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WT-476i1 G.hn Access
COAX Performance Testing Solution

G.hn Access is broadband access network solution based on the ITU-T G.hn standard that supports the Multi Dwelling Units (MDUs) environment, including large apartment complexes and office buildings. The Broadband Forum's WT-476i2 test plan is relied upon by test laboratories, service providers, equipment manufacturers and chipset makers to evaluate the performance of this technology. The performance tests in the standard are designed to ensure correct functional operation and leverage the performance of G.hn Access with the GAM and one CPE/GNT modem on coaxial cable, with pass/fail criteria according to the ITU-T Recommendation's G.996x for G.hn.

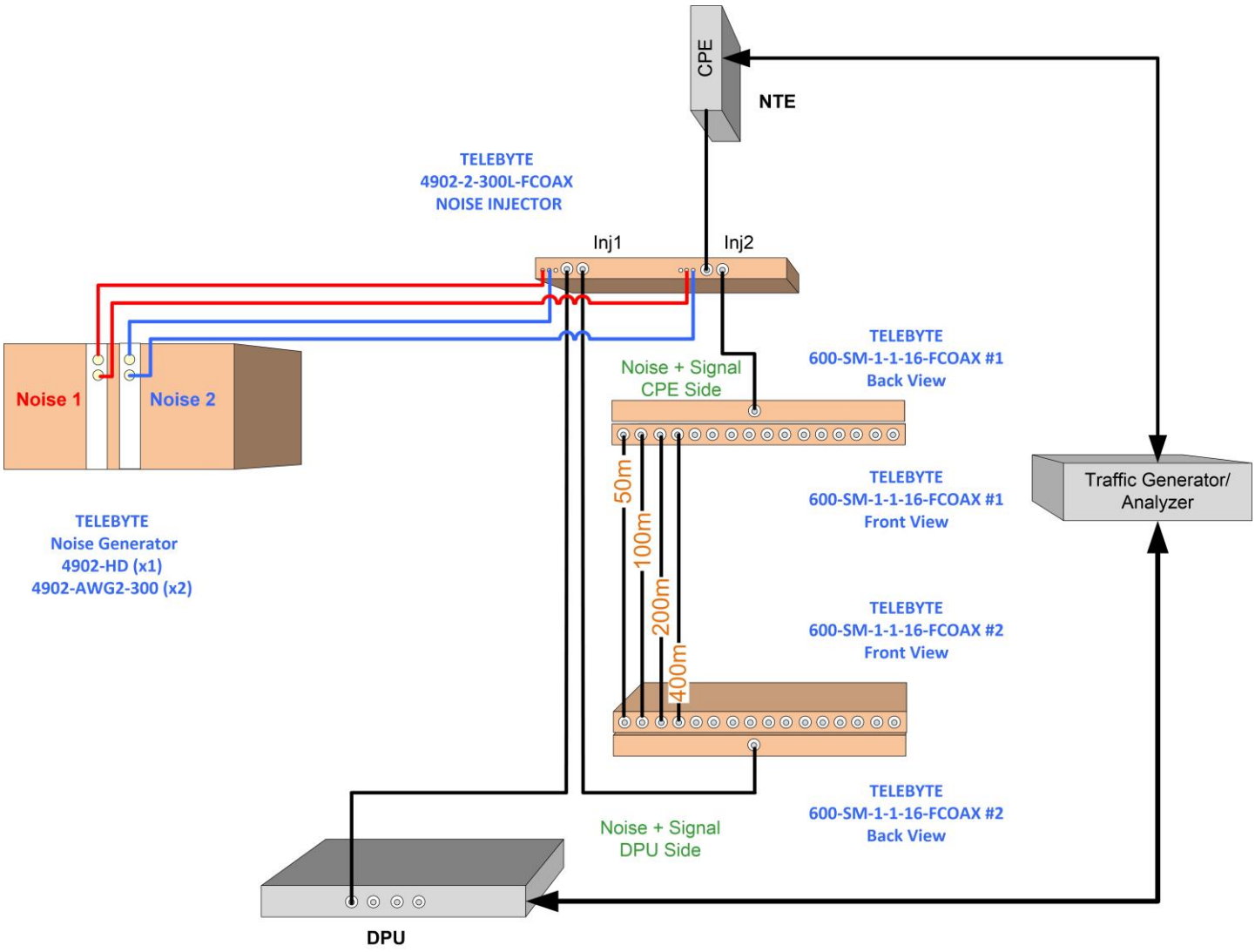
Telebyte's WT-476 G.hn Access COAX Performance Testing Solution is ideal for automated switching of multiple lengths of coaxial cable. Customers may already own many components of this solution!

Features of the Solution:

- Up to 16 cable Lengths
- Supports 138kHz to 300MHz
- Automated G.hn Access rate vs reach testing with noise interference
- High performance transparent switches
- 75 ohm terminations for unused pairs
- Reverse Power Feed support of ETSI Short Range specs (SR2 & SR3)
- Bidirectional
- Low Noise testing
- Dynamic Range of Noise Output -95dBm/Hz to -160dBm/Hz (full bandwidth)

Cost-Effective Solution **Utilize Existing Equipment**

WT-476i1 Test Setup



While the actual WT-476i1 document provides the vital step-by-step details for all aspects of testing the standard, most of the tests are run using one basic equipment setup with no changes in connections.

The RG-6 coaxial cable loops must be calibrated to ensure they are the correct electrical length per the requirements of TR-285 and WT-476i1 when connected to the switch and noise injector. The switch supports up to 16 lengths. In the above example, 12 additional custom lengths or cable types may be installed.

