

Keeping you updated about our activities! Here we highlight our latest work and focus on areas which are most critical.



A Word from our CEO

Following the launch of Broadband 20/20 last year, we are now in an important and challenging phase as we start to turn this vision into deliverables and reality. This week's meeting in Prague saw a whole new range of work activity and I am very encouraged by the way the new working groups and work areas are working together to introduce SDN, virtualization and other new services to the broadband network.

One of the biggest Prague talking points has been Broadband Assured IP Services (BAS). Following Monday's converged sessions between the Service Provider Action Council (SPAC) and the Innovation Track, the work areas are now looking at what is required to turn BAS into a revenue-generating opportunity for Service Providers. I urge you all as you return to your member companies to identify the person most likely to be in a position to handle strategic development and get them engaged. Feedback from all areas of the market on the concept of BAS is very important to us and how we move forward.

I would also like to draw your attention to next month's **special meeting of the Broadband Forum** in Atlanta (May 18-20) - The Future of Broadband Networks. This is a unique opportunity to hear first-hand from the people directly facing the issues - on how they see the broadband future evolving. As I write this editorial, ten operators and three manufacturers have already confirmed they will attend and share their informed opinions. A demonstration of CORD by OnLab will also be given on the first day, making this event something not to be missed. The only problem is that numbers are strictly limited so, if you plan to attend, reserve your place without delay!

Finally, it was good to acknowledge the work and contribution of retiring board members Drew Rexrode and Marcin Drzymala, both retiring Board Members, this week. Their leadership awards were well-deserved and they have both played an important part in getting us to this point, as we approach another pivotal stage in broadband service provision for the world to benefit from.

Retiring directors honored in Prague



Retiring board members Drew Rexrode, of Verizon, and Marcin Drzymala, of Orange, were given the Broadband Forum leadership award in recognition of their work as 'outgoing, commendable leaders'. Both were thanked for their efforts in supporting the growth and development of the Forum over several years.

Forum chairman Kevin Foster presented Marcin with his award (pictured) while Drew, who was unable to attend the meeting, will receive his at a later date.

Operators and major vendors confirmed to speak at Atlanta meeting

Ten of the world's leading Service Providers, as well as major vendors, have confirmed they will attend next month's Interim Meeting in Atlanta to discuss and debate the requirements of the next-generation broadband network.

The event, sponsored by AT&T, will include presentations from AT&T itself, NTT, BT, Sky, Deutsche Telecom, CenturyLink, Orange, Telecom Italia, Vodafone and Spark New Zealand. The vendor perspective will come from Nokia, Adtran and Huawei.

Forum CEO Robin Mersh said: "Since we launched our Broadband 20/20 vision last October, the industry response has been excellent and we have made some significant progress. There is therefore no better time to combine our work and our vision to the needs and visions of the people who matter most - the Service Providers which have to deliver global connectivity and services to end-users in the home and the office."

Also featuring on the agenda will be the Central Office Reimagined as a Datacenter (CORD) project, with OnLab delivering an interactive demo and presentations, which will also involve the wider CORD community. CORD re-architects the telco central office as a datacenter to bring in cloud-style economies of scale and agility. It takes today's proprietary boxes, determines how their functions can be aggregated or disaggregated, and instantiates them on commodity infrastructure. Broadband Forum members and invited guests will look at its business case architecture and potential use cases.

"CORD is a critical development which complements the work we are already doing around Software Defined Networking (SDN) and the demonstration will be valuable for both our members and our guests," added Mersh.

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Work Area Updates from Prague

Architecture and Migration Work Area completes NERG working text

The Framework for Virtualization (WT-359), is entering straw ballot. This is a fundamental document that will underpin future Broadband Forum work in Network Functions Virtualization (NFV) by defining an ETSI-aligned architecture to evolve the Multi-Service Broadband Network (MSBN). Work is already underway to augment the architectural models with SDN concepts in a future revision. WT-359 is expected to enter final ballot in Q4.

The Network Enhanced Residential Gateway (NERG, WT-317) is an important project for both the BBF and the industry, distributing compute resources between new bridging CPE functionality (BRG) and the virtual gateway (vG) CPE processes in the network. WT-317 entered Letter Ballot in Prague.

Virtual Enterprise Gateway (WT-328), has continued to progress and is expected to go into straw ballot after the Q3 meeting in Berlin. It expands on the virtualization of CPE by exploring options for carrier-managed virtualization at the customer premises, as well as network-hosted services.

