CORNING

FTTH Glossary

The following terms used within this guide are defined within the context of the optical fiber industry.

Adapter
A mechanical media termination device designed to align and join fiber optic connectors often referred to as coupling, bulkhead, or interconnect sleeve.

Angled Polish Connector (APC)
Connectors which have their end-face mating surface polished at an 8-degree angle to the fiber axis. Minimizes reflections; required in RF video applications.

Architecture
Describes how network elements logically relate to each other.

Armor
Additional protective element beneath outer jacket to provide protection against severe outdoor environments. Usually made of plastic-coated steel, it may be corrugated for flexibility.

Attenuation
The decrease in a signal's magnitude of power during transmission between points. A term used for expressing the total loss of an optical system, normally measured in decibels (dB) at a specific wavelength.

Attenuation Coefficient
The rate of optical power loss with respect to distance along the fiber, usually measured in decibels per kilometer (dB/km) at a specific wavelength. The lower the number, the better the fiber's attenuation. Multimode wavelengths are 850 and 1300 nanometers (nm); single-mode wavelengths are 1310 and 1550 nm. *Note: When specifying the attenuation, it is important to note whether the value is average or nominal.*

Attenuation Test Set
Test set having a calibrated light source and meter; used to measure the power loss in an optical link or network.

Bend-Improved Optical Fiber
Class of single-mode optical fibers compatible with ITU G.657.A recommendations and having bending performance of 0.75 dB per 360-degree turn at 1550 nm with a 10 mm bend radius. These fibers are required to be backward compatible with standard single-mode.

Bend-Insensitive Optical Fiber
Class of single-mode optical fibers with bending performance of .1 dB per 360-degree turn at 1550 nm with a 5 mm bend radius.

Bend-Optimized Optical Fiber
Any single-mode fiber that has been engineered to provide low loss at 1550 nm under tight bending conditions, when compared to standard single-mode fibers.

Bend-Tolerant Optical Fiber
Class of single-mode optical fibers compatible with ITU G.657.B recommendations and having bending performance of 0.5 dB per 360-degree turn at 1550 nm with a 7.5 mm bend radius. These fibers are not required to be backward compatible with standard single-mode fibers.

Broadband Passive Optical Network (BPON)
System described in ITU G.983 standard. Uses optical splitters to create a one-to-many relation between the CO/HE and the subscribers. Capable of delivering voice and data; usually combined with an RF overlay for video. Usually no active (powered) components between CO/HE and subscriber.

Brownfield
Existing neighborhoods and/or MDUs already served by at least one provider.

Buffer Tube
Extruded cylindrical tube covering optical fiber(s) used for protection and isolation.

Building Homerun
MDU topology in which each subscriber's fiber cable extends all the way to a common point for the entire building (usually a terminal in the basement or mounted on an outside wall).

Business
Refers to large (corporate), medium, and small (small business/small office/home office) business users. Businesses may occupy a multitenanted unit (MTU), such as an office block/tower, or a single-tenanted unit (STU), such as a stand-alone office building or warehouse.

Cable Assembly
Optical fiber cable that has connectors installed on one or both ends. General use of these cable assemblies includes the interconnection of optical fiber cable systems and opto-electronic equipment. If connectors are attached to only one end of a cable, it is known as a pigtail. If connectors are attached to both ends, it is known as a jumper or patch cord.

Cable Bend Radius
The minimum recommended bending radius during installation or after installation so that cable damage will not occur. Cable bend radius during installation infers that the cable is experiencing a tensile load. Free bend infers a smaller allowable bend radius since it is at a condition of minimal load.

Central Member
The center component of a cable. It serves as an anti-buckling element to resist temperature-induced stresses and sometimes serves as a strength element. The central member material is normally dielectric, glass-reinforced plastic.

Central Office (CO)
The telephone company's central location containing active (powered) equipment, from which services are provided. May contain telephone switching equipment and/or optical line terminals and RF video for BPON and GPON systems.

Cladding
The material surrounding the core of an optical waveguide. The cladding must have a lower index of refraction to keep the light reflecting through the core.

Corning® ClearCurve® Optical Fiber
Bend-insensitive fiber developed by Corning Incorporated. Special technology in the fiber traps light, producing performance of 0.1 dB per 360-degree turn at 1550 nm with a 5 mm bend radius, while remaining backward compatible with standard single-mode fibers. This fiber represents the state-of-the art for MDU deployments.

