

## LONWORKS & Control Terminology

### Common LonWorks Terms

*Acknowledgment Service* (See End-to-End Acknowledgment Service)

#### *Actuator*

Any component that affects a physical variable of the system under control or indicates the values of system variables for human operators. Some examples are pumps, fans, heaters, alarm annunciators, and operator displays. This term may apply only to the component that converts electrical or pneumatic control signals into a physical force that causes a mechanical component such as a damper or valve to move, or it may apply to both components as a unit.

#### *Ad Hoc Configuration*

Physical nodes are configured and commissioned on-line as the network data is entered. The network database is built simultaneously.

#### *AI-10 Analog Input Interface Module*

Provides two 16-bit analog inputs to attach to sensor devices with 0-24ma, 0-10v, and 100-15Kohm interfaces. The application program has an analog sensor FB corresponding to each input, as well as several other FBs, including digital functional blocks, digital encoders, and type translators.

#### *AO-10 Analog Output Interface Module*

Provides two 12-bit analog outputs to attach to actuator devices requiring 0-20ma or 0-10v interfaces. The application program has an analog actuator FB corresponding to each output, as well as several other FBs, including two PID loop controllers, analog functional blocks, digital encoders, and type translators.

#### *Application Configuration*

A process by which the application program in each node is tailored to the desired functionality by selecting the appropriate configuration parameters. LONWORKS Network Services (LNS) provides a platform for manufacturers to create easy-to-use graphical configuration interfaces, called plug-ins, that are then automatically compatible with any other LNS-based network tool.

#### *Application Program*

The software code in a LONWORKS device that implements the "personality" of the device. Also referred to as the application or the application layer, it resides in ROM or is downloaded over the network into non-volatile RAM. The application program interfaces with the LonTalk firmware to communicate over the network. It may reside completely in the Neuron Chip, or it may be split between the Neuron and an attached host processor (a host-based device).

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### *Authentication*

A service provided by the LonTalk protocol used to ensure that a received message was sent by an authorized source.

### *Backbone Network*

A high-speed network channel connecting several lower speed channels.

### *Base Plate*

A mounting frame for physical installation of LonPoint modules. It provides termination points for the network, I/O device wiring, and power supply. It allows pre-wiring and cable testing by an electrician prior to installation of the electronics. A LonPoint module plugs into the base plate, which is in turn mounted to a 4x4 electrical box or EuroBox for wall or DIN rail mounting.

### *Binding*

The process that defines connections between LONWORKS Devices. Connections define the data that devices share with one another.

### *Bit Rate*

The rate in bits at which the packet frame is transferred across the communication medium.

### *Channel*

The communications media that connect LONWORKS Devices. Segments connected via a physical layer repeater are considered a single channel. LONWORKS Routers are used to connect two channels.

### *Channel Segment*

A portion of a channel. A single channel can be comprised of multiple segments connected by physical layer repeaters.

### *Client-Server Architecture*

An architecture where a device (client) makes a request to another device or object (server) that delivers it.

### *Commissioning a Device*

The process of using a network installation tool such as the LonMaker for Windows Integration Tool to download the network configuration data and application configuration data to a device. For devices whose application programs are not contained in ROM, the network tool also downloads the application program into non-volatile RAM memory in the device. Devices are usually either commissioned and tested one at a time or commissioned in off-line mode, then brought on-line and tested one at a time.

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### *Configuration Network Variable*

A special class of network variable used to store network-modifiable application configuration data. Configuration network variables are always inputs. For Neuron Chip-hosted Application Devices, the contents of configuration network variables can be stored in the device's on-chip EEPROM, or off-chip EEPROM, flash, or NVRAM. For host applications, it is the responsibility of the host to store configuration values.

### *Configuration Properties*

Configuration properties are used to configure the operation of a device or LONMARK object. Configuration properties may be implemented using a special class of network variables called a configuration network variable, or they may be implemented as configuration parameters stored in a data block that is read and written using the LonTalk file transfer protocol or direct memory read/write.

### *Configured Device*

A device state where the device has both an application image and a network image. This indicates that the device is ready for network operation.

### *Connection*

The implicit addressing established during binding. A connection links one or more logical outputs (network variables or message tags) to one or more logical inputs.

### *Destination Address*

The logical address contained in every LonTalk packet of the node or group of nodes designated to receive the packet. The destination address can be the unique Neuron ID, the logical node address, a group address, or a broadcast address.

### *Device* (See LONWORKS Device)

### *DI-10 Digital Input Interface Module*

Provides four digital inputs to attach to sensor devices with dry contacts or 0-32vdc interfaces. The application program has a digital sensor FB corresponding to each input, as well as several other FBs, including analog functional blocks, digital encoders, and type translators.

### *DO-10 Digital Output Interface Module*

Provides four digital outputs to attach to actuator devices requiring dry contacts or 0-32vdc interfaces. The application program has a digital actuator FB corresponding to each output, as well as several other FBs, including analog functional blocks, digital encoders, and type translators.

