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

Our Q4 meeting was an important one for the Forum; not just our 25th anniversary which is, of course, a real milestone, but significantly the fact we are now beginning to make concrete progress on taking the path we set out at our pivotal Special Meeting in Atlanta.

Cloud Central Office (CO) is of particular importance as we continue to deliver on the conclusions of the Atlanta meeting. The wider aim of moving towards an agile and programmable broadband is progressing, with a Birds of a Feather (BoF) discussion on migration issues and the integration of Open Source software and broadband standards organized by the Innovation Group being a particular highlight of the Q4 meeting.

This session agreed to do an industry-wide operator survey on plans and issues affecting the proposed migration to virtualized and programmable networks. Work to agree the questions for the survey will begin shortly with the results feeding into future Forum materials, shaping and forming our future work. We are also enabling the operator community to come together and drive the requirements that will accelerate the migration, allowing for new relationships, new business models and new services.

This newsletter also contains significant updates in other areas we have identified as priorities. The User Services Platform (USP) has hit a significant milestone, with its first 'hackfest' taking place, where prototype implementations showed the first proof-of-concept of the protocol. Preparation for a significant cooperation with 3GPP is also underway and this will lead to advances in 5G and everything that promises. Finally, we had a very positive workshop with participants from the ITU-T, IEEE and FSAN joining the FAN group on discussions around PON convergence and how the whole community could benefit from those proposals.

All of this meets those objectives set out in Atlanta and confirms our commitment to the rapid and high quality delivery of new standards adapted to the latest industry disruptions.

With this continued approach, I am very much looking forward to the next 25 years!

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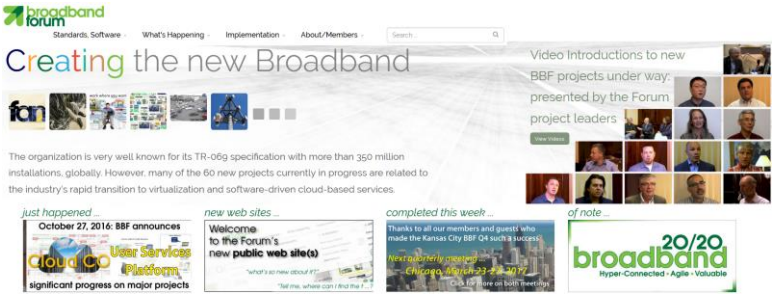
Broadband Forum launches new website

The presentations from the BoF and the plenary sessions are available on the new Broadband Forum members' collaboration wiki. Not signed up yet? You will need a new sign up for the wiki and the new "BitBucket" code repository site. There's already around 200 pages. Click here to join the 200+ users who have registered since we opened the site a few months ago!

And don't forget, if you haven't seen it yet, please check out our **all new** public web site featuring new videos by the project leaders and new information about the key projects highlighted in this newsletter.



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Broadband Forum agrees Cloud CO next steps and plans operator survey

Organized by the Innovation Group, the Q4 meeting began with a BoF session which addressed the challenges of introducing the new technologies of NFV, SDN, 5G and the Internet of Things (IoT). The discussion covered topics such as management, operations, innovation, new skillsets and methodology.

CenturyLink's Mike Bugenhagen kicked off the meeting with a presentation on how operators can migrate to NFV, with specific focus on what the Broadband Forum should do in this space to stay ahead and in line with the industry. Bugenhagen went on to explore the different types of architecture migration paths operators could follow to NFV and Cloud CO, highlighting a common platform for NFV to be deployed on that supports multiple applications as one approach operators could take. In regards to where the Broadband Forum fits into the picture, he suggested that carrying out a wide-scale survey of operators on their deployment requirements would be the best place to start in making a new RG specification.

Tom Anschutz, of AT&T, followed up Bugenhagen's presentation with more detail on Cloud CO and the CORD project.

