

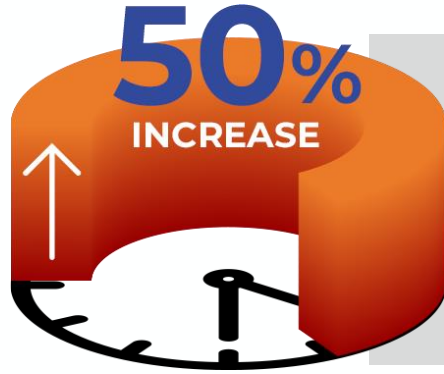
Living in a Multi-Gig World



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The Pandemic Dramatically Accelerated Bandwidth Consumption



Broadband consumption during the hours of 9 am to 5 pm has increased by more than 50% since January.¹

Work



90M

Estimate of People in US Working From Home during COVID-19 Crisis²

Learn



54.8M

K-12 students learning at home (end of March)³

Play



31%

Increase in online gaming since Stay-In-Place order⁴

¹ Working From Home During Coronavirus Pandemic Hasn't Broken Internet. Krouse. March 27, 2020

² Estimated based on data in: [pewresearch.org/fact-tank/2019/08/29/facts-about-american-workers/](https://www.pewresearch.org/fact-tank/2019/08/29/facts-about-american-workers/)

³ The Online Learning Divide. Time Magazine. April 6, 2020.

⁴ Consumer Technology Association

Applications Driving Growth

TELEVISION



NETFLIX

Disney+

ROKU

hulu

VIDEO SURVEILLANCE



arlo

nest

ring

CLOUD GAMING



XBOX

PlayStation

STADIA

GEFORCE NOW

VIRTUAL REALITY



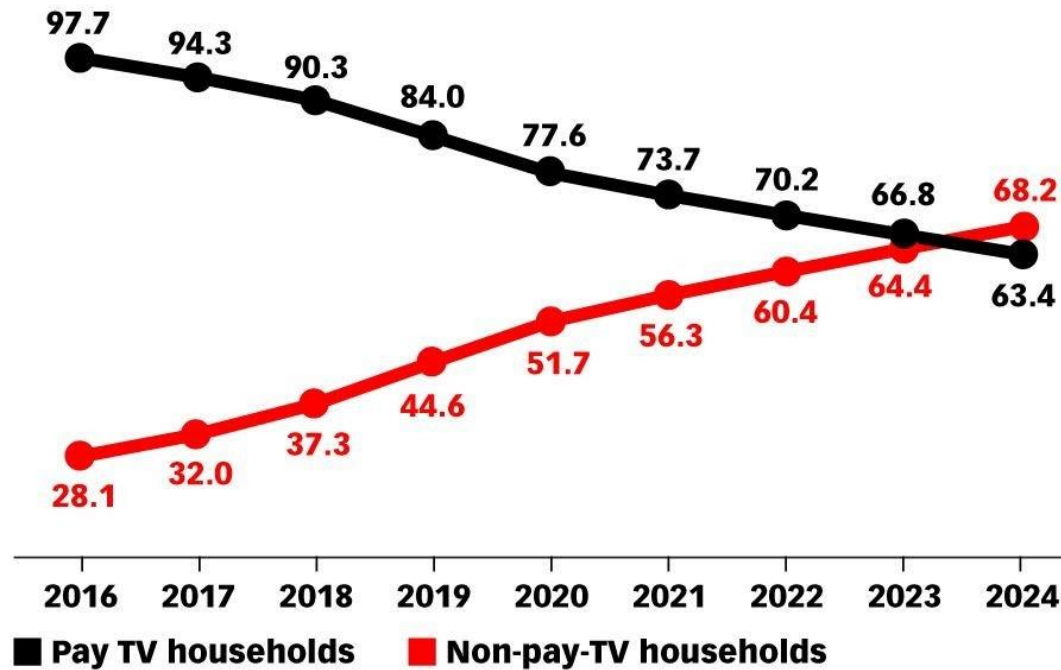
oculus

VIVE



Cable Operators Moving to a Broadband First Model

US Pay TV vs. Non-Pay-TV Households, 2016-2024
millions



Note: pay TV households are those with a subscription to traditional pay TV services; excludes IPTV and pure-play online video services (e.g., Hulu, Netflix, YouTube, Sling TV); non-pay-TV households are those that have canceled their subscription or have never had traditional pay TV services
Source: eMarketer, Sep 2020

