optimize!
softing

2017 PRODUCT CATALOG

Certification, qualification, verification & troubleshooting of network infrastructure from copper to fiber, up to 2,500 Mhz.

IT Networks
itnetworks.softing.com

FOREWORD

Softing IT Networks, formerly known as Psiber Data, specializes in measurement equipment for qualifying, certifying and documenting the performance of cabling in IT systems.

With the rapidly growing and all-encompassing networking of people, things and services (Internet of Everything/ IoE), powerful and reliable IT networks will become the backbone of our modern world. But even today, the capabilities and success of modern companies depend heavily on the quality of their IT networks!

The failure of this communication infrastructure often leads to data losses and is almost always very costly.

This is why it is so important to prevent unplanned network outages. To make this possible and ensure a rapid response in the event of network faults, installers, system integrators and network operators need access to powerful, professional measurement equipment.

We provide testing, qualification and certification instruments for copper and fiber-optic IT cabling based on global technological standards.

Whether it is used for telecommunications, databases, mainframes or plant engineering in the field of industrial automation, the professional measurement equipment from Softing IT Networks will help you optimize the performance of your data communication through faster, more secure connections over the entire lifecycle of your network.

Our measurement equipment makes it possible to ensure the physical efficiency and high quality of communication between network components.

The competencies of Softing IT Networks are complemented by the Industrial division's expertise in networking industrial worlds and Softing Automotive's expertise in evaluating the functionality of electronic vehicle components.

Your Softing IT Networks Team

COPPER CABLE – TESTERS

Cable Tester Overview	06
CableMaster 200	08
CableMaster 400	09
CableMaster 450	10
CableMaster 600	11
CableMaster 800	13

COPPER CABLE – QUALIFIER / CERTIFIER / ADAPTER

Qualifier / Certifier Overview	16
NetXpert 1400	17
White Paper: “Ethernet Speed Certification”	19
WireXpert 500	22
WireXpert 4500	23
Patch Cord Test Adapter	26
Class F_A Adapter	27
M12 Adapter	28
Coax Adapter	29
White Paper: “40GBASE-T in Data Center Networks“	30

CONTENT

FIBER – CABLE TESTERS

WireXpert 4500	34
MPO/MTP® Adapter	36
EF Multimode Adapter	37
Singlemode Adapter	38
White Paper: „Encircled Flux“	39
FiberXpert OTDR 5000	42
FiberXpert Launch Cord	44

ETHERNET – NETWORK TESTERS

CableMaster 800	46
NetXpert 1400	48
LanExpert 80	50

COPPER CABLE TESTERS

CABLE TESTER OVERVIEW

Testers for Data-, Voice- and Video-Cabling	Cable Tracker	CableMaster 200	CableMaster 400
			
Product Description	**CT15**	**CM 200**	**CM 400**
Part-No.	226007	226504	226501
Application	■	■	■
Cable Test			
Wiremap (i.e. Split Pairs, Shorts, Opens, Reversals, Miswires)		■	■
Length Measurement			
Voltage Warning		■	■
PoE Load Test			
Hub Flash			
Mapper ID (allocation of ports/outlets)			■
Mapper-ID Set RJ45			5
Mapper-ID Set COAX			5
Wiremap Remote units			
Toning		■	■
Cable Detection and Port Mapping	■	CT15 (optional)	CT15 (optional)
Saving Results/PC- Reporting Software			
Network Test			
Ethernet and Bandwidth Detection			
Link/Ping Test			
Discovery (LLDP, CDP, NDP)			
VLAN Detection			
IPv6 Support			
Connectors			
RJ45/RJ 11-12/Coax (Type F)		■ /-/-	■ / ■ / ■
Crocodile Clip			■
USB Jack (data output)			

CableMaster 450	CableMaster 600	CableMaster 650	CableMaster 800	CableMaster 850
				
CM 450	**CM 600**	**CM 650**	**CM 800**	**CM 850**
226502	226515	226516	226520	226521
■	■	■	■ ■	■ ■
■	■	■	■	■
■	■ (TDR)	■ (TDR)	■ (TDR)	■ (TDR)
■	■	■	■	■
	■	■	■	■
	■	■	■	■
■	■	■	■	■
5				
5		20		20
	1	8	1	8
■	■	■	■	■
CT15 (optional)	CT15 (optional)	■	CT15 (optional)	■
	■	■	■	■
	■	■	■	■
			■	■
			■	■
			■	■
			■	■
■ / ■ / ■	■ / - / ■	■ / - / ■	■ / - / ■	■ / - / ■
■	■	■	■	■
	■	■	■	■

■ Copper ■ Ethernet

CableMaster 200

A Compact and Economical Cable Tester

The CableMaster 200 is an economical, compact cable tester for Ethernet cabling and is particularly well-suited for network technicians and electricians. CableMaster 200 tests Ethernet cabling for open, shorts, split pairs and miswires - simply by pressing a button. A unique feature in its class is a built-in tone generation for convenient cable tracing and port identification.

FEATURES

- Display cable faults if cable wiring does not conform to TIA568 specifications
- Detachable remote unit for testing long cable runs, tests cable lengths of up to 304 m
- Tone generator can be used for cable tracing with the appropriate tone tracer probe (optional)
- Easy-to-read LCD screen that clearly displays all test results, including PASS or FAIL indication
- Easy to operate
- Compact size

The CableMaster 200 impresses with its convenient handling and its large display, which directly displays easy-to-read messages.

The CableMaster 200 tests Ethernet cabling for open, shorts, split pairs and miswires – simply by pressing a button.

Order Number:
226504

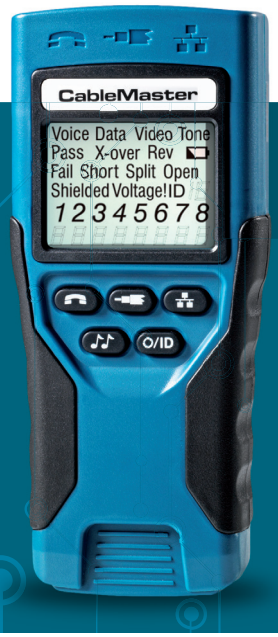
CableMaster 200 (RJ45)

With RJ45 and integrated remote unit

Checks twisted pair cables for shorts, crossed wires and split pairs

Built-in tone generator

Optional Accessories: CT15



CableMaster 400

Affordable Cable Tester for your Toolbox

The CableMaster 400 is the all-in-one tool for localizing cable faults in data cables, telephone cables and coax cables. The large LCD shows multiple fault situations and gives a “Pass” or “Fail” indication where necessary.

CableMaster 400 is the solution for testing the complex wiring that exists in today‘s information and entertainment systems. A built-in tone generator is useful for tracing faults and finding the termination ends of installed cable of all types. Using the built-in remote and wire mapper sets, one user can identify up to 19 remote and wire mapper sets.

FEATURES

- Tests voice (6 wire), data (8 wire) and video (coax)
- Tests and indicates pins with shorts, opens, reversals, miswires and split pairs
- Displays “Pass” icon for correctly wired 6-pin telephone plus “Rev” for reversed-pinned
- Easy-to-read, extra large 7-segment LCD screen with large icons
- Tone generator with selectable tone cadence and selectable pins carrying tone. Traces multiple cables, runs with four different tones to quickly distinguish between respective outlets
- RJ master remote stores in bottom of case
- Maps 19 locations at a time
- Low power consumption for long battery life
- Auto power-off

The CableMaster 400 is the solution for testing the complex wiring that exists in today’s information and entertainment systems. Rugged and built for years of use, the CableMaster 400 is the perfect solution for accurate and easy field testing results.

Order Number:
226501

CableMaster 400

Cable tester with RJ45, RJ11, Coax (F-Type) connectors

Integrated remote unit, built-in tone generator

Tests all cable connections, wire map showing shorts, cuts, cross over and split pairs

Includes RJ45 to alligator, F-adapter, 5 ea. network and coax remotes

Optional Accessories: CT15

CableMaster 450

Affordable Cable Tester and Fault Locator

The CableMaster 450 is the all-in-one tool for localizing cable faults in data cables, telephone cables and coax cables.

The length measurement function allows easy measurement of a cable run or distance to fault. A built-in tone generator is useful for tracing faults and finding the termination ends of installed cable of all types. Using the attached remote and wire mapper sets, one user can identify up to 19 remote and wire mapper sets.

FEATURES

- Tests Voice (6 wire), Data (8 wire) and Video (coax)
- Tests and indicates pins with shorts, opens, reversals, miswires and split pairs
- Displays “Pass” icon for correctly wired 6-pin telephone plus “Rev” for reversed-pinned
- Measures length or distance to fault (open short)
- Easy-to-read, extra large 7-segments LCD screen with large icons
- Tone generator with selectable tone cadence and selectable pins carrying tone
- Traces multiple cables, runs with four unique tones to quickly distinguish between respective outlets
- RJ master remote stores in bottom of case
- Map 19 locations at one time
- Low power consumption for long battery life
- Auto power-off

The CableMaster 450 is the solution for testing the complex wire environment that exists in today‘s information and entertainment systems. The length measurement function allows easy measurement of a cable run or distance to fault. A built-in tone generator is useful for tracing faults and finding the termination ends of installed cable of all types. Using the attached remote and wiremapper sets, one user can identify up to 19 remote and wire mapper sets. Rugged and built for durability, the CableMaster 450 is the perfect solution for accurate and easy field testing results.

Order Number:
226502

CableMaster 450

Cable tester with RJ45, RJ11, Coax (F-Type) connectors

Integrated remote unit, length measurement, built-in tone generator

Tests all cable connections with wire map showing shorts, cuts, cross over and split pairs

Includes RJ45 to alligator, F-adapter, 5 ea. network and coax remotes

Optional Accessories: CT15

CableMaster 600

Professional Cable Tester for Data, Voice and Video

The CableMaster 600 is a cable tester for network, telephone, coax cabling as well as determining the cable length and distance to the fault. Equipped with a RJ45 jack for network cables and a F-type connector for coax cables. CableMaster 600 verifies the wire map, determines the cable length and distance to fault. The results can be saved and documented using the PC-based reporting software. CableMaster 600 offers many functions for troubleshooting such as cable tracing, link detection up to 1 Gbit/s, PoE tests and port/outlet identification with ID remotes. CableMaster 600 is perfectly suited for professional installers and network operators who are challenged with testing both network RJ45 and coax cabling, verifying the correct wiring, determining cable lengths and documenting all this in test reports.

FEATURES

- Tests network and coaxial cables (RJ45 jack and F-type connector)
- Displays wire map in graphical format for rapid troubleshooting
- Determines cable length and distance to the cable fault performing a full TDR measurement
- High resolution color display for excellent readability in any environment
- Generation of test reports and documentation with PC-based reporting software
- Extensive test and fault finding capabilities such as: Cable tracing/port identification using a tone probe, PoE detection and testing, Link test up to 1 Gbit/s, outlet/port identification with ID remotes

The CableMaster 600 features an integrated tone generator to send a modulated audible signal into the cable. The tone can be detected by an optional tone probe used for cable tracing (unscreened unlabeled cables) and outlet/port identification. Cable ID remotes enable the user to identify which outlet is connected to the appropriate port in a patch panel.

