E

E & M signaling: In telephony, an arrangement that uses separate leads, called the "E" lead and "M" lead, for signaling and supervisory purposes. *Note 1:* The near end signals the far end by applying –48 vdc to the "M" lead, which results in a ground being applied to the far end's "E" lead. When –48 vdc is applied to the far end "M" lead, the near-end "E" lead is grounded. *Note 2:* The "E" originally stood for "ear," *i.e.*, when the near-end "E" lead was grounded, the far end was calling and "wanted your ear." The "M" originally stood for "mouth," because when the near-end wanted to call (*i.e.*, speak to) the far end, –48 vdc was applied to that lead.

earth: *See* **ground.**

Earth coverage (EC): In satellite communications, the coverage that occurs when the satellite-to-Earth beam is sufficiently wide to cover all of the surface of the Earth exposed to the satellite, *i.e.*, the footprint is as large as it can possibly be from a geographic standpoint. (188)

earth electrode subsystem: A network of electrically interconnected rods, plates, mats, or grids, installed and connected, for the purpose of establishing a low-resistance contact with earth. (188)

Earth exploration-satellite service: A radiocommunication service between Earth stations and one or more space stations, which may include links between space stations, in which:

- information relating to the characteristics of the Earth and its natural phenomena is obtained from active sensors or passive sensors on Earth satellites;
- similar information is collected from airborne or Earth-based platforms;
- such information may be distributed to Earth stations within the system concerned;
- platform interrogation may be included.

This service may also include feeder links necessary for its operation. [NTIA] [RR]

earth ground: *See* **ground.**

Earth station: A station located either on the Earth's surface or within the major portion of the Earth's atmosphere and intended for communication:

- with one or more space stations; or
- with one or more stations of the same kind by means of one or more reflecting satellites or other objects in space. [NTIA] [RR]

Earth terminal: In a satellite link, one of the non-orbiting communications stations that receives, processes, and transmits signals between itself and a satellite. (188) *Note:* Earth terminals may be at mobile, fixed, airborne, and waterborne Earth terminal complexes. *Synonym* **satellite Earth terminal.**

Earth terminal complex: In satellite communications systems, the assembly of equipment and facilities necessary to integrate an Earth terminal into a communications network. (188) *Note:* The Earth terminal complex includes the Earth terminal and its support equipment and any required interconnect facilities and their support equipment. It does not include facilities at the site that are not necessary to establish and integrate the satellite links with the network.

EAS: *Abbreviation for* **extended area service.**

EBCDIC: *Acronym for* **extended binary coded decimal interchange code.** An 8-bit alphanumeric coded character set.

E-bend: A smooth change in the direction of the axis of a waveguide, throughout which the axis remains in a plane parallel to the direction of electric E-field (transverse) polarization. (188) *Synonym* **E-plane bend.**

E_bN_0: *See* **signal-to-noise ratio per bit.**

EBS: *Abbreviation for* **Emergency Broadcast System.**

EC: *Abbreviation for* **Earth coverage.**

ECCM: *Abbreviation for* **electronic counter-countermeasures.**

echo: **1.** A wave that has been reflected by a discontinuity in the propagation medium. **2.** A wave that has been reflected or otherwise returned with sufficient magnitude and delay to be perceived. (188) *Note 1:* Echoes are frequently measured in dB relative to the directly transmitted wave. *Note 2:*

Echoes may be desirable (as in radar) or undesirable (as in telephone systems). **3.** In computing, to print or display characters (a) as they are entered from an input device, (b) as instructions are executed, or (c) as retransmitted characters received from a remote terminal. **4.** In computer graphics, the immediate notification of the current values provided by an input device to the operator at the display console.

echo area: *See* **scattering cross section.**

echo attenuation: In a communication circuit (4- or 2-wire) in which the two directions of transmission can be separated from each other, the attenuation of echo signals that return to the input of the circuit under consideration. *Note:* Echo attenuation is expressed as the ratio of the transmitted power to the received echo power in dB. (188)

echo cancellation: In a system, the reduction of the power level of an echo or the elimination of an echo. (188) *Note:* Echo cancellation is usually an active process in which echo signals are measured and canceled or eliminated by combining an inverted signal with the echo signal.

echo canceler: *See* **echo suppressor.**

echo check: A check to determine the integrity of transmission of data, whereby the received data are returned to the source for comparison with the originally transmitted data. *Synonym* **loop check.**

echo command: A programming language command that causes an echo response from a computer to be displayed on a monitor or printer for analysis or monitoring of the progress of processing.

echo effect: *See* **ghost.**

echo line: In computer systems, on a hard-output or display device, a line of information that verifies (reflects) data entered into the computer.

echoplex: An echo check used in public switched networks operating in the full-duplex transmission mode, *i.e.*, the two-way-simultaneous mode.

echo return loss: *See* **return loss.**

echo sounding: The measurement of the depth of a body of water or the distance to an object in a body of water by measuring the time it takes sound or electromagnetic waves of known velocity to reflect from the bottom of the water body or from the distant object. *Note:* In echo sounding, damped cw transmission is usually used.

echo suppressor: A device for connection to a two-way telephone circuit to attenuate echo signals in one direction caused by signals in the other direction. (188)

ECM: *Abbreviation for* **electronic countermeasures.**

edge busyness: In a video display, distortion that is concentrated at or near the edge of objects, and that is categorized further by its temporal and spatial characteristics.

edge-emitting LED: An LED that has a physical structure superficially resembling that of an injection laser diode, operated below the lasing threshold and emitting incoherent light. *Note:* Edge-emitting LEDs have a relatively small beam divergence, and thus are capable of launching more optical power into a given fiber than are the conventional surface-emitting LEDs. [After FAA]

EDI: *Abbreviation for* **electronic document interchange.**

EDTV: *Abbreviation for* **extended-definition television.**

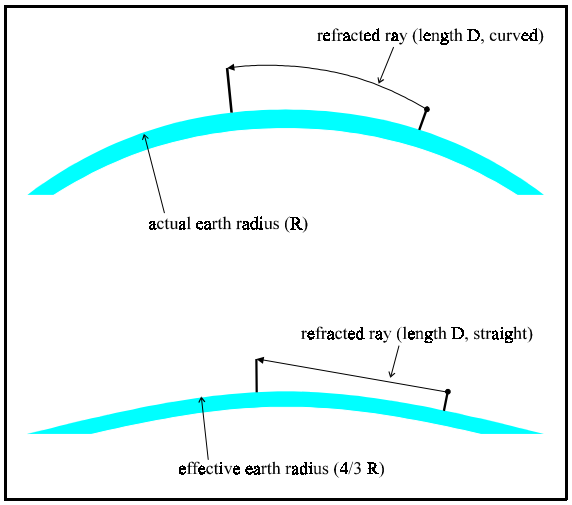
effective antenna gain contour (of a steerable satellite beam): An envelope of antenna gain contours resulting from moving the boresight of a steerable satellite beam along the limits of the effective boresight area. [NTIA] [RR]

effective boresight area (of a steerable satellite beam): An area on the surface of the Earth within which the boresight of a steerable satellite beam is pointed. There may be more than one unconnected effective boresight area to which a single steerable satellite beam can be pointed. [NTIA] [RR]

effective data transfer rate: The average number of units of data, such as bits, characters, blocks, or

frames, transferred per unit time from a source and accepted as valid by a sink. (188) *Note:* The effective data transfer rate is usually expressed in bits, characters, blocks, or frames per second. The effective data transfer rate may be averaged over a period of seconds, minutes, or hours.

effective Earth radius: The radius of a hypothetical Earth for which the distance to the radio horizon, assuming rectilinear propagation, is the same as that for the actual Earth with an assumed uniform vertical gradient of atmospheric refractive index. (188) *Note:* For the standard atmosphere, the effective Earth radius is 4/3 that of the actual Earth radius.



effective Earth radius

effective height: **1.** The height of the center of radiation of an antenna above the effective ground level. (188) **2.** In low-frequency applications involving loaded or nonloaded vertical antennas, the moment of the current distribution in the vertical section divided by the input current. (188) *Note:* For an antenna with symmetrical current distribution, the center of radiation is the center of distribution. For an antenna with asymmetrical current distribution, the center of radiation is the center of current moments when viewed from points near the direction of maximum radiation.

