



## **GLOSSARY of NETWORK TERMS**

**Address:** An identifier used to uniquely identify nodes on a control network.

**Annunciator:** An annunciator is used to give remote indication of the status of an operating component in a system. Annunciators are typically used in applications where the equipment monitored is not located in a portion of the facility that is normally attended. The National Fire Protection Association (NFPA) has specific requirements for annunciators in some applications, such as hospitals.

**ANSI:** American National Standards Institute - The United States government body responsible for approving US standards in many areas, including computers and communications.

**Attaching:** Term used to describe connecting the PC that is used for network installation and service to the PowerCommand Network via the Installation Gateway.

**ASCII:** American Standard Code for Information Interchange – A standard for encoding data.

**Backbone:** Typically a fast cable, or fiber, connection used to connect wiring closets, hubs, and switches. In a buss topology the backbone is the buss.

**Bandwidth:** The amount of data that can be transmitted in a fixed amount of time. For digital devices, it is usually expressed as bits per second, or bytes per second. For analog devices, it is usually expressed as cycles per second, or Hertz.

**Baud Rate:** The speed of data transmission in serial data communications approximately equal to the number of code elements (bits) per second (BPS). Bits per second are also termed BPS with the prefix (k) denoting thousands.

**Binding:** The process of making the logical connections to the network (also called connecting). This involves connecting network variable outputs to network variable inputs using Lonmaker for Windows software.

**Bit:** Binary Digit (i.e. a 1 or 0)

**Boolean:** A logical system used to express one of two states, such as on or off (yes or no, 1 or 0, etc.)



**Bound:** A network communication technique whereby a node automatically receives a network variable from a sender node whenever the sender node sends it out. Whenever this condition exists, the node is said to be “bound”.

**Bridge:** A device that governs the flow of traffic between networks or network segments and forwards packets between them. It can be used to connect dissimilar networks. Bridges can be programmed to reject packets from particular networks. Bridging occurs at the data link layer of the OSI model, which means that a bridge cannot read IP addresses.

**Bus:** The main “backbone” of the network data wire. It must be terminated at both the start and end of the network. The wire is “daisy-chained” from one node to the next. The Lonworks network bus cannot exceed specified length (which varies by cable type used) without the use of a router. Stubs off the main bus wire of a Lonworks network cannot exceed 10 feet. Bus can also refer to the devices that connect the generators and loads to a system.

**Bus Topology:** All devices are connected to a backbone cable, or bus. The Bus Topology is relatively inexpensive to install. Ethernet networks can use a bus topology. Typically both ends of the bus must be terminated.

**Byte:** For the purposes of control networking a byte can be defined as a set of eight contiguous bits.

**Cellular:** Refer to a communication system that divides geographic regions into sections called cells. The purpose of this division is to make the most use of the limited number of transmission frequencies.

**Client:** A Client is a device that accesses a service, or shared data, on another device, or server. Typically clients would require specific permissions and software in order to utilize the services, or data, on the server.

**Collision:** A network error that occurs when the electrical signals from two or more devices on a network collide.

**Control Communication Module (CCM):** There are two versions – Genset and ATS. The design allows for use with other manufacturer's gensets and transfer switches. The Module has 3-phase voltage, current, PF sensing, 32 discrete inputs, 7 analog inputs, and 8 relay outputs. The module operates on 5-36VDC power.

**Channel:** A Channel is the physical communications media that connects the devices and the properties of these media (such as transmission speed). Most PowerCommand network installations will have only one channel (UTP cable and 78 KBPS transmission speed). In a large network, there may be multiple



channels and each channel may or may not be of the same media type. Typically, channels are linked together using routers.

**Channel Terminator:** This is used to terminate networks on devices that do not have terminate switches. These are devices such as Gateways, RCI's, Routers, etc. that do not terminate circuits built into their design.

**Comma Separated Value (CSV):** A record layout that separates data fields with a comma and usually surrounds character data with quotes. PowerCommand for Windows uses the CSV record format.

