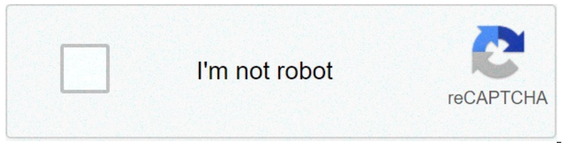

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Measure ethernet cable length software

"Ethernet is Everywhere", those wise words often spoken out by manufacturers of active network components and we have to fully agree. Ethernet as a transportation protocol is not only embedded in the office environment, but has its place in data centers, industrial applications, and has even conquered the intelligent home. Therefore, it is essential for the installer and operator of networks to have extensive testing capabilities to ensure smooth operation of the network. Both after installation, alterations and extensions (Moves, Adds & Changes) and in troubleshooting various tests are required. Up until now this required that the technician carried a wide range of test equipment. Copper Today, copper cables are the media of choice for Ethernet data transmission in all areas of networking - from home cabling and office communication to Industrial Ethernet applications, and data centers. Copper cables are characterized by ease of installation and dramatically increased bandwidth with each new generation of cables and associated specifications. In addition, the new developments, such as PoE (Power over Ethernet) - the remote powering of terminal equipment over data cabling, are only supported by copper cabling. Moreover, copper considerably helps to reduce the TCO of an IT plant, as the active network equipment, for example the copper Ethernet switches and routers are significantly less expensive than their fiber optic counterparts. If you are doing Cat5e/6 gigabit and your PC auto negotiates to gigabit then your data pairs are terminated correctly. If it auto negotiates to 10/100 or doesn't work at all your data pairs are out of order or incorrectly terminated. If a file copy of a large file hits max speed, and wireshark or netstat -s shows lower TCP retransmissions (0.5% or lower is acceptable), then the wire is good. The larger the file you copy the higher the guarantee is that the cable is good. If you need to test the non data pairs (applies to 10/100 ONLY not gigabit which uses all 4 pairs), then you will need either a tester (which tests continuity), or a certifier (which is expensive). Some certifiers only test continuity on the non data pairs anyway, so if you do the same thing it is NOT the end of the world. Cable certifiers make finding the issue quick and easy, and make testing much quicker then a PC. They completely eliminate the possibility of PC hardware issues from the equation. The downside is the price, especially for SOHO or hobbyists. However there are some specialized PC based testers like NetPi turning up, if you are not sure where to start as far as what software to use, and how to use it. Passing Cat6 can be hard, if there are any kinks, nicks, etc. Also if you punch down to a keystone keep the wire twisted as close to the keystone as possible, if you untwist it too much it won't pass. Cat5e cert is good enough for gigabit, so most people are fine with this in SOHO and Hobby. But if you are charging or going to be charging people for Cat6 certified, then it should certify as Cat6. Network testing plays a huge part in the world of cables, but the details surrounding network testing are not well known. For starters, there are different types of testers for different types of technologies, and different tests that can troubleshoot different issues. For this article we will focus on RJ45 Ethernet testers, what they are and what purpose they serve. To start with, we will go over some typical terminology that is used in regards to network testing. We will also explore different types of network tests, and how they are executed. Many of these measurements are calculated by using mathematical formulas, of which we will show a few. If you would like to get into more technical detail with these equations, please see the ANSI/TIA-568-C.2 specification at www.tiaonline.org. Pinout/Continuity: Testing for continuity or resistance continuity refers to the continuous path for current flow in a closed circuit. A continuity tester will also allow you to test if electrical currents can flow between two points. Resistance: This is the measurement of a conductor's opposition to an electron current, which is measured in ohms. When there is resistance present, the current capacity will decrease as the length of a wire increases. This means that the longer the cable, the less current capacity it has. Most professional testers have the ability to measure ohms and can read resistance. Insertion Loss: This is otherwise known as power loss in a return signal when a device is inserted down an optical fiber line. When a transmitted signal is reflected by link components, this causes insertion loss. NEXT: This acronym stands for "near-end crosstalk", which is a failure or interference between two wires inside a cable. This can occur when the wires in a twisted pair cable get crossed. Disturbance is the measurement of interference caused by one twisted pair when wired pairs get crossed. Testing for NEXT can be tricky when some pairs inside the cable pass, and others fail, causing you to have to test each wire individually. PS NEXT: "Power-sum near-end crosstalk is a measurement and extension of NEXT as it applies at the ends of four-wire twisted pair cable. ACR-F: "Attenuation to crosstalk ratio - far end" Ensures a twisted pair cable receives a signal at the receiving end of the cable, to make sure there is no other interference from other cable pairs. ACR-F is measured by network testers in decibels. A network tester can calculate the signal power transmitted into one end of a link of a twisted pair. PS ACR-F: "Power Sum Attenuation-to-Crosstalk-Far End": The difference between PSNEXT and attenuation on the farthest end of the cable. PS ACR-F calculates the power sum of an individual pair ACR-F. ACR-N: "Attenuation to Crosstalk Ratio -Near End": This is the measurement which will tell when signal transmissions are stronger than the interference that is caused by crosstalk at the end of the cable. PS ACR-N: This stands for Power Sum Attenuation-to Crosstalk-Near End and describes the power sum that is the accumulation of attenuation within four wires. Return Loss: This occurs when a cable gets small internal signal clogs caused by reflections that are sent back to the transmitter while en route to the receiver. Return loss normally occurs in cables that have subpar terminations due to shoddy crimping. On top of causing a poor signal transmission, if the amount of return loss in a cable is too high, this can cause the cable to receive a failing grade when tested. Return loss tests are measured in decibels. The equation for return loss for Cat 5e cable channel is: RL = 10 log10(Pout/Pin) The frequency (in MHz) 1< f Professional Testers There are numerous different types of network testers available on the market today. What differentiates professional network testers from other standard testers? The most obvious difference between a generic standard tester and a professional tester is typically the name brand and the cost, as professional network testers