

EXECUTIVE BRIEF

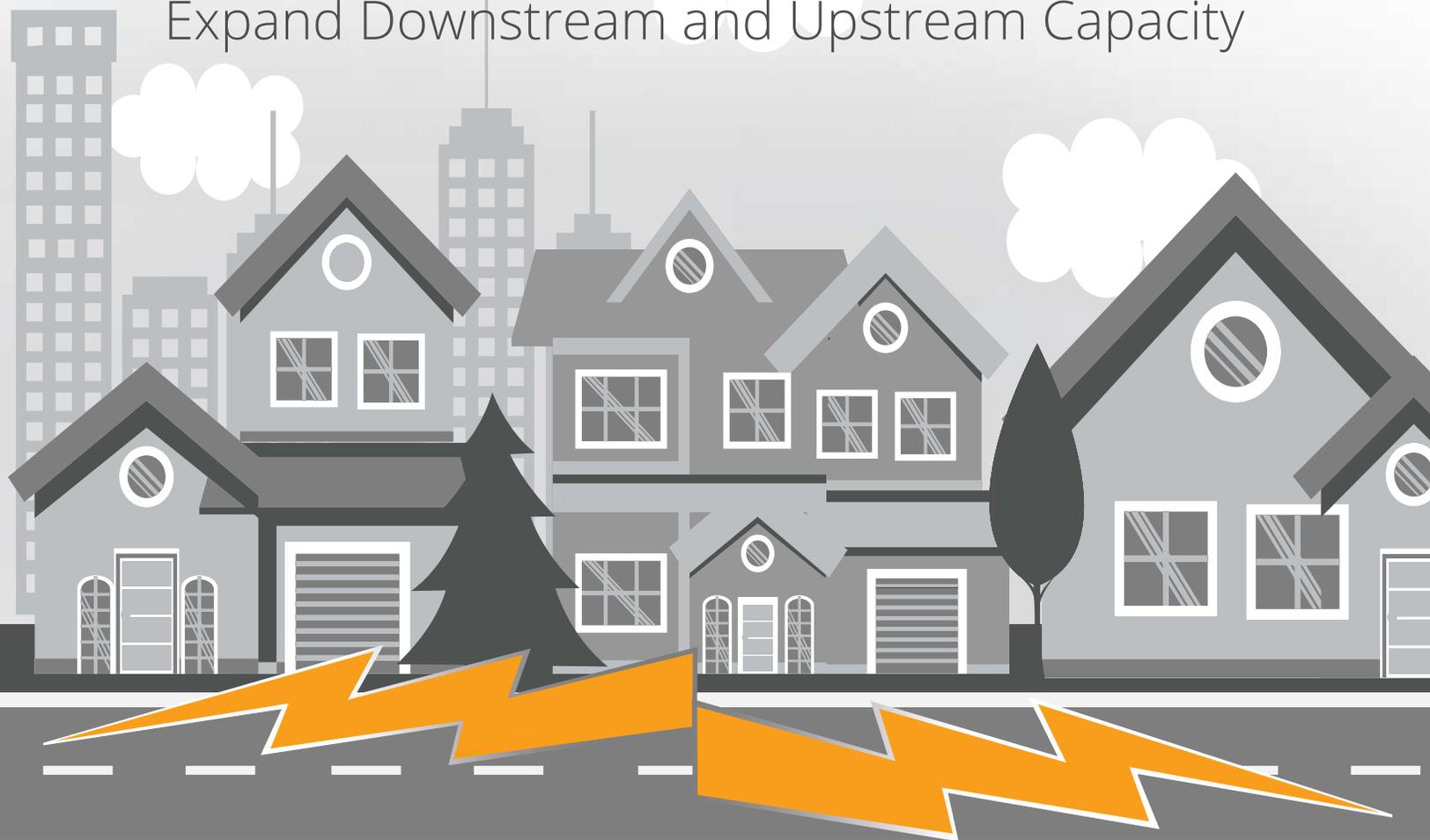
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EVOLVING NETWORKS TO PROFITABLY DELIVER MULTIGIGABIT SPEEDS

Upgrading HFC Networks with DOCSIS® 3.1 Can
Expand Downstream and Upstream Capacity



