

GLOSSARY

Acoustic detector: Detects vehicles by using microphones along with signal processing technology to listen for sounds associated with vehicles.

Active infrared detector: Detects vehicle by transmitting electromagnetic energy.

Add-a-lane: A general implementation approach whereby an HOV facility is created by adding roadway capacity to an existing freeway facility, usually by widening the freeway or modifying the median or outside shoulder. This is the primary way HOV facilities have been created.

Add-drop (multiplexer, unit): A device connected to a time division multiplexed channel which obtains data from the channel and provides data to the channel.

Address: The identification code for a specific drop on a multidrop line so the unit alone will respond to a transmitted message.

Aloha: A contention technique channel access control scheme.

Amplitude: The maximum value of a sine wave.

Amplitude Modulation (AM): A method of transmitting information by varying the strength of a carrier waveform in accordance with the instantaneous value of the intelligence-bearing signal.

Analog: Information represented by continuous and smoothly varying signal amplitude or frequency over a certain range; such as in human speech or music.

Area radio network: A point-to-multipoint radio communication system.

Articulated bus: An extra-long, high-capacity segmented bus that has the rear portion flexibly but permanently connected to the forward portion with no interior barrier to hamper movement between the tow parts. The seated passenger capacity is 60 to 80 persons with space for many standees, and the length is from 60 to 70 feet. The turning radius for an articulated bus is usually the same or less than that of a standard urban or inter-city bus.

Asynchronous data transmission: A mode of data transmission in which the time between sequential message characters is unpredictable.

Attenuation: The loss in signal strength (weakening of power) associated with the transmission process. Attenuation is usually expressed as the ratio of received signal strength to transmitted signal strength. This ratio is often expressed in decibels, a logarithmic unit for expressing dimensionless ratios.

Attenuation distortion: The distortion of a transmitted signal caused by the nonuniform loss or gain at different frequencies.

Automatic gain control: A circuit which enables a communication receiver to provide a steady level of output when the carrier level of the input signal varies.

Automatic Vehicle Identification (AVI): Vehicles equipped with transponders are identified when they come within range of a roadside communication unit. Most common application is for automatically

collected tolls on tollways; however, system is also used as a means of automatically collecting travel time information along freeways.

Automatic Vehicle Location (AVL): Enables the approximate location of a vehicle to be determined and tracked as it traverses the transportation network. Commonly used by emergency services and transit agencies to track location of vehicles. Also can be used to monitor traffic conditions by obtaining probe reports from vehicles traveling in the network.

Avalanche photodiode: A highly sensitive detector device used in fiber optic communication systems.

Average vehicle occupancy: The number of persons divided by the number of vehicles traveling past a selected point over a predetermined time period, usually expressed to two or three significant figures (e.g., 1.2 or 1.26).

Backbone: A high capacity communication system to which a number of drops are connected. The drops may service lower capacity distribution systems.

Bandwidth: (1) The range of signal frequencies that a medium or channel will respond to, or carry, without excessive attenuation. (2) The amount of green time available to a platoon of vehicles in a progressive signal system.

Barrier-separated HOV facility: An HOV lane that is physically separated from adjacent general purpose traffic by some type of barrier. A concrete barrier is the most commonly used approach, but wide buffers, moveable barriers, and pylons may be used. A barrier-separated HOV lane may

be a one direction/reversible facility or a two lane bi-directional facility.

Barrier separation: A physical barrier (either concrete or guard-rail) that is used to separate an HOV facility from general purpose freeway traffic.

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 signal speed equal to the number of signal symbols per second, which may or may not be equal to the data rate in bits per second.

Benefit-cost ratio: The ratio of the dollars of benefits achievable for a given outlay of costs, both of which have been adjusted to a common time increment.

Binary: A number system using the base 2; it is commonly used in computers and data communication.

Bit: A binary digit, the smallest element of information in a binary system. A "1" or "0" of binary data.

Bit error rate: The ratio of incorrectly transmitted bits to correctly transmitted bits.

Bit rate: The speed at which bits are transmitted, usually expressed in bits per second.

Broadcast: The simultaneous transmission of a message to all receivers on the channel.

Buffer-separated lane: A HOV lane that is separated from the adjacent mixed-flow freeway lanes by a designated buffer. Different widths of buffers are currently in use with various HOV lanes.