Cabling Tests

The CableMaster 600 features extensive test capabilities for RJ45 network, telephone and coaxial cable testing. Consisting of a main unit and a network/tel testing and ID remote, the CableMaster 600 is the ideal tool to test RJ45 cabling displaying the results in a wire map format. It verifies continuity, tests for reversals, miswires, split pairs, shorts, and opens. The cable length and the distance to the open will be determined using the integrated TDR (Time Domain Reflectometer).

Network Testing

The CableMaster 600 enables a rapid identification of network ports/outlets while displaying the link capability and the current link status. In addition, PoE (Power over Ethernet) presence is detected and displayed and can be tested with a load test compliant with IEEE 802.3 af/at.

Save and Report

Cable test results can be saved in the main unit and exported to the PC-based eXport reporting software via the included USB cable. eXport is the central reporting software for creating professional test reports that also supports other Softing IT Networks measurement and test instruments.

Order Number: 226515	**CableMaster 600** Professional cable tester incl. 1 remote Unit 6 x AA batteries 2 x RJ45 cable Micro USB cable Pouch
Order Number: 226516	**CableMaster 600** Cable tester, incl. 1 CableTracker CT15 tone probe 8 network/tel testing and ID remotes Cable assembly RJ45 to alligator clips No. 1-20 coax ID remotes 6 x AA batteries 9 x RJ45 cables Micro USB cable, pouch

CableMaster 800

Cable Tester and Network Diagnostic Tool

CableMaster 800 is a professional cable tester equipped with a RJ45 jack for network cables and an F-type connector for coaxial cables. The CableMaster 800 verifies the wire map, determines the cable length and distance to the fault. The results can be saved and documented using the PC-based reporting software. In addition, CableMaster 800 offers many network diagnostics features for troubleshooting such as cable tracing, link detection up to 1 Gbit/s, ping, network discovery, PoE tests and much more. CableMaster 800 is perfectly suited for professional installers and network operators who are challenged with testing and troubleshooting both network (RJ45) and coaxial cabling inactive networks.

FEATURES

- Tests network and coaxial cables (RJ45 jack and F-type connector)
- Displays wire map in graphical format for rapid troubleshooting
- Determines cable length and distance to the cable fault performing a full TDR measurement
- Cable/port identification using the cable/port ID remotes
- PoE detection and load test
- Link test up to 1 Gbit/s to identify link capability and current link status
- Pinging of individual or lists of IPv4 and IPv6 addresses as well as any URL on internet
- Network Discovery creates lists of broadcasted devices
- CDP/LLDP/NDP and VLAN discovery
- High resolution color display for excellent readability in any environment
- Generation of test reports and documentation with PC-based reporting software

The CableMaster 800 professional cable tester is highly versatile - whether during installation, to verify which outlet is connected to the appropriate port in the patch panel, after installation, for quality testing and documentation of the cabling, or for in-service troubleshooting of the network.

The test results are displayed on the full-color graphic screen in a clear and easy to understand way. Test results can be saved in the device and be exported to a PC for evaluation or documentation with the free PC reporting software.

Cable Testing

CableMaster 800 features extensive test capabilities for RJ45 network, telephone and coaxial cabling. Consisting of a main unit and a test/ID remote, the CableMaster 800 is the perfect tool to test RJ45 cabling displaying the results in a wire map format on a full-color graphical display. It verifies continuity, tests for reversals, miswires, split pairs, shorts, and opens. The cable length and the distance to the open will be determined using the integrated TDR (Time Domain Reflectometer).

CableMaster 800 features an integrated tone generator to send a modulated audible signal into the cable which is detected by an optional tone probe used for cable tracing (unscreened unlabelled cables) and outlet/port identification. Numbered cable ID remotes allow the user to easily identify which outlet is connected to the appropriate patch panel port.

Order Number:
226520

CableMaster 800

Professional Cable and Network Tester

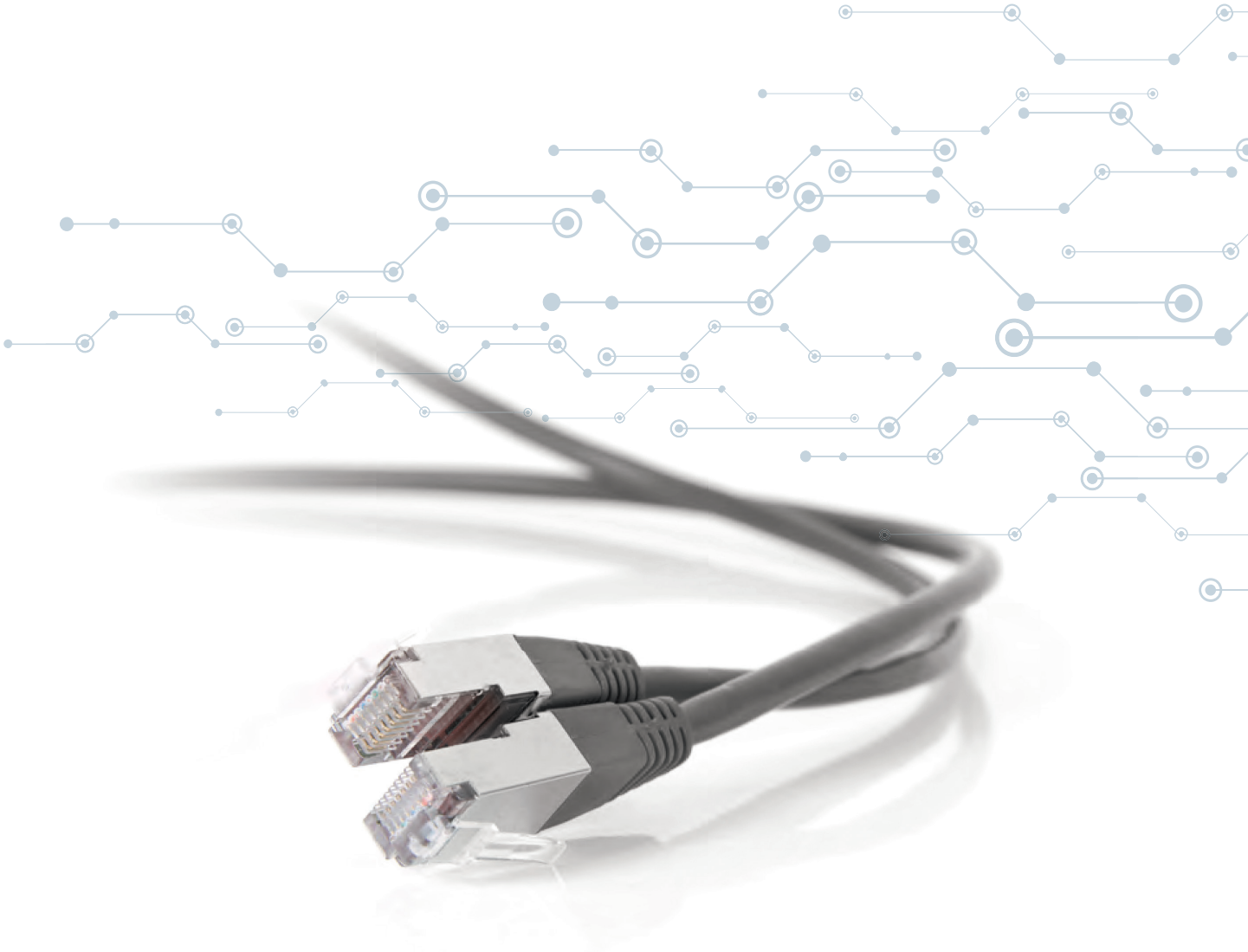
Tests all cable connections, wire map showing shorts, cuts
Tests RJ45 data, telephone and coax cabling
Active network tester
Checks the active network connection, speed and PoE
Storage and documentation function (PC software)
Easy-to-read color display and integrated tone generator
Includes:
1 x CableMaster 800 basic unit
1 x Remote unit
2 x RJ45 cable
6 x AA Batteries, micro USB cable, pouch
Optional Accessories:
CT15 Tone-Probe must be ordered separately as PS_CT15

Order Number:
226521

CableMaster 850

Professional Cable and Network Tester with useful accessories

Functions like PD_CM800 (order no. 226520)
Includes:
1 x CableMaster 800 basic unit
1 x Cable Tracker Tone Probe CT15
8 x Remote units
1 x RJ45 cable/Alligator clip
20 x coax remotes with labeling (1-20)
9 x RJ45 Cable
6 x AA Batteries, micro USB cable, pouch



COPPER CABLE

QUALIFIER
CERTIFIER
ADAPTER

QUALIFIER / CERTIFIER OVERVIEW

	Qualifier	Certifier	
Qualifier or Certifier? Which test equipment is the right one?	NetXpert 1400 	WireXpert 500 	WireXpert 4500 
Order No.	226533	228071	228070
Application	■	■	■ ■
Typical Applications			
Home Cabling	■	■	■
Office Cabling	■	■	■
Industrial Cabling	■	■	■
Data Center		■	■
Measurements against Generic Standards			
ANSI/TIA 568 (US)		■	■
ISO/IEC 11801 (International)		■	■
EN 50173 (Europe)		■	■
Testing against Application Standards			
IEEE 802.3 Fast Ethernet 100 Mbit/s Clause 25	■		
IEEE 802.3 Gigabit Ethernet 1,000 Mbit/s Clause 40	■		
IEEE 802.3af PoE 12.95W	■		
IEEE 802.3at PoE+ 21.9W	■		
Passive Test and Measurement Parameters			
Wire Map	■	■	■
Length	■	■	■
Tone Generator	■		
RF Measurements (NEXT; Insertion Loss, Return Loss, ...)		■	■
Signal-to-Noise-Ratio	■		
Delay Skew	■	■	■
Test frequency		until 500 MHz	until 2.500 MHz
Active Test Parameters			
Ethernet Capability	■		
DHCP test	■		
Ping (single and list)	■		
Discovery function (LLDP/CDP/NDP)	■		
Port LED Activation	■		
VLAN Recognition	■		
Trace Route	■		
Bit-Error-Rate Test	■		
Reporting			
Report generation already in tester	■		
PC Reporting software		■	■

■ Copper ■ Fiber

NetXpert 1400

Gigabit LAN Qualifier with Network Diagnostic Tool

Easy Cable Testing and Ethernet Speed Certification

The NetXpert 1400 provides a complete solution for cable qualification and trouble-shooting of active networks, enabling rapid, simple verification and documentation of the capability of cabling links to support Gigabit Ethernet operation compliant with the IEEE 802.3ab standard. A “Pass/Fail” result indicates whether the existing cabling can support data rates up to 1 Gbit/s.