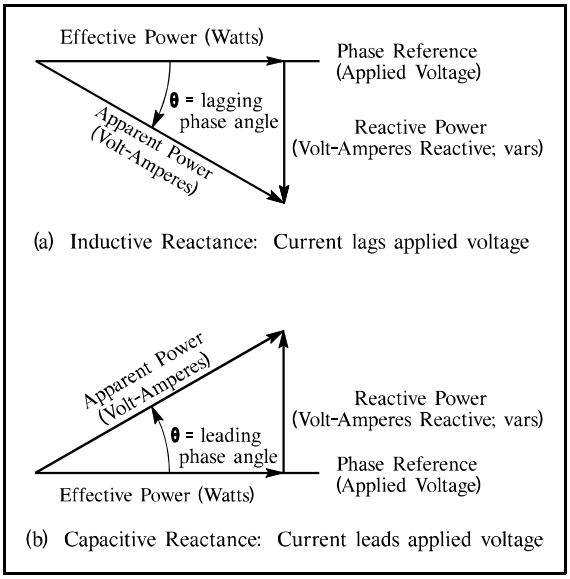
effective input noise temperature: The source noise temperature in a two-port network or amplifier that will result in the same output noise power, when connected to a noise-free network or amplifier, as that of the actual network or amplifier connected to a noise-free source. (188) *Note:* If F is the noise figure numeric and 290 K the standard noise temperature, then the effective noise temperature is given by $T_n = 290(F–1)$.

effective isotropically radiated power (e.i.r.p.): The arithmetic product of (a) the power supplied to an antenna and (b) its gain.

effective mode volume: For an optical fiber, the square of the product of the diameter of the near-field pattern and the sine of the radiation angle of the far-field pattern. The diameter of the near-field radiation pattern is defined here as the full width at half maximum and the radiation angle at half maximum intensity. *Note:* Effective mode volume is proportional to the breadth of the relative distribution of power amongst the modes in a multimode fiber. It is not truly a spatial volume but rather an *"optical volume"* equal to the product of area and solid angle.

effective monopole radiated power (e.m.r.p.): The product of the power supplied to the antenna and its gain relative to a short vertical antenna in a given direction. [RR]

effective power: In alternating-current power transmission and distribution, the product of the rms voltage and amperage, *i.e.*, the apparent power, multiplied by the power factor, *i.e.*, the cosine of the phase angle between the voltage and the current. *Note:* Only effective power, *i.e.*, the actual power delivered to or consumed by the load, is expressed in watts. Apparent power is properly expressed only in volt-amperes, never watts. *Synonym* **true power.** *See figure on following page.*



effective power

effective radiated power (e.r.p.) (in a given direction): 1. The power supplied to an antenna multiplied by the antenna gain in a given direction. (188) *Note 1:* If the direction is not specified, the direction of maximum gain is assumed. *Note 2:* The type of reference antenna must be specified. **2.** The product of the power supplied to the antenna and its gain relative to a half-wave dipole in a given direction. [NTIA] [RR] *Note:* If the direction is not specified, the direction of maximum gain is assumed.

effective speed of transmission: *Synonym* **effective transmission rate.**

effective transmission rate: The rate at which information is processed by a transmission facility. *Note 1:* The effective transmission rate is calculated as (a) the measured number of units of data, such as bits, characters, blocks, or frames, transmitted during a significant measurement time interval divided by (b) the measurement time interval. *Note 2:* The effective transmission rate is usually expressed as a number of units of data per unit time, such as bits per second or characters per second. (188) *Synonyms* **average rate of transmission, effective speed of transmission.**

efficiency factor: In data communications, the ratio of (a) the time to transmit a text automatically at a specified modulation rate to (b) the time actually required to receive the same text at a specified maximum error rate. (188) *Note 1:* All of the communication facilities are assumed to be in the normal condition of adjustment and operation. *Note 2:* Telegraph communications may have different temporal efficiency factors for the two directions of transmission. *Note 3:* The practical conditions of measurement should be specified, especially the duration of the measurement.

EHF: *Abbreviation for* **extremely high frequency.**

EIA: *Abbreviation for* **Electronic Industries Association.**

EIA Class IVa fiber: *Synonym* **dispersion-unshifted fiber.**

EIA Class IVb fiber: *Synonym* **dispersion-shifted fiber.**

EIA interface: Any of a number of equipment interfaces compliant with voluntary industry standards developed by the Electronic Industries Association (EIA) to define interface parameters. *Note 1:* Some of the EIA interface standards have been adopted by the Federal Government as Federal Standards or Federal Information Processing Standards. *Note 2:* The telecommunication-standards-developing bodies of the EIA are now part of the Telecommunications Industry Association (TIA), and the standards are designated TIA/EIA-XXX.

eight-hundred (800) service: A service that allows call originators to place toll telephone calls to 800-service subscribers, from within specified rate areas, without a charge to the call originator.

elastic buffer: 1. A buffer that has an adjustable capacity for data. **2.** A buffer that introduces an adjustable delay of signals.

E layer: *See* **E region, ionosphere.**

electrical length: 1. Of a transmission medium, its length expressed as a multiple or submultiple of the wavelength of a periodic electromagnetic or electrical signal propagating within the medium. *Note 1:* The wavelength may be expressed in radians or in artificial units of angular measure, such as

degrees. *Note 2*: In both coaxial cables and optical fibers, the velocity of propagation is approximately two-thirds that of free space. Consequently, the wavelength will be approximately two-thirds that in free space, and the electrical length, approximately 1.5 times the physical length. **2.** Of a transmission medium, its physical length multiplied by the ratio of (a) the propagation time of an electrical or electromagnetic signal through the medium to (b) the propagation time of an electromagnetic wave in free space over a distance equal to the physical length of the medium in question. *Note:* The electrical length of a physical medium will always be greater than its physical length. For example, in coaxial cables, distributed resistances, capacitances and inductances impede the propagation of the signal. In an optical fiber, interaction of the lightwave with the materials of which the fiber is made, and fiber geometry, affect the velocity of propagation of the signal. **3.** Of an antenna, the effective length of an element, usually expressed in wavelengths. *Note 1:* The electrical length is in general different from the physical length. *Note 2:* By the addition of an appropriate reactive element (capacitive or inductive), the electrical length may be made significantly shorter or longer than the physical length.

electrically powered telephone: A telephone in which the operating power is obtained either from a battery located at the telephone, *i.e.*, a local battery, or from a telephone central office, *i.e.*, a common battery.

electric field: The effect produced by the existence of an electric charge, such as an electron, ion, or proton, in the volume of space or medium that surrounds it. *Note:* Each of a distribution of charges contributes to the whole field at a point on the basis of superposition. A charge placed in the volume of space or in the surrounding medium has a force exerted on it.

electrochemical recording: Facsimile recording by means of a chemical reaction brought about by the passage of a signal-controlled current through the sensitized portion of the record sheet. (188)

electrographic recording: *See* **electrostatic recording.**

electroluminescence: Nonthermal conversion of electrical energy into light. *Note 1:* Electroluminescence is distinguished from incandescence, which is a thermal process. *Note 2:* One example of electroluminescence is the photon emission resulting from electron-hole recombination in a pn junction, as in a light-emitting diode (LED).