**Configured/Unconfigured:** The term configured, as used in Lonworks networks, refers to a module that has been logically installed with LonMaker software. A "network image" (address and binding information) is stored in the node. A module that has not been logically installed with LonMaker is referred to as being unconfigured. The service LED will blink on an unconfigured module.

**Connecting Devices:** Connecting to refers to the process of assigning connections-linking an output variable of one device to an input variable of another device. This process is also called "binding".

**Crossover Cable:** A twisted pair patch cable used to provide the network connection for like devices. A Crossover Cable would be used to directly connect two PC's NIC cards.

**Daisy Chain:** A wiring method where each device on a network is wired in series.

**Digital Input/Output Module (DIM):** This device is a relay board with some dry-contact discrete inputs. The Base DIM module has four (4) discrete customer inputs and eight (8) Form-C dry contact outputs. An Expansion DIM module can be added to the Base for an additional four (4) discrete customer inputs and eight (8) Form-C dry contact outputs. The DIM requires 10-36VDC power for operation.

**Digital Master Control (DMC):** This device is designed to control the power systems in a facility. It is offered as an option on CPG Switchgear.

**Distributed Control System:** A collection of nodes that interact to control a system whose components are spread out over some distance. Each node has intelligence for operating its own particular component of the system. Different parts of the system communicate status and control information with one another to form a distributed control system. Typically, they communicate on a peer-to-peer level. This is different from a type of system where all control and interaction



between components is dictated by one central control. This is a common master/slave arrangement.

**Domain:** A domain is a network concept that allows independently functioning networks to share resources such as transmission media. A domain designation provides an ID number to identify the devices that can communicate within that domain. A network must have at least one domain. PowerCommand Network installations will usually have only one specified domain.

**Dominion:** Name for Model PCC3200 controller available on certain CPG gensets.

**Echelon:** The name of the company that developed the Network Protocol Lontalk and some of the Lonworks products used by CPG.

**Ethernet:** Ethernet refers to network products and structures covered by the IEEE 802.3 standard. Three data rates are currently defined for operation over optical fiber and twisted-pair cables: 10 Mbps-10BaseT, 100 Mbps-100BaseT, 1000 Mbps-Gigabit Ethernet. Ethernet is the most prevalent LAN technology, it is currently used for approximately 85 percent of the world's LAN-connected PCs and workstations. Ethernet is easy to understand, implement, manage, and maintain.

**Fiber Optic Cable:** A technology using glass or plastic threads (fibers) to transmit data. A fiber optic cable is a bundle of either glass or plastic threads capable of transmitting messages modulated into light waves. Typically, fiber optic cable has greater bandwidth allowing them to carry more data than metal wires. Fiber optic cable is lighter and less susceptible to interference than metal wires. Also, data can be transmitted digitally rather being transformed into analog data for transmission as is the case with metal wires when used for computer data transmission. Fiber optics are becoming increasingly more common for use with Local-Area Networks (LAN's).

**Fiber Optic Transmission:** A communication method where electrical data is converted to light energy and transmitted via optical fibers.

**Gateway:** A device that acts as an interface between two different communication protocols. The Network Gateway Module (NGM) provides a communication protocol that a PC can understand. Other gateway devices may be used to interface between our Lontalk protocol and other systems such as a SCADA or Building Automation System. Typically, a gateway becomes necessary when a SCADA or BAS does not have a driver developed for Lontalk.

**Genset Communication Module (GCM):** The GCM provides a communication gateway between the Model 3100 PowerCommand Control and the network. The



GCM communicates with the PCC3100 control over a serial data link. The GCM gets data from the PCC3100 control such as voltage, current, engine speed, oil temperature, etc. and then sends it out on the network if another network node is bound to it or requesting data.

**Genset Lonworks Card (GLC):** A network module used with the Model 3200 PowerCommand Control genset. The network module is specific to this style control and provides the necessary network information similar to how a GCM provides network information from a Model 3100 PowerCommand Control genset.

