	LANmark 2000 Extended Length Conformance to IEE 802.3
Data Communications Competence Center	NHCC13060401

Test Summary

In some installations, there is a need for channels that exceed the specified maximum 100-meter length for structured category cabling. The extended distance channel configuration within this report accommodates installations that are beyond the 100-meter length, yet comply with the system electrical requirements. Testing was performed for both passive and active requirements of IEEE 802.3ab 1000Base-T. Active testing was performed for a period of 20 days with a result of $9.34E^{-13}$ Frame Error Rate (FER) and has exceeded the required Bit Error Rate (BER) 1×10^{-10} for IEEE 802.3ab. The LANmark 2000 CMP channel met the requirements for IEEE 802.3ab for lengths up to 116 meters.

Background

The Berk-Tek Management Team, for the purpose of qualifying LANmark 2000 CMP for extended distances up to 116m, commissioned this testing.

Equipment

The Data Communications Competence Center performed the testing using the equipment listed below:

Model Number	Serial Number
DTX-1800 Main	8716126
DTX-1800 Remote	8716125
Smartbits Chassis	SMB-200
Smartbits Card	GX-1405B
SMC TigerSwitch	8612T

Statement of Limitations

At the client's request, this report provides electrical performance data on the test samples for the purpose of System levels testing and it is not valid to use this report for any other purpose.

Test Setup

Test Method

- LANmark 2000 channel was assembled and tested with the Fluke DTX-1800 to limit specification for 1000 BASE-T. Active data was then transmitted using the Smartbits equipment with the following settings; Ethernet II, IPV4, UDP/IP, 64-byte packets
- Test Schematic is shown in figure 1

Test Hardware

<u>Manufacturer</u>	<u>Part Name</u>	<u>Part Number</u>	<u>Description</u>
Berk-Tek	LANmark-2000 CMP	10163222	Cable
Leviton	CAT 6 Patch Panel	1-058-69586-U24	Patch Panel
Leviton	CAT 6 Extreme	61110-RW5	Jack
Leviton	Cord, UTP,CAT 6 Extreme , 15FT	6D460-15*	Patch Cord (5m)(2each)

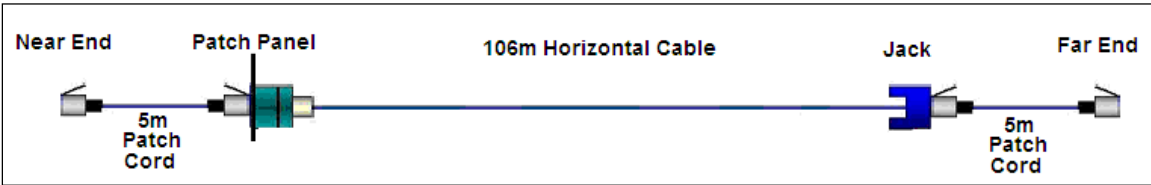


Figure 1: 116m Two Connector Channel Configuration



Observation / Conclusions

The LANmark 2000 CMP channel met the requirements for IEEE 802.3 system specifications for lengths up to 116 meters. The testing utilized a more stringent Frame Error Rate (FER) testing instead of the more common Bit Error Rate (BER) testing. FER testing extends the required test time. This test took place over a period of 20 days. A single bit error discards an entire frame. This test more accurately reveals the impact of errors on the application than BER testing. This result of $9.34E^{-13}$ FER substantially exceeds the IEEE 802.3ab bit error rate 1×10^{-10} target.

Appendix

Test Results:

DTX-1800 Fluke Reports

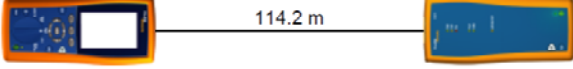



Cable ID: LEV116M
 Date / Time: 04/29/2013 03:50:25 PM
 Headroom 20.3 dB (NEXT 36-45)
 Test Limit: 1000BASE-T
 Cable Type: LANmark-2000 Plenum
 Calibration Date: 05/18/2012

Operator: SST1
 Software Version: 2.6300
 Limits Version: 1.8100
 NVP: 72.0%

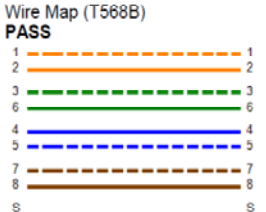
Test Summary: FAIL
 Model: DTX-1800
 Main S/N: 8716126
 Remote S/N: 8716125
 Main Adapter: DTX-CHA002
 Remote Adapter: DTX-CHA002

