broadband forum

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

As the anniversary of our Broadband 20/20 launch approaches, this week's meeting has shown the tremendous developments we have all made in moving the Forum towards the realization of the future broadband network.

Examples of vital new work areas include Cloud Central Office (Cloud CO), the completion of our first YANG deliverable (TR-355), the publishing of TR-317, a landmark Network Functions Virtualization (NFV) document, and a new Intellectual Property policy adapted to enable the increasing focus on software delivery.

We have also moved towards the world of 5G and a real highlight of this week's gathering was the keynote presentation by Antje Williams, of Deutsche Telekom, who encouraged us to further help the industry ensure standardization is central to the convergence of fixed and mobile networks, an essential requirement for successful 5G implementation.

All this activity follows our groundbreaking Atlanta Special Meeting on Broadband Network Evolution. Here, many Service Providers gave their views and visions on how the network needs to develop to ensure the ubiquitously connected world we all are aiming for can be achieved. Further details of how the Forum is already working to realize the actions agreed in Atlanta can be found below – highlighted especially in the discussions on the Cloud CO project.

We have also made great progress in areas that are traditionally central to the Forum, but will be vital as broadband evolves. TR-069 is evolving and the imminent arrival of the User Services Platform will be a game changer. In addition, the G.fast Certification program is poised to make a significant impact in the delivery in ultra-fast broadband.

Behind the scenes, we have fully embraced our new Working Area / Project Stream method of working, as well as seeing new initiatives such as the Innovation Track, where we are looking to address the evolution of broadband services. Supporting all this has been the hard work around new and additional software tools, as well as increased social media activity, including our LinkedIn company page and Twitter feed, which topped 1,000 followers this week.

All of this stands us in good stead to continue to be the voice of broadband for the industry. We have shown our ability to adapt to meet the opportunities of the dramatic changes we are seeing and this week I've been very encouraged by the way everyone is working together to help bring about the move towards a slicker, faster and highly relevant Broadband Forum.

Lets keep moving forward!

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Deutsche Telekom calls on Broadband Forum members to "Collaborate on 'true convergence' of mobile and fixed networks to unlock full potential of 5G"

In her keynote presentation delivered during the Opening Plenary of the Broadband Forum meeting in Berlin, Deutsche Telekom's 5G Executive Program Manager Antje Williams called

for true convergence between fixed and mobile networks so that a seamless experience could be delivered to consumers.

Access-agnostic networks are a vital component in realizing the full potential of 5G, and in order for this to happen, more collaboration is needed between different standards bodies, including open source communities, according to Williams.

"When you look at the amount of challenges and traffic that has to be transported in the future, we will not manage that with just the mobile network," said Williams. "Today, a much bigger portion of whatever is transported runs through fixed line networks and we strongly believe the solution for the future has to be a combination of the two, or access-agnostic networks. This means that when using the networks, consumers shouldn't see a difference between mobile access and Wi-Fi access.

"Today, standardization of the two networks is done separately and to become one network, we need more alignment," she added. "From a consumer perspective one of the most important topics is convenience. Therefore, it is essential that 5G delivers to its full potential."

Williams concluded her presentation with a call-to-action to Broadband Forum members to play their part and start engagement and work on this area in order to realize the broadband networks of the future.

The theme of Williams' presentation echoed the perspectives of the Broadband Forum's special meeting on Broadband Network Evolution, which was held in Atlanta in May. Following this meeting, the Forum set out a course of action which reinforces its interaction and commitment to embracing the best of both open source and standards development, and increasing its work with key industry groups.

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Broadband Forum and ON.Lab collaborate on CORD

In order to accelerate the development of future broadband requirements and standards in close collaboration with open source projects and develop new services, enabling our stakeholders to realize business benefits of emerging technologies such as SDN, NFV and Cloud, the Broadband Forum has entered a Memorandum of Understanding (MOU) with Open Networking Laboratory (ON.Lab).

