

# Optimizing Fiber to the Home

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## Ways for Carriers to Enhance Value Across Their Networks

Prepared by



**THE SHPIGLER GROUP**  
STRATEGY MANAGEMENT CONSULTING SERVICES

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- Energy
- Water
- Telecom
- Smart Cities

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- Supporting network design and construction management
- Performing technical research relating to projects or solutions designed
- Conducting management and operational audits
- Implementing go-to-market strategies
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- Developing complete network designs and performing economic analysis of chosen models
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## Executive Summary

For many years, the dream of building full fiber networks that encompass last mile connectivity seemed always to be in far off in the distance. However, we now see that Fiber-to-the-Home (FTTH) networks have moved well beyond the dream stage and are now widely utilized in major segments of the market. In fact, a recent study demonstrates the growth of FTTH networks<sup>1</sup>:

- In 2019, an additional 6.5 million U.S. homes were passed by carriers, bringing the total to 46.5 million homes
- The number of homes passed by FTTH networks represents 37% of the United States
- The number of homes passed by FTTH has grown by 16% in the past two years
- FTTH connectivity is nearly 1,000 times that of 2002 levels
- All-fiber deployments to customer end-points are at record levels, with over 400,000 fiber routes deployed in the last year, driven by deployments to homes, upgrades by cable operators, and the beginning of deployments to small cell sites
- FTTH deployment has now reached over a half of Canadian homes

With the growth of FTTH reaching levels never before seen, it is appropriate to consider how carriers can ensure they get the most out of their networks.

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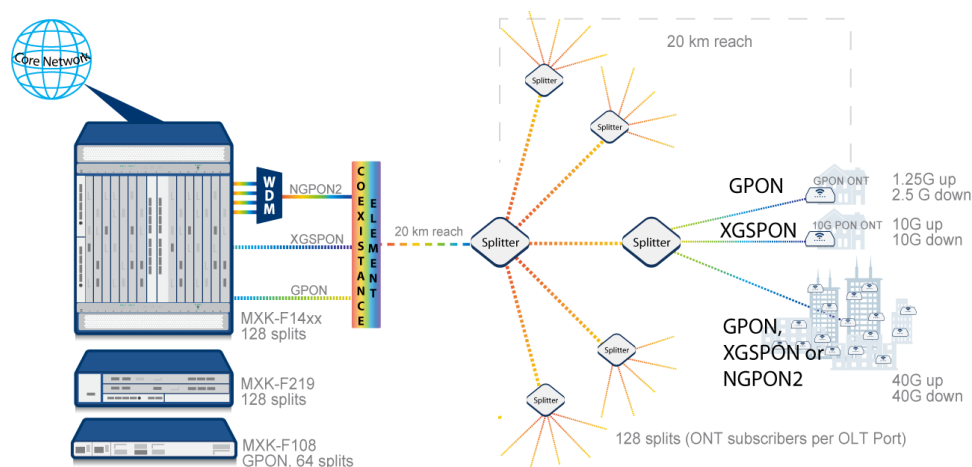
<sup>1</sup> Fiber Broadband Association and RVA, LLC.

## Developments in FTTH

Historically, a number of industry players had tried to compete with fiber with alternative access technologies. Telephone companies pushed DSL as a way to utilize their copper plant; cable companies promoted coax networks. Today, both have moved to fiber-based networks in order to enable carriers to contend with the ever-growing demands of customers for increasing levels of bandwidth, estimated to be expanding at the rate of 50-70% per year.<sup>2</sup> Across the board, carriers that include ILECs, CLECs, MSOs, and a variety of coops and municipal systems have moved their networks to FTTH. Much of the growth stems from a number of converging industry developments:

- 5G network deployment continues to grow, driving the need for additional fiber-based backhaul
- Software-defined networking and network functions virtualization (SDN/NFV) have pushed the need for deeper access networks
- Higher bit rates for passive optical networking systems are now possible, providing new service options
- The drive toward high speed networks, including XGS-PON and NG-PON2 has raised the stakes of networking

In particular, the inherent bandwidth scalability associated with the move from traditional GPON to XGS-PON and NG-PON2 provide for greater network efficiency.



