



**Gearing up for Ultra-High Speed Networks**

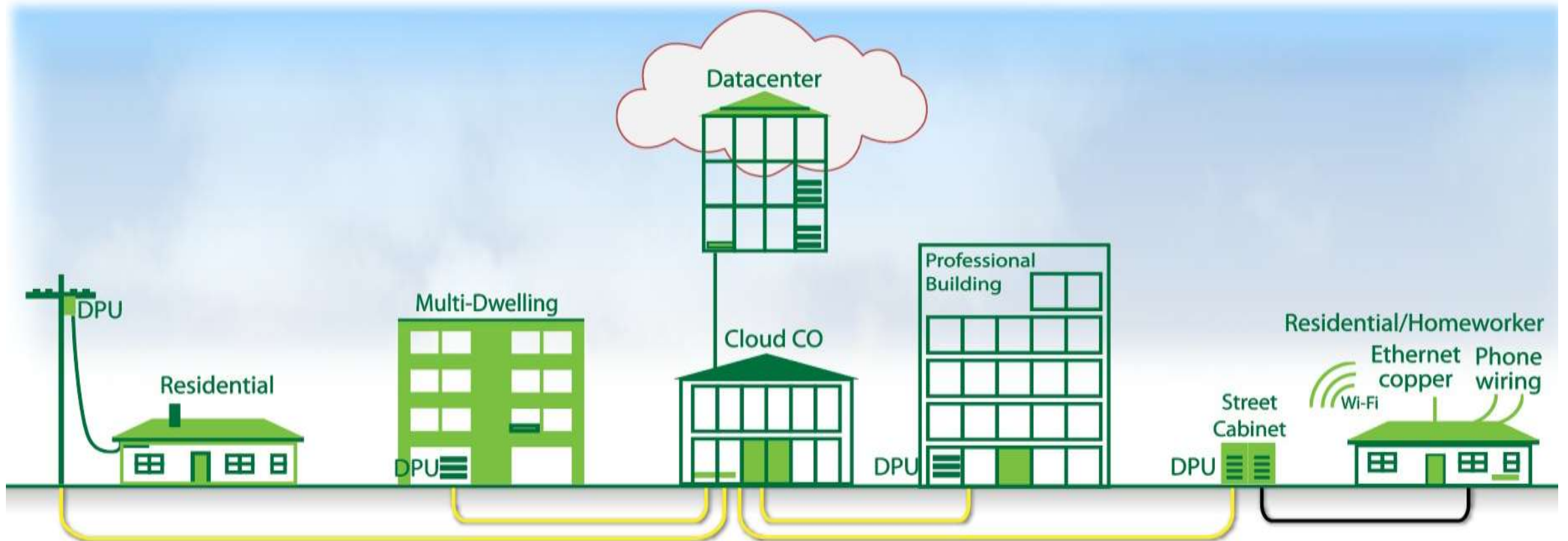
# **The impact of G.fast / FTTdp**

**Mark Fishburn**

**Director, Strategic Marketing  
Broadband Forum**

# The impact of G.fast & FTTdp

G.fast basics & deployment | the impact & the big picture | interop & certification



# G.Fast basics

G.fast is a digital subscriber line protocol standard for local loops shorter than 500m, with performance targets between 150 Mbit/s and 1 gbps, depending on loop length.

## Distance v Bandwidth

Actual speeds are dependent on physical infrastructure characteristics.