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### *Domain*

A logical collection of devices on one or more channels. Communications can only take place among devices configured in the same domain.

### *Domain ID*

The top level of the LonTalk addressing hierarchy of domain/subnet/node. The domain ID can be 0, 1, 3, or 6 bytes long. The zero length domain is reserved for the use of the LNS architecture and cannot be used as the system's domain.

### *Download*

An installation process in which data – such as the application program, network configuration, and/or application configuration – is transferred over the network to a device by a network management tool.

### *Dynamic Data Exchange (DDE)*

A standard Microsoft Windows protocol that defines a mechanism for Windows applications to share information with one another.

When applications share information with each other using DDE, they are said to be holding a DDE conversation. Each conversation has a well-defined beginning, middle, and end. To begin a conversation, one application, known as the client or destination application asks another application, known as the server or source application to open a communications channel.

Once a conversation is established, the client can send and receive data from the server on the DDE channel. For example, an Excel spreadsheet (the client or destination) may ask the LonManager DDE Server (the server or source) for the current fuel consumption from a flow sensor for use in an automated billing system. Alternately, an InTouch operator interface (the client or destination) may tell the LonManager DDE Server (the server, or source) to change the state of a valve in a LONWORKS network in response to a request issued by the user interface. Note that the destination application is the one that establishes the conversation, irrespective of which way the data actually flows.

### *EEPROM (Also See Non-volatile RAM)*

Electrically erasable programmable read only memory. Limited to approximately 10,000 write actions

### *End-to-End Acknowledgment Service*

A service of the LonTalk protocol that ensures a message was received by the addressee(s). After a configurable number of retries, failures are logged in a status register in the node which can be accessed by network management tools.

### *External Interface File*

A file produced by the LonBuilder Developer's Workbench or the NodeBuilder tool that documents a device's external interface. After converting the text version of the external interface file to binary using the utility XIF2BIN (supplied with the LNS

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Developer's Kit for Microcontrollers and the LNS Developer's Kit for Windows), the host application can import external interface file definitions into the NSS using a set of services. The text version has an extension of XIF, the binary file has an extension of XFB. The XFB file must be version 3.0 or later.

*FB* (See Functional Block)

### *Free Topology*

A connection scheme for the communication bus that removes traditional transmission line restrictions of trunks and drops of specified lengths and at specified distances, and terminations at both ends. Free topology allows wire to be strung from any point to any other, in bus, daisy chained, star, ring, or loop topologies, or combinations thereof. It only requires one termination anywhere in the network. This can reduce the cost of wiring by a factor of two or more.

### *Functional Block (FB)*

A LONMARK object in the application program of a LonPoint module that performs basic control functions. These functional blocks, together with the LONMARK objects contained in the other LONMARK devices attached to the system, form a "pool" of objects that are configured and connected using the LonMaker tool, to implement the desired system functionality.

### *Gateway Device*

A LONWORKS device that allows proprietary legacy control systems to be interfaced to LONWORKS systems. A gateway device has a physical interface appropriate to the foreign system device or communication bus. Its application program interfaces to the proprietary communication protocol for the foreign system, translates between the two protocols as required, and converts the proprietary command-based messages of the foreign system to SNVTs used by the information-based LONWORKS applications.

### *Group*

A logical collection of devices within a domain. Unlike a subnet, devices are grouped together without regard for their physical location in the domain. The number of groups to which a device may belong is determined by the number of available address table entries on it. This number is set by the Neuron application, but may not exceed 15. Groups and group membership are defined by the NSS during binding.

### *Group Addressing*

A logical addressing mode in the LonTalk protocol that allows a message to be sent simultaneously to a pre-configured group of devices. Each group has an 8-bit group ID. Each domain can have up to 256 groups defined.

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*HMI* (See Human-Machine Interface)

### *Host*

A device implementing layer 7 of the LonTalk protocol. A host may be based on the Neuron Chip, in which case it is called a Neuron Chip Hosted Device. A host may be based on another processor, in which case it is called a host-based device. A host-based device uses the Neuron Chip as a network interface to talk to the LONWORKS network.

### *Host Processor*

The application processor for a host-based device; typically a micro-controller, microprocessor, or computer.

### *Host-Based Device*

A devices in which layer 7 of the LonTalk protocol runs on a processor other than the Neuron Chip.

### *Human-Machine Interface (HMI)*

A network management tool that provides services for human monitoring and supervisory control of systems. The HMI usually runs on a workstation or desktop/portable PC.

### *I/O Interface*

An electrical interface from a LONWORKS device – such as voltage, current, or contact closure – to a non-LONWORKS sensor or actuator. The I/O interface can be digital (on/off), analog, or a communication protocol.

### *Input Network Variable*

A network variable that provides information to the device from some other device on the network.

