

Welcome to the Broadband Forum Quarterly Newsletter

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

So much has happened in the Forum since we last met that I hardly know where to start my comments for this Q1 newsletter from Chicago. The significance of the Atlanta meeting a year ago continues to reverberate all around us as those initiatives - coupled with the evolution of Broadband 20/20 - have created unprecedented change in not just the way we work, but the actual work we are doing. What is clearly emerging from our work is the exciting possibility of a holistic approach to the communications and management of the infrastructure, services for the entirety of the broadband network and its connected premises and devices.

Then again, we are re-energizing the Forum in a period of unprecedented change for the whole industry, so perhaps we should only expect it.

I urge you to read through this newsletter thoroughly and see all the work that is now being done in the work areas - all focused on bringing significant benefits for the service provider and ultimately the users.

Additionally, we have announced the new council for NG-PON2, which has seen the NG-PON2 Forum members continue their work as a council within the Broadband Forum, providing greater access to our wider range of member operators and vendors. We have also launched a Gfast Council and I foresee similar moves in other technology areas in the near future. The focus for these Councils is to educate the industry on the capabilities of the technology, the relevant use cases and to promote best practice, through workshops, webinars and white papers.

Another new development announced this month has been the creation of the Executive Advisory Council. Initially we have recruited 13 leaders from operators, manufacturers, technology organizations and other stakeholders to help us make sure that we deliver value to the whole industry. Meetings of this group will be virtual - possibly every six months - and more invitations are imminent.

One key proposal, for *Open Broadband*, was discussed at a Birds of a Feather session in Chicago. The Forum is exploring ways of supporting migration to virtualized and programmable networks, ensuring best practice, interoperability and on-boarding of new services, regardless of the platform used. I would encourage everyone to review the presentation and associated documents by [clicking on this link](#).

We have made a great start to the year, progressing proposals on Open Broadband, Cloud CO, the User Services Platform, carrier class Wi-Fi, G.fast and 5G, to name just a few of the projects. So together let's keep up the momentum.

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Accolades given for next-generation broadband innovation

Representatives from AT&T, Nokia, ADTRAN and Orange were recognized at our annual awards ceremony which this year honored members who have played a pivotal role in

delivering on the forum's Broadband 20/20 vision. [Click this link for the news release.](#)

Launched in 2015, the Broadband Forum's 20/20 vision was implemented to unlock the potential for new markets and profitable revenue growth by leveraging new technologies in the home, small business and multi-user infrastructure of the broadband network. It aims to enable the delivery of ultrafast broadband services through innovative technologies such as Network Functions Virtualization (NFV), Software Defined Networking (SDN), Internet of Things (IoT) and 5G technologies.

Broadband Forum chairman Kevin Foster said: "In our current telecoms industry, knowing what you want to achieve is not enough - you have to be able to deliver on it quickly and efficiently and that is exactly what these individuals recognized have helped the Broadband Forum to achieve. The Broadband Forum is the product of its members and I am proud of how quickly all the companies involved in our work have been able to advance the Broadband 20/20 vision."



Barbara Stark, of AT&T (pictured above left), and Michael Shaffer, of Nokia (pictured above right), both received Distinguished Fellow Awards, while Joey Boyd, of ADTRAN, and David Minodier, of Orange, were given Circle of Excellence Awards.

A number of Outstanding Contributor Awards were also presented, with recipients including Guiu Fabregas, of Nokia, Marta Seda, of Calix, Denis Khotimsky, of Verizon, Ron Insler, of RAD, and Marcos Martinez, of Marvell.

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Welcome to new members and first-time attendees!

As we continue to address the fast-changing broadband landscape, we have welcomed a number of new members this year, including two start-ups and some telecoms giants.

The broad range of industry expertise displayed by the new member companies highlights the continuously expanding breadth and scope of the Broadband Forum's work, which is focusing more on next-generation broadband technologies such as virtualization, IoT, next-gen optical communications and G.fast.