Where applicable, a Diplexor may be placed between one or both of the 600 Series switches and the noise injector.

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Solution Components

Telebyte Model	Quantity	Description
600-SM-1-1-16-FCOAX	2	Transparent Switching Matrix Module (1 x 16 matrix) for Coaxial Cable. (F-Type connectors, 480 MHz)
600-6SL	1	Chassis accepts six 600 Series modules. Required for control of modules. Includes web browser-based graphical user interface.
4902-HD OR 4902-Portable	1	Universal Noise Generator – High Density Version OR Universal Noise Generator – Portable Version
4902-AWG2-300	1*	2-Port AWG Card with 300MHz bandwidth
4902-N22	1	WT-380i2/WT-476i1 Gfast / G.hn Access Noise Library
4902-2-300L-FCOAX	1	2-Channel Coax Cable Noise Injector (20 kHz to 300 MHz) for Coaxial Cable. Interface is Coax F-Type Connector.
VeEX Digital Lightwave MPA™	1	Multi-Protocol Analyzer™

*While one AWG card is the required minimum for WT-476i1, two AWG cards are required for simultaneous frequency domain and time domain impulse noise testing.

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Solution Images

The 600-6SL 6-Slot Chassis accepts up to 6 of the 600 series switching modules. In the example above, 2, 600-SM-1-1-16-FOAX modules are installed in the chassis.

4902-Portable: Portable version holds up to 4 (2 or 4-port) AWG cards for a maximum of 16 AWG outputs

4902-HD: High-density version holds up to 6 (2 or 4-port) AWG cards for a maximum of 24 AWG outputs

4902-2-300L-FCOAX
2-Channel Coax Cable Noise Injector

VeEX Digital Lightwave Model MPA™
Multi-Protocol Analyzer

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Component Specifications

600-SM-1-1-16-FCOAX Transparent Switching Matrix Module Specifications	
Bidirectional Signal Switching Capability **Bandwidth**	1 output channel to any one of 16 input signal channels 1 of 16 input signal channels to 1 output channel 138kHz to 480MHz bandwidth
Insertion Loss	1 MHz: 0.03 dB 10MHz: 0.05 dB 50MHz: 0.12 dB 100MHz: 0.18 dB 200MHz: 0.30 dB 400MHz: 0.50 dB 480MHz: 0.60 dB
Signal Connectors	• 16 F-Type Coax connectors on front • 1 F-Type Coax connector on back
Noise Floor	Less than -167 dBm/Hz
Impedance	75Ω
Relay Cycles of Operation	More than 5,000,000 cycles

600-6SL 6-Slot Chassis Specifications	
Capacity	Accepts 1-6, 600 Series modules
Remote Control	Web Interface, or Command Line Interface (CLI) via Telnet
Mounting Options	Desktop or mount in 19" inch rack
Dimensions	[4U] 19 in W x 6 in D x 7 in H (482.6 mm W x 152 mm D x 177.8 mm H)
Power Supply Requirements	88 to 264 VAC, 50 or 60 Hz

4902-Portable Universal Noise Generator Specifications	
Remote Commands	Command Line Interface (CLI) via Telnet
Included Software	Telebyte Universal Gfast/G.hn Access Noise Generator Software
Power supply	AC 90 V to 264 V, 47 to 63 Hz
Operating Temperature Range	0 to 50 º C
Operating Relative Humidity	5% - 95% non-condensing
Mechanical Dimensions	DxWxH: 9.5" D x 13.5" W x 17.5" H
Weight	32 lbs.
Connectors	10 USB 3.0 Ports, 4 USB 2.0 Ports (2 front), 2 RJ-45 Gigabit LAN
Display	Integrated 17.3-in WUXGA+ (1920 x 1080) display

4902-HD Universal Noise Generator Specifications	
Remote Commands	Command Line Interface (CLI) via Telnet
Included Software	Telebyte Universal Gfast/G.hn Access Noise Generator Software
Power supply	AC 90 V to 264 V, 47 to 63 Hz
Operating Temperature Range	0 to 50 º C
Operating Relative Humidity	5% - 95% non-condensing
Mechanical Dimensions	DxWxH: 19.5" D x 16.8" W x 7.0" H
Weight	32 lbs.
Connectors	10 USB 3.0 Ports, 2 eSATA Ports, 2 RJ-45 Gigabit LAN

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Component Specifications continued

4902-AWGx-300 AWG Card Specifications	
Bandwidth	1 kHz to 300 MHz
Noise Outputs	4902-AWG2-300: 2 4902-AWG4-300: 4
Interference Profile Accuracy	≤ 0.5 dB mean absolute error (MAE) for Crosstalk PSD
AWGN Crest Factor	> 5
AWGN Gap	< 10%
Output Impedance	50Ω unbalanced
SMA Connectors	4902-AWG2-300: 2 4902-AWG4-300: 4

4902-2-300L-COAX 2-Channel Noise Injector Specifications	
Bandwidth	20 kHz to 300 MHz continuous frequency response of signal path
Injection Type	Single Ended
Maximum RMS Output	+5 dBm
Crest Factor	Greater than 5
Noise Floor	Below -167 dBm/Hz as measured at the output of the noise injector
Connectors	• SMA: (3) Female Connectors per channel for Independent Differential Mode noise from 4902-Portable or 4902-HD • 4 F-Type Coax Connectors on front (2 Input/Outputs for each channel)

Specifications are subject to change without notice. Made in the USA.