Length (m), Limit 100.0	[Pair 12]	114.2F
Prop. Delay (ns), Limit 570	[Pair 45]	559
Delay Skew (ns), Limit 50	[Pair 45]	30
Resistance (ohms)	[Pair 45]	17.4
Impedance (ohms)	[Pair 12]	101
Insertion Loss Margin (dB)	[Pair 78]	0.9
Frequency (MHz)	[Pair 78]	99.3
Limit (dB)	[Pair 78]	23.9

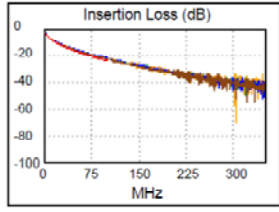


114.2 m

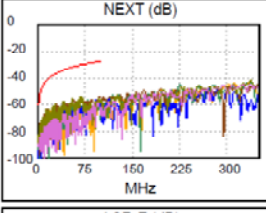
Wire Map (T568B)
PASS



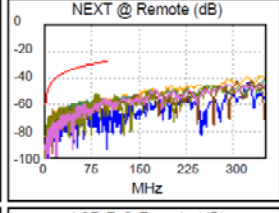
Insertion Loss (dB)



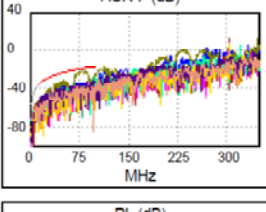
NEXT (dB)



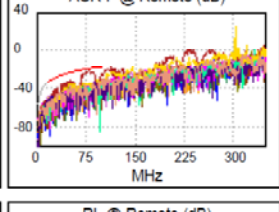
NEXT @ Remote (dB)



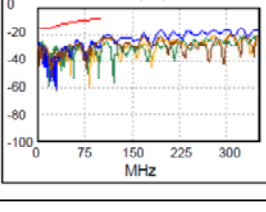
ACR-F (dB)



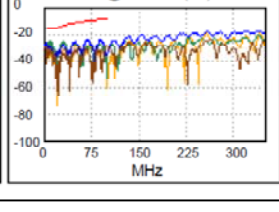
ACR-F @ Remote (dB)



RL (dB)



RL @ Remote (dB)



	Worst Case Margin		Worst Case Value	
	MAIN	SR	MAIN	SR
PASS				
Worst Pair	36-45	36-78	36-78	36-78
NEXT (dB)	20.3	20.7	23.4	22.9
Freq. (MHz)	1.9	4.9	68.3	81.0
Limit (dB)	56.1	49.1	29.9	28.6
PASS				
Worst Pair	36-45	45-36	36-45	45-36
ACR-F (dB)	2.0	1.9	2.0	1.9
Freq. (MHz)	79.5	79.8	79.5	79.8
Limit (dB)	19.0	19.0	19.0	19.0
Worst Pair	45	36	45	36
PS ACR-F (dB)	4.6	4.6	4.6	4.6
Freq. (MHz)	79.5	79.5	79.5	79.5
Limit (dB)	16.4	16.4	16.4	16.4
PASS				
Worst Pair	36	36	45	45
RL (dB)	9.2	9.5	13.4	13.7
Freq. (MHz)	6.4	6.4	62.8	68.5
Limit (dB)	15.0	15.0	10.0	9.7

Note:

Length is indicating a failure; this is due to the tester being hard coded for a maximum length of 100 meters. All other parameters indicate passing with margin to the 1000 Base-T specification.

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Data Communications Competence Center

Nexans' Data Communications Competence Center, located at the Berk-Tek Headquarters in New Holland, Pennsylvania, focuses on advanced product design, applications and materials development for networking and data communication cabling solutions. The Advanced Design and Applications team uses state-of-the-art, proprietary testing and modeling tools to translate emerging network requirements into new cabling solutions. The Advanced Materials Development and Advanced Manufacturing Processes teams utilize sophisticated analytical capabilities that facilitate the design of superior materials and processes. The Standardization and Technology group analyzes leading edge and emerging technologies and coordinates data communication standardization efforts to continuously refine Nexans' Technology Roadmap. An international team of experts in the fields of cable, connectors, materials, networking, standards, communications and testing supports the competence center. The competence center laboratories are a part of an extensive global R&D network.



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