

A GUIDE TO SELECTING A COPPER TESTER

Supporting Twisted Pair Networks

FLUKE networks®

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Introduction

Twisted pair copper cabling remains the primary media for connecting users and devices to a network. Copper cabling provides secure and exclusive high performance connections to every user at a reasonable cost. Copper's ability to provide Power over Ethernet means that devices don't require separate power cabling, reducing costs and increasing safety. PoE over copper cabling enables easy connections for the rapidly expanding Internet of Things (IoT). Even Wi-Fi requires copper cabling for access points.

If you install or support copper-cable-based networks or devices, the right tool can save time and make sure things get done right the first time. The tool you need depends on the jobs you expect to perform:

- Am I installing cabling that is expected to support operations decades into the future?
- Is my job mostly about day-to-day support of installed users and devices?
- Do I need to add users or devices to an existing network infrastructure?
- Do I need to provide documentation of my work?

As a result, it's important to know the distinction between the different cable test categories and instrument functionalities so you can choose the tester that truly performs the tasks needed.

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Testers are designed with a variety of focused feature sets for particular tasks. Depending on what task the test tool performs, cable testers can be classified into one of three broad hierarchical categories: certification, qualification, or verification. In addition there are hybrid Cable + Network Testers that combine traditional cable tester capabilities with utilities for testing network connectivity. The ever increasing number of PoE powered devices being connected to the network make these kind of instruments desirable as they enable installation right the first time.

While some features overlap between test tools, each group answers unique question(s):

- **Certification Testers**: Does the installed cabling infrastructure comply with industry standards (TIA/ISO)?
- **Qualification Testers**: Can this existing cabling link support the desired network speed or technology?
- **Verification Testers**: Is this cable connected correctly?
- **Cable + Network Testers**: Can the cabling link support the desired network speed or technology, what are the key switch port characteristics and how much power is the PoE switch port able to deliver?

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A closer look at certification

Certification is the most rigorous of all cable testing. Used primarily by commercial datacom contractors and network owners, certification tools are the only tools that provide “Pass” or “Fail” information in accordance with TIA and ISO standards.

A certification test tool makes many types of measurements across predefined frequency ranges and compares the detailed results to standards. The results from these measurements determine if a link is compliant with a category or Class of cable (for example, Cat 5e, 6, 6A, 8 or Class E, E_A, F, F_A). Certification is the final step required by structured cabling manufacturers to grant their warranties for properly certified projects. Certification test tools provide advanced graphical diagnostics and offer feature-rich project management and documentation capabilities.

When it comes to certifying links to which PoE devices will be connected, the following two parameters are of particular importance:

- Insertion Loss - cables in bundles now get hotter as devices are powered and
- Resistance Unbalance - PoE will not work properly without a balanced infrastructure.

While the Insertion Loss parameter is already part of a certification, Resistance Unbalance is currently an optional test, not yet required for field testing. It is however specified in IEEE-Std-802.3af/at/bt, ANSI/TIA-568-C.2 and ISO/IEC 11801:2010. Certifying Resistance Unbalance is highly recommended to ensure networks are ready for high power PoE use.

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When do you need a certification tool?

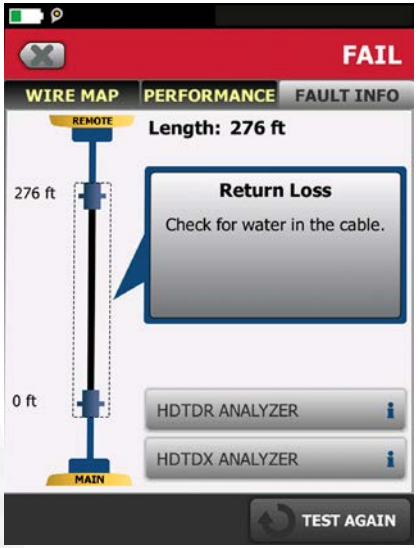


DSX CableAnalyzer™

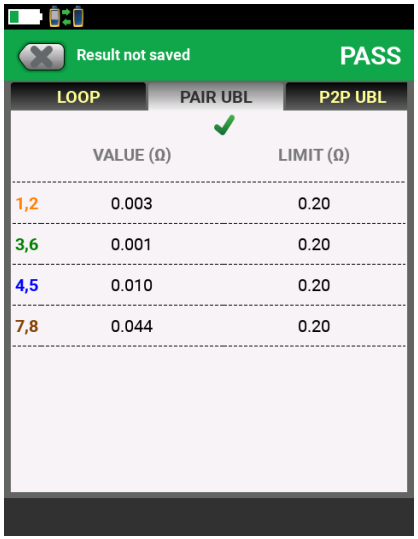
If you're an installer who needs to prove to the network owner that all cabling has been installed correctly, and meets TIA or ISO link specifications, you must certify it. If you are a network owner who wants to check third party installations, a certification tool is your only option. If you are in a troubleshooting environment, and need to show unequivocally that the link under test is failing category 5e, 6, 6A or 8 performance requirements according to the industry standard, your only choice is a certification tool. Certification tools are vital if there is ever any discrepancy or debate with a cabling supplier or installer regarding the performance of installed cabling.

