# G.Fast Keynote - Ready to Run

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# You know that G.fast transmits up to 1 Gb/s, but did you know:


- G.fast takes less than ten seconds to start-up,
  two seconds to retrain
- G.fast latency is 1 ms
- G.fast cost-to-serve is much less than FTTH, about the same vectored VDSL2
- G.fast with bonding can transmit well over 1 Gb/s
- G.fast can reach over 400 meters
- G.fast ratio of downstream/upstream bit-rate is adjustable from 9:1 to 3:7
- G.fast consumes less power than vectored VDSL2

# G.Fast origins come from ADSL, VDSL2; G.vector

- 2008: FTTC and FTTB using VDSL2 and Ethernet-based copper technologies
- 2009: The EU 4GBB Celtic project begins
- 2010: BBF FTTdp requirements definitions work starts
- 2011: ITU-T G.fast project starts
- 2013, December: ITU-T G.fast consent to start review process
- 2014, March: ITU-T approval of G.9700 (G.fast frequency range and PSD)
- 2014, September: BBF starts development of G.fast certification program
- 2014, November: First G.fast chips produced and demonstrated
- 2014, December: ITU-T approval of G.9701 (G.fast PHY)
- 2014, December: Service provider laboratory trials of G.fast begin
- 2015, January: first BBF G.fast Plugfest held at UNH

# G.Fast chips being developed by five vendors

- New features in development now:
  - Low power modes
  - Line measurements: HLOG, LATN, SATN, QLN, ALN
  - Bonding
  - PLOAM for G.fast
  - Certification and interoperability

# What may be next for G.fast

- Wider bandwidth (212 or 159 MHz) *
- More than 12 bits per DMT subcarrier
- Non-linear precoding
- PSD boost below 30 MHz *
- Receiver-based mitigation of non-FEXT noise
- Additional diagnostic functions (snapshot of failure)
- Larger DPU size (64 or more lines)
- FDM of VDSL2 and G.fast on the same wires

*The EMC aspects of G.fast have addressed well in the current standard. Further consideration of EMC will be necessary for future enhancements.

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*Engineering smarter & faster connections*

## Architecting a connected lifestyle

- Defining best practices for global networks
- Enabling multi-service and content delivery
- Establishing technology migration strategies
- Engineering critical device & service management tools
- Redefining Broadband

## Who are we?

- Industry consortium made up of approximately 150 service providers, vendors, consultants, academia and test labs
- Predominant broadband industry forum since **1991**
- Engineer technology solutions to help service providers achieve standards based, economical and effective broadband deployments

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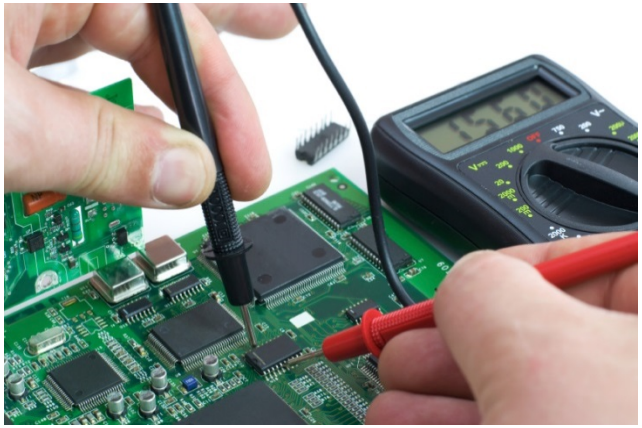
# BBF work related to G.fast

- G.fast plugfests (started January 2015, OD-335)
- G.fast certification (ID-337, WT-285)
- G.fast equipment management (WT-355)
- FTTdp (WT-301, WT-318)
- BBF also addresses Fiber PON certification

# BBF G.fast testing program

- BBF Plugfests help vendors identify interoperability issues
- Certification testing of G.fast equipment
  - Performance testing with specified loops and noise
  - Functional testing, may include reverse power feeding, vectoring, retransmission, PHY management
- Testing performed at BBF approved test labs



# FTTdp (Fiber to the distribution point)
## Defined in BBF WT-301 and WT-318

**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, NG-PON2
-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

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# BBF FTTdp/G.fast project

- BBF WT-301: Fiber  to the Distribution Point

  Specifies architecture for FTTdp for various deployment models:

  - Outdoor DPU serving multiple homes
  - Indoor unit for MDUs
  - Single-line, fiber-to-copper unit
  - Reverse power feed (DPU powered via current from RG)
  - Requirements for: QoS, VLANs, Multicast, OAM

- BBF WT-318: Management Architecture & Requirements for FTTdp
  - addresses management of FTTdp, including the PMA (persistent management agent), using NETCONF/YANG
  - FTTdp management must address various backhaul and drop technologies.

# Thank you

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