electrolytic recording: Electrochemical facsimile recording in which the recorded copy is made by the passage of a signal-controlled current through an electrolyte which causes metallic ions to be deposited, thus forming an image of the object. (188)

electromagnetic compatibility (EMC): 1. Electromagnetic compatibility is the condition which prevails when telecommunications equipment is performing its individually designed function in a common electromagnetic environment without causing or suffering unacceptable degradation due to unintentional electromagnetic interference to or from other equipment in the same environment. [NTIA] **2.** The ability of systems, equipment, and devices that utilize the electromagnetic spectrum to operate in their intended operational environments without suffering unacceptable degradation or causing unintentional degradation because of electromagnetic radiation or response. It involves the application of sound electromagnetic spectrum management; system, equipment, and device design configuration that ensures interference-free operation; and clear concepts and doctrines that maximize operational effectiveness. [JP1]

electromagnetic emission control: The control of friendly electromagnetic emissions, such as radio and radar transmissions, for the purpose of preventing or minimizing their use by unintended recipients. (188)

electromagnetic environment (EME): 1. For a telecommunications system, the spatial distribution of electromagnetic fields surrounding a given site. (188) *Note:* The electromagnetic environment may be expressed in terms of the spatial and temporal distribution of electric field strength (volts/meter), irradiance (watts/meter^2), or energy density (joules/meter^3). **2.** The resulting product of the power and time distribution, in various frequency ranges, of the radiated or conducted electromagnetic

emission levels that may be encountered by a military force, system, or platform when performing its assigned mission in its intended operational environment. It is the sum of electromagnetic interference; electromagnetic pulse; hazards of electromagnetic radiation to personnel, ordnance, and volatile materials; and natural phenomena effects of lightning and p-static. [JP1]

electromagnetic interference (EMI): Any electromagnetic disturbance that interrupts, obstructs, or otherwise degrades or limits the effective performance of electronics/electrical equipment. It can be induced intentionally, as in some forms of electronic warfare, or unintentionally, as a result of spurious emissions and responses, intermodulation products, and the like. [JP1] *Synonym* **radio frequency interference.**

electromagnetic interference (EMI) control: The control of radiated and conducted energy such that emissions that are unnecessary for system, subsystem, or equipment operation are reduced, minimized, or eliminated. *Note:* Electromagnetic radiated and conducted emissions are controlled regardless of their origin within the system, subsystem, or equipment. Successful EMI control with effective susceptibility control leads to electromagnetic compatibility. (188)

electromagnetic intrusion: The intentional insertion of electromagnetic energy into transmission paths in any manner, with the objective of deceiving operators or of causing confusion. [JP1]

electromagnetic pulse (EMP): **1.** The electromagnetic radiation from a nuclear explosion caused by Compton-recoil electrons and photoelectrons from photons scattered in the materials of the nuclear device or in a surrounding medium. The resulting electric and magnetic fields may couple with electrical/electronic systems to produce damaging current and voltage surges. May also be caused by nonnuclear means. [JP1] **2.** A broadband, high-intensity, short-duration burst of electromagnetic energy. (188) *Note:* In the case of a nuclear detonation, the electromagnetic pulse consists of a continuous frequency spectrum. Most of the energy is distributed throughout the lower frequencies between 3 Hz and 30 kHz.

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. [JP1]

electromagnetic radiation hazards (RADHAZ *or* EMR hazards): Hazards caused by a transmitter/antenna installation that generates electromagnetic radiation in the vicinity of ordnance, personnel, or fueling operations in excess of established safe levels or increases the existing levels to a hazardous level; or a personnel, fueling, or ordnance installation located in an area that is illuminated by electromagnetic radiation at a level that is hazardous to the planned operations or occupancy. These hazards will exist when an electromagnetic field of sufficient intensity is generated to: (a) induce or otherwise couple currents and/or voltages of magnitudes large enough to initiate electroexplosive devices or other sensitive explosive components of weapon systems, ordnance, or explosive devices; (b) cause harmful or injurious effects to humans and wildlife; (c) create sparks having sufficient magnitude to ignite flammable mixtures of materials that must be handled in the affected area. [JP1]

electromagnetic spectrum: The range of frequencies of electromagnetic radiation from zero to infinity. *Note:* The electromagnetic spectrum was, by custom and practice, formerly divided into 26 alphabetically designated bands. This usage still prevails to some degree. However, the ITU formally recognizes 12 bands, from 30 Hz to 3000 GHz. New bands, from 3 THz to 3000 THz, are under active consideration for recognition. *Refer to the figure on page E-20.*

electromagnetic survivability: The ability of a system, subsystem, or equipment to resume functioning without evidence of degradation following temporary exposure to an adverse electromagnetic environment. *Note:* The system, subsystem, or equipment performance may be degraded during exposure to the adverse electromagnetic environment, but the system will not experience permanent damage, such as component burnout, that will prevent proper operation when the adverse electromagnetic environment is removed. (188)

electromagnetic vulnerability (EMV): The characteristics of a system that cause it to suffer a definite degradation (incapability to perform the designated mission) as a result of having been subjected to a certain level of electromagnetic environmental effects. [JP1] (188)

electromagnetic wave (EMW): A wave produced by the interaction of time-varying electric and magnetic fields.

electromechanical recording: Recording by means of a signal-actuated mechanical device. (188)

electronically controlled coupling (ECC): The coupling of a lightwave from one dielectric waveguide into another dielectric waveguide upon the application of an electric field or electrical signal. *Note:* Devices that perform ECC can be used as switches.

electronic classroom: *Synonym* **teletraining.**

electronic commerce: Business transactions conducted by electronic means other than conventional telephone service, *e.g.,* facsimile or electronic mail (E-mail).

electronic counter-countermeasures (ECCM): That division of electronic warfare involving actions taken to ensure friendly effective use of the electromagnetic spectrum despite the enemy's use of electronic warfare.

electronic countermeasures (ECM): That division of electronic warfare involving actions taken to prevent or reduce an enemy's effective use of the electromagnetic spectrum.

electronic deception: 1. The deliberate radiation, reradiation, alteration, suppression, absorption, denial, enhancement, or reflection of electromagnetic energy in a manner intended to convey misleading information and to deny valid information to an enemy or to enemy electronics-dependent weapons. *Note:* Among the types of electronic deception are: (a) manipulative electronic deception—Actions to eliminate revealing or convey misleading, telltale indicators that may be used by hostile forces; (b) simulative electronic deception—Actions to represent friendly notional or actual capabilities to mislead hostile forces; (c) imitative electronic deception—The introduction of electromagnetic energy into enemy systems that imitates enemy emissions. **2.** Deliberate activity designed to mislead an enemy in the interpretation or use of information received by his electronic systems.

electronic emission security: Those measures taken to protect all transmissions from interception and electronic analysis. (188)

electronic jamming: The deliberate radiation, reradiation, or reflection of electromagnetic energy for the purpose of disrupting enemy use of electronic devices, equipment, or systems.

electronic line of sight: The path traversed by electromagnetic waves that is not subject to reflection or refraction by the atmosphere. [JP1]

electronic line scanning: In facsimile, a method of scanning that provides motion of the scanning spot along the scanning line by electronic means. (188)

electronic mail (E-mail): An electronic means for communication in which (a) usually text is transmitted, (b) operations include sending, storing, processing, and receiving information, (c) users are allowed to communicate under specified conditions, and (d) messages are held in storage until called for by the addressee. (188)

electronic message system (EMS): A message system incorporating electronic mail to a central facility which then assumes responsibility for delivering the message in hard copy form. *Note:* In DOD, these messages have a specific format known as message text format (MTF).

electronic reconnaissance: The detection, identification, evaluation, and location of foreign electromagnetic radiations emanating from other than nuclear detonations or radioactive sources. [JP1]

electronics intelligence (ELINT): Technical and geolocation intelligence information derived from foreign noncommunications electromagnetic radiations emanating from other than nuclear detonations or radioactive sources. [JP1]

electronics security (ELSEC): The protection resulting from all measures designed to deny unauthorized persons information of value that might be derived from their interception, and study of noncommunications electromagnetic radiations, *e.g.*, radar. [JP1]

electronic switching system (ESS): 1. A telephone switching system based on the principles of time-division multiplexing of digitized analog signals. *Note:* An electronic switching system digitizes analog signals from subscribers' loops, and interconnects them by assigning the digitized signals to the appropriate time slots. It may also interconnect digital data or voice circuits. **2.** A switching system with major devices constructed of semiconductor components. *Note:* A semi-electronic switching system that has reed relays or crossbar matrices, as well as semiconductor components, is also considered to be an ESS. (188)

electronic warfare (EW): Any military action involving the use of electromagnetic and directed energy to control the electromagnetic spectrum or to attack the enemy. The three major subdivisions within electronic warfare are: electronic attack, electronic protection, and electronic warfare support. [After JP1]

electronic warfare support measures (ESM): 1. That division of electronic warfare involving actions taken under direct control of an operational commander to search for, intercept, identify, and locate sources of radiated electromagnetic energy for the purpose of immediate threat recognition. Thus, electronic warfare support measures (ESM) provide a source of information required for immediate decisions involving electronic countermeasures (ECM), electronic counter-countermeasures (ECCM), avoidance, targeting, and other tactical employment of forces. Electronic warfare support measures data can be used to produce signals intelligence (SIGINT), both communications intelligence (COMINT) and electronics intelligence (ELINT). **2.** That division of electronic warfare involving action taken to search for, intercept, identify, and locate radiated electromagnetic energy for the purpose of immediate threat recognition. It provides a source of information required for immediate decisions involving electronic countermeasures, electronic counter-countermeasures, and other tactical actions such as avoidance, targeting and homing.