258227

www.eMarketer.com

Explosion in FTTH Deployments

Committed Fiber Homes Passed

Fiber Homes Passed	Current	Committed
AT&T	15.5M	30M by 2025
Frontier	3M	6-8M by 2031
Lumen	2M	7M by 2030
Verizon	15.8M	18.6M by 2030
Windstream	1.3M	3M by 2030
Total	38M	65-68M by 2025

- ❑ Cox, Charter, Altice expected to add 5+ million more homes passed by 2030
- ❑ Total US fiber homes passed could easily exceed 75 million by 2030
- ❑ Fiber overbuilding, network expansion fueled in part by subsidies

Consumers Got Savvy About Upstream Bandwidth



Multi-Gig = Bragging Rights...and more



**Cable moves at the speed of copper.
Fiber moves at the speed of light.**

Your move.

STAY CONNECTED

***FIBER OPTIC
INTERNET SPEEDS
UP TO 10 GIG***

THE FASTEST GIG IN TOWN!

Symmetric speeds up to 10 Gig!

[📍 CHECK AVAILABILITY](#)

HBC Bringing 10 Gigabit Residential Fiber Service to

Winona

Posted on January 14, 2022



10G

Broadband

Winona, MN – The City of Winona is about to become the fastest broadband community in southeastern Minnesota. Hiawatha Broadband Communications, Inc. (HBC) has announced it will be constructing a new Fiber-To-The-Premise (FTTP) network in Winona, MN.

Source: <https://www.telecompetitor.com/hbc-bringing-10-gigabit-residential-fiber-service-to-winona/>

Press Release

MLGC brings 5-gigabit residential internet service to North Dakota

By mlgadmin | December 3, 2020 | No Comments

Its About More Than Just Broadband Speed

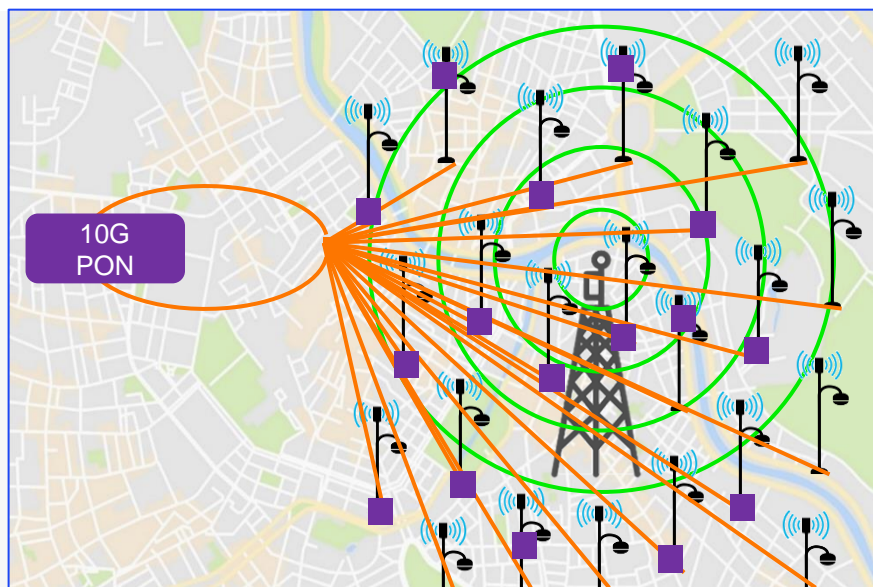


Simplify. Excite. Grow.

