this frame should not be divided into smaller fragments.

TraceRoute

NOTE

The times shown in TraceRoute are cumulative and not segmented into segment times.

The TraceRoute tool is used to determine the route taken to a slave device. A list of routers found along the path to the slave device is displayed along with a count of the number

of hops to each router and the response time for each router.

The operator may alter the following parameters.

Slave device IP address The slave device may be selected from a list or entered as a name or IP address. If the device is specified by a name, DNS and WINS are used to translate the name into an IP address.

Maximum hop count The maximum number of routers to traverse while tracing out the route.

SNMP Queries

This tool uses SNMP to retrieve the following information from the device. This information is usually provided by IT services.

- MIB II System Group
 - System description
 - Up time
 - Contact
 - System name
 - Location

Locate Switch Port

This tool is used to determine the switch port of a connected device. SNMP is used to look for switches in the network. Each of these switches are probed to see if the device shows up in the switch tables. The MAC address are displayed for all of the switch ports which are mapped to the devices. There is no order to the list for multiple results, so you cannot interpret the results as a direct path.

Traffic Generator

A hardware-based traffic generation tool is provided to enable network testing under heavily loaded conditions. Hardware-based timers control the transmission of user specified frames into the network.

The operator may change any of the following properties of the traffic being generated.

Frame Length The number of bytes in the frame, including the FCS. This number ranges from 64 to 1518 unless long frame is specified. If the Long Frame check box is selected, the frame size ranges from 1519 to 16000.

Frame Rate The rate at which frames are transmitted by the WireScope Pro. Changing the Frame Rate causes the Utilization to be recalculated.

Utilization The percentage of the Ethernet bandwidth which the WireScope Pro should fill up. This value ranges from 0, which causes no frames to be transmitted, to 100, which causes the WireScope Pro to completely load the network connection. Changing the Utilization causes the Frame Rate to be recalculated.

Frames or Continuous The number of frames the WireScope Pro should generate when the **Start** button is pressed. If **Continuous** is selected, the WireScope Pro begin generating frames when the **Start** button is pressed and does not stop until the **Stop** button is pressed or until you exit the Traffic Generator tool.

Errors The generated frames with errors. The error types include CRC Error or Long Frame.

Frame Type The list of frame type which includes 802.3/802.2, Ethernet/IP, 802.2/IP, SNAP/IP, EthernetII/IPX, 802.3/IPX, 802.2/IPX, and SNAP/IPX.

MAC Source The choices for MAC source which include this WireScope Pro MAC or simulate multiple (16, 128 or 256) stations. The simulated MACs uses the value of 00-0C-65-01-00-XX where XX increments from 01 (hexadecimal) in steps of 16, 2, or 1, respectively.

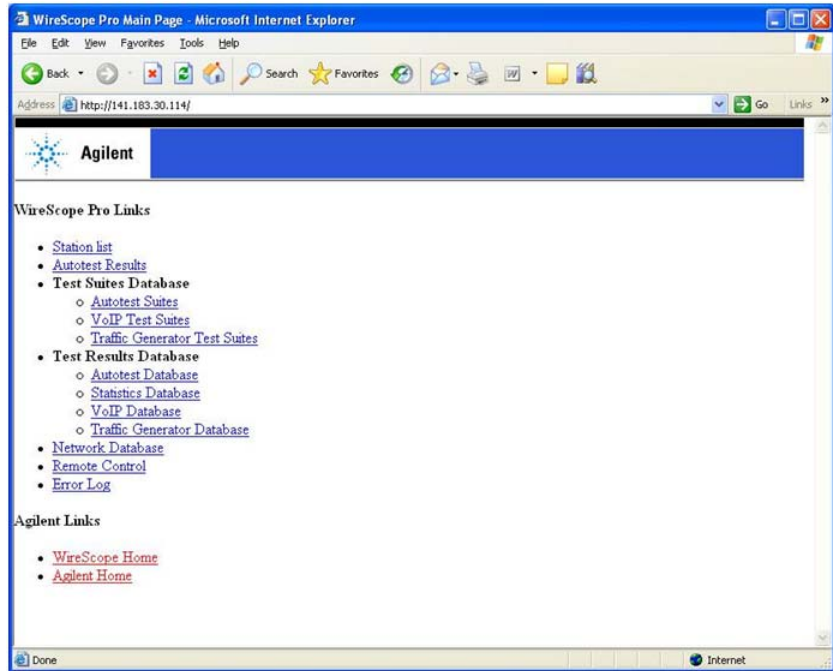
MAC Destination The MAC address to send a frame to a station on the local LAN. If the destination address is set to FF-FF-FF-FF-FF-FF, the frame will be received by all devices on the LAN. To send a frame across a router, the router MAC address should be used.