Buffer strip, HOV buffer separation: A roadway area that is used to physically separate an HOV lane from a regular use lane. Generally, no vehicles are allowed in this area, but if the buffer is sufficiently wide (more than 14 feet), it may be considered a refuge for disabled vehicles. The buffer strip is not considered a safe enforcement area.

Bus and carpool lanes, preferential lanes, or HOV lanes: A form of preferential treatment in which lanes on streets and highways are reserved for the exclusive use of high occupancy vehicles, transit buses, carpools, vanpools, or all of the above.

Bus lane (bus primary lane, preferential bus lane): A lane reserved primarily for buses, during at least portions of the day.

Bus priority system: A means by which transit buses are given an advantage over other traffic (e.g., preemption of traffic signals or bus priority lanes).

Busway: A separated roadway designed for exclusive or predominant use by buses in order to improve bus movement and travel times.

Bypass lane: See *queue bypass* (HOV)

Byte: A sequence of adjacent bits used to represent a single character of information. The most common byte sizes are 8 bits and 16 bits.

Cable loss: The loss or attenuation of signal power in a cable as a result of its electrical or optical properties.

Call box: Located at given locations along the side of a freeway. Motorist can request various services (such as police, fire, or ambulance) by pressing certain buttons.

Capacity: The maximum number of vehicles (vehicle capacity) or passengers (person capacity) that can pass over a given section of roadway or transit line in one or both directions during a given period of time under prevailing roadway and traffic conditions.

Carpool: Any vehicle, usually an automobile, carrying two or more occupants, including the driver, or a group of people sharing automobile transportation.

Carrier: A signal compressed of a single frequency. A characteristic of this signal is changed (modulated) in accordance with the information being transmitted.

Carrier detect: Indicates to the sender that the receiving modem has received the transmitting modem's carrier.

Carrier sense multiple access: A contention technique channel access control scheme.

Cellular radio: A communication technique using low power transmitters to service geographical areas or cells. Frequencies may be reused for other messages in non-adjacent cells.

Cellular telephone tracking: Uses radio frequency receivers and triangulation techniques to determine a vehicle's location by measuring signals resulting from cellular phone usage within a vehicle.

Central Business District (CBD): That portion of a city which serves as the primary activity center. Its land use is characterized by intense business activity that serves as a destination for a significant number of daily work trips.

Central communication unit: A unit commonly used at the traffic operations center coordinating the operation of time division multiplexed communication with field controllers.

Changeable message sign (CMS): See Dynamic message sign

Channel capacity: The maximum signal rate which a communication channel can sustain. It is usually measured in bits/sec.

Channel throughput: See “channel capacity.”

Channel: A path of communication from a transmitter to one or more receivers over a path. A frequency band or type of transmission is also a characteristic of a channel.

Checksum: A communication error detection technique.

Clear to send: The signal sent to the transmitting computer that both modems are ready to perform their functions and that transmission may begin.

Closed-Circuit Television (CCTV): Uses video cameras to provide visual surveillance of the freeway system.

Coax: See “coaxial cable.”

Coaxial cable: A cable with a single central conductor having a common axis with a second outer cylindrical conductor.

Code division multiplexing: A multiplex technique commonly used in spread spectrum radio communications which selects the appropriate signal from others in the same frequency band by means of a unique code.

Codec: A coder decoder. The terminology is commonly use for equipment which transmits and receives coded video information. Coding compresses the video information so that it may be transmitted over a digital channel with a lower bandwidth than would otherwise be required to carry the signal.

Collision: The simultaneous transmission and reception of signals by elements of a communications system based on contention techniques.

Coded TV: Signals encoded in connection with codecs. See “codec.”

Communication: Transfer of information from one location to another so that meaning is understood.

Communications architecture: An organization of communications channels and communication terminals.

Communications buffer: A register in a communications terminal which interfaces with a computer and provides temporary storage for data passing between these units.

Communications hub: A location at which data is transferred between backbone and distribution communications systems.

Communication medium: The composition of the path along which a communications signal is propagated, such as wire pair, coaxial cable, optical fiber, or airpath.

Communication overhead: That portion of the communication character stream which is provided for identification of the drop, control of symbol transmission and detection, and correction of errors.

Compliance rate: The number of eligible HOVs on an HOV facility divided by the number of total vehicles on the HOV facility (eligible and ineligible), expressed as a percent.