The signing of the agreement formalizes and extends the collaboration between Broadband Forum and ON.Lab which began during the build-up to the Forum's Atlanta meeting. The terms of the MOU will enable the CORD™ Project community to understand the requirements of next-generation broadband services at the Forum and demonstrate how these can be met with the CORD platform. The work of the community will in turn inform future Forum standards based on real-world open source implementations and speed up the time-to-market of solutions for providers and vendors.

The emergence of the Cloud Central Office (CO) was a key discussion point at the Atlanta meeting, with ON.Lab holding demonstrations and presentations of the CORD project. CORD, or Central Office Re-architected as a Data Center, integrates NFV and SDN to bring data center economics and cloud flexibility to both the telco Central Office and the entire access network.

ON.Lab Executive Director Guru Parulkar said: "The Cloud CO as a concept is going to be a vital part of our work going forward and with it, operators will be able to quickly and efficiently deliver new technologies into the central office. With the help of the Broadband Forum, ON.Lab will continue to meet the challenges of re-imagining the telco CO as concepts and use cases emerge."

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SPAC and Innovation Group host open session on Net Neutrality

The Broadband Forum's Service Provider Action Council (SPAC) and Innovation Work Area welcomed guest speaker Florian Damas, of Nokia, who summarized the latest developments relating to net neutrality.

In his presentation, Damas summarized the different regulations that currently exist in different regions, including the United States, Europe, Norway, Israel and Latin America. He also highlighted concerns about the impact that regulations can have on businesses and whether the Broadband Forum should look to be involved in regulations as it continues to develop in an increasingly digitalized world.

Damas concluded by looking at how Net Neutrality affects and is affected by the Forum's upcoming planned work on Broadband Assured Services (BAS).

The topic of net neutrality was further explored by the Innovation Work Area, with particular focus on the new EU guidelines and how the Forum could respond in a position paper.

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Focus on the future as Forum approaches 25-year milestone

The Broadband Forum will celebrate its 25th anniversary at the Q4 meeting in Kansas City.

Plans for celebrations involving past and present members are already underway, as the Forum looks to the next 25 years.

CEO Robin Mersh said: "The Broadband Forum is operating in a very different telecoms industry compared to when we first started our work and the fact we are still make a different to Service Providers and vendors is a huge achievement.

"Of course, our work continues and, with emerging technologies like SDN, NFV and Cloud, our ability to adapt and respond to the demands of the industry means the contribution we continue to make to the industry remains all the more relevant."

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Work Area Updates from Berlin

Architecture and Migration Work Area builds on Broadband 20/20 vision as Forum's first NFV document is published

The Network Enhanced Residential Gateway (NERG, TR-317) has passed final ballot. This is an important project for both the Forum and the industry, distributing compute resources between new bridging Customer Premises Equipment (CPE) functionality (BRG) and the virtual gateway CPE processes in the network.

Work around the sharing of copper access (TR-349) has passed final ballot. This 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.

Progressing the Forum's work on Software Defined Networking (SDN) and NFV, WT-345 on migration to NFV has completed straw ballot and will now progress to final ballot. WT-345 defines models for introducing NFV into legacy networks to facilitate the network transformations currently underway in the industry.

The Framework for Virtualization (WT-359) has completed straw ballot and will now progress to final ballot. This is a fundamental document that will underpin future Broadband Forum work in 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.

A study on the impact of 4K video on the network is nearing completion 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.

SD-365, which focuses on enhancing our architectural models to encompass SDN concepts is nearing completion and will ultimately be reflected in an update to WT-359 in the new year.

A new project on performance monitoring from customer equipment to the IP edge has been initiated and is expected to be technically completed during 2017 Q2. This is expected to enhance providers' ability to monitor Service Level Agreements (SLAs) and improve network operations.

Finally, the process of transferring the whole area of Broadband Assured IP Services (BAS) from incubation to specification commenced at the Q3 meeting.

Broadband User Services Group continues to evolve TR-069

The BUS work area has been working diligently on completing its next version of the popular TR-069 protocol, version 1.5. This includes several updates including a more robust firmware management mechanism, lightweight notifications over XMPP and security enhancements. It is on track to be published in Q1 of 2017 and represents a version of the protocol that should be stable for some time.