Work around the sharing of copper access (WT-349) is now entering final ballot stage. It defines the business-to-business interface between infrastructure providers and virtual network operators to facilitate new business models for broadband access. This will create new opportunities for monetizing access for Service Providers.

A study on the impact of 4K video on the network is now underway and has been helped by the detailed information received from Forum members. With the proliferation of smartphones able to extract a UHD stream directly from the network, this is expected to dominate network dimensioning in the metro for the foreseeable future and is a major issue for the Forum to address.

Progressing the Forum's work on SDN and NFV, WT-345 on migration to NFV is in straw ballot and expected to reach final ballot in Q3. WT-345 defines models for introducing NFV into legacy networks to facilitate the network transformations currently underway in the industry.

The group has initiated a project stream on fiber access network sharing, which aims to facilitate new business relationships between virtual carriers and infrastructure providers. A first document on the architecture (WT-370) is underway and further documents are under consideration. This project stream will be transferring to the SDN and NFV Work Area following this meeting.

Broadband User Services Group builds on TR-069 success

The Broadband User Services (BUS) Working Group spent the week doing what they do best: evolving and building the tools and standards that help Service Providers improve end-users' broadband experience.

In its Home Network Measurement project, progress was made in a summary marketing draft (MD-363), which is targeted at Service Providers looking for ways to perform measurements and gain valuable diagnostic data for troubleshooting end-users' home networks. In addition, the group agreed to take on standardization and testing for implementations of IEEE P1905.1, a technology that provides a unified layer for the widely varying in-home networking technologies.

The group's flagship protocol (TR-069) - now implemented in close to 350 million devices worldwide - saw improvements to its data model "Device:2", with the finalization of additions that enable the management of CPE with G.fast interfaces, driving the "ultrafast" broadband connections that are part of the Forum's Broadband 20/20 vision. The group also moved toward its next revision of the popular protocol CWMP 1.5, culminating in many industry-driven improvements.

Finally, the group made significant progress in its new vision for activation, management, security, measurement, and control of the platform created by the end-user's network and Internet of Things (IoT) devices - the User Service Platform. The architecture and protocol is ready to be used in a set of working texts and the group is looking to exercise working implementations by the end of 2016.

FTTdp Work Area moves closer to publishing first YANG model

The Fiber to the Distribution Point (FTTdp) Work Area had a jam-packed meeting, with around 50 contributions covering the full spectrum of FTTdp architecture and management. The group is focused on agreeing for release of the Persistent Management Agent (PMA) to Distribution Point Unit (DPU) YANG model and progressing the second issue of the architecture document.

The FTTdp Management project stream drove the work on the YANG modules for FTTdp

Management. These modules defined in WT-355 and WT-371 are undergoing Straw Ballot comment resolution, with the aim to have them agreed before the next meeting. Efforts are now quickly ramping up to specify all other YANG modules in the FTTdp ecosystem, including service management (Virtualized Local Access Network (VLAN) forwarding, multicast) and equipment management. In order to ensure the best chance of ensuring reusability of these YANG models, a new common YANG Project Stream has been set up to coordinate YANG modeling.

The FTTdp Architecture project stream drove the work on progressing the second issue of TR-301 with productive discussion around some missing areas of DPU time zone configuration and synchronization, software image management, equipment management and traffic forwarding.

There was considerable interest and discussion on a New Project Initiation Form (NPIF) for a high-level MSBN management architecture and a North-Bound Interface (NBI) management model for the Persistent Management Agent Aggregation (PMAA) and good discussion. After significant discussion, it was agreed to have a small working group tighten the scope and represent at a future teleconference.

FAN increases access network flexibility

Project WT-280, G-PON in the Context of TR-178, which adds to the requirements for G-PON systems deployed in access networks, made significant movement towards straw ballot status during the Prague meeting. There was also major progress on MD-311, a marketing document giving an overview of Fiber Infrastructure Management Systems, which is now expected to go to final ballot.

The group is communicating and cooperating closely with the Full Service Access Network (FSAN) to develop ITU-T xPON interoperability test cases and organize test events. Future BBF-FSAN IOP events will target NGPON2 and XGSPON systems, which are very important for industry maturity.

WT-331, Architecture and Technical Requirements for PON-Based Mobile Backhaul Networks, is being developed jointly with the Routing and Transport Work Area. There have been several notable contributions including on the Operations, Administration and Management (OAM) and multicast requirements.

The Multi-Wavelength PON Inter-Channel-Termination Protocol (ICTP) Specification (WT352) has made great progress on ICTP message format and transportation and the ICTP ad hoc group is now working on the Optical Line Terminator (OLT) Transmission Control (TC) state machine.

