Moving Toward Unified Access: Proximus and AT&T discuss 25G

OMDIA

Contents

Omdia view

Summary

Networking experts from AT&T and Proximus joined Omdia to discuss the expanding role of PON in supporting different types of customers and applications. Both AT&T and Proximus have deployed XGS-PON (10G symmetrical) in their respective access networks. AT&T is studying 25G PON, while Proximus has moved to deployments. Proximus is both a retailer and a wholesaler, supporting more than 30 retail customers. AT&T has been expanding its fiber footprint, choosing a variety of solutions to support wireless and wireline traffic. Next-generation PON is enabling both operators to move toward the goal of a future-proof, fiber-based unified access network. Highlights of the discussion are presented below.

PON's role for unified fiber access

Broadband network operators are seeking capital and operational efficiencies as they support ever-increasing bandwidth demand from residential and enterprise customers. In addition, 5G transport costs are a major concern for integrated and wireless-only operators given mobile traffic growth. Consequently, operators are seeking access solutions that can be upgraded easily and support different types of traffic. PON meets these requirements and is becoming the technology of choice for unifying access networking wherever possible. **Figure 1** summarizes PON's key advantages and the related business impact for operators.

Figure 1: PON's advantages and business impact
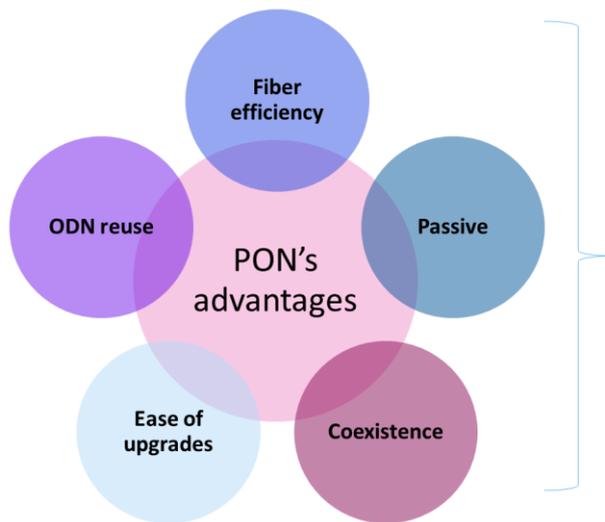
Source: Omdia

PON's point-to-multipoint architecture is fiber efficient, leading to space and power savings. Additional power savings come from the absence of active components. These are two major advantages of PON over point-to-point Active Ethernet.

PON technologies were designed for easy upgrades without touching the underlying optical distribution network (ODN). An operator can decide when to upgrade an existing OLT port or add next-generation PON OLT ports to the network. Further, an operator does not need to upgrade all OLT ports at the same time. This approach provides the operator with significant control and flexibility around upgrades.

There is also flexibility regarding upgrade strategies for ONTs/ONUs at the customer's location. For example, an operator can choose to offer 1G residential services on existing GPON equipment or upgrade the customer to a 10G PON ONT to support higher-bandwidth services in the future.

Next-generation PON is being widely deployed today. Next-generation PON OLT ports represented 49% of global shipments in 2Q21, a significant increase over 19% in 2Q19. Next-generation PON ONTs/ONUs represented 4% of global shipments in 2Q21. In North America, next-generation PON ONT/ONU shipments were 18% of total ONT/ONU shipments in 2Q21, up from 1% in 2Q19. Next-generation ONTs/ONUs are supporting high-end residential and nonresidential customers and applications.

Operators have begun to evaluate 25G PON, and initial deployments are underway. In October 2020 a 25GS-PON multisource agreement (MSA) was formed by operators and vendors. Membership

continues to expand and includes operators, component vendors, equipment vendors, and test and measurement companies. This industry group is focused on accelerating deployment of 25G PON solutions and addresses the gap between XGS-PON and 50G GPON.

PON's role beyond residential: Challenges and solutions

Enterprise services

The concept of using PON to support enterprises—whether small, medium, or large—is not new. Often operators included small businesses or enterprises into their FTTH networks while serving enterprises with point-to-point fiber using Active Ethernet. Many operators have been reluctant to use PON for enterprises. The first reason concerns bandwidth, since GPON supports 2.5G downstream and 1.25G upstream. Next-generation PON availability alleviates the bandwidth concern, with XGS-PON supporting 10G symmetrical bandwidth and 25G PON supporting 25G symmetrical bandwidth. These solutions enable operators to offer a wide range of offerings beyond 1G.

The second concern cited by operators focuses on PON and service level agreements (SLAs). Many enterprises have SLAs from their service providers, and these often include overall network uptime, jitter, latency, and packet loss. PON technology contains features that support the prioritization of traffic by subscriber and by application per subscriber. These features were not widely used in the early deployments of PON for best-efforts residential services. Today, however, many vendors support them, enabling operators to feel confident offering PON-based SLAs to enterprise customers.