**Genset Open Architecture Link (GOAL):** This is the proprietary protocol used by CPG Genset and Transfer Switch controls to talk to each other. The Bravo based software tools support the GOAL protocol (i.e. Inpower and PCW II.)

**Hub:** A common connection point for devices or nodes in a network or sub-network. Hubs are commonly used to connect segments of a LAN and contain multiple ports.

**Interoperability:** Design to allow one product to work with another product without modification. This is a requirement for all LonMark products.

**Junction Box/Terminator (JBT):** A device that contains connection points for the network power and data wires. (NOTE: The terminator on a JBT cannot be used with FTT-10 networks.)

**Keystone:** The name of the new controls available on certain CPG transfer switches.

**KVA:** This is the abbreviation for kilo-volt-amperes, a common term for rating electrical devices. A device's KVA rating is equal to its rated output in amps multiplied by its rated operating voltage. In the case of three-phase generator sets, KVA is the kW output divided by 0.8, the rated power factor. KVA is the vector sum of the active power (kW) and the reactive power (KVAR) flowing in the circuit.

**KVAR:** This is an abbreviation for kilo-volts-amperes reactive. It is associated with the reactive power that flows between paralleled generator windings and between generators and load windings that supply the magnetizing currents necessary in the operation of transformers, motors, and other electromagnetic loads.

**LAN:** Local Area Network (See definition below.)

**LNS:** LonWorks Network Services (See definition below.)



**Local-Area Network (LAN):** A computer network that spans a relatively small geographic area. Most LANs are confined to a single building or group of buildings.

**Locations:** Locations are subdivisions of a network that can be selected for easier organization. Locations may designate physical places, but are not required to do so. For example, network devices in one location may communicate with network devices in another location when requested to do so.

**Logical Address:** This is a “virtual address” which can read and write data. This does not correspond to a particular location in memory.

**LON:** LON stands for Local Operating Network. LON is a trademark of Echelon Corporation. LON networks use the LonTalk<sup>®</sup> Protocol and are known for reliability. Since they use a Peer-to-Peer network environment there is no single point of failure.

**LonMaker for Windows:** This is Echelon software used for installing and trouble-shooting a PowerCommand Network.

**LonMark:** This is the organization set up by Echelon to create and define standards to promote interoperability between LonWorks products.

**LonTalk:** All devices on a LonWorks network communicate with one another using a protocol that underlies the LonTalk Protocol. This protocol is embedded in Neuron Chips which are an integral part of every LonWorks device. The LonTalk protocol provides services that allow the application using it to send and receive messages across a network without regard for the media type or topology of the network. LonTalk devices are intended for use in a Peer-to-Peer network environment. In a Peer-to-Peer network environment devices communicate directly with each other, without the need for a centralized controller. Peer-to-Peer control networks are fault tolerant, because Peer-to-Peer control networks do not require a centralized controller they have no single point of failure.

**LonWorks Network Services (LNS):** This is the new client/server architecture developed by Echelon for communication with a LonWorks network.

**Master/Slave:** A type of network operating system whereby one device controls all communication on a channel. This controlling device is known as the master. The slaves are all other devices on a network. This is different than the peer-to-peer (See Definition) type of network operating system used in the PowerCommand Network.



**Mbps:** Mega Bits Per Second – One Million Bits Per Second. A rate often used to describe the speed that data is moved across the network.

**Media:** The physical material that network signals travel over between devices. The standard media for Lonworks networks is Unshielded Twisted Pair (UTP) cable.

**Message Tag:** This is an alternative means to network variables in which data is shared among nodes in a PowerCommand Network. Message tags allow larger amounts of data to be transferred at a single time. Unlike a network variable, message tags do not have an inherent structure.

**Modem:** (Modulator Demodulator) A device that converts a computer's digital pulses into audio frequencies (analog) over a telephone line and converts them back into digital pulses at the receiving site. Typically, one modem will transmit the data and another will receive the data over a telephone line at a controlled transmission speed.