### *Interoperability*

A condition that ensures that multiple devices (from the same or different manufacturers) can be integrated into a single network without requiring custom device or tool development.

*LCA* (See LONWORKS Component Architecture)

### *Legacy I/O Device*

A sensor or actuator which cannot directly attach to a LONWORKS network.

### *Link Powered Device*

A device that is powered by a central power supply connected to the network. This power supply is typically shared by several devices on the network,

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eliminating the need for a power supply at each device. The power is supplied over the same medium as the communication signals.

*LNS* (See LONWORKS Network Services)

### *LonMaker for Windows Integration Tool*

An LNS-compatible network tool based on the Visio graphical user interface. The LonMaker tool is used to design, commission, maintain, and document distributed control networks comprised of both LONMARK and other LONWORKS devices.

### *LonManager Protocol Analyzer*

A protocol analyzer for field use that provides LONWORKS manufacturers, system integrators, and end-users with a rich set of Microsoft Windows-based tools and a high performance PC interface card to allow users to observe, analyze, and diagnose the behavior of installed LONWORKS networks. This card accepts any two SMX compatible transceivers, so that you may diagnose protocol-related problems on any type of medium. The LonManager Protocol Analyzer includes three tools for network analysis and monitoring:

- Packet monitor tool
- Network traffic statistics tool
- Network diagnostics tool

The LonManager Protocol Analyzer has an open architecture to allow you to customize it to your unique application needs. Developers can write custom applications in a Windows programming language and, through the protocol analyzer's application programming interface (API), access packet logs and create custom packet filters.

### *LONMARK*

A distinctive logo applied to LONWORKS devices that have been certified to the interoperability standards of the LONMARK Interoperability Association.

### *LONMARK Device*

A LONWORKS device that has been certified to meet the interoperability standards of the LONMARK Interoperability Association.

### *LONMARK Functional Profile*

A LONMARK object designed for specific application areas, such as HVAC or lighting systems. An example is the VAV Controller functional profile, which takes room temperature value from the network and implements a PID control algorithm to drive a damper actuator to regulate room temperature. The LONMARK Association forms task groups of interested members to design, approve, and publish functional profiles in numerous functional areas, such as HVAC, security, lighting,

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and semiconductor manufacturing systems. Complete documentation on all LONMARK objects can be found on the LONMARK Association web site.

### *LONMARK Interoperability Association*

An independent organization of LONWORKS developers, system integrators, and end-users that define standards to ensure interoperability between LONWORKS devices from multiple manufacturers.

### *LONMARK Object*

A collection of network variables, configuration properties, and associated behavior defined as part of the LONMARK interoperability program. LONMARK objects define standard formats and semantics for how information is exchanged between devices on a network.

### *LonPoint Application*

The application program in a LonPoint device. A LonPoint application consists of a set of functional blocks (FBs), which are LONMARK objects that perform basic control functions. These functional blocks, together with the LONMARK objects contained in the other LONMARK devices attached to the system, form a “pool” of objects that are configured and connected using the LonMaker tool to implement the desired system functionality.

### *LonPoint Control Device*

A LonPoint device that provides distributed control functions such as scheduling, signal conditioning, and PID loop algorithms. It also provides standard I/O interfaces permitting easy incorporation of non-LONWORKS sensors and actuators into a LONWORKS network.

### *LonPoint Interface Module*

A LonPoint device that provides I/O interfaces for incorporation of non-LONWORKS sensors and actuators into a LONWORKS network. It also provides distributed control functions such as signal conditioning and PID loop algorithms.

### *LonPoint Router*

A LonPoint module that physically connects two LONWORKS channels. It provides full router functions as defined in the LonTalk protocol. See LONWORKS Router for additional information. Versions are available for all combinations of LONMARK twisted pair channels.

### *LonPoint System*

A family of products designed to enable system integrators to realize the benefits of the LONWORKS technology in highly distributed, peer-to-peer control networks for building and industrial applications. The family consists of:

- LonPoint control devices and routers – LONMARK certified devices with application programs providing many distributed control functions such as

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scheduling, signal conditioning, and PID loop algorithms, as well as standard I/O interfaces which permit easy incorporation of non-LONWORKS sensors and actuators into any system.

- LonMaker for Windows Integration Tool – a powerful network tool based on the Visio graphical user interface used to design, commission, and maintain distributed control networks comprised of both LONMARK and other LONWORKS devices.

### *LonTalk Firmware*

A program implementation of the LonTalk protocol residing in ROM in the processor chip of every LONWORKS device. A portion of non-volatile RAM in the device is reserved for modifiable configuration parameters to make tradeoffs in performance, security, and reliability for a particular application.

### *LonTalk Protocol*

The protocol used on LONWORKS networks to standardize communication. It defines a standard way for devices to exchange information.