FEATURES

- Tests network and coaxial cabling
- Qualifies data cabling for IEEE 802.3 compliance at transmission rates of up to 1 Gbit/s (BERT)
- Determines Signal-to-Noise ratio (SNR)
- Measures delay skew
- Performs full TDR for pair length and distance to fault measurements
- Full-color wire map shows opens, shorts, miswires, and split pairs
- Results can be saved in the tester, and standards-based measurement
- Reports showing “Pass/Fail” results can be generated

The NetXpert 1400 is a cost-effective alternative for installers and operators of network cabling systems where qualifying cabling bandwidth up to Gigabit Ethernet is sufficient. The NetXpert 1400 allows users to verify whether cabling links will support a maximum data rate of up to 1 Gbit/s regardless of the category of the cables, patch panels, or outlets installed.

Performing standards-based tests with real data as per IEEE 802.3ab and Bit Error Rate Test (BERT), the NetXpert 1400 tests the error free data transmission at 100 MBit/s or 1 Gbit/s. In addition, parameters affecting signal quality can be displayed including Signal-to-Noise ratio (SNR) and delay skew. Delay skew in a 4-pair cable indicates the signal time delay between pairs and can impact Gigabit Ethernet performance.

Continuity test results of all 8 wires and the shielding are displayed in full-color wire map format while showing cable faults such as opens, shorts, miswires, and split pairs in a clear and easy to understand way. Cable length and distance to the cable fault are determined using advanced TDR (Time Domain Reflectometer) technology.

QUALIFIER

The results can be saved in the NetXpert 1400 and full-color reports can be generated for documentation purposes. Featuring a bundle of network testing capabilities, the NetXpert 1400 assists you with verifying network configuration and troubleshooting as any moves, adds & changes (MACs) performed will require a renewed verification. The NetXpert 1400 verifies, when connected to a communications outlet, if a link can be established to the switch and which connection speeds are supported (up to 1Gbit/s). The Ping test detects the availability of individual and lists of IPv4 and IPv6 addresses and any user-selectable URLs.

On top of this, the user can choose from a range of other network tests, such as LLDP/CDP/NDP and VLAN discovery and comprehensive PoE (Power over Ethernet) tests, including a load test.

- Link test up to 1 Gbit/s to identify link capability and link status
- Ping to a single or lists of IPv4 and IPv6 addresses (Iv 6 planned) as well as any URL on the internet
- CDP/LLDP/NDP and VLAN discovery
- PoE/PoE+ detection and load test for voltage drop
- DHCP test
- Traceroute
- Switch port identification by blinking the port LED

Full-color, Easy-to-Use Touch Screen

The full-color touch screen with 4 buttons makes the NetXpert 1400 easy to use while the high-resolution color screen guarantees excellent readability in any environment. Its ruggedized design is ideally suited for rough handling environments. Test reports and documentation can be generated directly on the device.

Order Number:
226533

NetXpert 1400

Network and Cabling Qualifier

Tests all cable connections, wire map showing shorts, cuts

Network Tests with PoE, Link connectivity, LLDP, ping and DHCP

Qualification of IEEE connectivity up to 1 Gbit/s

NetXpert main unit, active remote, 2 x power supply, 4 GB SD card

Micro USB cable, 1 network set and coax remote set (each #1-5), F-connector coupler

2 x Network patch cable, 2 x sacrificial cable, hanging strap and clip, carrying case

Easier Testing for Gigabit Compliance

Ethernet Speed Certification
LAN Qualifier and Network Diagnostics

Field testing passive networks intended for later use as Gigabit networks can be a complicated, prolonged and costly business. This is achieved by carrying out three simple steps.

Bit Error Rate, Signal to Noise Ratio and determining delay skew - you can check for suitability and cable quality. By taking this approach, you can not only almost instantly find out whether the network is performing as it should but you can also track errors and document the system. Today's ever-growing bandwidth demands mean a vast increase in the number of network cables used for communication (data, telephone, coaxial, audio...) as well as building management (security, access, alarms...). The importance of Ethernet is growing and its role is expanding.

As systems are increasingly linked together, and Moves, Adds and Changes become more frequent, it is vital to ascertain whether individual cables and bundles are working in accordance with specs and to ensure that there are no bottlenecks along the line. At first glance, this testing may seem complex. Installers are required to present 'proof of performance' documentation and perform pre-tests. The IEEE 802.3ab 1000BASE-T standard gives minimum requirements on multiple test parameters for verifying Gigabit devices.

If network testing is late, inaccurate or incomplete, much can go wrong. This can drive up the cost of the network. Testing must be an integrated part of the design and rollout processes. Connections are often separately checked for certification, qualification and verification. We try to confirm that the cabling system is compliant with the industry standards, able to support required network speeds, and are properly connected. Active troubleshooting is also carried out. Of these, certification might be considered the most rigorous. Based on TIA and ISO standards, these produce either "Pass" or "Fail" for each measured connection.

Multiple Tests for Greater Accuracy

Operators and installers simply want to know whether a cabling network works and can support Gigabit bandwidth, not only for newly installed networks, but also when existing networks are changed or extended. Qualification can be completed by measuring a few carefully selected parameters from the relevant transmission standards and using these basic tests to get valuable results.

However, if tests show that a network does not perform favorably, it is important to find out where the problem is and get an indication of what is causing it without extensively testing LF and RF parameters. Short circuits, miswires and split pairs will all affect system performances, identifying these are crucial to taking effective steps to rectifying the problems.

Checking for Bit Error Rate (BER), Signal-to-Noise Ratio (SNR) and determining delay skew are common test methods. By performing all three in a single session and cross-referencing the results, test accuracy is increased by a considerable degree. Most of the professional test devices normally used for this are, however, very costly. Without NetXpert, you would need to carry around multiple expensive devices and most are not suited for harsh environments.

Cost-effective Cable Testing and Ethernet Speed Certification

This is where the NetXpert 1400 comes in. This small, portable, rugged device can test for BER, SNR and delay skew but is up to five times cheaper than other devices. It has been specifically designed for checking smaller installations, such as SOHO networks, clinics, law firms and so on. Operating it requires no special skills. The cost-effective NetXpert 1400 allows installers and operators to quickly and easily find out whether their network cabling systems qualifies for IEEE 802.3ab standard compliant Gigabit Ethernet, and also enables troubleshooting of active networks. A “Pass/Fail” result indicates whether existing cabling link supports data rates up to 1 Gbit/s.

Verifying Links

NetXpert allows the user to verify whether cabling links will support a maximum data rate of up to 1 Gbit/s regardless of the category of the cables, patch panels, or outlets installed. Performing standards-based tests with real data as per IEEE 802.3ab and Bit Error Rate Tests (BERT), the NetXpert 1400 tests the error-free data transmission up to 1 Gbit/s. Adding to this, parameters affecting signal quality can be displayed including Signal-to-Noise Ratio (SNR) and delay skew. Delay skew in a 4-pair cable indicates the signal time delay between pairs and can impact Gigabit Ethernet performance.

Continuity test results of all 8 wires and the shielding are displayed in full-color wire format while showing cable faults such as opens, shorts, miswires, and split pairs in a clear and easy to understand way. Cable length and distance to the cable fault are determined using advanced TDR (Time Domain Reflectometer) and capacitance technology.

1 GB Ethernet APPROVED

Network Testing and Diagnosis

Featuring a bundle of active network testing capabilities, the NetXpert 1400 assists you with verifying network configuration and troubleshooting networks as any moves, adds & changes (MACs) performed will require a renewed verification.

The NetXpert 1400 verifies, when connected to a telecommunications outlet, if a link can be established to the switch and which connection speeds are supported (up to 1 Gbit/s). The Ping test detects the availability of individual and lists of IPv4 and IPv6 addresses and any user-selectable URLs. User can also choose from a range of other network tests, such as LLDP/CDP and VLAN discovery and comprehensive PoE tests, including a load test.

The full-color touch screen and 4 additional buttons make the NetXpert 1400 easy to use while the high resolution color screen guarantees excellent readability in any environment. Its rugged design is ideally suited for rough environments. Results can be saved in the NetXpert 1400 and detailed, full color reports can be generated for documentation purposes. Internally stored test data can be moved via USB Flash to a PC or tablet in PDF or CSV format and printed without special software.

Testing network links by combining three key parameters means accurate results with an easy-to-use, portable and rugged device and is the fastest, most cost effective way to verify whether cabling links will support a maximum data rate of up to 1 Gbit/s.

Author:
Alfred Huber, Technical Manager

CERTIFIER

WireXpert 500

Most Affordable Tester for Copper LAN Cabling Certification

It is increasingly common today for electrical contractors to get projects for installing network cabling systems. WireXpert 500 allows technicians to easily certify copper cabling systems from CAT 5E to CAT 6A (Class D to Class E_A) and produce professional test reports for their customer.

FEATURES

- Advanced cable certification up to 500 MHz
- Certifying according to standards Class D/E/E_A & CAT 5E/6/6A
- Extremely short auto-test time for CAT 6A and Class E_A
- Meets TIA and ISO Level IIIe accuracy requirements
- Certification testing of Patch cords via dedicated adapters
- Industrial Ethernet testing via purpose-built M12 adapters
- Advanced reporting and documentation

Owners of network systems in SOHO and medium enterprises increasingly demand fully tested installations. While technicians with good training and skills can handle the installations effectively, the challenge is to perform testing of these cables efficiently and with minimum cost. WireXpert 500 is the latest addition to Softing IT Networks WireXpert product family and is specifically designed for installers of copper network cabling systems. It can test shielded and unshielded cables to industry standard requirements.

Note: Please consider the most advanced cable tester WireXpert 4500 if you see a need to perform installation testing on CAT 8/40G cables, Class F/F_A cables, or fiber and MPO cables.

Order Number:
228071

WireXpert 500 LAN Copper Cable Certifier - Class D, E, E_A and CAT 5, 6, 6A

Includes two measurement units: Local and remote

2 x CAT 6A channel adapters, 2 x CAT 6A link adapters, 2 x headsets

Li-Ion batteries, power supplies, USB drive, soft carry case

Calibration certificate and reporting software

WireXpert 4500

Most Advanced Cable Tester up to 2,500 MHz

Certify your data center and enterprise installations in the shortest time. The WireXpert, with its unparallelled 2,500 MHz measurement range, is the first cable certifier with the capability to certify the highest performance cabling systems in enterprise networks and data centers. Cable installers make significant gain in productivity with WireXpert's industry leading test speed and ease of use. With certification testing up to Class F_A and CAT 8 copper cabling, as well as MPO, SM, MM and MMEF fiber optic cabling, WireXpert is ready for 40G and beyond.

