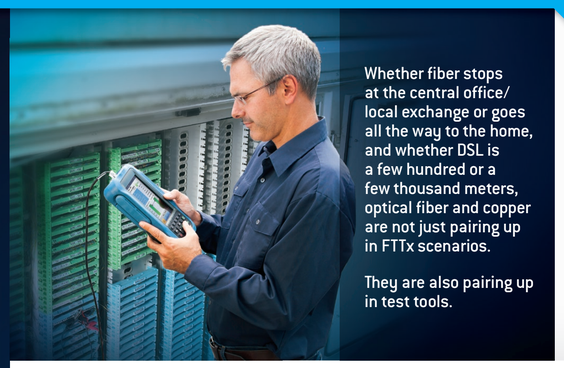
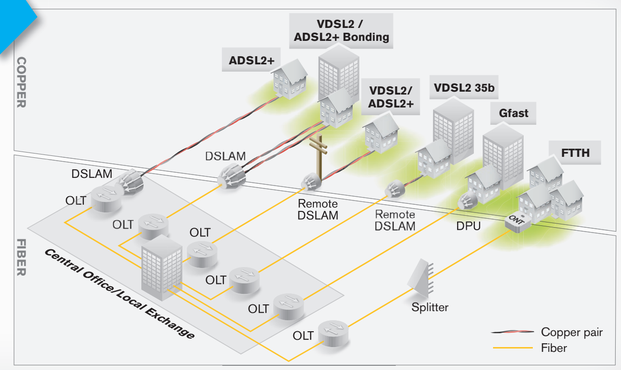
FTTdp and Gfast Reference Poster

WHERE COPPER MEETS FIBER



Whether fiber stops at the central office/ local exchange or goes all the way to the home, and whether DSL is a few hundred or a few thousand meters, optical fiber and copper are not just pairing up in FTTx scenarios.

They are also pairing up in test tools.



Network topology

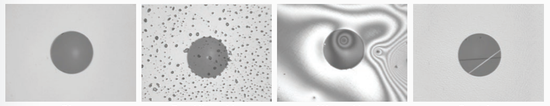
OPTICAL PHYSICAL LAYER TESTING

Connector inspection

Required to prevent high loss and reflectance as well as permanent damage to network equipment

Causes

- Contamination from dust, isopropyl alcohol, oil from hands, mineral oils, index-matching gel, epoxy resin, oil-based black ink and gypsum
- Physical damage (scratches and chips) to the connector endface



Clear *Dust/dirt residue* *Wet residue* *Scratches*

Fiber inspection solutions

Probe *Test platform (or standalone display)* *Analysis software* *Cleaning devices (wet, dry or hybrid method)*

Fiber characterization

Required to make sure that a network meets system specifications or network standards

- Budget loss
- Reflectance and return loss
- Fiber length
- Poor connections
- Microbends
- Bad splices
- Bad drop cable
- Faulty ONT
- Macrobends
- Fiber breaks
- Faulty splitter branches

Ports	Splitter loss (dB) (excluding connections and excess splitter loss)
2	3
4	6
8	9
16	12
32	15
64	18

OTDR: The tool of choice for end-to-end fiber link characterization

Test platform *OTDR test module* *iOLM: Intelligent Optical Link Mapper* *Launch cables*

10G-PON

10G-PON is now the defacto deployment scheme to increase bandwidth both up- and downstream, replacing standard GPON

- Defined in ITU-T G.987
- Uses Ethernet, TDM or TDMA protocol
- Voice, data, triple-play applications
- Up to 20 km, with a split ratio up to 1:256
- Asymmetric (10G down and 2.5G up) or symmetric (10G up and down)
- Nominal wavelengths (up/down):
  - XG and XGS PON: 1270/1577 nm
  - NG-PON: 1524-1544/1596-1603 nm
- May overlay legacy GPON (1490/1550/1310 nm)

Live field reporting

Edit, analyze and document all your work while boosting reporting productivity

FastReporter 2 DATA POST-PROCESSING SOFTWARE

- Live data analysis with direct on-site report generation and minimal risk of error*
- A single software solution to manage your data and generate reports for all your optical layer test applications
- Faster job completion, and faster transition to the next job

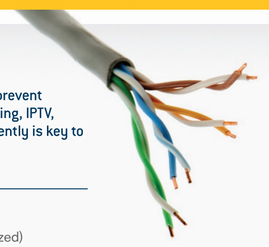
***Edit** multiple measurement files* ***Analyze** multiple measurement files* ***Document** your network*

**Available only or FTB-1, FTB-1 V2 and FTB-2 platforms*

TESTING COPPER TWISTED PAIRS AND GFAST/VDSL2 PERFORMANCE

Copper twisted pair characterization

The copper plant must be free of performance-limiting faults that will restrict or prevent subscribers from the enjoyment of advanced services, such as OTT video streaming, IPTV, VoIP, gaming, social media and web browsing. Detecting and locating faults efficiently is key to ensure the rapid installation and repair of subscriber Gfast or VDSL2 circuits.



