Pre-commissioning Cable Tests Create New Revenue Streams

Nobody likes leaving money on the table – especially when it's right within reach. Unfortunately, professional cable installers are doing just that. For new projects that require cable certification, installers are well versed in churning out certification tests and handing the client a detailed report of the results. What many aren't aware of, however, is the fact that businesses are willing to spend a bit extra for Pre-commissioning cable tests that help to ensure their endpoints and IoT devices can operate at optimal levels once the network and/or Power over Ethernet (PoE) equipment is installed. Let's learn more about what these tests are and why customers are willing to pay for them.

What is a Pre-commissioning cable test?

Cable certification tests that professional installers are accustomed to conducting are often performed immediately after copper and fiber is pulled – but before any network equipment is installed. While certification test is valuable in the sense that it confirms meeting manufacturer standards for warranty purposes, it does not provide guarantees of real-world link speed and PoE load capability under load. Thus, once network and power delivery equipment is installed, a Pre-commissioning cable test should be run to verify that cabling, connectors and power delivery hardware meet the required power and network performance for any given use-case.

What is driving the need for Pre-commissioning cable tests?

Increased use of technology via automation, machine learning and IoT is putting pressure on IT staff to deliver network connectivity that's both ubiquitous and reliable. As such, IT leaders have grown more cognizant of network infrastructure problems at the physical layer that potentially hinder these types of digital transformation projects.

Network access devices and sensors connected via copper or fiber cabling are calling for increased throughput to account for the uptick in data that is transmitted between endpoints and application servers these days. Additionally, real-time streaming services require increased performance from a network latency, jitter, and packet loss viewpoint. What many IT shops are discovering is that even with new and fully certified cabling, there's no telling as to how the cabling will actually perform under load at multi-gigabit speeds.

Further compounding the physical layer performance issue is an escalation in the number of PoE devices – many of which require higher levels of power delivery than ever before. The increased numbers of devices combined with higher levels of power output running across each cable can cause electromagnetic interference within and between cables. This interference can significantly impact data transport from a performance and reliability perspective.

What types of Pre-commissioning tests should be run?

To ease concerns of physical layer performance problems in production environments, it is now recommended that Pre-commissioning cable tests be run to simulate how cabling will perform in real-world situations. Both the AEM TestPro CV100 and the Network Service Assistant (NSA) can run these types of tests when connecting to production twisted-pair copper and fiber optic switches – including those that use built-in PoE or midspan power delivery components.

One critical test that must be performed is a Multi-Gigabit Autotest, which puts both traffic and PoE load on the wire simultaneously to create as much of a real-world scenario as possible. A per-pair Signal-to-Noise Ratio (SNR) measurement is then made at 2.5, 5, 10GigE connection speeds, giving you a verification that the signal is strong enough to get through the noise on the wire. Having a per-pair breakdown also provides an indication of headroom. This is a quick test that can be performed with a printed report as a customer deliverable. While Bit Error Rate Testing (BERT) is also sometimes used for this purpose, these types of tests must be left to run over a period of time in order to obtain meaningful results. The ability to run a rapid Autotest under both traffic and PoE load with a printed report output gives contractors a quick and easy path to this new service offering, with the same tester used for certification or qualification+, and no need to purchase additional test gear. Multifunction testing capability also means faster ROI.

As you can see from the example test result below, the Multi-Gigabit Autotest report shows simple pass/fail results at various multi-gigabit link speeds. Additionally, SNR readings are shown on a per-pair basis and PoE load test results indicate the detected PSE Type, allocated power coming from the PSE and actual Wattage (Real Power) delivered to the remote end of the cable:

8-2-A-03

AEM

Pass

Test Time	: 3/5/2020 3:45:33 PM	Limit	: IEEE 802.3
Project	: DECK 8 LAN/PoE	Serial Number	: Main: 4200-0071
Profile	: Validation	Device Software	: 2.8.B4
Operator	: STEVE	Calibration Date	: Monday, August 5, 2019

Cable Length : 124.67 ft

SNR

Network Speed	Result	Limit	Pair 12 (dB)	Pair 36 (dB)	Pair 45 (dB)	Pair 78 (dB)
10G	Pass	0.0	5.6	3.4	3.7	4.8
5G	Pass	0.0	9.4	9.0	10.2	10.1
2.5G	Pass	0.0	12.2	12.7	12.7	12.7
1G	Pass					
100M	Pass					

POE

PSE Type	4
PD Class	8
Cable Pairing	12-36 & 45-78
Allocated Power	71.00 W
Voltage	52.27 V
Current	1.314 A
Real Power	68.69 W