Concurrent-flow lane: An HOV lane that is operated in the same direction as the adjacent mixed-flow lanes, and is designed for use by HOVs during all or portion of the day. The lane is separated from the adjacent general-purpose freeway lanes by a standard lane stripe or a buffer. Concurrent-flow HOV lanes are usually found on the inside lane, but may also be on the outside lane.

Conduit: A cylindrical structure, usually of steel or polyvinyl chloride, which provides protection for communication cable.

Conditioned line: A communications cable specially compensated to provide improved transmission characteristics.

Connector: Hardware installed on cable ends to provide physical connection between electrical devices.

Contention: Communication systems which permit more than one transmitter to send simultaneously. Message interferences are detected and the signal is retransmitted at a later time.

Contiguous flow lane: A non-separated concurrent flow lane (also see non-separated lane).

Contraflow lane: A lane on which, during certain hours of the day, HOVs operate in a direction opposite to that of the normal flow of traffic (commonly the inside lane in the off-peak direction of travel). For freeway applications, the lane is typically separated from the opposing direction travel lanes by pylons or movable concrete barrier.

Crosstalk: Interference or presence of unwanted signals from one transmission channel, detected on another (usually parallel) channel.

Cyclic redundancy code: A commonly used error detection code included in the transmitted signal.

Decibel: A logarithmic unit for the ratio of two powers.

Delay: The time lost by a person or a vehicle during travel due to circumstances which impede the desirable movement of traffic. It is the travel time difference between congested and free-flow travel times.

Demodulation: The process of extracting transmitted information from a modulated carrier signal. The opposite of modulation.

Diamond: A uniform traffic control symbol used on signing and pavement markings to designate the restricted usage on preferential (HOV) facilities.

Dielectric: An insulator occupying the space between two conductors such as the inner and outer conductors of coaxial cable.

Digital: Information in discrete or quantized form; not continuous.

Directional coupler: Combines signals propagating in one direction on a cable onto another cable while substantially isolating signals from the opposite direction.

Dispersion: A general term for those phenomena that cause a broadening or spreading of light as it propagates through an optical fiber.

Distortion: An unintended modification to the wave form of a communications signal

caused by the media or by devices in the transmission path of the signal.

Distribution system: The portion of the communication system which services the field traffic controller.

Download: The transmission of messages from the control center or field master to a local controller for intermediate or long term storage in the local controller.

Drop: Receiver on a transmission line. A drop may also act as a transmitter in a two-way communications network.

Dynamic message sign (DMS): Signs that use electronics or mechanics to vary the visual word, number, or symbolic display as traffic conditions warrant. The term is used interchangeably with changeable message signs and variable message signs.

Dynamic range: The range of signal levels for which a receiver function properly. The lowest signal level is determined by noise level considerations and the upper level is determined by detector or receiver distortion, saturation, or power level limitations.

Earth station: The terrestrial equipment component of a satellite-based communication system.

Electromagnetic spectrum: The entire available range of sinusoidal electromagnetic wave frequencies.

Electromagnetic wave: Electric and magnetic waves are time varying electric and magnetic fields in a volume of space which are related by Maxwell's equations. Electromagnetic fields provide the basis for the wire line, wireless, and optical communication technologies.

Embedded detector: Traffic detector system that consists of sensors in or below the surface of the roadway.

Emergency telephone: Located at given locations along the side of a freeway. Motorists can contact a dispatcher to report conditions and request help.

Enforcement: The function of maintaining the rules and regulations to preserve the integrity of a preferential (HOV) facility.

Enforcement area: A dedicated space in which enforcement can be performed. Enforcement areas can be delineated within an available shoulder or provided at specific locations.

Environmental detectors: Used to detect adverse weather conditions such as ice, fog, or flooding.

Error control: The methodology of detecting communication system errors and responding to this information.

Error detection: The process by which sufficient redundant or check information is included with data that are transmitted so that the receiver can, within certain ranges of error, identify erroneously received data.

Exclusive facility, freeway right-of-way: An HOV roadway or lane(s) located within a freeway right-of-way that is physically separated from the general purpose freeway lanes and designated for HOVs for all or portions of the day. Physical separation is usually via a concrete barrier, but separation can also be via a wide painted buffer. Examples include those located in Hartford, Connecticut and on the Shirley Highway in northern Virginia. (See also *barrier-separated facility* and *buffer-separated facility*).

