Next-Gen Cable Networks: Opportunities for Fiber-Based Technologies

EXECUTIVE SUMMARY

After largely dismissing all-fiber networks as too costly, too disruptive, and simply unnecessary earlier in the decade, the cable industry is now moving rapidly toward widespread fiber deployment. From the Americas to Europe to the Asia/Pacific region, cable operators are quietly weighing the potential bandwidth, performance, operational, reliability, and marketing advantages of adding fiber-to-the-premises (FTTP) extensions to their conventional hybrid fiber/coax (HFC) plant. In the U.S., Canada, U.K., Portugal, Japan, the Netherlands, and other nations, cable providers are studying and testing the merits of installing fiber lines to serve master planned communities, other new housing developments, apartment building complexes, businesses, and other groups, especially in markets where they face competitive threats from major telco fiber networks such as Verizon's FiOS and AT&T's U-verse initiatives.

In the U.S., major MSOs including Time Warner Cable, Cox Communications, Bright House Networks, and WideOpenWest (WOW!) are all either testing or rolling out all-fiber networks to boost their competitive position in one or more large markets. Meanwhile, Tier 2 cable operators including Armstrong Cable, Bend Broadband, Midcontinent Communications, and NPG Cable are deploying FTTP systems to serve residential and/or commercial subscribers; and a growing number of other cable providers, both large and small, are giving FTTP technology a closer look as well.

Excerpt 1: North American MSO Fiber Trials & Deployments

<table>
<thead>
<tr>
<th>CABLE OPERATOR</th>
<th>FIBER TECHNOLOGY</th>
<th>EQUIPMENT VENDOR(S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allen's TV Cable Service</td>
<td>Hybrid RF-PON</td>
<td>Alloptic</td>
</tr>
<tr>
<td>Armstrong Cable</td>
<td>Hybrid RF-PON</td>
<td>Alloptic, Aurora Networks</td>
</tr>
<tr>
<td>Bend Broadband</td>
<td>Hybrid RF-PON</td>
<td>Alloptic</td>
</tr>
<tr>
<td>Bresnan Communications</td>
<td>Fiber Deep, BrightPath</td>
<td>Aurora Networks, CommScope</td>
</tr>
<tr>
<td>Bright House Networks</td>
<td>EPON</td>
<td>Salira Systems</td>
</tr>
<tr>
<td>CableOne</td>
<td>Fiber Deep, BrightPath, GPON</td>
<td>Aurora, CommScope, Enablence</td>
</tr>
<tr>
<td>Comcast</td>
<td>Hybrid RF-PON</td>
<td>Alloptic</td>
</tr>
<tr>
<td>Cox Communications</td>
<td>Fiber Deep, RFoG, GPON, RFI</td>
<td>Aurora Networks, CommScope</td>
</tr>
<tr>
<td>Midcontinent Communications</td>
<td>Hybrid RF-PON</td>
<td>Alloptic</td>
</tr>
<tr>
<td>NPG Cable</td>
<td>Hybrid RF-PON</td>
<td>Alloptic</td>
</tr>
<tr>
<td>Rogers Communications</td>
<td>Fiber Deep, pre-RFoG</td>
<td>N/A</td>
</tr>
<tr>
<td>Suddenlink Communications</td>
<td>Fiber Deep</td>
<td>Aurora Networks</td>
</tr>
<tr>
<td>CABLE OPERATOR</td>
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<tr>
<td>Sunflower Broadband</td>
<td>BrightPath</td>
<td>CommScope</td>
</tr>
<tr>
<td>Time Warner Cable</td>
<td>BrightPath, RFI</td>
<td>CommScope</td>
</tr>
<tr>
<td>Videotron</td>
<td>Fiber Deep</td>
<td>Aurora Networks</td>
</tr>
<tr>
<td>WOW!</td>
<td>GPON</td>
<td>Calix Networks</td>
</tr>
</tbody>
</table>

Source: Heavy Reading

All of this activity is occurring as more than a dozen different equipment manufacturers are promoting a variety of "fiber-deep," FTTP, and passive optical networking (PON) architectures, systems, and devices to cable operators as the way to maintain their competitive edge against the rising telco fiber threat on the broadband and video fronts. The lineup of fiber access gear vendors pushing their products to MSOs includes established cable technology suppliers as well as some well-positioned startups.