### *LonTalk Router (See LONWORKS Router)*

### *LONWORKS Component Architecture (LCA)*

The LNS application programming interface for Microsoft Windows NT or Windows 95 hosts. LCA is an architecture for implementing LONWORKS network tools using multiple cooperating software components. LCA provides an open standard with a standard network tool kernel, so that tools may be constructed from software components from multiple vendors. LCA defines a standard Windows OLE service interface for invoking network services and a standard application interface for invoking LCA software components.

### *LONWORKS Control Device*

A LONWORKS device that senses and/or controls the variables in the system being controlled. It can have any combination of embedded sensors and actuators, or input-output interfaces to external legacy sensors and actuators. The application program in the device can both send and receive values over the network and perform data processing (e.g. linearization, scaling) of the sensed variables and control logic such as PID loop control, data logging, and scheduling.

### *LONWORKS Device*

A device that communicates on a LONWORKS network. A LONWORKS device may be an application device or a router. LONWORKS devices are commonly called devices or nodes in LONWORKS documentation. Each LONWORKS device includes local processing and input/output (I/O) hardware to process input data from sensors, execute a control task, and control actuators. Each device also includes the capability to communicate with other devices using the LonTalk protocol in firmware. The LonTalk protocol is a complete 7-layer communications protocol that

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ensures that devices can interoperate using an efficient and reliable communications standard.

Each LONWORKS device contains an application program and the following hardware:

- A Neuron Chip.
- A transceiver.
- Application electronics to connect the Neuron Chip to I/O devices such as sensors, actuators, displays, and keypads.
- An optional host processor. If a host processor is used, the application executes on the host processor and the Neuron Chip is used as a network interface.

Two development tools are available for LONWORKS devices. The NodeBuilder Development Tool is used to develop LONWORKS devices; the LonBuilder Developer's Workbench is used to develop LONWORKS systems. Development teams can use a single NodeBuilder tool per developer, and a LonBuilder tool for system integration and test. A LONWORKS Router is a special type of LONWORKS device.

### *LONWORKS Network Services (LNS) Architecture*

The foundation for interoperable LONWORKS installation, maintenance, monitoring, and control tools. Using the services provided by the LNS architecture, tools from multiple vendors can work together to install, maintain, monitor, and control LONWORKS networks .

### *LONWORKS Node (See LONWORKS Device)*

### *LONWORKS Router*

An active LONWORKS device which physically connects two LONWORKS channels. Each router side can receive a packet, make a decision as to whether the packet needs to be transmitted, and transmit the packet on the other side's channel, if required. The router necessarily injects some delay in the packet transmission. A router can be configured to be one of the following:

- Repeater: all packets are forwarded.
- Permanent Repeater: all packets are forwarded. Subnets can span permanent repeaters.
- Bridge: all packets in a given domain are forwarded.
- Permanent Bridge all packets in a given domain are forwarded. Subnets can span permanent bridges.
- Learning Router: packets are routed only for a given domain. The router starts as a bridge and reduces forwarding as it learns the topology. Learning routers are vulnerable to failures if configured devices are incorrectly moved within the topology.

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- Configured Router: packets are routed only for a given domain. Configured routers forward packets based on configured tables. This is the most reliable and efficient form of router.

Each router side can be addressed by its Neuron ID or by a subnet/node address. The side of the router which can communicate with the network manager is referred to as the near side, and the other side as the far side.

### *LONWORKS Technology*

LONWORKS technology consists of the tools, modules, and ICs required to build intelligent device and to install them in control networks. Each LONWORKS device includes local processing and input/output (I/O) hardware to process input data from sensors, execute a control task, and control actuators. Each device also includes the capability to communicate with other devices using the LonTalk protocol in firmware. Two development tools are available for LONWORKS devices. The NodeBuilder Tool is used develop LONWORKS devices; the LonBuilder Developer's Workbench is used to develop systems. Development teams can use a single NodeBuilder tool per developer, and a LonBuilder tool for system integration and test.

Both the NodeBuilder and LonBuilder tools are used to program Neuron Chip-hosted devices to send messages to one another in response to changes in various conditions, and to take action in response to messages they receive. The NodeBuilder and LonBuilder tools facilitate the independent development of individual devices whose function may be simple or complex, and integration of these devices into LONWORKS applications which might perform complex and sophisticated tasks.

*LPR Module (See LonPoint Router )*

*Media (See Physical Medium)*

*MMI (See Human-Machine Interface)*

### *Network Configuration*

The process of converting a network design into the data elements required by the LonTalk protocol in each node of the network. This includes:

- Assigning domain ID and logical addresses to all devices and groups of devices.
- Binding network variables to create logical connections between devices.
- Configuring the various LonTalk protocol parameters in each node for the desired features and performance, including channel bit rate, acknowledgement, authentication, priority service, etc.

