UNLEASH THE POWER OF LIMITLESS CONNECTIVITY
10G and FTTP: Drivers, Considerations and Strategies

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Armstrong
Armstrong

• Family owned and operated since founding in 1946
• America’s 11th largest MSO - serving Pennsylvania, Ohio, West Virginia, Kentucky, Maryland and New York
• 1st broadband Internet customer connected in 1997
• Offering Internet speeds from 25 Mbps to 5 Gbps and DIA speeds up to 100Gbps
• Decided to build FTTP 15 years ago
  • RFOG to reach ten homes per mile in rural areas
• 4 years ago, switched to same 1x32 distributed split PON architecture with GPON for “Network of the Future”
The FTTP Decision: Then & Now

- “Growth in perpetuity”
- 12-month trendline analysis
  - Average usage CAGR = 55%
  - Peak usage CAGR = 57.6%
- KPI and metric analysis changing to align with customer usage
- Upstream capacity increasingly important
- Competitive threats and customer demand

Figure 1. Cumulative Usage for (Wide Area Network) WAN Plus (Content Delivery Network) CDN and Peering Cumulative Ports (Jan’20-Jan’21)

Source: Armstrong
The FTTP Decision: Reasons Why

- **Power Savings**
  - Substantial energy savings - millions of dollars annually
  - Major labor savings with decrease in need for HFC plant maintenance

- **CPE Costs**
  - GPON and XGS-PON ecosystem more mature; costs more predictable
  - XGS CPE costs 1/10th of MPLS CPE

- **HFC Upstream Limitations**
  - Sub-split to mid-split enables 300Mbps upstream
  - High-split move for sym. 1Gbps complex, costly

HFC Spectrum Impact of Support for Higher Speed Services
The FTTP Decision: Reasons Why (continued)

- Consumer Electronics Show
  - Emergence of AR/VR centric gaming apps
  - Proliferation of network-connected devices: IoT and others
- Field Tech Training & Equipment
  - Skills honed on DOCSIS transfer to FTTP
  - Handheld splicing tools replace complicated connectorized cables
  - PON meters simpler to operate than RF signal level meters

Major Lesson Learned

Deploy FTTP even faster
- Compete with newer fiber entrants for same labor and material
- But benefit from lower tech prices. Price erosion contributed to XGS-PON move.
Provisioning: DOCSIS to GPON

- GPON system used its own service templates for provisioning customers
- With commercial middleware, translated DOCSIS service codes to PON templates
- In-house developer replaced commercial middleware with our adapter – in 1 week
- Result: agnostic approach to flow-through provisioning
- Enabled field techs to provision cable modem, GPON ONT, Wi-Fi, Telephony MTA/number porting and video

Source: Armstrong
10G Platform with XGS-PON and Combo PON

- GPON fit needs of some customers. But, for high-bandwidth customers, needed smooth shift to accessing higher speeds.
- Co-mingle GPON and XGS-PON on same fiber strand to provide network flexibility
- Same platform. Same card. Same PON. Economies of scale.
- Simplify deployment of XGS-PON over existing GPON network with Combo PON technology from ADTRAN
- Supports SLAs required for Carrier Ethernet business services

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XGS-PON Capturing OLT Volumes

PON OLT port volume forecast by type

Source: Omdia

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XGS-PON OLTs majority of shipments in 2022

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The In-Home Gigabit Experience

Extension of the Last Mile to the Home

• Bottlenecks remain at home
• Stellar in-home Wi-Fi experience all-important
  • Issues trigger customer service calls

Managed Wi-Fi Solution

• Ensure that customers leveraging latest technology (Wi-Fi 6, Wi-Fi 6E)
• Placing advanced components throughout house to ensure maximum coverage

Analytics & Insight

• Leverage integrated cloud-based data and analytics packages
• Window into customer’s network, behavior and experience
• Enables enhanced customer service; present new customer-centric offerings
Backbone Network: Scaling to 100G

- Re-examine backbone network between OLTs and core
- As access network scales to 10G, Armstrong strengthens transport network – from Nx10GE to Nx100GE
- The 10G Access systems connect to upstream Broadband Network Gateway Router
  - Adds simplicity and scale
With small service groups, DOCSIS 3.1 can support only downstream speeds that GPON enables, but not the speeds delivered with XGS-PON.

To achieve 10G, DOCSIS 4.0 Extended Spectrum or Full Duplex DOCSIS required.

Valid choices, but plant upgrades to extend spectrum to 1.8 GHz, and to modify split and/or change to Node + 0 can lead to:

- Service disruption during upgrade;
- No operating cost reduction;
- Disruption of legacy services due to interference from new upstream channels (requiring filter installation or CPE change), and
- Multiple upgrade steps may be needed on the way to 10G

Non-issues with FTTP overlay, or upgrade from GPON to Combo PON.
Evolution to 100G PON

- PON like DOCSIS: Both revolutionary in their introduction and have similar evolutionary paths:
  - Original DOCSIS, D2.0, D3.0, D3.1, D4.0, etc
  - RFoG, GPON, XGS-PON, etc
- And BOTH are paths to our industry’s “10G” objective
- Bandwidth usage will continue to increase - as will new broadband uses
- ITU-T working on 50G PON standardization (end-2021)
- CableLabs Coherent PON Working Group (kicked off in May 2021)

The best path to the future is found by planning today!!

Source: CableLabs 2021

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Conclusion

• The Armstrong FTTP story is compelling
• Business, network, operations and economic reasons for move valid today
  • Performance of bandwidth-hungry (gaming) applications
  • Escalating volume of network-connected devices;
  • Long-term, competitive, lower cost solution;
  • Lower labor expense with reduction in plant maintenance;
  • Significant energy savings.
• Argument bolstered by advantages of XGS-PON together with Combo PON
  • Same fiber. Same platform. Same card. Same PON.
  • Significant reduction in space use, power consumption and capital expense
  • Longer GPON life span; increase in gigabit service coverage
• The time for XGS-PON is now!
Thank You!

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