Exclusive facility, separate right-of-way:

An HOV roadway or lane(s) located in a separate right-of-way that is usually, but not always, designated for the exclusive use by buses. The facility is typically operated two-way and includes two lanes. Examples of this facility are located in Ottawa, Ontario and Pittsburgh, Pennsylvania. (See also *busway*).

Exclusive lane: A preferential lane separated by a wide buffer or physical barrier from general purpose lanes. (see also *barrier-separated lane* and *buffer-separated lane*)

Express bus service: Bus service with a limited number of stops, either from a collector area directly to a specific destination or in a particular corridor with stops en route at major transfer points or activity centers. Express bus service is usually routed along freeways or HOV facilities where they are available.

Fading: Variation in the field strength or other properties of a received radio wave signal as a result of changes in the electromagnetic field propagation characteristics of the transmission path with time.

Fiber optics: Technique for the transmission of light from a transmitting source through a bundle of tiny and flexible glass fibers.

Forward error control: A form of error detection and control which uses codes in the transmitted message to correct the errors. It is useful for certain types of errors.

Freeze frame video: A transmission process for video signals over voice grade channels. Periods of time extending from several

seconds to approximately one minute may be required. Also known as “slow scan” video.

Frequency: The number of oscillations of a signal per unit of time: usually expressed in cycles per second (cps) or Hertz (Hz).

Frequency band: The range of frequencies occupied by a signal or which can be transmitted by a communication channel.

Frequency division multiplexing: Divides the total channel bandwidth into a series of subchannels, each of which occupies a subband of frequencies.

Frequency Modulation (FM): A method of data transmission whereby the frequency of a sinusoidal waveform (carrier) is changed in accordance with the information that is to be transmitted.

Frequency Shift Keying (FSK): The binary form of frequency modulation, in which a 0 is represented by one frequency and a 1 represented by another frequency.

Full duplex: A transmission link providing simultaneous transmission and reception in both directions.

Gas discharge tube: A device used to protect electronic field devices from electrical transients on the communication or power lines.

General purpose, mixed-flow, mixed-use lane: Lanes adjacent to or affected by an HOV facility that are available for use by all vehicles (i.e., single-occupancy vehicles, HOVs transit, trucks, etc.).

Graded index fiber: An optical fiber whose core has a nonuniform index of refraction. The core is composed of concentric rings of glass whose refractive indices decrease from

the center axis. The purpose is to reduce dispersion and thereby increase fiber bandwidth.

Guard band: A region of unused frequencies that separates the different frequency regions within an FDM transmission system. The guard bands facilitate the separation of the signals.

Half duplex: A transmission link providing both transmission and reception in both directions, but not simultaneously.

Half power point: The upper and lower frequencies which identify the bandwidth of a communication channel or receiver. The power level of the channel or amplification of the receiver at these frequencies is at 50 percent of the highest value.

Harmonic: Frequencies other than the fundamental basic frequency of a repetitive wave. When the waveform of the fundamental departs from a sine wave, harmonics are introduced at integer multiples of the fundamental frequency.

Headway: The time or distance spacing between successive vehicles in a given traffic lane measured from the front of the vehicles.

Hertz (Hz): A measure of frequency. One Hertz equals one cycle per second.

Highway Advisory Radio (HAR): A low-powered radio (generally AM) station devoted to presenting travel-related information to the public.

High Occupancy Vehicle (HOV): Motor vehicles carrying at least two or more occupants including the driver. An HOV could be a transit bus, vanpool, carpool or any other vehicle that meets the minimum occupancy requirements, usually expressed

as either two or more, three or more, etc., persons per vehicle.

High-Occupancy Vehicle (HOV) lane: A preferential lane that is reserved for the use of high-occupancy vehicles.

High-Occupancy Vehicle (HOV) system: The collective application of physical facilities to support HOV operations, including HOV lanes, park-and-ride lots, park-and-pool lots, and/or other supporting facilities that are administered so as to effectively integrate all physical elements into a unified whole.

Hub: See "Communication hub."

Incident detection algorithm: Computer software developed to automatically identify incidents on the basis of field data received from detection equipment.

Index of refraction: The ratio of the velocity of light in free space to the velocity of light in a given material.

Inductive loop detector: Coil of cable embedded in the pavement surface that creates a magnetic field. Vehicle is detected when this magnetic field is disturbed.

