



Agilent N2640A WireScope™ Pro

Certifying Structured Cabling for Network Standards

Product Note

N2640A WireScope Pro – An Expandable Platform

WireScope Pro supports copper cable certification to TIA Categories 3 to 6A and ISO Classes C to E, Class E_A and F limits. Sweeping a full 1 GHz in a few seconds, it boosts Category 6A and Class F measurement times to industry leading speed, and provides a future proof platform.

The instrument not only certifies LAN cabling against cabling standards, but also allows checking the installation against the requirements of common networking standards. In addition to copper standards, the instrument also addresses a large number of TIA and ISO fiber networking standards, as well as several legacy standards.

This document describes how the WireScope Pro defines the PASS/FAIL criteria for the “Certify Networks” function.

WireScope Pro vs. FrameScope Pro

There is a fundamental difference between the network performance tests offered by FrameScope Pro and the “Certify Networks” function of WireScope Pro: during RFC 2544 testing, which is commonly used to stress-test network connections, a pair of FrameScopes generates test traffic up to full line rate, and observes frame losses and other performance parameters such as network latency. While it is possible to

Network Standard	Certification Criteria
10BASE-T	Frequency range: 1 to 16 MHz The following limit values apply to Transmit Pair 1, 2 and Receive Pair 3, 6: NEXT ≤ -26 dB, Attenuation ≤ 26 dB, SNR > 14.5 dB [1]
100BASE-TX	Frequency range: 1 to 80 MHz The following limit values apply to Transmit Pair 1, 2 and Receive Pair 3, 6: NEXT ≤ -29dB, Attenuation ≤ 29dB, SNR > 15 dB [1]
1000BASE-T	Frequency range: 1 to 128 MHz The following limit values apply to all pair combinations: NEXT, Attenuation, Return Loss and ELFEXT pass Category 5 limits, and SNR > 19 dB, Delay Skew < 50 ns
10GBASE-T	Frequency range: 1 to 500 MHz The following limit values apply to all pair combinations: NEXT, Attenuation, Return Loss, ELFEXT, Delay and Delay Skew pass TIA/EIA TSB-155 limits

Table 1: Copper Cable Test Criteria

run this test (and other FrameScope tests) on a passive link without an operating network infrastructure, those tests are not revealing any metrics for the cabling quality. FrameScope Pro is targeted to verify service level agreements and the availability and performance of network services.

In contrast, the measurement results WireScope Pro acquires during the cabling certification can be compared against the requirements defined by international networking standards.

The cabling certification is done when the cabling system is installed, and before the network is turned up – early enough to allow for corrective actions in case of a failure or a marginal result.

Table 1 above lists the copper cabling requirements for Ethernet speeds from 10 Mbit/s to 10 Gbit/s.

[1] SNR is measured in a proprietary way using the internal 10/100BASE-T network interface.



Table 2 below reflects the reference table used by the WireScope Pro for optical Ethernet fiber networking standards. The table is compiled from individual network specifications. It is meant for general reference.

Please note that some cable vendors may define their own limits for specific cables, which may be less stringent. In such cases, please refer to the specifications provided by the vendor.