Multi-gigabit and PoE load test result example

A second recommended Pre-commissioning test for existing or newly-installed Cat6A twisted-pair cabling is bi-directional 6-second Cat6A Channel test performed with the TestPro CV100. This test (example below) largely focuses on cabling performance from an RF perspective. This test can point to problems with data transmission interference due to increasingly higher rates of data throughput speeds and/or electromagnetic interference. For those that rely on cable manufacturer warranty programs, this is the test solutions for you.
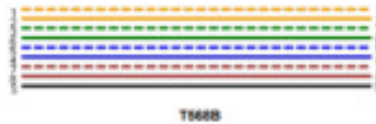
A-004

Pass

Test Time	: 8/19/2020 3:52:16 PM		**Limit**	: TIA - Cat 6A Channel
Project	: 2.9.R3		**Model**	: TestPro CV100
			Serial Number	: Main: 4200-0071, Remote: 4200-0072
Profile	: Certification		**Device Software**	: 2.9.R3
Operator	: Default		**Calibration Date**	: Friday, April 24, 2020
Cable Type / NVP	: CAT 6A UTP , 68%		**Main Adapter**	: PROBE CAT 6A CHANNEL
Connector	: Generic Cat 6A		**Remote Adapter**	: PROBE CAT 6A CHANNEL

Parameter	Result	Pair	Value	Limit
Length(ft)	Pass	78	159.7	328.1
Prop Delay(ns)	Pass	45	253.0	555.0
Delay Skew(ns)	Pass	45	15.0	50.0
DC Loop Resistance(Ω)	Pass	12	15.718	25.000
Res. Unbal, pair-pair(Ω)	Info	45-78	2.133	0.720
Res. Unbal, wire-wire(Ω)	Info	12	11.679	0.308

T568B

RF Parameters

Parameter	Result	Main							Remote						
		Worst Margin				Worst Value			Worst Margin				Worst Value		
		Pair	Margin (dB)	Limit (dB)	Freq (MHz)	Pair	Value (dB)	Freq (MHz)	Pair	Margin (dB)	Limit (dB)	Freq (MHz)	Pair	Value (dB)	Freq (MHz)
Return Loss	Pass	12	1.7	19.0	8.80	12	17.4	458.00	12	0.9	18.8	10.75	12	13.1	500.00
Insertion Loss	Pass	12	1.4	3.1	2.05	45	23.7	500.00	-	-	-	-	-	-	-
NEXT	Pass	36-78	2.2	32.6	266.00	36-78	31.4	480.00	36-78	1.8	29.6	373.00	12-36	30.9	470.00
PSNEXT	Pass	36	4.0	29.7	287.00	36	29.3	480.00	36	2.4	26.8	367.00	36	28.5	475.00
ACRF	Pass	12-45	3.7	10.3	444.00	12-45	14.0	444.00	45-12	4.0	10.3	444.00	45-12	14.3	444.00
PSACRF	Pass	12	6.5	60.3	1.00	45	14.0	444.00	12	6.7	7.3	444.00	12	14.0	444.00
TCL	Info	12	-9.0	40.0	2.05	78	20.1	268.00	12	-9.2	40.0	2.20	12	17.6	433.00
TCTL	Info	45	-3.9	30.0	1.00	45	26.1	1.00	45	-0.5	30.0	1.00	45	22.6	29.95

Insertion Loss

Return Loss

NEXT

TCL

ACRF

ACRN
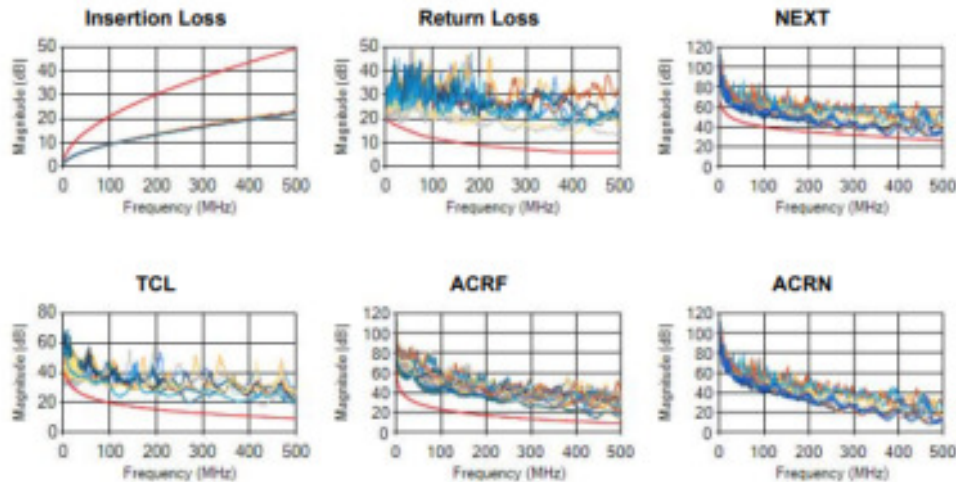
10BASE-T, 100BASE-T, 1000BASE-T, 2.5GBASE-T, 5GBASE-T, 10GBASE-T

TestPro CV100 bi-directional Cat6A Channel Certification test result example

For those that do not need to perform bi-directional certification tests to comply with cable manufacturer warranty programs, single-ended Qualification+ testing using Certi-Lite delivers the ability to verify the primary RF parameters that would provide you with assurance of the physical infrastructure (example below).
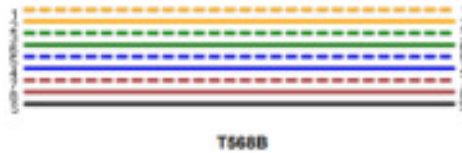
B4-R01-P01-01