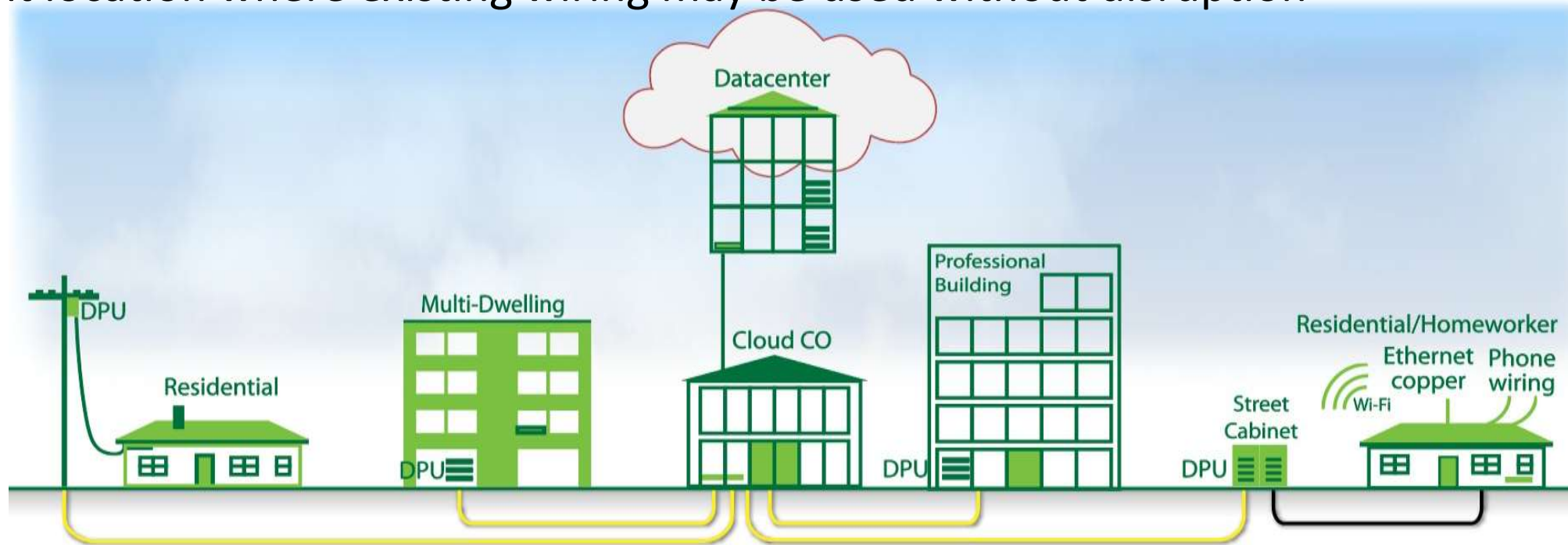
\* Speeds of more than 2000 mbps have been achieved.

Distance	Bandwidth Range
<100 m	500-1000 mbps*
200 m	300-500 mbps
300 m	200-300 mbps
500m	100-200 mbps
500m +	Up to 100 mbps

The various G.fast industry definitions are shown on the poster (more later)

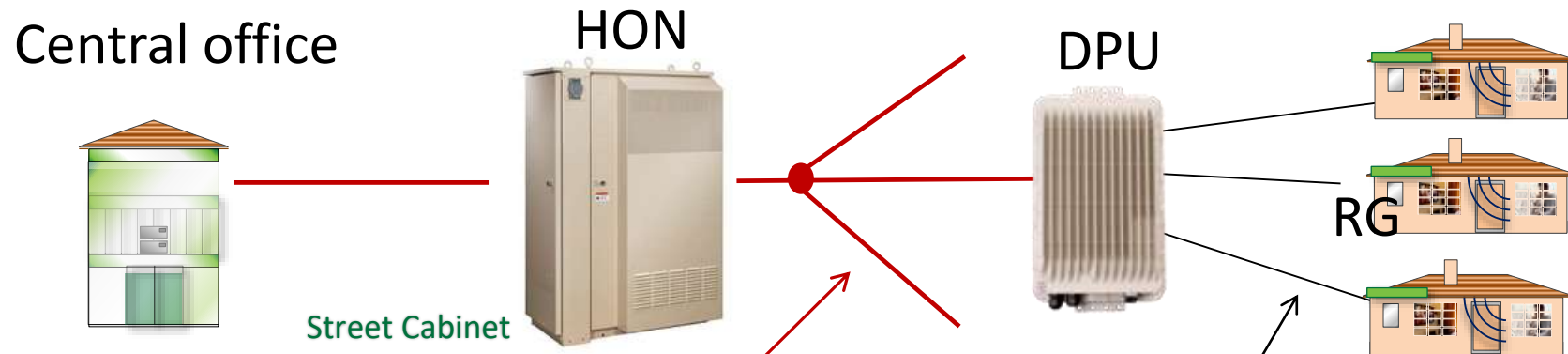
# G. fast deployment alternatives

- **FTTdp:** The distribution point units (DPU) is in a street cabinet where power is available
- **FTTdp:** On a building or street pole where power may or not be available for the DPU  
Where no power is available G.fast supports reverse power feeds from a nearby connected building
- **G.fast is not solely FTTdp.** As Fiber to the Building (FTTB) in a multi-dwelling or multi-tenant location where existing wiring may be used without disruption