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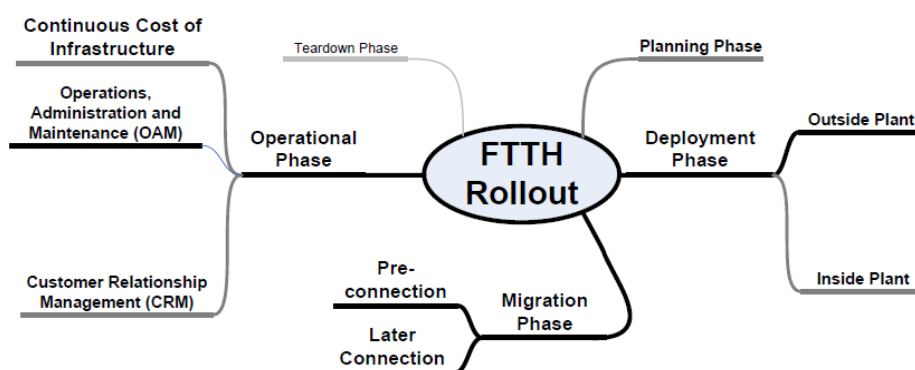
<sup>2</sup> Nielsen Norman Group estimates 50% annual growth; FTTH Conference estimates 70% annual growth.

<sup>3</sup> Multicom.

## Opportunities in Enhancing Value

The existence of fiber to a home has been shown to add value. According to one study, access to fiber may increase a home's value by up to 3.1 percent – equivalent to adding a fireplace, half of a bathroom or a quarter of a swimming pool to the home.<sup>4</sup> In addition, studies have demonstrated that higher per capita GDP in communities exist where gigabit Internet was available.

There is undoubtedly a value proposition for customers of FTTH networks. The question that follows is, is there a value proposition for network operators? Despite the positive developments within the FTTH sector, there remains a need for each individual network operator to identify a way to translate features and functions of technology into dollars and cents – a way to create a viable business case. In doing so, it is critical to incorporate all of the elements of revenue and cost into a comprehensive business model:



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Some of the key elements of the business model include:

- Revenues
  - Broadband services
  - Video services
  - Telephony services
  - Managed services
- Operating expense
  - Content cost
  - Backhaul expense
  - Managed provider expense
  - System maintenance
  - Network operations
  - Tech support

<sup>4</sup> Fiber to the Home (FTTH) Council Americas, 2015.

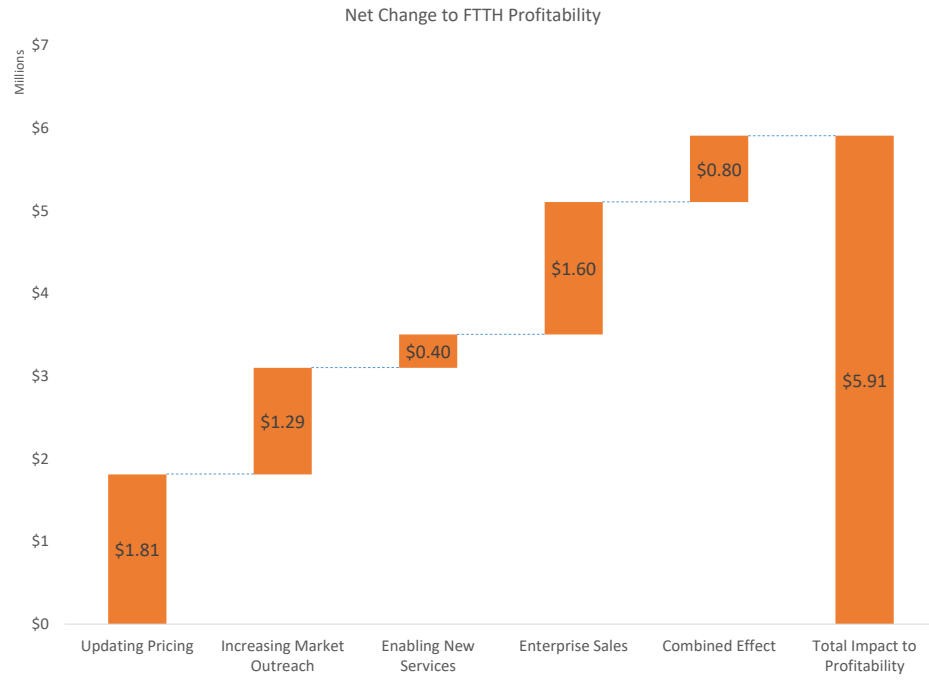
<sup>5</sup> Verbrugge, S., Lanoo, B., Casier, K., Mas Machuca, C. (January 2011). Research Approach toward the Profitability of Future FTTH Business Models. Ghent University.