BUS has also finished its work on the alternate management path project (WT-356), which describes the requirements for creating a second management channel when the primary management is unavailable – for example, when the user's WAN connection is down - leveraging TR-069 and TR-064 Issue 2. This opens the possibility of using a subscriber's smartphone or tablet as an alternate communications device to resolve service problems. It is scheduled to be published in Q4 of 2016.

The group also continued its work on the User Service Platform, its new flagship protocol that represents the natural evolution of TR-069 into the world of virtualization and the Internet of Things. It is on track to hold a possible implementation "hackfest" during the Q4 Broadband Forum meeting in Kansas City and is looking to publish the first working version of the protocol no later than Q2 of 2017.

The always ongoing updates to the Device:2 data model for TR-069 and associated service data models were also continued, with the BUS group having just published version Device:2.11. The group explored what may be necessary to add to enable the new User Service Platform, additional DSL parameters for SELT, updates to VDSL2 parameters and link aggregation.

Last but not least, the group's home network measurement working group is taking great strides in outlining the most common end-user problems and how service providers can use existing networking tools to troubleshoot and resolve those. In addition, it began work on the development of an open source IEEE 1905.1 stack and associated test plan to unify disparate in-home networking technologies.

Industry first as FTTdp Work Area publishes suite of G.fast and VDSL YANG modules

The Fiber to the Distribution Point (FTTdp) Work Area passed a major milestone with the

publication of the YANG modules, enabling the management of G.fast and VDSL Distribution Point Units (DPUs). This removes a major roadblock allowing the Persistent Management Agent (PMA) to use Netconf/YANG to manage the DPU. This facilitates interoperability between the different vendors' equipment.

The FTTdp Management project stream continued to progress this work on the YANG modules for FTTdp Management, in conjunction with the Common YANG Project Stream, resulting in an extensive set of modules covering both DPU-specific, as well as more generic YANG modules.

The group agreed the baseline version for progression of the YANG modules to enable similar control from the PMA back to the network management systems and OSS. This has the potential to enable operators to reduce network management complexity.

The FTTdp Architecture project stream moved forward the work progressing the second issue of TR-301 with productive discussion around some missing areas including certificate management, PMA discovery, software image management and bulk statistics collection. The group aims to complete issue 2 of TR-301 at the next meeting and then proceed to Straw Ballot.

Overall, the Work Area had a very productive week, progressing on both FTTdp architecture and management aspects.

FAN looks to speed-up new service deployment for Service Providers

The Q3 meeting saw FAN publish the GPON ONU conformance test specification, 2016.565.02 (IR-247i3a1). This Broadband Forum program gives Service Providers a qualified list of vendors, reducing the time it takes to launch new services and bringing maturity to vendors' technology for FTTH deployments, as well as the entire FTTH industry.

Further collaboration with Full Service Access Network (FSAN) and ITU-T SG15 Q2 took yet a further step towards achieving faster time-to-market for new services. The group is communicating and cooperating closely with FSAN and ITU-T to organize the first XGS-PON & fourth XG-PON1 interoperability test event. This is scheduled to take place from November 28, 2016 to December 2, 2016.

Project WT-280, G-PON in the context of TR-178, which adds to the requirements for G-PON systems deployed in access networks, is now ready for final ballot. This document will be the basis for the next revision of ATP-247, which will include GPON & XG-PON1, XGS-PON and NG-PON2 ONUs.

Completing final ballot and due to be published soon is MD-311, a marketing document giving an overview of Fiber Infrastructure Management Systems. This work aims to eliminate the costly and lengthy installation and operation process traditionally associated with optical fiber deployments by moving from paper records to electronic resource information collecting and processing. This enables automation of all operations in network installation, including maintenance, trouble-shooting, fault locating and service provisioning.

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 ODN modeling requirements.

The Multi-Wavelength PON Inter-Channel-Termination Protocol (ICTP) Specification (WT-352) continues to make great progress on ICTP message format and transportation, while the ICTP ad hoc group is now working on the Optical Line Terminator (OLT) Transmission Control state machine. This is expected to start straw ballot by the end of 2016.