electro-optical intelligence (ELECTRO-OPTINT): Intelligence information other than signals intelligence derived from the optical monitoring of the electromagnetic spectrum from ultraviolet (0.01 µm) through the far infrared (1000 µm). [JP1]

electro-optic detector: *Deprecated term. See* **optoelectronic.**

electro-optic effect: Any one of a number of phenomena that occur when an electromagnetic wave in the optical spectrum interacts with an electric field, or with matter under the influence of an electric field. (188) *Note 1:* Two of the most important electro-optic effects having application as modulation mechanisms in optical communication are the Kerr effect and the Pockels effect, in which birefringence is induced or modified in a liquid (Kerr effect) or solid (Pockels effect). *Note 2:* The term *"electro-optic"* is often erroneously used as a synonym for *"optoelectronic."*

electro-optic modulator: An optical device in which a signal-controlled element is used to modulate a beam of light. (188) *Note 1:* The modulation may be imposed on the phase, frequency, amplitude, or direction of the modulated beam. *Note 2:* Modulation bandwidths into the gigahertz range are possible using laser-controlled modulators.

electro-optics: The technology associated with those components, devices and systems which are designed to interact between the electromagnetic (optical) and the electric (electronic) state. [JP1] *Note 1:* The operation of electro-optic devices depends on modification of the refractive index of a material by electric fields. (188) *Note 2:* In a Kerr cell, the refractive index change is proportional to the square of the electric field, and the material is usually a liquid. *Note 3:* In a Pockels cell, the refractive index change varies linearly with the electric field, and the material is a crystal. *Note 4:* *"Electro-optic"* is often erroneously used as a synonym for *"optoelectronic"*.

ELECTRO-OPTINT: *Acronym for* **electro-optical intelligence.**

electrophotographic recording: Recording in which light is used to produce a change in electrostatic charge distribution to form a photographic image. (188) *Note:* Subsequent processing is usually required to make the image visible.

electrosensitive recording: Recording in which an electrical signal is directly impressed on the record medium.

electrostatic recording: Recording by means of a signal-controlled electrostatic field. (188) *Note:* Subsequent processing is usually required to make the image visible.

electrothermal recording: That type of recording produced principally by signal-controlled thermal action. (188)

elemental area: In facsimile transmission systems, any segment of a scanning line, the dimension of which along the line is exactly equal to the nominal line width. (188) *Note:* An elemental area is not necessarily the same as the scanning spot.

elementary signaling element: *See* **unit interval.**

elevated duct: An atmospheric duct consisting of a high-density air layer that starts at high altitudes and continues upward or remains at high altitudes, thus affecting primarily very-high-frequency (VHF) transmission. [From Weik '89]

ELF: *Abbreviation for* **extremely low frequency.**

ELINT: *Acronym for* **electronics intelligence.**

elliptical polarization: In electromagnetic wave propagation, polarization such that the tip of the electric field vector describes an ellipse in any fixed plane intersecting, and normal to, the direction of propagation. (188) *Note 1:* An elliptically polarized wave may be resolved into two linearly polarized waves in phase quadrature with their polarization planes at right angles to each other. [2196] *Note 2:* Circular and linear polarization are special cases of elliptical polarization.

ELSEC: *Acronym for* **electronics security.**

E-mail: *Abbreviation for* **electronic mail**.

emanations security (EMSEC): The protection resulting from all measures designed to deny unauthorized persons information of value that might be derived from intercept and analysis of compromising emanations from other than crypto-equipment and telecommunications systems.

embedded base equipment: Customer-premises equipment that had been provided by the Bell Operating Companies prior to January 1, 1984, that was ordered transferred from the BOCs to AT&T by court order.

embedded customer-premises equipment: Telephone-company-provided premises equipment in use or in inventory of a regulated telephone utility as of divestiture (December 31, 1981).

embedded processor: In non-ADP equipment, a CPU and firmware that are critical to the operation of the equipment. *Note:* An embedded processor is not subject to FIRMR regulation when used for control of devices such as weapons systems, communications devices, home appliances, automobile diagnostics, *etc.*

EMC: *Abbreviation for* **electromagnetic compatibility.**

EMC analysis: Analysis of a system, subsystem, facility, or equipment to determine its electromagnetic compatibility (EMC) status. (188) *Note:* The EMC analysis may be theoretical analysis before construction or an empirical analysis after construction.

EMCON: *Abbreviation for* **emission control.**

EMD: *Abbreviation for* **equilibrium mode distribution.**

EME: *Abbreviation for* **electromagnetic environment.**

Emergency Broadcast System (EBS): The EBS is composed of AM, FM, and TV broadcast stations; low-power TV stations; and non-Government industry entities operating on a voluntary, organized basis during emergencies at national, state, or operational (local) area levels. [47CFR]

emergency locator transmitter (ELT): A transmitter of an aircraft or survival craft actuated manually or automatically that is used as an alerting and locating aid for survival purposes. [NTIA] [RR]

emergency position-indicating radiobeacon station: A station in the mobile service the emissions of which are intended to facilitate search and rescue operations. [NTIA] [RR]

EMI: *Abbreviation for* **electromagnetic interference.**

emission: 1. Electromagnetic energy propagated from a source by radiation or conduction. (188) *Note:* The emission may be either desired or undesired and may occur anywhere in the electromagnetic spectrum. **2.** Radiation produced, or the production of radiation, by a radio transmitting station. For example, the energy radiated by the local oscillator of a radio receiver would not be an emission but a radiation. [NTIA] [RR]

emission control (EMCON): The selective and controlled use of electromagnetic, acoustic, or other emitters to optimize command and control capabilities while minimizing, for operations security (OPSEC): (a) detection by enemy sensors; (b) to minimize mutual interference among friendly systems; and/or (c) to execute a military deception plan. [After JP1]

emission security: Protection resulting from all measures taken to deny unauthorized persons information of value which might be derived from intercept and analysis of compromising emanations from crypto-equipment, AIS, and telecommunications systems. [NIS]

emission spectrum: Of a radio emission, the distribution of power or energy as a function of frequency.

emissivity: The ratio of power radiated by a substance to the power radiated by a blackbody at the same temperature. (188)

EMP: *Abbreviation for* **electromagnetic pulse.**

emphasis: In FM transmission, the intentional alteration of the amplitude-vs.-frequency characteristics of the signal to reduce adverse effects of noise in a communication system. (188) *Note:* The high-frequency signal components are emphasized to produce a more equal modulation index for the transmitted frequency spectrum, and therefore a better signal-to-noise ratio for the entire frequency range.

EMR: *Abbreviation for* **electromagnetic radiation.**

EMR hazards: *Abbreviation for* **electromagnetic radiation hazards**

e.m.r.p.: *Abbreviation for* **effective monopole radiated power.**

EMS: *Abbreviation for* **electronic message system.**

EMSEC: *Acronym for* **emanations security.**

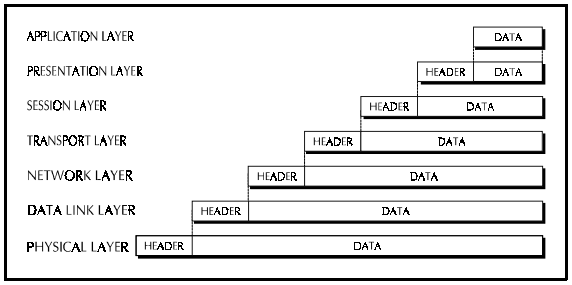
emulate: To duplicate the functions of one system with a different system, so that the second system appears to behave like the first system. *Note:* For example, a computer emulates another, different computer by accepting the same data, executing the same programs, and achieving the same results. *Contrast with* **simulate**.