Data Pattern The choices for Data Pattern which include 0x00 00, 0xFF FF, 0xAA 55, 0x00 FF, and 0x11 11.

Payload Pattern The list of predefined patterns to be repeated in the traffic payload.

Remote Control

A web server is implemented in the WireScope Pro to provide a means to control and monitor the WireScope Pro using a web browser.



The WireScope Pro home page provides links to the following WireScope Pro functions.

Station List Links to the current list of stations. This is the same list that is accessible on the WireScope Pro through the **Network Database** button on the **Tools** menu.

Autotest Results Links to the current Autotest results.

Test Suites Links to a list of test configuration files for various types of tests.

Test Database Links to a list of stored test results from the following test tools.

- Autotest Database - links to a list of stored Network Autotest results
- Statistics Database - links to a list of saved statistics data
- VoIP Database - links to a list of VoIP test results

These results may be viewed directly as web pages or the result file may be uploaded to a PC. The result file contains all of the results for the test in Comma Separated Value (CSV) format for use in spreadsheet programs.

Java™ generated reports are available for VoIP Test.

A user defined logo can now be included into Java Test Reports, using the USB flash drive.

To display a logo in Java report, save the image file of the logo as a *.gif* file in the size of 250 pixels wide by 40 pixels high and with the name *customer.gif*, in the directory “<drive>\WSDATA1.0\logo\” on the USB flash drive.

The report will automatically scale the logo if it is larger. Providing an image with the recommended resolution will give a better effect.

By default, when you press **Save**, the WireScope Pro creates a logo directory and “*customer.gif*” logo file with the logo of Agilent Technologies.

NOTE

If the WireScope Pro is currently running one of the tools (Autotest, IP/MAC Loopback, or Statistics) in any of the WireScope Pro screens, its respective stored data or test results in the WireScope Pro cannot be displayed. For example, if you are running Statistics on the WireScope Pro, you cannot view the Statistics database from the remote screen.

Network Database Links to a list of stored station lists. These station lists may be uploaded to the PC. The station lists are stored in CSV format for use in spreadsheet or database programs.

Remote Control Links to a page which shows an image of the WireScope Pro display. Pressing on this image has the effect of pressing the WireScope Pro display. The display is updated when you click on the screen or updated every 10 seconds if no screen operations are performed.

Error Log Links to a list of errors found on the network.

Memory Requirements

The WireScope Pro supports the use of a USB flash drive to store test results and network station lists. The amount of memory that each Autotest result takes up depends on the number of test and the number of iterations that you set before starting the test. The results require about 600 bytes per test plus 150 bytes per iteration for each test. There is a limit of 100 tests and a limit of 100 iterations. Therefore, the maximum results size is about 1.5 MB.

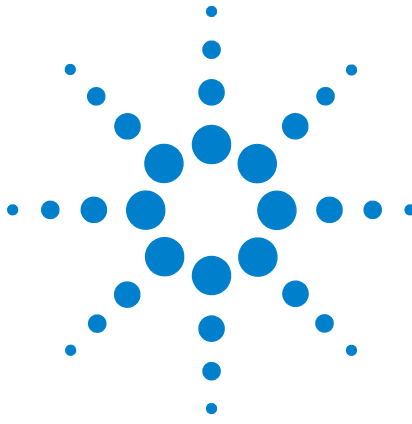
The Autotest suite storage requirement is only 350 bytes per test, so the maximum size is about 35 KB.