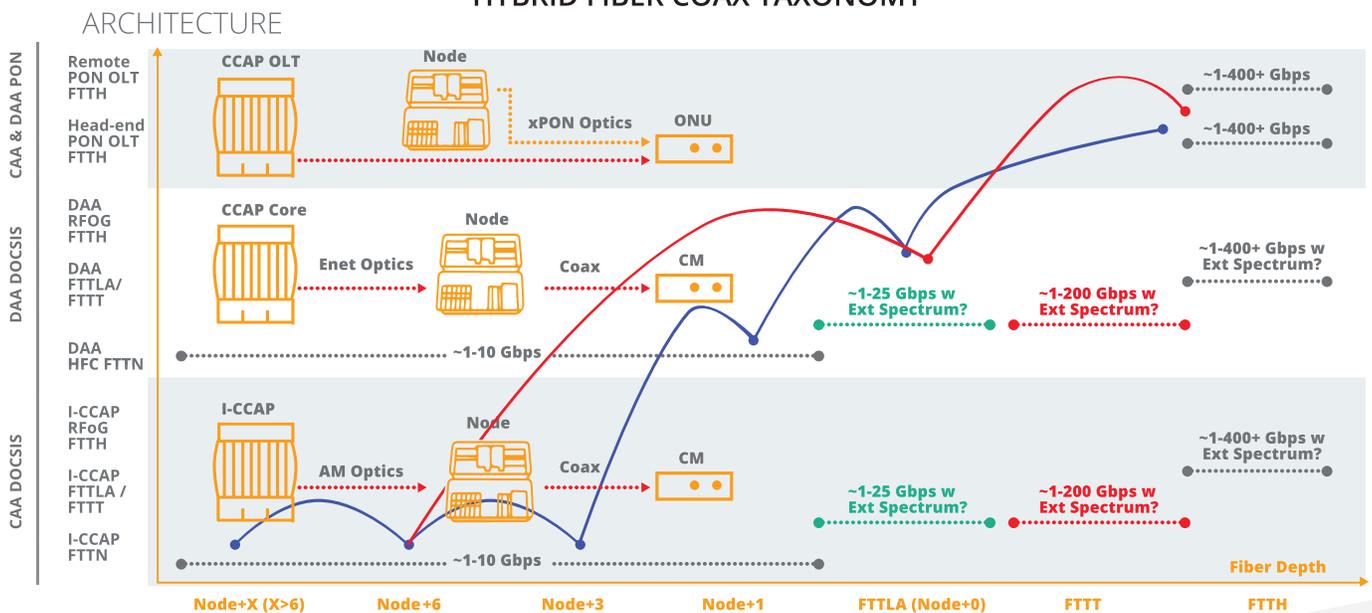
EVOLVING NETWORKS TO PROFITABLY DELIVER MULTIGIGABIT SPEEDS

Upgrading HFC Networks with DOCSIS® 3.1 Can Expand Downstream and Upstream Capacity

Telecom Operators across the Caribbean and Latin American (CALA) region are looking to the future and preparing to deal with unprecedented growth in bandwidth demand. The broadband access market is still dominated by digital subscriber line (DSL) technology over twisted pair telephone wires, but networks using DOCSIS to provide Internet access over existing hybrid fiber coax (HFC) infrastructure have higher data carrying capacity.

For Operators with existing HFC networks, a methodical evolution can be a winning strategy to achieve the high bandwidth and low latency required to serve consumers across the CALA market. While the long-term goal may be a fully fiber-to-the-home (FTTH) network, in the meantime, they can upgrade current HFC networks to increase capacity and data speeds with operational cost savings and superior quality of experience.

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The smartest path to a fiber-to-the-home future starts with upgrading today's HFC plant

While every Telecom Operator has specific business goals and unique needs, most Operators in CALA have one thing in common: they are ready to selectively deploy a 10 Gbps fiber solution in new areas to a small group of subscribers for a selective evolution approach. Converting all customers to FTTH at once now would require a significant investment without immediate revenue to compensate for the expense. Fortunately, current HFC networks are a key asset that can be upgraded and monetized now to soften the longer-term economics of upgrading to all fiber.

A hybrid fiber coax broadband is an FTTx network and combines optical fiber and coaxial cable to carry video and data between the cable system's distribution facility—the headend—and local communities. From there an optical node translates the signal to and from radio frequency and coaxial cable handles the last leg to devices in residences. Operators support two-way, high-speed broadband traffic using frequency-division multiplexing in the HFC network to carry analog TV, digital TV, video on demand, telephony and high-speed data, and Internet access. A passive optical network (PON) brings optical fiber most of the way to the end users – the subscribers' neighborhoods and buildings.