A new project was also launched for WT-385 - YANG model for management of ITU-T PON – which aims to simplify the integration of FTTx management into Service Providers' current OSS/BSS systems.

Innovation Track progresses work on 5G, BAS and net neutrality

The Innovation Track kicked off the Q3 meeting with an open session on net neutrality, discussing the subject in general, including US and European rules, with a particular focus on the impact from the new Body of European Regulators for Electronic Communications (BEREC) guidelines on Broadband Forum work.

This was followed by a special session which discussed in more detail the next steps to be taken and the group decided to write and publish several position papers for regulators on topics of importance to the Forum, such as traffic management and BAS.

The Innovation Track also worked further on 5G, considering a way to cooperate more efficiently with 3GPP. This is extremely important to the group, which believes that in order to facilitate the fixed-mobile convergence, now is the time to work together on specific subjects to unify both mobile and fixed networks.

Further work on the BAS use cases was also undertaken, leading to a proposal to further progress the architecture and migration document.

Finally, the group decided to organize a BoF session at the Q4 meeting in Kansas City which will explore the challenges of migrating operator networks towards more 'softwarization', including SDN, NFV and Cloud. This is expected to take place on the first day of the meeting.

Routing and Transport Work Area stellt weiterhin Wurst her (continues making sausage in Berlin)

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. 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. The work on EVPN is focused on making the network providing Ethernet services more efficient and resilient by providing higher quality services for new and demanding applications. For more detail, please see the EVPN white paper available on the BBF website here.

The Packet Optical Evolution project is evaluating the drivers for WT-319 Part C, as well as the accompanying updates to the TR-319 tutorial and whitepaper. 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 and more seamless operation brings with it potentially significant OPEX and CAPEX savings for operators as they balance the need for faster transport network infrastructure with raising average revenue per   user.

The latest work on the broadband mobile backhaul architecture is nearing completion. The amendment adds new technology from ITU-T SG15/Q13 on time synchronization, as well as IETF resiliency and scalability enhancements to ensure highly available and reliable services over the mobile network. These, combined with the existing TR-221 architecture, produce a solution ready for LTE Advanced and initial 5G architectures. The group continues to study challenges to the transport and IP networks to support 5G and the innovative services brought about by the 2020 mobile network.

G.fast certification remains a clear focus for Physical Layer Transmission Work Area

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 September 8, 2016. After this, 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 progressed on the new project to develop a G.fast performance test plan (WT-380). We had extensive discussions on cable types and loop topology for the test plan.

There was little activity on the Test Specification of Reverse Power Feed (RPF) equipment (WT-338). The schedule for initiating a Straw Ballot has been moved to Q2 2017.

In the very-high-bit-rate Digital Subscriber Line (VDSL) 2 project stream, the group continued work on Issue 3 of WT-114, agreeing to define performance tests for VDSL2 operating at an extended reach of up to 6km.

In the bonding project stream, work progressed on Straw Ballot comment resolution on WT-273 amendment 1, which includes testing of the initialization time of VDSL 2 transceivers deployed with bonding.

In the home networking project stream, work has begun on the new project 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.

A new project proposal to specify performance tests for Wi-Fi access points was considered in an effort to define performance requirements for 'carrier grade Wi-Fi' to facilitate reliable delivery of high-speed services to end users. It was agreed to coordinate with the Wi-Fi Alliance before proceeding.

Focus on virtualization for SDN and NFV Group with four projects in the pipeline

The SDN and NFV Working Area had a busy meeting, having made substantial progress on four separate projects since Q2.

Cloud CO project is underway, developing a next-generation Central Office solution that incorporates SDN and NFV running on a Cloud-like infrastructure. This activity involves de-composing and disaggregating legacy Broadband Network Gateway, access node and CPE systems into various physical and virtualized network functions with SDN control. Expected benefits include simplifying the network by reducing redundant functions and optimizing service processing flows. The goal is not to virtualize all the access and aggregation nodes but to move some control, management and data plane functions into the Cloud platform as appropriate to facilitate greater service and operational flexibility.