The station list storage requirement is 250 bytes per station with a maximum of about 1500 stations, so the maximum size is 375 KB.

The following table lists the approximate record storage capacities when configured for a 32 MB USB flash drive and for comparison, a 1 GB USB flash drive. All sizes of the USB flash drive will work as the WireScope Pro Network Autotest results storage.

Table 12-1 Saved test results capacities, assuming 32 MB drive is used for test suites and station lists

Number of Autotest	Iteration	Size of record	Capacity (Number of records)	
			32 MB USB flash drive	1 GB USB flash drive
10	1	6 KB	5,160	165,120
10	100	156 KB	198	6,330
100	1	60 KB	510	16,320
100	100	1.56 MB	19	600



13 Specifications

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General Specifications [272](#)

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nm/1550 nm) Fiber SmartProbe [273](#)

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This chapter describes the WireScope Pro and Fiber SmartProbe specifications.



General Specifications

Test Parameters

- Supported frequency range: 1 MHz to 1 GHz.
- Complies with TIA Level IV Accuracy.

Power Supply

- Removable or rechargeable lithium-ion batteries, provides 5 to 8 hours of continuous operation.
- AC Power adapter: 100 ~ 240 VAC, plugs directly into the battery. Can be recharged separately from the instrument.

Memory

- 64 MB internal flash memory.
- 1 GB USB flash drive included which allows for flexible test record storage.

Connectivity

- SmartProbe Interface Connector.
- Auxiliary 10/100 Mbps Ethernet port, RJ-45.
- Universal Serial Bus (USB1.1) port.
- Talkset interface: 3.5 mm stereo jack.

Software Upgrade

Semi-automated software upgrade from Agilent FTP site, using USB flash drive, or using USB connection to PC.

Dimensions

- Size: 232 mm × 126 mm × 86.7 mm (9.13" × 4.96" × 3.41")
- Weight: approximately 1.36 kg (approximately 3.0 lbs.)

Environmental Conditions

- Operating Temperature: 0 °C to +40 °C
- Storage Temperature: -10 °C to +55 °C
- Relative Humidity: 10% to 80%

- Operating Altitude: up to 3000 meters
- Pollution Degree: 2

N2644A Series Category 6A Universal Channel and Link SmartProbe, Category 7 Channel and Link SmartProbe

General Specifications

- Size: 79.5 mm × 60.5 mm × 44 mm (3.1" × 2.4" × 1.7"), excluding cable
- Operating Temperature: 0 °C to +40 °C
- Storage Temperature: -40 °C to +55 °C

Table 13-1 Specifications

Measurement Parameter	Range	Resolution	Accuracy
Length	0 to 100 m at NVP > 0.6	0.5 m at NVP = 0.7	± 1 m
Propagation Delay and Skew	0 to 1100 ns	±1 ns	± 6 ns
Insertion Loss	60 dB	0.1 dB	[1]
Near End Crosstalk (NEXT)	90 dB	0.1 dB	[1]
Attenuation to Crosstalk Ratio Far End (ACRF)	90 dB	0.1 dB	[1]
Resistance	5 to 1000 Ω	1 Ω	± 5%
Network Specifications			
Cabling Standards	TIA/EIA-606-A and TIA/EIA-568-B Category 3 through 7 ISO/IEC 11801, EN 50173 and Australia/New Zealand Classes C, D, E and F UTP, STP and SCTP cabling		
Ethernet	IEEE 802.3 10BASE-T, 100BASE-TX, 1000BASE-T, 10GBASE-T		
Legacy Networks	IEEE 802.5 Token Ring and IBM Type 1 TP PMD interfaces		
Supported Tests	Insertion Loss Near End Crosstalk (NEXT) in pair-to-pair and/or PowerSum format Attenuation to Crosstalk Ratio Far End (ACRF) Return Loss and Loop Resistance Wiremap Cable Length, Total Propagation Delay and Delay Skew between pairs		

[1] If not otherwise mentioned, specifications are according to TIA Level IV definition.

