

ON TOPIC

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NETWORK

As demands for 10G network capabilities continue to grow, an increasing number of cable MSOs are turning to fiber to meet their needs. The articles in this On Topic explain why this is happening and lay out the options for future-proof fiber broadband infrastructure.

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# XG-PON, NG-PON2, 50G PON:

## How to Tell Which Option Is Best for Your Network

BY TERESA MCGAUGHEY

Service providers often ask me the same two questions:

1. “Why are there so many 10G and beyond PON standards?”
2. “Which one should I use?”

In reality, the next standards beyond 10G are already being created, so deployments will always be behind the standards creation. To be successful, service providers must pick a standard and move forward with deploying it.

It’s a bit scary, though, wondering if you’ve made the right decision—especially if you choose a standard that doesn’t have support from the majority of the telecom ecosystem. You could end up with high costs and little support from your vendors.

### ALL THE LATEST PON OPTIONS FOR NETWORK ENGINEERS

A quick look at the latest standards from the ITU include:

- **XG-PON** (10G down/2.5G up): ITU G.987, 2009. XG-PON is essentially a higher-bandwidth version of GPON. It has the same capabilities as GPON and can coexist on the same fiber with GPON. XG-PON has been minimally deployed to date.
- **XGS-PON** (10G down/10G up): ITU G.9807.1, 2016. XGS-PON is a higher-bandwidth, symmetric version of GPON. Again, it features the same capabilities as GPON and can coexist on the same fiber with GPON. XGS-PON deployments are just beginning.

- **NG-PON2** (multiple wavelengths of 10G down/10G up, 10G down/2.5G up): ITU G.989, 2015. Not only is NG-PON2 a higher-bandwidth version of GPON, it also enables new capabilities like wavelength mobility and channel bonding. NG-PON2 coexists well with GPON, XG-PON, and XGS-PON.
- **50G PON** (50G down/10G or 25G or 50G up): ITU G.9802, 2021. The next ITU-T PON standard is 50G PON, which will deliver several true 10G services, 5G fronthaul, and residential services all on a single fiber. This standard launched in late 2021, but vendors must create the required chips and products to deliver it.

### CHOOSING YOUR NEXT PON TECHNOLOGY

Your next PON technology needs to work for all PON-based services (residential, business, and mobile). It must also provide a high return on investment. Before you choose, look at all aspects of the deployment—not just the obvious OLT, ONT, and optical components you’ll need.

For instance, delivering true 10G services or greater requires a choice between NG-PON2 and 50G PON. Deploying new residential PON services today? Choosing XGS-PON makes sense because it will deliver the bandwidth you need to excite subscribers for 10 years or more. ●

*Teresa McGaughey is area vice president, access and field marketing, at [Calix](#).*

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# THE FUTURE OF CABLE IS FIBER

Simply put, fiber is the ultimate network-infrastructure option for delivering superior broadband-related services.

BY GARY BOLTON—ORIGINALLY PUBLISHED SEPTEMBER 13, 2022

This past summer, for the first time in its 59-year history, Comcast failed to pick up any broadband subscribers during a fiscal year quarter. In its second-quarter earnings report in late July, the nation's largest cable operator revealed that it closed out the period with just under 31.2 million high-speed data customers, the exact same amount that it tallied at the end of the first quarter in March.

These results sharply contrasted with Comcast's record Q2 haul of 354,000 broadband subscribers last year and its steady gain of 262,000 subs in this year's first quarter. It thus marked the first time in two decades that Comcast did not net any broadband subs. In fact, only once in those 20 years did Comcast fail to add at least 100,000 data subs in a quarter.

Nor is Comcast the only major U.S. cable provider to see its broadband engine start to shrink this year. In its second-quarter earnings report released just a day after that of Comcast, Charter Communications revealed that it actually lost 21,000 total broadband customers (including 42,000 residential data subs) in the spring quarter, also its worst showing in memory. That loss represented a stark reversal from Charter's whopping gain of 355,000 data subs in the same period a year earlier and its pickup of 185,000 subs in this year's first quarter.