Coating
A material put on a fiber during the drawing process to protect it from the environment and handling.

Compact Drop Cable
These cables leverage ClearCurve optical fiber to minimize and eliminate loss due to bending, but have a smaller 2.9 mm diameter to make them more aesthetically pleasing, when required, and to enable a bend-insensitive solution. For those who prefer to use microduct, compact drop cable is the ideal ClearCurve solution.

Conduit
Pipe or tubing through which cables can be pulled or housed.

Connecting Hardware
A device used to terminate an optical fiber cable with connectors and adapters that provides an administration point for cross-connecting between cabling segments or interconnecting to electronic equipment.

Connector
A mechanical device used to align and join two fibers together to provide a means for attaching to and decoupling from a transmitter, receiver, or another fiber (patch panel). Commonly used connectors include the LC, SC, and ST® compatible.

Connector Panel
A patch panel designed for use with fiber optic hardware; it contains either 6, 8, or 12 connector adapters pre-installed for use with field-installable or preconnectorized termination methods.

Core
The central region of an optical fiber through which light propagates from the transmitter.

Decibel (dB)
Unit for measuring the relative strength of light signals. Normally expressed in dB, it is equal to one-tenth the common logarithm of the ratio of the two levels dB = 10 log Pout in. Expressed in dBm when a power level is compared to a milliwatt. *Note: 1 mW (electrical) = 0 dBm (optical), dBm = 10 log mW.*

Dielectric
Nonmetallic and, therefore, nonconductive. Glass fibers are considered dielectric. A dielectric cable contains no metallic components.

Digital
A data format that uses differing physical levels to transmit information corresponding to zeros and ones. A discrete or discontinuous signal.

DS
Digital signal

DM
Direct modulated

Dispersion
The cause of bandwidth limitations in a fiber. Dispersion causes a broadening of input pulses along the length of the fiber. Three major types are: (1) modal dispersion caused by differential optical path lengths in a multimode fiber; (2) chromatic dispersion caused by a differential delay of various wavelengths of light in a waveguide material; and (3) waveguide dispersion caused by light traveling in both the core and cladding materials in single-mode fibers.

EIA
Electronic Industry Association

Equipment Room (ER)
A centralized space for telecommunications equipment that serves the occupants of a building. An equipment room is considered distinct from a telecommunications room because of the nature or complexity of the equipment.

Erbium-Doped Fiber Amplifier (EDFA)
Fiber amplifier in which the signal to be boosted travels through a special fiber containing, as an additive, the element erbium. Laser light pumped into this special section of fiber excites the valence electrons in the erbium. When the transmitted signal passes through the fiber, the excited electrons give up their extra energy in sync with the transmitted signal, adding to its strength. The output is identical to the input, but now has a much higher power level. EDFAs amplify the optical signal without the need to convert it to an electrical signal and back to optical.

EP2P
Ethernet over P2P

EPON
Ethernet Passive Optical Network

Exclusive Access
Privately controlled property such as an MDU where a single service provider is permitted access to the subscribers.

EM
Externally modulated

FCC
Federal Communications Commission

Fiber
An optical waveguide consisting of a core and cladding that is capable of carrying information in the form of light signals.

Fiber Bend Radius
Radius a fiber can bend before it risks breakage or an increase in attenuation.

Fiber Optics
Light transmission through optical fibers for communication or signaling.

Fiber to the x (FTTx)
Refers to a host of acronyms based on taking fiber to the home (FTTH), node (FTTN), curb (FTTC), etc.

Future-Ready
Design decision process in which elements that may not be required today, but which are very likely to be needed in the future, are either built into the design up front or are planned as simple upgrades.

GbE
Gigabit Ethernet

Gigabit Passive Optical Network (GPON)
Similar to BPON, but based on higher gigabit speeds. Like BPON, these systems may use an RF overlay for video, but because of their increased bandwidth per subscriber, are also being used for IPTV deployment, in which all services (voice, video, and data) are placed on the GPON and the RF video overlay is not required.

Gbps
Gigabits per second; 1 billion bits transmitted per second.

Greenfield
New construction of MDUs and neighborhoods. In this case, no service provider and no broadband network communications exists. Fiber cable system can be planned and placed efficiently while walls, ceilings, basements, and attics are openly accessible to create pathways.