N2647MM Multimode (850 nm/1300 nm) and N2647SM Singlemode (1310 nm/1550 nm) Fiber SmartProbe

General Specifications

- Size: 79.5 mm × 64 mm × 44 mm (3.1" × 2.5" × 1.7")
- Connectors: 2 × SC (Transmitter, Receiver)
- Operating Temperature: 0 °C to +40 °C
- Storage Temperature: -40 °C to +55 °C

Table 13-2 Specifications

Specification	N2647MM Multimode SmartProbe	N2647SM Singlemode SmartProbe
Power Meter		
Detector Type	InGaAs	InGaAs
Calibrated Wavelengths	850 nm, 1300 nm	1310 nm, 1550 nm
Measurement Accuracy	± 0.25 dB at -20 dBm ^[1, 2]	± 0.25 dB at -20 dBm ^[1]
Power Measurement Range	0 dBm to -42 dBm	0 dBm to -42 dBm
Transmitter		
Source Type	LED	Fabry-Perot Laser
Center Wavelength	850 nm, 1300 nm (nominal)	1310 ± 30 nm, 1550 ± 30 nm,
Output Power	≥ -20.5 dBm (into 50/125 μm fiber) ≥ -19 dBm (into 62.5/125 μm fiber)	-6 dBm (into 9/125 μm fiber)
Laser Stability	n/a	± 0.1 dB (1 hour, after 5 minutes warming up)
Fiber Network Specifications		
Cabling Standards	TIA 568A, 568.3, ISO 11801	TIA 568A, 568.3, ISO 11801
Gigabit Ethernet	1000BASE-SX, 1000BASE-LX	1000BASE-LX
Legacy Networks	100BASE-F, 10BASE-FL, 10BASE-FB, Token Ring	
ATM/SONET	ATM-155 (UNI 3.1), ATM-155 SWL, ATM-622, ATM/SONET OC-3, -OC-12	ATM-622, ATM/SONET OC-3, OC-12, OC-48
FDDI/Fiber Channel	FDDI, Fiber Channel-133, -266, -531, -1062	FDDI, Fiber Channel-133, -266, -531, -1062
Propagation Delay		
Accuracy (whichever is greater)	± 2% or ± 3.6 ns	
Resolution	± 4.2 ns	
Measurement Range	0 μs to 300 μs	

13 Specifications

Table 13-2 Specifications

Specification	N2647MM Multimode SmartProbe	N2647SM Singlemode SmartProbe
Fiber Length		
Accuracy (whichever is greater)	$\pm 2\%$ or ± 0.72 m	$\pm 2\%$ or ± 0.72 m
Resolution	0.83 m at refractive index 1.4785	0.83 m at refractive index 1.4785
Distance Range	0 km to 8 km for 1.50 dB/km at 1300 nm ^[3]	0 km to 50 km for 1.50 dB/km at 1310 nm ^[4]

[1] At room temperature, 23 °C $\pm$ 3 K.

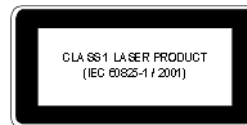
[2] With 50/125 μ m fiber.

[3] Assumes double-ended configuration with 12 dB maximum link loss. Divide by two for single-ended configurations.

[4] Assumes double-ended configuration with 25 dB maximum link loss. Divide by two for single-ended configurations.

Laser Safety (N2674SM Fiber SmartProbe)

Fabry-Perot Class 1 Laser Product in accordance with IEC 60825.1 and FDA 21 CFR 1040.10



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