The latest additions include EANTC, Fujitsu Limited, Go!Foton, Shenzhen Gongjin Electronics, SK Telecom, TiBit Communications, Tellabs, VoltServer and Works Systems (Tianjin) Co., Ltd.

"We're delighted to be able to welcome so many new members into the Broadband Forum, including - for the first time - start-up companies, namely TiBit Communications and VoltServer," said CEO Robin Mersh. "The work the Forum is carrying out to deliver on our Broadband 20/20 vision is attracting a lot of interest from these sorts of companies and the Forum is the perfect platform for them due to our policy of giving every member company an equal voice, whether they are a start-up or a long-established operator. The broadband industry is changing and evolving at a rapid pace but the addition of these new members demonstrates the Forum remains a clear voice amid the changes."

NG-PON2 Council and Gfast Council are launched

A new face at the Chicago meeting was Bernd Hesse, the newly appointed chair of the NG-PON2 Council within the Forum. Bernd, who is Senior Director of Technology Development at Calix, was the founder and President of the NG-PON2 Forum before integrating the work of the group inside the Broadband Forum. [Click this link for the news release.](#)

The newly created Gfast Council, chaired by Michael Weissman of Scipio, has a similar role of supporting the adoption of Gfast technologies and, of course, the Forum's Certification program currently in beta trials.

Both groups are open to all members and will meet regularly in order to develop their programs and organize events.

Work Area Updates from Chicago

Architecture and Migration Work Area building the Forum's foundations

Maintaining the momentum on foundational work on virtualization, the team has initiated work on TR-359 Issue 2. This builds on the NFV enhanced architecture defined in Issue 1 to incorporate SDN and a greatly enhanced view of management. This work is expected to go to straw ballot in Q4 2017. All this is expected to facilitate the Forum's efforts on Cloud CO and the broader applicability of SDN and NFV to the multi-service broadband network.

The specification of multicast Adaptive Bit Rate (ABR) for broadband networks is also progressing. This will provide carriers with significantly more efficient video and media delivery options that could include wholesale to Over-The-Top (OTT) operators.

The work on performance monitoring from customer equipment to the IP edge completed straw ballot and will be published within a Q3 timeframe. This will enhance providers' ability to monitor Service Level Agreements and improve network operations.

Finally, efforts on Broadband Assured Services continue, with the current focus continuing to be on refining the use cases that would be input into the architecture.

Broadband User Services Group pushes TR-069 evolution

The Broadband User Services Work Area plunged forward on the new User Services Platform, representing the natural evolution of TR-069 into the world of IoT and virtualization. Already playing with prototype implementations, progress is on track to have the protocol released later this year, with the priority use cases being firmware upgrade capability for IoT and management of smart Wi-Fi systems.

In the spirit of managing those systems, the group continued to explore the requirements and test metrics for defining "carrier grade" home Wi-Fi, which is reliable for the end user who expects to get the most out of their broadband subscription.

This idea of reliable home Wi-Fi really means a reliable in-home network using many technologies. The group is continuing creation of a standardized and testable code base for the 1905.1 unified MAC for in-home networking technologies, and has also recently inherited

the nVoy certification program from HomePlug.

Lastly, the group agreed to begin pulling together industry resources to define requirements for home router and connected device security, including new IoT devices that may not have the experience of working within the chaotic world of broadband networking. This is critical in a time when malicious attackers are explicitly making use of end users' devices as part of DDoS attacks or in phishing, ransomware and malware scams.

This combination of manageability, reliability and security will ensure that a broadband user's services are all truly "carrier grade."

FTTdp Work Area publishes TR-301

The Fiber to the Distribution Point (FTTdp) Work Area took a major step forward in Chicago with the publication of Issue 2 of TR-301 (Architecture and Requirements for FTTdp). This is tremendously important for service providers, as it removes a series of known roadblocks when deploying ultrafast broadband based on either G.fast or Very-high-bit-rate Digital Subscriber Line 2 (VDSL2) using distribution point units (DPUs). This document helps to simplify network troubleshooting, software management and DPU installation.

