Photonics

Bandwidth : The range of frequencies over which a particular instrument is designed to function within specified limits.

Infrared : The invisible portion of the electromagnetic spectrum that lies between about 0.75 and 1000 μm.

Laser: Light Amplification by the Stimulated Emission of Radiation. Lasers usually have low bandwidth and high power. Lasers can operate in the infrared, visible and ultraviolet regions of the optical spectrum.

LED : Light Emitting Diode. LEDs work on the principle of spontaneous emission of light as opposed to stimulated emission. LEDs usually have high bandwidth but relatively low power. LEDs operate in the infrared, visible and ultraviolet regions of the optical spectrum.

Optics : That branch of physical science concerned with vision and certain phenomena of electromagnetic radiation in the wavelength range extending from the vacuum
ultraviolet at about 40 nm to the far-infrared at 1 mm. Now being replaced by the more inclusive term photonics.

Optical fiber : A thin filament of drawn or extruded glass or plastic having a central core and a cladding of lower index material to promote internal reflection. It may be used singly to transmit pulsed optical signals (communications fiber) or in bundles to transmit light or images.

Optical interconnection : The use of photonic devices rather than electronic devices to make connections within and between integrated circuits.

Photodiode : A two-electrode, radiation-sensitive junction formed in a semiconductor material in which the reverse current varies with illumination. Photodiodes are used for the detection of optical power and for the conversion of optical power to electrical power.

Photonics : The technology involving light and photons at all wavelengths between the far-infrared and the ultra-violet. Also called "Optoelectronics".

Splice: A permanent joint whose purpose is to couple optical power among two or more ports. Also, a device whose purpose is to couple optical power between a waveguide and a source or detector.

Ultraviolet:
The invisible region of the spectrum just beyond the violet end of the visible region. Wavelengths range from 1 to 400 nm.

Visible Spectrum : Light which can be seen by the unaided human eye, defined in our case as between 400 nm and 750 nm.

Waveguide: A system or material designed to confine and direct electromagnetic waves in a direction determined by its physical boundaries.

Wavelength: Electromagnetic energy is transmitted in the form of a sinusoidal wave. The wavelength is the physical distance covered by one cycle of this wave; it is inversely proportional to frequency.

Fiber Optic Glossary

AC: Alternating current.

Acceptance Angle: The half-angle of the cone within which incident light is totally internal reflected by the fiber core. It is equal to sin-1(NA).

Acrylic Fiber: consists of an inner acrylic plastic core coated with a thin cladding of a fluorinated resin.. This material is more durable, lighter in weight, can be bent to a tighter radius than can glass fiber, and can be easily field terminated.

AD or ADC Analog-to-digital converter: A device used to convert analog signals to digital signal.

AGC Automatic gain control: A process or means by which gain is automatically adjusted in a spe fied manner as a function of input level or another specified parameter.

AM: See amplitude modulation.

Amplitude Modulation (AM): A transmission technique in which the amplitude of t carrier is varied in accordance with the signal.

Analog A continuously variable signal :A mercury thermometer, which gives a variable range temperature readings, is an example of an analog instrument. Opposite of digital.

Angular Misalignment : Loss at a connector due to fiber end face angles being misaligned.

ANSI: American National Standards Institute.

APC: Angle polished connector. An 5'-15' angle on the connector tip for the minimum possible backreflection.

APD: See avalanche photodiode.

APL: Average picture level. Video parameter.

AR Coating : Antireflection coating. A thin, dielectric or metallic film applied to an optical surfa to reduce its reflectance and thereby increase its transmittance.

Armor: A protective layer, usually metal, wrapped around a cable.

ASCII : American standard code for information interchange. A means of encoding information.

ASIC : Application-specific integrated circuit. A custom-designed integrated circuit.

ASTM: American Society for Testing and Materials.

Asynchronous: Data that is transmitted without an associated clock signal.

Asynchronous Transfer Mode [ATM): A digital transmission switching format, with c containing 5 bytes of header information followed by 48 data bytes. Part of the B-ISDN standard.

ATE: Automatic test equipment.

Attenuation: The decrease in signal strength along a fiber optic waveguide caused by absorption and scattering. Attenuation is usually expressed in dB/km.

Attenuation Constant: For a particular propagation mode in an optical fiber, the real part of the axial propagation constant.

Attenuation-Limited Operation : The condition in a fiber optic link when operation is limited by the power of the received signal (rather than by bandwidth or distortion).

Attenuator 1: In electrical systems, a usually passive network for reducing the amplitude of a signal without appreciably distorting the waveform. 2. In optical systems, a passive device for reducing the amplitude of a signal without appreciably distorting the waveform.

Avalanche Photodiode (APD): A photodiode that exhibits internal amplification of photocurrent through avalanche multiplication of carriers in the junction region.

Average Power : The average level of power in a signal that varies with time.

Axial Mode: allows the highest light output for FiberOptic systems. In this mode (sometimes referred to as "end-light"), the end of the fiber is exposed and delivers all of the available light. Lateral mode (or "side-light") is the compliment to this and is often used to simulate neon. Lightly Expressed does not supply lateral mode FiberOptic products.

Axial Propagation Constant : For an optical fiber, the propagation constant evaluated along the axis of a fiber in the direction of transmission.

AXIS; The center of an optical fiber.

B:

B : See bel.

Backscattering: The return of a portion of scattered light to the input end of a fiber; the scattering of light in the direction opposite to its original propagation.

Bandwidth: The range of frequencies within which a fiber optic waveguide or terminal device can transmit data or information.

Bandwidth: The range of frequencies within which a fiber optic device is designed to function or can transmit data/information.

Bandwidth-Limited Operation: The condition in a fiber optic link when bandwidth, rather than received optical power, limits performance. This condition is reached when the signal becomes distorted, principally by dispersion, beyond specified limits.

Baseband: A method of communication in which a signal is transmitted at its original frequency without being impressed on a carrier.

Baud: A unit of signaling speed equal to the number of signal symbols per second, which mav or may not be equal to the data rate in bits per second.

Beamsplitter: An optical device, such as a partially reflecting mirror, that splits a beam of light into two or more beams. Used in fiber optics for directional couplers.

Bel (B) : The logarithm to the base 10 of a power ratio, expressed as B = log10 (P1/P2), where P1 and P2 are distinct powers. The decibel, equal to one-tenth bel, is a more commonly used unit.

Bending: Loss Attenuation caused by high-order modes radiating from the outside of a fiber optic waveguide which occur when the fiber is bent around a small radius. See also macrobending, microbending.

Bend Radius: The smallest radius an optical fiber or fiber cable can bend before increased attenuation or breakage occurs.

BER: See bit error rate.

Bidirectional Operating in both directions:. Bidirectional couplers operate the same way regardless of the direction light passes through them. Bidirectional transmission sends signals in both directions, sometimes through the same fiber.

Birefringent: Having a refractive index that differs for light of different polarizations.

Bit: The smallest unit of information upon which digital communications are based; also an electrical or optical pulse that carries this information.

BITE Built-in test equipment: Features designed into a piece of equipment that allow on-line diagnosis of failures and operating status.

Bit Error Rate: (BER) The fraction of bits transmitted that are received incorrectly.

BNC: Popular coax bayonet style connector often used for baseband video.

Broadband: A method of communication where the signal is transmitted by being impressed a high-frequency carrier.

Buffer 1: In optical fiber, a protective coating applied directly to the fiber. 2. A routine or storage used to compensate for a difference in rate of flow of data, or time of occurrence of events, when transferring data from one device to another.

Bus Network: A network topology in which all terminals are attached to a transmission medium serving as a bus.

Butt Splice: A joining of two fibers without optical connectors arranged end-to-end by means of a coupling. Fusion splicing is an example.

BW : See bandwidth.

Bypass: The ability of a station to isolate itself optically from a network while maintaining the continuity of the cable plant.

Byte: A unit of eight bits.

C :

C Celsius.: Measure of temperature where water freezes at O' and boils at 100'.

Cable: One or more optical fibers enclosed within protective covering(s) and strength members.

Cable Assembly:A cable that is connector terminated and ready for installation.

Cable Plant: The cable plant consists of all the optical elements including fiber connectors, splices, etc. between a transmitter and a receiver.

Carrier-to-Noise Ratio : The ratio, in decibels, of the level of the carrier to that of the noise in a receiver's IF bandwidth before any nonlinear process such as amplitude limiting and detection takes place.