EMV: *Abbreviation for* **electromagnetic vulnerability.**

enabling signal: A signal that permits the occurrence of an event.

en-bloc signaling: Signaling in which address digits are transmitted in one or more blocks, each block containing sufficient address information to enable switching centers to carry out progressive onward routing.

encapsulation: In open systems, the technique used by layered protocols in which a lower layer protocol accepts a message from a higher layer protocol and places it in the data portion of a frame in the lower layer.



OSI—Reference Model example of data encapsulation

encipher: [To] Convert plain text into an unintelligible form by means of a cipher. [NIS]

encode: 1. To convert data by the use of a code, frequently one consisting of binary numbers, in such a manner that reconversion to the original form is possible. (188) **2.** [To] Convert plain text to equivalent cipher text by means of a code. [NIS] **3.** To append redundant check symbols to a message for the purpose of generating an error detection and correction code.

encoder: *See* **analog-to-digital converter.**

encoding: *See* **analog encoding.**

encoding law: A law defining the relative values of the quantum steps used in quantizing and encoding signals.

encrypt: 1. [A] generic term encompassing encipher and encode. [NIS] **2.** To convert plain text into unintelligible forms by means of a cryptosystem. *Note:* The term "*encrypt*" covers the meanings of "*encipher*" and "*encode.*" [JP1]

end distortion: In start-stop teletypewriter operation, the shifting of the end of all marking pulses, except the stop pulse, from their proper positions in relation to the beginning of the next start pulse. (188) *Note 1:* Shifting of the end of the stop pulse is a deviation in character time and rate rather than an end distortion. *Note 2:* Spacing end distortion is the termination of marking pulses before the proper time. *Note 3:* Marking end distortion is the continuation of marking pulses past the proper time. *Note 4:* The magnitude of the distortion is expressed as a percentage of an ideal pulse length.

end exchange: *Synonym* **end office**.

end finish: For an optical fiber, the optical quality of the surface at the end of the fiber.

end instrument: A communication device that is connected to the terminals of a circuit. (188)

end office (EO): A central office at which user lines and trunks are interconnected. *Synonym* **end exchange.**

end-of-medium character: A control character that may be used to identify either the physical end of a data medium or the end of the usable or used portion of a data medium. [From Weik '89]

end-of-message function: In tape relay procedure, the letter and key functions, including the end-of-message indicator, that constitute the last format line. (188)

end-of-selection character: The character that indicates the end of the selection signal.

end-of-text character (ETX): A transmission control character used to terminate text.

end-of-transmission-block character (ETB): A transmission control character used to indicate the end of a transmission block of data when data are divided into such blocks for transmission purposes.

end-of-transmission character (EOT): A transmission control character used to indicate the conclusion of a transmission that may have included one or more texts and any associated message headings. *Note:* An EOT is often used to initiate other functions, such as releasing circuits, disconnecting terminals, or placing receive terminals in a standby condition.

endpoint node: In network topology, a node connected to one and only one branch. *Synonym* **peripheral node.**

end system (ES): A system containing the application processes that are the ultimate source and sink of user traffic. *Note:* The functions of an end system can be distributed among two or more processors or computers.

end-to-end encryption: The encryption of information at its origin and decryption at its intended destination without any intermediate decryption. (188)

end-to-end security: Safeguarding information in a secure telecommunication system by cryptographic or protected distribution system means from point of origin to point of destination. [NIS]

endurability: The property of a system, subsystem, equipment, or process that enables it to continue to function within specified performance limits for an extended period of time, usually months, despite a severe natural or man-made disturbance, such as a nuclear attack, or a loss of external logistic or utility support. (188) *Note:* Endurability is not compromised by temporary failures when the local capability exists to restore and maintain the system, subsystem, equipment, or process to an acceptable performance level.

endurable operation: *See* **endurability.**

end user: The ultimate user of a telecommunications service.

engineering channel: *Synonym* **orderwire circuit.**

engineering orderwire (EOW): *Synonym* **orderwire circuit.**

enhanced-quality television: *Synonym [in CCITT usage]* **improved-definition television.**

enhanced service: Service, offered over commercial carrier transmission facilities used in interstate communications, that employs computer processing applications that act on the format, content, code, protocol, or similar aspects of the subscriber's transmitted information; provides the subscriber with additional, different, or restructured information; or involves subscriber interaction with stored information. (188)

ENQ: *Abbreviation for* **enquiry character.**

enquiry character (ENQ): A transmission control character used as a request for a response from the station with which a connection has been set up. *Note:* The response may include station identification, the type of equipment in service, and the status of the remote station.

***E*/*N* ratio:** In the transmission of a pulse of an electromagnetic wave representing a bit, the ratio of (a) the energy in each bit, *E*, to (b) the noise energy density per hertz, *N*. *Note: E* is usually expressed in joules per bit and *N* is usually expressed in watts per hertz. Thus, the *E*/*N* ratio is hertz-seconds per bit. A joule is a watt-second and a hertz is a cycle per second. Thus, the *E*/*N* ratio is actually cycles per bit. However, if a cycle is a bit, then the *E*/*N* ratio is dimensionless. [From Weik '89]

entrance facility: The entrance to a building for both public and private network service cables (including antenna transmission lines, where applicable), including the entrance point at the building wall or floor, and continuing to the entrance room or entrance space. [After ANSI/TIA/EIA-568A]

entrance point: In a building, the point of emergence of telecommunications service cables through an exterior wall, floor slab, or from a rigid metal conduit or intermediate metal conduit. [After ANSI/TIA/EIA-568A]

entrance room: In a building, a space in which the joining of inter- and/or intrabuilding telecommunications backbone facilities takes place. *Note:* An entrance room may serve also as an equipment room. [After ANSI/TIA/EIA-568A]

envelope: The boundary of the family of curves obtained by varying a parameter of a wave. (188) *See figure under* **amplitude modulation.**

envelope delay distortion: Signal distortion that results when the rate of change of phase shift with frequency over the necessary bandwidth of the signal is not constant. (188) *Note:* Envelope delay distortion is usually expressed as one-half the difference between the delays of the two extremes of the necessary bandwidth.

environmental control: *See* **air-conditioning.**

environmental security: 1. The security that is inherent in the physical surroundings in which a facility or functional unit is located, such as on ships,

on aircraft, and in underground vaults, where locations by their nature provide a certain amount of protection against exploitation of compromising emanation even before other protective measures are implemented. **2.** The application of electrical, acoustic, physical, and other safeguards to an area to minimize the risk of unauthorized interception of information from the area. [From Weik '89]

EO: *Abbreviation for* **end office.**

EOT: *Abbreviation for* **end-of-transmission character.**

EOW: *Abbreviation for* **engineering orderwire.**

E-plane bend: *Synonym* **E-bend.**

epoch date: A date in history, chosen as the reference date from which time is measured. *Note 1:* An example of an epoch date is the beginning instant of January 1, 1900, Universal Time, for Transmission Control Protocol/Internet Protocol (TCP/IP). *Note 2:* TCP/IP programs exchange date or time-of-day information with time expressed as the number of seconds past the epoch date.

