Growing Bandwidth Demand Offers Profit Potential.

The demand for broadband connectivity and services to handle bandwidth-dependent applications is exploding across many global markets. Services such as carrier-class telephony, high-speed Internet access, voice-over-internet (VoIP), broadcast TV, HDTV, real-time duplex video, online gaming and video-on-demand (VoD) represent substantial new revenue opportunities for communications service providers and equipment manufacturers (OEMs). Profitability and long-term competitive advantage in providing these broadband services depend on active network development, careful technology choices and effective resource management. A window of opportunity has opened, and now is the time for action.
THE BEAUTY OF FIBER TO THE PREMISES.

Service providers are finding that Fiber to the Premises (FTTP) offers the ideal solution to the challenges of delivering high bandwidth services to subscribers economically and dependably. The cost of optical technology is declining, and FTTP provides the ability to converge voice, video and data signals in a single high-speed pathway. FTTP offers reduced network costs compared to copper, handles all current demands, delivers essentially unlimited bandwidth and full compliance with coming services. Freedom from EMI, RFI, cross-talk and most moisture problems makes FTTP easier and less costly to maintain than copper-based networks. Elimination of outside plant electronic components increases the reliability of networks and reduces their complexity and life-cycle costs.
3M OFFERS
UNMATCHED VALUE FOR
FTTP IMPLEMENTATION.

3M supports FTTP implementation
with unmatched history and
innovation in fiber optics
technology in the physical-media
layer—to leverage existing
infrastructure or install a
completely new network.

3M has decades of experience
in the telecommunications
access network, a full and
growing product portfolio and
industry-leading research and
development resources.

With 3M as an expert partner,
service providers and equipment
manufacturers can assemble
and implement effective,
future-proofed FTTP solutions
that meet customer demands
and protect the customer base.

3M IMPLEMENTS THE FTTP PHYSICAL-MEDIA LAYER
WITH PROVEN RESOURCES.

The Open Systems Interconnection (OSI) Model defines
seven layers that describe the functionality of a network,
from physical connections to the user applications,
and includes all signal details and transfer protocols.

THE PHYSICAL-MEDIA LAYER.
• The physical path in which the information
  will travel across
• Each layer affects the overall service quality;
  but none more critical than the media layer
• All communication processes depend on the
  media layer
One of two basic approaches is commonly used to deliver FTTP services from central office/headend to customer premises: the Passive Optical Network (PON)—where fiber bandwidth is shared among multiple users by means of splitters; and Point-to-Point (P2P) Switched Ethernet—where equipment at a mid-point in the network provides dedicated service to each subscriber. These architectures offer benefits and advantages that suit each of them to particular operating environments.

**Passive Optical Network (PON)**
- Requires passive optical couplers/splitters
- Supports BPON (ITU-T G.983), EPON, FSAN (Full Service Access Network) and GPON (ITU-T G.984)
- Eliminates powering and maintenance issues associated with electronics in the outside plant

**Point-to-Point (P2P) Switched Ethernet**
- Switching accomplished at remote Ethernet switch site
- Does not require passive optical couplers/splitters
- Supports IEEE 802.3ah EFM (Ethernet in the First Mile)
FTTP OSP NETWORK ARCHITECTURE ALTERNATIVES.

Within the PON architecture, one of three OSP architectures can be selected:

- Point-to-point
- Centralized splitting
- Distributed splitting

Each has unique merits. In all cases, PON equipment communicates with the PSTN and is connected to ATM or Ethernet interfaces, with switching accomplished in the central office. Video services are accessed by means of a CATV headend or satellite feed. Voice, video and data signals are combined on fibers by means of wave division multiplexing and directed to subscribers through passive optical splitters.

A fourth FTTP architecture, switched Ethernet, relies on Ethernet switching equipment located at a point in the outside plant beyond the central office, using Ethernet protocol optimized for internet traffic. This approach may offer reduced overhead compared to ATM, conserving bandwidth and optimizing data capacity.
**Switched Ethernet Architecture - P2P**

- All switching and splitting done in the central office/headend
- Fiber Distribution Hub (FDH) serves as a consolidation point for smaller fiber count cables into larger fiber count cables
- Dedicated fiber from central office to customer premises
- All administration work and maintenance performed at the central office/headend
- Very high bandwidth capacity and minimal maintenance

**Passive Optical Network Architecture - P2P**

- All switching done in the central office/headend
- Couplers/splitters located at a centralized point: FDH
- Distribution fibers are spliced or connected to drop fibers at fiber terminals (for 4 to 8 households)
- Single maintenance and administration point