### *Network Configuration Tool*

A software application, such as the LonMaker for Windows Integration Tool, which is used to facilitate the network configuration process. For example, if you use the

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LonMaker tool, the physical design of a network is as simple as dragging and dropping device icons onto a drawing and selecting the channel to which they attach. Functional network design is as simple as dragging the devices' application functional blocks onto the drawing and connecting inputs and outputs to determine which functional blocks use what network variables.

### *Network Image*

A device's network address and connection information. For Neuron Chip hosted devices, the node's network image is stored in EEPROM on the Neuron Chip. For host applications, all of the network image except the network variable configuration table is stored in EEPROM on the Neuron Chip.

### *Network Interface Device*

A LONWORKS device that has a physical interface to an external host computer such as a PC or a hand-held maintenance tool. The device application program provides communication protocols and an API (application programming interface) to allow host-based applications such as network tools to access the LONWORKS network. For example, the Echelon PCLTA-10 LonTalk Adapter is a network interface device packaged on a standard PC ISA adapter card. It plugs into the ISA bus internal to the PC, providing access to the network for network tools compatible with LNS such as the LonMaker for Windows Integration Tool.

### *Network Management*

The management of functions, services, events, and properties in an integrated LONWORKS network.

### *Network Management Tool*

A software application, such as the LonMaker for Windows Integration Tool, which is used to facilitate one or more network management tasks, such as network design, configuration, installation, documentation, maintenance, modification, monitoring, or supervisory control.

### *Network Services Interface (NSI)*

The component in the LNS architecture that provides the physical connection to the LONWORKS network, manages transactions with the NSS, and provides transparent remote access to the NSS.

### *Network Services Server (NSS)*

The component in the LNS architecture that processes network services, maintains the network database, and enables and coordinates multiple points of access. Note that the NSS-10 module combines elements of both the NSI and NSS, but does not support multiple points of access.

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### *Network Variable*

High-level objects that application devices use to communicate with one another. The types, functions, and number of network variables in each node are determined by the application code within the device. Network variables make it easy to develop networked control applications by eliminating all of the low-level and tedious work of building and sending downlink messages, and receiving and responding to uplink messages.

### *Neuron Chip*

A family of VLSI components that implements the LonTalk protocol. The Neuron Chip can manage I/O devices and execute user-written application code, or alternatively it can be used to create a network interface to a host processor.

### *Neuron Chip Firmware*

Firmware required to operate a Neuron Chip and implement the LonTalk protocol. This firmware is contained in the VERxxx subdirectories of the LONWORKS IMAGES directory (default C:\LONWORKS\IMAGES) in files with the name S\*.NX\*. A custom system image including the Neuron Chip firmware with extensions for the LTM-10 hardware is included in the LTMSYS.NX file in the VER122 subdirectory of the IMAGES directory. This file does not include the MIP image included in the LTM-10 module. A special Neuron Chip firmware image is provided in a file named EEBLANK.NRI in the NodeBuilder system directory. This image can be used to blank the EEPROM in a Neuron 3150 Chip. See EEBLANK for details. Use of the Neuron Chip firmware is subject to terms and conditions defined in the NodeBuilder software license agreement and the LONWORKS OEM license agreement.

### *Neuron ID*

A 48 bit number assigned to each Neuron Chip at manufacture time. Like a serial number, each Neuron Chip has a unique Neuron ID.

### *Node*

A LONWORKS device. This term is used in the LONWORKS Network Services Architecture.

### *Node Address*

A unique 15-bit logical identifier for each node in a domain. The node address consists of two parts: a 7-bit subnet address and an 8-bit Node ID. The Node ID is unique within the subnet.

### *Node ID*

The third part of the LonTalk addressing hierarchy of domain/subnet/node. At installation time, each device is assigned a unique node ID within its subnet by the NSS.

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### *Node Object*

A LONMARK object which monitors the status of all LONMARK objects in a node and makes the status information available for monitoring by network management tools.

### *Non-Volatile RAM*

Read-write processor memory that does not lose its contents when electrical power is removed. Two widely used semiconductor technologies are EEPROM (electrically erasable programmable read-only memory) and Flash memory.

### *NSI (See Network Services Interface)*

### *NSS (See Network Services Server)*

### *NV (See Network Variable )*

### *Output Network Variable*

A network variable that provides information from a device to other devices on the network.

### *PCC-10*

A type II PC (formerly PCMCIA) card NSI that includes an integral FTT-10 transceiver. Other transceiver types can be connected to the PCC-10 via external transceiver "pods". The PCC-10 is the best NSI to use with laptop, notebook, or embedded PCs.

### *PCLTA-10*

A 1/2 size ISA card NSI. Unlike the PCNSI, it includes a twisted pair transceiver onboard, eliminating the need to attach a separate SMX transceiver assembly. The PCLTA-10 also supports the Windows plug-and-play standard. The PCLTA-10 is the best NSI to use on a desktop PC host that attaches to a twisted pair channel.

