

## Gfast characteristics

Gfast delivers gigabit faster by extending fiber broadband over existing wiring

### Gigabit broadband access technology

- Up to 2 gigabits per second dedicated per customer
- Dynamic bandwidth allocation allows for balancing upload and download speeds as needed

### Deploys faster by extending fiber broadband over existing wiring infrastructure

- Eliminates the need for new construction work in and to premises
- No customer disruption – re-uses existing copper installation
- Self-installation applies in many locations

### Brings ultrafast broadband to more users by lowering cost of deployment

- Minimizing infrastructure construction
- Civil works approval requirements minimized
- Reverse power feed provides lower cost power alternative
- No new fiber in the last segment

## Impact for the industry & users

- Recommended way to rapidly deliver ultrafast broadband where it is impracticable to economically deliver fiber
- Creates new opportunities for communities who have not had the necessary broadband infrastructure to attract business investment
- Brings high speed networking and the digital community to new areas a round the world – possibly 100s millions
- Meets the demands of delivering increasingly ubiquitous cloud-computing
- An important new tool in providers' strategy for ubiquitous fiber deployment

### Impact is dependent of stakeholder/application

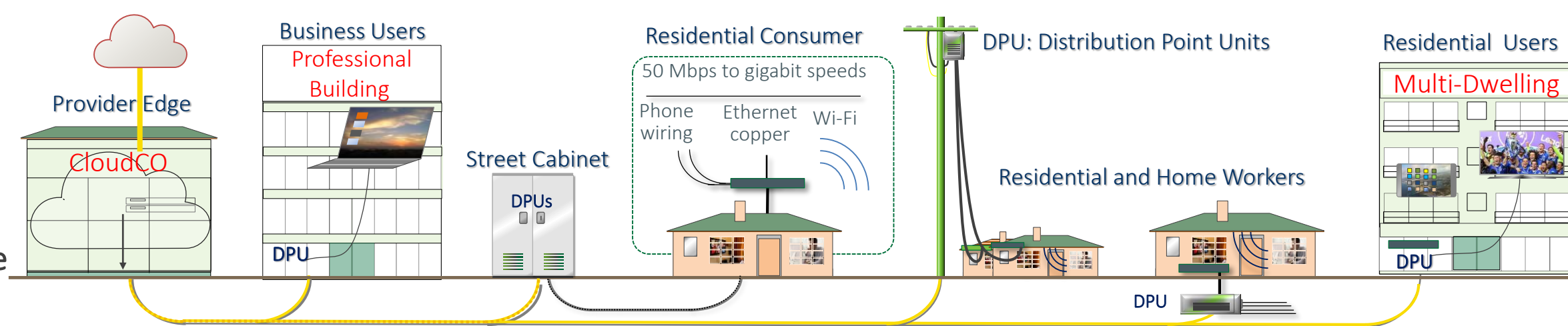
- Enables services/applications at a residence or small offices that have normally been associated with a fiber-connected metro office
- Brings instant high-speed connectivity to multi-tenant without disruption
- Enables high-end consumer video and gaming experiences

## Gfast in context

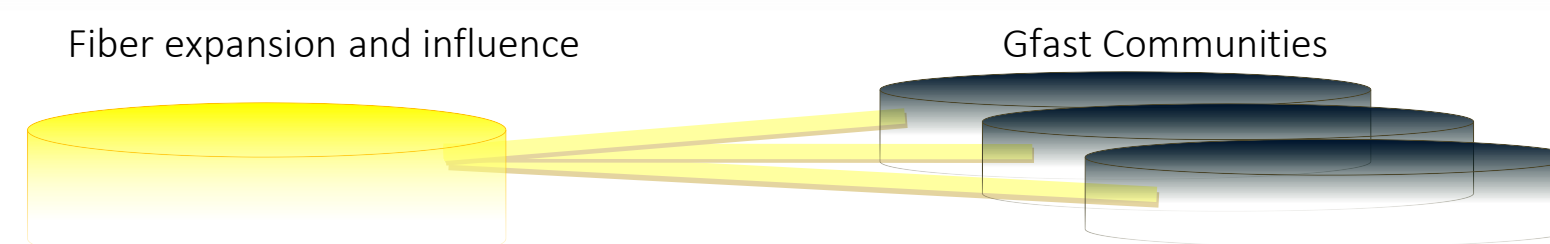
The **Broadband Forum** is the defining body for today's Broadband Technologies and Software. The many areas spanned include: TR-069 CPE WAN Management Protocol, Broadband User Services, access network technologies, SDN & NFV, CloudCO, wireless-wireline/ 5G.

