broadband forum

Shaping the Future of Broadband

WELCOME TO THE BROADBAND FORUM QUARTERLY NEWSLETTER

Your quarterly resource for updates on recent activities and our most critical work and focus areas.

Calling for speakers on Energy and Sustainability at the Q2 Town Hall Innovation Series (THIS) sessions!

The first inaugural Town Hall Innovation Series (THIS) sessions at the Q1 Broadband Forum meeting were well-attended by the membership and guest attendees. Greater collaboration between Video Content Providers and Broadband Service Providers to capitalize on broadcasting opportunities was called for, and improved coordination and collaboration between different government agencies and standards organizations was identified to bridge the digital divide across the United States.

Cutting edge research and technology were presented at THIS Birds of a Feather (BoF).

The importance of SLA-aware real-time control across optical, computing, and mobile networks was highlighted as a key enabler for 5G Ultra-Reliable Low-Latency Communication (URLLC). Colorless Multi-Access (CMA) network was introduced as a new frontier, blending the best of access technologies.

Thank you to all our speakers!

Going forward, these Town Hall sessions will take place at each quarterly Members' meeting, and we are inviting speakers to get involved. We plan to focus on different topics each quarter, with the focus in our Q2 meeting being Energy and Sustainability. The topics presented at THIS sessions can stimulate future work for the Forum and act as a catalyst for new projects.

Please contact THIS@broadband-forum.org if you would like to present on a subject matter or suggest a topic.

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A welcome from our leadership

Ken Ko, Managing Director

Craig Thomas, VP Strategic Marketing and Business Development

Dallas, Texas, was the location for our Q1 meeting and it was great to see so many of our members face-to-face.

Dallas is home to a key piece of innovation; Dallas-born Jack Kilby invented the integrated circuit used in microchip technology back in 1959. It is therefore fitting that our members converge on this location, to innovate and collaborate in their joint quest of delivering new open standards for the entire broadband ecosystem to benefit from.

Last year, we published 39 standards, test plans, marketing reports, and open software releases and we continue to build on this progress. We have reached a milestone of five hundred Technical Reports, with WT-500 launched in the PHYtx Work Area.

Thanks to all of our members' continuous hard work and dedication that ensures our open standards and open software benefit all in the broadband industry.

We recognized those individuals across the industry who have gone above and beyond to help drive future broadband standards development during our awards ceremony. Congratulations to all of our Distinguished Fellow, Leadership, Circle of Excellence, and Outstanding Contributor award winners!

Thank you to all of our speakers at the Q1 Town Hall Innovation Series sessions, which were well-attended and provided expert views on video broadcasting, bridging the digital divide, SLA-aware real-time control technology, and the future of multi-access networks. If you would like to provide a presentation on sustainability for our Q2 meeting, please get in touch.

The Broadband Forum grows from strength-to-strength as we enter the year with a new ten-year membership high. Now our attention turns to our next quarterly meeting in Porto, Portugal on June 5-8. We look forward to welcoming you there!

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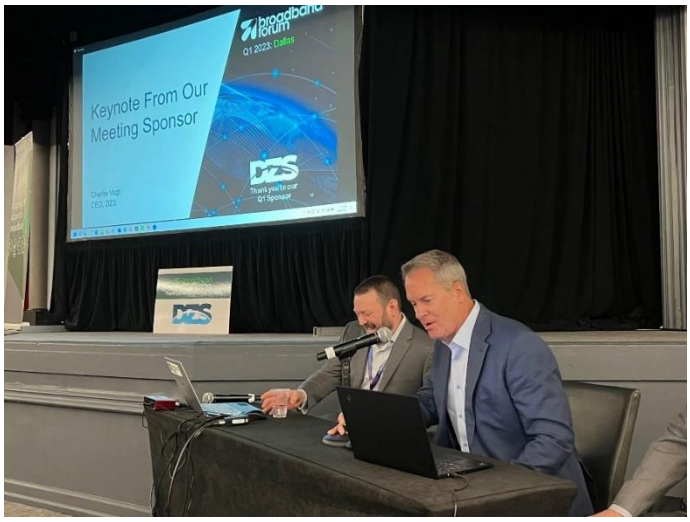
Thank you to our meeting sponsor, DZS!

Charlie Vogt, President and CEO at DZS, delivered an engaging keynote presentation on the power of standards. DZS actively contributes and supports the Broadband Forum, playing a key role in many Work Areas.



Vogt outlined the generational opportunity available for service providers and technology companies with both global broadband revenue and subscriptions continuing to heighten in coming years. The presentation discussed mobile networks gearing up for open standards with Open RAN and 6G on the horizon. Vogt acknowledged the crucial role that standards and interoperability play.

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Engaging pool of Town Hall Innovation Series sessions this quarter

OutSys: Collaborate on broadcast or pay the price

Greater collaboration between video content providers and broadband service providers is needed to capitalize on broadcast opportunities, according to Fabrizio Guidotti, of OutSys.

Kicking off the Broadband Forum Town Hall Innovation Series, held as part of the Q1 meeting, Guidotti, outlined how broadcasters, such as the BBC, are pondering whether to switch-off terrestrial television and radio signals in the years ahead to focus on Internet content streaming only. This follows viewers' growing preference to access TV via their broadband network. Currently, television broadcasters have to run two separate platforms to deliver the same service. By dropping one of them, they can save money and resources.

At the same time, said Guidotti, linear TV broadcasters and video OTTs are all competing to acquire the exclusive rights to live event streaming – the latest revenue stream to tap into as the Video on Demand (VoD) market is becoming saturated and overcrowded. While linear and live event streaming can be delivered using both Unicast and Multicast, delivering it using infrastructure designed for VoD that use Unicast only can have consequences, Fabrizio warned.