The FTTdp management Project Stream continued to progress the next revision of TR-355, further improving and enhancing these YANG modules for managing ultrafast broadband. Furthermore, the Project Stream published the second revision of TR-298 (Management Model for DSL Line testing). In addition, the group worked in conjunction with the common YANG Project Stream to finalize the first issue of the common YANG module specification (WT-383), providing an extensive set of modules covering both DPU-specific, as well as more generic YANG modules. This work will be a great step forward in allowing service providers to reduce network management complexity - especially in the SDN/NFV era.

The group has started work on addressing real-life interoperability challenges when connecting the Persistent Management Agent (PMA) to the DPU by defining an interop test plan. The Project Stream - FTTdp Management Interop and Testing - has agreed on the first set of test cases, which verify the NETCONF/YANG communication between the PMA and the DPU.

FAN takes the initiative on PON convergence

Following the Kansas City meeting, a second ad-hoc session was held in conjunction with the ITU-T Q2/15 group meeting on November 17 in Hangzhou. Since then, the IEEE 802.3ca task force has also held meetings on the subject. Representatives of all sectors of the industry (system and component vendors, telephone and cable system operators) participated in these meetings and many diverse viewpoints were expressed. Various organizational and administrative issues were mentioned, which make formal collaboration difficult. However, one common theme was clear - a converged Passive Optical Network (PON) ecosystem was a good idea and in everyone's interest. Because of this, the progress of PON convergence will likely be fulfilled through "grass roots" efforts, driven by company contributions across the organizations that support the goal of common specifications wherever possible.

The new white paper project, MD-396 - gigabit access over FTTx - has started and aims to promote PON deployment in multiple applications - that is, to use PON as a transportation technology to backhaul all kinds of access medium (fiber, DSL, cable, etc.) to provide gigabit access pipe. There has already been agreement on use cases and architecture for the paper.

The Project Stream for PON abstraction interfaces for time-critical applications has made a start. This work is needed because operators are interested in providing more additional valued or differentiated services to meet the trend towards more diversified network requirements, particularly where the network is used as business infrastructure. These are all-time critical functions where flexibility and quality of experience are vital to the operator.

YANG model projects, i.e. WT-385 (YANG model for management of ITU-T PON), WT-394 (YANG Models for Management of PON ONUs) and WT-395 (NETCONF Management of PON ONUs Architecture Specification), are of high interest to the community and the whole group has agreed on how to start further building PON-related YANG models. This work will continue to benefit the service provider community as they move towards a more unified SDN/NFV fiber access network infrastructure.

It's all action at the Innovation Group

Network Migration is an important topic for operators. China Telecom made an impressive presentation about its own network migration and challenges, the main points being a targeted architecture for 2025 with Optical Line Termination re-architected, a unified physical infrastructure and a view of the distribution of the layering of the data center infrastructures. This will help on the operator networks survey discussion that the group will organize jointly with the Cloud CO Project Stream before Q2.

A Traffic Management white paper is now ready for straw ballot. This is a high-level educational paper highlighting the industry practice, ensuring that networks operate efficiently and offering quality of experience to end users in a sound technical and economical way.

It was also agreed to create a white paper socializing different ubiquitous and performance-aware IP services, based on long standing and innovative Broadband Forum technical reports.

The group, jointly with the 5G Project Stream, reviewed the output of the discussion carried on from the workshop with 3GPP in February about Fixed Mobile Convergence (FMC) in 5G. There were a lot of incoming contributions on the topic, leading to the decision of creating a new work item about slicing in the existing wireline broadband network and extending to the mobile network. The Broadband Forum will also be reaching out to 3GPP SA2, letting them know that the Forum is willing to take responsibility and actions on working on the successful development of true 5G FMC.