CATV Community antenna television: A television distribution method whereby signals from distant stations are received, amplified, and then transmitted by coaxial or fiber cable or microwave links to subscribers. This term is now typically used to refer to cable TV.

CCIR: Consultative Committee on Radio.

CCITT: Consultative Committee on Telephony and Telegraphy.

CCTV: Closed-circuit television.

CD Compact disk: Often used to describe high-quality audio, CD-quality audio, or short-wavelength lasers; CD Laser.

Center Wavelength: In a laser, the nominal value central operating wavelength. It is the wavelength defined by a peak mode measurement where the effective optical power resides. In an LED, the average of the two wavelengths measured at the half amplitude points of the power spectrum.

Central Office: A common carrier switching office in which users' lines terminate. The nerve center of a telephone system.

CGA: Color graphics adapter A low-resolution color standard for computer monitors.

Channel: A communications path or the signal sent over that path. Through multiplexing several channels, voice channels can be transmitted over an optical channel.

Chirp In laser diodes : the shift of the laser's central wavelength during single pulse durations due to laser instability.

Chromatic Dispersion: All fiber has the property that the speed an optical pulse travels depends on its wavelength. This is caused by several factors including material dispersion, waveguide dispersion and profile dispersion. The net effect is that if an optical pulse contains multiple wavelengths (colors), then the different colors will travel at different speeds and arrive at different times, smearing the received optical signal.

Cladding : Material that surrounds the core of an optical fiber. Its lower index of refraction, compared to that of the core, causes the transmitted light to travel down the core.

Cladding Mode : A mode confined to the cladding, a light ray that propagates in the cladding.

Cleave : The process of separating an optical fiber by a controlled fracture of the glass, for the purpose of obtaining a fiber end, which is flat, smooth, and perpendicular to the fiber axis.

CM : Centimeter Approximately 0.4 inches.

CMOS : Complementary metal oxide semiconductor. A family of IC's. Particularly useful for low speed or low-power applications.

CNR: See carrier-to-noise ratio.

CO: See central office.

Coating : The material surrounding the cladding of a fiber. Generally a soft plastic material that protects the fiber from damage.

Coherent Communications : In Fiber Optics, a communication system where the output of a local laser oscillator is mixed optically with a received signal, and the difference frequency is detected and amplified.

Color Subcarrier : The 3.58 MHz signal which carries color information in a TV signal.

Composite Sync : A signal consisting of horizontal sync pulses, vertical sync pulses, and equalizing pulses only, with a no-signal reference level.

Composite Video : A signal which consists of the luminance (black and white), chrominance (color), blanking pulses, sync pulses, and color burst.

Compression : A process in which the dynan-dc range or data rate of a signal is reduced by controlling it as a function of the inverse relationship of its instantaneous value relative to a specified reference level. Compression is usually accomplished by separate devices called compressors and is used for many purposes such as: improving signal-to-noise ratios, preventing overload of succeeding elements of a system, or matching the dynamic ranges of two devices. Compression can introduce distortion, but it is usually not objectionable.

Concatenation : The process of connecting pieces of fiber together.

Concentrator : A multiport repeater.

Concentricity : The measurement of how well-centered the core is within the cladding.

Connector : A mechanical or optical device that provides a demountable connection between two fibers or a fiber and a source or detector.

Connector Plug : A device used to terminate an optical conductor cable.

Connector Receptacle : The fixed or stationary half of a connection that is mounted on a panel/bulkhead. Receptacles mate with plugs.

Connector Variation : The maximum value in dB of the difference in insertion loss between mating optical connectors (e.g., with remating, temperature cycling, etc.). Also called optical connector variation.

Core: The hght-conducting central portion of an optical fiber, composed of material with a higher index of refraction than the cladding. The portion of the fiber that transmits light.

Counter : Rotating An arrangement whereby two signal paths, one in each direction, exist in a ring topology.

Coupler : An optical device that combines or splits power from optical fibers.

Coupling : Ratio/Loss (CR,CL) The ratio/loss of optical power from one output port to the total output power, expressed as a percent. For a 1 x 2 WDM or coupler with output powers O1 and O2, and Oi representing both output powers.

Critical : Angle In geometric optics, at a refractive boundary, the smallest angle of incidence at which total internal reflection occurs.

Crosstalk (XT) 1 : Undesired coupling from one circuit, part of a circuit, or channel to another. 2. Any phenomenon by which a signal transmitted on one circuit or channel of a transmission system creates and undesired effect in another circuit or channel.

CRT : Cathode ray tube.

CSMA/CD : Carrier sense multiple access with collision detection.

CTS: Clear to send.

Cutback Method : A technique of measuring optical fiber attenuation by measuring the optical power at two points at different distances from the test source.

Cutoff : Wavelength In single-mode fiber, the wavelength below which the fiber ceases to be single-mode.

CW: (Abbreviation for continuous wave) Usually refers to the constant optical output from an optical source when it is biased (i.e., turned on) but not modulated with a signal.

D:

DA or DAC: (Digital-to-analog converter) A device used to convert digital signals to analog signals.

Dark Current : The induced current that exists in a reversed biased photodiode in the absence of incident optical power. It is better understood to be caused by the shunt resistance of the photodiode. A bias voltage across the diode (and the shunt resistance) causes current to flow in the absence of light.

Data Rate : The number of bits of information in a transmission system, expressed in bits per second (b/s or bps), and which may or may not be equal to the signal or baud rate.

dB Decibel :

dBc : Decibel relative to a carrier level.

DBu : Decibels relative to microwatt.

DBm : Decibels relative to milliwatt.

DC : Direct current.

DCE : Data circuit-terminating equipment.

Decibel (dB) : A unit of measurement indicating relative optic power on a logarithmic scale. Often expressed in reference to a fixed value, such as dBm (1 milliwatt) or dBA (1 microwatt).

Demultiplexer : A module that separates two or more signals previously combined by compatible multiplexing equipment.

DESC : Defense electronics supply center.

Detector : An opto-electric transducer used in fiber optics to convert optical power to electrical current. Usually referred to as a photodiode.

DFB: See distributed feedback laser

DG : See differential gain.

Diameter : Mismatch Loss The loss of power at a joint that occurs when the transmitting fiber has a diameter greater than the diameter of the receiving fiber. The loss occurs when coupling light from a source to fiber, from fiber to fiber, or from fiber to detector

Dichroic Filter : An optical filter that transmits light according to wavelength. Dichroic filters reflect light that they do not transmit.

Dielectric : Any substance in which an electric field may be maintained with zero or near-zero power dissipation. This term
usually refers to non-metallic materials.

Differential Gain : A type of distortion in a video signal that causes the brightness information to be distorted.

Differential Phase : A type of distortion in a video signal that causes the color information to be distorted.

Diffraction Grating : An array of fine, parallel, equally spaced reflecting or transmitting lines that mutually enhance the effects of diffraction to concentrate the diffracted light in a few directions determined by the spacing of the lines and by the wavelength of the light.

Digital : A signal that consists of discrete states. A binary signal has only two states, 0 and 1.

Diode : An electronic device that lets current flow in only one direction. Semiconductor diodes used in fiber optics contain a junction between regions of different doping. They include light emitters (LED's and laser diodes) and detectors (photodiodes).

Diode : Laser Synonymous with injection laser diode.

DIP : Dual in-line package.

Diplexer : A device that combines two or more types of signals into a single output.

Directional Coupler : A coupling device for separately sampling (through a known coupling loss) either the forward (incident) or the backward (reflected) wave in a transmission line.

Directivity : See near-end crosstalk.

Dispersion : The temporal spreading of a light signal in an optical waveguide caused by light signals traveling at different speeds through a fiber either due to modal or chromatic effects.

Dispersion : Shifted Fiber Standard single-mode fibers exhibit optimum attenuation performance at 1550 nm and optimum bandwidth at 1300 nm. Dispersion-shifted fibers are made so that both attenuation and bandwidth are optimum at 1550 nm.

Distortion : Nonlinearities in a unit that cause harmonics and beat products to be generated.

Distortion : Limited Operation Generally synonymous with bandwidth-limited operation.

Distributed Feedback Laser : (DFB) An injection laser diode which has a Bragg reflection grating in the active region in order to suppress multiple longitudinal modes and enhance a single longitudinal mode.

Dominant Mode : The mode in an optical device spectrum with the most power.

Dope : Thick liquid or paste used to prepare a surface or a varnish-like substance used for waterproofing or strengthening a material.