The third concern focuses on security since PON is a point-to-multipoint technology, meaning that multiple subscribers are using the same fiber connection. PON contains many features that separate, encrypt, and secure data. These include the following:

- **User isolation.** PON technology uses GEM (gigabit encapsulation method), which is a label in the traffic header to isolate traffic for each user.

- **Traffic encryption.** In addition to data being separated for each user, downstream data itself is protected by encryption such as AES (Advanced Encryption Standard). Encryption keys are generated by each ONT/ONU and sent upstream to the OLT.

- **User activation.** PON has a user activation procedure that prevents unauthorized devices from being connected. Each ONU has a unique serial number and registration ID, which are programmed by the operator so the OLT knows ahead of time which ONTs/ONUs are to receive service and therefore traffic.

- **Message integrity.** Message integrity checks (MICs) are used by OLTs and ONTs/ONUs to verify that the upstream and downstream control messages came from a legitimate source and have

not been tampered with. MIC keys are calculated by the OLT and ONT/ONU independently and are executed in the control layer as a protection against malicious users.

Consequently, service providers are becoming more confident that PON can be used to support enterprise services and should be considered when determining the best technology to meet an enterprise's requirements.

xHaul transport services

PON has been used to support xHaul transport such as wireless backhaul. However, PON's fit for macrocell wireless backhaul was limited. This changes in the 5G small cell environment when many cells are deployed within a small geographic area where PON's point-to-multipoint topology becomes a good fit. According to an Omdia survey, 5G transport costs are a major concern for operators given the amount of additional data that must be transported or "hauled." Omdia forecasts that the outdoor small cell backhaul equipment market will approach $1.5bn in 2024, up from less than $600m in 2019.

There is debate whether PON can support xHaul transport, including the concerns (such as bandwidth, SLAs, and security) and solutions discussed above. But there are additional issues, primarily around latency since xHaul has tight latency requirements. Significant work has been done by standards organizations, vendors, and operators to optimize next-generation PON for 5G transport. This includes improving latency and adding network slicing.

Omdia does not expect PON to become the dominant transport solution, but it has the opportunity to become a tool in the tool kit, supporting fiber-efficient xHaul and enabling reuse of PON infrastructure, leading to capex and opex savings. Consequently, mobile-only operators, integrated operators, and wholesale operators have begun to use their next-generation PON infrastructure to support small cell xHaul transport for their own traffic or for leasing their network to others.

Case study: Proximus

Patrick Delcoigne, director of networking engineering & operations, leading Proximus's fiber network planning and operations in Belgium

Proximus, headquartered in Brussels, Belgium, is both a retail and wholesale operator for its broadband services, covering residential and enterprise customers, along with xHaul transport. In May 2021 Proximus publicly announced activation of 25G PON, reiterating the importance of fiber for supporting innovative services along with a digital society. Since May, Proximus's executives have discussed next-generation PON's strategic role in helping it to meet future bandwidth demand as a wholesaler and retailer, complementing its strong mobile network.

Proximus is striving for a unified fiber access network, using the PON infrastructure to support FTTH and FTTBusiness for itself and for already more than 34 retail operator customers through a bitstream offering today. In addition, PON can already be used to support mobile backhaul transport for microcells and then for macrocells in the future. Proximus's goal is to build and offer a future-proof, countrywide open network, thereby eliminating redundant costly fiber overbuild. PON's energy efficiency and ease of upgrade were critical decision factors in the choice of PON, XGS-PON,

and most recently, 25G PON, which is fully backward compatible with previous generations: there is no need to refarm wavelengths.

Proximus has combined engineering and operational teams for access, both radio access network (RAN) backhauling and FTTx, enabling the operator to optimally use its network assets. It has adopted sharing of its RAN infrastructure through the joint venture with Orange Belgium.

Proximus opened its PON infrastructure from day one to any operator through the bitstream offering. To accelerate the fiber rollout across Belgium, Proximus created two joint ventures (JVs), Fiberklaar and Unifiber, with 49.9% share. These JV infrastructures provide the ability to wholesale from Proximus, through the active bitstream offering, or through wholesalers using their own active equipment. Proximus is also investigating possible virtualization within its PON infrastructure, streamlining fiber access network sharing.

Fiber is key to Proximus's gigabit and open network strategy. PON is the technology of choice, providing fiber access to residential and nonresidential customers and applications. According to Proximus, 25G PON will be able to support future symmetrical bandwidth needs, supporting applications that cannot be imagined today.

Proximus states many of the 25G PON components are standardized already. Furthermore, like other networking technologies, 25G PON is about to become a de facto standard through its deployment in the live networks of major operators. The MSA is defining the technology, ensuring that 25G PON is backward compatible, leading to ease of upgrades along with affordability.

The demonstration of 25G PON live over the existing passive Proximus fiber network shows that the fiber being deployed today will be usable for decades. Today's fiber can accommodate the needs of today, tomorrow, and the day after for both retail and wholesale markets, without the need for overbuild.