Network	Nominal Wavelength	Maximum Length Limit			Maximum Loss Limit		
		Multimode Fiber		Single Mode Fiber	Multimode Fiber		Single Mode Fiber
		62.5/125 μm	50/125 μm		62.5/125 μm	50/125 μm	
10BASE-FL	850 nm	2,000 m	2,000 m		12.4 dB	7.8 dB	
10BASE-FB	850 nm	2,000 m	2,000 m		12.5 dB	7.8 dB	
100BASE-FX	1300 nm	2,000 m	2,000 m		11.0 dB	6.3 dB	
100BASE-LX10	1310 nm			10,000 m			6.0 dB
1000BASE-SX	850 nm	220 m, at 160 MHz·km modal bandwidth	500 m, at 400 MHz·km modal bandwidth		2.4 dB	3.4 dB	
		275 m, at 200 MHz·km modal bandwidth	550 m, at 500 MHz·km modal bandwidth		2.6 dB	3.5 dB	
1000BASE-LX	1300 nm	550 m, at 500 MHz·km modal bandwidth	550 m, at 500 MHz·km modal bandwidth		2.4 dB	2.4 dB	
	1310 nm			5,000 m			4.6 dB
1000BASE-LX10	1300 nm	550 m, at 500 MHz·km modal bandwidth	550 m, at 500 MHz·km modal bandwidth		2.4 dB	2.4 dB	
	1310 nm			10,000 m			6.0 dB
10GBASE-SR	850 nm	26 m, at 160 MHz·km modal bandwidth	66 m, at 400 MHz·km modal bandwidth		2.6 dB	2.2 dB	
		33 m, at 200 MHz·km modal bandwidth	82 m, at 500 MHz·km modal bandwidth		2.5 dB	2.3 dB	
			300 m, at 2,000 MHz·km modal bandwidth			2.6 dB	
10GBASE-SW	850 nm	26 m, at 160 MHz·km modal bandwidth	66 m, at 400 MHz·km modal bandwidth		2.6 dB	2.2 dB	
		33 m, at 200 MHz·km modal bandwidth	82 m, at 500 MHz·km modal bandwidth		2.5 dB	2.3 dB	
			300 m, at 2,000 MHz·km modal bandwidth			2.6 dB	
10GBASE-LR	1310 nm			10,000 m			6.0 dB
10GBASE-LW	1310 nm			10,000 m			6.0 dB
10GBASE-ER	1550 nm			30,000 m			11.0 dB
10GBASE-EW	1550 nm			30,000 m			11.0 dB
10GBASE-LX10	1300 nm	300 m, at 500 MHz·km modal bandwidth	240 m, at 400 MHz·km modal bandwidth	10,000 m	2.5 dB	2.0 dB	6.6 dB
	1310 nm		300 m, at 500 MHz·km modal bandwidth			2.0 dB	

Table 2: Optical Ethernet Fiber Test Criteria

Table 3 below reflects the reference table used by the WireScope Pro for legacy fiber networking standards. The table is compiled from individual network specifications and is meant for general reference. Where cable vendors define their own limits, please refer to the specifications provided by the cable vendor.

Network	Nominal Wavelength	Maximum Length Limit			Maximum Loss Limit		
		Multimode Fiber		Single Mode Fiber	Multimode Fiber		Single Mode Fiber
		62.5/125 μm	50/125 μm		62.5/125 μm	50/125 μm	
ATM-155	1300 nm	2,000 m	2,000 m		10.0 dB	5.3 dB	
	1310 nm			15,000 m			7.0 dB
ATM-622	1300 nm	500 m	500 m		6.0 dB	1.3 dB	
	1310 nm			15,000 m			7.0 dB
FDDI	1300 nm	2,000 m	2,000 m		11.0 dB	6.3 dB	
	1310 nm			40,000 m			10.0 dB
Fiber Channel-SX	850 nm	300 m	500 m		4.0 dB	4.0 dB	
Fiber Channel-LX	1300 nm	1,500 m	1,500 m		6.0 dB	5.5 dB	
OC3-SX	850 nm	500 m	500 m		9.0 dB	9.0 dB	
OC3-LX	1300 nm	2,000 m	2,000 m		11.0 dB	11.0 dB	
	1310 nm			15,000 m			16.0 dB
OC12	1300 nm	2,000 m	2,000 m		7.0 dB	7.0 dB	
	1310 nm			15,000 m			13.0 dB
OC48	1310 nm			2,000 m			10.0 dB
Token Ring	850 nm	2,000 m	2,000 m		13.0 dB	8.3 dB	

Table 3: Legacy Fiber Network Test Criteria

For Sales and Service information call:



Gap Wireless Inc.

Toronto
905-826-3781

Montreal
514-469-0776

Edmonton
780-628-4886

www.agilent.com

www.agilent.com/find/wirescope

Copyright © 2008 Agilent Technologies
January 30, 2008

5989-7951EN

Head Office

14 - 2900 Argentia Road, Mississauga, ON L5N 7X9
Tel: 905-826-3781 Fax: 905-826-9837

www.gapwireless.ca



Agilent Technologies