"Service providers and video content providers have to keep expanding their infrastructures to avoid service disruptions, and this endless growth is costly in terms of money, time, and resources," he added.

Although Guidotti said he was not suggesting replacing any Content Delivery Network Systems, he did highlight the need for additional features and capabilities to handle multicast streaming.

"The service provider can pre-allocate the Multicast Groups with assured bandwidth, latency, and distribution capabilities on its network infrastructure and then assign them to the video content providers," he said.

To achieve these outcomes, Guidotti called for greater collaboration between video content providers and broadband service providers. Without this, Fabrizio warned, they are doomed to keep continually expanding their infrastructures or having to negotiate a new procedure for each broadband provider and video content provider to deploy their custom multicast model.

According to Guidotti, the Broadband Forum is the right place, with the right culture, for all stakeholders to meet and come to an agreement – but more video content providers to join the conversation! Guidotti called for the launch of a new initiative within Broadband Forum to address the issue the industry faces.

"Giant step forward for America's connectivity goals but not across the finish line yet"

The US is in the beginning stages of a once in a lifetime investment in high speed, reliable broadband networks and user adoption/skills training. However, greater coordination and collaboration between different government agencies and standards organizations is needed to bridge the digital divide across the United States, according to a panel during another engaging THIS session.

Greg Bathrick, Board Member and Distinguished Fellow at Broadband Forum and Area Vice President of Commercial Development at Calix, said: "Technology has changed lives, but there are many communities that still have not benefitted, with broadband no longer a luxury but a requirement."

Bathrick moderated an informative session with Kevin Sievert, Acting Broadband Program Director at State of North Dakota, and Kevin Noll, Principal Access Architect in the Office of the CTO at Vecima and President of Loudoun Broadband Alliance. The panel outlined how the pandemic proved that for remote working and learning, reliable broadband was paramount. But Internet connectivity with the sufficient speeds was lacking in many states across the United States, and across the globe.

Participants also stressed the need to deliver reliable connectivity to reach everyone. The 25 Mbps download speed with 3 Mbps upload speed proposed by the FCC was regarded as not enough. The group highlighted that the Broadband Equity, Access, and Deployment (BEAD) Program and American Rescue Plan Act (ARPA) will be pivotal. North Dakota is very near completing its broadband network buildout and is expecting BEAD funding slightly above the $100 million minimum grant; in comparison Texas, where the Q1 meeting is taking place, is estimated to receive $3.5 billion by Cartesian group.

Sievert pointed out that almost 100% of the population in North Dakota have access to 100 Mbps services and the key to that success has been driven by the local telcos, coops and cable players. North Dakota will be working in the coming months to develop a comprehensive Digital Equity Plan that will help drive adoption- and education. Sievert advised that the success of connectivity has to measure against a key criteria consisting of access, reliability, affordability and useability.

Meanwhile, Noll advised that Loudoun County, Virginia, had the highest concentration of data centers on the planet, carrying 80 percent of the world's internet traffic. While many in the county have access to gigabit or faster speeds with the largest service providers, there is a huge divide in the county with 8,700 households without access to broadband Internet and

many homes without cellular coverage. Noll stressed that rural communities are always playing catch up in terms of internet access.

Noll emphasized that if operators cannot provide affordable or reliable internet access, then they are not doing their job properly. Noll highlightedthe impact broadband access has on education, and new employment and job searches. We are building broadband networks to help people in their daily lives."

When evaluating grantees and their applications, Sievert advised that the deployment priorities included unserved to underserved and different organization types, such as small businesses in communities they serve. Sievert agreed that wireline technologies deliver the high-speed connectivity needed and believes the time is right to deliver fiber in rural areas.

Noll advised that when the Broadband Forum produces specifications, members need to consider the motivations for operators and the need to focus on connecting those situated in less profitable areas – lowering the operational costs of equipment and infrastructure, while also maximizing the return on investment.

The group agreed that in some cases service providers have exaggerated reach and delivery speeds, and that regulatory government agencies are in need of improved and more accurate testing tools of the broadband service and speeds provided to hold service providers more accountable. By combining new funding and next-generation technologies with standardization, fairer allocation of resources to underserved and unserved locations can be delivered in the future.

Real-time SLA-control technology key to unlocking new opportunities

Kota Asaka, of NTT Access Network Service Systems Laboratories, highlighted the importance of SLA-aware real-time control technology across optical, computing, and mobile networks. Asaka advised that the percentage of the working age population (15-64) has been decreasing in developed areas. Service providers have therefore been tasked with efficiently providing network services with a reduced workforce.

Remote services such as remote surgery or remote inspection require large bandwidth and low latency. Asaka outlined the advantages of an All Photonics Network (APN) as it provides an end-to-end optical direct connection without an optical/electrical/optical conversion at the node. However, Asaka pointed out that the remote services could not be achieved by APN itself, but by collaborating with computing and mobile networks.

An example showcased a drone with 4K/8K video collecting footage for inspection at a bridge. By sharing resources, there was a collaborative operation between the APN, computing resources and mobile controllers.

Asaka provided examples of real-time control while experiencing congestion at the computing resource or mobile base station. With a real-time controller, in-service dynamic control could be achieved.

Asaka advised that Broadband Forum's Automated Intelligent Management (AIM) architecture is consistent with what has been proposed and WT-436 could be suitable as a baseline text. The next step proposed could involve analyzing the gap between the document and real-time technology. Marrying standardization with real-time control technology could unlock a plethora of new opportunities for the industry.

AT&T Labs – Now is the perfect time for a Colorless Multi-Access network

"This is a revolutionary access technology which cost-effectively supports both dedicated and shared services across a single passive optical network with one waveform, one Central Office node, one NTE/CPE device, and a single control plane."