What these startling reversals seem to indicate is that the cable industry's record pandemic-fueled data subscriber gains of 2020 and 2021 are now history. Indeed, on the company's Q2 earnings

call with financial analysts in late July, Comcast Chairman & CEO Brian Roberts admitted as much, noting that consumers are beginning "to return to pre-pandemic patterns" of behavior.

Several Wall Street market analysts agree that the broadband glory days for cable have now come to a screeching halt, quite possibly forever. "The cable broadband growth era is over," the analysts at LightShed Partners concluded in a major market report in May. Singling out Charter as particularly vulnerable, they argued that it's "plausible that Charter's broadband subscriber base could contract within the next few years."

## ON THE OTHER HAND...

Meanwhile, at the same time, AT&T added 316,000 residential fiber customers in the spring quarter, up from a year-earlier gain of 246,000 fiber-to-the-premises (FTTP) subs and one of its largest fiber sub hauls to date. It marked the 10th straight quarter that AT&T picked up more than 200,000 fiber customers, boosting its grand total to nearly 6.6 million subs as it continues to shift its legacy DSL customers over to its new FTTP networks.

"We already have the country's largest fiber internet coverage, but we're not sitting back," AT&T Network Executive Vice President Chris Sambar wrote in a recent guest-perspective column for Light Reading. "Instead, we're out there building more fiber than anyone else, adding, on average, more than 350

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customer locations per hour across the country. This fast track puts our fiber network on pace to cover more than 30 million locations by the end of 2025.”

Verizon did not fare nearly as well as its rival telco, adding just 30,000 Fios fiber subscribers in the second quarter, down markedly from the 92,000 Fios subs that it added in the second quarter a year earlier. But Verizon still scored far better than either Comcast or Charter, lifting its overall fiber sub count to slightly over 6.6 million.

In short, it’s clear that fiber, not coaxial cable, is now winning the day in the U.S. broadband market. Although the cable industry still dominates the broadband market with DOCSIS technology running over its core hybrid fiber/coax (HFC) infrastructure, all-fiber players are picking up speed and starting to close the market-share gap.

## WHY FIBER?

It’s not hard to see why. Although innovative cable technologies such as DOCSIS 4.0, Distributed Access Architecture (DAA), spectrum mid-splits and high-splits, and network virtualization all can help cable operators boost their downstream and upstream speeds higher than ever before as part of the industry’s ambitious 10G initiative, they still can’t match the speeds and other benefits that only fiber can offer.

Indeed, cable’s physical medium and basic network elements can only be stretched so much beyond their original specifications to support the multi-gig symmetrical speeds, lower latency levels, and other goodies that both commercial and residential customers increasingly require and demand.

Simply put, then, fiber is the ultimate network-infrastructure option for delivering superior broadband-related services. It offers the fastest speeds, lowest latency levels, highest bandwidth capacity, most secure solution, and best overall

customer experience.

Further, unlike coaxial cable, fiber is scalable and upgradable at minimal capital expense, enabling it to support a wide array of new bandwidth-intensive services, products, and applications. The long and still-growing list includes work-from-home, online learning, remote health care, home security, 5G mobile, 4K and 8K video, home automation, edge computing, fixed wireless access service, autonomous vehicles, and virtual reality/augmented reality, among others.

That explains why major U.S. cable operators such as Altice USA are scrambling to overbuild their own legacy HFC networks with new FTTP networks. In Altice’s case, the nation’s third-largest MSO has aggressively committed to deploying fiber to 6.5 million homes and businesses across its Optimum footprint (mostly in the greater New York metro area) and its former Suddenlink regions (mainly in the rural Southwest) by the end of 2025, including 1.3 million locations this year, another 1.6 million locations apiece in 2023 and 2024, and then 800,000 more in 2025.

“We continue to be driven by the herd mentality that fiber is the technology of choice for anyone investing significant amounts of capital into the ground to upgrade a network or to deploy a new network,” Altice USA CEO Dexter Goei explained on the company’s Q4 2021 earnings call back in February. “We just don’t believe that the isolated U.S. market can continue to drive a very U.S.-centric technology. Even the DOCSIS networks in a European context or around the world are all driving themselves to fiber as well.”