# FTTdp (Fiber to the distribution point)

One FTTdp architecture benefit is that the DPU equipment typically serves 8-20 lines, making it small enough to place on a pole, in a hand-hole or in a small pedestal



## DPU backhaul options:

- G-PON, XG-PON1
- EPON, 10GEPON
- Point-to-Point fiber
- bonded VDSL2 copper

## Copper drop options:

- G.fast \*
- VDSL2
- Vectored VDSL2
- IEEE 802.3 BASE-T

\*may include reverse power feed from RG to DPU

HON: Higher order node, such as G-PON OLT

DPU: Distribution point unit

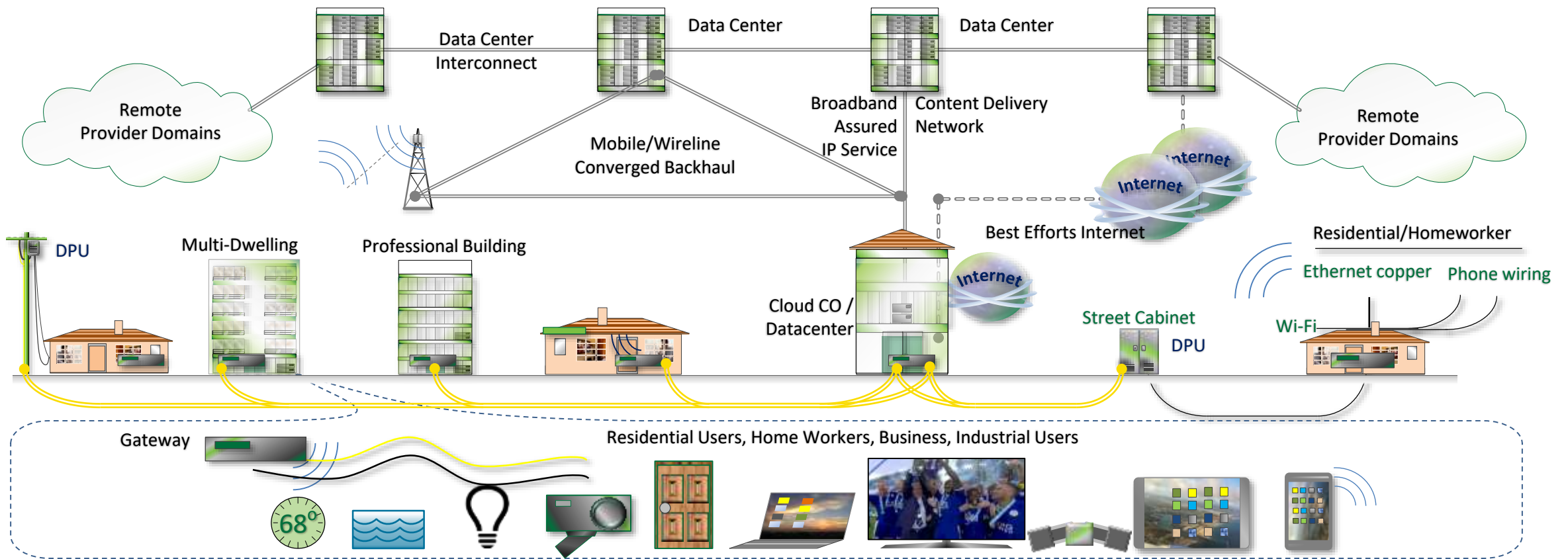
RG: Residential gateway

# G.fast Impacts the largest area of the wired market

- G.fast brings fiber and gigabit-class service delivery over existing copper to the largest sector of the market worldwide
  - G.fast installation requires no premises disruption/visit
- Rejuvenates residential broadband and opens new business markets
  - Enables the opportunity to run services/applications at a residence or small offices that are normally associated with a fiber-connected metro office
  - Enables high-end consumer video and gaming experiences
- Takes an important step toward ubiquitous fiber deployment
- Existing phone wiring now stands alongside Ethernet and Wi-Fi as an equal, but non-intrusive, player in the gigabit home/multi-dwelling location