This was the message delivered by Bhushan Padhiar, Principal Member of Technical Staff at AT&T Labs during Broadband Forum's Q1 Meeting.

According to AT&T, Colorless Multi-Access, a proposed next-generation access technology, transforms the access architecture to provide access convergence supporting services currently offered over a multitude of access technologies including point-to-point (dedicated), point-to-multipoint (shared), and WDM. This new technology efficiently converges most legacy services onto a single waveform from one Central Office network node across one common passive optical network with one control plane which has the potential to greatly consolidate and simplify the access network for operators.

AT&T called for more vendors and operators to provide feedback and get involved. With this framework, the next step would be engaging standards organizations such as Broadband Forum, ITU-T and FSAN to standardize the technology and define the architecture and management interface.

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Board of Directors Nominations are now open!

There are five available seats to be filled for 2023 and each term is for two years. If you are interested, nominations are due by April 24th and nominees must represent current paid principal members.

Election voting opens on May 1st and closes June 5th. To learn more and to become a candidate, see here.

Broadband Forum recognizes the leaders and key contributors driving pivotal work in the industry

Broadband Forum's Q1 meeting has recognized individuals across the industry who have gone above and beyond to help drive future broadband standards development.

The 2023 Distinguished Fellow award was bestowed upon Joey Boyd, Adtran, and William Lupton, Broadband Forum. This award is given to those who are committed to delivering a distinguished service and show leadership in the advancement of the broadband networking industry, inspiring industry growth.

Samuel Chen of Broadcom received the Leadership award for his leadership in the Fiber Access Networks (FAN) Work Area over the last several years. The Circle of Excellence award recognizes those who show excellence and leadership in advancing the mission of the Broadband Forum and the networking communications industry. There were five recipients of the Circle of Excellence award: Elia Battiston, Radisys; David Cluytens, Orange; Al Morton, AT&T; Mauro Tilocca, TIM; and Nagaraj Turaiyur, Juniper Networks.

The Outstanding Contributor award was presented to individuals who have played an integral role in driving contributions, innovation, and enhancement in Broadband Forum work. The awards were received by; Sam Chen of Broadcom; Killian De Smedt of Nokia; Chris Gray of Orange; Ben Greear of Candela; Jeff Hartley of CommScope; Bjørn Ivar Teigen of Domos; Hugues Le Bras of Orange; Mengmeng Li of China Mobile; Antonio Marsico of Reply; and Roland Schott of Deutsche Telekom AG.

Read the full press release here.

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Operators keen to harness CPE with intelligent services and applications for future growth

Smarter Customer Premises Equipment (CPE) that drives an “à la carte” and differentiated service offering at the touch of a button will be essential for operators to secure new revenue opportunities and reverse declining ARPU, according to Broadband Forum Managing Director Ken Ko.

With traditional revenue streams, such as fixed voice and IPTV, decreasing, Ko called for service providers to invest in devices with application intelligence built in to create an app-store-like experience for consumers. This will allow the industry to cater to multiple markets segments, such as teleworkers, e-health, security, home automation, and Augmented Reality / Virtual Reality, while maintaining fewer product SKUs in their deployments.

“Operators know they need to move from simply being connectivity providers, but how they do that has, until now, remained elusive,” said Ko. “As consumer demand for network quality and innovative services continues to grow, it is now clear that if operators are to grow their revenue streams, their focus should be on delivering more choices and an enhanced user experience. An app-enabled services gateway will achieve this, giving the capability to cater for individual bandwidth, application-aware latency, and service requests at the touch of a button.”

Read the full story now.

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Broadband Forum’s UDP speed test delivers on latency promise

Broadband operators are a step closer to being able to deliver a new standard of connectivity as Broadband Forum releases the next update of its groundbreaking User Datagram Protocol (UDP)-based Speed Test utility.

UDPST performs the tests defined in TR-471 Issue 3 ‘Maximum IP-Layer Capacity Metric, Related Metrics, and Measurements’, to quantify and verify broadband networks in instances

where consistent low latency is just as critical as speed. It aids the deployment of gigabit services that intend to support next-generation applications with growing user uptake. Applications such as gaming, UHD streaming, augmented reality and virtual reality require low latency to assure the required Quality of Experience.

“Our open source implementation provides an approach to Internet access measurement with demonstratable accuracy and is an integral part of Broadband Forum specifications. The TR-471 specification was harmonized and developed in coordination with other standards organizations, including ITU-T, IETF and ETSI-STQ/Mobile,” said Al Morton, AT&T and OB-UDPST project co-leader and TR-471 Editor. “UDP is a critical communication protocol for time-sensitive transmissions on the Internet, and the UDPST measurements provide consumer confidence in their service’s support of applications that use UDP.”

Read the full story here.