Hardware vendors are rallying around an emerging set of industry technical specifications being drafted by the Society of Cable Telecommunications Engineers (SCTE) that would allow cable operators to install fresh fiber lines all the way to homes and businesses quickly, easily, and relatively cheaply. Known as Radio Frequency Over Glass (RFoG), this proposed standard would enable MSOs to add targeted fiber extensions to their HFC networks without changing any of their existing headend and hub equipment or customer premises gear, including digital cable set-top boxes, Docsis cable modems, and embedded multimedia terminal adapters (E-MTAs), or voice modems. Cable providers would also be spared the need and expense of switching out their operation support systems (OSSs) and business support systems (BSSs).

**Next-Gen Cable Networks: Opportunities for Fiber-Based Technologies** explores the cable industry's initial forays into the FTTP market, examining the prospects for MSOs as they seek to expand beyond their traditional HFC architectures by extending fiber lines to the customer premises. The study analyzes the opportunities for cable operators to capture greater portions of the residential and commercial markets through targeted plant extensions to master planned communities, other new housing developments, apartment building complexes, business locations, rural areas, and other segments. It evaluates the significant obstacles that cable providers must overcome to transform themselves into major players in the FTTP arena, and it measures how well RFoG technology stacks up against competing telco delivery systems.

The report provides a detailed competitive analysis of 15 technology, equipment, and service suppliers in this emerging sector, assessing their products, strategies, strengths, and weaknesses. The findings and analysis in this report are based on four months of in-depth interviews with equipment vendors, cable engineers, financial and market experts, industry consultants, standards developers, and cable operators. In addition, the findings are based on a variety of research surveys, press conferences, conference panel sessions, analyst earnings calls, Webinars, technical papers, and trade show reports.

For a complete list of technology suppliers reviewed and analyzed in this report, click here.

With easy-to-add fiber extensions, cable operators could support the more reliable delivery of greater downstream spectrum and services to residential and commercial subscribers. Because RFoG systems support the delivery of up to 1 GHz of spectrum to the customer premises, MSOs could more easily upgrade their system capacity to carry more digital video channels, HDTV services, VoD choices, higher-speed data signals, VoIP services, and other offerings.

Although RFoG proponents can point to a wide range of advantages that can be provided by the standard, cable operators are increasingly concerned about the actual performance of RFoG-based networks as compared with competing fiber-based telco initiatives. Unlike the various PON
technologies that the phone companies are increasingly deploying, RFoG doesn't actually produce any more bandwidth or faster transmission speeds on its own. While RFoG systems can support HFC networks with up to 1GHz capacity, they don't provide any extra capacity for the industry's typical 750MHz system. Cable operators must still upgrade the rest of their plant to increase their overall bandwidth capacity.

Excerpt 2: Bandwidth Comparisons of RFoG vs. GPON & EPON

<table>
<thead>
<tr>
<th>TECHNOLOGY</th>
<th>DOWNSTREAM BANDWIDTH</th>
<th>UPSTREAM BANDWIDTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>RFoG (with Docsis 3.0)</td>
<td>160 Mbit/s</td>
<td>120 Mbit/s</td>
</tr>
<tr>
<td>GPON</td>
<td>2.4 Gbit/s</td>
<td>1.2 Gbit/s</td>
</tr>
<tr>
<td>EPON</td>
<td>1.0 Gbit/s</td>
<td>1.0 Gbit/s</td>
</tr>
</tbody>
</table>

Source: Heavy Reading

Another critical hurdle for RFoG is that industry experts estimate that FTTP systems still cost up to 20 percent to 25 percent than HFC systems in dense, urban areas — although the price gap between all-fiber and HFC construction continues to narrow, especially in low-density rural areas where long lines must be run to cover great distances. As long as that price gap remains, MSOs may remain reluctant to install fiber extensions in any great number.