Innovation Track focuses on Broadband Assured IP Services (BAS) and 5G

It was a busy week for the Innovation Track, with major discussions on BAS and 5G.

On the opening day, the meeting started with a well-attended session and debate on BAS and the issues and opportunities this could create for Service Providers in the future. The Forum is looking for members to encourage their individual business and strategy leaders to engage with the Forum in order to turn BAS from a potential new service into a global revenue-generating opportunity. As usual with the Innovation Track, there was lively and informative debate on several areas including Internet regulatory issues, which may become

the subject of a webinar at a later date.

Specific BAS projects and the BAS framework document were discussed in the working areas during the week, with the SDN/NFV, Architecture and Broadband User Services groups discussing it in more detail.

The meeting came together again at the end of the week to progress and bring together the ideas and discussions that had taken place across all the groups in Prague and to decide on the next steps.

Another strategic area for the Innovation Track is 5G and how the Broadband Forum should be involved in this technology. Discussions started at the 5G Workshop, held as part of the Mexico meeting, led to the development of Study Document 373 (SD-373) on 5G enablers. SD-373 will now continue jointly with the Wireline-wireless Convergence work area. This meeting saw a whiteboard discussion, with the goal of stimulating new activity across the Forum and in particular in the Architecture group.

Next month in Atlanta, the Innovation Track team will play a key role in the Strategic and Visionary Workshop as part of the Special Meeting. It is expected that around ten leading Service Providers from across the globe, plus key vendors, will share their views on the next-generation broadband network, including the evolution of CORD, SDN in access and 5G.

Routing and Transport Work Area makes big splash at MPLS+SDN+NFV World Congress in Paris

A major priority for the Cloud Interconnect Project has been the Ethernet Virtual Private Network (EVPN) architecture and requirements, which was presented as a tutorial at MPLS+SDN+NFV World Congress in Paris. The interactive tutorial was attended by nearly 200 delegates who engaged with the speakers about both the technology and market drivers behind its adoption. The tutorial was accompanied by an EVPN white paper that is available on the BBF website [here](#).

The project continues to progress Phase 2 of the EVPN architecture work (TR-350), focusing on point-to-point and point-to-multipoint service implementation. These reflect the Metro Ethernet Forum (MEF) Carrier Ethernet service definitions for both E-LINE and E-TREE, and are based on Internet Engineering Task Force (IETF) Request for Comments (RFC)s. The work on EVPN is focused on the movement of data to deliver cloud-based and mobile services in a way that ensures customers receive optimal quality of experience and world class services wherever they are located.

The TR-319 Part B work on Achieving Packet Network Optimization using Dense-Wavelength-Division Multiplexing (DWDM) Interfaces was approved by the Broadband Forum membership and published [here](#). The Packet Optical Evolution project continues with WT-319 Part C, as well as a tutorial and whitepaper to explain the importance of the work to the industry. The project welcomes contributions to these efforts. The project has already produced specifications, with significant input from Forum partner organizations ITU-T SG15 and IETF, integrating the packet network with the optical network. The tighter integration brings with it potentially significant OPEX and CAPEX savings for operators.

Work on mobile backhaul architecture progressed, with key input from ITU-T SG15/Q13 on time and synchronization technology enhancements. These, combined with the existing TR-221 architecture, produce a solution ready for LTE Advanced and initial 5G architecture. Work has also started on identifying challenges to the transport and IP networks to support

gigabit speeds of 5G and the innovative services brought about by the 2020 mobile network. Those interested in hosting or receiving the Broadband Forum tutorials should contact info@broadband-forum.org.

Physical Layer Transmission moves forward with G.fast certification

The G.fast testing and certification project stream continued addressing comment resolution for the second straw ballot of ID-337 issue 1 (G.fast certification test plan). This second straw ballot will remain open until the expected completion of the beta testing, now targeted for October 2016.

There was continued activity on the Test Specification of Reverse Power Feed (RPF) equipment (WT-338) - where the customer premises equipment provides power to the DPU via the twisted wire-pair connection. This document defines procedures for testing the end-to-end functionality of RPF equipment in FTTdp applications at both customer premises and DPU locations.

In the VDSL2 and RPF project stream, the group continued progress on Issue 3 of WT-114, defining performance tests of VDSL2 transceiver operating with retransmission enabled.

In the bonding project stream, work progressed on the development for testing of the initialization time of Very-high-bit-rate Digital Subscriber Line (VDSL) 2 transceivers deployed with bonding, for inclusion in a new amendment to WT-273.