While Telecom Operators may have FTTH in their long-term business plan, the question is: Which journey will enable them to recognize profits along the way? Ideally, the strategy should be compatible with current technology at the headend, in the field and at the home, while creating a path to bandwidth expansion for years to come by taking advantage of existing infrastructure. Not surprisingly, Multi-access Providers, Cable Companies and Telecom Operators want to leverage their existing investments in plant and equipment as long as possible.

While analysts predict spending on cable infrastructure will reach US\$2 billion globally by 2023¹, HFC networks can be upgraded for multigigabit speeds right now using a combination of Extended Spectrum DOCSIS and Full Duplex DOCSIS 3.1.

Meeting customer demand by evolving HFC networks

Market demand for more bandwidth and lower latency is driven by applications such as live sports streaming and advanced gaming, as well as an overall

HFC Market Growth

Research firm Technavio projects the global hybrid fiber coax market to post a CAGR of close to 9% during the period 2019-2023.

proliferation of bandwidth-consuming activities such as exchanging files with the cloud. Low latency is required for gaming, virtual reality and 5G backhaul support. Higher upstream bandwidth capacity is needed for applications such as interactive Internet-of-Things devices. Greater downstream capacity is a foundation for creating high-value service level agreements in the future. Operators are feeling pressure to prepare for future bandwidth demand patterns that resemble those seen in North America and other markets.

Providing a high-quality subscriber experience – including attractive service bundles and high capacity broadband – is vital to minimizing churn rates. But each Cable Operator's roadmap is unique, and each needs to begin with some form of digital transformation in its access network.

Fortunately, CALA Operators' existing HFC networks are like road systems originally built to accommodate one thousand traffic lanes, where only a fraction of the lanes are currently being used. Operators have the ability to use all the lanes (spectrum) with "bigger trucks" that can carry more data (capacity). Extended Spectrum DOCSIS opens 1.8 GHz of coax spectrum for downstream and upstream transport. Existing HFC networks can deliver up to 1.2 Gbps downstream and 100 Mbps upstream with DOCSIS 3.0 and, when upgraded with DOCSIS 3.1, can reach 9.0 Gbps downstream and 4.5 Gbps upstream if an all IP implementation takes place in the future.

Each Operator has unique considerations that call for a trusted, technology-agnostic partner in finding an optimal way forward, based on key actions including:

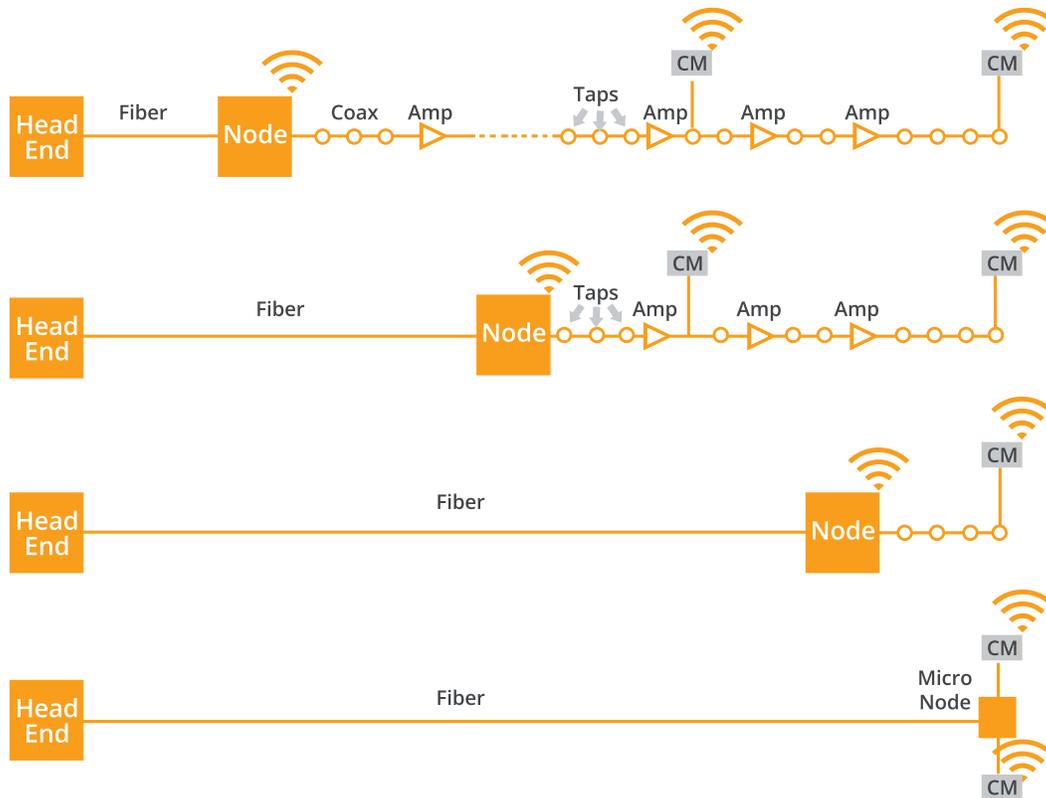
- Adding more DOCSIS 3.1 licenses in the central office to boost bandwidth and speed, with minimal disruption to the network
- Placing DOCSIS 3.1 gateways in the home. Note that only subscribers who want a high-speed connection need to acquire new gateways. Also, because DOCSIS technology is backward compatible, adding DOCSIS 3.1 licenses in the network improves performance for all homes with DOCSIS 3.0 and 3.1 without requiring upgrades.