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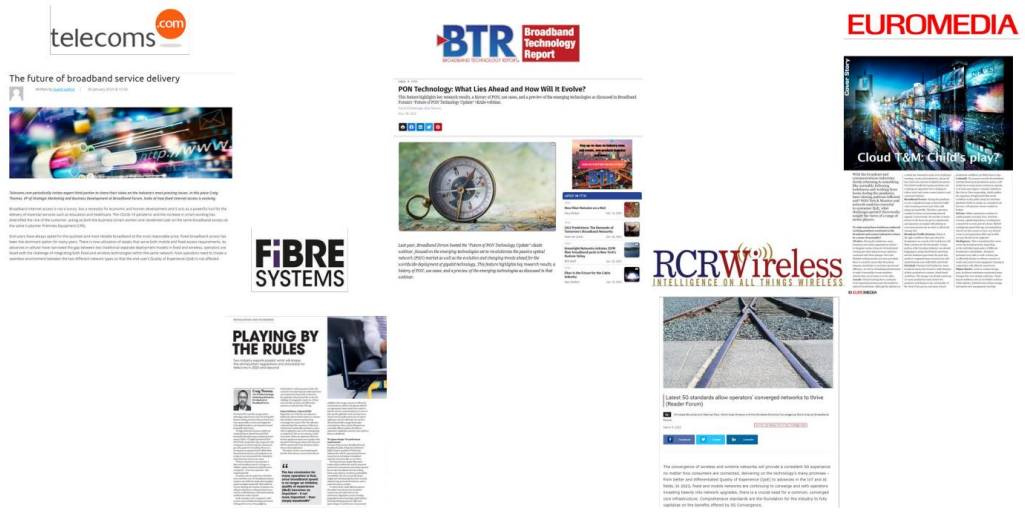
Broadband service delivery, QoE, cloud test and monitor, PON technology and 5G standards round off a busy editorial quarter



Five editorial articles have been published over the last quarter from the Broadband Forum. **Christele Bouchat and Manuel Paul, Work Area Directors of the Wireless-Wireline Convergence Work Area** advised that fixed and mobile networks are continuing to converge, there is a **crucial need for a common, converged core infrastructure in RCR Wireless.**

As demand for full fiber access and connectivity inside the home continues to heighten, a seamless customer experience becomes more critical than ever. A key piece of the puzzle is how networks can continue to evolve, grow, and develop. **Frank Effenberger, rapporteur of ITU-T Q2/15 and Ana Pesovic, Marketing Director at Nokia** discussed **what lies ahead for PON technology and how it will evolve in Broadband Technology Report**.

Test & Monitor and network analytics remain essential to consumer QoE, but what challenges persist? **Broadband Forum spoke to Euromedia Magazine in its Winter issue on pages 10-16**. **Craig Thomas, Vice President Strategic Marketing and Business Development at Broadband Forum** stated that the industry is at a turning point as operators look to differentiate

beyond speed and price, to **Fibre Systems Yearbook 2023**. Thomas highlighted that standards are set to play an even more pivotal role in helping the industry become more service aware.

Once broadband speed no longer prohibits the users' required services, **QoE will become even more important than faster connectivity**, especially with the increasing take-up in homeworking, eHealth, eEdcuation, new 8K+ video streaming and AR/VR entertainment services according to Thomas in **Telecoms.com**.

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Call for Interest: OMDIA / Broadband Forum Connected User research

Are you interested in sponsoring our global Industry wide Connected User Survey? The results and findings are targeted for release in Q3 2023.

This survey will drive quantitative data from over 100 operators representing all types of service providers from Tier 1 and tier 2 Telco and MSOs from around the world. In addition, we will perform in-depth qualitative interviews with over 10 recognized leading operators.

The survey is undertaken in partnership with OMDIA (formerly Ovum) to ensure industry renowned results and credibility. As you will see there is a significant opportunity to sponsor, market and be seen as a major thought leader in the future of home broadband services.

At this present time, we are seeking your expressed interest in this opportunity.

Top level benefits for major sponsors include:

- Sponsor influence of specific valuable research questions through the BUS Work Area and Connected Home Council
- Sponsor influence of potential interviewees for the qualitative research
- Your logo and recognition on all Market Research Reports, Whitepapers, Broadband Forum relevant website pages, Webinars and Blogs
- Free Access to the report, data analysis and narrative PowerPoint presentation
- Unconditional use of all data and results
- Panelist representation for major sponsors on all the follow-up Broadband Forum BASe Webinars with the opportunity to access attendee information within GDPR guidelines

If you would like to express your interest or require more information on this opportunity, please contact Rhonda Heier at rheier@broadband-forum.org.

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Work Area Updates

For the full list of all Technical Reports published by Broadband Forum, click here. Please feel free to share this information with your colleagues so they are engaged with and aware of the developments of this work. For additional insight and to get involved, sign up for access to

Broadband Forum tools and access your account using your company email address.

ATA - Steering work forward!

Target: The Access & Transport Architecture Work Area maintains primary architectural work of the Broadband Forum. This work reflects the control, management and data plane aspects of the Broadband Forum's defined and new architectures. These architectures are augmented to leverage new industry practices, while protecting the investment in broadband networks already deployed.

Outcomes:

- Access Architecture Project Stream - WT-459i2 progressed to Final Ballot.
- Access Architecture Project Stream - WT-459i3 Control and User Plane Separation for a Disaggregated BNG started.
- Access Architecture Project Stream - WT-459.2i2 Multi-Service Disaggregated BNG with CUPS: Integrated Carrier Grade NAT function. Reference Architecture, Deployment Models, Interface, and Protocol Specifications revision started.
- Performance, Experience, Application Testing Project Stream - TR-452.5 Quality Attenuation Measurements Using L2 PM OAM starting Straw Ballot.
- Performance, Experience, Application Testing Project Stream - WT-471 Issue 4: IP Layer Capacity Metrics and Measurement started.

Progress:

- Access Architecture Project Stream - WT-459i2 working through Straw Ballot comments and making significant progress.
- Access Architecture Project Stream - MD-459.4 CUPS for a Disaggregated BNG: Objective and Scope continuing. This needs to wrap up for TR-459i2 release.
- Access Architecture Project Stream - WT-474 Subscriber Session Steering project continuing YANG data modeling project (YMSSS) for the entities and relationships defined in the document. Work has been completed offline via BitBucket.
- Access Architecture Project Stream - WT-487 DBNG for Wired Access is under development. The protocol debates continue.
- Access Architecture Project Stream - WT-497 WiFi Authentication is under development.
- Mobile Transport & Routing Project Stream - New work items encouraged.
- Performance, Experience, Application Testing Project Stream - WT-452.4 QED Measurement Formats progressing via BitBucket and markdown.
- Performance, Experience, Application Testing Project Stream - WT-452.3 Quality Attenuation Conformance Testing is in progress.
- Performance, Experience, Application Testing Project Stream - WT-471i4 IP Capacity Metrics and Measurement is in progress.
- Performance, Experience, Application Testing Project Stream - WT-499 Service Metrics contribution in progress.