Information theory: a mathematical treatment of the generation of information and the limitations on its transmission rate over communication channels.

Injection laser diode: An electronic transmitting device used for fiber optic communication.

Input/output unit: That portion of an electronic communication unit which interfaces with a digital computer.

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

Interference: A disturbance that changes the shape of a communications transmission wave.

Junction box: A mechanical unit, usually installed in the ground, which provides an enclosure for connection at cable junctions.

Kiosks: Video monitors mounted on a cabinet, in a wall, or on a counter top which travelers can access and request travel-related information

Kiss-and-ride: An access mode to transit whereby passengers (usually commuters) are driven to a transit stop and left to board the vehicle, then met after their return trip.

Land-line: A communications medium consisting of twisted-wire pairs, fiber optics or coaxial cable.

Lane: A portion of a street or highway, usually indicated by pavement markings, that is intended for one line of vehicles.

Leased channels (also leased lines): Communication channels which are leased from a communications service carrier or supplier such as the telephone company. The lessee has the full time use of these channels during the lease period. Maintenance of the channels is performed by the communications service carrier.

Level of Service: A descriptive measure of the quality and quantity of transportation service provided the user that incorporates finite measure of quantifiable characteristics such as travel time, travel cost, number of transfers, etc. Operating characteristics of

levels of service for motor vehicles can be found in the latest edition of the *Highway Capacity Manual*, Transportation Research Board Special Report.

Light Emitting Diode (LED): A solid state device with illumination properties similar to that of a low power incandescent lamp.

Linear drop: Nodes connected in a string or chain with transmission data being “dropped” at a designated node.

Link control signals: Modem control signals which control or identify modem states to establish the need for communication, its direction, and the readiness state of the modem.

Local exchange carrier (LEC): The seven Regional Bell Operating Companies and independent telephone companies which provide “local” telephone service.

Longitudinal redundancy check: A communication error detection technique.

Magnetometer: Small cylinders containing sensor coils that operate in a manner similar to inductive loops. Developed as alternative to loop detectors for special situations.

Medium: See “Communications medium.”

Messenger cable: A structural cable used to support communication cable installed on poles or bridges.

Microwave: Electromagnetic energy occupying the frequency band ranging from approximately 225 Mhz to 100 Ghz.

Microwave radar: Transmits electromagnetic energy toward vehicles on roadway. Traffic parameters are calculated

by measuring the return signal frequency from vehicles.

Mixed-flow, mixed-use: See *general purpose*.

Mode: A particular form of travel (i.e., walking, bicycling, traveling by bus, traveling by carpool, traveling by train, etc.).

Mode shift: The shift of people from one mode to another (i.e., non-separated single-occupancy vehicles to HOVs or vice versa).

Modem: A device used at both ends of a communications channel to transmit and receive data. Contraction of Modulator Demodulator.

Modulation: The process by which a characteristic of one wave (the carrier) is modified by another wave (the signal).

Multimode fiber: A type of optical fiber that supports more than one propagating mode.

Multipath transmission: Rapid transmission along a path other than the direct path between transmitter and receiver, often used by reflection and by various atmospheric effects. It may result in fading or interference.

Multiple access contention: See “contention.”

Multiplexing: A communications technique which allows more than one item of information to be transmitted or received over the same channel.

NEMA controller: A traffic signal controller conforming to the NEMA TS1 or NEMA TS2 standard specification. NEMA

is the abbreviation for National Electrical Manufacturers Association.

Node: See “Communications hub.”

Noise: Unwanted signals not present in the original transmitted information; disturbances that tend to interfere with normal operations of the communication system.

Nonintrusive detector: Traffic detector system that consists of sensors mounted on a structure above the pavement.

Non-proprietary protocol: A communication protocol available to all prospective users and for which technical information is available.

Nonrecurring congestion: Caused by a random event (e.g., incident, maintenance activity, special event, etc.) and has the effect of reducing capacity on a specific section of freeway.

Nonseparated (HOV) lane: An HOV lane that is not separated from adjacent mixed-flow freeway lanes (i.e., delineation is via a standard dashed pavement stripe).

Occupancy: Percent of time a given section of roadway is occupied.

Off-peak direction: The direction of lower demand during a peak commuting period. In a radial corridor, the off-peak direction has traditionally been away from the CBD in the morning and toward the CBD in the evening.