- Capital expense
  - Fiber
  - Electronics
  - Engineering
  - Installation labor
  - Drops & CPE
  - Outside plant

For any FTTH network developer, these elements must be considered in the optimization of future plans. Consider the case of a rural developer of broadband via FTTH. The service is very attractive to the community being served, competitive offerings are modest and subpar in terms of service quality, and penetration rates are high. And yet, the operation fails to generate a profit. Why? The answer, in large part, stems from this provider's inability to optimize the network operations. Consider the following issues in place:

- Pricing is inconsistent across service tiers and customer classes (residential vs. commercial). There are some levels that are overpriced relative to market levels while other tiers are drastically underpriced. Pricing may be the single best way to align strategy with operational practices; if this is out of line with internal goals, it sends the wrong signals to customers and fails to provide proper buying incentives.
- Market outreach has been lacking. The marketing effort has largely been passive, depending on bill stuffer ads and word of mouth. While these two elements serve as important parts of a robust market outreach effort, they cannot be the only elements. A more focused outreach effort was needed.
- A robust FTTH network has been deployed at great cost, but is only being utilized for broadband data. With no video or voice services, the network was built for the cost of triple-play services, but revenue generation was coming in via single-play.
- The backbone of the network was only being utilized for traditional broadband services. Located in a rural area between major metro markets, there was a demand for connectivity by enterprises with a presence in both markets. Opportunities to sell dark fiber and lit capacity services on a wholesale basis were not being pursued.

The good news for this carrier is that each of these issues is fixable. Pricing for broadband services can be restructured to better reflect market pricing and internal allocation of bandwidth. Increased efforts toward market outreach can be conducted. Telephony and cable TV services may be added, either as a reseller or as a triple-play service provider. Dark fiber and enterprise lit capacity sales can be added to the portfolio. Pursuing new approaches in each of these areas ultimately is forecasted to add nearly \$6 million in annual profit:



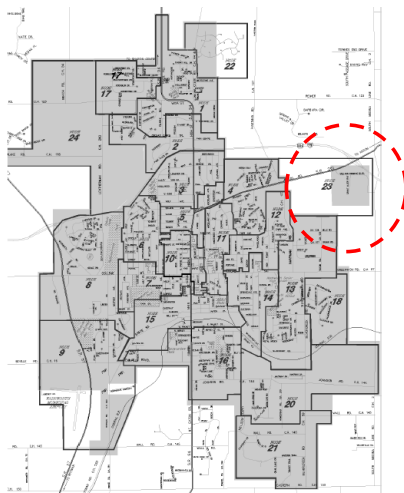


## Tactical and Strategic Issues

In order to achieve any gains in the FTTH sector, network providers must execute on their plans, including each element of the lifecycle of the network – deployment, customer provisioning, and operations. As a FTTH network is designed, it is incumbent upon the network operator to prudently design each element of the network, including backbone facilities, last mile access, and customer premise. Considering viable areas to grow a network will depend on the dual elements of potential cost and revenue:

- Common revenue elements
  - What is the breakdown between residential and commercial customers?
  - What is the nature of competition in the market?
  - Are there gaps in the level of service delivered by competitors?
  - What is the prevailing price level for service within the market?
  - Are there opportunities to deliver added services beyond traditional offerings?
- Common cost elements
  - What is the cost per passing?
  - How many of the potential customers can be reached via lower cost aerial fiber vs. higher cost boring and/or trenching?
  - What arrangements have been made to secure right-of-way?
  - Is there available conduit to reduce the cost of new construction?
  - Are there opportunities to leverage backbone facilities from a local carrier's carrier?

Once these (and other) questions have been addressed, the system operator may consider the best approach to network build. Consider the case of a municipal network operator with a hybrid-fiber-coax network that was considering converting to a full FTTH network. Even within one city, there were vast differences in cost and revenue potential. The city was broken down into 24 nodes, with each one being evaluated for payback of network build. For the most economically viable portion of the city, the cost to deploy FTTH would be recovered within 18 months:



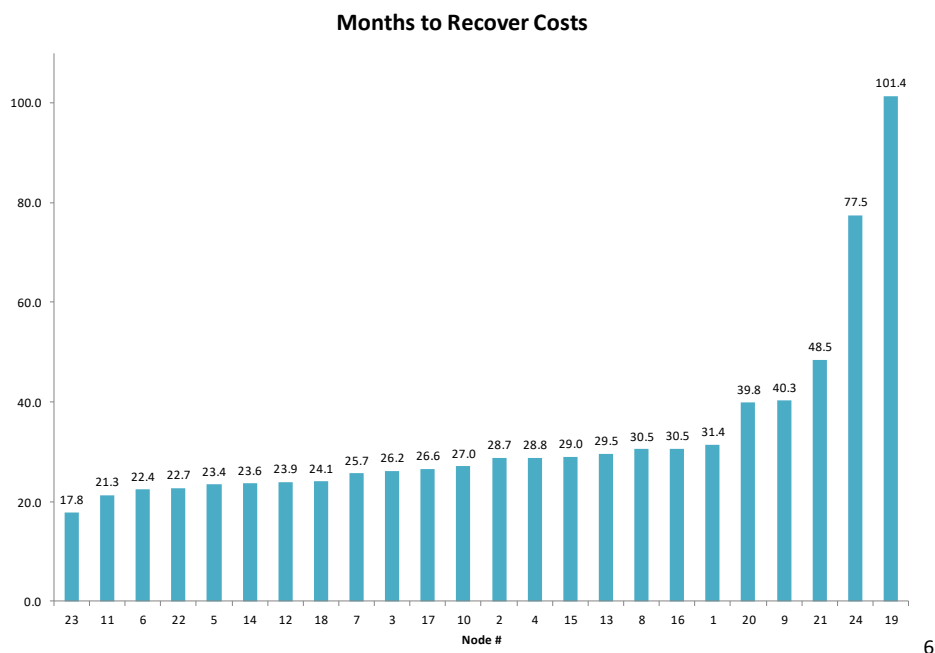
**Node Demographics**

Average Household Income	\$	102,283
Average Housing Value	\$	193,709
Unemployment Rate		1.9%
Population Below Poverty Line		1.1%
Average Age		46.8

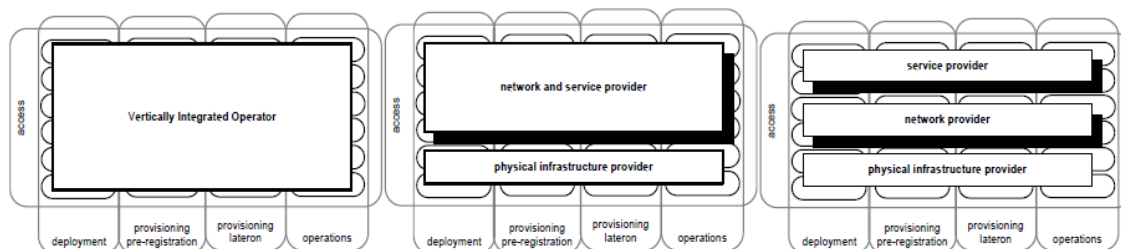
**Node Cost Detail**

Fiber	\$	55,600
Electronics	\$	89,240
Sub Cutover	\$	24,250
Engineering	\$	37,364
Total Cost	\$	206,454

Other portions of the city did not offer as attractive of a payback scenario. While some nodes within the city also offered rapid payback, there were others that yielded much longer payback periods:



Furthermore, the system operator may consider a number of different operating approaches. While much of the industry has focused on traditional retail FTTH offerings, there are other options that may also be considered:



#### Retail Provider

*The original business case of an operator who is active on all layers and will take up most (if not all) roles within the FTTH network*

#### Wholesale Operator

*FTTH physical infrastructure (up to the fiber) has been deployed and operated by one company who opens up this infrastructure for all network and service operators on top*

#### Landlord Strategy

*Deployment of network that is opened up to access by a variety of different service provider*

<sup>6</sup> The Shpigler Group analysis.

<sup>7</sup> Verbrugge, S., Lanoo, B., Casier, K., Mas Machuca, C. (January 2011). Research Approach toward the Profitability of Future FTTH Business Models. Ghent University. The Shpigler Group analysis.

## Summary

The field of fiber-based services is a highly promising one, with great potential for carriers to deliver high-bandwidth services that are certainly in demand. Carriers are increasingly learning that:

- Internet penetration is most sensitive to high bandwidth service delivery, as today's customer base demands higher bandwidth to support increasingly dynamic content
- In addition, the delivery of bandwidth-intensive services like Video-on-Demand calls for high bandwidth delivery that can be better supported by a FTTH network
- Any carrier with an HFC network has an inherent advantage to converting to FTTH as the current customer base can be leveraged
- The telephony business line of many carriers tends to be much smaller and far less sensitive to bandwidth requirements; however, the appeal of bundled services offers some potential "pull through" effect from increased penetration of other services
- The deployment of an advanced network like FTTH may be seen as a possible defense against future competitive market attacks

The opportunity behind FTTH may be strong and should be considered. However, all carriers should take care to ensure that efforts are made to maximize the chance for success. Current FTTH network providers will need to assess their current operations to make sure they are getting all of the potential value out of their networks.