ATA Marketing Group - See Join or Leave BBF Groups and Email Lists to subscribe.

For more information on ATA Work Area's ongoing work, visit: https://wiki.broadband-forum.org/display/BBF/Access+and+Transport+Architecture.

The standardized app-enabled services gateway edges closer to publication

Target: Finalize key technical components of the app-enabled services gateway, advance Wi-Fi performance quality.

Outcomes: WT-181 Device:2.16 and USP version 1.3 are on track to be released by Q2 2023.

The Broadband User Services (BUS) Work Area completed Straw Ballot resolution for the key components necessary for operators and vendors to have a standardized app-enabled services gateway (ASG) to realize new revenue-generating services and efficiently deploy applications in the connected user network. This includes updates to its flagship standards, TR-369/USP and the TR-181 Device:2 Data Model to support containerized applications on end-user devices. These are expected to be published in Q2. The overarching guide to building and deploying an ASG and its applications, WT-492, is still in progress and is on track for publication in Q3.

In addition, the next version of the Broadband Forum's popular TR-398 Wi-Fi Performance Metrics test plan that fuels the BBF.398 Certification Program is about to enter the final phase before publication. The specification's tests and test setups have been finalized, and is on track for participating laboratories to begin testing the specification to develop the final benchmark metrics.

Take a look at the BUS Work Area's latest work: https://wiki.broadband-forum.org/display/BBF/Broadband+User+Services.

Got YANG? Common YANG is here to help!

- **Target:** Specify YANG modules that are applicable to multiple Work Areas, provide support to those same Work Areas for their specific YANG projects, and maintain YANG Best Current Practices, processes, procedures, and tools.
- **Progress:** Supporting role towards SDN/NFV and FAN Work Areas, working on YANG models in a series of ongoing projects. We continued to review new functionalities targeting future amendments of TR-383.
- **Outcomes:** Publication of Amendment 6 of TR-383 and Amendment 1 of OD-360; agreed on the functional architecture of fiber-fed Multimedia over Coax Alliance (MoCA) access nodes.

Just ahead of the meeting, Amendment 6 of the group's flagship project TR-383 'Common YANG Modules for Access Networks' was published. This next amendment adds functionality that addresses scale in large networks, as well as further improving existing functionality. Beyond Amendment 6, new contributions were brought in at the meeting, both adding new functionality and improving the modeling of existing configuration profiles.

Also, just prior to the meeting, the group published Amendment 1 of OD-360 'BBF YANG Best

Current Practices', enhancing existing and adding new guidelines when creating YANG models.

The group agreed on the functional architecture of a fiber-fed MoCA access node, as part of WT-496 'YANG Modules for MoCA Access 2.5 Interface'. YANG data models will now be brought forward for further review and approval in interim conference calls.

The Work Area passed an important milestone as it has now reached a point where its primary role is a supportive one for other Work Areas aiming to develop and publish YANG models. To that end, sessions were held with the SDN/NFV and FAN Work Areas, reviewing items of common interest, including Issue 2 of WT-413 'SDN Management and Control Interfaces for CloudCO Network Functions', WT-477 'Cloud CO Enhancement - Access Hardware Disaggregation', WT-451 'vOMCI Interface Specification', and WT-385 'ITU-T PON YANG Modules'.

Moving forward, the group will continue the formal review of the specification of YANG modules for VoIP; this topic did not get addressed at the meeting but will be covered during a series of interim conference calls. This work is intended to be covered in a future amendment of TR-383.

For an overview of the Common YANG Work Area's current activities, please visit: https://wiki.broadband-forum.org/display/BBF/Common+YANG+Work+Area.

FAN continues key progress across its project streams

Target: The Fiber Access Networks (FAN) Work Area specifies and maintains PON architecture and nodal requirements, PON abstraction and mobile backhaul requirements. It is also responsible for PON test suites related to ITU-T PON Conformance and Interoperability, and compliance Test Plans related to XGS-PON, NG-PON2 and Physical Medium Dependent (PMD)/Transmission Convergence (TC) Layer. Lastly, it is responsible for ITU PON YANG data model specifications.

In Progress: During the Q1 meeting, the following updates occurred in each project stream:

The Unassigned Project Stream reviewed contributions for updating the following architectural documents to include Higher Speed PON/25GS PON:

- WT-301 Issue 3 'Architecture and Requirements for Fiber to the Distribution Point'. It was agreed that this Working Text would be moved to the PHYtx Work Area. Two Co-editors volunteered to help with the updates.
- WT-331 Issue 2 'Architecture and Technical Requirement for PON-Based Mobile Backhaul Networks'.

In the Interoperability/25GS-PON/G.HSP 50G-PON Project Streams, contributions were reviewed for:

- DTP-247 Issue 4 Corrigendum 1 'PON Conformance Test'
- WT-309 Issue 3 'TC Layer Interoperability Test Plan'
- WT-423 Issue 3 'PON PMD Test Plan'
- It was determined that one more NPIF needs to be created to update WT-423 to include XGS-PON PMD requirement updates from the latest ITU-T specifications.