**Modbus:** Modicon's Modbus protocol is an old protocol, by technology standards, that has become a de facto standard for generic network devices and in some cases for devices using different technologies that need to communicate. Most manufacturers of control devices and protocols have included the ability to communicate with Modbus protocol. Some examples of different Modbus implementations:

- Modbus ASCII – ASCII characters are used to represent the data in Modbus ASCII messages. This is a serial protocol typically communicating over an RS-232 connection. Modbus ASCII is considered an Open Protocol.
- Modbus RTU – One RTU character is used to represent the data in Modbus RTU messages. This is a serial protocol typically communicating over an RS-232 or RS-485 connection. Modbus RTU is considered an Open Protocol.
- Modbus TCP – Modbus TCP is a proprietary TCP/IP based protocol that communicates over an Ethernet network. The data structure of Modbus TCP is similar to Modbus RTU.

**Modbus Plus:** An industrial networking system that uses token-passing peer-to-peer communications at data transfer rates of one megabit per second (MBPS). The network media is shielded twisted-pair cable.

**Modlon Gateway Kit:** A device that allows for conversion to Modbus RTU from our Lontalk protocol for devices on the PowerCommand Network. Please note that the conversion capability of a single kit changes with the configuration of the PowerCommand Network.



**Modules:** Modules are also called nodes or devices. These are devices such as Genset Communication Modules (GCM's), Control Communication Modules (CCM's), and Digital Input/Output Modules (DIM's).

**Multi-drop Bus Topology:** The wiring arrangement used for the network data. The bus starts at one point and ends at another. Both the start and end of a network must be terminated through the use of a terminate switch. The maximum stub length must not exceed 10 feet and must be included in the total length of the main network bus.

**Multimode Fiber:** Multimode fiber is optical fiber that is designed to carry multiple light rays, or modes, at the same time. Multimode fiber transmission is used for short distances.

**National Electric Code (NEC):** This document is the most common general electrical standard in the United States.

**National Fire Protection Agency Section 110 (NFPA 110):** This section deals with the regulations concerning Emergency Power Systems (EPS). This section deals with regulations on installation, operation, and monitoring of EPS. CPG equipment must meet the standards set for EPS.

**Network:** A collection of Nodes that communicate with one another over a common medium. The PowerCommand Network communication is Unshielded Twisted-Pair (UTP) cable and the protocol or "language" spoken is Lontalk.

**Network Data Wire:** Unshielded-Twisted Pair (UTP) cable that carries the network data over the main network bus. We recommend AWG 22 CAT 4 UTP cable for use over the main network bus.

**Network Gateway Module:** A device acting as an interface between a modem or PC and the network wire. The Gateway takes the UTP wire and then provides an RS-232 port for connection to either a modem or PC.

**Network Power Wire:** Wire used to run power to nodes that do not have a local power source. These are devices such as Control Communication Modules (CCM), and Digital Input/Output Modules (DIM). The wire gauge must be chosen with consideration for the number and type of module and the maximum distance from the power source to the module. Refer to the PowerCommand Network Installation and Operator's Manual for information on this selection.

**Network Variables:** Network Variables send a value with defined units from one device (output) to another (input). Each network variable is either an input or an output. This process is also called Connecting Devices (See Definition). Typically, these variables are both analog or discrete values providing operating





and alarm conditions on the PowerCommand Network. However, certain variables may be designed to provide control capability on the PowerCommand Network.

**Neuron Chip:** Each Lonworks node contains a Neuron Chip. The primary purpose of the Neuron Chip is to serve as a communication link between the system component located at that node and other system components on the network. The Neuron Chip also provides the node with some local processing power to read switch positions, drive outputs, read analog data, etc. The Neuron Chip communicates by transmitting and receiving through a transformer-coupled transceiver.

**Nibble:** Four Bits or half of (an 8 Bit) Word.

**NIC:** Network Interface Card

**Node:** A module that can communicate over the network data to other modules. A module contains a Neuron Chip. Certain devices are nodes such as Genset Communication Modules (GCM) and Control Communication Modules (CCM).