Case study: AT&T

Eddy Barker, AVP access architecture and design, managing AT&T's converged access architecture, focusing on broadband access and centralized RAN and transport

AT&T converged its fixed access team with its RAN team, bringing together cross-functional capabilities. By bringing together the wireless and fixed access network teams, AT&T can more easily evaluate a range of access technologies and solutions, seeking the best fit for its residential, enterprise, and xHaul transport requirements.

At AT&T, PON has been used for residential and business services already. Broadband services were typically best efforts across a shared optical distribution network with a 1×64 or 1×32 split. But the reliability and performance of PON is critical. Traditionally, AT&T used Layer 2 with Active Ethernet for higher-end business services and mobile backhaul and time-sensitive fiber for mobile fronthaul.

According to AT&T, the lines are blurring more and more regarding the services that can be offered over point-to-multipoint architectures such as PON versus Active Ethernet, but there are still pros and cons to consider. Operators must closely examine service attributes, performance parameters,

and OSS guidelines to determine the best access technologies to use according to customer requirements.

PON has the ability to support many enterprise applications and mobility transport, but it requires proper engineering, paying attention to latency and jitter. PON has been challenged in time sensitivity, but standards are being developed to reduce latency. The bottom line is that PON can support SLA-based services, and an operator needs to examine its SLAs and see how to implement PON (e.g., by reducing split ratios) and how to enforce its SLAs.

AT&T has been deploying XGS since March 2020. Currently, AT&T is assessing 25G PON technology including lab testing and is a member of the 25GS MSA. It has seen significant membership growth and ecosystem developments. AT&T believes that the 25G PON ecosystem still needs time to mature, although it is evolving quickly. Currently, the OLT side is more mature than the ONT/ONU side. AT&T is active in many standards organizations, open forums, and MSAs because its strategy is to use diverse methods to achieve its fiber objectives within reasonable timeframes.

Because it has a similar base technology to both XGS and GPON, which keeps the costs down, 25G PON is interesting. It leverages data center components, such as optics, and it uses SFP-28 pluggable modules, all contributing to its low cost. The SFP interface is well understand, and the upstream wavelengths are 20 nanometers, which also contributes to lower costs.

Conclusions

PON technologies are widely deployed today. The uptake of next-generation PON is accelerating as operators use PON for high-end residential and nonresidential services. Momentum behind 25G PON is increasing as operators seek future-proof solutions that are backward compatible with existing PON deployments.

The 25GS PON MSA continues to grow, encompassing the ecosystem and including PON MAC ASIC vendors, optics vendors, equipment vendors, and test and measurement companies. Numerous operators including telco and cable broadband service providers are also members. The MSA is ensuring that 25G PON supports smooth upgrades with the flexibility to choose upgrades as needed with no underlying changes to the ODN.

PON is playing a key role in enabling operators to move toward unified access networks, reducing capital and operating expenses while supporting networking and subscriber requirements for today and tomorrow.

Appendix

Further reading

Fiber and Copper Access Equipment: Units – 3Q21 (Share Only) (December 2021)

"There is room for both 25G and 50G PON, reflecting operator strategy and timing" (October 2021)

Author

Julie Kunstler
Chief Analyst, Broadband Access
Infrastructure Service
customersuccess@omdia.com

Get in touch

Omdia consulting

Omdia is a market-leading data, research, and consulting business focused on helping digital service providers, technology companies, and enterprise decision-makers thrive in the connected digital economy. Through our global base of analysts, we offer expert analysis and strategic insight across the IT, telecoms, and media industries.

We create business advantage for our customers by providing actionable insight to support business planning, product development, and go-to-market initiatives.

Our unique combination of authoritative data, market analysis, and vertical industry expertise is designed to empower decision-making, helping our clients profit from new technologies and capitalize on evolving business models.

Omdia is part of Informa Tech, a B2B information services business serving the technology, media, and telecoms sector. The Informa group is listed on the London Stock Exchange.

We hope that this analysis will help you make informed and imaginative business decisions. If you have further requirements, Omdia's consulting team may be able to help your company identify future trends and opportunities.

Copyright notice and disclaimer

The Omdia research, data and information referenced herein (the "Omdia Materials") are the copyrighted property of Informa Tech and its subsidiaries or affiliates (together "Informa Tech") or its third party data providers and represent data, research, opinions, or viewpoints published by Informa Tech, and are not representations of fact.

The Omdia Materials reflect information and opinions from the original publication date and not from the date of this document. The information and opinions expressed in the Omdia Materials are subject to change without notice and Informa Tech does not have any duty or responsibility to update the Omdia Materials or this publication as a result.

Omdia Materials are delivered on an "as-is" and "as-available" basis. No representation or warranty, express or implied, is made as to the fairness, accuracy, completeness, or correctness of the information, opinions, and conclusions contained in Omdia Materials.

To the maximum extent permitted by law, Informa Tech and its affiliates, officers, directors, employees, agents, and third party data providers disclaim any liability (including, without limitation, any liability arising from fault or negligence) as to the accuracy or completeness or use of the Omdia Materials. Informa Tech will not, under any circumstance whatsoever, be liable for any trading, investment, commercial, or other decisions based on or made in reliance of the Omdia Materials.