
WHITE PAPER

# The Economics of FTTN vs. FTTP

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There are three predominant schools of thought regarding how to meet the ever-increasing bandwidth needs of consumers and businesses. Fiber-to-the-premise (FTTP) architectures take optical fiber all the way to the home or office and offer the most future-proof solution in terms of pure bandwidth capabilities. But in some cases, FTTP may not be the optimal solution in terms of overall cost and the value of existing infrastructure.

Fiber-to-the-node (FTTN) solutions offer operating companies an alternative solution to providing the necessary bandwidth required by today's voice, data, and video services while taking advantage of existing infrastructure. In many cases, FTTN can actually complement FTTP deployments. Finally, there is a fiber-to-the-curb (FTTC) solution that boasts 80 Mbits/sec to the home. Certainly the question surrounding this architecture is whether 80 Mbits/sec will be adequate and for how long.

At the end of the day, the key consideration in choosing which architecture will work best for any provider boils down to bandwidth – now and in the future. This paper addresses several key considerations in helping service providers decide if FTTN makes sense for all or part of their network.

For example, if a high percentage of a provider's network is already designed using digital loop carrier (DLC) remote terminals, it may make more sense to deploy FTTN from an economic standpoint. Traditional telephone service providers seeking to offer additional broadband services over an existing copper-based voice network may find FTTN more advantageous and less costly than building a new network that takes fiber all the way to the customer.

## The business case

Every operating company must consider its own business case in relation to the capabilities of the existing network. Since an FTTN strategy seeks to leverage existing facilities as much as possible, it will ultimately come down to what each individual carrier sees as the real demand for customer bandwidth – and where that demand will be five to ten years from now.

Additionally, whether you choose FTTN or FTTC strategy as an early alternative to FTTP for rapidly providing broadband services to customers, it's important to ensure network longevity. Any solution should include an easy migration path to FTTP if future bandwidth demands exhaust the bandwidth capabilities of the current infrastructure.

Installation cost is always the primary concern in making a business case for the network architecture. The FTTN architecture will be less expensive to install than FTTP because it re-uses legacy infrastructure for the final 3000 to 5000 feet. But, as stated earlier, installation costs alone should not necessarily dictate choosing FTTN over FTTP, particularly if the FTTN overbuild network will only provide a five-year life in terms of bandwidth demand.

Service providers may find themselves in the position of deciding which course of action is more prudent in the long run – reaching customers ahead of competitors with an FTTN overbuild that may require upgrades in a few years, or spending more money for a new FTTP network that will provide all the necessary bandwidth for years to come. In other words, FTTN has the potential for faster return on investment, yet it may require a complete overhaul at some point – possibly sooner than later, depending on consumer bandwidth demand.

Another consideration in choosing FTTN vs. FTTP depends on how much of the network is rural and how much is metro. An operating company can leverage FTTN in areas with limited customers and lower entry costs in rural areas, making broadband services available to customers more quickly.

## Bandwidth – how much is enough?

The biggest unknown in the broadband services equation lies in how much bandwidth will be enough to support video into the next decade. Will 50 Mbits/sec be enough? 80 Mbits/sec? 100 Mbits/sec? For the moment, MPEG4-encoded high-definition television (HDTV) requires about 9-10 Mbits/sec, enabling consumers to receive four HDTV stations from a 50-Mbits/sec very high speed digital subscriber line (VDSL) service. Without knowing content requirements of the future and how much bandwidth will be required to deliver new applications and services, a limited service of 50 Mbits/sec could easily come up short in just a few years.

Pair bonding can be used to produce higher bandwidth capability from FTTN buildouts that use copper-based "last mile" architectures. This technique enables the electronic bonding, inside the DSLAM, of two output DSLAM ports for providing twice the bandwidth to a single customer. This requires the availability of two continuous copper pairs to the customer premise. Also, the service delivery platform, such as the cross box or interface, must support the pair bonding.

There are other issues that must be considered to successfully implement this technique. For example, this technique requires using more of the DSLAM to serve fewer customers. With that in mind, a 192-circuit DSLAM may only be capable of handling 96 customers if multiple HDTV services are demanded at each residence. Also, if the distribution area requires resectionalization as reachable distances decrease (for example, deploying VDSL will require new cabinets for reaching customers outside a 3000-foot perimeter), the deployment of additional adjunct DSLAMS may be necessary. Furthermore, if existing cross boxes do not have the necessary binding posts to support them, this initiative can quickly become very complicated and expensive.

Another wildcard in making a decision between FTTN and FTTP is in knowing what changes will occur in active components over the next few years. As these components improve, the bandwidth guessing game gets more and more complicated. Where does this leave the network architect?

Business cases must be determined by customer needs today and the best determination of what they will need in the future. An increasing demand for additional bandwidth for cutting-edge broadband services seems like the one thing everyone agrees on. But will the network upgrades to provide that additional bandwidth be a simple matter of swapping out a card at each end of the network? Will it require a higher quality fiber plant to support high-end services? Will factors like better forward error correction techniques enable longer use of existing infrastructure?

## The long and short of FTTN

FTTN offers several advantages over the short term to operating companies that want to be first in reaching customers with today's broadband services. Because it re-uses existing infrastructure to the customer, turn-up can be achieved faster to meet immediate consumer demand. For the same reason, FTTN is a less expensive overbuild and, therefore, will provide a faster return on investment, particularly in many brownfield situations.

However, there are still many unanswered questions about bandwidth demand over the long term that cannot be ignored. FTTN architectures will continue to have bandwidth limits that may be exceeded – perhaps in five years or less. On the other hand, FTTP is certainly a more future-proof network design. In greenfield models, there is no question it is the architecture of choice. It cannot be overstated that any decision to deploy an FTTN overbuild network should include a solution that provides a relatively easy migration to FTTP.

In the end, the final decision for FTTN boils down to current architecture and several considerations that each operating company must resolve. Is it more advantageous to opt for an initial cost savings model with faster return on investment? Can we depend on technology improvements that will allow us to avoid the need to upgrade in the near future? Or is it more important, despite additional costs, to upgrade directly to FTTP to ensure future-proofing the network against any future bandwidth demand?

There is no "one size fits all" solution when transforming the traditional switched approach network into a high-speed, high-capacity broadband network. These are challenging days for any service provider – but making decisions based on today's information coupled with a concern for future events will help network architects develop a solid business plan that meets each unique situation.

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