**Node ID:** This is the lowest level of addressing for the network. The Node ID uniquely identifies the device on that subnet only. There may be up to sixty-four (64) nodes on a single subnet. This is an electrical limitation, not a logical one. The Node ID is not unique across subnets.

**OPC:** OPC stands for OLE (Object Linking and Embedding) for Process Control. Object Linking and Embedding is a method for sharing information among Microsoft Windows based applications. OPC technology has proven itself to be a very powerful tool for control network monitoring systems. Because OPC technology allows for sharing data between virtually any Microsoft Windows applications, it provides an inexpensive way to move data from one application to another. Most successful vendors of control network applications, such as Cummins Power Generation, incorporate OPC technology into their control network applications.

**Operating System:** The operating system is the system software that is responsible for the direct control and management of the system's hardware and internal control operations.

**Parity:** In error detecting schemes, a Bit (even or odd) that represents the binary sum of the data transmitted. Primarily used when transmitting data over a long distance. For example, when transmitting information using modems.

**Pass Thru:** Refers to a junction box connection where the network bus comes to a connector and then continues straight on through. In most Pass Thru



connections, very little input and output is done. An example of this connection is the Junction Box/Terminator (JBT).

**Patch Cable:** A cable used to connect devices to a star topology Ethernet network.

**Peer-To-Peer:** A network operating environment where any device on the main network bus can initiate communication.

**Plenum:** The Space above a ceiling in an office area where cables and network media are often installed. Plenum cabling is made from materials that, in the event of a fire, do not put off harmful gases or vapors. Plenum cabling is often required by fire code, and is typically significantly more expensive than standard cabling.

**Poll:** A poll is accomplished when one network device interrogates another for data or information.

**Port:** The external connector on a device at which the network cable or medium is attached.

**POTS:** Plain Old Telephone Service refers to standard analog telephone service.

**PowerCommand Control (PCC):** Another name for CPG Genset and Transfer Switch controls.

**PowerCommand for Windows:** This is software developed by CPG for monitoring and controlling a PowerCommand Network. It can access a PowerCommand Network through either local or remote access.

**Programmable Logic Controller (PLC):** Computerized controller often used instead of relays in control systems.

**Protocol:** Set of rules used mutually by two or more devices or software applications to communicate. Different protocols often describe different aspects of a single communication; taken together, these form a protocol stack. Different protocols function at various levels of the protocol stack. For example, the TCP/IP protocol is a transport protocol that functions at the lower levels of a protocol stack, where Modbus is an application protocol that functions at the upper levels of the protocol stack.

**PSTN:** Public Switched Telephone Network is another name for standard analog telephone service.

**RAS:** Remote Access Service - A Windows NT and 2000 service that allows remote clients to connect to a machine or network.



**Ring Topology:** All devices are connected to each other in a closed loop, or ring, each device is connected directly to two other devices. Ring Topology networks are very reliable.

**Router:** A router is a device that directs network traffic between two networks. Routers receive packets of data, filter them, and forward them to a final destination using the best route. Most LAN and WAN routers direct packets of data based on TCP/IP addresses. Although they can transform information at the data link level, routers cannot transform information from one data format such as TCP/IP to another such as IPX/SPX. Routers do not send broadcast packets or corrupted packets. If the routing table does not indicate the proper address of a packet, the packet is discarded. The term router is also used in relation to control networks to apply to devices that are used to encapsulate and receive data over different networks or media.

**RS232:** RS-232 is a standard for serial data communication between a DTE (Data terminal equipment) and a DCE (Data communication equipment). This originally meant a dumb terminal and a modem; it was only later that personal computers, printers, and other devices started to make use of the standard. Today RS-232 is gradually being superseded by USB, which is faster and has connectors that are simpler to connect and use. However, for serial communication in the control industry RS-232 remains the standard.