FEATURES

- First cable certification up to 2,500 MHz to support new TIA CAT 8 and ISO Class I and II draft standard
- Most advanced cable certification for all standards: Class D/E/E_A/F_A, Category 5E/6/6A, and the new draft CAT 8 as well as ISO draft standards Class I and Class II
- Accuracy independently verified by ETL
- Exceeds ISO Level V, IV and TIA Level IIIe Accuracy requirements
- Endorsed by companies worldwide
- Many measuring modules available e.g. patchcord testing, Industrial Ethernet, Class F_A
- Perform extended Fiber certification for 850/1,300 nm (Multimode) and 1,310/1,550 nm (Singlemode)
- Advanced reporting and documentation
- The only certifier supporting all data center, premise cabling and industrial ethernet requirements

Cabling systems are evolving rapidly, with CAT 8 standard for copper cabling on the horizon, and rapidly growing use of MPO and Singlemode cabling for 40G Ethernet and beyond. The powerful measurement engine of WireXpert 4500 performs the most complex cable certification tests accurately, and in a matter of seconds you will know the answer to "Pass/Fail"

WireXpert 4500, can test many different types of cables and components. WireXpert 4500 has test adapters for all categories of copper patch-cords, Multimode MPO cables, simplex Multimode and Singlemode fiber, industrial Ethernet cabling systems (1G and 10G), coaxial cables, and more. WireXpert 4500 even offers a range of specialized adapters for lab testing. In fact, some cable vendors use WireXpert 4500 in their research labs to qualify newly developed cabling components.

Easy to Use and Rugged Design

WireXpert comes with an intuitive touch sensitive user interface, featuring bright color LCD screens designed for industrial, heavy duty usage. The Dual Control System (DCS™) – featuring identical devices for Local and Remote units – makes it really easy to operate the test cycles. Whether coordinated by two technicians or only one, walking time between outlets is minimized.

Protects your Investment: Beyond 10G

If you are testing 10 Gbit/s cabling, WireXpert is the clear choice. If you are thinking beyond 10G, WireXpert is the only choice. Built on a future proof, scalable measurement engine, WireXpert protects your investment in test equipment as the data rates supported by the cabling systems increase. WireXpert employs a novel measurement architecture that achieves extremely wide bandwidth with superior measurement accuracy. Its unique RF measurement engine exceeds level V requirements throughout the measurement frequency range.

WireXpert, with its industry leading measurement performance, provides adapters for testing cabling systems with higher performance than CAT 6A (500 MHz). For Class F_A cabling, testing is performed over full standards defined frequency range from 1 MHz through 1,000 MHz. Both TERA and GG45/ARJ45 interfaces are available through WireXpert test adapters. Both channel and permanent link testing are supported.

Adapters are also available for testing CAT 7A patch cords. With measurement bandwidth exceeding 2,000 MHz, WireXpert is capable of testing CAT 8 cabling once the standard is approved.

Proven Accuracy

WireXpert has been independently verified by highly respected test laboratories such as ETL.

Vendor Approvals

Most leading cable manufacturers have extensively tested WireXpert and have approved the instrument for field certification and associated warranties of their structured cabling solutions. Laboratory testing and comparisons against vector analyzers have proven that WireXpert has excellent accuracy and measurements correlate with laboratory equipment. In fact, major cable vendors are using WireXpert in their labs for qualifying CAT 8 cabling systems under development.

Order Number:
228070

WireXpert 4500 LAN Cable Certifier – Class D, E, E_A, F, F_A and CAT 5, 6, 6A, 7, 7A & 8 Frequency Range up to 2,500MHz

Ready for CAT8 and Class I & II Draft up to 2,000 MHz
Includes two measurement units: local and remote
2 x CAT 6A channel adapters
2 x CAT 6A link adapters
2 x headsets
Li-Ion batteries
Power supplies
USB drive
Soft carry case
Calibration certificate

Patch cord test adapter

Fast and Accurate Dual-Ended patch cord testing with WireXpert.

Poor quality patch cords are often cause of bad performance of otherwise good quality cabling channels. It is a good practice to confirm the performance of patch cords.

WireXpert offers an efficient way for quickly identifying and recording the performance of patch cords. With its fast and accurate dual-ended testing, WireXpert's patch cord test kits are suitable for both manufacturing testing, as well as for incoming inspection at end user premises.

WireXpert patch cord test kits are available for testing CAT 5E, CAT6, CAT6A, and CAT 7/7A patch cords.

FEATURES

- Fast, 10-seconds auto-test performs dual ended patch cord certification testing
- Intuitive selection of test configuration and limits
- Kits available testing against all ISO and TIA patch cord standards
- Support for user-defined customized test limits
- Seamless reporting in eXport software with copper test results
- Automated standards based label creation, one label per patch cord
- Easy replacement of worn out patch cord test jacks without opening the adapter

WireXpert offers standards based patch cord testing for all industry standard performance levels for patch cord testing. You can test CAT 5E, CAT6, CAT6A, and even CAT 7 and CAT 7A patch cords using patch cord adapters suitable for testing cords with required performance grade. A touchscreen graphical menu makes it easy to choose TIA or ISO limit for patch cords of given length. WireXpert tests a patch cord from both ends for all parameters in a single 10 second auto-test.

Order Number:	CU patch cord measurement WireXpert:
228098	CAT 7A patch cord adapter pair with GG45 interface
228027	Pair of patch cord adapters with CAT 6A test jacks mounted for testing shielded and unshielded CAT 6A patch cords
228028	Pair of patch cord adapters with CAT 6 test jacks mounted for testing shielded and unshielded CAT 6 patch cords
228029	Pair of patch cord adapters with CAT 5E test jacks mounted for testing shielded and unshielded CAT 5E patch cords
228037	Pre-tested reference CAT 6A patch cord for use in verification of CAT 6A patch cord adapter performance
228038	Pre-tested reference CAT 6 patch cord for use in verification of CAT 6 patch cord adapter performance
228039	Pre-tested reference CAT 5A patch cord for use in verification of CAT 5A patch cord adapter performance

Class F_A Adapter

Testing High Performance Twisted Pair Cabling

The WireXpert Class F_A adapter meets the proposed level V accuracy specifications required for certifying Class F_A cabling. WireXpert 4500 provides accurate measurements over a wide bandwidth from 1 MHz to 2.5 GHz, making it the tester of choice for certifying high performance cabling systems like Class F_A and proposed CAT 8.

FEATURES

- **Auto-test Class F_A links and channels in just 15 seconds**
- **First tester in the industry with measurement bandwidth far exceeding Class F_A requirements**

WireXpert 4500 offers comprehensive certification capability for Class F_A systems. The standards for specifying field tester accuracy categorizes the performance by levels. An accuracy spec from IEC (61935-1 ed4) specifies “level V” test instruments for Class F_A cabling certification. WireXpert far exceeds this proposed specification in terms of both measurement bandwidth and accuracy.

Class F_A

WireXpert 4500 is the first cable tester to meet the level V accuracy specifications (ISO/IEC 61935-1 ed.4) required for certifying Class F_A cabling. In fact, a majority of Class F_A cables installed world-wide are certified using WireXpert. Class F_A certification testing is performed over full standards defined frequency range from 1 MHz through 1,000 MHz. Both TERA and GG45/ARJ45 interfaces are available through WireXpert test adapters. Adapters are also available for testing CAT 7A patch cords.

Proposed Category 8

WireXpert 4500 is the first cable certifier to offer test limits for CAT 8 cabling. It performs testing to 2.5 GHz and shows plots for comparing measurement parameters against the proposed limits. This is very helpful in determining if a given cabling channel is likely to meet CAT 8 requirements.

Order Number:	TERA measurement method for WireXpert (adapter and accessories)
228004	Pair of Class F_A channel adapters with TERA interface for Class F/F_A channel testing
228051	Pair of Class F_A channel adapters with TERA interface for Class F/F_A channel testing Included is one 2 m TERA patch cord for “set reference”
Permanent Link Adapter	
228052	Kit for Class F/F_A TERA permanent link testing comprising of a pair of Class F_A TERA permanent link interface adapters and a pair of Class F_A permanent link test cords
228005	Pair of Class F_A permanent link adapters with TERA interface for Class F/F_A permanent link testing
GG45/ARJ45 Channel Link Adapter	
228054	Pair of Class F_A channel adapters with GG45/ARJ45 interface, suitable for Class F/F_A channel testing. Included is one 2 m GG45/ARJ45 patch cord for “set reference”
228006	Pair of Class F_A channel adapters with GG45/ARJ45 interface, for Class F/F_A channel testing

M12 Adapter

Industrial Ethernet Cabling Test with WireXpert

WireXpert's industrial Ethernet cabling test solution has two M12 adapter kits. Both channel and permanent link configurations with M12 industrial Ethernet connectors are supported. Separate kits are available for two-pair (D-Coded) and four-pair (X-coded) industrial Ethernet testing.

WireXpert is the first cable certification tester with full support for X-coded industrial Ethernet cabling. These kits feature adapters with high performance TERA interface and test cords terminated in M12 test connectors. This approach provides flexibility particularly in space-constrained industrial outlets as the test instrument does not need to directly attach to link/channel under test. Second, this approach improves longevity of the adapter because after extensive use only the worn out test cords need to be replaced, not the adapter.

FEATURES

- **Testing of M12 channels, permanent links, end-to-end-links or hybrid links (M12-RJ45)**
- **Easy selection of test limits including PROFINET limits**
- **Support for user-defined customized test limits**
- **Selection of 2-pair or 4-pair configurations**
- **Seamless reporting in eXport software of test results**
- **Cost effective replacement of worn out test cords**

WireXpert is the first cable certification tester with full support for X-coded industrial Ethernet cabling. These kits feature adapters with high performance TERA interface and test cords terminated in M12 test connectors. This approach provides flexibility particularly in space constrained industrial outlets as test instruments do not need to directly attach to links/channels under testing. This approach improvesthe longevity of the adapter because extensive use only wears out the test cords, not the adapter.

WireXpert provides built-in limit for PROFINET. Alternatively, a standard limit can be selected (e.g. CAT 5E for two pairs). A user can also create custom test limits for specific applications.
Industrial Ethernet cabling links use M12 connector due its rugged structure. WireXpert provides options to test various configurations of industrial Ethernet cabling.

Order Number:	Industry Profinet measurement for WireXpert (adapter and accessories)
228099	M12 (4-position) channel adapter pair including test cords
228084	A pair of M12 channel adapters and a pair of TERA to 8-position M12 (female) test cords for channel testing

Coax Adapter

WireXpert's Unique Test Solution for Coax Cable

The coax cabling solution has a wide RF measurements frequency range of 1-2,400 MHz. The auto-test takes about 15 seconds and both dual-ended and single-ended testing can be performed. There are customizable test limits for insertion loss and return loss.

FEATURES

- **RF measurements frequency range: 1-2,400 MHz**
- **Auto-test time: 15 seconds**
- **Customizable test limits for insertion loss and return loss**
- **Both dual-ended and single-ended tests**

With coax test adapters, WireXpert supports testing of coaxial cables for attenuation and return loss over a wide frequency band.

Test Parameters include:

- Insertion Loss v/s frequency
- Return Loss v/s frequency
- Measured from both ends in dual-ended mode
- For single-ended mode, a remote termination is required
- DC resistance
- Length

Simple one-time reference process for the local and remote units to pair with each other. The eXport software provides full graphical reports including all measurement plots.