Routing and Transport Work Area breezes through its work

The latest work on the broadband mobile backhaul architecture is nearing publication. The last call for comments (straw ballot) is nearly complete. There are a few outstanding issues the Project Stream is addressing and we anticipate the document going for final approval out of the Q2 meeting with publication to follow.

The TR-221 MPLS in Mobile Backhaul architecture not only provides the foundation for LTE and LTE advanced networks and their services, but sets the stage for initial 5G architectures. The group is continuing to explore how to transform transport and IP networks to efficiently support 5G and the innovative services brought about by 2020 mobile networks. These new services, through the development of new applications that they enable, generate new revenues both for the provider and their customers.

The Ethernet Virtual Private Network (EVPN) architecture and requirements (TR-350) continues to progress through Phase 2, focusing on point-to-point and point-to-multipoint service implementation. The remaining work will be done virtually (via the wiki and conference calls) to allow broader, more expedient participation. The final content should be added between now and the Q2 meeting, with last call for comments to follow.

TR-350 Phase 2 architects the Metro Ethernet Forum Carrier Ethernet service definitions for both E-LINE and E-TREE. These architecture and requirements are based on the latest Internet Engineering Task Force specifications for EVPN. This work makes the Ethernet services network more efficient and resilient, thereby supporting services for new and demanding applications while potentially reducing expense. For more detail, please see the EVPN white paper available on the BBF website [here](#).

The Work Area is examining a potential new project to define solution architecture and equipment requirements for the EFlex technology. This innovative technology combines the ubiquity of Ethernet with the guaranteed consistency of optical network.

Those interested in the details of the projects and progress are encouraged to contact the Area Director and/or Project Stream Leads for suggestions on how to get involved and contribute.

Physical Layer Transmission Work Area progresses G.fast certification

The G.fast Testing and Certification Project Stream continued to address issues in ID-337 raised from the beta trial program. Once this program has been completed, a final ballot for an internal report (IR-337) will be initiated and an abstract test plan (ATP-337) will be prepared for publication.

Work continued on the project to develop a G.fast performance test plan (WT-380). Discussions addressed the maximum loop length to be used and tests to verify the quality of delivered Network Timing Reference (NTR) and Time of Day (ToD) function, plus NTR under various noise scenarios.

In the VDSL2 Project Stream, the group finalized the straw ballot on the WT-114 Issue 3, Amendment 1, related to the performance requirements for retransmission profiles. This will now go to final ballot. The group continued to work on the amendment to Issue 3 related to the performance tests for longer reach VDSL2.

It was agreed to open a new project, TCP/UDP Traffic Generation for Testing (SD-405). This is important not only to projects in physical layer transmission, but may be applicable throughout the Broadband Forum, since it defines different traffic patterns in the network that represent real-life applications

The work progressed on WT-400, testing of bonded G.fast links.

In the Home Networking Project Stream, it was agreed to start work on WT-208 Issue 3 (performance test plan for in-premises powerline communication systems) with the goal of simplifying the test suite.

Work progressed on the two study documents; one on Wi-Fi in-premises installation and diagnostics (SD-401) and the other on Wi-Fi in-premises performance testing (SD-398). The group will continue to inform the Wi-Fi Alliance, Wireless Broadband Alliance and IEEE 802.11 about this work as it progresses.

Cloud CO sees blue skies thinking from SDN and NFV Group

Cloud CO has been a major focus for the SDN and NFV Group since the Kansas meeting, with an interim meeting being held in Berlin in January and an active online development process also well underway. There was considerable participation and contribution made during the Q1 meeting - so much so that not all of it could be handled within the meeting itself, but the overflow will continue to be discussed using the online process and regular conference calls. One topic attracting attention was migration and co-existence as a deliverable within the Cloud CO Project Stream.