Significant strides have also been made on the Software Defined Access Network (SDAN), with the work remaining to be done identified and the group on track to complete the remaining sections of the draft and then proceed to Straw Ballot by the end of the year. This work will enable software-defined control of all the major access technologies of copper, fiber and wireless. Like Cloud CO, SDAN enables increased agility of networks but through bringing software control to the edge of the network, rather than via virtualization.

Work on the Fixed Access Network Sharing (FANS) architecture continues to progress, targeting Straw Ballot at the Q4 meeting. FANS applies virtualization to copper access coupled with slicing techniques to enable multiple operators to share one physical network. This project, which defined the concept of Virtual Network Operators (VNOs), will not only be assigned bandwidth through FANS but will also enable VNOs to manage and control their part of the contracted shared network as their own. The first specification (WT-370) is

progressing and is expected to be completed by the end of this year. A second project defining virtual interface requirements has also begun.

Finally, progress on the virtual Business Gateway (vBG) – one of the most awaited applications of NFV – is continuing, enabling a new generation of flexible business services. By applying virtualization to some of the functions traditionally provided by legacy business gateway solutions, some of the functions can be distributed between a vBG located in the network with the remaining functions in a simpler on-site physical device at the customer's premises. It reduces the complexity of current customer-located equipment, enables customer self-provisioning through a business portal, allows functions to be added, deleted, exchanged and modified for rapid introduction of new services or retirement of unsuccessful services, as well as up-selling of added value services on top of basic transport services. This is all without the need to do a truck roll to deploy specialized hardware devices to every remote enterprise sites. The application of virtualization technique enables new deployment models and use cases that are interoperable with the network service provider's virtualization and migration of the Multi Service Broadband Network (MSBN).

Promise of bigger bandwidth and better reliability as Wireline-Wireless Convergence Work Area completes Phase 1 of hybrid access work

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.

The RADIUS catalogue passed letter ballot and is published as TR-341. This document consolidates RADIUS attributes both specified by the Forum and in common use in the industry in a single document to facilitate standards maintenance.

Hybrid access combines wireline and wireless access to enhance reliability, provide fast fulfilment and offer greater bandwidth. Phase 1 (TR-348) of the work on hybrid access lays the groundwork for the solution space and has passed final ballot. Phase 2 on specifying solutions (WT-378) was progressed at the Q3 meeting.

Discussions have continued with respect to the role of fixed broadband and 5G networks, with increasing participation bringing further clarity.

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Documents approved include:

- MR-311 Overview of Fiber Infrastructure Management Systems

- TR-124 Issue 5 Functional Requirements for Broadband Residential Gateway Devices

- TR-181 Issue 2 Corrigendum 2 Device Data Model for TR-069

- TR-181 Issue 2 Amendment 11 Device Data Model for TR-069

- TR-317 Network Enhanced Residential Gateway

- TR-341 Radius and Diameter Attributes Catalog

- TR-348 Hybrid Access for Broadband Networks

- TR-349 DSL Data Sharing

- TR-355 YANG Modules for FTTdp Management

- TR-371 G.fast Vector of Profiles (VoP) Managed Object Structure

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

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Broadband Forum takes part in Telco Transformation's On-the-Air Thursdays

Since the Forum announced its agreed set of actions from the Atlanta meeting, we have seen renewed interest in our work from media and analysts.

CEO Robin Mersh wrote a blog on why we need to collaborate with open source projects for Light Reading's Telco Transformation website, which was quickly followed by an invitation to take part in the publication's On-the-air Thursdays show.

The debate – which can be listened to <u>here</u> – had a great reaction from those listening and even led to a further opportunity for the Forum to highlight its developments with analyst firm Heavy Reading.

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Events Calendar

2016 Broadband Forum Meetings

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 *<u>click here</u>* for more information or contact Christine Corby at ccorby@broadband-forum.org.

Forthcoming Industry Events
- SDN & Openflow World Congress: October 11 – 14, The Hague, Netherlands
- Broadband World Forum: October 18 – 22, London, UK

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