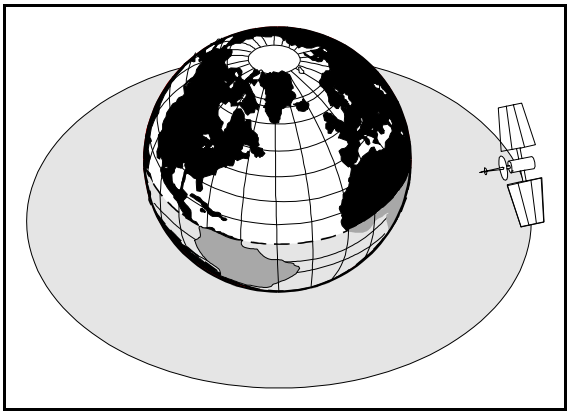
equal gain combiner: A diversity combiner in which the signals on each channel are added. *Note:* The channel gains can be made to remain always and everywhere equal so that the resultant signal remains approximately constant. (188)

equalization: The maintenance of system transfer function characteristics within specified limits by modifying circuit parameters. (188) *Note:* Equalization includes modification of circuit parameters, such as resistance, inductance, or capacitance.

equal-length code: A telegraph or a data code in which (a) all the words or code groups are composed of the same number of unit elements, (b) each element has the same duration or spatial length, (c) each word or code group has the same duration or spatial length, and (d) usually each word or code group has the same number of characters. [From Weik '89]

equal-level patch bay: An analog patching facility at which all nominal input and output voice frequency levels are uniform. (188) *Note:* The use of an equal-level patch bay permits patching without making transmission level adjustments.

equatorial orbit: For a satellite orbiting the Earth, an orbit in the equatorial plane. *Note:* An equatorial orbit has an inclination angle of 0°. (188)



equatorial orbit

equilibrium coupling length: *Synonym* **equilibrium length.**

equilibrium length: For a specific excitation condition, the length of multimode optical fiber necessary to attain equilibrium mode distribution. (188) *Note:* Equilibrium length is sometimes used to refer to the longest such length, as would result from a worst-case, but undefined, excitation. *Synonyms* **equilibrium coupling length, equilibrium mode distribution length.**

equilibrium mode distribution (EMD): That condition in a multimode fiber wherein after propagation has taken place for a certain distance, called the *"equilibrium length,"* the relative power distribution among modes becomes statistically constant and remains so for the course of further propagation down the fiber. *Note 1:* In practice, the equilibrium length may vary from a fraction of a kilometer to more than a kilometer. *Note 2:* After the equilibrium length has been traversed, the numerical aperture of the fiber's output is independent of the numerical aperture of the optical source, *i.e.*, beam, that drives the fiber. This is because of mode coupling and stripping, primarily by small perturbations in the fiber's geometry which result from the manufacturing and cabling processes.

Note 3: In the ray-optics analogy, the equilibrium mode distribution may be loosely thought of as a condition in which the "outermost rays" in the fiber core are stripped off by such phenomena as microbends, and only the "innermost rays" continue to propagate. In a typical 50-µm core multimode graded-index fiber, light propagating under equilibrium conditions occupies essentially the middle seven-tenths of the core and has a numerical aperture approximately seven-tenths that of the full numerical aperture of the fiber. This is why in-line optical attenuators based on the principle of gap loss may be ineffective or induce a lower-than-rated loss if they are inserted near the optical receiver. To be fully effective, gap-loss attenuators should be inserted near the optical transmitter, where the core is fully filled. [After FAA] *Synonym*s **equilibrium mode power distribution, steady-state condition.**

equilibrium mode distribution length: *Synonym* **equilibrium length**.

equilibrium mode power distribution: *Synonym* **equilibrium mode distribution.**

equilibrium mode simulator: For an optical fiber, a device or optical system used to create an approximation of the equilibrium mode distribution.

equipment clock: A clock that satisfies the particular needs of equipment and, in some cases, may control the flow of data at the equipment interface. (188)

equipment intermodulation noise: Intermodulation noise introduced into a system by a specific piece of equipment. (188)

equipment room: In a building, a centralized space for telecommunications equipment that serves the occupants of the building. *Note:* An equipment room is considered distinct from a telecommunications closet because of the nature or complexity of the equipment housed by the equipment room. [After ANSI/TIA/EIA-568A]

equipment side: The portion of a device that is directly connected to facilities internal to a station, such as the data terminal equipment (DTE) side of the DTE/data-circuit-terminating (DCE) interface, switches, and user end instruments.

equipotential ground plane: A mass, or bonded masses, of conducting material that offer a negligible impedance to current flow. (188) *Note:* Equipotential ground planes may be in direct contact with the earth or may be physically isolated from the earth and suitably connected to it.

equivalent network: **1.** In a system, a network that may replace another network without altering the performance of the system. **2.** A network with external characteristics that are identical to those of another network. **3.** A theoretical representation of an actual network. (188)

equivalent noise resistance: A quantitative representation in resistance units of the spectral density of a noise-voltage generator, given by $R_n = (\pi W_n)/(kT_0)$, where W_n is the spectral density, k is Boltzmann's constant, T_0 is the standard noise temperature (290 K), and $kT_0 = 4.00 \times 10^{-21}$ watt-seconds. *Note:* The equivalent noise resistance in terms of the mean-square noise-generator voltage, e^2, within a frequency increment, Δf, is given by $R_n = e^2/(4kT_0\Delta f)$.

equivalent noise temperature: The temperature, usually expressed in kelvins, of a hypothetical matched resistance at the input of an assumed noiseless device, such as a noiseless amplifier, that would account for the measured output noise. [From Weik '89]

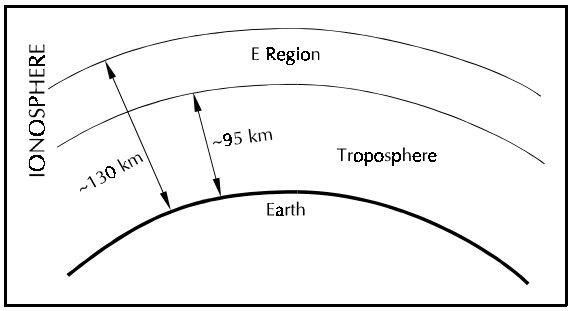
equivalent pulse code modulation (PCM) noise: The amount of thermal noise power on a frequency-division multiplexed (FDM) or wire channel necessary to approximate the same judgment of speech quality created by quantizing noise in a PCM channel. *Note 1:* The speech quality judgment is based on comparative tests. (188) *Note 2:* Generally, 33.5 dBrnC ± 2.5 dB is considered the approximate equivalent PCM noise of a 7-bit PCM system.

equivalent satellite link noise temperature: The noise temperature referred to the output of the receiving antenna of the Earth station corresponding to the radio-frequency noise power which produces the total observed noise at the output of the satellite link excluding noise due to interference coming from satellite links using other satellites and from terrestrial systems. [NTIA] [RR]

erase: 1. To obliterate information from a storage medium, such as to clear or to overwrite. (188) **2.** In a magnetic storage medium, to remove all stored data by (a) changing the medium to an unmagnetized state or (b) changing the medium to a predetermined magnetized state. **3.** In paper tape and punched card storage, to punch a hole at every punch position.

erect position: In frequency-division multiplexing, a position of a translated channel in which an increase signal frequency in the untranslated channel causes an increase signal frequency in the translated channel. (188) *Synonym* **upright position.**

E region: That portion of the ionosphere existing between approximately 95 and 130 km above the surface of the Earth. *Note:* The E Region lies between the D and F regions. (188) *Synonyms* **Heaviside layer, Kennelly-Heaviside layer.**



E region

erlang: A dimensionless unit of the average traffic intensity (occupancy) of a facility during a period of time, usually a busy hour. *Note 1:* Erlangs, a number between 0 and 1, inclusive, is expressed as the ratio of (a) the time during which a facility is continuously or cumulatively occupied to (b) the time that the facility is available for occupancy. (188) *Note 2:* Communications traffic, measured in erlangs for a period of time, and offered to a group of shared facilities, such as a trunk group, is equal to the average of the traffic intensity, in erlangs for the same period of time, of all individual sources, such as telephones, that share and are served exclusively by this group of facilities. *Synonym* **traffic unit.**

erroneous block: A block in which there are one or more erroneous bits.

error: 1. The difference between a computed, estimated, or measured value and the true, specified, or theoretically correct value. (188) **2.** A deviation from a correct value caused by a malfunction in a system or a functional unit. *Note:* An example of an error is the occurrence of a wrong bit caused by an equipment malfunction. (188)

error blocks: In video systems, a form of block distortion in which a block or blocks in the received image bear no resemblance to the current or previous scene and may contrast greatly with adjacent blocks.

error budget: The bit-error-ratio requirement allocated to the respective segments of a communications system, such as trunking, switching, access, and terminal devices, in a manner that satisfies the specified system end-to-end bit-error-ratio requirement for transmitted traffic. (188)

error burst: A contiguous sequence of symbols, received over a data transmission channel, such that the first and last symbols are in error and there exists no contiguous subsequence of *m* correctly received symbols within the error burst. (188) *Note:* The integer parameter *m* is referred to as the guard band of the error burst. The last symbol in a burst and the first symbol in the following burst are accordingly separated by *m* correct bits or more. The parameter *m* should be specified when describing an error burst.