**SC:** Stick and Click – SC is a type of fiber optic connector.

**SCADA:** SCADA stands for Supervisory Control and Data Acquisition. SCADA systems are industrial control systems that consist of a central host, which is a computer running a SCADA application, and one or more data gathering or control devices. SCADA systems are operator interfaces to a control network and are an important component of the network. SCADA traditionally refers to systems covering a large geographical area.

**Serial Port:** A communication port at which data is transferred one bit at a time.

**Server:** A server is a device that provides services or resources, such as printers and files, for the use of other devices on the network.

**Single Mode Fiber:** Single Mode fiber is optical fiber that is designed to carry a light ray, or mode. Single Mode fiber transmission is used for long distances.

**Site:** A single instance where a network has been installed.



**Slave:** A networked device that is controlled by another device. Slave devices do not initiate data transmission. They respond to commands or requests initiated by a master device.

**SNMP:** Simple Network Management Protocol. A standard protocol used for managing Ethernet networks.

**ST:** Stick and Twist – ST is a type of fiber optic connector.

**Standard Network Variable Type (SNVT):** This is the standard developed by the LonMark Association for Lontalk variables dictating the data type, format, scaling, offset, and units for a particular measurement. This insures interoperability of variables during communication between devices. (Also see **User-defined Network Variable Type.**)

**Star Bus Topology:** Multiple network stars are connected to a central bus.

**Star Topology:** A topology where all the devices must connect to a central hub. Star topologies are relatively easy to install and manage but can have bottlenecks occur as all the information must pass through the hub.

**Subnet:** The subnet defines a logical grouping of nodes in a network and is part of a node's network address. For our purposes, the subnet is a collection of nodes on a single channel. Each node within a subnet has the same address. Each subnet address within a network is unique.

**Subnet Mask:** A mask used to determine which sub-network an IP address belongs to. Logically, the purpose of the subnet mask is to take a particular IP address and divide it into smaller sub-networks connected by Ethernet Routers.

**Switch:** A switch is a multi-port device that allows devices to attach to a network in the star configuration. A switch receives data and sends the data only to the port with the intended recipient attached.

**Switching Hub:** Short for port-switching hub, a special type of hub that actually forwards information to the appropriate port based on the IP address assigned. Conventional hubs simply rebroadcast information to every port. Switching hubs forward information only to the required port.

**Termination:** Lonworks network channels must be terminated to avoid transmission reflections. The Terminator is a RC circuit that matches the impedance of the physical media.



**Thin Client:** A thin client runs its applications on a server or does most of its processing on a server with as little hardware and software as possible at the client end.

**Token:** In data transmission, a frame passed on a network that gives a networked device the current authority to transmit.

**Token-Ring Topology:** All of the devices or nodes are connected to one another in the shape of a closed loop. Ring topologies are relatively expensive to install, but they offer high bandwidth and can span larger distances.

**Topology:** The physical shape of a network. There are three principal topologies: multi-drop bus, token-ring, and star.

**Transmission Control Protocol/Internet Protocol (TCP/IP):** A common network layer protocol primarily used in Internet and other Ethernet network environments. TCP/IP allows for assigning a sub-network number called an IP address. The host station also has an IP address assigned for proper routing.

**User-defined Network Variable Type (UNVT):** This is a custom Lontalk network variable. UNVTs allow for consolidating information into one variable

**UTP:** In Unshielded Twisted Pair (UTP) cable each pair of wires consists of two insulated copper wires arranged in a regular spiral pattern to minimize the electromagnetic interference between adjacent pairs. UTP cable typically has at least two twisted pairs and can have hundreds of pairs.

**WAN:** Wide Area Network.

**Wide Area Network (WAN):** A Wide Area Network is an interconnection of LANs over a large geographical area (i.e. Counties, States, Countries, Worldwide) typically connected via a fiber optic line, telephone line and/or radio wave.

**Word:** A group of bits that represents a digital value. Older generation computers used 8 Bit Words. Modern computers use 16 bit or 32 Bit Words.