Cloud CO is just one of several projects being handled by the group. Straw ballot comments are being reviewed and resolving on Software Access Networks, Fixed Access Network Sharing (FANS) and the virtual Business Gateway (vBG).

The Software Defined Access Network (SDAN) will enable software-defined control of all the major access technologies of copper, fiber and wireless. SDAN enables increased agility of networks through bringing software control to the edge of the network. FANS architecture applies virtualization to copper access coupled with slicing techniques to enable multiple operators to share one physical network, while the vBG - one of the most awaited applications of NFV - enables a new generation of more agile business services.

Wireline-Wireless Convergence Work Area drives 5G FMC

The Wireline-Wireless Convergence (WWC) Work Area addressed the needs of converged operators, which have both wireline and mobile networks deployed and are in a position to leverage all of their assets with combined subscriber offerings.

Hybrid access combines wireline and wireless access to enhance reliability, provide fast fulfilment and offer greater bandwidth. Phase 2 of this work continued to progress in Chicago.

Building on the joint Broadband Forum workshop with 3GPP in February, WWC kicked off a number of efforts directed at defining a clear path to specifying true convergence between wireline and wireless networks. The direction is to drive a high degree of commonality in operations and management and provide carriers with enhanced options for the build out of both fixed and mobile broadband. The target for this work is to be coordinated with the emergence of key 3GPP 5G specifications in 2018.

Documents approved include:

- MR-363: Home Network Diagnostics Tools and Mechanisms (White Paper)
Editors: Barbara Stark, AT&T, and Miodrag Djurica, KPN
- TR-114 Issue 3: VDSL2 Performance Test Plan
Editor: Aleksandra Kozarev, Intel
- TR-208 Issue 2: Performance Test Plan For In-premises Powerline Communication Systems
Editor: Marcos Martinez, Marvell Semiconductors
- TR-285 Amendment 1: Broadband Copper Cable Models
Editor: Andre Holley, TELUS Communications
- TR-298 Issue 2: Management model for DSL line test
Editor: Joey Boyd, ADTRAN
- TR-301 Issue 2: Architecture and Requirements for Fiber to the Distribution Point

- Editors: Michael Shaffer, Nokia, and Dong Wei, Huawei Technologies*
- TR-352: Multi-wavelength PON Inter-Channel-Termination Protocol (ICTP) Specification
Editors: Marta Seda, Calix, and Denis Khotimsky, Verizon
 - TR-355 Corrigendum 1: YANG Modules for FTTdp Management
Editors: Joey Boyd, ADTRAN, and Ken Kerpez, ASSIA
 - TR-383: Common YANG Modules
Editors: Joey Boyd, ADTRAN, and Ludwig Pauwels, Nokia

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.

Broadband Forum in the news

As the Forum continues to drive forward next-generation broadband initiatives, its work is continuing to attract attention from the media. At Broadband World Forum, Robin Mersh was interviewed by [UBB 2020](#) (part of Light Reading) about access network virtualization, while he also took part in a web cam interview about the business end of SDN and NFV for [RCR Wireless News](#).

Events Calendar

2017 Broadband Forum Meetings

Keep the below dates free for this year's quarterly meetings.

Q2 Meeting: May 15 - 18, Taipei, Taiwan

Q3 Meeting: September 11 - 14, Helsinki, Finland

Q4 Meeting: December 4 - 7, New Orleans, LA, USA

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

- ONS 2017: Apr 3 - 6, Santa Clara, CA
 - Gigabit Copper 2017: Apr 4 -5, Brussels, Belgium
 - China SDN/NFV Conference: Apr 13 - 13, Beijing, China
 - Internet of Things Summit: Apr 19 - 20, San Francisco,
 - Telco Cloud World Forum: Apr 24 - 26, London, UK
 - ONUG Spring Meeting: Apr 25-26, San Francisco
 - NFV World Congress: May 2 - 5, San Jose, CA
 - G.fast Summit: May 9 - 11, Paris, France
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Contact information

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