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Multi-Gig Is About More Than The Home

Fixed Wireless / Mobile Networks



RAN Densification
(Midhaul / Backhaul)



Multi-Tenant Units

Multi-Dwelling Units

Residential / Business



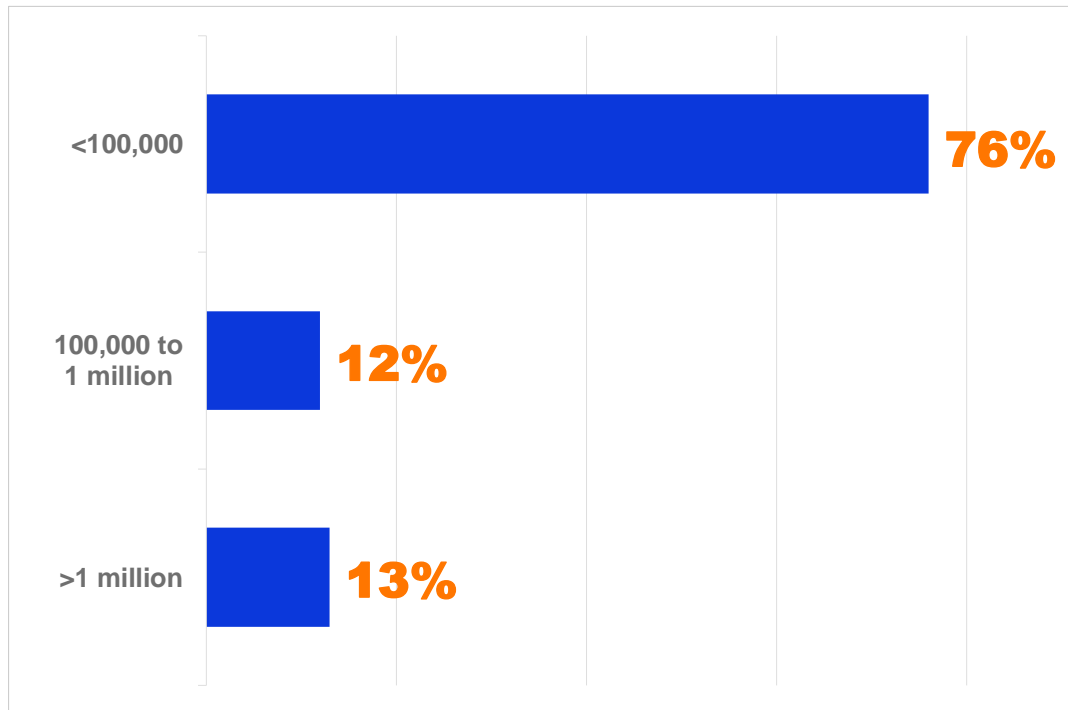
Why Multi-Gig - Summary

- **Both Telcos & Cableco's Are Investing Heavily in Fiber**
- **Marketing Leadership - Bragging Rights**
- **Leverage Your Network to Serve Multiple Customer Segments – Own Your Market**
- **Frees Your Teams Up to Focus on Winning The Hearts & Minds of Your Customers**