Key performance indicators

Automated test scripts
Suite of copper measurements to assess key performance indicators and evaluate against pass/fail thresholds

Fault location
RFL/K-Test
TDR

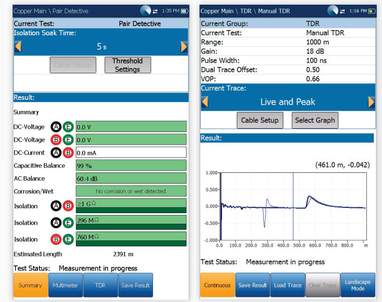
Loop length
TDR

DVOM
AC voltage (400 V)
DC voltage (280 Vrms)
Shorts/resistance
Opens/capacitance
1GΩ leakage/insulation resistance up to 500 V
Ground resistance/station ground

Balance
Stressed (energized)
Longitudinal
Resistive

Noise
Metallic/voiceband
Power influence
Wideband to 30 MHz
Impulsive (REIN, PEIN, SHINE)

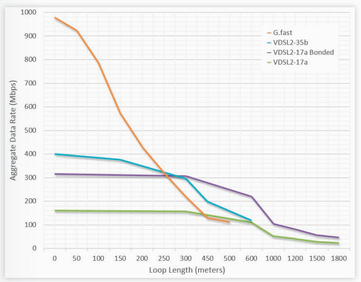
smartR™

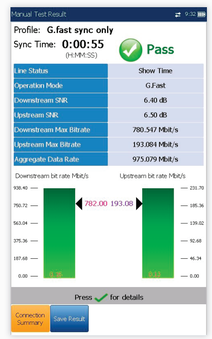


Gfast and VDSL2 Performance Validation

As operators are faced with increasing competition and demands from subscribers for more bandwidh and faster speeds, the latest technologies of Gfast, VDSL2-35b and VDSL2-17a bonding deliver, allowing operators to maximize their delivery of services to subscribers while remaining competitive with aggregate data rates of up to 1 Gbit/s.

Technology	Gfast	VDSL2-35b	VDSL2-17a
Standard	ITU-T G.9700/ ITU-T G.9701	ITU-T G.993.2/ Annex Q	ITU-T G.993.2
Maximum Aggregate Speed	1 Gbit/s	350 Mbit/s	150 Mbit/s
Typical Deployment Distance	< 250 m	< 550 m	< 1000 m
Maximum Bandwidth	106 Mhz	35 Mhz	17.7 Mhz
Line Coding Used	DMT	DMT	DMT
Tone Spacing	51.75 kHz	4.3125 kHz	4.3125 kHz
TDD or FDD	TDD	FDD	FDD
Vectoring Supported	Always	Yes	Yes
Technology Co-existance	Voice/ADSL2+/ VDSL2-17a	Voice	Voice





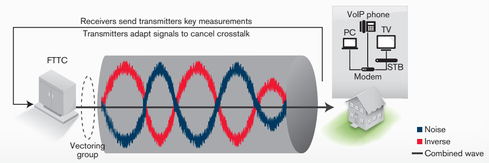
Bonding

Proper testing is needed to ensure the bonded group is properly configured and that both pairs are suitable in belonging to the same bonded group. However, it is only truly possible to test the higher layers by way of services testing such as IPTV, VoIP or TCP network bandwidth performance if the bonded group is in place. Without the bonded group successfully configured, the DSL systems data pump will not allow traffic flow.

- Defined in ITU-T G.998.1 and G.998.2
- Supports both ADSL2+ and VDSL2 up to 17a
- Combines two wire pairs to:
  - Increase capacity
  - Extend reach
  - Deliver from CO/LE (MDF) as well as from street cabinet/remote (FTTx)

Vectoring

- Defined in ITU-T G.993.5 for VDSL2 and Gfast
- Self-FEXT (far-end crosstalk) cancellation in both directions
- Measures FEXT noise on every line of the binder
- Increases performance up to 90%
- Shorter cable length, higher performance



THE PERFECT FIELD TOOL FOR END-TO-END FTTx CHARACTERIZATION

MaxTester 730C

Fully featured, entry-level, dedicated OTDR with tablet-inspired design, suitable for:

- FTTx/PON testing though splitters (up to 1 x 128)
- Access network testing (P2P)
- Metro links testing (P2P)
- Live fiber troubleshooting

iOLM

Intelligent and dynamic application that turns complex OTDR trace analysis into a one-touch task.

- One-touch, automatic analysis and clear link view display
- Automatic parameter settings and clear go/no-go results
- Accurate analysis with Link-Aware technology™
- Identification of each event and fiber link status
- Prompt diagnosis to fix network issues quickly and efficiently
- Generates OTDR trace files (.sor)

Test automation systems

EXFO Connect
Automated and dynamic, cloud-hosted, asset-management system

TestFlow
Field test automation and analytics solution that orchestrates test processes and flow of information.

THE PERFECT INSTALLATION AND REPAIR TOOL FOR COPPER AND GFAST/VDSL2 TESTING

MaxTester 635G

Handheld solution for ultra-broadband installation and maintenance

- Validate bandwidth performance and speed using Speedtest™ by Ookla®, HTTP, FTP or iPerf
- SmartR™ features automatically analyze metallic test results using plain language and graphics to identify and locate faults
- Easily determine Gfast and VDSL2 bit rates; supports ADSL2+ and VDSL2 bonding, vectoring and G.INP (physical layer retransmission)
- Triple-play testing to ensure VoIP quality against MOS, validate bandwidth speed performance, and perform basic network connectivity testing (ping, traceroute)

OOKLA SPEEDTEST
Gfast CERTIFIED
smartR™
Intelligent and automated copper fault analysis with graphical results and plain language interpretation

EXFO.com/FTTx

EXFO

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FTTdp and Gfast Reference Poster

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