Cable operators also run the great risk of scaring investors with talk of major capital improvements to their plant so soon after they upgraded most of their HFC networks to 750MHz and 860MHz capacity. If they embrace RFoG and related all-fiber technologies such as GPON and EPON, they could stoke investors’ fears that the industry’s capital spending will shoot up again, after years of promised declines. In turn, these fears could further depress cable’s slumping stock prices and dampen the industry’s ability to raise funds needed for maintenance, expansion, and growth, at a time when cable operators can scarcely afford such threats.

Finally, senior cable managers fear that an industry-wide embrace of FTTP delivery systems would make them look, well, quite foolish. Even if their engineering staffs believe that a switch to FTTP makes sense, these executives worry that such a move would prove to the world that big phone companies such as Verizon and AT&T have been right all along about fiber's superiority to coax, further hurting cable’s public image and stock prices. They also worry the move would show that they do indeed have strong concerns about HFC’s bandwidth shortages — a position they have strenuously sought to deny over the past several years.

Report Scope & Structure

Next-Gen Cable Networks: Opportunities for Fiber-Based Technologies is structured as follows:

Section I is an introduction to the report, with complete report key findings.

Section II provides an overview of the cable FTTP market, sizing up the cable FTTP opportunity and breaking down the overall fiber market into several basic segments. This section also defines the different technological approaches, products, and services that the industry is considering.

Section III examines the new, still evolving industry tech standards that will play a big role in shaping cable’s FTTP market prospects, particularly as cable operators seek to compete against telco fiber network builds. It will also compare and contrast RFoG with GPON and EPON.

Section IV delves into the myriad challenges facing cable operators seeking to enter the FTTP market, grouping the hurdles into a number of major categories. In particular, it looks at the hurdles confronting MSOs contemplating whether to roll out the industry’s emerging RFoG standard.
Section V spells out the early FTTP market activity by cable providers. It also explores the FTTP testing and deployment plans of two large cable operators in the U.S. in detail, comparing and contrasting their outlooks and strategies as the RFoG era dawns.

Section VI provides in-depth profiles of 15 FTTP technology, equipment, and system suppliers seeking to serve the cable fiber market, including manufacturers of fiber cabling, optical laser transmitters and receivers, optical network terminals (ONTs), optical line terminals (OLTs), other network interface units (NIUs), optical amplifiers, passive splitters, and passive edge devices.

Next-Gen Cable Networks: Opportunities for Fiber-Based Technologies is essential reading for a wide range of industry participants, including the following:

- **Cable technology suppliers:** How will the development of fiber-based network deployments affect cable MSO technology plans? When is the market for deep-fiber cable likely to develop, and what's the most likely timeframe for rollouts? How will the emergence of RFoG and other fiber technologies and standards affect other technologies that are being proposed to increase bandwidth efficiency for cable MSO networks? Where are the opportunities for market growth? Are your products and marketing messages in line with cable MSO plans and expectations?

- **Cable network operators:** How do the current options for deploying fiber-based technologies compare with one another in terms of cost and effectiveness? How are other cable MSOs approaching the fiber deployment issue? Are their plans and expectations in line with your company's approach? Which technology suppliers are best positioned to meet your company's requirements regarding next-gen cable network deployments?

- **Investors:** Which technologies are emerging as the winning solutions for deep-fiber cable network deployments, and which companies are the leading providers of those solutions? How will the need for new technology and infrastructure affect profitability for the cable MSO sector in the coming months and years?

Next-Gen Cable Networks: Opportunities for Fiber-Based Technologies is published in PDF format.