AEM

Pass

Parameter	Result	Pair	Value	Limit
Length(ft)	Pass	78	149.6	328.1
Prop Delay(ns)	Pass	45	239.0	555.0
Delay Skew(ns)	Pass	45	15.0	50.0
DC Loop Resistance(Ω)	Pass	78	8.150	25.000
Res. Unbal, wire-wire(Ω)	Pass	12	0.000	0.200

T568B

RF Parameters

Parameter	Result	Main						Remote						
		Worst Margin				Worst Value		Worst Margin				Worst Value		
		Pair	Margin (dB)	Limit (dB)	Freq (MHz)	Pair	Value (dB)	Freq (MHz)	Pair	Margin (dB)	Limit (dB)	Freq (MHz)	Pair	Value (dB)	Freq (MHz)
Return Loss	Pass	12	8.3	14.3	58.25	12	17.6	462.00						
Insertion Loss	Pass	36	1.6	3.1	2.05	36	24.2	500.00						
NEXT	Pass	36-45	5.7	32.4	274.00	45-78	35.6	479.00						
PSNEXT	Pass	36	6.2	29.5	274.00	78	33.1	480.00						
ACRF	Pass	45-12	19.1	25.4	78.25	12-78	39.2	435.00						
PSACRF	Pass	78	21.4	28.4	39.00	45	38.0	496.00						

Insertion Loss

Return Loss

NEXT

ACRF

ACRN
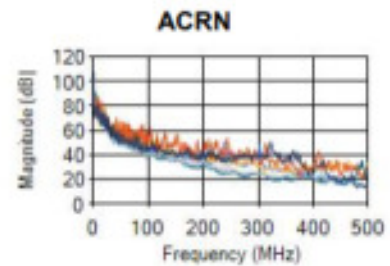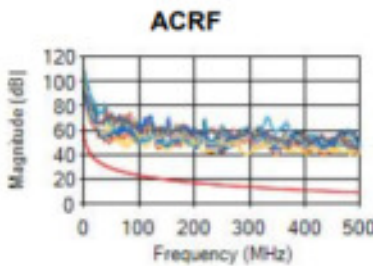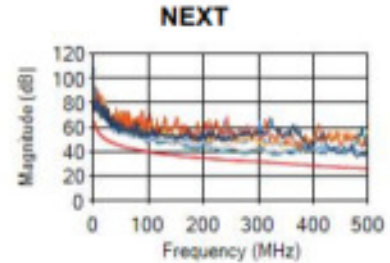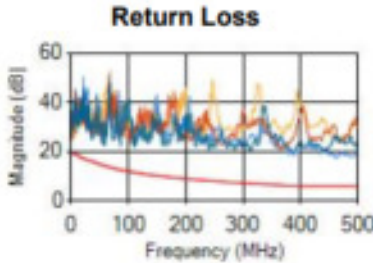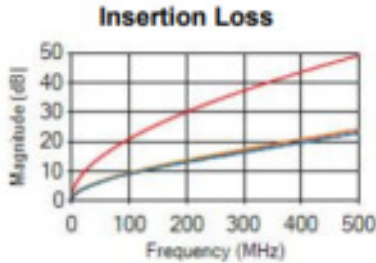
Network Service Assistant Single-ended Cat6A Channel Qualification+ test result example

Pre-commissioning cable tests with reported results will soon become the norm

As with traditional copper and fiber certification tests that are commonly requested as part of a post cable install process, clients are now seeking similar proof that their cabling is shown to meet certain network performance and power requirements for their projects in real-world speed and PoE scenarios. As such, cabling installers can begin offering this newly desired testing and reporting step as part of the overall cable install/verification checklist for an extra fee. What's also important to note is that the AEM bi-directional certification Autotest run as part of this process can be executed in an industry-best 6-seconds per connection including DC Resistance Unbalance, ELTCTL, Return Loss/NEXT/Shield distance to fault and more, as opposed to competitors that take 18 seconds. When hundreds of cables need to be tested, this time savings adds up. Thus, the opportunity to generate new revenue with little time and effort spent is the ultimate way to maximize profit with a single multifunction test solution.

To learn more about AEM and our testing solutions, visit us at AEM-Test.com.

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