Headend (HE)
Cable television term analogous to the telephone company's central office.

Homerun
Installation in which fiber cables are pulled from each outlet or device back to one common location, such as the ONT in a living unit or from each living unit to a common location for the MDU building.

Homes Connected
Number of residential and business premises to which a service provider is supplying FTTH services under a commercial contract.

Homes Passed
Number of residential and business premises to which a service provider has access to deliver FTTH services within the standard service activation period (for example 30 days) should the owners/occupiers sign a contract for an access service.

Horizontal Cross-Connect (HC)
A cross-connect of horizontal cabling to other cabling, e.g., horizontal, backbone, equipment.

Index-Matching Fluid
A fluid with an index of refraction close to that of glass that reduces Fresnel reflections caused by refractive-index differences.

Index of Refraction
The ratio of light velocity in a vacuum to its velocity in a given transmission medium.

Inside Wiring (IW)
The communications wiring inside a home or living unit. Includes phone, data, and CATV (coax) wiring.

IEEE
Institute of Electrical and Electronics Engineers

Intermediate Cross-Connect
A secondary cross-connect in the backbone cabling used to mechanically terminate and administer backbone cabling between the main cross-connect and horizontal cross-connect.

Intermediate Terminal
Topology in which multifiber cables are run (usually in a riser) to serve terminals (MDU terminals) placed on multiple floors. This approach is used in larger MDUs to consolidate individual drops into larger cables that can be easily connected in a central point in the building.

International Telecommunications Union (ITU)
Industry organization that makes recommendations for product specifications. ITU G.652 defines standard single-mode fibers, and ITU G.657 defines bend-improved and bend-tolerant fibers.

Internet
Refers to use of the Public Internet for exchanging email, Web-browsing, video gaming, etc.

Jumper
Optical fiber cable that has connectors installed on both ends.

Laser
Term originated as an acronym for “light amplification by stimulated emission of radiation.” An opto-electronic device that produces coherent light with a narrow range of wavelengths, typically centered around 850, 1310, or 1550 nm. Lasers with wavelengths centered around 850 nm are commonly referred to as VCSEL.

Link
A telecommunications circuit between any two tele-communications devices, excluding the equipment connectors.

Local Convergence Point (LCP)
The point in the network, usually a cabinet or closure, that marks the breakout from the feeder cable (from the CO/HE) to the distribution cables that go through a neighborhood or MDU. The LCP usually contains optical splitters.

Main Cross-Connect (MC)
The centralized portion of the backbone cabling used to mech-anically terminate and administer the backbone cabling, providing connectivity between equipment rooms, entrance facilities, horizontal cross-connects, and intermediate cross-connects.

MDU Terminal
The MDU terminal serves as an interconnection between a distribution cable (with many fibers) and individual drops going to subscriber living units. This is usually a small cabinet or enclosure; in some cases, it may contain splitters. It can be located inside or on the exterior of an MDU.

Mechanical Splicing
Joining two fibers together by permanent or temporary mechanical means (vs. fusion splicing or connectors) to enable a continuous signal. The CamSplice™ mechanical splice is a brand of this type of product.

Medium Density Polyethylene (MDPE)
A type of plastic material used to make cable jacketing.

Microduct
Small duct, usually < 1/2 in (13 mm), installed in MDUs to protect single-fiber drop cables. It also makes it possible to easily remove/replace drops in the event of damage. Microduct typically has a total installed cost greater than placement of rugged drop cables directly into building structures.

Migration
The process of moving from one cabling system or technology to another, such as migrating from a copper to optical network.

Mode
A term used to describe an independent light path through a fiber, as in multimode or single-mode.

Mode Field Diameter (MFD)
The functional parameter for defining the diameter of the light-guiding region (i.e., the core and cladding) of a single-mode fiber.

Modulation
Coding of information onto the carrier frequency. This includes amplitude, frequency, or phase modulation techniques.

Multidwelling Unit (MDU)
A building structure that has two or more residential dwelling units occupied by separate entities. The living units may be owned individually or the entire building may be owned as one property with units rented to tenants.

Multiplex
Combining two or more signals into a single transmission path that can be individually recovered at the receiving end.

Nanometer (nm)
A unit of measurement equal to one billionth of a meter; 10^{-9} meter. Typically used to express the wavelength of light, e.g., 1310 nm.