# Impact: The Big Broadband Picture



# Broadband Forum executing the Broadband 20/20 Vision



Ultra-fast wireline infrastructure service

Intelligent home/small business services

Hybrid wireline/wireless connectivity services

Performance Aware Broadband Services

Personalized network service

- Focus on new service revenues
- Leverage 350m installations of TR-069
- Ultrafast broadband/G.fast Certification
- New Software models and specs leverage G.fast, SDN, NFV, IoT, 4/5G
- User Services Platform
- Cloud CO
- Performance Aware Broadband Services

[www.broadband-forum.org](http://www.broadband-forum.org)

150 service provider, vendor member companies | More than 25 years of



# Broadband Forum work & deliverables

## BBF Work

- VDSL2 and Bonding
- Vectored VDSL2
- G.fast, FTTdp, Fiber PON certification
- Software data models

## G.Fast deliverables

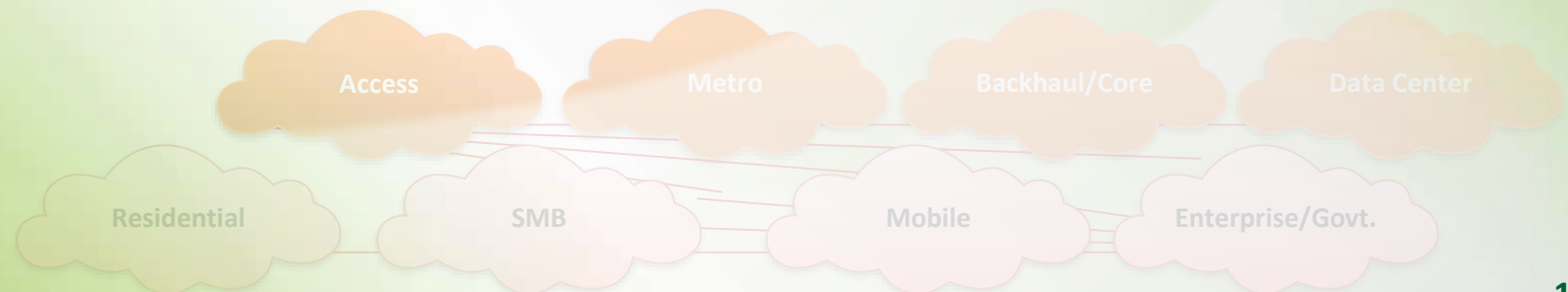
- ID-337 G.fast certification test plan
- WT-285 Copper Transmission Models for Testing above 30 MHz
- WT-338 G.fast Reverse Power Feeding Test Plan
- OD-335 G.fast plugfest test plan

## FTTdp deliverables

- WT-301i2 FTTdp requirements, adding PMA, DPU discovery and reverse power feeding
- TR-355 - DPU YANG management model (7 items)
- WT-318 FTTdp management architecture
- TR-317 FTTdp vector of profiles
- OD-369 DPU-PMA Interoperability test plan



## BBF G.fast Testing and Certification



# BBF Interoperability and Certification Program

## Accelerating implementation, deployment and business

### Interoperability plug-fests

- Provide an invaluable accelerator to product and service introduction
- Leverages vast experience and expertise
- Open sourcing greatly increases importance of interoperability
- Testing performed at BBF approved test lab



University of New Hampshire  
**InterOperability  
Laboratory**

- **Certification**

- Avoids extensive provider testing before purchase
- Significantly reduces costs and accelerates time to revenue for all stakeholders
- Creates a trusted industry standard for implementation and high customer satisfaction

- **Designation of G.fast Certification**

- The Certification for G.fast has been designated BBF.337

*Fiber Fast/Copper Convenience*

**BBF.337**

# Key G.fast Certification Deliverables

- Ensure multi-chipset interoperability between solutions
  - Certified devices must interoperability with at least 3 distinct chipsets
- Verification of key features within G.fast
  - RMC operation {bit-swap, FRA, SRA}, Test Modes, PSD control
- Basic assurance of performance
  - Required bit-rate vs. distance
  - Required operation in noisy conditions



# Good Timing! New BBF wall chart on booth 2110.8

## New G.fast wall chart

- ITU-T, ETSI & BBF standards
- Certification
- Interop
- G.fast facts

or at

- [broadband-forum.org/gfast](http://broadband-forum.org/gfast)

Thank you for your interest


[mfishburn@broadband-forum.org](mailto:mfishburn@broadband-forum.org)

## G.fast

Ultrafast connectivity for home & business

**G.fast, facts, impact, deployment options**

G.fast is a digital subscriber line protocol standard for local loops shorter than 500m, with performance targets between 150 Mbit/s and 1 Gbit/s, depending on loop length. The various industry definitions are shown on the right.