If you're installing or troubleshooting links that are field terminated with an RJ45 plug make sure the tester has the capability to test an Modular Plug Terminated Link (MPTL). Directly connecting devices to the network can improve security by eliminating equipment cords that can be easily disconnected. It is also preferred for connecting IoT devices like cameras and access points that can be in places that are difficult to access.

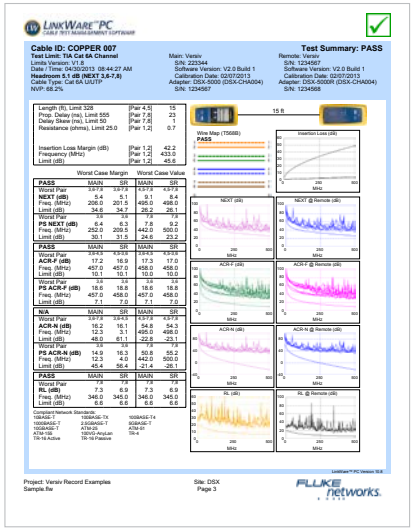
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DSX CableAnalyzers™ provide the most advanced diagnostics for troubleshooting difficult cabling problems.



Too much unbalance causes saturation of the Power Sourcing Equipment transformer. This results in data distortion, causing bit errors, retransmits and even non-functional data links.



An example of a LinkWare™ PC certification report.

When do you need a qualification tool?

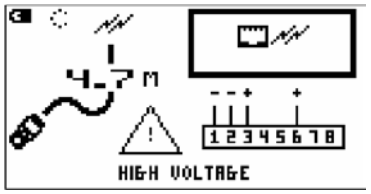


CableIQ™
Qualification Tester

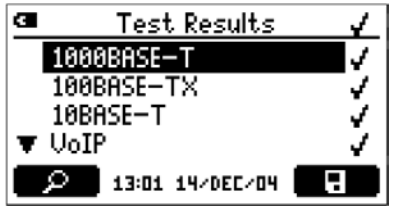
If you are a network technician, and have undocumented cabling and need to see if it will support your network up to 1000BASE-T, a qualification tool is the right choice. If you have an existing network and are doing small adds, moves, and changes, or you are setting up a temporary network and just need to qualify it for a specific network technology, a qualification tool is a good option.

Qualification testers determine if an existing cabling link can or cannot support certain network speeds and technologies (like VoIP and Gigabit Ethernet) and allow you to quickly isolate cabling problems from network problems.

Qualification tools are more powerful than verification tools, but do not perform the battery of tests required to be considered a certification tool.



PoE appearing as voltage between pairs 1-2 and 3-6



CableIQ™ 4-second Autotest clearly indicates with a check mark which speeds and applications the tested cable can run.

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When do you need a verification tool?



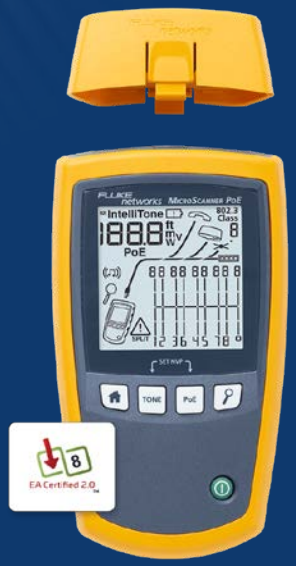
MicroScanner2™
Cable Verifier

Verification tools are typically used by any technician who pulls and terminates cable, performs basic moves, adds and changes. These tools are used as a first line of defense in finding connection and wire-pairing faults.

They perform basic continuity functions, including wiremap and toning. A powerful Time Domain Reflectometer (TDR) function helps to determine the length of the cabling link or the distance to a break or a short circuit in the link-under-test. Verification tools typically also detect and report that the cable under test is connected to an active device such as a hub or switch.

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When do you need a Cable + Network Tester?



MicroScanner™ PoE

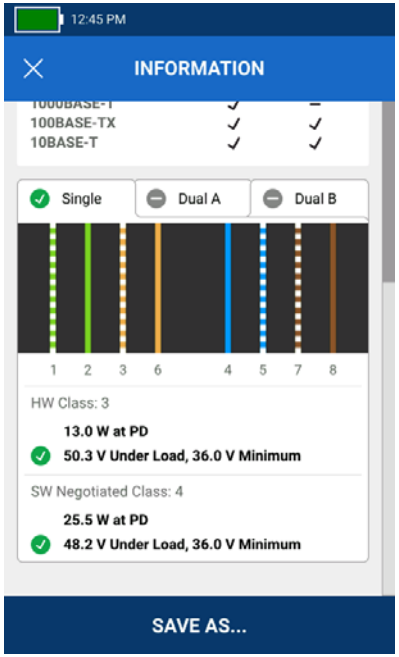
If you are a Network Technician, Network Manager or System Installer you need a twisted pair cabling system to reliably support Ethernet applications up to 10GBASE-T. Swiftly solving network connectivity problems, installing PoE devices right first time and managing network moves, adds and changes effectively, are essential to you.