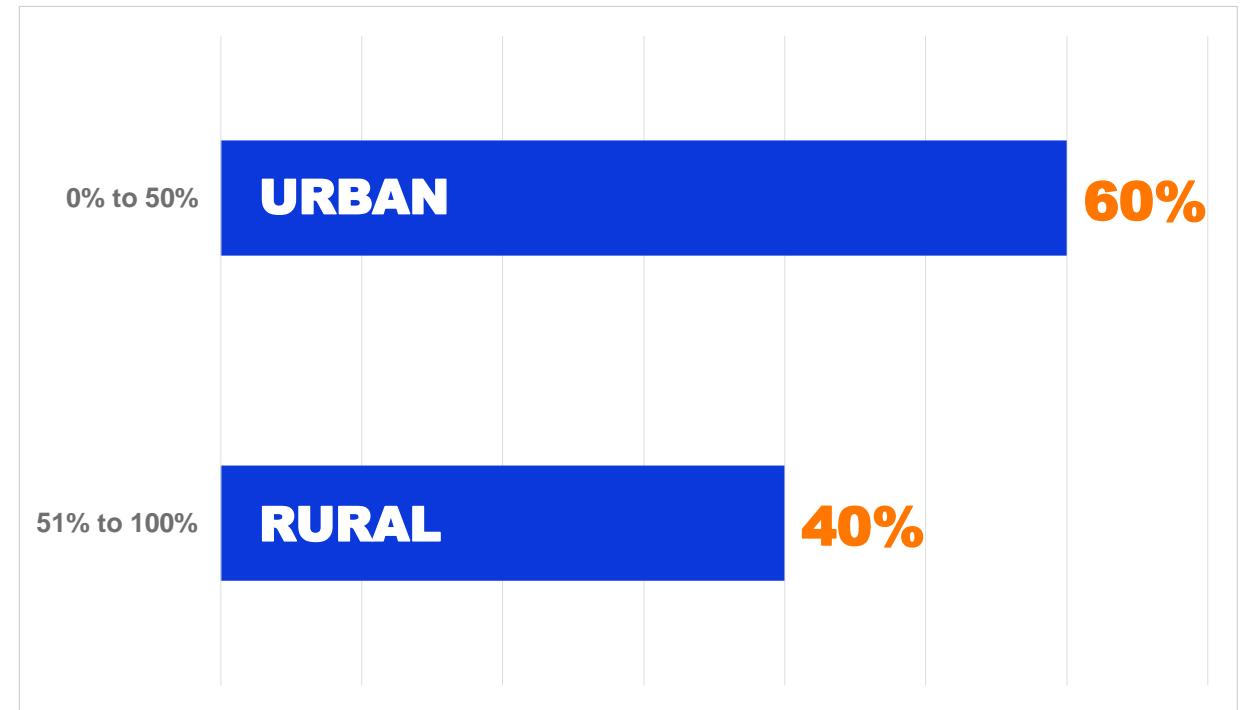
FBA/LIGHTWAVE 10G PON Survey – October 2021

Who responded?

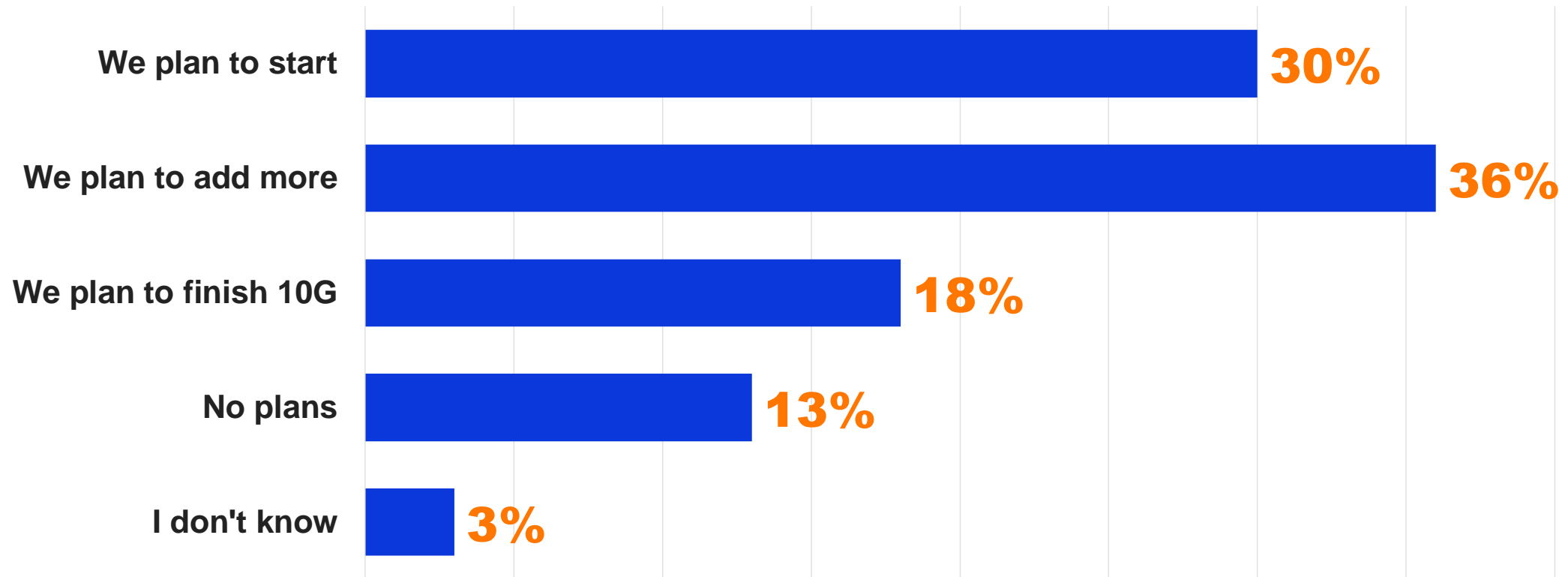
How many subscribers?