Double-Window Fiber : This term is used two ways. For multimode fibers, the term means that the fiber is optimized for 850 nm and 1300 nm operation. For single-mode fibers, the term means that the fiber is optimized for 1300 nm and 1550 nm operation.

DP : See differential phase.

DSR : Data set ready.

DSx : A transmission rate in the North American digital telephone hierarchy. Also called T-carrier.

DTE : Data terminal equipment.

DTR : Data terminal ready.

Dual Attachment Concentrator : A concentrator that offers two attachments to the FDDI network which are capable of accommodating a dual (counter-rotating) ring.

Dual Attachment Station : A station that offers two attachments to the FDDI network which are capable of accommodating a dual (counter- rotating) ring.

Dual Ring : (FDDI Dual Ring) A pair of counter- rotating logical rings.

Duplex Cable : A two-fiber cable suitable for duplex transmission.

Duplex Transmission : Transmission in both directions, either one direction at a time (halfduplex) or both directions simultaneously (full-duplex).

Duty Cycle : In a digital transmission, the fraction of time a signal is at the high level.

E:

E**CL : (Emitter-coupled logic)** A high-speed logic family capable of GHz rates.

EDFA : See Erbium-doped fiber amplifier

Edge-Emitting Diode : An LED that emits light from its edge, producing more direction output than surface-emitting LED's that emit from their top surface.

EGA : (Enhanced graphics adapter) A medium-resolution color standard for computer monitors.

EIA : (Electronic Industries Association) An organization that sets video and audio standards.

8B10B Encoding : A signal modulation scheme in which eight bits are encoded in a 10-bit word to ensure that too many consecutive zeroes do not occur; used in ESCON and fiber channel.

802.3 Network A 10 Mb/s CSMA/CD : bus-based network; commonly called ethernet.

802.5 Network : A token-passing ring network operating at 4 Mb/s or 16 Mb/s.

Electromagnetic Interference : (EMI) Any electrical or electromagnetic interference tha causes undesirable response, degradation, or failure in electronic equipment. Optical fibers neither emit nor receive EMI.

Electromagnetic Radiation [EMR) Radiation made up of oscillating electric and magnetic fields and propagated with the speed of light. Includes gamma radiation, X-rays, ultraviolet, visible and infrared radiation, and radar and radio waves.

Electromagnetic Spectrum : The range of frequencies of electromagnetic radiation from zero to infinity.

ELED : See edge-emitting diode.

Ellipticity : Describes the fact that the core or cladding may be elliptical rather than circular.

EM : Abbreviation for electromagnetic.

EMD : See equilibrium mode distribution.

EMI : Electromagnetic interference.

EMP : Electromagnetic pulse.

EMR : Electromagnetic radiation.

Endoscope : A fiber optic bundle used for imaging and viewing inside the human body.

ENG : Electronic news gathering.

E/O : Abbreviation for electrical-to-optical converter.

Equilibrium Mode Distribution : (EMD) The steady modal state of a multimode fiber i which the relative power distribution among modes is independent of fiber length.

Erbium-Doped Fiber Ampliffer : Optical fibers doped with the rare earth element erbiu which can amplify light in the 1550 nm region when pumped by an external fight source.

ESCON Enterprise systems connection : A duplex optical connector used for computer-to computer data exchange.

Ethernet : A baseband local area network marketed by Xerox and developed jointly by Xerox, Digital Equipment Corporation, and Intel.

Evanescent Wave : Light guided in the inner part of an optical fiber's cladding rather than the core.

Excess : Loss In a fiber optic coupler, the optical loss from that portion of light that does no !merge from the nominal operation ports of the device.

External Modulation : Modulation of a light source by an external device that acts like an electronic shutter.

Extinction Ratio : The ratio of the low, or OFF optical power level (Pl) to the high, or ON optical power level (Ph).

Extrinsic : Loss In a fiber interconnection, that portion of loss not intrinsic to the fiber but related to imperfect joining of a connector or splice.

Eye Pattern : (Also called eye diagram) The proper function of a digital system can be quantitatively described by its BER, or qualitatively by its eye pattern. The "openness" of the eye relates to the BER that can be achieved.

F:

F Fahrenheit : Measure of temperature where water freezes at 32' and boils at 212'.

Failure Rate : The number of failures of a device per unit of time.

Fall Time : (Also called turn-off time) The time required for the trailing edge of a pulse to fall from 90% to 10% of its amplitude; the time required for a component to produce such a result. Typically measured between the 80% and 20% points or alternately the 90% and 10% points.

FAR : Federal acquisition regulation.

Faraday Effect : A phenomenon that causes some materials to rotate the polarization of light in the presence of a magnetic field parallel to the direction of propagation. Also called magneto-optic effect.

Far-End Crosstalk : See wavelength isolation.

FC : A threaded optical connector that originated in Japan. Good for single-mode or multimode fiber and applications requiring low backreflection.

FCC : Federal Communications Commission.

FC/PC : (See FC) A special curved polish on the connector for very low backreflection.

FDA : (**Food and Drug Administration)** Organization responsible for laser safety.

FDDI : (Fiber distributed data interface) 1. A dual counter-rotating ring local area network. 2. A connector used in a dual counter-rotating ring local area network

FDM : See frequency-division multiplexing.

Ferrule : A rigid tube that confines or holds a fiber as part of a connector assembly.

FET : Field-effect transistor.

Fiber Bundle : refers to the collection of individual fibers that supply light to the fixture. These fibers are held together and protected by the sheathing.

Fiber Grating : An optical fiber in which the refractive index of the core varies periodically along its length, scattering light in a way similar to a diffraction grating, and transmitting or reflecting certain wavelengths selectively.

FiberOptic : (variously "fiber optic," "fibre optic" (England), and "fiberoptic,") refers to the conduction of light waves through materials of exceptional clarity and across long distances. FiberOptics demonstrate total internal reflection by combining like materials of differing indices of refraction.

Fiber Optic Attenuator : A component installed in a fiber optic transmission system that reduces the power in the optical signal. It is often used to limit the optical power received by the photodetector to within the limits of the optical receiver.

Fiber Optic Cable : A cable containing one or more optical fibers.

Fiber Optic Communication System : The transfer of modulated or unmodulated optical energy through optical fiber media which terminates in the same or different media.

Fiber Optic Gyroscope : A coil of optical fiber that can detect rotation about its axis.

Fiber Optic Link : A transmitter, receiver, and cable assembly that can transmit information between two points.

Fiber Optic Span : An optical fiber/cable terminated at both ends which may include devices that add, subtract, or attenuate optical signals.

Fiber Optic Subsystem : A functional entity with defined bounds and interfaces which is part of a system. It contains solid state and/or other components and is specified as a subsystem for the purpose of trade and commerce.

Fiber Optic Test Procedure : (FOTP) Standards developed and published by the Electronic Industries Association (EIA)
under the EIA-RS-455 series of standards.

Fiber-to-the-Curb : (FTTC) Fiber optic service to a node connected by wires to several nearby homes, typically on a block.

Fiber-to-the-Home : (FTTH) Fiber optic service to a node located inside an individual home.

Fiber-to-the-Loop : (FTTL) Fiber optic service to a node that is located in a neighborhood.

Fiber Channel : An industry-standard specification that originated in Great Britain which details computer channel communications over fiber optics at transmission speeds from 132 Mb/s to 1062.5 Mb/s at distances of up to 10 kilometers.

Filter : A device which transmits only part of the incident energy and may thereby change the spectral distribution of energy.

FIT : Rate Number of device failures in one billion device hours.

Fluoride Glasses : Materials that have the amorphous structure of glass but are made of fluoride compounds (e.g., zirconium fluoride) rather than oxide compounds (e.g., silica). Suitable for very long wavelength transmission.

FM : See frequency modulation.

FOG-M : Fiber optic guided missile.

FOTP : See fiber optic test procedure.

4B5B Encoding : A signal modulation scheme in which groups of four bits are encoded and transmitted in five bits in order to guarantee that no more than three consecutive zeroes ever occur; used in FDDI.

FP : (Fabry-Perot) Generally refers to a type of laser

Frequency-Division Multiplexing : (FDM) A method of de'n'ving two or more simultaneous, continuous channels from a transmission medium by assigning separate portions of the available frequency spectrum to each of the individual

channels. In optical communications, one also encounters wavelength-division multiplexing (WDM) involving the use of several distinct optical sources (lasers), each having a distinct center wavelength.