Packet radio: A radio data transmission technique based on sending data in defined groups or “packets.” This technique is often used to provide all transmitters on the channel the opportunity to access the channel when they have data to transmit.

Parallel data transmission: A method of simultaneously transmitting all of the bits that make up a digitally encoded character. Parallel transmission requires a separate wire for carrying each bit.

Parity: A communication error detection technique.

Park-and-pool lots: Facilities where individuals can rendezvous to utilize carpools and vanpools except the lot is not served by public transportation.

Park-and-ride lots: Facilities which serve as a transfer terminal for automobiles and bikes and which are normally served by public transportation. They can include spaces used by persons transferring to carpools or vanpools whether officially designated for that purpose or not.

Passive infrared detectors: Do not transmit energy, but detect vehicles by measuring the amount of energy emitted by objects in the field of view.

Peak hour: That hour during which the maximum amount of travel occurs. It may be specified as the morning peak hour or the afternoon or evening peak hour.

Peak period: The period during which traffic levels rise from their normal background levels to maximum levels. These periods are for morning, evening, and mid-day peaks and include the appropriate peak hours.

Personal Data Assistants (PDAs): Computer products with radio frequency communications to allow users to obtain various types of travel information.

Phase: The fractional part of the period of sine wave which has elapsed since the wave had the value of zero.

Phase Modulation (PM): A technique to transmit information using a sine wave carrier. The sine wave has its phase changed in accordance with the information to be transmitted.

Pixel: The smallest area on the screen of a graphics CRT display that can be discretely displayed.

Polarity: The sign of the voltage rise from a reference point (usually ground) to a point in a circuit.

Polling: A centrally controlled technique of sequentially calling a number of drops to permit them to transmit information back to a field master or to the traffic operations center.

Polling cycle: The time period required to poll all of the drops on a channel one time.

Power budget: A convenient methodology for analyzing the power reception and signal to noise ratio capability of a communication link.

Power fading: See "fading."

Power margin: The difference between the power received and the power required for reception.

Preferential parking: Parking lots or spaces reserved exclusively for HOVs only as a means to encourage ridesharing. They are usually located closer to a terminal or building entrance than other vehicle spaces and may also enjoy a reduced parking fee.

Preferential treatment: In transportation, giving special privileges to a specific mode or modes of transportation (e.g., bus lanes or signal preemption at intersections).

Presence: Detection mode in which signal from traffic detector is sent as long as the vehicle is in the detection area. Used to measure volume and occupancy.

Present worth factor: A coefficient used in engineering economics which relates a uniform series of end of period payments to value of those payments at the present time. Also known as “uniform-series present worth factor.”

Private line: See “leased channel.”

Processing gain: In spread spectrum communications, processing gain is a measure of the additional noise penetrability achieved by the use of additional bandwidths and coding schemes.

Proprietary protocol: A communication protocol which is the intellectual property of a communication manufacturer or supplier and which is not available for use by others.

Protected ring: Two rings used instead of one, thereby providing two unidirectional transmission paths that may run in opposite directions.

Protocol: A set of codes, procedures, and relative timing relationships by which data are transmitted over a communication channel, such as a twisted pair wire, fiber optic, etc.

Pulse: Detection mode in which a short signal from the traffic detector is sent when a vehicle is detected. Typically used to provide volume counts.

Pulse dispersion: See “dispersion.”

Queue: A line of waiting vehicles or persons, e.g., traffic at a bottleneck location or signal, or buses at a park-and-ride facility, or persons in line to board a bus.

Queue bypass: An HOV facility that provides a bypass around a queue of vehicles delayed at a ramp meter, toll plaza, bridge, tunnel, ferry landing, or other bottleneck location.

Queue bypass lane: See *queue bypass*.

Ramp metering: A system used to reduce congestion on a freeway facility by managing flow from on-ramps. An approach ramp is equipped with a metering device or a traffic signal that allow the vehicles to enter a facility at a controlled rate.

Ramp meter bypass: A form of preferential treatment in which bypass lanes are provided at a ramp meter for the exclusive use of high-occupancy vehicles.

Real-time expert system: Software that provides decision support for operations personnel.

Receiver: A part of the communication system which accepts and translates (decodes) signals into commands or data functions.

Receiver sensitivity: The minimum optical power required to achieve a specified level of performance, such as a Bit Error Rate.