error control: Any technique that will detect or correct errors.

error-correcting code: A code in which each telegraph or data signal conforms to specific rules of construction so that departures from this construction in the received signal can generally be automatically detected and corrected. *Note 1:* If the number of errors is less than or equal to the maximum correctable threshold of the code, all errors will be corrected. (188) *Note 2:* Error-correcting codes require more signal elements than are necessary to convey the basic information. *Note 3:* The two main classes of error-correcting codes are block codes and convolutional codes.

error-correcting system: In digital data transmission, a system employing either forward error correction (FEC) or automatic repeat-request

(ARQ) techniques such that most transmission errors are automatically removed from the data unit prior to delivery to the destination facility. (188)

error-detecting-and-feedback system: *Synonym* **ARQ.**

error-detecting code: A code in which each telegraph or data signal conforms to specific rules of construction, so that departures from this construction in the received signal can generally be detected automatically. (188) *Note:* Error-detecting codes require more signal elements than are necessary to convey the basic information.

error-detecting system: A system employing an error-detecting code and so arranged that any signal detected as being in error is either deleted from the data delivered to the data sink, in some cases with an indication that such deletion has taken place, or delivered to the data sink together with an indication that the signal is in error.

error message: In a computer or communications system, a message that indicates that an error has been made and, sometimes, the nature or type of error. [From Weik '89]

error rate: *Deprecated term. See* **error ratio.**

error ratio: The ratio of the number of bits, elements, characters, or blocks incorrectly received to the total number of bits, elements, characters, or blocks sent during a specified time interval. (188) *Note:* For a given communication system, the bit error ratio will be affected by both the data transmission rate and the signal power margin.

error signal: In computer and communications systems, an audio or visual signal that indicates that an error has been made by the system or its operator. *Note:* In most systems, the error signal accompanies an error message and is used to draw operator attention to the error message. [From Weik '89]

e.r.p. [*or* ERP]: *Abbreviation for* **effective radiated power.**

ES: *Abbreviation for* **end system, expert system.**

ESC: *Abbreviation for* **escape character.**

escape character (ESC): **1.** In alphabet coding schemes, a specially designated character, the occurrence of which in the data signifies that one or more of the characters to follow are from a different character code, *i.e.*, have meanings other than normal. **2.** In a text-control sequence of characters, a control character that indicates the beginning of the sequence and the end of any preceding text.

ESF: *Abbreviation for* **extended superframe.**

ESM: *Abbreviation for* **electronic warfare support measure.**

ESS: *Abbreviation for* **electronic switching system.**

essential service: A network-provided service feature in which a priority dial tone is furnished. *Note 1:* Essential service is typically provided to fewer than 10 % of network users. *Note 2:* Essential service is recommended for use in conjunction with NS/EP telecommunications services. *Synonym* **critical service.**

ETB: *Abbreviation for* **end-of-transmission-block character.**

Ethernet: A standard protocol (IEEE 802.3) for a 10-Mb/s baseband local area network (LAN) bus using carrier-sense multiple access with collision detection (CSMA/CD) as the access method, implemented at the Physical Layer in the ISO Open Systems Interconnection—Reference Model, establishing the physical characteristics of a CSMA/CD network. *Note 1:* Ethernet is a standard for using various transmission media, such as coaxial cables, unshielded twisted pairs, and optical fibers. *Note 2:* The IEEE-802.3 standard is based on a proprietary product with a similar name.

ETX: *Abbreviation for* **end-of-text character.**

evanescent field: In a waveguide, a time-varying field having an amplitude that decreases monotonically as a function of transverse radial distance from the waveguide, but without an accompanying phase shift. (188) *Note 1:* The evanescent field is coupled, *i.e.*, bound, to an electromagnetic wave or mode propagating inside the waveguide. *Note 2:* The evanescent field is a surface wave. *Note 3:* In fiber optics, the evanescent

field may be used to provide coupling to another fiber. [After 2196]

evanescent mode: A mode of the evanescent field. (188)

even parity: *See* **parity, parity check.**

event: 1. An occurrence or happening, usually significant to the performance of a function, operation, or task. (188) **2.** In Integrated Services Digital Networks (ISDN), an instantaneous occurrence that changes at least one of the attributes of the global status of a managed object. *Note:* An event (a) may be persistent or temporary, thus allowing for functions, such as surveillance, monitoring, and performance measurement, (b) may generate reports, (c) may be spontaneous or planned, (d) may trigger other events, and (e) may be triggered by one or more other events.

EW: *Abbreviation for* **electronic warfare.**

exalted-carrier reception: A method of receiving either amplitude- or phase-modulated signals in which method the carrier is separated from the sidebands, filtered and amplified, and then combined with the sidebands again at a higher level prior to demodulation. *Synonym* **reconditioned carrier reception.** (188)

exception condition: In data transmission, the condition assumed by a device when it receives a command that it cannot execute.

excess insertion loss: *Deprecated term. See* **insertion loss.** *Note: Excess insertion loss* was used to indicate that, in an optical-fiber coupler, the loss occasioned by dividing the input power among the ports is not the total insertion loss.

exchange: 1. A room or building equipped so that telephone lines terminating there may be interconnected as required. *Note:* The equipment may include manual or automatic switching equipment. (188) **2.** In the telephone industry, a geographic area (such as a city and its environs) established by a regulated telephone company for the provision of local telephone services. **3.** In the Modification of Final Judgment (MFJ), a local access and transport area.

exchange access: In telephone networks, access in which exchange services are provided for originating or terminating interexchange telecommunications within the exchange area.

exchange area: A geographic area served by one or more central offices within which local telephone service is furnished under regulation.

exchange facilities: The facilities included within a local access and transport area.

executive program: *Synonym* **supervisory program.**

exempted addressee: An organization, activity, or person included in the collective address group of a message and deemed by the message originator as having no need for the information in the message. *Note:* Exempted addressees may be explicitly excluded from the collective address group for the particular message to which the exemption applies.

existing quality television: *Synonym [in CCITT usage]* **distribution-quality television.**

expander: A device that restores the dynamic range of a compressed signal to its original dynamic range. (188)

expansion: The restoration of the dynamic range of a compressed signal to its original dynamic range.

expansion capability: The inherent limit for increasing the capacity of a system beyond its installed capacity. [NATO]

expedited data unit: In layered systems, a service data unit that is delivered to a peer entity in the destination open system before the delivery of any subsequent service data unit sent on that connection.

experimental station: A station utilizing radio waves in experiments with a view to the development of science or technique. This definition does not include amateur stations. [NTIA] [RR]

expert system (ES): A computer system that facilitates solving problems in a given field or application by drawing inference from a knowledge base developed from human expertise. *Note 1:* The term "*expert system*" is sometimes used synonymously with "*knowledge-based system,*" although it is usually taken to emphasize expert knowledge. *Note 2:* Some expert systems are able to improve their knowledge base and develop new inference rules based on their experience with previous problems.

express orderwire: A permanently connected voice circuit between selected stations for technical control purposes. (188)

extended area service (EAS): A network-provided service feature in which a user pays a higher flat rate to obtain wider geographical coverage without paying per-call charges for calls within the wider area.

extended binary coded decimal interchange code: *See* **EBCDIC.**

extended-definition television (EDTV): Television in which (a) improvements are made to the standard National Television System Committee (NTSC) television system, (b) the improvements are receiver-compatible with the standard NTSC television system, and (c) the improvements modify the standard NTSC television system emission standards. *Note 1:* EDTV improvements may include (a) a wider aspect ratio, (b) a higher picture definition than NTSC definition, and (c) any of the improvements used in improved-definition television (IDTV). *Note 2:* When EDTV signals are transmitted in the 4:3 aspect ratio, it is referred to as *"EDTV."* When transmitted in a wider aspect ratio, it is referred to as *"EDTV-Wide."*

extended superframe: A T-carrier framing technique in which framing requiring less frequent synchronization than the original T-carrier superframe format is provided for D-4 formatting and for on-line, real-time testing of circuit capability and operating condition. *Note:* Less-frequent synchronization frees overhead bits for use in testing and monitoring.