Order Number:
228017

Coax Adapter (1 pair)
Pair of coax adapters with 75 Ohm F-type interface
for testing frequency range of 1-2,500 MHz in accordance with TIA570B, 568C.4

Need for Speed: 25/40GBASE-T in Data Center Networks

DEVELOPMENT IN THE CABLING TECHNIQUE FOR DATA CENTERS.

Data center network infrastructure is witnessing a transformation, driven by growing bandwidth and network performance demand. 10 Gigabit Ethernet is de-facto standard in today's data center with growing adoption of 40G. While 40G Ethernet standards already exist for SM fiber and MPO based MM fiber cables, standards bodies have developed 40GBASE-T Ethernet over twisted pair copper cabling systems. Such high networking speed imposes strict performance requirements for cable components and cabling systems. This article examines challenges in ensuring adequate performance of installed cabling, with specific attention to certification testing in field.

40G Ethernet Physical Layer Alternatives

Singlemode Fiber

Due to its long reach and superior transmission performance, singlemode fiber is specified for carrying 40 Gbit/s data up to a distance as long as 10 km (40GBASE-LR4). The physical layer electronics and optics consist of four channels, each carrying 10 Gbit/s data with different wavelengths. Singlemode fiber is the preferred option where budget is not a constraint, or when the link distances are long.

Multimode Fiber

Multimode fiber with parallel optics MPO interface is the most popular medium for 40G Ethernet today (40GBASE-SR4). The networking hardware is cheaper compared to singlemode, and it supports all typical link lengths (up to 100 m for OM3 cable and 150 m for OM4) in a data center network.

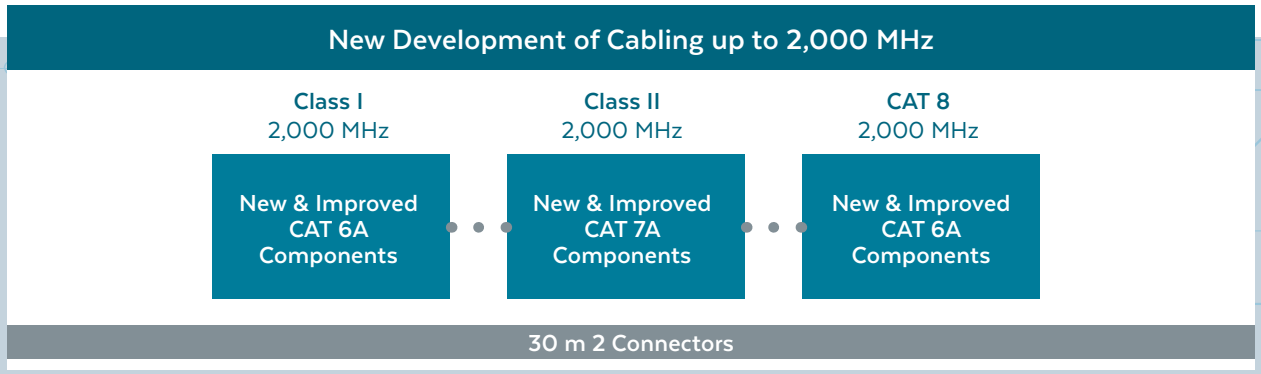
Copper Twinax

For short reach channels up to a length of 7 m, 40 GBASE-CR4) standard specifies use of twinax copper cable assemblies. Typical use is interconnecting networked devices which are physically located adjacent to each other.

Copper Twisted Pair

Recent developments suggest that copper structured cabling systems are here to stay and will be an important alternative to fiber links for 40G Ethernet. Twisted pair copper cabling is likely to retain its cost advantage over fiber for the next several years. Copper cables are perceived to be easier to install and maintain.

Illustration of Class F_A /(extended), Class I & II and CAT 8



Importantly, BASE-T networking standards over twisted pair cable are backwards compatible with auto-negotiation capability. This enables organizations to upgrade to higher speeds incrementally, with better control over capital expenses. IEEE initiated a formal project for defining 40GBASE-T standard using twisted pair cabling in 2012. Cabling standardization bodies are also updating their specifications. TIA has developed specifications for "Category 8" cabling systems suitable for 40GBASE-T. ISO/IEC has a similar project that aims to define two variants of cabling systems that will support 40GBASE-T. These new cabling systems are being called Class I (using CAT 6A like components with higher capacity) and Class II (using CAT 7A like components with higher capacity). Additionally, ISO/IEC is defining recommendations about using existing cabling systems such as Class F_A for 40GBASE-T application.

Selecting Transmission Bandwidth for Twisted Pair Cabling for 40GBASE-T

One of the key tasks in defining Ethernet standards is to determine appropriate RF bandwidth for communication. For example, 10GBASE-T uses 400 MHz bandwidth, which roughly means that every Hz of RF spectrum carries 25 bits of binary data, in other words, channel capacity utilization is 25 bits/Hz. Higher order and more complex modulation schemes can increase capacity utilization. There is a maximum limit to channel capacity, known as Shannon Capacity.

This limit is due to the electromagnetic noise experienced by the channel. Noise comes from external and internal sources. Examples of internal noise sources are cross-talk and return-loss. Ethernet physical layer devices use sophisticated signal processing techniques to predict and cancel the effects of internal noise sources, thereby increasing capacity of the channel. However, the trade-off is higher power consumption and the resulting heat generation.

Learning from the 10GBASE-T Experience

High power consumption was the single largest reason why 10GBASE-T adoption was below expectations when the standard was released in 2006. This problem has been largely overcome today through innovative designs and semiconductor technology advancements.

With this 10GBASE-T experience fresh in mind, the experts developing 40GBASE-T standard are reluctant to significantly increase the target for capacity utilization.

But 40G is four times as much data as 10G. One way of squeezing more data, without significantly changing modulation density (capacity utilization), is to increase the bandwidth. In this case, it would mean a four-fold increase from 400 MHz to 1,600 MHz. This is what the 40GBASE-T standard seems to be driving towards.

There is one issue with the increase of bandwidth. On twisted pair cables, signal attenuates rapidly with increasing frequency. This means, received signals at 2,000 MHz are significantly smaller than received signals at 100 MHz. This phenomenon imposes restrictions on the length of cable.

With a 100 m cable, received signals at high frequencies would be buried in the noise. A compromise therefore has to be made on the maximum supportable link distance.

The net effect of all these considerations are:

- **40GBASE-T uses bandwidth spectrum from 1 MHz-2,000 MHz**
- **The maximum length of the cable is limited to 30 m**
- **The cabling channel is specified for two connectors**

The good news is, a large percentage of data center link lengths are well within this 30 m constraint. Studies have indicated that more than 80% of data center links are 30 m or shorter, and therefore eligible to benefit from 40GBASE-T.

Field Testing of 40G Copper Cabling

While cabling technologies and semiconductor technologies can support 40 Gbit/s Ethernet over twisted pair copper cables, wide spread market adoption calls for additional considerations. One of the key elements is availability of field test instruments to characterize and certify installed cabling for suitability for 40GbE.

Measurement Bandwidth

Just like a 300 ml soft-drink needs a bottle with 400 ml capacity for easy filling, cabling systems for supporting 1,600 MHz transmission will be specified to 2,000 MHz, and field testers will typically support even higher measurement bandwidths. While many aspects of 40 GBASE-T are still in the early stages of development, field testing is a noteworthy exception. Softing IT Networks WireXpert is an example of field tester that provides sufficient measurement bandwidth to qualify 40GBASE-T cabling during draft standardization stages and after standardization. A number of IEEE studies on RF performance of cabling systems have been done using this instrument.

Conclusion

Despite the growth in wireless and fiber infrastructure, copper cabling will still be the dominant medium for enterprise networks for the foreseeable future. When designing infrastructure for use over the next 15 to 20 years, one must consider the fact that there is a high likelihood that 40GBASE-T systems will be defined, and become commonplace in 5-10 years. There are technical challenges in supporting such high data rates, one of the main challenges being complexity of physical layer devices. In order to create a complete eco system for adoption of technologies like 40GBASE-T, the industry will need cabling systems, networking devices, standardization, and also field test instruments suitable for that technology. Field testing over wider bandwidths has been constrained in the past due to several factors, but now at least one commercially available field tester features the capability of certifying cabling to bandwidths higher than 2,000 MHz, which is expected to meet field testing needs for future 40GBASE-T systems.

Author:
Thomas Hüsch, Technical Support & Training

FIBER
CABLE TESTERS

CERTIFIER

WireXpert 4500

Most Advanced Cable Tester up to 2,500 MHz

The WireXpert, with its unparallelled 2,500 MHz measurement range, is the first cable certifier with the capability to certify the highest performance cabling systems in enterprise networks and data centers. Cable installers make significant gain in productivity with WireXpert's industry leading test speed and ease of use. With certification testing up to Class F_A and CAT 8 copper cabling, as well as MPO, SM, MM and MMEF fiber optic cabling, WireXpert is ready for 40G and beyond.

FEATURES

- First cable certification up to 2,500 MHz to support new TIA CAT 8 and ISO Class I and II draft standard
- Most advanced cable certification for all standards: Class D/E/E_A/F_A, Category 5E/6/6A, and the new draft CAT 8 as well as ISO draft standards Class I and Class II
- Accuracy independently verified by ETL
- Exceeds ISO Level V, IV and TIA Level IIIe Accuracy requirements
- Endorsed by companies worldwide
- Many measuring modules available e.g. patchcord testing, Industrial Ethernet, Class F_A
- Perform extended Fiber certification for 850/1,300 nm (Multimode) and 1,310/1,550 nm (Singlemode)
- Advanced reporting and documentation
- The only certifier supporting all data center, premise cabling and industrial ethernet requirements

Cabling systems are evolving rapidly, with CAT 8 standard for copper cabling on the horizon, and rapidly growing use of MPO and Singlemode cabling for 40G Ethernet and beyond. The powerful measurement engine of WireXpert 4500 performs the most complex cable certification tests accurately, and in a matter of seconds you will know the answer to "Pass or Fail".

WireXpert 4500 can test many different types of cables and components. WireXpert 4500 has test adapters for all categories of copper patch cords, Multimode MPO cables, simplex Multimode and Singlemode links, industrial Ethernet cabling systems (1G and 10G), coaxial cables, and more. WireXpert 4500 even offers a range of specialized adapters for lab testing. In fact, some cable vendors use WireXpert 4500 in their research labs to qualify newly developed cabling components.

We welcome you to experience the speed of testing, accuracy, and simplicity of WireXpert 4500!

Easy to Use and Rugged Design

WireXpert comes with an intuitive touch sensitive user interface, featuring bright color LCD screens designed for industrial, heavy duty usage. The Dual Control System (DCS™) – featuring identical devices for Local and Remote units – makes it really easy to operate the test cycles. Whether coordinated by two technicians or only one, walking time between outlets is minimized.

Protects your Investment: Beyond 10G

If you are testing 10 Gbit/s cabling, WireXpert is the clear choice. If you are thinking beyond 10G, WireXpert is the only choice. Built on a future proof, scalable measurement engine, WireXpert protects your investment in test equipment as the data rates supported by the cabling systems increase. WireXpert employs a novel measurement architecture that achieves extremely wide bandwidth with superior measurement accuracy. Its unique RF measurement engine exceeds level V requirements throughout the measurement frequency range.