Recurring congestion: Typically predictable and occurs at locations where demand exceeds capacity, or at geometric bottlenecks (e.g., lane drops, high-volume entrance ramps, etc.).

Refraction: The change in direction of an electromagnetic wave resulting from changes in the velocity of propagation of the medium through which it passes.

Regeneration: The process of demodulating and remodulating a digital signal for retransmission.

Remote Communication Unit (RCU): A field receiving and field equipment interface commonly used for traffic system communications. It converts communication signals into signals which are used by field equipment such as controllers and converts detector and controller state data into communication signals.

Repeat transmission: A communication error detection technique.

Repeater: A device used to amplify and/or regenerate attenuated signals.

Repeater amplifier: A device used to amplify attenuated signals.

Request to send: A signal from the computer indicating it wants to send data.

Reversible-flow lane: A lane on which the direction of traffic flow can be changed to match the peak direction of travel during peak traffic periods.

Reversible lane: See lane, reversible flow

Ridesharing: The function of sharing a ride with other passengers in a common vehicle. The term is usually applied to carpools and vanpools.

Rodding: Use of a probe to test or clean communication conduits or duct.

Separated roadway, barrier separated facility: A physically-separated, access-controlled, HOV facility. It is usually located in the median of an urban freeway and separated from the regular travel lanes with a barrier. They can be used either as single-lane, reversible flow facilities or as two-way, single (or multiple) lane facilities.

Serial data transmission: A method of digital data transmission whereby the bits that represent an item of information are transmitted sequentially over a single channel.

Serial port: A portion of a computer, modem, or device which is used to interface the serial communication bit stream with the functional circuitry of the device.

Service patrol: Utilize public or private vehicles (i.e., pickup trucks, vans, or tow trucks), and operate on mobile patrol or on standby to handle incidents and provide motorist assistance.

Settling time: The time required to reverse the direction of transmission in a half duplex system.

Shoulder lane: An HOV lane that is created on an existing median or outside shoulder of a freeway.

Signal: The physical form of the data or message carried by the communication channel.

Signal preemption: A technique for altering the sequence or duration of traffic signal phasing using vehicle detection in order to provide preferential treatment for buses and emergency vehicles.

Signal-to-Noise-Ratio (SNR): The ratio of signal power to noise power at a communication receiver. A measure of the quality of a communications channel that regulates the received signal strength to the strength of the unwanted signals (noise) that combine with the desired signal during transmission.

Simplex: A transmission channel capable of transmission and reception in one direction only.

Single mode fiber: An optical fiber that supports only one mode of light propagation.

Slotted aloha: A contention technique channel access control scheme.

Slow scan video: See “Freeze frame video.”

Speed: Rate of motion. Ratio of travel distance and travel time.

Splice: An interconnection method for joining the ends of communication cables.

Splitter: A device for bifurcating a wireline communication channel into separate physical paths.

Spread spectrum radio: A technique for spreading the power of a radio channel over a bandwidth which is many times the bandwidth required to communicate at the signal rate. The transmitted power density (watts per cycle) is low.

Star: Communication links emanated from a source node (e.g., traffic operations center) to multiple secondary nodes.

Start bit: A flow control bit forming a portion of the communication protocol.

Stop bit: A flow control bit forming a portion of the communication protocol.

Study period: The time during which a study is being conducted which could be one or more parts of a day, all day, or more than a day.

Support facility: A facility that enhances HOV operation, including park-and-ride lots, park-and-pool lots, transfer terminals, or other physical improvement that is considered a supporting element of the operation.

Support program: Any of a number of services that enhance the public acceptance or usage of the HOV system, including ridesharing, employer-sponsored programs, public information, and marketing.

Surveillance, Communications and Control (SC&C): A remotely operated system of monitoring and managing the operation of an HOV and/or freeway facility to better assure acceptable traffic operation and improved responsiveness to incidents. Major elements are (a) Surveillance — collection and processing of data by detectors and visible verification by closed circuit television; (b) Communications — presentation of operational information to motorists through signs, delineation, signals, and/or auditory means; and (c) Control—application of traffic restraints or direction of flow by signs, barrier gates, and signals.

Switched telephone line: A commercially available telephone channel providing dial-up service.

Symbol: A single unit communication transmission format.