The MicroScanner™ PoE Cable Verifier graphically displays length, wiremap, opens/shorts and distance to fault. In addition it detects network speed and the class (0-8) from PoE, PoE+ and PoE++ (802.3 at, af, and bt) switches. MicroScanner™ PoE is certified for IEEE 802.3™ Power over Ethernet (PoE) interoperability which ensures flawless operation with IEEE-compliant devices.

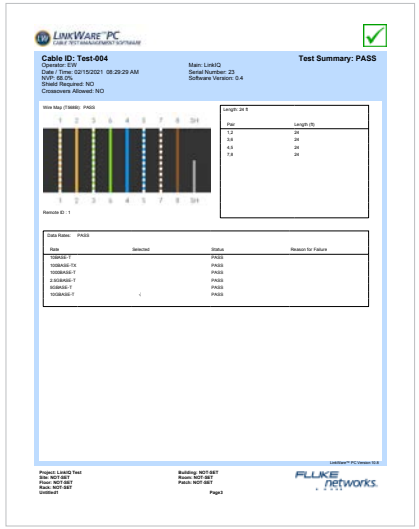
The LinkIQ™ provides those features plus measurement and documentation of cabling bandwidth and Ethernet switch port capability including PoE sourcing.



The LinkIQ™ "speedometer" indicates the maximum Ethernet data rate supported by the cabling.



The LinkIQ™ screen with network speed and PoE Power Sourcing Equipment (PSE) diagnostics including result of PoE loaded test.



Results can be stored in the LinkIQ™ with descriptive names, recalled and exported to a PC for documentation purposes.

Instruments ensuring successful PoE deployment






	MicroScanner™ PoE	CableIQ™	LinkIQ™	DSX CableAnalyzer™ *
	Checks cable continuity and interrogates PoE switch	Troubleshoots network speed or technology	Measures cabling bandwidth and Ethernet switch port capability	Certifies to TIA/ISO & advanced troubleshooter
Certify international standards				✓
Parametric tests on cable and connectors		Measures crosstalk and impedance	Measures crosstalk and loss	Full parametric bi-directional test
PoE Test	✓ class & power	✓ appears as voltage between pairs	PoE Class (1-8), Negotiated Power (up to 802.3at), Power Load Test	Certification of MPTL links. Resistance balance tests to ensure PoE performance of cabling
Shield integrity test to find connections impacting EMC/EMI				✓
Wiremap, continuity, length and tone generation	✓	✓	✓	✓
Documentation of test results for commissioning		250 results in tester. Document with CableIQ Reporter Software	1000 results in tester. Document with LinkWare™ PC	12,700 Category 6A test results in tester. Document with LinkWare PC and LinkWare™ Live (Cloud)
Network Test capabilities		Detects and locates switches and shows link configuration (speed/duplex/pairing)	Switch Name, Port, & VLAN Info; Speed to 10 Gb/s, Simplex/Duplex Identification; Port Blink	
Network speed	10 Mb/s to 10 Gb/s	10 Mb/s, 100 Mb/s, 1000 Mb/s, VoIP	10 Mb/s to 10 Gb/s	
Connector support	RJ45	RJ45 & Coax	RJ-45 (standard); M12D, M12X, and M8 adapters available in LinkIQ-IE kits	RJ45, M12-D, M12-X, Tera, GG45 & Coax (with adapters)
Fiber optic tests				✓(requires optional fiber modules)
User Interface	Monochrome	Monochrome	Color “gesture-based“ touch screen	Large color “gesture-based“ touch screen, ProjX Project Management System & automated fault analysis

* The DSX CableAnalyzer Series consists of the following 3 models: DSX-602 (500 MHz), DSX2-5000 (1 GHz) and DSX2-8000 (2 GHz)

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Service and Support

Getting the tools you need is only the start. Get the support you need from the leader in cable testing solutions.

- Gold support for your tester provides a premium level of support to minimize business downtime and ensure a high return on your investment
- A knowledge base featuring over 1,000 articles on cable testing topics
- Hundreds of hours of videos including product training, troubleshooting tips, and more
- Worldwide service and training
- A support team with over 150 years of cable testing experience



Gold Support members enjoy many privileges.

For a complete view of cable testing technology and Standards information please visit:
https://www.flukenetworks.com/expertise/learn-about/cable-testing

Want to talk to an expert then locate you local contact number on:
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