This chart was produced by the Broadband Forum's **Gfast council** - a group open to all 150+ Forum member organizations and created to provide education and awareness of current and anticipated developments in Gfast. The Forum greatly appreciates the sponsoring members listed below for their support of the production of this wallchart.

## Gfast service implementation choices



### Accelerating gigabit delivery to new high-bandwidth communities



## Distance v Bandwidth Guideline

This table is for general guidance only. Bandwidth is dependent on implemented ITU profile (e.g. 106a), physical infrastructure types (twisted pair or coax) and installed copper condition. Actual bandwidth may be lower or higher.

Loop Length	Bandwidth Range
< 100 m	500-1000 Mbps
200 m	300-500 Mbps
300 m	200-300 Mbps
500 m	100-200 Mbps

In-progress ITU G.9701 profiles such as amendment 3 are targeted to increase bandwidth over the shorter reaches to 2± Gbps. Much higher rates can be achieved with bonding. Please refer to the specifications on the right to track latest developments.

## BBF Gfast Interoperability and Certification Program

Minimizes provider testing before purchase, significantly reduces costs, accelerates time to revenue for all stakeholders, creates a trusted industry standard for implementation.

### Certification: First announcement June 2017

- ADTRAN, ARRIS, Calix, EXFO, Huawei, Metanoia, Nokia and Technicolor, and Viavi have achieved device interop-certification supported by chip manufacturers Broadcom, Metanoia and Sckipio
- As of Sept 2017, certification of 25 interoperable products had been achieved. Please see [www.broadband-forum.org](http://www.broadband-forum.org) for the latest list
- Certification is conducted by BBF approved test lab, University of New Hampshire IOL, according to the Forum's IR-337 certification test spec and ODC-362 program guidelines:
  - **Stability:** fast rate adaption, bit-swapping, seamless rate adaption, dying gasp
  - **Functionality / Control:** performance counter verification, PSD masks and spectrum control
  - **Performance:** achievement of basic minimum bit-rates, vectoring, noise immunity (SHINE / REIN)

### Interoperability plug-fests

- Ongoing interoperability provides an invaluable accelerator for new product development

## Gfast technical information

### ITU-T specifications

#### Recommendation ITU-T G.9700: Power spectral density specification

G.9700 specifies power spectral density (PSD) mask requirements, tools to support reduction of the transmit PSD mask, parameters that determine spectral content, allowable transmit power and verification of transmit PSD.

#### Recommendation ITU-T G.9701: 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 fibre-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 (G.fast) transmission systems. It specifies managed objects for configuration, fault, status, inventory, and performance management.

### ETSI specifications

ETSI TS 101 548 European Requirements for Reverse Powering of Remote Access, Terminals, Transmission and Multiplexing

### Broadband Forum specifications

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

TR-301 provides the architectural basis and technical requirements that are needed to deploy FTTdp within a TR-101 and/or TR-178 architecture. To this end a new node type, the Distribution Point Unit (DPU), is defined being typically positioned at the Distribution Point. These support one or more high-speed copper drops to customer premises and uses a gigabit (or faster) fiber link to backhaul user data to a High Order Node or CloudCO. It includes support for reverse power from copper lines.

#### Broadband Forum TR-355: YANG Modules for FTTdp Management

TR-355 defines YANG data models for the management interfaces to enable interoperability for FTTdp management and 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, Single-Ended Line Test (SELT) and Metallic Line Test (MELT) configuration and test results. Definition of YANG modeling addresses operators' needs for interop & programmability via SDN/NFV.

#### 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 IR-337: G.fast Certification Test Plan (available to members)

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

**Work in Progress:** Management model for DSL line test (WT-298), Yang Models for Management of G.hn Systems in FTTdp Architecture (WT-374), Persistent Management Agent Aggregator Management Model (WT-393) amendments