What percentage are rural?

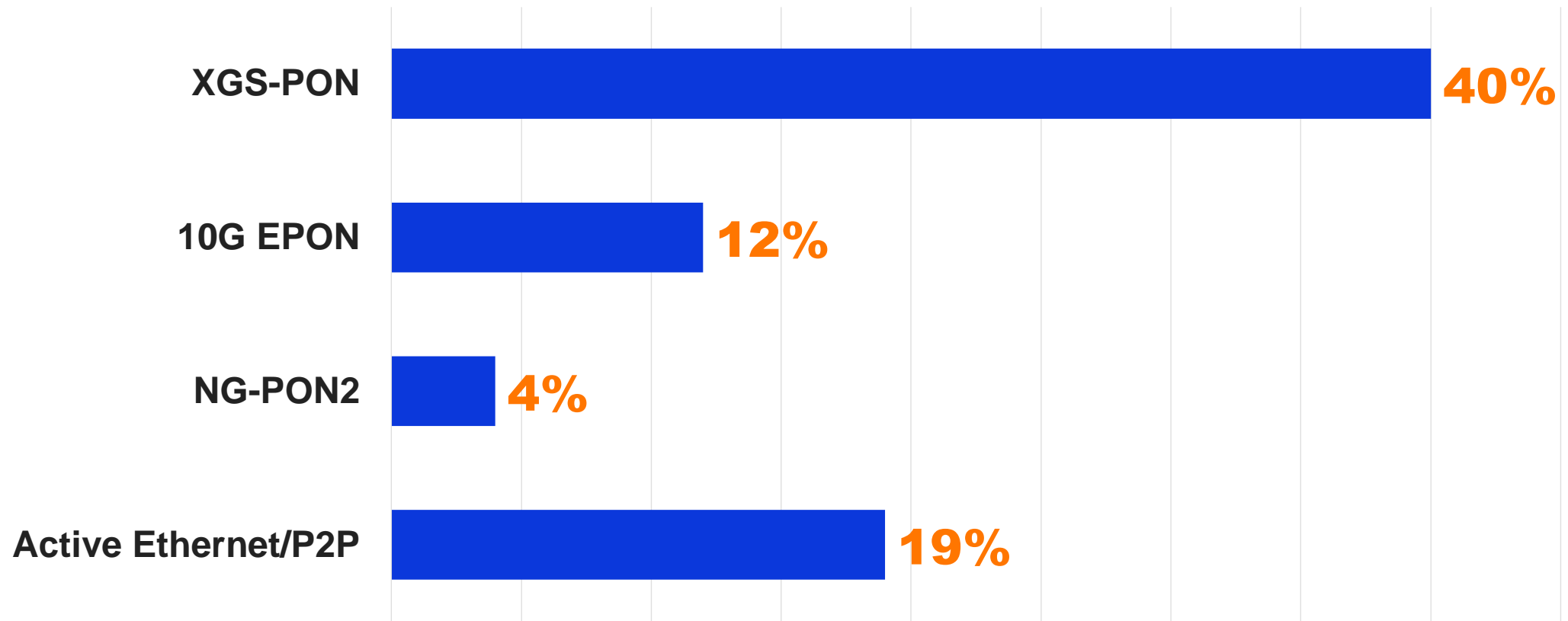


What are your 10G deployment plans for the next two years?



84% will start, add or finish 10G network build

Which 10G technology do you prefer?



How Do I Transform My Network?

Consumer

4K streaming/gaming
Smart home
Work from home

Today

0.9

Terabytes



Future

4.6

Terabytes



AT&T CEO John Stankey: We conservatively project a 5x data increase on our network over 5 years

...and do it with minimal disruption to my subscribers??