Having helped shape cable industry innovation, ARRIS, now a part of CommScope, has an extensive portfolio of products and resources with engineering and professional services teams that support the broadest range of HFC customers. ARRIS helps Operators monetize their current HFC networks and evolve to an all-fiber or all-wireless future by implementing reliable and field-proven multigigabit speeds over their existing infrastructure.

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PUSHING FIBER CLOSER TO THE SUBSCRIBER



The case for HFC over GPON

Some Operators with existing HFC networks have considered turning to Gigabit Passive Optical Networks (GPON) technology as an alternative point-to-multipoint access mechanism, but questioned if GPON could deliver more bandwidth. While GPON solutions can reach speeds of 2.35 Gbps downstream and 1.25 Gbps upstream, an upgraded HFC network with DOCSIS 3.1 can reach as much as 9.0 Gbps downstream and 500 Mbps upstream.

Also, there is an inaccurate perception that GPON is a less expensive alternative to the license and equipment costs of an HFC upgrade. It's important to look beyond the direct cost of ports and equipment to see hidden costs for back-office systems, new set-top boxes for all subscribers and the significant operational learning curve for a different technology. Provisioning for GPON requires all homes to be upgraded, whether subscribers wish to change or not, by installing a new drop and new infrastructure at the home. This cost is extremely significant for Operators. Alternatively, evolving an existing HFC network enables a much faster and cost-effective time-to-market.

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Conclusion: Multigigabit HFC meets exploding demand for bandwidth while monetizing existing infrastructure

The smart move for Operators with HFC networks is to stick with DOCSIS and go further with fiber. For a fraction of the cost of pulling fiber to all subscribers, a Telecom Operator can significantly extend the lifespan of its HFC plant for years to come, while taking selective steps toward an all-fiber network using higher FTTH solutions such as XGSPON or 10GEPON. Mechanisms adopted with DOCSIS 3.1 and lower latency DOCSIS can reduce HFC network latency to a range of 1-2 milliseconds and deliver the quality of experience customers demand. Upgrading the HFC plant to 1 GHz or 1.2 GHz, and moving to an 85 MHz upstream provides a platform that can deliver 9.0 Gbps downstream and 500 Mbps upstream for subscribers at the top billboard tier.

It's about a methodical evolution. By deploying a multigigabit HFC upgrade, FTTH deployments can be done selectively over time, thus optimizing infrastructure spending while ensuring subscribers who desire the fastest speeds and capacity are migrated first, without impacting others.

Leveraging the full potential of existing HFC networks by upgrading with DOCSIS 3.1 can be a winning strategy for CALA Operators who need to increase quality of service profitably as they evolve toward a FTTH future.

Learn more about migrating HFC networks to FTTX at <https://www.arris.com/solutions/fiber-deep/>

¹ "Broadband Access 5-Year Forecast Report," Dell'Oro Group, February 19, 2019, <http://www.delloro.com/news/investments-cable-infrastructure-projected-reach-2-billion-2023>

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