

# EXHIBIT 50

# HARGRAVE'S COMMUNICATIONS DICTIONARY

Frank Hargrave



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**multiple access**

allowed only for reading files. If users are allowed to make changes to a file, some sort of locking mechanism is required to prevent users from interfering with each other's work. (4) The connection of a user to two or more switching centers by separate access lines using a single message routing indicator or telephone number.

**multiple call** A synonym for a *conference call*.

**multiple circuit** Two or more circuits connected in parallel.

**multiple frame transmission** The transmission of more than one frame when the token is captured by a node in a Token Ring access system.

**multiple frequency shift keying (MFSK)** Frequency shift keying (FSK) in which multiple frequencies are used in the transmission of digital signals. Several schemes are used to establish these multiple code levels. For example,

- The sequential transmission of any one of a family of frequencies, each of which represents a particular code state. Two frequencies allow the transmission of two states (normal binary FSK), four frequencies allow the transmission of 2 bits, eight frequencies enable 3 bits, and so on.
  - The concurrent transmission of a number of frequencies within a specified family. For example, a family of four discrete frequencies taken two at a time allows six discrete transmission states, five frequencies allows 10 states, six frequencies allows 15 states, and so on.
- DTMF is an example of this type of signaling. It uses eight frequencies arranged in two groups. Two frequencies (one from each group) are transmitted for each of the 16 possible symbols.

**multiple link interface (MLI)** Part of the *Open Data-link Interface (ODI, ODLI)* generic network driver interface. It sits under the *link-support layer (LSL)* which deals with the protocol stacks, while the *MLI driver (MLID)* deals with the various network interface cards, or adapters, that support ODI.

**multiple logical terminals (MLT)** A feature of an IBM 3174 establishment controller, in a System Network Architecture (SNA) environment that allows control user terminal (CUT) components to support multiple sessions simultaneously.

**multiplex (MUX)** To interleave or simultaneously transmit two or more messages on a single communications channel.

**multiplex aggregate bit rate** In a time division multiplexer, the bit rate that is equal to the sum of all selected input channel data signaling rates available to the user plus the rate of all overhead bits required.

**multiplex baseband (1)** In frequency division multiplexing, the frequency band occupied by the aggregate of the signals in the line interconnecting the multiplexer and the next device of the system. (2) In frequency division multiplexed carrier systems, the frequency band presented to the input to any stage of frequency translation.

For example, in telephony's analog multiplex hierarchy each of the 12 4-kHz voice frequency input channels is the baseband to the group multiplexer. The aggregate output consists of a band of frequencies from 60 to 108 kHz. This is the group level baseband that results from combining the 12 voice frequency input channels. Five group-level baseband signals are multiplexed into a supergroup having a baseband of 312 to 552 kHz. Ten supergroups are in turn multiplexed into one master group, the output of which is a baseband that may be used to modulate a microwave frequency carrier or may be further multiplexed. See also *multiplex hierarchy*.

**multipoint access**

**multiplex hierarchy** The structure of the frequency division multiplex method used in analog carrier systems. That is,

MULTIPLEX HIERARCHY		
	U. S.	ITU
1 Jumbo group	6 Mastergroups (3600 channels)	6 Mastergroups (1800 channels)
1 Mastergroup	10 Supergroups (600 channels)	5 Supergroups (300 channels)
1 Supergroup	5 groups (60 channels)	5 groups (60 channels)
1 group	12 channels	12 channels
1 channel	300-3400 Hz	300-3400 Hz

See also *group*.

**multiplexer (MUX)** A device that allows several users to share a single resource (such as a communications circuit). It combines (or funnels) multiple input data streams into an aggregate stream for transport over a single communication channel. At the receiving end, another *multiplexer* separates the single data stream into its constituent parts and directs each on to its destination.

- A device that interleaves two or more signals on a single path.
- A device for selecting one of a number of signal sources and switching it to an output.

**multiplexing** The process of combining several signals from separate sources into a single signal suitable for delivery on a transmission system and subsequent recovery of the original signals at their respective destinations. The transmission facility is divided into two or more channels such that several independent signals may be transported essentially simultaneously. There are several methods of accomplishing the *multiplexing* task. For example,

- *Code division multiplexing* is accomplished by using two stages of modulation. That is, the data of each channel are first impressed onto a unique *pseudorandom sequence*. Then the carrier is modulated by this signal. A receiver can recover the original data stream only if it uses the same pseudorandom code in the detection process. A different code will cause the signal to look like noise. See also *spread spectrum*.
- *Frequency division multiplexing (FDM)* is accomplished by splitting the channel bandwidth into some number of smaller channel bandwidths.
- *Wavelength division multiplexing (WDM)* is essentially the same as frequency diffusion multiplexing except light of different wavelengths is specified rather than different frequencies.
- *Statistical multiplexing* is accomplished by providing bandwidth only to those data lines having *activity* or information ready to transmit. No bandwidth is wasted on channels that are idle. A form of *time division multiplexing*.
- *Time division multiplexing (TDM)* is accomplished by allocating each subchannel its own time slot where transmission occurs. There are several variants of TDM. That is,
  - *Asynchronous time division multiplexing (ATDM)*—multiplexing in which the data are transmitted asynchronously.
  - *Statistical time division multiplexing (STDM)*—a multiplexing method that polls nodes and immediately skips any nodes that have nothing to send.
  - *Synchronous transfer mode (STM)*—designed for use in broadband ISDN (BISDN) and also supported in the Synchronous Optical Network (SONET) architecture.

**multipoint access** Access in which more than one terminal is supported by a single network termination.

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