In the home networking project stream, a new project was approved to define a test plan for verifying the functionality of a system that mitigates interference between DSL and power line systems based on new approved recommendation ITU-T G.9977.

Cloud Central Office provides new focus for SDN and NFV Group

A major development for the SDN and NFV Group in Prague was the decision to start work on Cloud Central Office. This brings virtualization out to the very edge of the network, allowing highly flexible and rapid deployment of new services while preserving the latency and other performance parameters necessary to support those services. This is an important complement to the existing activity on Software Defined Access Network (SDAN) currently being progressed, which will enable software defined control of all the major access technologies of copper, fiber and wireless.

A great deal of the work area's activities are conducted jointly with the Architecture and Migration Work Area. This joint work includes: defining virtualization of business gateways (WT-328); requirements for migration of the Broadband infrastructure (WT-345), topologies and deployment scenarios into an NFV environment; and WT-359 - the defining a framework for network virtualization. Progress on WT-328 has seen it move towards initiation of straw ballot.

Wireline-wireless Convergence Work Area focuses on 5G

This work area addresses the needs of converged operators, who have both wireline and mobile networks deployed and are in a position to leverage all of their assets with combined subscriber offerings.

Phase one of the work on hybrid access (WT-348), which combines wireline and wireless access to enhance reliability, provide fast fulfilment and offer greater bandwidth, is now in straw ballot and is expected to be published shortly. Phase 1 lays the groundwork for the solution space that is being addressed and will form WT-378.

A study document has been progressed on 5G. It will explore the role of fixed broadband as an enabler for the rollout of 5G.

Documents approved include:

- TR-319 Part B: Achieving Packet Network Optimization using Dense-Wavelength-Division Multiplexing (DWDM) Interfaces

These documents will be published in the following days, however for a full list of all work in progress, [click here](#). Please feel free to share this information with your colleagues, so they are engaged and aware of the developments of this work.

Welcome to our new and returning Members!



Foxconn Interconnect Technology (FIT) Ltd and Greenlee Communications have become the latest companies to join the Broadband Forum, as it starts to deliver on its Broadband 20/20 program.

FIT is a leading supplier of precision components, manufacturing in Asia, the Americas and Europe, while Greenlee Communications develops test and measurement equipment, supporting the development, installation and maintenance of copper and fiber networks globally.

Broadband Forum's LinkedIn profile continues to grow

Since our last quarterly meeting, we have doubled the number of people following our recently launched company page.

Thank you to everyone who has followed us so far and if you haven't already, what are you waiting for? All our official updates will be posted here, including news, events, images, videos and documents.

To view the new Broadband Forum company page on LinkedIn, please [click here](#).



Broadband Forum in the news

CEO Robin Mersh spoke at Total Telecom's Gigabit Copper, held in Brussels in March. Following his presentation, he was interviewed by Total Telecom TV and asked about the Forum's viewpoint on G.fast. The video can now be viewed on the official Broadband Forum YouTube page, at: <https://www.youtube.com/watch?v=d4ca9SA90yo>

G.fast has proven to be a popular topic this quarter, with ISE Magazine (formerly OSP Magazine) also featuring content on this subject. To read the article supplied by the Broadband Forum, please visit: <http://www.isemag.com/2016/04/copper-proves-its-mettle/>

Events Calendar

2016 Broadband Forum Meetings

Special Meeting: May 18 - 20, Atlanta, Georgia

Board Strategy Meeting: May 23 - 25, Portsmouth, New Hampshire

Q3 Meeting: July 25- 29, Berlin, Germany

Q4 Meeting: October 24 - 28, Kansas City, Missouri

Sponsoring a BBF meeting can be a great way to get some company recognition! If you are interested in sponsoring a meeting, then please [click here](#) for more information or contact Christine Corby at ccorby@broadband-forum.org.

Forthcoming Industry Events

M2M World Congress: April 26 - 27, London, England

ITW: May 8 - 11, Chicago, Illinois

TMForumLive: May 9 - 12, Nice, France

G.fast Summit: May 18, Roissy, France

Connections 2016: May 24 - 26, San Francisco, California

Light Reading Big Communications Event: May 24 - 25, Austin, Texas

CommunicAsia: May 31 - June 3, Singapore, Singapore

TNO Ultra Fast Broadband: June 27 - 30, Den Haag, Netherlands

Contact information

Questions or ideas? Contact the [Broadband Forum](#) +1 510.492.4020 or email info@broadband-forum.org