### *Peer-To-Peer*

A control strategy in which independent intelligent devices share information directly with each other and make their own control decisions without the need or delay of using an intermediate, central, or master controller. Because of the enhanced system reliability introduced by eliminating the master (a single point of failure) and the reduced installation and configuration cost inherent in peer-to-peer designs, LONWORKS networks often use a peer-to-peer control strategy.

### *Physical Layer Repeater*

A hardware device that connects two segments of a channel. Unlike a LONWORKS router, a physical layer repeater has no intelligence, so it cannot selectively

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forward packets to increase network capacity, and unlike a router, it forwards damaged packets.

### *Physical Medium*

A communication environment that carries the modulated signals from sources to destinations in a network. LONWORKS supports many media types, including twisted pair, power line, fiber optic cable, radio frequencies, infrared, and coax.

### *PL-20 or PLT-22*

A power line LONWORKS channel type.

### *Plug-In*

An easy-to-use LNS-compatible graphical software tool for configuring an application program in a LONWORKS device. Compatibility with LONWORKS Network Services (LNS) automatically assures compatibility with other LNS-based network tools. For example, the applications in the Echelon LonPoint Modules all have LNS-based plug-ins for configuration. After defining and performing network configuration of one of these devices using the LonMaker tool, the user can right-click on the device icon, select Configure from the shortcut menu, and the configuration plug-in is immediately launched from within the LonMaker tool.

### *Pre-Engineered Configuration*

Configuration information is collected into a database at system design time by the network configuration tool, then is downloaded to the physical nodes later at network installation time.

### *Priority*

A mechanism provided by the LonTalk protocol to allow devices priority access to a channel.

### *Protocol*

A communication scheme defined by (i) services, (ii) data types handled by the services, and (iii) a state transition scheme for each device receiving or providing the protocol services.

### *Protocol Analyzer*

A tool that can read every packet on a LONWORKS channel. A protocol analyzer is different from a device containing the complete LonTalk protocol stack in that it can receive every packet on the network, not just packets that are addressed to it.

Protocol analyzers allow users to observe, analyze, and diagnose the behavior of installed LONWORKS networks. Both the LonBuilder Protocol Analyzer and the LonManager Protocol Analyzer include the following tools for network analysis and diagnosis:

- Packet monitor tool

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Network traffic statistics tool

Network diagnostics tool

### *RAM*

Read-write processor memory. May be volatile (loses contents on power loss) or non-volatile (maintains contents even if power is lost).

### *ROM*

Read-only processor memory. Maintains contents on power loss (non-volatile).

*Router* (See *LONWORKS Router*)

### *SCH-10 Scheduler Module*

Provides a real-time clock, calendar, and system scheduler for coordinating system functions. An integral battery-backed real-time clock chip/calendar chip provides input to the Real Time Clock FB. Two other powerful functional blocks provide time-based or input-based control functions for a system or a subsystem. Time-based control is specified via the Event Scheduler FB. System schedules may be defined based on the time of day, day of the year, or specific month and day. The Mode Generator FB allows the design of sophisticated control algorithms that use both time-based events and the current or historical values of selected analog and digital points in the network. Multiple scheduler modules can be chained together for redundancy or for more complex scheduling applications.

*SCPT* (See Standard Configuration Parameter Type)

### *Self-Documentation*

A mechanism that a device can use to provide descriptive information. Self-documentation can be provided for the device's program and network variables. A provider of user-defined services and events may also support self-documentation for itself, its services, events, objects, and properties. When possible, the NSS makes self-documentation information available to the host application through properties.

### *Sensor*

Any component that is used to determine the condition or value of a physical system variable, or to accept commands from a human operator.

### *SLTA-10*

A serial NSI interface with built-in twisted pair transceiver that connects to any host with an EIA-232 (formerly RS232) port. It can also connect to the host remotely using a Hayes compatible modem. The SLTA-10 is the best NSI to use for remote application or for portable hosts that do not contain a type II PC slot.

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*SNVT (See Standard Network Variable Type)*

### *Source Address*

The logical node address of the transmitting node, contained in every packet transmitted over a LONWORKS network.

### *Standard Configuration Parameter Type (SCPT)*

A method of storing application configuration data using files that are read and written using the LonTalk File Transfer Protocol. SCPTs are defined by the LONMARK Association to ensure that LONMARK devices can be configured without a proprietary configuration tool. See the LONMARK web site for a current list and documentation.

### *Standard Network Variable Type (SNVT)*

SNVTs facilitate interoperability by providing a well-defined interface for communication between devices made by different manufacturers. See the Echelon or LONMARK website for a current list and documentation.

### *Subnet*

A logical collection of up to 127 devices within a domain. Up to 255 subnets can be defined within a single domain. All devices in a subnet must be on the same segment. Subnets cannot cross non-permanent type routers.

### *Terminator*

Provides electrical termination for twisted pair channels.