Frequency Modulation : (FM) A method of transmission in which the carrier frequency varies in accordance with the signal.

Fresnel Reflection : Loss Reflection losses at the ends of fibers caused by differences in the refractive index between glass and air. The maximum reflection caused by a perpendicular air-glass interface is about 4% or about -14 dB.

FSK : (Frequency shift keying) A method of encoding data by means of two or more tones.

FTTC : See fiber-to-the-curb.

FTTH : See fiber-to-the-home.

FTTL : See fiber-to-the-loop.

Full-Duplex : Simultaneous bidirectional transfer of data.

Fused Coupler : A method of making a multimode or single-mode coupler by wrapping fibers together, heating them, and pulling them to form a central unified mass so that light on any input fiber is coupled to all output fibers.

Fused Fiber : A bundle of fibers fused together so they maintain a fixed alignment with respect to each other in a rigid rod.

Fusion Splicer : An instrument that permanently bonds two fibers together by heating and fusing them.

FUT : Fiber under test.

FWHM : (Full width half maximum) Used to describe the width of a spectral emission at the 50% amplitude points.

FWHP : (Full width half power) Also known as FWHM.

G:

G Giga : One billion.

GaALAs : (Gallium aluminum arsenide) Generally used for short wavelength light emitters.

G**aAS : (Gallium arsenide)** Used in light emitters.

GaInAsP : (Gallium indium arsenide phosphide) Generally used for long wavelength light emitters.

Gap Loss : Loss resulting from the end separation of two axially aligned fibers.

Gate 1 : A device having one output channel and one or more input channels, such that the output channel state is completely determined by the input channel states, except during switching transients. 2. One of the many types of combinational logic elements having at least two inputs.

Gaussian Beam : A beam pattern used to approximate the distribution of energy in a fiber core. It can also be used to describe emission patterns from surface-emitting LED'S. Most people would recognize it as the bell curve.

GBaud : One billion bits of data per second.

Gb/S : See GBaud.

Ge Germanium : Generally used in detectors. Good for most wavelengths (e.g., 800-1600 nm).

Genlock : A process of sync generator locking. This is usually performed by introducing a composite video signal from a master source to the subject sync generator. The generator to be locked has circuits to isolate vertical drive, horizontal drive and subcarrier. The process then involves locking the subject generator to the master subcarrier, horizontal, and vertical drives so that the result is that both sync generators are running at the same frequency and phase.

GHZ : (Gigahertz) One billion Hertz (cycles per second) or 109 Hertz.

Glass Fiber : is the original FiberOptic material, and still the standard in communications technology. Glass fiber requires a large bend radius and is not easily field-terminated. Lightly Expressed does not typically use glass fiber. See Acrylic Fiber.

Graded-Index Fiber : Optical fiber in which the refractive index of the core is in the form of a parabolic curve, decreasing toward the cladding.

GRIN : (Gradient index) Generally refers to the SELFOC lens often used in fiber optics.

Ground Loop Noise : Noise that results when equipment is grounded at points having different potentials thereby creating an unintended current path. The

dielectric properties of optical fiber provide electrical isolation that eliminates ground loops.

Group Index : Also called group refractive index In fiber optics, for a given mode propagating in a medium of refractive index (n), the group index (N), is the velocity of light in a vacuum (c), divided by the group velocity of the mode.

Group Velocity 1 : The velocity of propagation of an envelope produced when an electromagnetic wave is modulated by, or mixed with, other waves of different frequencies. 2. For a particular mode, the reciprocal of the rate of change of the phase constant with respect to angular frequency. 3. The velocity of the modulated optical power.

H:

Half-Duplex : A bidirectional link that is limited to one-way transfer of data, i.e., data can't be sent both ways at the same time.

Hard-Clad Silica Fiber : An optical fiber having a silica core and a hard polymeric plastic cladding intimately bounded to the core.

HDTV : (High-definition television) Television that has approximately twice the horizontal and twice the vertical emitted resolution specified by the NTSC standard.

Headend 1: A central control device required within some LAN/MAN systems to provide such centralized functions as remodulation, retiming, message accountability, contention control, diagnostic control, and access to a gateway 2. A central control device within CATV systems to provide such centralized functions as remodulation. See also local area network.

Hertz : One cycle per second.

HIPPI : (High performance parallel interface) as defined by ANSI X3T9.3 document.

Hydrogen : Losses Increases in fiber attenuation that occur when hydrogen diffuses into the glass matrix and absorbs some light.

Hz : See Hertz.

I:

IDP : See integrated detector/preamplifier

IEEE : Institute of Electrical and Electronic Engineers.

Illuminators : are the source of light for FiberOptic lighting. The illuminator consists of a transformer, ballast, lamp holder, lamp, and a fan. There are many different illuminator manufacturers, as well as different lamp intensities, color temperatures, and lamp types. Illuminators may come equipped with color-change wheels, dimmers (mechanical or electrical) and remote control capability.

Index-Matching Fluid : A fluid whose index of refraction nearly equals that of the fiber's core. Used to reduce Fresnel reflection at fiber ends. See also index-matching gel.

Index-Matching Gel : A gel whose index of refraction nearly equals that of the fiber's core. Used to reduce Fresnel reflection at fiber ends. See also index-matching fluid.

Index of Reftaction : (Also refractive index) The ratio of the velocity of light in free space to the velocity of light in a fiber material. Symbolized by n. Always greater than or equal to one.

Infrared : (IR) The invisible portion of the electromagnetic spectrum bounded by the long-wavelength extreme of the visible spectrum (about 0.7 um) and the shortest microwaves (about 1000 um). See also frequency, light.

Infrared Fiber : Colloquially optical fibers with best transmission at wavelengths of 2 Jim or longer, made of materials other than silica glass. See also fluoride glasses.

InGaAs : (Indium gallium arsenide) Generally used to make high-performance long-wavelength detectors.

InGaAsP : (Indium gallium arsenide phosphide) Generally used for long-wavelength light emitters.

Injection Laser Diode : (ILD) A laser employing a forward-biased semiconductor junction as the active medium. Stimulated emission of coherent light occurs at a pn junction where electrons and holes are driven into the junction.

Insertion Loss : The loss of power that results from inserting a component, such as a connector or splice, into a previously continuous path.

Integrated Detector/preamplifier : (IDPI) A detector package containing a PIN photodiode and transimpedance amplifier.

Integrated Services Digital Network : (ISDN) An integrated digital network in which the same time-division switches and digital transmission paths are used to establish connections for services such as telephone, data, electronic mail and facsimile. How a connection is accomplished is often specified as a switched connection, nonswitched connection, exchange connection, ISDN connection, etc.

Intensity : The square of the electric field strength of an electromagnetic wave. Intensity is proportional to irradiance and may get used in place of the term 'irradiance' when only relative values are important.

Interchannel Isolation : The ability to prevent undesired optical energy from appearing in one signal path as a result of coupling from another signal path. Also called crosstalk.

Interferometric Sensors : Fiber optic sensors that rely on interferometric detection.

Intrinsic Losses : Splice losses arising from differences in the fibers being spliced.

IPCEA : Insulated Power Cable Engineers Association.

IPI : (Intelligent peripheral interface) as defined by ANSI X3T9.3 document.

IR : See infrared.

Irradiance : Power per unit area.

ISA : Instrument Society of America.

ISDN : See integrated systems digital network.

ISO : international Standards Organization.

Isolation : See near-end crosstalk.

J:

Jacket : The outer, protective covering of the cable.

Jitter : Small and rapid variations in the timing of a waveform due to noise, changes in component characteristics, supply voltages, imperfect synchronizing circuits, etc.

Jitter Data Dependent : (DDJ) Also called data dependent distortion. Jitter related to the transmitted symbol sequence. DDJ is caused by the limited bandwidth characteristics, non-ideal individual pulse responses, and imperfections in the optical channel components.

Jitter Duty Cycle Distortion : (DCD) Distortion usually caused by propagation delay differences between low-to-high and high-to-low transitions. DCD is manifested as a pulse width distortion of the nominal baud time.

Jitter Random :(RJ) Random jitter is due to thermal noise and may be modeled as a Gaussian process. The peak-to-peak value of Rj is of a probabilistic nature, and thus any specific value requires an associated probability.

JPEG : (Joint photographers expert group) International standard for compressing still photography.

Jumper : A short fiber optic cable with connectors on both ends.