Synchronization: In synchronous data transmission, the process by which a transmitter and a receiver coordinate their operation so as to properly identify the bits and characters that make up a digitally transmitted message.

Synchronous data transmission: A type of data transmission in which there are no start and stop bits. Timing is derived through synchronizing characters at the beginning of each message or block of data.

T1 (system): A standard digital signal transmission hierarchy which permits signals to be sent at the various rates described in the standard.

Take-a-lane: A general implementation approach whereby an HOV facility is created by consuming or borrowing use of a mixed-flow lane on a freeway facility, usually by pavement markings and signing. This approach has rarely been applied.

Tap: A signal splitting device which permits a small amount of power to be siphoned from a communication line for use at a local drop point.

Telco central office: A location which terminates communication lines to customers. A switched or leased line is routed from the customers' facility to a central office. Connections are made between central offices before the line is routed to its destination.

Telephone central office: See "Telco central office."

Terrestrial microwave link: A microwave link with both termini on the earth (as compared with a satellite).

Thermal noise: Thermal agitation of electrons in the load resistance of the receiver.

Time division multiplexing: Shares time on a channel and enables a traffic operations center or field master to communicate at different times with each controller on a communication channel.

Traffic Management System (TMS): Any of various measures to improve the operation of a facility without construction of additional roadway lanes, such as: dynamic message signs (DMS), ramp metering and closed-circuit camera surveillance, and loop detection to detect and respond to emergencies.

Transient: A voltage of short duration. Often used to describe extraneous voltages appearing on the signal lines resulting from lightning and similar disturbances.

Transmitter: A part of the communication system which provides the transmission signal power to the modulated waveform.

Transportation Demand Management (TDM): The operation and coordination of various transportation system programs to provide the most efficient and effective use of existing transportation services and facilities. TDM is one category of traffic system management actions.

Transportation System Management (TSM): Actions that improve the operation and coordination of transportation services and facilities to effect the most efficient use of the existing transportation system. Actions include operational improvements to the existing transportation system, new facilities, and demand management strategies.

Trunk: A transmission link joining two points, which is distinguished by its large information carrying capacity and by the fact that all signals go from point to point without branching off to any separate drops except at the end points.

Turnaround time: See “settling time.”

Two-way HOV facility: An HOV facility in which both directions of traffic flow are provided for at least during portions of the day (see also bi-directional).

Ultrasonic detector: Transmits sound waves and detects vehicle by measuring return waves.

Unprotected ring: Each node (i.e., communications hub or traffic control equipment) is connected to two others by a uni-directional transmission link, creating a “closed” loop.

Upload: A periodic transmission of data from the field controller to the traffic operations center or field master.

Vanpool: A prearranged ridesharing function in which a number of people travel together on a regular basis in a van, usually designed to carry six or more persons.

Variable message signs (VMS): See Dynamic message signs

Vehicle probes: Vehicles on given freeway section act as moving sensors (or probes) to provide information about traffic conditions.

Video compression: The processing of video data by codecs to achieve lower communication signal rates. See “codec.”

Video grade channel: A communication channel which transmits signals with the approximate frequency range of 300 Hz to 3000 Hz.

Video image processing: Image processors receive information from video cameras and use algorithms to analyze the video image input.

Violation: An infraction of the rules and regulations for roadway use. In an HOV context, a violation can include vehicle and occupancy eligibility.

Violation Rate: The total number of violators divided by the total number of vehicles in an HOV lane or lanes.

Volume: Number of vehicles passing a given point over a period of time.

Wavelength: The physical length of an electromagnetic wave.

ABBREVIATIONS

AASHTO: American Association of State Highway and Transportation Officials

CBD: Central Business District

DOT: Department of Transportation

FHWA: Federal Highway Administration

FTA: Federal Transit Administration (formerly UMTA)

ITS: Intelligent Transportation Systems

LOS: Level of service

LRT: Light rail transit

MUTCD: Manual on Uniform Traffic Control Devices

MPH: Miles per hour

P&P: Park-and-pool

P&R: Park-and-ride

ROW: Right-of-way (also R.O.W.)

RRT: Rapid rail transit

TDM: Transportation demand management

TSM: Transportation system management

UMTA: Urban Mass Transportation Administration

VPH: Vehicles per hour

VPHPL: Vehicles per hour per lane

3+: Three or more persons per vehicle

2+: Two or more persons per vehicle