National Electric Code® (NEC®)
Defines building flammability requirements for indoor cables. *Note: Local codes take precedence but may refer to or require compliance to the NEC.*

NEMA
National Electrical Manufacturers Association

NIST
National Institute of Standards and Technology

Numerical Aperture (NA)
The number that expresses the light-gathering capability of a fiber. Related to acceptance angle.

Open Access (Duct)
Refers to the situation where multiple retail or wholesale service providers may share the use of a duct network covering a substantial region by drawing or blowing their fiber cables through the shared ducts and compete to offer their services.

Open Access (Fiber)
Refers to the situation where multiple retail or wholesale service providers may use the FTTH network by connecting at a physical layer (“dark” fiber) interface and compete to offer their services.

Open Access (Packet)
Refers to the situation where multiple retail service providers may use the FTTH network by connecting at a packet layer interface and compete to offer their services to end users.

Open Access (Wavelength)
Refers to the situation where multiple retail or wholesale service providers may use the FTTH network by connecting at a wavelength layer interface and compete to offer their services.

Optical Line Terminal (OLT)
For BPON and GPON systems, this is the electronics located in the CO/HE and which control the ONTs served at each subscriber's location. Typically, OLTs service 16, 32, or 64 ONTs.

Optical Network Terminal (ONT)
For BPON and GPON systems, this is the electronics located at the subscriber's premises. The ONT converts the optical signal to copper and coax-based signals for connection to phones, computers, and televisions in the residence.

Optical Return Loss (ORL)
For an optical network, as a system, ORL is a measure of the total reflected signal relative to the signal being transmitted into the network (the incident signal). ORL includes all components, end to end, such as fiber, connectors, splices, etc. in the link. ORL is expressed as a positive value, and the larger the value, the better the performance. For example, 60 dB means the total signal reflected back is 60 dB below the incident being transmitted into the network.

OS
Optical source

OSE
Optical splice enclosure

OTS
Optical test set

Optical Time Domain Reflectometer (OTDR)
A test set that sends out light and senses light scattered and reflected back to the set. It is capable of showing the distance to faults and other "events" in an optical cable, as well as the attenuation (power loss) associated with each event.

Outside Plant (OSP)
Cabling outside of buildings, including aerial and buried installations.

Patch Cord
A fiber optic interconnect or cross-connect jumper.

Patch Panel
A length of optical cable with a plug on one or both ends.

Pathway
The path planned and used for cable placement. It includes ducts, raceway, aerial strand, directly buried, etc.

PC
Physical contact of two terminated fiber strands.

Pigtail
Optical fiber cable that has a connector installed on one end.

Point-to-Multipoint (P2MP)
Cable plant provides branching optical paths from the telecommunications operators switching equipment to more than one contiguous location such that portions of the optical paths are shared by traffic to and from multiple locations. In generic terms, this is a tree-and-branch topology.

Point-to-Point (P2P)
Cable plant provides optical paths from the telecommunications operator's switching equipment to a single contiguous location such that the optical paths are dedicated to traffic to and from this single location. In generic terms, this is a star topology.

PE
Polyethylene, typically used for outdoor cable jacket.

Preconnectorized
Cables having optical connectors pre-installed and tested at a factory before being shipped to the field for installation as an assembly.

Prestubbed
Hardware (such as an LCP cabinet) that has a factory-connectorized or factory-prepared cable (stub) built into it. In the field, the hardware is placed and the stub cable is spliced into the system. The work of connectorizing each fiber or preparing the cable inside the cabinet has already been complete, saving field time and labor.

Receiver
An electronic package that converts optical signals to electrical signals.

Reflectance
Reflectance is the ratio of power reflected to the incident power at a connector junction or other component or device, usually measured in decibels or dB. Reflectance is stated as a negative value, e.g., -30 dB. A connector that has a better reflectance performance would be a -40 dB connector or a value less than -30 dB. The terms return loss, back reflection, and reflectivity are also used synonymously in the industry to describe device reflections, but stated as positive values.

Residential
Refers to private users in their homes. Residential users may live in either a multidwelling unit (MDU), such as an apartment/condominium, or in a single-family dwelling unit (SFU), such as a stand-alone house/villa/landed property.