K:

k Kilo : One thousand.

K Kelvin : Measure of temperature where water freezes at 273' and boils at 373'.

KBaud : One thousand bits of data per second.

kb/s : See kbaud.

Kevlar : A very strong, very light, synthetic compound developed by Du Pont which is used to strengthen optical cables.

Kg : (Kilogram) Approximately 2.2 pounds.

KHz : One thousand cycles per second.

Km : (Kilometer)1km = 3,280 feet or 0.62 miles.

L:

Lambertian Emitter : An emitter that radiates according to Lambert's cosine law. This law states that the radiance of certain idealized surfaces is dependent upon the angle from which the surface is viewed. The radiant intensity of such a surface is maximum normal to the surface and decreases in proportion to the cosine of the angle from the normal.

LAN : See local area network.

Large Core Fiber : Usually, a fiber with a core of 200 um or more.

Laser : Acronym for light amplification by stimulated emission of radiation. Lasers usually have low bandwidth and high power. Lasers in fiber optics are usually solid-state semiconductor types.

Laser Diode : A semiconductor that emits coherent light when forward biased.

Lateral Displacement Loss: The loss of power that results from lateral displacement of optimum alignment between two fibers or between a fiber and an active device.

Lateral Mode : is the least efficient mode of light conduction in a FiberOptic system. In this mode, light is emitted from the sides of the FiberOptic strand. As a result, there is significant light loss (this translates into uneven linear light distribution) along the length of the fiber. LPL utilizes FiberOptic systems in their most efficient manner, and as a result, save in material and energy costs.

Launch Fiber : An optical fiber used to couple and condition light from an optical source into an optical fiber Often the launch fiber is used to create an equilibrium mode distribution in multimode fiber Also called launching fiber

LD : See laser diode.

LED : Light Emitting Diode. LEDs work on the principle of spontaneous emission of light as opposed to stimulated emission. LEDs usually have high bandwidth but relatively low power. LEDs operate in the infrared, visible and ultraviolet regions of the optical spectrum.

LH : (Long-haul) A classification of video performance under RS-25OB/C. Lower performance than medium-haui or short-haul.

L-I Curve : The plot of optical output (L) as a function of current (I) which characterizes an electrical to optical converter.Light in a strict sense, the region of the electromagnetic spectrum that can be perceived by human vision, designated the visible spectrum and nominally covering the wavelength range of 0.4 um to 0.7 um. In the laser and optical communication fields, custom and practice have extended usage of the term to include the much broader portion of the electromagnetic spectrum that can be handled by the basic optical techniques used for the visible spectrum. This region has not been clearly defined, but, as employed by most workers in the field, may be considered to extend from the near ultraviolet region of approximately 0.3 um, through the visible region, and into the mid-infrared region to 30 um.

Light Piping : Use of optical fibers to illuminate.

Lightguide : Synonym optical fiber

Lightwave : The path of a point on a wavefront. The direction of the lightwave is generally normal to the wavefront.

Local Area Network : (LAN) A communication link between two or more points within a small geographic area, such as between buildings.

Local Loop : Synonym for Loop.

Long-Haul : Telecommunications Long-distance telecommunications links such as crosscountry or transoceanic.

Longitudinal Mode : An optical waveguide mode with boundary condition determined along the length of the optical cavity

Loop 1 : A communication channel from a switching center or an individual message distribution point to the user terminal. 2. In telephone systems, a pair of wires from a central office to a subscribers's telephone. 3. Go and return conductors of an electric circuit; a closed circuit. 4. A closed path under measurement in a resistance test. 5. A type of antenna used extensively in direction-finding equipment and in UHF reception. 6. A sequence of instructions that may be executed iteratively while a certain condition prevails.

Loose-Tube : A type of fiber optic cable construction where the fiber is contained within a loose tube in the cable jacket.

Loss : The amount of a signal's power, expressed in dB, that is lost in connectors, splices, or fiber defects.

Loss Budget : An accounting of overall attenuation in a system.

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M:

M Meter : 39.37"

M Mega : One million.

Milhamp : One thousandth of an Amp.

NMC Multiplexed analog components : A video standard developed by the european community An enhanced version, HD-MAC delivers 1250 lines at 50 frames per second, HDTV quality.

Macrobending : In a fiber, all macroscopic deviations of the fiber's axis from a straight line.

MAN : See metropolitan area network.

MAP : Manufacturing automation protocol.

Margin : Allowance for attenuation in addition to that explicitly accounted for in system design.

Mass Splicing : Simultaneous splicing of many fibers in a cable.

Material Dispersion : Dispersion resulting from the different velocities of each wavelength in a material.

MBaud : One million bits of information per second. Also referred to as Nbps or Mb/s.

Mb/S : See MBaud.

Mean Launched Power : The average power for a continuous valid symbol sequence coupled into a fiber

Mechanical Splice : An optical fiber splice accomplished by fixtures or materials, rather than by thermal fusion.

Metal Halide : provides a very bright, high efficiency lamp with a high color temperature and a long lamp life.

Metropolitan Area Network : A network covering an area larger than a local area network. A wide area network that covers a metropolitan area. Usually, an interconnection of two or more local area networks.

MFD : See mode field diameter.

MH Medium-haul : A classification of video performance under RS-25OB/C. Higher performance than long-haul and lower performance than short-haul.

MHz : (MegaHertz) One million Hertz (cycles per second).

Microbending : Mechanical stress on a fiber may introduce local discontinuities called microbending. This results in light leaking from the core to the cladding by a process called mode coupling.

Micrometer : One millionth of a meter. Abbreviated um.

Microsecond : One millionth of a second. Abbreviated us.

Microwatt : One millionth of a Watt. Abbreviated uW

MIL-SPEC : Military specification.

MIL-STD : Military standard.

Misalignment Loss : The loss of power resulting from angular misalignment, lateral displacement, and end separation.

Mm : (Millimeter) One thousandth of a meter.

MM : Abbreviation for multimode.

Modal Dispersion : See multimode dispersion.

Modal Noise : Modal noise occurs whenever the optical power propagates through mode-selective devices. It is usually only a factor with laser light sources.

Mode : A single electromagnetic wave traveling in a fiber.

Mode Coupling : The transfer of energy between modes. In a fiber, mode coupling occurs until equilibrium mode distribution (EMD) is reached.

Mode Evolution : The dynamic process a multilongitudinal laser undergoes whereby the changing distribution of power among the modes creates a continuously changing envelope of the laser's spectrum.

Mode Field Diameter : (MFD) A measure of distribution of optical power intensity across the end face of a single-mode fiber.

Mode Filter : A device that removes higher-order modes to simulate equilibrium mode distribution.

Mode Scrambler : A device that mixes modes to uniform power distribution.

Mode Stripper : A device that removes cladding modes.

Modulation : The process by which the characteristic of one wave (the carrier) is modified by another wave (the signal). Examples include amplitude modulation (AM), frequency modulation (FM), and pulse-coded modulation (PCM).

Modulation Index : In an intensity-based system, the modulation index is a measure of how much the modulation signal affects the light output.

Monitor : A television that receives its signal directly from a VCR, camera, or separate TV tuner for high-quality picture reproduction. Also a special type of television receiver designed for use with closed circuit TV equipment.

MonoChrome : Black and white TV signal.

MPEG : (Motion picture experts group) An international standard for compressing video that provides for high compression ratios. The standard has two recommendations: MPEG-1 compresses lower-resolution images for videoconferencing and lower-quality desktop video applications and transmits at around 1.5 Mb/s. MPEG-2 was devised primarily for delivering compressed television for home entertainment and is used at CCIR resolution when bit rates exceed 5.0 Mbits per second as in hard disk-based applications.

Ms : (Milliseconds) One thousandth of a second.

MTBF : (Mean time between failure) Time after which 50% of the units of interest will have failed.

MTTF : Mean time to failure. See MTBE

Multilongitudinal Mode Laser : (MLM) An injection laser diode which has a number of longitudinal modes.

Multimode Dispersion : Dispersion resulting from the different transit lengths of different propagating modes in a multimode optical fiber. Also called modal dispersion.

Multimode Fiber : An optical fiber that has a core large enough to propagate more than one mode of light The typical diameter is 62.5 micrometers.

Multimode Laser Diode : (MMLD) Synonym for Multilongitudinal mode laser.

Multiple Reflection Noise : (MRN) The fiber optic receiver noise resulting from the interference of delayed signals from two or more reflection points in a fiber optic span. Also known as Multipath Interference.