Following input from members which mostly saw support for the ideas presented, discussion moved to Understanding the Migration to Agile, showing that there are new principles in the Cloud that must be respected and understood more if operators are going to be truly agile. Technical Committee Chair Mike Fargano added to this with a comparison of High Level Data Centers and CO configurations and standards, including fire protection, electrical powers and HVAC.

The focus then turned to next steps, with a suggestion being made to record working instances of architecture that the Forum could embrace and develop into a set of understood systems that people can contribute to.

Concluding the session, CEO Robin Mersh announced the Forum will be carrying out an operator survey in the near future to gather information on different deployment techniques and the outcomes.

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Two Special Recognition awards acknowledge ten years of "sterling service"

Two Broadband Forum Special Recognition awards were handed out by Chairman Kevin Foster to CEO Robin Mersh and Executive Director Christine Corby in recognition of the pair's "sterling service to the Forum and the board."

Presenting the award during the Opening Plenary, Foster said: "These are two people who have lived Broadband Forum values, two people who have been instrumental in making the Forum what it is today and two people who have been key in driving forward transformation initiatives. They are always smiling and never negative, giving ten years of sterling service to the board and to the Forum."

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Welcome to new members and first-time attendees!

The Broadband Forum is pleased to announce three new additions to its membership – Beijing Internet Institute (BII), Inango Systems Inc. and LEA Networks.

Headquartered in Paris, France, LEA Networks is a wholly-owned subsidiary of HF Company (NYSE Euronext: HF) and a worldwide provider of xDSL splitters/filters, HomePlug Powerline Carrier (PLC), Primary Surge Protection and SmartHome solutions for the telecommunications industry.

The BII is an independent, private company with a keen interest in promoting the development of the next-generation Internet: IPv6 and SDN, focusing on technology research, promotion, and testing and certification to support a secure, stable, extensible and interoperable Internet.

Finally, Inango Systems leverages open source packages to develop innovative software for networking equipment companies and has deep experience in Linux, communications protocols, management and encryption systems and application level software.

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Broadband Forum celebrates 25 years!

A celebration was held in Kansas City to mark the Broadband Forum's 25th year, with members old and new attending to recognize the Forum's successes.

Between dinner and entertainment, the meeting heard from the Forum's President Tom Starr, Chairman Kevin Foster, Vice President Dave Sinicrope and Technical Committee Chair Mike Fargano, all of whom summarized the Forum's past successes and milestones.

The focus was very much on the future, though, with all three speakers highlighting Forum's ability to evolve with the industry as one of the key factors behind its continued success.

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Work Area Updates from Kansas City

Architecture and Migration Work Area completes two NFV specifications

Progressing the Forum's work on SDN and NFV, TR-345 on migration to NFV has passed final ballot and will be publicly available on the website in the near-future. TR-345 defines models for introducing NFV into legacy networks to facilitate the network transformations currently underway in the industry.

The Framework for Virtualization (TR-359) has also passed final ballot and will be available on the website soon. 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 emerging from the completed SD-365 study. This is projected to go to straw ballot Q2 2017.

A study on the impact of 4K video on the network has been completed and the group is now looking at one of the first outcomes. This is improved methods of video delivery for OTT with the cooperation of carriers. A project has been initiated to look at multicast distribution of ABR.

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

Work on Broadband Assured Services (BAS) continues with the current focus being on refining the use cases that would be input into the architecture.

Finally, the group is looking at other areas that will be foundational to the network transformations that will roll-out over the next decade. This relates to top down models and the associated architectural principles that will guide the Forum's work.

Broadband User Services Group hosts real-time USP hackfest

The Broadband User Services Work Area had an exciting week with a real-time "hackfast" to test out the first stages of its new protocol, the User Services Platform (USP). USP is the natural evolution of the popular TR-069 protocol into the IoT world and consumer electronics. It helps solve the very real problems those industries have with managing devices and systems that have multiple stakeholders and often have not dealt with connected environments before.