RF Video Overlay
Use of an RF video signal, usually at a separate wavelength from the data/voice transmission to provide television/video services. The transmission technique is similar to that used for cable television.

Riser
Pathways in a building that go from floor to floor. Cables and nonmetallic duct must be “riser rated” to control flame propagation building in this space. The exception, depending on local codes, is for cables placed in sealed metallic duct/conduits.

Rugged Drop Cable
MDU drop cables designed to provide inherent bend-radius control (self-limiting), ensuring low optical loss and robust mechanical performance when installed, bent and stapled like copper and coax cabling. Rugged drop cables typically use bend-insensitive fibers, such as Corning® ClearCurve® optical fiber, to minimize or eliminate loss due to bending.

Scattering
A property of glass that causes light to deflect from the fiber and contributes to optical attenuation.

Self-Contained Distribution
An MDU topology element in which splitters are placed in the same building as the subscribers they serve. Therefore the entire distribution portion of the network is contained within the building.

Self-Limiting Cable Sheath
Cable sheath designed to limit bending of the enclosed optical fiber(s) to ensure both low attenuation and mechanical reliability, such as ClearCurve rugged drop cable.

Shared Distribution
An MDU topology element in which splitters are external to the building and the subscribers they serve. Usually, two or more buildings share a common splitter location (LCP).

Single-Mode (SM) Fiber
An optical waveguide (or fiber) in which the signal travels in one mode. The fiber has a small core diameter, typically 8.3 to 9.5 µm.

Splice Closure
A container used to organize and protect splice trays and splices. Typically used in outside plant environments.

SCF
Splice closure family

Splice Tray
A container used to secure, organize, and protect spliced fibers.

Splicing
The permanent joining of a bare fiber end to another fiber, either one pair at a time or in a mass.

Splitter (Optical)
An optical device which splits the optical power of one signal into multiple outputs, each containing the same signal, but at a lower power level. For BPON and GPON systems, splits of 1x16, 1x32, and 1x64 are used.

SRP
Standard recommended procedure

Take Rate
Calculated by the simple division of "home/premises connected" by "home/premises passed" and is expressed as a percentage.

Telecommunications Enclosure (TE)
Enclosed space or housing for telecommunications intended to contain cable terminations, cross-connect cabling, and electronic equipment located in the horizontal pathway and spaces that link to the telecommunications outlet.

TIA
Telecommunications Industry Association

Telecommunications Room (TR)
An enclosed space for housing telecommunications equipment, cable terminations, and cross-connects. The room is recognized between the backbone and horizontal cabling.

Tight-Buffered Cable
Type of cable construction whereby each glass fiber is tightly buffered by a protective thermoplastic coating to a diameter of 900 micrometers/micron (µm). Increased buffering provides ease of handling and connectorization.

TKT
Tool kit

Topology
The physical layout of the network that describes how the system components are actually placed and connected to each other. While the architecture is the logical view, the topology is a physical view of the network.

Transmitter (Tx)
An electronic package used to convert an electrical information-carrying signal to a corresponding optical signal for transmission by fiber. The transmitter is usually a light-emitting diode (LED) or laser diode.

Triple-Play Services
The offering, by carriers, of voice, video, and data services over one medium (one network). Usually this reduces network complexity and cost for the carrier and offers preferred pricing for subscribers.

Ultra Physical Contact (UPC) Connector
An optical connector whose end face has been radiused and polished to minimize reflections. Unlike the angled polish connector (APC), the mating surfaces are NOT angled to the axis of the fiber. APCs provide superior reflectance performance compared to UPCs.

UV
Ultraviolet

Video
Refers to the exchange of visual material by use of IP, RF (carried via a separate optical wavelength), or other encoding and transport protocols.

VFL
Visual fault locator

Voice
Refers to the exchange of human conversations by use of IP or other encoding and transport protocols.

Wavelength
The distance between two successive points of an electromagnetic waveform, usually measured in nanometers (nm).

Wavelength Division Multiplexer (WDM)
A passive device used to combine and/or separate optical signals of different wavelengths. Example: WDMs combine the downstream data/voice signals (1490 nm) with RF video signals (1550 nm) in the CO to be sent out toward subscribers.

Zero Dispersion Wavelength
Wavelength at which the chromatic dispersion of an optical fiber is zero. Occurs when waveguide dispersion cancels out material dispersion, around 1310 nm for standard single-mode fiber.

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