WireXpert, with its industry leading measurement performance, provides adapters for testing cabling systems with higher performance than CAT 6A (500MHz). For Class F_A cabling, testing is performed over full standards defined frequency range from 1 MHz through 1,000 MHz. Both TERA and GG45/ARJ45 interfaces are available through WireXpert test adapters. Both channel and permanent link testing are supported. Adapters are also available for testing CAT 7A patchcords. With measurement bandwidth exceeding 2,000 MHz, WireXpert is capable of testing CAT 8 cabling once the standard is approved.

Proven Accuracy

WireXpert meets and exceeds all accuracy requirements for cable certification. WireXpert has been independently verified by highly respected test laboratories such as ETL.

Vendor Approvals

Most leading cable manufacturers have extensively tested WireXpert and have approved the instrument for field certification and associated warranties of their structured cabling solutions. Laboratory testing and comparisons against vector analyzers have proven that WireXpert has excellent accuracy and measurements correlate with laboratory equipment. In fact, major cable vendors are using WireXpert in their labs for qualifying CAT 8 cabling systems under development.

Order Number:
228070

WireXpert 4500 LAN Cable Certifier – Class D, E, E_A, F, F_A and CAT 5, 6, 6A, 7, 7A & 8 Frequency Range up to 2,500 MHz

Ready for CAT 8 and Class I & II Draft up to 2,000 MHz
Includes two measurement units: local and remote
2 x CAT 6A channel adapters
2 x CAT 6A link adapters
2 x headsets
Li-Ion batteries
Power supplies
USB drive
Soft carry case
Calibration certificate

MPO/MTP® Adapter

Fast and accurate MPO/MTP® Cabling and Component Testing with the WireXpert Certifier

This MPO test solution enables data center IT-managers, technicians and installers to get quick and accurate assessment of the quality of MPO cabling.

Additionally, it helps to perform incoming inspection of MPO components such as trunk cables, fan-out cables and cassettes. The key feature of this solution is a 5-second auto-test that detects the fiber connection map and the measurement of loss on each fiber.

FEATURES

- Tests MPO/MTP® using theWireXpert WX4500-FA cable certifier
- MPO auto-test in less than 5 seconds
- Reporting is integrated in eXport software together with standard single fiber and copper test results
- Tests MPO-to-SC/LC links for end-to-end loss measurement on individual fibers
- Tests connectivity from MPO to individual fibers
- Allows configuring the number of active fibers in MPO, making it possible to test custom links, including 8-fiber links
- Automatically identifies connection type as type A, B, C or customized
- Allows reference settings with any connection type
- Displays absolute power level and loss on each fiber

The new MPO adapters for WireXpert enable testing of MPO/MTP® cabling. A typical test setup consists of the WireXpert local unit with MPO Power Meter adapter and the Remote unit with MPO Light Source adapter attached.

Alternatively, a Multimode fiber adapter can be attached to WireXpert Local unit for testing individual fibers in MPO links. This solution provides fast and accurate measurement of MPO link loss and testing against user configured limit.

Order Number:
228072

MPO test kit for WireXpert 4500

Kit includes:

Light Source & Power Meter

2 x Typ A test cable “unpinned to pinned”

2 x Typ A adapter

1 x Typ A reference cable “unpinned to unpinned”

1 x Typ B reference cable “unpinned to unpinned”

1 x MPO Cleaning Kit

EF Multimode Adapter

New Generation Multimode Fiber Adapters add full Standards - Compliant Fiber Certification

A light source and power meter are used to measure the power loss and length of optical cables at 850 and 1,300 nm. Certification of Multimode fibers has often been a contentious issue due to the inherent uncertainties in the measurement process. ISO/IEC and TIA have recently adopted an Encircled Flux (EF) standard that standardizes the launch condition for the light sources used in Multimode test equipment. The WireXpert's new EF compliant adapters give you guaranteed compliance to the EF standard IEC 61280-4-1.

FEATURES

- **Compliant to IEC- 61280-4-1 EF standards and IEC-14763-3**
- **Provides validation to different modal behaviors of various fiber optic manufacturers**
- **Interchangeable robust SC, LC and ST adapters**
- **Provides troubleshooting with built-in Visual Fault Locator (VFL)**
- **Improved repeatability of measurements**
- **Reduced insertion loss variation between laboratory and field instruments**

New generation of Multimode fiber adapters adds full standards compliant fiber certification. ISO/IEC and TIA have recently adopted an Encircled Flux (EF) standard that standardizes the launch condition for the light sources used in Multimode test equipment. The WireXpert's new EF compliant adapters give you guaranteed compliance to the EF standard IEC 61280-4-1.

Order Number:	Fiber Adapter for WireXpert 4500:
228079	**Encircled flux compliant Multimode Fiber adapter set** For certification testing at 850 nm and 1,300 nm wavelengths with dual wavelength source (850 nm and 1,300 nm). Includes a pair of FC-SC modally transparent test cords, a pair of SC-SC tail cords and cleaning kit
228089	**LC test cord kit for encircled flux compliant Multimode adapter** Includes a pair of modally transparent FC-LC test cords, a pair of LC-LC simplex tail cords, a pair of interchangeable LC adapters and a pair of LC-LC duplex adapters
228088	**A pair of modally transparent FC-SC test reference cords; and a pair of SC-SC tail cords**

Singlemode Adapter

WireXpert Optical Loss Test Kit
Fast and Intuitive Fiber Certification

WireXpert's Singlemode fiber adapters offer unmatched performance in certification testing of fiber optic cabling. In addition to 6-second dual-ended, dual-wavelength certification testing, WireXpert provides intuitive graphical work-flow for bi-directional testing.

WireXpert makes the task of selection of set-reference method and test configuration straight-forward with the advantage of easy to follow graphical steps.

FEATURES

- Fast, 6-second auto-test performs dual-wavelength certification testing
- Intuitive selection of test configuration and reference setting
- 1-, 2-, or 3- jumper referencing
- Seamless reporting in eXport software together with copper test results
- Automated standards based label creation
- Light source and power meter functions converts WireXpert into two independent instruments
- Certification single-fiber links in addition to duplex links
- Loopback testing independently using WireXpert Local or Remote units, doubling the test capacity

WireXpert offers Singlemode adapters to perform standards based testing at 1310 nm and 1,550 nm. The fiber adapters have SC type connector on both transmit and receive ports. Accurate testing of LC links is possible with use of optional LC test kit.

Order Number:

228003

WireXpert 4500 Singlemode Fiber adapter pair for certification testing

Test at 1,310 nm and 1,550 nm wavelengths (1,310 nm and 1,550 nm laser light source)
Includes 2 duplex reference test cords
Two pairs of Singlemode reference cords
SC-SC duplex adapter Singlemode
Cleaning kit

“Encircled Flux” = More Accurate Multimode Fiber Measurement Technology

What is “Encircled Flux”?

What is difference in the measurement of Multimode fiber cabling with “Encircled Flux”?

Why is the “Encircled Flux” Multimode fiber measurement technology important for installers?

Measurement In-Accuracy

Multimode fiber cabling as part of what is commonly referred to as “universal structured building cabling” and is typically evaluated either by a loss measurement (LSPM = Light Source + Power Meter = Tier 1) or an OTDR measurement (OTDR = Optical Time Domain Reflectometer = Tier 2). Large variability in test results can occur especially in loss measurements depending on the measurement equipment used. To get comparable measurement results, standardization bodies have agreed on new definitions of loss measurements on Multimode fiber cabling. Accuracy enhancement is achieved by the specification of reference methods and the tolerances for the measurement tools used, and by the specification of the test signal used.

Cleanliness

Cleanliness and lack of defects are of utmost importance for fiber optic cabling and, of course, also for the fiber optic measurement equipment.

In order to verify the cleanliness and the condition of the fiber connectors of the reference cords (measurement cords) and of the fiber cabling under test, it is critical to inspect the end faces of the fiber connectors included in the test with a fiber inspection microscope each time before a measurement is carried out. If the connector end faces are contaminated, they can be cleaned and re-inspected. At that point, if everything is clean and free from defects, only then should the fiber connectors be connected. Any other way of proceeding can yield incorrect results. Moreover, careless handling of the fiber connector end faces can cause damage that leads to a complete failure of the fiber cabling (see Figure 1).

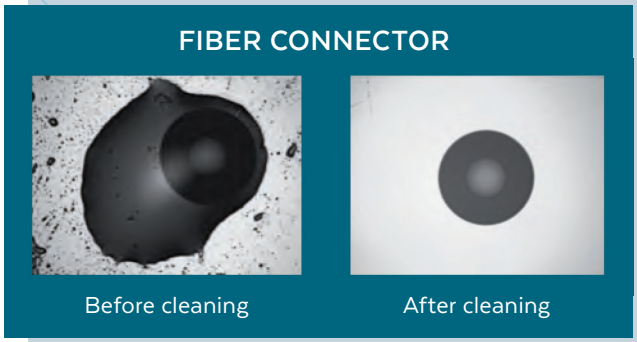


Figure 1 – Cleanliness of fiber connectors

Optical Attenuation (Loss)

To be able to understand the impact of “Encircled Flux” on measurement equipment, you need to know the fundamentals of fiber optic loss measurement. How can attenuation in fiber cabling be measured? It sounds quite simple. One uses a light source (LS) and a power meter = PM and measures the optical power that is getting lost on the fiber run.

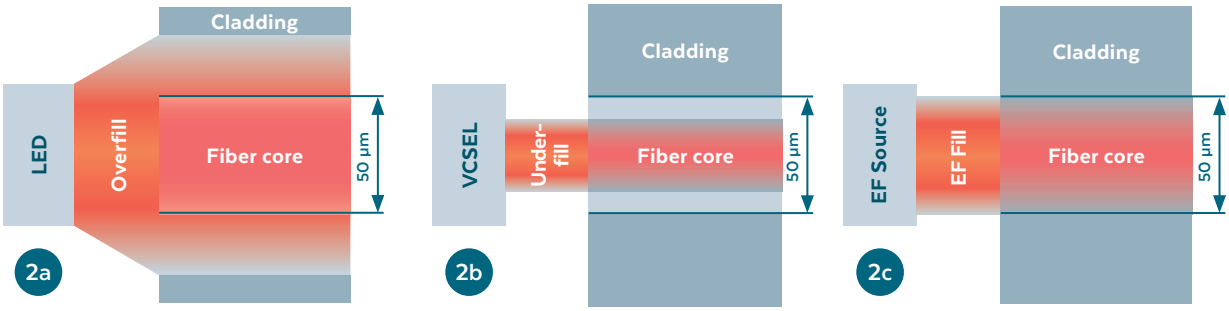


Figure 2: LED, VCSEL and EF light sources / launch conditions

$$L\,[dB] = 10 * \log (Pin / Pout)$$

Or, if the power meter used is able to display the measured light power levels directly in dBm, then loss can be computed by simply subtracting the input power received (PPM [dBm]) from the output power (PIS [dBm]).

$$L\,[dB] = PLS\,[dBm] - PPM\,[dBm]$$

This seems to be quite easy, but the devil is in the details, because it is necessary to set reference before a measurement is performed to exclude the measurement equipment itself from the overall measurement. The quality of the measurement cords and connectors directly affects the accuracy of the result. In order to get the correct relative measurement value, it is required to determine the output power of the light source (PLS) and to store this value as a reference value in the power meter.