The hackfest successfully operated the control of smart lights through a Z-wave proxy, communication through a controller between a motion sensor and camera, and achieved successful interop of basic message sequences (requests and responses) between three different implementations. The hackfest let the group take a huge leap toward its target of publishing the USP specification and open source components by Q2 2017.

The group is also tackling the chaotic world of Wi-Fi with respect to broadband subscribers. Very often, service providers are on the hook to help end-users have quality Wi-Fi - a term coined "Carrier Grade Wi-Fi." The group began joint work with the Physical Layer Transmission Work Area on defining use cases, requirements and test procedures for the performance and quality of end-user Wi-Fi networks.

FTTdp Work Area takes TR-355 to the next level

Overall, 2016 has been a tremendous year for the Fiber to the Distribution Point (FTTdp) Work Area, with the publication of TR-355 and TR-371, defining the YANG modules for G.fast and FTTdp Management, as well as major work on defining the architecture and requirements for the FTTdp ecosystem. This work enables the management of G.fast and

VDSL Distribution Point Units (DPUs) and allows the Persistent Management Agent (PMA) to use Netconf/YANG to manage the DPU.

The FTTdp management project stream continued to progress the next revision of TR-355, further improving and enhancing several Netconf/YANG management-related aspects. In addition, the group worked in conjunction with the common YANG Project Stream to resolve straw ballot comments on the common YANG module specification (WT-383). The aim is to publish an extensive set of modules covering both DPU-specific, as well as more generic YANG modules. The group has also progressed the management architecture that will 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 progressed well on the second issue of TR-301, covering several enhancements including certificate management, PMA discovery, software image management and bulk statistics collection. With all contributions handled at the meeting, the group has agreed in principle to proceed to straw ballot and start the comment resolution process.

Moving forward, the group intends to dive into the real-life interoperability challenges when connecting the PMA to the DPU, by defining an interop test plan.

FAN begins preparations for future converged PON world with a workshop with key partners

The Q4 meeting saw FAN publish the WT-280, ITU-T PON in the context of TR-78. This project enhances ITU-T PON with various service requirements beyond that of TR-156, helping to make ITU-T PON much more suitable for the Fiber-to-the-Home (FTTH) industry.

As PON migrates, there is a strong trend emerging that both ITU-T PONs and IEEE PONs will share more and more in common in order to make the most cost-effective industry base. Collaboration with Full Service Access Network (FSAN), ITU-T SG15 Q2 and IEEE802.3 will begin to make a unified PON church. Ideas from the whole industry have been considered and further steps have been agreed for more work to be done in promoting PON convergence work. These four groups will be working on how to cooperate and develop a unified plan to work on PON convergence – look out for future announcements.

The new white paper project, MD-396, gigabit access over FTTx, 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.

A proposal made at the Atlanta special meeting by NTT has resulted in a new Project Stream being kicked off in Kansas City for PON abstraction interfaces for time-critical applications.

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.

Innovation Group hosts BoF session on 'softwarization' and advances work on 5G

The Innovation Group kicked off the Q4 meeting with a BoF session which explored the challenges of migrating operator networks towards more 'softwarization', including SDN, NFV and Cloud. Discussion and a first conclusion is for the Forum to organize a wide survey among Service Providers focusing on which migration path they plan to take.

On net neutrality, a first position paper will be reviewed in a November teleconference, with the aim of involving people that deal with regulation.

With the 3GPP 5G cooperation in mind, the Innovation Group created a new project stream on 5G convergence where new work focusing on the points highlighted on the 3GPP agenda for 5G has been approved. During the session, the group reviewed several propositions focusing on specific work which asks people to volunteer to engage further. The group is proposing a date in February 2017 to meet with 3GPP SA2.

Routing and Transport Work Area is smokin'!

The latest work on the Broadband mobile backhaul architecture is entering the approval process. The last call for comments has been issued and the comments received will begin to be resolved between now and the Q1 2017 meeting. It is anticipated the work will complete after the Q1 2017 meeting. 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.