Simplify. Excite. Grow.

Why is XGS-PON growing 4x-5x YoY?



Cable also fitting into the fiber frenzy



CABLE NEXT-GEN TECHNOLOGIES & STRATEGIES 2022 – The path forward for operators is no longer a straight line. Rather than simply advancing toward the next generation of DOCSIS, several operators are instead plowing ahead with overbuilding their hybrid fiber/coax (HFC) with fiber-to-the-premises (FTTP)

WEB EXCLUSIVE

Brightspeed Taps Calix, Corning, Dycom and IQGeo as its FTTH Partners

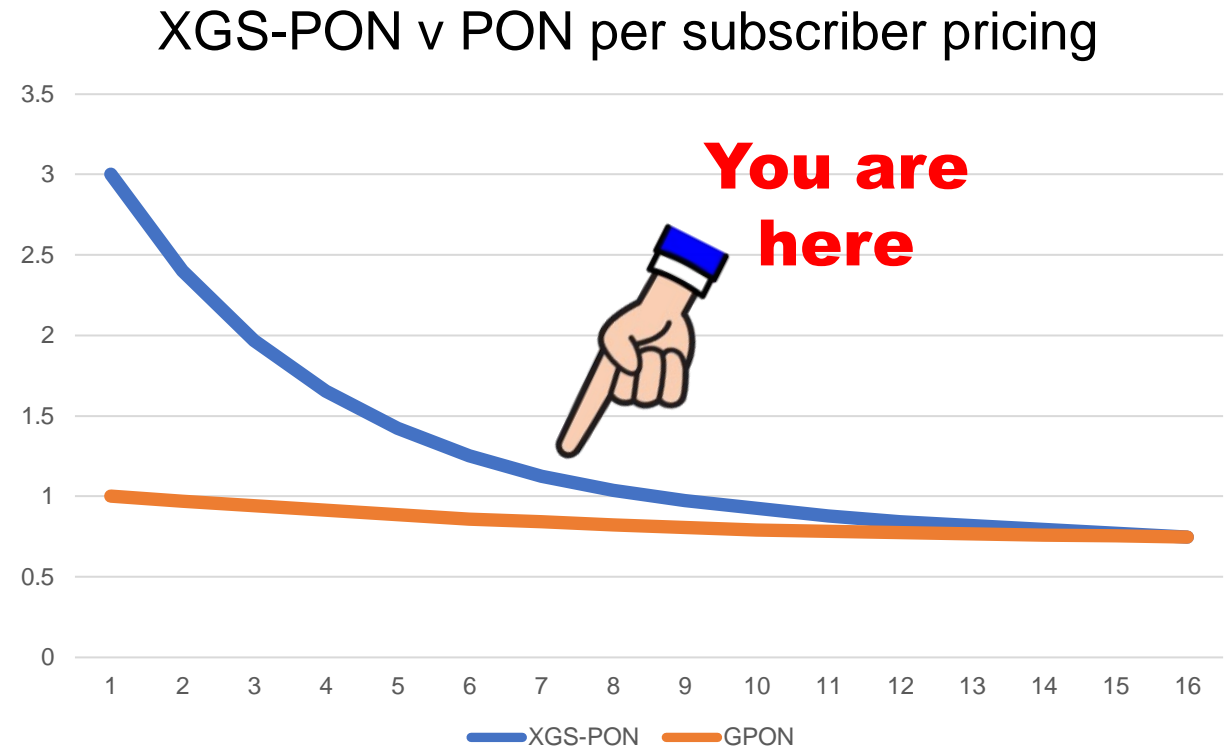
March 30, 2022

Blue Ridge, Calix take on FTTH rebuild of DOCSIS 3.1 cable systems in rural PA



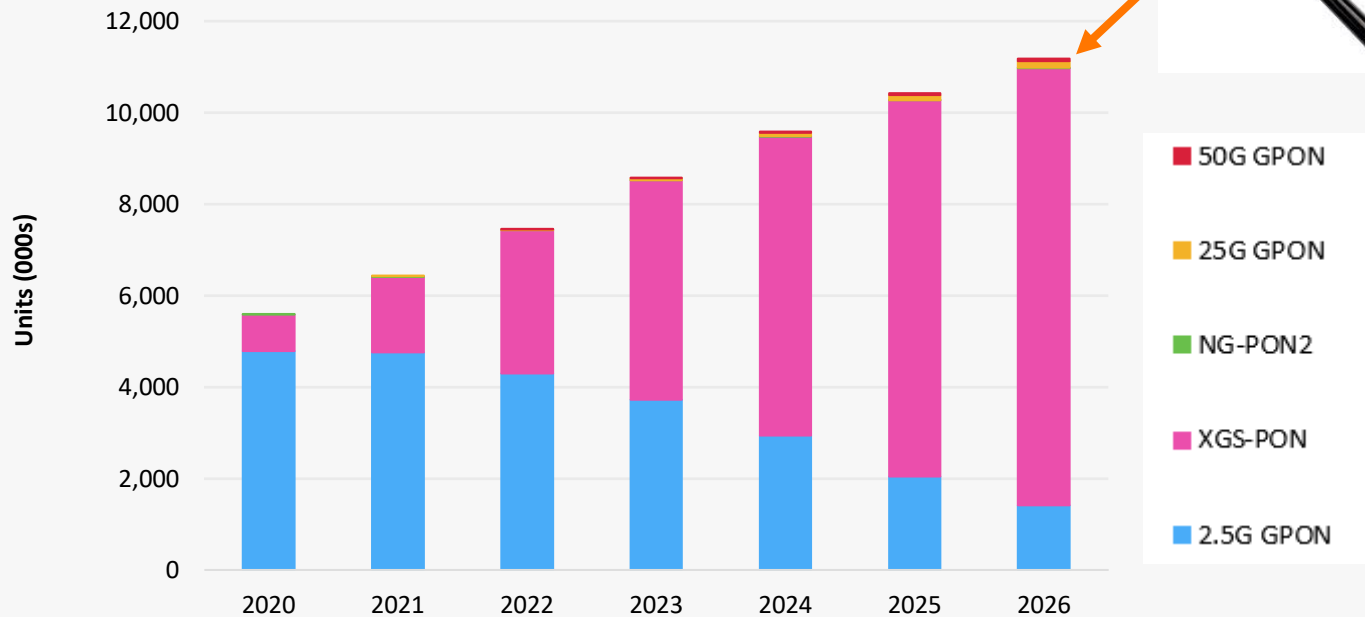
What about the price of XGS-PON?