In the PON Project Stream, Straw Ballot comments for the below Working Texts were resolved. These Working Texts will be prepared next for Final Ballot:

- WT-385 Issue 2 Amendment 1 'ITU-T PON YANG Modules'

- WT-489 Issue 1 'Authentication of an ONU and selection of eOMCI or vOMCI'

For more on the FAN Work Area's ongoing work, please see: https://wiki.broadbandforum.org/display/BBF/Fiber+Access+Networks.

PHYtx Work Area publishes TR-285i2a1, TR-476 and TP-337i4c1

Target: To help service providers deploy equipment that will provide better Quality of Experience (QoE) for their end-users.
Progress: Two new technical reports and one test plan update were published: TR-285i2a1, TR-476 and TP-337i4c1.
Outcome: A new project was started WT-500 "MoCA Access Performance Test Plan".

At this meeting, the PHYtx Work Area was proud to announce the publication of three new Technical Reports:

- TR-476 'G.hn Access Performance Test Plan': addresses performance requirements for G.hn Access implementations in Point-to-Point deployments over both twisted pair and coaxial cable. TR-476 becomes part of the GHNA Certification Program in collaboration with the HomeGrid Forum.
- TR-285 Issue 2 Amendment 1 'Broadband Copper Cable Models'. This brings, the Australian cable models for distribution, lead-in and building cables:
  - CPFUT 0.4mm (Cellular polyethylene insulation)
  - PEIFLI 0.4mm (PE insulated)
  - HT57 0.57mm (High twist lead-in cable, solid PE insulated)
  - Cat 3 (Building Cabling, PE insulated).
- TP-337i4c1 is a corrigendum to TP-337i4, the G.fast Certification Test Plan. It updates some references to align with the recent versions of other Broadband Forum technical reports.

A new project WT-500: "MoCA Access Performance Test Plan" was started. MoCA Access is one of the technologies that can be used in the scope of Fiber To The extension point (FTTep) deployments as described in TR-419i2. The focus of this performance test plan is on the physical layer and traffic testing, similar to how TR-380i2 and TR-476 are defined. This test plan will include test setup information, equipment configuration requirements, test procedures, and performance requirements for each test case. Traffic tests should show the throughput and delay for various packet sizes and mixes for the various use cases. This Technical Report will be beneficial to the industry, providing guidance of the expected performance and Quality of Service for operators in an FTTep environment.

For further insight into the current work of the Physical Layer Transmission Work Area, visit: https://wiki.broadband-forum.org/display/BBF/Physical+Layer+Transmission.

SDN/ NFV closes in on publication of WT-486 on AIM interfaces

- **Target:** Define the Cloud-based Central Office (CloudCO) architecture using SDN, NFV, and cloud technologies to support network functions. Fundamentally redefine the architecture of access and aggregation networks and support the migration of SDN and NFV into all aspects of broadband networks. Facilitate the agile deployment of new distributed broadband services and applications for operators with greater operational efficiency and lower cost.
- **Progress:** The SDN/ NFV Work Area continues to progress the CloudCO project for virtualized network functions, SDN management and control and domain orchestration capabilities in a broadband network. The main current activities are related to the disaggregation of the access node and defining the related interfaces. The "Cloud Component" project stream is continuing work on Automated Intelligence Management (AIM), smart SD-WAN and virtual OMCI.
- **Outcomes:**

WT-477 on Access Node disaggregation is close to being completed. The missing data models were created and reviewed by the Common YANG and FAN Work Areas in a joint session. The document is expected to enter 'Straw Ballot' review before the Q2 meeting. The first proposal includes new virtual functions (traffic steering and L3 functions) for WT-477 Issue 2. Further inputs are expected before identifying and developing call flows and data models.

WT-413 Issue 2 on 'SDN Management and Control Interfaces for CloudCO Network Functions' is progressing. In a joint meeting, the SDN/ NFV and Common YANG Work Areas reviewed the approach and agreed to report a detailed list of data models, so that vendors can rapidly discover the data models to be implemented for each access network function. The document is expected to enter Straw Ballot review before the Q3 meeting.

On the artificial intelligence and automation fronts, WT-486, which specifies the interfaces for the AIM Framework specified in TR-436, is in Straw Ballot review. The deadline for submitting comments is the 17th of April. A joint leadership call with TMForum has been agreed upon to establish a collaboration for defining closed loop automation at all levels, including intents. A 'Tiger Team' has also been established for reviewing the AIM architectural framework defined in TR-436 in order to include new use cases. The Tiger Team will also analyze the impact on AIM interfaces.

Regarding WT-386i2 on 'Fixed Access Network Sharing', YANG data models are under review. They are expected to be closed in the coming weeks so the document should be ready to enter Straw Ballot review at the Q2 meeting.

A Tiger Team has been established to review the document on CloudCO interfaces (WT-411i2) to include the Access SDN Management and Control northbound interface intent-based interactions addressing access network topology and abstraction, including inventory.

Some contributions were focused on making improvements related to virtual OMCI (TR-451): defining the Transmission Control Protocol (TCP)/ Transport Layer Security (TLS) endpoints for the YANG data models and introducing a protocol improvement to reduce the latency for performance monitoring.

WT-495 on Smart SD-WAN had a contribution on the use case definition. A liaison was also approved towards the Metro Ethernet Forum to explain the activity we have agreed to establish in the Broadband Forum to improve network connectivity among SD-WAN endpoints.

More information about the SDN/ NFV Work Area can be found at: https://wiki.broadband-forum.org/display/BBF/SDN+and+NFV.

WWC is finalizing Phase 3; new multi-tenant FWA NPIF initiated

- **Target**: Address the needs of operators which have wireline or mobile networks deployed so they can leverage their assets with combined subscriber offerings with a converged core.
- **Progress**: The WWC Work Area is progressing work on the third phase of specification development. It currently has two active project streams, 5G and IMS for 5G-RG. With this work, the group continues to subsume more of the capabilities of the 5G architecture.
- **Outcomes**: Work continues on a new set of capabilities and enhancements with the latest specifications in progress for subsequent publication.