usually are much more expensive than other testers. Standard testers can be used by anyone wanting to check the quality of their cables. Professional network testers are typically used in commercial environments and can be used to certify a professional cable installer's work. Ideally, cable manufacturers should test their cables after they are constructed. Then they should be re-tested by an installer before they are placed inside a network. These types of tests are considered preventative maintenance as they ensure the job meets all requirements for the network. Professional testers will have more capabilities when it comes to troubleshooting cable, all while maintaining a higher grade of accuracy. As an added bonus, professional testers will allow you to track and archive your test results for future reference. Having data to reference is especially important when it comes to certifying cables, as the same network may be tested multiple times over a span of a few years. Newer professional network testers will also consolidate all of your test results in one place, and will allow you to upload and manage those results from different projects directly on your smartphone. Larger companies that have multiple professional testers can download software in order to keep all the various test results and network tester information in one place. Checking the quality of wires inside an Ethernet cable is relatively quick and easy. Most testers require you to plug one end of the cable connectors directly into the RJ45 ports on the side of the tester. Standard testers are typically manual and professional testers are usually automatic. The automatic tester will test all the eight wires at once. The automatic tester allows you to use contrasting TIA/ISO testing procedures to highlight many individual tests to check for compliance. TIA/ISO stands for "Telecommunications Industry Association/ International Organization for Standardization." We at CableWholesale use the Fluke DTX 1800 type of professional network tester when testing our own cables. We think it is critical for cable manufacturers to use professional testers when testing cables that they are producing. The Fluke DTX 1800 is upgradeable, which is important to stay up to date with the TIA/ISO-568 requirements. These requirements are the industry standard regarding cable networks within large commercial environments. This tester is fast too; it will certify Cat6 cables in under ten seconds flat. Packet Loss/Crosstalk When you receive interference and an unwanted signal within your cable, you have what is referred to as crosstalk. These ailments go hand-in-hand with what is known as packet loss, which can mutilate data and break up signal strength. These two issues can wreak havoc with your network, but luckily can be tested with a network tester that has test management software installed. Continuity and Current Testers If you need to test voltage, current or continuity, you can do so with an electrical tester. This type of tester allows you to test cables using volts, current, or ohms while checking for circuit shorts within the cable. Testers can automatically measure AC/DC volts and current digitally, often within a matter of seconds. Tone Generator Testers Tone generators usually come with an amplifier probe and can test the continuity of a cable using audio by sending a tone down a group of wires while the amplifier receives that tone and singles out faulty wires within twisted pairs. Tone generators can check for active ports, check for issues on the far ends of cables and can even reallocate unused ports. Certification Testing Some commercial environments require network test certifications. Certification testing is performed with professional network testers by certified installers. This is a way for installers to ensure that the cables that are going into a network meet the TIA/ISO requirements. While this process can be costly, it is another way to gain peace of mind that the cables that are being installed are performing at maximum efficiency. This is especially important in commercial environments. Cables are typically certified before they are installed, and once the infrastructure is in place, you can recertify your cabling every few years to make sure it is still performing up to industry standards. Certification tests will either result in a pass or fail grade. Certification testing can be considered as futureproofing your network against cable failure later down the road. Certification tests will also protect an installer's work in the event that there are future issues. In the event that something goes wrong, they can refer back to the certified test results. There are two types of certification testing, generally referred to as "channel" testing and (depending on the cable tester) "component" or "permanent link" testing. To understand the difference, and why these are important, it helps to remember the composition of a typical network cable run. When installing network cabling in a building, a contractor will typically have bulk Ethernet wire that is terminated at either end to a keystone or patch panel. From there, the building owner can use patch cords to connect to computers, network switches, etc. The bulk wire and patch panel / keystone can be thought of as the "permanent" part of the install, into which customers will plug patch cords later. The entire run, including the patch cords at either end, is the "channel." With every connection that is added to a channel, there is a risk of signal loss. In addition, patch cords themselves, by nature of their construction, can add a bit to signal loss. Therefore, you want to make sure that when patch cords are added to your network run that you are still meeting the category 5e (or category 6) specification that you are installing. So, when installers build the permanent link, they need to ensure that it passes tests with enough margins that the install will still be compliant once patch cords are introduced into the system. This level of testing is referred to as "component" or "permanent link" testing, and is stricter than its channel test counterpart. Once patch cords have been added, the system can be tested with the channel test setting. As a rule, installers who are certifying their work should be performing a permanent link test, so that their clients can rest assured that their networks will perform properly when patch cords and devices are added. In addition, companies that manufacture network products such as bulk wire and patch panels should be able to produce permanent link tests that ensure that their components will perform properly when integrated into a full network. Some companies require that their measurement process be traceable. For this reason you can buy professional testers that come with a Traceable Certificate of Calibration, meaning that the tester is already calibrated to certain testing specifications right out of the box. This is just another perk of buying a professional tester. If you would like to recieve CableWholesale technical articles in your inbox you can request a subscription.

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