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 work is nearing the point where the approval process will be started. The final content should be added between now and the Q1 2017 meeting. Phase 2 architects the Metro Ethernet Forum (MEF) Carrier Ethernet service definitions for both E-LINE and E-TREE, and is based on Internet Engineering Task Force (IETF) Request for Comments (RFC)s. 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, such as cloud and data center interconnect, evolution to 5G backhaul, UHD video distribution and the IoT. For more detail please see the EVPN white paper and the EVPN tutorial on the BBF website.

The Packet Optical Evolution project has completed its evaluation of 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 and will continue the project based on contributions. 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.

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 focused on the test set-up and test loops for the test plan.

In the very-high-bit-rate Digital Subscriber Line (VDSL2) project stream, the group finalized the straw ballot on the WT-114 Issue 3 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.

Work has started on new project WT-400, testing of bonded G.fast links.

In the home networking project stream, the group decided to exchange information with ETSI for the development of a test plan for verifying the functionality of a system that mitigates interference between DSL and power line systems based on ITU-T G.9977. In addition, the group completed straw ballot comment resolution for WT-208 Issue 2 and decided to move the document to final ballot.

A new project stream for carrier-grade Wi-Fi was formed. Two study documents have been initiated; one on Wi-Fi in premises installation and diagnostics (SD-401) and another 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.

Four virtualization projects progressed by SDN and NFV Group

The SDN and NFV Working Area had a busy meeting, having made substantial progress on four separate projects since Q3.

The Cloud CO project is drawing a large amount of interest and participation, developing a next-generation CO 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 level of participation seen in this project at Q4 has been so great that the group is currently planning an Interim Meeting to accelerate the work and has incorporated online collaboration in its workflow.

Following the Q4 meeting, the Software Defined Access Network (SDAN) work is now technically complete and will proceed to straw ballot. This work 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.

The first specification (WT-370) in Fixed Access Network Sharing (FANS) architecture is now technically complete and will progress to straw ballot. FANS applies virtualization to copper access coupled with slicing techniques to enable multiple operators to share one physical network. The second project which builds on 370 to define virtual interface requirements has also progressed.

Finally, the virtual Business Gateway (vBG) – one of the most awaited applications of NFV – is continuing, enabling a new generation of flexible business services. This is expected to go to straw ballot before the next quarterly meeting, with any comments due to be resolved at the Q1 2017 meeting.

Wireline-wireless Convergence Work Area continues 5G discussions

This work area addresses 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 on specifying solutions (WT-378) was progressed at the Q4 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:

- TR-196 Issue 2 Corrigendum 3 Femto Access Point Service Data Model
- TR-273 Amendment 1 Testing of Bonded, Multi-Pair xDSL Systems
- MR-276 Lessons Learned from IPv4 to IPv6 Migration and Guidance for Future Deployment
- TR-280 ITU-T PON in the context of TR-178
- TR-345 Broadband Network Gateway and Network Function Virtualization
- TR-356 Alternate Management Path from Home Gateway
- TR-359 A Framework For Virtualization

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.

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Broadband Forum in the news

Since the Q3 meeting, the Broadband Forum has announced the publication of two new documents – TR-317 and TR-355 – drawing attention from media and journalists.

In addition to Press Releases, the Forum also received requests for longer in-depth features on TR-317, including from IT Pro Portal.

Briefings were also carried out at Broadband World Forum with Telecom TV and Light Reading recording video interviews with Robin Mersh and Computer Weekly and Mobile Europe requesting face-to-face briefings.

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Events Calendar

2017 Broadband Forum Meetings

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

Q1 Meeting: March 20 - 23, Chicago, IL, USA
Q2 Meeting: May 15 - 18, Asia
Q3 Meeting: September 11 - 14, Europe
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

- ITU World Telecom 2016: November 14 – 17, Bangkok, Thailand
- Globecomm: December 4 – 8, Washington DC, USA

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Contact information

Questions or ideas? Contact the Broadband Forum +1 510.492.4020 or email info@broadband-forum.org