Work in the WWC Work Area has transitioned from improving the basic set of specifications in Phase 2 to focusing on topics that bring more value to 5G for wireline and provides operators with increased flexibility, revenue potential and deployment options. The goal is to increase the service capabilities of the network to allow operators to fully leverage convergence of their networks while at the same time giving them more paths to transition their networks to a single 5G core.

The group continues to incorporate capabilities from the 5G Toolkit into our specifications to realize a variety of use cases. These range across a broad spectrum and include topics such as hybrid access, enhanced work from home, access sharing scenarios and convergence of voice with the mobile system. This work will allow converged operators to provide a uniform experience to their customers irrespective of the access or appliance they are using, supported by a common and streamlined back office and control plane.

The 5G project stream is nearing finalization of two specifications; WT-457 (FMIF Functional Requirements) is in final ballot and WT-458 (CUPS for 5G Wireless Wireline Convergence) has made good progress in Straw Ballot resolution. Both documents expand the deployment options for 5G WWC. The IMS for 5G-RG project stream addresses 5G-RG IMS voice support, with work on the architecture and a profile for residential voice. Work is moving forward on WT-493 (IMS for 5G-RG Architecture) and WT-494 (IMS for 5G-RG Residential Voice Requirements). This key piece of work will converge legacy voice services onto the 5G system. With these two key baseline texts established, there is now an opportunity for all interested parties to contribute to this important work.

A new NPIF on 5G Fixed Wireless Access for multi-tenant fixed broadband has been proposed. The group also held a joint session with the BUS Work Area to discuss LIAISE-576 from 3GPP regarding wireline access and Fixed Wireless Access for accessing standalone private networks. The group provided feedback on the support provided by 5G-RG, FN-RG and W-AGF. The continued work with 3GPP to introduce the Release 18 Study output will facilitate a WWC study around “Devices behind the RG”.

The WWC Work Area has progressed planning for the group’s first demonstration with Network X targeted to showcase the 5G Phase 2 and Phase 3 work. The group continues to expose the industry to the latest WWC work and supports the ongoing education and marketing activities.

Broadband Forum is taking an important role in developing 5G, continuing the productive cooperation with 3GPP, and making recommendations for the connection points between the fixed and 5G mobile core networks to drive core convergence.

For more on the WWC Work Area, please see: https://wiki.broadband-forum.org/display/BBF/Wireless-Wireline+Convergence.

OB-BAA planning Release 6.0 publication in Q2

The Open Broadband – Broadband Access Abstraction (OB-BAA) project team agreed on the Release 6.0 activities, where the planned delivery date is the end of June 2023.

The main (planned) code development activities are:

- embedding a reference Disaggregated Optical Line Terminal (D-OLT) Virtualized Network Function (VNF) on the BAA platform based on WT-477 and appropriate interfaces. The selected reference VNF is a Point-to-Point protocol over Ethernet intermediate agent (PPPoE IA)
- Optical Network Terminal (ONT) Telemetry (enabling the likes of streaming of Optical Network Unit (ONU) performance monitoring counters) over vOMCI based on Kafka
- configurable ONU simulator for vOMCI automation testing
- automation test suite for OB-BAA based on open source “robot framework”
- IP Flow Information Export (IPFIX) enhancement with a more flexible adapter framework.

Discussions are ongoing about whether there will be a Broadband Forum vOMCI Plugfest later this year - where OB-BAA vOMCI can be leveraged - and the OB-BAA team will provide support where and when needed.

For more information about the OB-BAA project, see: https://wiki.broadband-forum.org/display/OBBAA/Open+Broadband-Broadband+Access+Abstraction+Project+Home.

OB-MAP and prpl Foundation continue joint collaboration

The Open Broadband – Multi Access Point (OB-MAP) project and the prpl Foundation’s prplMesh project are establishing a baseline vision of how data and control commands will be represented in TR-181. This will influence the design of the APIs presented by prplMesh.

The data model (and prplMesh APIs) is meeting the diagnostics and management needs of service providers that use multiple physical layer networking technologies to deliver ever-increasing broadband bandwidth and innovative services through increasingly complex home networks to end-user devices.

The OB-MAP project team has continued to collaborate with the prpl team on requirements and feature prioritization, and data modelling of multiple devices and services in a mesh network. Progress has been made on prplMesh’s Northbound API (NAPI), including:

- data Elements R3 definitions
- network-wide SSID, with groupings and an underlying distribution system / VLAN
- statistics and topology for wired stations and wired backhaul
- IEEE 1905 neighbor statistics
- unassociated station statistics
- extender with both EasyMesh agent and USP/cloud agent
- support for TR-069.

To learn more about the OB-MAP project's ongoing work, please see: https://wiki.broadband-forum.org/display/OBMAP/OBMAP+Home.

OB-USP-Agent's Heron release soaring into view

OB-USP-Agent Release 7 (Goldeneye) was pushed to GitHub in January. Goldeneye was a maintenance release with the following focus:

- key improvements around the MQTT MTP implementation
- performance improvements for large data models that can result in big 'Get' responses
- fixes related to compliance testing and the updated TP-469a2 Test Plan
- resolution of some known issues (including several raised in GitHub).

OB-USP-Agent Release 8 (Heron) has been scoped and is focused on the upcoming changes in Device:2.16 and USP version 1.3 as it pertains to software modularization and USP-enabled applications, more specifically implementing the UNIX Domain Socket MTP and the associated concepts that enable USP communications between applications within the CPE. Release planning is still underway, which will lead to development of the identified epics, stories, and features.