It also explains why Liberty Global, one of Europe’s two biggest cable operators, is now teaming up with Telefonica and InfraVia Capital Partners on a joint venture that will roll out fiber-to-the-home (FTTH) networks to greenfield areas throughout the U.K.

The £4.5 billion (\$5.32 billion) plan calls for the joint-venture partners to deploy fiber by 2026 to 5 million homes not currently served by Virgin Media O2 (VM02, the joint venture between Liberty Global and Telefonica), with the option of expanding that number to 7 million premises eventually.

Overall, VM02 plans to overlay FTTP across 15.5 million homes by 2028, at an estimated cost of only about £100 (\$136) per home passed. This means that VM02, unlike some other major cable operators around the world, does not plan to pursue DOCSIS 4.0 upgrades to its legacy HFC plant.

“Everything has checked out,” Liberty Global CEO Mike Fries said on the company’s Q4 2021 earnings call in February following the completion of a 50,000-home FTTP trial. “We remain confident about the technology, our suppliers, and the estimated cost of the project.”

Fries noted that the costs of building the new FTTP network “compare really favorably to DOCSIS 4.0” Indeed, a report issued earlier this year by Wall Street firm Cowen and consultants Broadband Success Partners estimated that the cost of upgrading fully to DOCSIS 4.0 could cost cable operators \$250 to \$400 per home passed. Those figures are significantly higher than the \$10 per home of incremental network costs associated with upgrading to the earlier DOCSIS 3.1 standard.

And it explains why such other major operators as Comcast, Cox, Charter, Vodafone, WideOpenWest (WOW!), and others are quietly stringing fiber lines in new greenfield territories and “edge-out” areas adjacent to their existing footprints, rather than putting in more coax or extending their legacy HFC networks. Plus, it explains why many smaller cable providers are deploying fiber rather than coax whenever they wire a new section of their territories.

## SURVEY SAYS

Not surprisingly, these developments all reflect the latest cable market research. In the most recent annual survey of operators conducted by Light Reading and SCTE last fall, for example, more than three-fifths of respondents (62%) said their company intends to build FTTP networks in at least some of their regions over the next five years. That number was up significantly from the 44% of survey participants who said so a year earlier.

Moreover, nearly two-fifths of the survey respondents (38%) said they expect their company to cover more than 30% of their homes passed with all-fiber lines by fall 2024. In addition, just about the same number of operators (39%) said their company plans to deploy fiber-deep networks over the next five years, extending their fiber lines and eliminating all, or at least most, of the legacy signal amplifiers in their existing HFC plant.

So, as the study concludes, the cable industry is clearly headed down both of these fiber-fueled tracks as it seeks to expand its bandwidth capacity and remain competitive with AT&T, Verizon, and other fiber-happy rivals. The only remaining question is how long it will take for the industry as a whole to get there.

Altice USA’s Goei summed up the overall sentiment this way on the earnings call: “Fiber is the future, and given the progress we have made at Optimum with our fiber build, we’re excited to build on that success and break ground later this year at Suddenlink to bring our state-of-the-art network to more customers and communities,” he said. “We strongly believe this is the right approach to improve the customer experience and enhance the value of the business.” ●

*Gary Bolton is president and CEO of the Fiber Broadband Association.*

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## RESOURCES

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### Webinar

[Meet Future Bandwidth Demand: A Simple Path to 10G XGS-PON and 100G Deployments](#)

### Web Page

[Intelligent Access EDGE - 10G PON Solutions](#)

### eBook

[5 Crucial PON Deployment Questions to Ponder When Designing a Future-Proof Network](#)

### Blog

[XG-PON, NG-PON2, 50G PON: How To Tell Which Option Is Best for Your Network](#)

### White Paper

[Next-Generation PON: Eliminating Physical Constraints From the Access Network](#)

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# Is It Time to Deploy 10G PON?

**Get the right  
solution at the  
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**Find out how**