**Passive Optical Network Architecture - Centralized Splitting**

- All switching done in the central office/headend
- Splitter dependent; FDH houses 1x8 or 1x4 couplers/splitters
- Fiber terminal houses a 1x8 or 1x4 coupler/splitter
- Distribution fibers spliced or connected to drop fibers, drop fibers dedicated from fiber terminal to customer premises
- Requires maintenance and administration work at both FDH and fiber terminal locations

**Passive Optical Network Architecture - Distributed Splitting**

- All switching done in the central office/headend
- Splitter dependent; FDH houses 1x8 or 1x4 couplers/splitters
- Fiber terminal houses a 1x8 or 1x4 coupler/splitter
- Distribution fibers spliced or connected to drop fibers, drop fibers dedicated from fiber terminal to customer premises
- Requires maintenance and administration work at both FDH and fiber terminal locations

**Switched Ethernet Architecture - P2P**

- Switching and fiber interconnection done in the Ethernet remote terminal cabinet
- No couplers/splitters required
- Distribution fibers are spliced or connected to the drop fibers in the fiber terminals
- Leverages existing backbone fiber
- Active electronics positioned at network mid-point
3M MASTERS THE PHYSICAL-MEDIA LAYER.

3M provides a full universe of physical-media layer capabilities for FTTP implementation in the central office, outside plant and customer premises. These products include interconnection, fiber management and facilities protection to accommodate every aspect of the physical-media layer.

With more than 30 years experience in fiber optics, international resources, and unmatched product line depth, 3M is uniquely equipped to provide a turnkey optical pipeline and help make FTTP a reality.
3M PHYSICAL-MEDIA LAYER CAPABILITIES.

FIBER SPlicing
Full range of discrete and multi-fiber splices and tools for use throughout the FTTP network.

FIBER INTERCONNECT
A full range of 3M epoxy, epoxyless and hot melt connectors in FC, SC and ST configurations follows tight design and manufacturing tolerances for a wide range of uses. 3M™ GGP Cable Assemblies use glass/glass/polymer fiber designed to be more flexible and durable than standard fibers.

FIBER MANAGEMENT
Cross-connect and interconnect fiber cable management systems (ODF, FDUs) and fiber organization trays for central office/headend, outside plant, customer premises or OEM applications.

FACILITIES PROTECTION
Sealed and free-breathing aerial, buried and underground fiber optic splice closures and terminals; indoor and outdoor cabinets.

LOCATING AND MARKING
Dynatel™ locating and marking products offer solutions for fault finding, locating and permanent marking and mapping of buried facilities and points of special interest.
3M products for the FTTP physical-media layer are proven and optimized for signal integrity, throughput, reliability and ease of installation and maintenance. For example, 3M fiber optic closures are craft-friendly and can be installed quickly.
and accurately with minimal training. 3M products are configurable—designed to make moves and changes simple for excellent network scalability in keeping with evolving market needs. Value for today, value for tomorrow!
Whether you are a service provider or an FTTP equipment supplier, get a head start on optimized FTTP network development with product and development resources from 3M. You’ll enjoy the benefits of the broadest, most functional and reliable line of products for the physical-media layer, supported with long experience, global distribution, training support and responsive technical service.

Contact your local 3M representative for more information, or call the global 3M FTTP department at: 512/984 4533.

www.3MTelecommunications.com

3M and Dynatel are trademarks of 3M Company.

Important Notice
All statements, technical information, and recommendations related to 3M’s products are based on information believed to be reliable, but the accuracy or completeness is not guaranteed. Before using this product, you must evaluate it and determine if it is suitable for your intended application. You assume all risks and liability associated with such use. Any statements related to the product which are not contained in 3M’s current publications, or any contrary statements contained on your purchase order shall have no force or effect unless expressly agreed upon, in writing, by an authorized officer of 3M.

Warranty; Limited Remedy; Limited Liability.
This product will be free from defects in material and manufacture for a period of 12 months from the date of purchase. 3M MAKES NO OTHER WARRANTIES INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. If this product is defective within the warranty period stated above, your exclusive remedy shall be, at 3M’s option, to replace or repair the 3M product or refund the purchase price of the 3M product. Except where prohibited by law, 3M will not be liable for any loss or damage arising from this 3M product, whether direct, indirect, special, incidental or consequential regardless of the legal theory asserted.