extension bell: In telephony, a user end device, separate from a subscriber telephone, which device produces an audible signal indicating that there is an incoming call from a switchboard or exchange. [From Weik '89]

extension facility: A facility that provides access to communications for a user or group of users isolated from a central communications node. (188)

extension terminal: A terminal that is added to an existing terminal and that uses the same circuit and address, *i.e.*, port and number, as the terminal to which it is added.

external timing reference: In a given communications system, a timing reference obtained from a source, such as a navigation system, external to the given system. *Note:* External timing references are usually referenced to Coordinated Universal Time .

extinction coefficient: The sum of the absorption coefficient and the scattering coefficient. [From Weik '89]

extinction ratio (r_e): The ratio of two optical power levels,

$$r_e = \frac{P_1}{P_2} \quad ,$$

of a digital signal generated by an optical source, *e.g.*, a laser diode, where P_1 is the optical power level generated when the light source is "on," and P_2 is the power level generated when the light source is "off." *Note:* The extinction ratio may be expressed as a fraction or in dB. [2196].

extra bit: *Synonym* **added bit.**

extra block: *Synonym* **added block.**

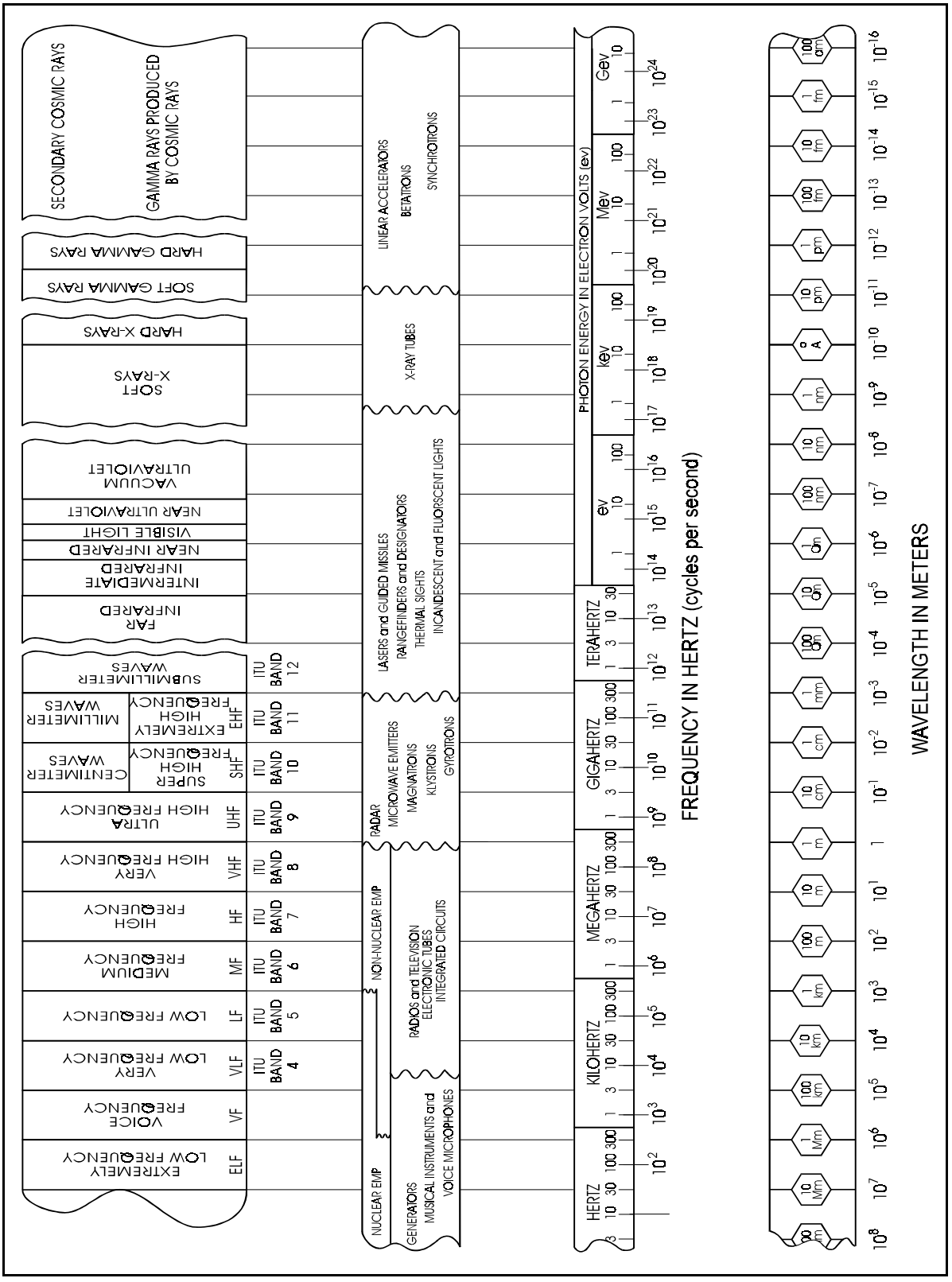
extremely high frequency (EHF): Frequencies from 30 GHz to 300 GHz. (188)

extremely low frequency (ELF): Frequencies from 30 Hz to 300 Hz. (188)

extrinsic joint loss: For an optical fiber, that portion of a joint loss that is not intrinsic to the fibers, *e.g.*, loss caused by end separation, angular misalignment, or lateral misalignment.

eye pattern: An oscilloscope display in which a pseudorandom digital data signal from a receiver is repetitively sampled and applied to the vertical input, while the data rate is used to trigger the horizontal sweep. (188) *Note:* System performance information can be derived by analyzing the display. An open eye pattern corresponds to minimal signal distortion. Distortion of the signal waveform due to intersymbol interference and noise appears as closure of the eye pattern.

eyes only: A message marker for a special-category message that is intended for delivery only to a specific person, or authorized representative of that person, and therefore no one else. [From Weik ’89]


SECONDARY COSMIC RAYS
GAMMA RAYS PRODUCED BY COSMIC RAYS
HARD GAMMA RAYS
SOFT GAMMA RAYS
HARD X-RAYS
SOFT X-RAYS
VACUUM ULTRAVIOLET
NEAR ULTRAVIOLET
VISIBLE LIGHT
NEAR INFRARED
INTERMEDIATE INFRARED
FAR INFRARED
SUBMILLIMETER WAVES
EXTREMELY HIGH FREQUENCY
MILLIMETER WAVES
SUPER HIGH FREQUENCY
CENTIMETER WAVES
ULTRA HIGH FREQUENCY
VERY HIGH FREQUENCY
HIGH FREQUENCY
MEDIUM FREQUENCY
LOW FREQUENCY
VERY LOW FREQUENCY
VOICE FREQUENCY
EXTREMELY LOW FREQUENCY
ELF
VF
VLF
LF
MF
HF
VHF
UHF
SHF
EHF
ITU BAND 4
ITU BAND 5
ITU BAND 6
ITU BAND 7
ITU BAND 8
ITU BAND 9
ITU BAND 10
ITU BAND 11
ITU BAND 12
NUCLEAR EMP
NON-NUCLEAR EMP
GENERATORS
MUSICAL INSTRUMENTS and VOICE MICROPHONES
RADIOS and TELEVISION ELECTRONIC TUBES INTEGRATED CIRCUITS
RADAR
MICROWAVE EMITTERS
IMAGINATIONS
KLYSTRONS
GYROTRONS
LASERS and GUIDED MISSILES
RANGEFINDERS and DESIGNATORS
THERMAL SIGHTS
INCANDESCENT and FLUORSCENT LIGHTS
X-RAY TUBES
LINEAR ACCELERATORS
BETATRONS
SYNCHROTRONS
HERTZ
KILOHERTZ
MEGAHERTZ
GIGAHERTZ
TERAHERTZ
FREQUENCY IN HERTZ (cycles per second)
PHOTON ENERGY IN ELECTRON VOLTS (ev)
ev
Kev
Mev
Gev
WAVELENGTH IN METERS
electromagnetic spectrum

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