**ITU-T, ETSI and Broadband Forum Reference Specifications**

G.fast has been defined by the ITU-T in the following original documents together with later additions and amendments. The Broadband Forum's FTTP specifications work in concert with those of the ITU-T and ETSI.

**Recommendation ITU-T G.9700:** Fast access to subscriber terminals (FAST) – Power spectral density specification

G.9700 specifies power spectral density (PSD) mask requirements for fast access to subscriber terminals (FAST), tools to support selection of the transmit PSD mask, parameters that determine spectral content, allowable transmit power and verification of transmit PSD.

**Recommendation ITU-T G.9701:** Fast access to subscriber terminals (FAST) – Physical layer specification

G.9701 specifies a gigabit broadband access technology that exploits existing infrastructure of wire-pairs, originally deployed for POTS services. Equipment can be deployed from three-fed distribution points (FTTdp) located very near the customer premises, or within buildings (FTTB). It supports asymmetric and symmetric transmission at a data rate up to 1 Gbit/s on twisted wire-pairs using spectrum up to 106 MHz and specifies far-end crosstalk (FEXT) cancellation between multiple wire-pairs and facilitates low power operation.

**Recommendation ITU-T G.997.2:** Physical layer management for G.fast transceivers

G.997.2 specifies the physical layer management for Fast Access to Subscriber Terminals (FAST) transmission systems. It specifies managed objects for configuration, fault, status, inventory, and performance management.

**ETSI TS 101 348:** European Requirements for Reverse Powering of Remote Access, Terminals, Transmission and Multiplexing

**Broadband Forum TR-301:** Architecture and Requirements for Fiber to the Distribution Point

This Technical Report provides the architectural basis and technical requirements that are needed to deploy FTTP within a TR-101 and/or TR-178 architecture. To this end a new mode type, the DPL, is defined being typically positioned at the Distribution Point (DP), supports one or more high-speed copper drops into the customer premises and uses a gigabit line back to their link to backhaul user data to a High Order Mode. A key aspect of the mode type is the ability for it to be reverse powered from one or more copper drop pairs.

**Broadband Forum TR-335:** YANG Modules for FTTP Management

TR-335 defines YANG data models for the management interfaces to support FTTP. These models enable interoperability for FTTP management. These include common BBF YANG types, an interface object supporting xDSL and G.fast, and the ITU-T standardized objects for start-up of G.fast or VDSL, G.fast and VDSL2 configuration, status monitoring, performance management, testing & diagnostics, and Single Ended Line Test (SELT) and Metallic Line Test (MLLT) configuration and test results.

ITU-T SG15 has welcomed the Broadband Forum's first deliverable on the YANG modules for FTTP management that facilitate deployment of the ITU-T standardized objects for management of copper access (G.fast, VDSL, G.fast, SELT and MLLT). The Broadband Forum's move to the state of the art YANG modeling addresses operators' needs for interoperability of management protocols and for programmability of Access's evolving deployment of SD-WAN.

**Broadband Forum TR-371:** G.fast Vector of Profiles (VOP) Managed Object Structure



TR-371 includes configuration management, status and performance monitoring, thresholds, test/diagnostics and inventory.

**Broadband Forum TR-285:** Copper cable models, required for testing G.fast systems

**Broadband Forum ID-337:** G.fast Certification Test Plan (available to members)

**Broadband Forum OD-362:** G.fast Certification Requirements and Rules (available to members)

Visit [broadband-forum.org](http://broadband-forum.org) for more on Management model for DSL line test (WT-298), Yang Models for Management of G.fast Systems in FTTP Architecture (WT-124), Persistent Management Agent Aggregation Management Model (WT-990) and amendments to existing work.



**STAND 2110.8**


**STAND 2110.9**

**G.fast in Context**

The Broadband Forum is the defining body for today's Broadband Technologies and Software. The many areas and projects spanned include: TR-069 CPE IAN Management Protocol, Broadband User Services, Broadband secured IP services, fiber access networks, fiber to the distribution point (highlighted here), SD-WAN NFV for Broadband networks, physical line transmission, hybrid wireless-wireline including 5G integration all aimed at increased growth of revenue generating services known collectively as Broadband 20/20. G.fast is an accelerator for most of the above Broadband areas.

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