### *TP/FT-10*

The free topology twisted pair LONWORKS channel type, 78Kbps bit rate.

### *TP/XF-1250*

A bus twisted pair LONWORKS channel type, 1.25Mbps bit rate.

### *TP/XF-78*

A bus twisted pair LONWORKS channel type, 78Kbps bit rate.

### *Transceiver*

The device that physically connects a Neuron Chip to its channel. The transceiver implements layer 1 of the LonTalk protocol.

*UCPT (See User-Defined Configuration Parameter Type)*

### *Unconfigured Device*

A device state where the device has an application image, but no network image. The device must be configured before it can operate on the network.

## LONWORKS & Control Terminology

### *User-Defined Configuration Parameter Type (UCPT)*

A non-standard data structure used for configuration of the application program in a LONMARK device. UCPTs can be used only when there is no appropriate Standard Configuration Parameter Type (SCPT) defined. LONMARK certified devices have UCPTs documented in resource files according to a standard format, in order to allow the devices to be configured without the need for proprietary configuration tools.

### *XIF (See External Interface File)*

#### STANDARDS ORGANIZATIONS

ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE.
ASHRAE	AMERICAN SOCIETY OF HEATING, REFRIGERATION, AIR CONDITIONING ENGINEERS
ASPE	AMERICAN SOCIETY OF PLUMBING ENGINEERS
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
ARI	AMERICAN REFRIGERATION INSTITUTE
IEEE	INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS
ISA	INSTRUMENT SOCIETY OF AMERICA
IES	ILLUMINATING ENGINEERING SOCIETY
JIC	JOINT INDUSTRIAL COUNCIL
LONMARK™	LONWORKS INTEROPERABILITY STANDARDS ASSOCIATION
NEMA	NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION
OSHA	OCCUPATIONAL SAFETY AND HEALTH ACT
UL	UNDERWRITER'S LABORATORIES, INC.
UBC	UNIFORM BUILDING CODE
UMC	UNIFORM MECHANICAL CODE
UPC	UNIFORM PLUMBING CODE
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
RSES	REFRIGERATION SERVICE ENGINEERS SOCIETY
FCC	FEDERAL COMMUNICATIONS COMMISSION

## LONWORKS & Control Terminology

### Common Building Control Terms

Algorithm: A logical procedure for solving a recurring problem.

Analog: A continuously varying signal value (temperature, current, velocity, etc.).

Binary: A two-state system where an "on" condition is represented by a high signal level and an "off" condition is represented by a low signal level.

Bridge: A device that routes messages or isolates message traffic to a particular segment, sub-net or domain of the same physical communication media.

Building Automation System (BAS). The complete facility control system comprised of mechanical system automation, security control, lighting control, automatic temperature control, etc., as defined in the contract documents.

Channel: A physical media serving a number of nodes.

Control Unit (CU): Control product that incorporates solid state components based upon the Neuron chip to perform multiple control loops or functions. Control Unit shall conform to the LONMARK™ functional profiles and interoperability standards.

Control Wiring: Includes conduit, wire and wiring devices to install complete control systems including motor control circuits, interlocks, thermostats, EP and IP switches and like devices. Includes all wiring from Intelligent Devices and Controllers to all sensors and points defined in the input/output summary shown on the drawings or specified herein and required to execute the sequence of operation.

Deadband: A temperature range over which no heating or cooling energy is supplied, such as 72-78 ° F, i.e. as opposed to single point changeover or overlap.

Distributed Control: A system whereby control processing is decentralized and independent of a central computer.

Diagnostic Program: Machine-executable instructions used to detect and isolate system and component malfunctions.

## LONWORKS & Control Terminology

**Gateway:** A device that contains an I/O software driver to translate data from a particular format to that conforming to LonTalk™ standard. LonTalk™ protocol is inserted on outbound LONWORKS® message and striped on all incoming messages.

**Intelligent Devices (ID's):** Control products that incorporate solid state components based around the Neuron chip to perform a single dedicated control loop or function (ex: actuators, sensors, switches). Device functional profiles are based on upon LONMARK™ Interoperability Association Standards.

**LONWORKS®:** The generic technology that incorporates LONMARK™ compliant products that communicate using LonTalk™ Communication protocol. The technology employees routers, gateways, bridges multimedia transceivers permitting topology and media independent control solutions.

**Human-Machine Interface (HMI):** A graphical, object oriented method by which an operator is capable of communicating with the BAS. Human-machine interfacing allows the operator to manage, command, monitor, and program the system. Also known as GUI (graphical user interface) or MMI (man machine interface)

**Network:** A system of distributed control units that are linked together on a communication bus. A network allows sharing of point information between all control units. Additionally, a network provides central monitoring and control of the entire system from any distributed control unit location.

**Operator Interface Terminal:** An HMI device (PC, laptop or dumb display terminal) which incorporates the LONWORKS® Network Services Interface (NSI), Application Program Interface (API) for remote network client services.