- ONT price delta narrowing considerably (cost curve)
- Second generation cost reduction
- Remember ~8-10% of the network cost is in the electronics



The Year of XGS-PON has arrived

PON OLT optical component forecast – PON family



Source: Omdia

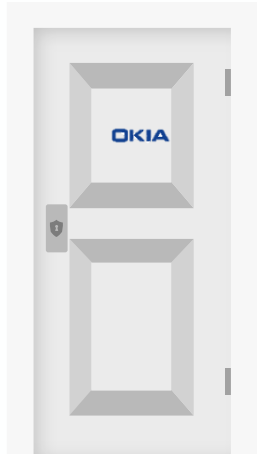
© 2021 Omdia

North America

- 2021 is the breakout year for XGS-PON
- XGS-PON dominates through 2026
- 25G / 50G PON forecast minimal through 2026

What are the options beyond 10G?

25G



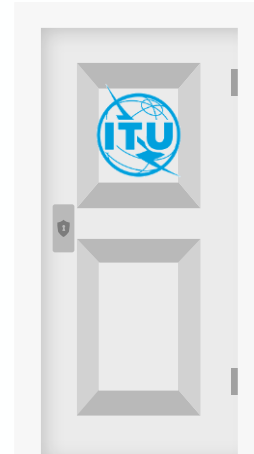
Non-Standard MSA*

NG-PON2



40Gb available today with 4 wavelengths. Calix leads this market

50G



ITU driven Standard completed

100G



CableLabs driven Standard expected in 2025

*MSA = Multi-Service Agreement



Thank You
CTA