Multiplexer : A device that combines two or more signals into a single output.

Multiplexing : The process by which two or more signals are transmitted over a single communications channel. Examples include time-division multiplexing and wavelength-division multiplexing.

MUSE : Multiple sub-nyquist encoder A high-definition standard developed in Europe that delivers 1125 lines at 60 frames per second.

Mv : Millivolt. One thousandth of a Volt.

mW : Milliwatt. One thousandth of a Watt.

N:

n Nano : One billionth.

N Newtons : Measure of force generally used to specify fiber optic cable strength.

nA Nanoamp : One billionth of an Amp.

NA : See numerical aperture.

NAB : National Association of Broadcasters.

NA Mismatch Loss : The loss of power at a joint that occurs when the transmitting half has a numerical aperture greater than the NA of the receiving half. The loss occurs when coupling light from a source to fiber, from fiber to fiber, or from fiber to detector.

National Electric Code : (NEC) A standard governing the use of electrical wire, cable and fixtures installed in buildings; developed by the NEC Committee of the American National Standards Institute (ANSI), sponsored by the National Fire Protection Association (NFPA), identified by the description ANSL/NFPA 70-1990.

Near-End Crosstalk : (NEXT, RN) The optical power reflected from one or more input ports, back to another input port. Also known as isolation directivity.

Near Infrared : The part of the infrared near the visible spectrum, typically 700 nm to 1500 nm or 2000 nm; it is not rigidly defined.

NEMA : National Electrical Manufacturers Association.

NEP : See noise equivalent power.

Network 1 : An interconnection of three or more communicating entities and (usually) one or more nodes. 2. A combination of passive or active electronic components that serves a given purpose.

NFPA : National Fire Protection Association.

Nm : Nanometer. One billionth of a meter.

Noise Equivalent Power : (NEP) The noise of optical receivers, or of an entire transmission system, is often expressed in terms of noise equivalent optical power.

NRZ : (Nonreturn to zero) A common means of encoding data that has two states termed "zero" and "one" and no neutral or rest position.

Ns : (Nanosecond) One billionth of a second.

NTSC 1 : (National Television Systems Committee) The organization which formulated the NTSC system. 2. Standard used in the U.S. that delivers 525 lines at 60 frames per second.

Numerical Aperture : (NA) The light-gathering ability of a fiber; the maximum angle to the fiber axis at which light will be accepted and propagated through the fiber. The measure of the lightacceptance angle of an optical fiber. NA = sin x, where x is the acceptance angle. NA is also used to describe the angular spread of light from a central axis, as in exiting a fiber, emitting from a source, or entering a detector

Nw : Nanowatt. One billionth of a Watt.

O:

OC-x Optical carrier.: A carrier rate specified in the SONET standard.

O/E : Optical-to-electrical converter.

OEIC : Opto-electronic integrated circuit.

OEM : Original equipment manufacturer.

OLTS : Optical loss test set.

Open Standard Interconnect : A seven-layer model defined by ISO for defining a communication network.

Optics : That branch of physical science concerned with vision and certain phenomena of electromagnetic radiation in the wavelength range extending from the vacuum ultraviolet at about 40 nm to the far-infrared at 1 mm. Now being replaced by the more inclusive term photonics.

Optical Ampliffer : A device that amplifies an input optical signal without converting it into electrical form. The best developed are optical fibers doped with the rare earth element, erbium.

Optical BandpaSS : The range of optical wavelengths which can be transmitted through a component.

Optical Channel : An optical wavelength band for WDM optical communications.

Optical Channel : Spacing The wavelength separation between adjacent WDM channels.

Optical Channel Width : The optical wavelength range of a channel.

Optical Continuous Wave Reflectometer : (OCWR) An instrument used to characterize a fiber optic link wherein an unmodulated signal is transmitted through the link, and the resulting light scattered and reflected back to the input is measured. Useful in estimating component reflectance and link optical return loss.

Optical Directional Coupler : (ODC) A component used to combine and separate optical power.

Optical Fall Time : The time interval for the falling edge of an optical pulse to transition from 90% to 10% of the pulse amplitude. Alternatively, values of 80% and 20% may be used.

Optical Fiber : A glass or plastic fiber that has the ability to guide light along its axis.

Optical fiber : A thin filament of drawn or extruded glass or plastic having a central core and a cladding of lower index material to guide light along its axis. It may be used singly to transmit pulsed optical signals (communications fiber) or in bundles to transmit light or images.

Optical interconnection : The use of photonic devices rather than electronic devices to make connections within and between integrated circuits.

Optical Isolator : A component used to block out reflected and unwanted light. Used in laser modules, for example. Also called an isolator.

Optical Link Loss Budget : The range of optical loss over which a fiber optic link will operate and meet all specifications. The loss is relative to the transmitter output power.

Optical Loss Test Set : (OLTS) A source and power meter combined to measure attenuation.

Optical Path Power Penalty : The additional loss budget required to account for degradations due to reflections, and the combined effects of dispersion resulting from intersymbol interference, mode-partition noise, and laser chirp.

Optical Power Meter : An instrument that measures the amount of optical power present at the end of a fiber or cable.

Optical Return Loss : (ORL) The ratio (expressed in units of dB) of optical power reflected by a component or an assembly to the optical power incident on a component port when that component or assembly is introduced into a link or system.

Optical Rise Time : The time interval for the rising edge of an optical pulse to transition from 10% to 90% of the pulse amplitude. Alternatively, values of 20% and 80% may be used.

Optical Time Domain Reflectometer : (OTDR) An instrument that locates faults in optical fibers or infers attenuation by backscattered light measurements.

Optical Waveguide : Another name for optical fiber.

OSI : Open standards interconnect.

OTDR Optical time domain reflectometer.

P:

p Pico :. One trillionth.

pA Picoamp : One trillionth of an Amp.

PABX : Private automatic branch exchange.

PAL Phase alternation line : A composite color standard used in many parts of the world for TV broadcast. The phase alternation makes the signal relatively immune to certain distortions (compared to NTSC). Delivers 625 lines at 50 frames per second. PAL-plus is an enhanced-definition version.

Passive Branching Device : A device which divides an optical input into two or more optical outputs.

PC Physical contact : Refers to an optical connector that allows the fiber ends to physically touch. Used to minimize backreflection and insertion loss.

PCB : Printed circuit board.

PCM : See pulse-code modulation.

PCS Fiber : See plastic clad silica.

Peak Power Output : The output power averaged over that cycle of an electromagnetic wave having the maximum peak value that can occur under any combination of signals transmitted.

PFM : (Pulse-frequency modulation) Also referred to as square wave FM.

Phase Constant : The imaginary part of the axial propagation constant for a particular mode, usually expressed in radians per unit length. See also attenuation

Phase Noise : Rapid, short-term, random fluctuations in the phase of a wave caused by time domain instabilities in an oscillator.

Photoconductive : Losing an electrical charge on exposure to light.

Photodetector : An optoelectronic transducer such as a PIN photodiode or avalanche photodiode.

Photodiode: A two-electrode, radiation-sensitive junction formed in a semiconductor material in which the reverse current varies with illumination. It's a semiconductor device that converts light to electrical current.
Photodiodes are used for the detection of optical power and for the conversion of optical power to electrical power.

Photon: A quantum of electromagnetic energy. A particle of light.

Photonics: A term coined for devices that work using photons, analogous to "electronic' for devices working with electrons. Also called Optoelectronics.

Photovoltaic: Providing an electric current under the influence of light or similar radiation.

Pigtail: A short optical fiber permanently attached to a source, detector or other fiber optic device.

PINFET PIN: (detector plus a FET amplifier) Offers superior performance over a PIN alone.

PIN Photodiode: See photodiode.

Planer Waveguide: A waveguide fabricated in a flat material such as thin film.

Plastic Clad Silica : (PCS) Also called hard clad silica (HCS) A step-index fiber with a glass core and plastic or polymer cladding instead of glass.

Plastic Fiber : An optical fiber having a plastic core and plastic cladding.

Plenum : The air handling space between walls, under structural floors, and above drop ceilings, which can be used to route intrabuilding cabling.

Plenum Cable : A cable whose flammability and smoke characteristics allow it to be routed in a plenum area without being enclosed in a conduit.

Point-to-Point Transmission : Transmission between two designated stations.

Polarization : The direction of the electric field in the lightwave.