Referencing

For setting reference, the standards organizations have defined the use of one to three reference measurement cords. There are various conditions – i.e. how and how much light (more precisely light modes) is coupled into the fiber. In recent years the coupling light into a fiber has become an issue again and the definition of "Encircled Flux" was included in the standards.

But how was it done before? Initially, the use of LED light sources was standardized. These produce what is referred to as "overfilled" launches (See Figure 2a). This "overfilling" was not particularly clever, because an overfilling with the light emitted by the LED light source will not only launch light modes into the fiber core but into the cladding as well, that propagates in the fiber as stable modes of lower order (near the center of the fiber core) and as unstable modes of higher order (further away from the center of the fiber core, and even in the cladding). When using short reference measurement cords, this resulted in measuring too much light with a power meter when setting reference. In turn, this led to inaccurate measurements, because the measured reference power was too high due to the cladding modes. In addition to this, in longer cable runs, the unstable modes of higher order in the fiber cladding and partly also in the fiber core, tend to disappear after some distance and then will no longer be part of the measurement. To ensure more stable conditions, the so-called cladding modes and the unstable higher order modes are already filtered out by means of a mode filter (mandrel) before setting reference (see Figure 3). Somewhat more stable measurement conditions were created with this method, however, the loss readings were typically still too high and therefore too conservative.

As VCSEL (Vertical Cavity Surface Emitting Laser) based light sources (see Figure 2b) were employed in the measurement equipment (these were often used in the active equipment deployed in transmission lines e.g. 1 GbE SFPs with 850 nm VCSEL) but produced measurement results that were too optimistic, because of an insufficient illumination of the fiber core and too small a number of higher order modes launched. Moreover, certain faults, such as an offset of the fiber cores in a mated fiber connection, were unable to be detected. These two launch conditions - "overfill" and "underfill" - were likely to produce measurement variability that significantly exceeded 10%, which was not especially critical in the the past times of ample system headroom in fiber links. But with

today's increased data rates such as 40GBASE-SR4/100GBASE-SR10 over OM3 or OM4 fibers with lengths of 100/150 m and an acceptable channel loss of merely 1.9/1.5 dB, such a large system headroom no longer exists, and variability exceeding 10% is unacceptable. Standardization bodies responded with launch methods that eliminate such a high degree of variability with an exact definition of the light power distribution in the fiber core. This definition is named "Encircled Flux" and is between an "overfilled" and an "underfilled" launch.

"Encircled Flux" Definition

As specified by the standard, Encircled Flux is the portion of the cumulative (summed) power of the near field relative to the overall output power as a function of the radial distance from the optical center of the fiber core. By way of an exact measurement of the light power through a near field measurement, it can be exactly determined how many modes of lower and higher order are launched into the fiber for the measurement and hence into the fiber core of the link under test. Please refer to the IEC 61280-4-1 standard for the light power ratios specified for the various core diameters and wave lengths. The values and tolerances are fixed in the EF template, as upper and lower bounds in near field measurements carried out with laboratory measurement equipment. Now, that we have thoroughly explained the light sources, there is another challenge to be faced. Standard specifications demand that the Encircled Flux launch condition is not present at the output of the light source, but at the end of a reference measurement cord to ensure that Encircled Flux compliant mode power distribution is fully achieved in the fiber optic cabling under test.

"EF" until the Point of Insertion

In the case that the light source itself provides the "Encircled Flux" launch condition, EF until the point of insertion can be achieved with special "modally transparent" reference measurement cords.

Figure 3: Mandrel

In this way it can be ensured that the light coupled into the cabling link under test, exactly meets Encircled Flux conditions at the output of the launch cord/reference connector. The benefit of this method over other Encircled Flux methods (e.g. a mode conditioner placed between the light source and the reference connector) is that replacing the worn reference connector of a reference measurement cord will be relatively inexpensive, as you can simply buy a new modally transparent reference cord. When comparing different measurement instruments, the variability of measurement results is well below 10%, due to the clear definition of the modal distribution at the reference connector by Encircled Flux.

Conclusion

With the continous advance of technology, it is imperative to employ measurement equipment complying with "Encircled Flux" launch conditions to get reliable and accurate results in the certification measurement of Multimode fiber cabling. This is the only way to ensure that modern fiber optic high-speed applications can be operated without problems.

Author:
Thomas Hüsch,
Technical Support & Training

FiberXpert OTDR 5000

Fiber Optic Cabling Certifier

Designed with the installers and operators of enterprise networks in mind, the FiberXpert OTDR 5000 measures, documents and troubleshoots fiber optic networks. The FiberXpert OTDR 5000 provides very high resolution with one of the shortest dead zones available for testing Multimode and Singlemode fibers, thus enabling measurement of very short fiber links. Automatic analysis simplify the measurement tasks and let you be the fiber expert.

With a high dynamic range and a small event dead zone the FiberXpert OTDR 5000 is the tool for measuring short optical fiber links in company networks and data centers. With an event dead zone of less than 80 cm, it is possible to detect connectors in a short row and measure them accurately. To reduce costs and resources, the FiberXpert measures with maximum resolution in the shortest possible time.

FEATURES

- Optical Time Domain Reflectometer (OTDR) for 850/1,300 nm Multimode or combined for 850/1,300 nm Multimode and 1,310/1,550 nm Singlemode
- Standards compliant Tier 2 measurement of fiber optic cabling
- Automatic “Pass/Fail” analysis of the test results according to the limits specified by TIA/IEC
- Display of the OTDR trace in a graphical format for a length-dependent analysis of all events for reflection and attenuation
- All fiber link events and analysis listed in a table of results
- Automatic macro-bend detection
- Built-in optical loss test set
- Optional fiber inspection probe
- Large color LCD touch screen
- Generation of professional reports with eXport evaluation software

High precision with a view on the details

With a high dynamic range and a small event dead zone the FiberXpert OTDR 5000 is the tool for measuring relatively short optical fiber links in company networks and data centers.

Easy to Use and Interpret

The soft case and shoulder strap (included) makes it possible to work with both hands. The measurement results are shown on the 5´´ touchscreen and can be analyzed and saved easily on the device. The automatic “Pass/Fail” detection shows all detected events and indicates if the fiber can be used or needs to be reworked.

Enhanced Measurements

In addition, the FiberXpert can measure the loss of the fiber, and with the built-in power meter, it can show the output power of active components such as switches. An optional fiber microscope enables inspection of the quality of the connector faces, again with the help of an automatic “Pass/Fail” detection.

All your Measurement Projects with one Software Package

Ideally, both copper and fiber measurements should be documented in one software package. The eXport software supports both the FiberXpert and the WireXpert and all your measurement reports will be in the same format and in the same location.

Order Number:	
226534	**FiberXpert OTDR 5000 Quad** Multimode/Singlemode 850/1,300/1,310/1,550 nm Optical Time Domain Reflectometer Includes main measurement unit SC compatible Multimode module SC compatible Singlemode module Li-Polymer batteries, power supplies, soft case with shoulder strap, hard carry case Calibration certificate and eXport report Software
226534	**FiberXpert OTDR 5000 Multimode** 850/1,300 nm Optical Time Domain Reflectometer Includes main measurement unit SC compatible Multimode module Li-Polymer batteries, power supplies, soft case with shoulder strap, hard carry case Calibration certificate and eXport Software

FiberXpert Launch Cord

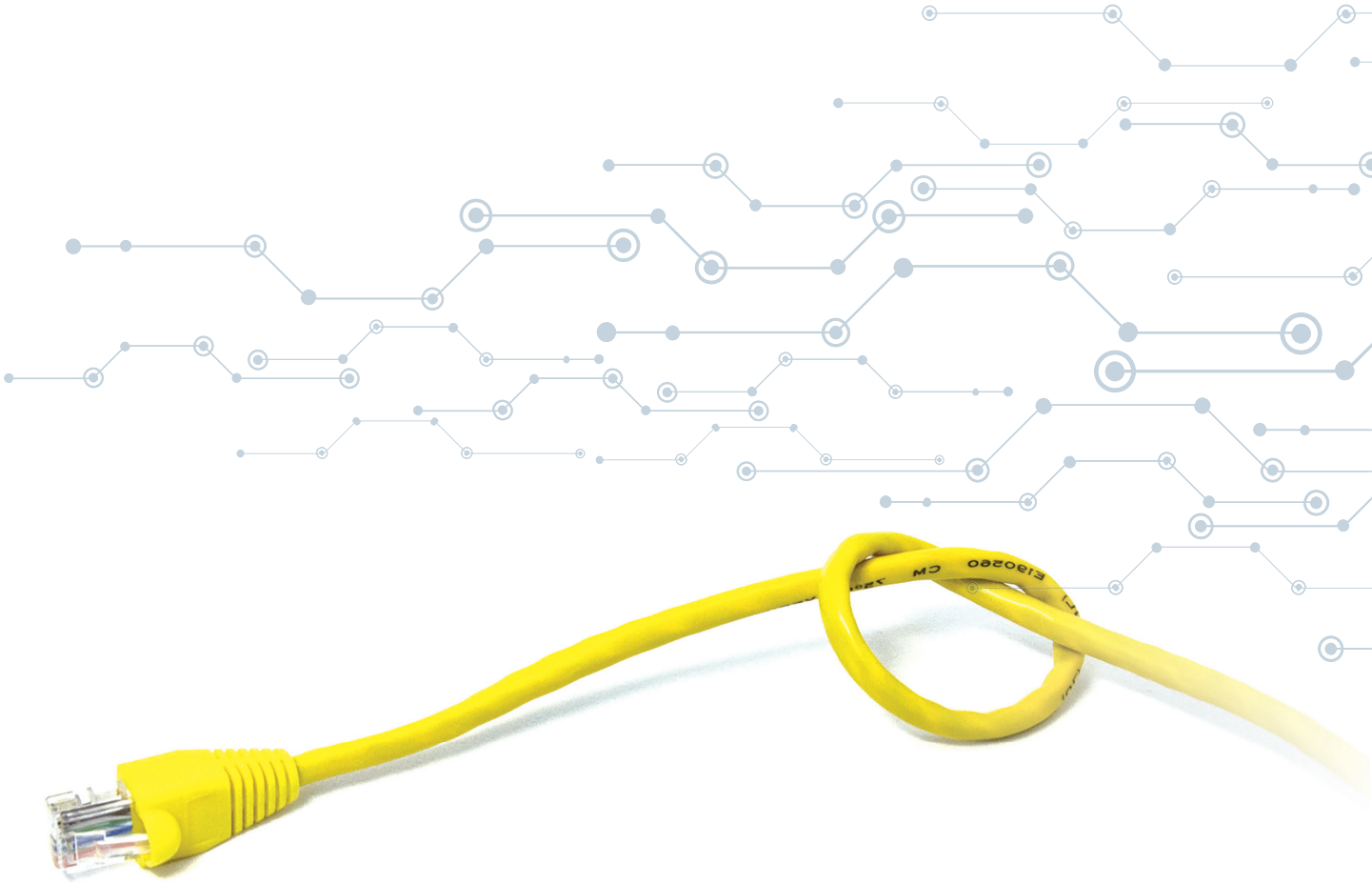
Multimode and Singlemode launch cords neatly arranged and ready to use

FiberXpert launch cords ensure order in the measuring case. The launch cords are coiled gently and can be easily rolled up and stored. The fiber itself is protected and can be stored in the hard case of the FiberXpert OTDR 5000.