For more on the OB-USP-Agent project's ongoing work, please see: https://wiki.broadband-forum.org/display/OBUSPA/OB-USP-Agent+Home.

Tenth Release of OB-UDPST: Clients can test with multiple UDP flows to multiple/diverse servers

Current Progress: March 2023 will see a major release of UDPST, version 8.0.0. The primary new feature in this release is support for multiple test connections (UDP flows) between the client and one or more server instances (i.e., distributed servers). This feature provides server redundancy and resiliency to busy or unavailable servers.

The following additional features are present in this release:

- the starting send rate adds support for randomized packet sizes in a QED-compliant stream
- mitigating attacks that prevent graceful test shutdown by manipulating STOP bits in Load Protocol Data Units (PDUs)
- adding an optional flag to the command-line to have the server cleanly exit after a single test
- randomizing the start time of load PDU generation, and enhancing socket receive processing to provide load balancing of events (to better support multiple flows).

With these changes, new fields were required in the Test Setup PDUs and Load PDUs. As a result, both the current and minimum protocol version are now (the new) version 10.

The OB-UDPST project team has begun work on Issue 4 of TR-471 to include the new multi-flow capabilities in the information model.

For more information on the OB-UDPST project team's ongoing progress, please visit: https://wiki.broadband-forum.org/display/OBUDPST/OB+UDP+Speed+Test+Home.

OB-5WWC project team head towards code development

Open Broadband-5WWC (OB-5WWC) is an Open Source project focused on bringing the full benefits of the 5G ecosystem to fixed-line services and offering a full end-to-end solution to operators. The aim is to create a reference implementation of the Broadband Forum specified Wireless-Wireline Convergence solution for 5G capable Residential Gateways (5G-RGs). There are already key Broadband Forum and 3GPP specifications available to help fulfill the need for 5G and convergence, and a 5G-RG reference implementation will be of great benefit to operators, providing shorter time-to-market for products and reduced development times and cycles.

OB-5WWC also seeks to provide a production grade 5G solution stack capable of integration with OpenWRT/ RDK-B frameworks and to provide a reference for testing Access Gateway Function (AGF) and RG test tool development.

Current Progress: The group continues to make good progress with the architecture, design, and alignment with OpenWRT and RDK-B and gaining clarification of RG deployment scenarios.

The low-level design including WWCd as a key component and the continued alignment on RDK-B architecture and integration has progressed.

A new development environment has been established and Continuous Integration (CI) operationalized, with exploration taking place of the components for the end-to-end test environment, including AGF and 5G Core. The development includes the solution design of the Control and User Plane transport including the Stubbed AGF test tool, and 5G Wireless Wireline Convergence User Plane Encapsulation (5WE), and the 5G controller (WWCd) providing registration and session management.

Next steps: The project team's next steps will be to start the MVP implementation of WWCd as a key module, and further improve the test environment. The group intends to begin code development soon.

Members of the project team aim to submit an NPIF to the BUS Work Area to establish an RG architecture Technical Report and have tasked the Work Area with improving data models for cellular interface management.

An important next step is the design of a common approach to access SIM-based credentials to develop a Broadband Forum compliant solution covering wired-only 5G-RG, and the group is calling on device manufacturers to support this activity.

There is now an opportunity for interested parties to offer contributions as we enter this key phase of implementation. The project continues to welcome interested parties, including candidates with software development experience in the C programming language, and radio module and mobile experience.

For any interested parties (including non-Broadband Forum members) that wish to be part of the project, please sign the project participation agreement online here.

For more on the OB-5WWC project's current work, please see: https://wiki.broadband-forum.org/display/OB5WWC/OB-5WWC+Home.

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Welcome to our new and returning members!

We welcomed a mix of new members and guest companies during the Q4 Meeting. We had 157 registrations, with 12 guests from nine companies and 17 first-time attendees. Thank you to our new and returning members: Blu-Castle, DISH, DKT, NAGRA Kudelski Group, Invigo, and ReadyLinks. Our Q1 guests included: Actelis, Anritsu, BEC Technologies, Frontier, Meta, Invigo, and Ozmo.

Are you interested in becoming the next member of the industry's leading standards body in defining broadband networks? Broadband Forum membership will not only accelerate your company's progress but enable you to become a key influencer in developing 5G, the Cloud, the Connected Home and Access Networks.

We have a range of membership options for companies of all sizes, from startup companies to large corporations and not-for-profit organizations. Our new regional Operator Membership category has further opened participation; take a look for further details of the access level privileges, benefits and requirements.

To learn more about the benefits of membership, watch the video interview with Rhonda Heier, Director of Membership Development, as Rhonda discusses the value of the Broadband Forum membership here or email rheier@broadband-forum.org for more information.

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Save the dates! Broadband Forum Meetings and BASe Events

- June 5-8, 2023, Broadband Forum Q2 Meeting, Porto
- September 5-8, 2023, Broadband Forum Q3 Meeting, Virtual
- December 4-7, 2023, Broadband Forum Q4 Meeting, Asia

To register for our latest events, visit: https://www.broadband-forum.org/meetings-and-events.

Sponsorship opportunities are available for Broadband Forum's quarterly meetings and BASe events. Sponsoring Broadband Forum events is a great way to highlight your company and exhibit your company's innovation in the broadband industry – including demonstrations or prototypes – while showing your support of Broadband Forum. Opportunities vary and can be customized to accommodate a variety of budgets.

Please view the list of our standard sponsorship packages and benefits at: https://wiki.broadband-forum.org/display/BBF/Sponsorship+Opportunities.

If you are interested in sponsoring a meeting, please contact Rhonda Heier at rheier@broadband-forum.org.

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Contact information

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