Polarization Maintaining Fiber : Fiber that maintains the polarization of light that enters it.

Polarization Mode Dispersion : (PMD) Polarization mode dispersion is an inherent property of all optical media. It is caused by the difference in the propagation velocities of light in the orthogonal principal polarization states of the transmission medium. The net effect is that if an optical pulse contains both polarization components, then the different polarization components will travel at different speeds and arrive at different times, smearing the received optical signal.

Port : Hardware entity at each end of the link.

POS : Point of sale.

POTS : Plain old telephone system.

p-p : (Peak-to-peak) A peak-to-peak value is the algebraic difference between extreme values of a varying quantity.

PPM : (Pulse-position modulation) A method of encoding data.

Preform : The glass rod from which optical fiber is drawn.

Profile Dispersion : Dispersion attributed to the variation of refractive index contrast with wavelength.

Ps : (Picosecond) One trillionth of a second.

Pulse : A current or voltage which changes abruptly from one value to another and back to the original value in a finite length of time. Used to describe one particular variation in a series of wave motions.

Pulse-Code Modulation : (PCM) A technique in which an analog signal, such as a voice, is converted into a digital signal by sampling the signal's amplitude and expressing the different amplitudes as a binary number The sampling rate must be at least twice the highest frequency in the signal.

Pulse Dispersion : The spreading out of pulses as they travel along an optical fiber

Pulse Spreading : The dispersion of an optical signal as it propagates through an optical fiber

pW : (Picowatt) One trillionth of a Watt.

Quantum : Efficiency In a photodiode, the ratio of primary carriers (electron-hole pairs) created to incident photons. A quantum efficiency of 70% means seven out of ten incident photons create a carrier.

Quaternary Signal : A digital signal having four significant conditions. See also signal.

Quartz Halogen : lamps burn hotter and tend to have a shorter lamp life than metal halide lamps. They do demonstrate however, a lower color temperature which is desirable in many applications.

Radiation-Hardened Fiber : An optical fiber made with core and cladding materials that are designed to recover their intrinsic value of attenuation coefficient, within an acceptable time period, after exposure to a radiation pulse.

Radiometer : An instrument, distinct from a photometer, to measure power (Watts) of electromagnetic radiation.

Radiometry : The science of radiation measurement.

Rayleigh Scattering : The scattering of light that results from small inhomogeneities of material density or composition.

RAYS : Lines that represent the path taken by light.

Receiver : A terminal device that includes a detector and signal processing electronics. It functions as an optical-to-electrical converter.

Receiver Overload : The maximum acceptable value of average received power for an acceptable BER or performance.

Receiver Sensitivity : The minimum acceptable value of received power needed to achieve an acceptable BER or performance. It takes into account power penalties caused by use of a transmitter with worst-case values of extinction ratio, jitter, pulse rise and fall times, optical return loss, receiver connector degradations, and measurement tolerances. The receiver sensitivity does not include power penalties associated with dispersion, jitter, or reflections from the optical path; these effects are specified separately in the allocation of maximum optical path penalty. Sensitivity usually takes into account worst-case operating and end-of-fife (EOL) conditions.

Recombination : Combination of an electron and a hole in a semiconductor that releases energy, sometimes leading to light emission.

Retraction : The changing of direction of a wavefront in passing through a boundary between two dissimilar media, or in a graded-index medium where refractive index is a continuous function of position.

Retractive Index : A property of optical materials that relates to the speed of light in the material.

Refractive Index : Gradient The change in refractive index with distance from the axis of an optical fiber.

Retractive Index : Profile The description of the value of the refractive index as a function of distance from the optical axis along an optical fiber diameter

Regenerative Repeater : A repeater, designed for digital transmission, in which digital signals are amplified, reshaped, retimed, and retransmitted.

Regenerator : Synonym for regenerative repeater.

Repeater : A receiver and transmitter set designed to regenerate attenuated signals. Used to extend operating range.

Residual Loss : The loss of the attenuator at the minimum setting of the attenuator.

Responsivity : The ratio of a photodetector's electrical output to its optical input in Amperes/ Watt (A/W).

Return Loss : See optical return loss.

RFI : (Radio frequency interference) Synonym of electromagnetic interference.

RGB : (Red, green, and blue) The basic parallel component set in which a signal is used for each primary color; or the related equipment or interconnect formats or standards.

Ribbon Cables : Cables in which many fibers are embedded in a plastic material in parallel, forming a flat ribbon-like structure.

RIN : (Relative intensity noise) Often used to quantify the noise characteristics of a laser.

Ring : A set of stations wherein information is passed sequentially between stations, each station in turn examining or copying the information, and finally returning it to the originating station.

Ring Network : A network topology in which terminals are connected in a point-to-point serial fashion in an unbroken circular configuration.

Rise Time: The time taken to make a transition from one state to another, usually measured between the 10% and 90% completion points of the transition. Alternatively the rise time may be specified at the 20% and 80% amplitudes. Shorter or faster rise times require more bandwidth in a transmission channel.

RMS : (Root mean square) Technique used to measure AC voltages.

RTS : Request to send.

RZ : (Return to zero) A common means of encoding data that has two information states called "zero" and "one" in which the signal returns to a rest state during a portion of the bit period.

S:

S : Abbreviation for second.

SAE : Society of Automotive Engineers.

SC : (Subscription channel connector) A push-pull type of optical connector that originated in Japan. Features high packing density, low loss, low backreflection, and low cost.

Scalloping : an effect of unblended areas of light when the light distribution points are too close to a reflective surface.

Scattering : The change of direction of light rays or photons after striking small particles. It may also be regarded as the diffusion of a light beam caused by the non-homogeneity of the transmitting material.

SDH : Synchronous digital hierarchy.

SECAM : (SystemeEtlectronique Couleur avec Memoire) A TV standard used in various parts of the world. Delivers 625 lines at 50 frames per second.

Selfoc Lens : A trade name used by the Nippon Sheet Glass Company for a graded-index fiber lens; a segment of graded-index fiber made to serve as a lens.

Sensitivity : See receiver sensitivity.

SH : (Short- haul) A classification of video performance under RS-25OB/C. Higher performance than long-haul or medium-haul.

Sheath : An outer protective layer of a fiber optic cable.

Sheathing : the plastic tube that protects the fiber bundle. Sheathing is available in many different materials and will be specified depending on your application

Shot Noise : Noise caused by current fluctuations arising from the discrete nature of electrons.

Si Silicon : Generally used in detectors. Good for short wavelengths only (e.g., < 1000 nm).

Sideband : Frequencies distributed above and below the carrier that contain energy resulting from amplitude modulation. The frequencies above the carrier are called upper sidebands, and the frequencies below the carrier are called lower sidebands.

Silica Glass : Glass made mostly of silicon dioxide, SiO2, used in conventional optical fibers.

Signal-to-Noise Ratio : (SNR) The ratio of the total signal to the total noise which shows how much higher the signal level is than the level of the noise. A measure of signal quality.

Simplex : Single element (e.g., a simplex connector is a single-fiber connector).

Simplex Cable : A term sometimes used for a single-fiber cable.

Simplex Transmission : Transmission in one direction only.

Single Attachment Concentrator : A concentrator that offers one attachment to the FDDI network.

Single-Line Laser : Synonym for single-longitudinal mode laser.

Single-Longitudinal Mode Laser : (SLM) An injection laser diode which has a single dominant longitudinal mode. A single-mode laser with a side mode suppression ratio (SMSR)< 25 dB.

Single-mode : (SM) Fiber A small-core optical fiber through which only one mode will propagate. The typical diameter is 8-9 microns.

Single-mode Laser Diode :(SMLD) Synonym for single-longitudinal mode laser.

Single-mode Optical Loss Test Set : (SMOLTS) An optical loss test set for use with single-mode fiber.

SI Units : Abbreviation for International System of Units, commonly known as the metric system,

SLED : See surface-emitting diode.

SM : Abbreviation for single-mode

SMA : A threaded type of optical connector One of the earliest optical connectors to be widely used. Offers poor repeatability and performance.

Smart Structures : (Also smart skins) Materials containing sensors (fiber optic or other types) to measure their properties during fabrication and use.

SMD : Surface-mount device.

SMPTE : Society of Motion Picture and Television Engineers.

SMT : Surface-mount technology.

S/N : See signal-to-noise ratio.

SNR : See signal-to-noise ratio.