FEATURES

- Optimum protection for your launch cord
- Multimode and Singlemode launch cords available
- Common connector combinations available
- Automatic roll-up in the PRO version

Order Number:	FiberXpert Launch Cord
400933	Launch Fiber Pro Singlemode
400931	Launch Fiber Pro Multimode
400932	Launch Fiber Eco Singlemode
400930	Launch Fiber Eco Multimode



ETHERNET NETWORK TESTERS

CableMaster 800

Cable Tester and Network Diagnostic Tool

CableMaster 800 is a professional cable tester equipped with a RJ45 jack for network cables and a F-type connector for coaxial cables. The CableMaster 800 verifies the wire map, determines the cable length and distance to the fault. The results can be saved and documented using the PC-based reporting software. In addition, CableMaster 800 offers many network diagnostics features for troubleshooting such as cable tracing, link detection up to 1 Gbit/s, ping, network discovery, PoE tests and much more. CableMaster 800 is perfectly suited for professional installers and network operators who are challenged with testing and troubleshooting both network (RJ45) and coaxial cabling in active networks.

FEATURES

- Tests network and coaxial cables (RJ45 jack and F-type connector)
- Displays wire map in graphical format for rapid troubleshooting
- Determines cable length and distance to the cable fault performing a full TDR measurement
- Cable/port identification using the cable/port ID remotes
- PoE detection and load test
- Link test up to 1 Gbit/s to identify link capability and current link status
- Pinging of individual or lists of IPv4 and IPv6 addresses as well as any URL on internet
- Network Discovery creates lists of broadcasted devices
- CDP/LLDP/NDP and VLAN discovery
- High resolution color display for excellent readability in any environment
- Generation of test reports and documentation with PC-based reporting software

The CableMaster 800 professional cable tester is highly versatile - whether during installation, to verify which outlet is connected to the appropriate port in the patch panel, after installation, for quality testing and documentation of the cabling, or for in-service troubleshooting of the network.

The test results are displayed on the full-color graphic screen in a clear and easy to understand way. Test results can be saved in the device and be exported to a PC for evaluation or documentation with the free PC reporting software.

Cable Testing

CableMaster 800 features extensive test capabilities for RJ45 network, telephone and coaxial cabling. Consisting of a main unit and a test/ID remote, the CableMaster 800 is the perfect tool to test RJ45 cabling displaying the results in a wire map format on a full-colour graphical display. It verifies continuity, tests for reversals, miswires, split pairs, shorts,

and opens. The cable length and the distance to the open will be determined using the integrated TDR (Time Domain Reflectometer).
CableMaster 800 features an integrated tone generator to send a modulated audible signal into the cable which is detected by an optional tone probe used for cable tracing (unscreened unlabelled cables) and outlet/port identification. Numbered cable ID remotes allow the user easily to identify which outlet is connected to the appropriate patch panel port.

Network Testing

CableMaster 800 enables rapid identification of network ports/outlets while displaying link capability and current link status. With the added network discovery features, any broadcasted devices in the network can be discovered and displayed and saved as a list. Pinging individual or lists of IPv4 and IPv6 addresses as well as a URL will detect their availability.

Save and Report

Cable test results can be saved in the main unit and be exported to the PC-based reporting software via the USB cable included to create professional test reports.

Order Number:	
226520	**CableMaster 800** **Professional Cable and Network Tester** Tests all cable connections, wire map showing shorts, cuts Tests RJ45 data, telephone and coax cabling Active network tester Checks the active network connection, speed and PoE Storage and documentation function (PC software) Easy-to-read color display and integrated tone generator Includes: 1 x CableMaster 800 basic unit 1 x Remote unit 2 x RJ45 cable 6 x AA Batteries, micro USB cable, pouch Optional Accessories: CT15 Tone-Probe can be ordered separately as PS_CT15
226521	**CableMaster 850** **Professional Cable and Network Tester with useful accessories** Functions like PD_CM800 (order no. 226520) Includes: 1 x CableMaster 800 basic unit 1 x Cable Tracker Tone Probe CT15 8 x Remote units 1 x RJ45 cable/alligator clip 20 x coax remotes with labeling (1-20) 9 x RJ45 Cable 6 x AA Batteries, micro USB cable, pouch

NetXpert 1400

Gigabit LAN Qualifier with Network Diagnostic Tool

Easy Cable Testing and Ethernet Speed Certification.

The NetXpert 1400 provides a complete solution for cable qualification and troubleshooting of active networks, enabling rapid, simple verification and documentation of the capability of cabling links to support Gigabit Ethernet operation compliant with the IEEE 802.3ab standard. A “Pass/Fail” result indicates whether the existing cabling can support data rates up to 1 Gbit/s.

FEATURES

- Tests network and coaxial cabeling
- Qualifies data cabling for IEEE 802.3 compliance at transmission rates of up to 1 Gbit/s (BERT)
- Determines signal-to-noise ratio (SNR)
- Measures delay skew
- Performs full TDR for pair length and distance to fault measurements
- Full-color wire map shows opens, shorts, miswires, and split pairs
- Results can be saved in the tester, and standards-based measurement
- Reports showing “Pass/Fail” results can be generated

The NetXpert 1400 is a cost-effective alternative for installers and operators of network cabling systems where qualifying cabling bandwidth up to Gigabit Ethernet is sufficient. The NetXpert 1400 allows users to verify whether cabling links will support a maximum data rate of up to 1 Gbit/s irrespective of the category of the cables, patch panels, or outlets installed.

Performing standards-based tests with real data as per IEEE 802.3ab and Bit Error Rate Tests (BERT) the NetXpert 1400 tests the error free data transmission at 100 MBit/s or 1 Gbit/s. In addition, parameters affecting signal quality can be displayed including Signal-to-Noise ratio (SNR) and delay skew. Delay skew in a 4-pair cable indicates the signal time delay between pairs and can impact Gigabit Ethernet performance.

Continuity test results of all 8 wires and the shielding are displayed in full-color wire map format while showing cable faults such as opens, shorts, miswires, and split pairs in a clear and easy to understand way. Cable length and distance to the cable fault are determined using advanced TDR (Time Domain Reflectometer) technology.

The results can be saved in the NetXpert 1400 and full color reports can be generated for documentation purposes. Featuring a bundle of network testing capabilities, the NetXpert 1400 assists you with verifying network configuration and troubleshooting as any moves, adds & changes (MACs) performed will require a renewed verification. The NetXpert 1400 verifies, when connected to a communications outlet, if a link can be established to the switch and which connection speeds are supported (up to 1Gbit/s). The Ping test detects the availability of individual and lists of IPv4 and IPv6 addresses and any user-selectable URLs.

On top of this, the user can choose from a range of other network tests, such as LLDP/CDP/NDP and VLAN discovery and comprehensive PoE (Power over Ethernet) tests, including a load test.

- Link test up to 1 Gbit/s to identify link capability and link status
- Ping to a single or lists of IPv4 and IPv6 addresses (Ipv6 planned) as well as any URL on the internet
- CDP/LLDP/NDP and VLAN discovery
- PoE / PoE+ detection and load test for voltage drop
- DHCP test
- Traceroute
- Switch port identification by blinking the port LED

Full-color, Easy-to-Use Touch Screen

The full-color touch screen and another 4 buttons make the NetXpert 1400 easy to use while the high-resolution color screen guarantees excellent readability in any environment. Its ruggedized design is ideally suited for rough handling environments. Test reports and documentation can be generated directly on the device.

Bestellnummer	NetXpert 1400
226533	Network and Cabling Qualifier
	Tests all cable connections
	Wire map showing shorts, cuts
	Network Tests with PoE
	Link connectivity, LLDP, ping and DHCP
	Qualification of IEEE-connectivity up to 1 Gbit/s
	NetXpert main unit, active remote
	2 x power supply, 4 GB SD card
	Micro USB cable, 1 network set and coax remote set (each #1-5), F-connector coupler
	2 x Network patch cable
	2 x sacrificial cable, hanging strap and clip, carrying case

LanExpert 80

Inline Gigabit Network Analyzer

The essential tool for LAN installers, technicians, managers and service providers

The LanExpert 80 Network Analyzer is an essential tool for installing, monitoring, maintaining, upgrading or troubleshooting any network. The LanExpert 80 utilizes a color touchscreen interface to access one of the most complete suites of test and analysis functions available in a portable test tool.

FEATURES

- Inline Network Analysis
- Expert Advice
- Network Connectivity Tests
- Packet Capture and Monitoring
- Cable Tests - Wire Map, Length and Power over Ethernet
- Traffic Generator
- Stress Test - RFC 2544

The Inline Mode allows users to non-intrusively monitor network traffic (10/100/1000BaseTX) to identify protocols, port usage, VoIP statistics and network utilization. The LanExpert 80 can capture and store up to 10,000 packets with user defined filters for detailed analysis in the field or downloaded over the network or to a USB flash drive. Using either RJ45 port, tests including Ping, Link, Trace Route, DHCP and Discovery function are used to quickly identify network problems. The LanExpert 80 can generate up to 100% traffic loading with control of packet rate and size to demonstrate network performance at various traffic levels.

Additionally, a stress test that generates traffic and measures performance metrics, in accordance with RFC 2544, is also provided. The stress test can be conducted using the two independent ports on a single unit or used with a second unit located remotely on a network. PoE tests include voltage and inline current measurement to determine the actual power used by a powered device. The LanExpert also tests cables for shorts, opens, split pairs, reversed pairs, measures cable length and generates tones for cable tracing.

Order Number:
226020

LanExpert (LE80) - 2 x Fixed 10/100/1000BaseT Interface

Inline Gigabit network and protocol analyzer, traffic generator
RFC2544 test routine, with extended cables, network and cable test
Handheld main unit with color touch screen
Pouch, remote terminator
Memory stick (contains manual and PC console software)
Short reference guide and charger

optimize!
softing

Softing IT Networks GmbH
Richard-Reitzner-Allee 6
85540 Haar (München)
Deutschland
Tel: +49 89 45 656 660
Fax: +49 89 45 656 656
E-mail: info.itnetworks@softing.com
http://itnetworks.softing.com