**Operating System (OS):** Software which controls the execution of computer programs and which provides scheduling, debugging, input/output controls, accounting, compilation, storage assignment, data management, and related services.

**Peripheral:** Input/Output equipment used to communicate to and from the computer and make hard copies of system outputs and magnetic files. Peripherals include CRT, printer, hard drives, disk drives, modems, etc.,

**Router:** A device which routes or forwards messages destined for a node on another subnet or domain of the control network. The device controls message traffic based on node address and priority. Routers shall also serve as communication interfaces between powerline, twisted pair and RF medias.

## LONWORKS & Control Terminology

Supervising Control and Data Acquisition (SCADA) Node: A MMI incorporating a graphical object oriented user interface software application provides supervisory control and data acquisition from a high level processing personnel computer.

Supervisory Control Unit (SCU): A controller that incorporates LONWORKS® network services host API to perform localized network management and network access services over a group of channel(s). Supervises groups of intelligent devices and Control Units to perform a global sequence of operation (ex: fire and life safety control). Can be configured to serve as a SCADA client on the BAS, Tier 1, Local Area Network.

## LONWORKS & Control Terminology

### Commonly used Abbreviations

AHU	Air Handling Unit
Approx.	Approximately
AO	Analog Output
AI	Analog Input
ATC	Automatic Temperature Control System
BAS	Building Automation System
BCS	Building Control System
BTU	British Thermal Unit
C	Common
CCC	Central Communications Controller
CCU	Central Control Unit
CCW	Counter ClockWise
CH	Chiller
CHWR	Chilled Water Return
CHWS	Chilled Water Supply
Contr.	Contractor
COS	Change of State
CPU	Central Processing Unit
CRT	Cathode Ray Tube
CR	Condensate Return
CW	ClockWise
CWR	Condenser Water Return
CWS	Condenser Water Supply
CT	Cooling Tower
D.A.	Direct Acting or Discharge Air
$\Delta T$	Delta Temperature (difference)
DB	Dry Bulb Temperature
DI	Digital Input
DO	Digital Output
DPS	Differential Pressure Switch
DX	Direct Expansion
Deg. or °	Degree Fahrenheit
Dia. or diam.	Diameter
DDC	Direct Digital Control
DHW	Domestic Hot Water
DMA	Direct Memory Access
Dpr.	Damper
DPDT	Double Pole Double Throw
DPC	Differential Pressure Control
Dwgs.	Drawings
EA	Exhaust Air

## LONWORKS & Control Terminology

EMS	Energy Management System
EP	Electric-pneumatic
FPB	Fan powered VAV box
FPM	Feet per minute.
FACP	Fire Alarm Control Panel
FCC	Fire Command Center
FCIP	Firefighters' Control and Indicating Panel
FMCS	Facility Management Control System
FMS	Fire Management System
Ft.	Feet
Galv.	Galvanized
GPM	Gallons per minute
GUI	Graphical User Interface
HMI	Human Machine Interface
HOA	Hand Off Auto Switch
HVAC	Heating Ventilating and Air Conditioning
HWR	Hot Water Return
HWS	Hot Water Supply
HX	Heat Exchanger
Hz	Frequency
I/O	Input/Output
kW	Kilowatt
kWh	Kilowatt Hour
LNS	LONWORKS® Network Services Architecture
NSS	Network Services Server
NSI	Network Services Interface
mA	MilliAmps
MAT	Mixed Air Temperature
Mfr.	Manufacture
Mfgr.	Manufacturer
Max.	Maximum
Min.	Minimum, Minute
MMI	Man Machine Interface
MSCP	Mass Storage Control Protocol
N	Neutral or Grounded Conductor
NC	Normally Closed
NO	Normally Open
NEC	National Electrical Code
NIC	Not in Contract
O.C.	On Center
O.D.	Outside Diameter
OL	Overload Protection
OS	Operating System
OSA	Outside Air
PA	Percent Authority

## LONWORKS & Control Terminology

PB	Proportional Band
PE	Pneumatic-electric
Per	According to, in accordance with
PID	Proportional Integral Derivative Control
PPM	Parts per million
PRV	Pressure Reducing Valve
Provide	Furnish and install
PSI (g)	Pounds per square inch (gauge)
RA	Return Air
R.A.	Reverse Acting
RAM	Random Access Memory
RH	Relative Humidity
RTD	Resistant Temperature Device
SA	Supply Air
SCADA	Supervisory Control and Data Acquisition System
SI	Systems Integrator
S/S	Start Stop
T	Temperature
TC	Time Clock
UBC	Uniform Building code
UMC	Uniform Mechanical Code
V	Voltage
VA	Volt Amperes
VAV	Variable Air Volume
VCS	Voice Communication System
WB	Wet Bulb
WC	Water Column
XIF	LONMARK™ Product Information Files
ZT	Zone Terminal