Soliton Pulse : An optical pulse having a shape, spectral content, and power level designed to take advantage of nonlinear effects in an optical fiber waveguide, for the purpose of essentially negating dispersion over long distances.

SONET : (Synchronous optical network transport system) An interface standard for synchronous 2.488 Gb/s optical fiber transmission, developed by the Exchange Carriers Standards Association.

Source : In fiber opfics a transmitting LED or laser diode, or an instrument that injects test signals into fibers.

Spectral Width : A measure of the extent of a spectrum. For a source, the width of wavelengths contained in the output at one half of the wavelength of peak power. Typical spectral widths are 50 to 160 nm for an LED and 0.1-5 nm for a laser diode.

Spectral Width, Full Width, Half Maximum : (FWHM) The absolute difference between the wavelengths at which the spectral radiant intensity is 50 percent of the maximum power.

Splice: A permanent joint whose purpose is to couple optical power among two or more ports. Also, a device whose purpose is to couple optical power between a waveguide and a source or detector.

Splitting Ratio : The ratio of power emerging from two output ports of a couplet

ST : (Straight tip connector) Popular fiber optic connector originally developed by AT&T.

Stabilized Light Source : An LED or laser diode that emits light with a controlled and constant spectral width, central wavelength,
and peak power with respect to time and temperature.

Star Coupler : A coupler in which power at any input port is distributed to all output ports.

Star Network : A network in which all terminals are connected through a single point, such as a star coupler or concentrator.

Step-Index Fiber : Fiber that has a uniform index of refraction throughout the core.

Strength Member : The part of a fiber optic cable composed of aramid yarn, steel strands, or fiberglass filaments that increase the tensile strength of the cable.

Submarine Cable : A cable designed to be laid underwater.

Subscriber Loop : (Also called local loop) The link from the telephone company central office (CO) to the home or business

(customer premises).

Supertrunk : A cable that carries several video channels between facilities of a cable television company.

Surface-Emitting Diode : An LED that emits light from its flat surface rather than its side. Simple and inexpensive, with emission
spread over a wide angle.

Sync : This signal is derived from the composite or combination of the horizontal and vertical drives. See also composite sync.

Synchronous : A data signal that is sent along with a clock signal.

T:

T Tera.: One trillion.

Tail : refers to the sheathed fiber bundle that connects the illuminator to the fixture. Tail length is typically limited to 30' as longer runs will begin to show lighting differentials in the fixture.

Tap : Loss In a fiber optic coupler, the ratio of power at the tap port to the power at the input port.

Tap Port : In a coupler where the splitting ratio between output ports is not equal, the output port containing the lesser power

TAXI : (Transparent asynchronous transmitter-receiver interface) A chip used to transmit parallel data over a serial interface.

TBC : Timebase corrector.

T-Carrier : Generic designator for any of several digitally multiplexed telecommunications carrier systems.

TDM : See time-division multiplexing.

TEC : Abbreviation for thermoelectric cooler.

Tee Coupler : A three-port optical coupler.

10 BASE-F : A fiber optic version of an IEEE 802.3 network.

10 BASE-FB : That portion of 10 BASE-F that defines the requirements for a fiber backbone.

10 BASE-FL : That portion of 10 BASE-F that defines a fiber optic link between a concentrator and a station.

10 BASE-FP : That portion of 10 BASE-F that defines a passive star coupler.

10 BASE-T : A twisted-pair cable version of an IEEE 802.3 network.

10BASE-2 : A thin-coaxial-cable version of an IEEE 802.3 network.

10 BASE-5 : A thick-coaxial-cable version of an IEEE 802.3 network; very similar to the original Ethernet specification.

Terminate : in order to maximize the transmission of light between the illuminator and the end of the fiber bundle, the fibers must be properly terminated. This involves cutting the ends of the individual fibers all at once so that the finished surface of the bundle is uniform.

Ternary : A semiconductor compound made of three elements (e.g., GaAlAs).

TFOCA : Tactical fiber optic cable assembly.

Thermal Noise : Noise resulting from thermally induced random fluctuation in current in the receiver's load resistance.

Throughput : Loss In a fiber optic coupler, the ratio of power at the throughput port to the power at the input port.

Throughput Port : In a coupler where the splitting ratio between output ports is not equal, the output port containing the greater power.

Tight-Buffer : A material tightly surrounding a fiber in a cable, holding it rigidly in place.

Time-Division Multiplexing : (TDM) A transmission technique whereby several low-speed channels are multiplexed into a high-speed channel for transmission. Each low-speed channel is allocated a specific position based on time.

Token Ring : A ring-based network scheme in which a token is used to control access to a network. Used by IEEE 802.5 and FDDI.

Total Internal Reflection : The reflection that occurs when light strikes an interface at an angle of incidence (with respect to the normal) greater than the critical angle.

Transceiver : A device that performs, within one chassis, both telecommunicafion transmitting and receiving functions.

Tiransducer : A device for converting energy from one form to another, such as optical energy to electrical energy.

Transmitter : A device that includes a source and driving electronics. It functions as an electricalto-optical converter.

Tree : A physical topology consisting of a hierarchy of master-slave connections between a concentrator and other FDDI nodes (including subordinate concentrators).

Trunk : A physical loop topology, either open or closed, employing two optical fiber signal paths, one in each direction (i.e. counter-rotating) forming a sequence of peer connections between FDDI nodes. When the trunk forms a closed loop, it is sometimes called a trunk ring.

TTL : Transistor-transistor logic.

U:

UL: Underwriter's Laboratory

Unidirectional : Operating in one direction only

UV : Ultraviolet.

Ultraviolet:
The invisible region of the spectrum just beyond the violet end of the visible region. Wavelengths range from 1 to 400 nm.

V : volt

VAC : volts, AC.

VDC : Volts, DC.

Vestigial-Sideband : (VSB) Transmission A modified double-sideband transmission in which one sideband, the carrier, and only a portion of the other sideband are transmitted. See also sideband.

VGA : (Video graphics array) A high-resolution color standard for computer monitors.

Videoconferencing : Conducting conferences via a video telecommunications system.

Videophone : A telephone-like service with a picture as well as sound.

Visible Light: Electromagnetic radiation visible to the human eye; wavelengths of 400-700 nm.

Voice Circuit: A circuit capable of carrying one telephone conversation or its equivalent; the standard subunit in which telecommunication capacity is counted. The U.S. analog equivalent is 4 kHz. The digital equivalent is 64 kbit/s in North America and in Europe.

VSB : See vestigial-sideband transmission.

W:

W : See Watt.

WAN : See wide area network.

Watt : Linear measurement of optical power, usually expressed in milhwatts, microwatts, and nanowatts.

Waveguide : A material medium that confines and guides a propagating electromagnetic wave. In the microwave regime, a waveguide normally consists of a hollow metallic conductor, generally rectangular, elliptical or circular in cross-section. This type of waveguide may, under certain conditions, contain a solid or gaseous dielectric material. In the optical regime, a waveguide used as a long transmission line consists of a solid dielectric filament (optical fiber), usually circular in cross-section. In integrated optical circuits an optical waveguide may consist of a thin dielectric film. In the RF regime, ionized layers of the stratosphere and the refractive surfaces of the troposphere may also serve as a waveguide.

Waveguide Couplers : A coupler in which light is transferred between planar waveguides.

Waveguide Dispersion : The part of chromatic dispersion arising from the different speeds light travels in the core and cladding of a single-mode fiber (i.e., from the fiber's waveguide structure).

Wavelength: The distance between points of corresponding phase of two consecutive cycles of a wave. The wavelength is related to the propagation velocity, and the frequency. It is indirectly proportional to frequency.

Wavelength-Division Multiplexing : (WDM) Sending several signals through one fiber with different wavelengths of light.

Wavelength Isolation : A WDM's isolation of a light signal in the desired optical channel from the unwanted optical channels. Also called far-end crosstalk.

WDM : See wavelength-division multiplexing.

Wide Area Network : A physical or logical network that provides capabilities for a number of independent devices to communicate with each other over a common transmission-interconnected topology in geographic areas larger than those served by local area networks.

Wideband : Possessing large bandwidth.

X, Y & Z :

XT : Abbreviation for crosstalk.

Y Coupler : A variation on the tee coupler in which input light is split between two channels (typically planar waveguide) that branch out like a Y from the input.

Zero-Dispersion: Wavelength In a single-mode optical fiber, the wavelength at which material dispersion and waveguide dispersion cancel one another. The wavelength of maximum bandwidth in the fiber.