LonWorks Glossary

BACNET is a standard protocol produced by ASHRAE (American Association of HVAC Manufacturers). LON is one of the transport media used by BACNET although some important and useful features of LON (especially network variables) are lost in the process.

Bridges transfer information to the opposite side provided the domain of origin of that information corresponds to one of the domains of the bridge regardless of the destination of the information. A bridge is used for linking domains, e.g. for passing on universal system information.

Channel The physical structure of networks comprises a number of Routers and Repeaters which subdivide the network into several channels. A channel denotes a physical segment of the network , e.g. a bus segment in TP/FT-10. Depending on the physical limits of the basic medium, a single channel can have any number of nodes.

Configured Routers transfer valid information to the opposite side provided the domain of origin of the information corresponds to one of the domains of the Router. Each side of a Configured Router possesses its own transmission table for this purpose. In the table for each of the 255 possible subnets and each of the 255 groups of a domain the transmitter transferring the information is identified with a transmission flag. These tables are generated with a network management tool and are permanently stored in the Router's EEPROM. The use of a Configured Router is advisable when network traffic needs to be deliberately separated. It produces islands with relatively high internal network traffic and relatively little external communication. As a result, the whole network does not become overloaded with information that is only 'local' in character.

CSMA is a method of access from a LAN and the abbreviation stands for **C**arrier **S**ense **M**ultiple **A**ccess. With CSMA the node first 'listens' to the network before it does anything. With CSMA/CD (**C**ollision **D**etect) the possibility of collisions is assumed from the outset and various methods of combating them are employed when necessary. LONWORKS uses the predective, p-persistant CSMA method which, even in large networks, allows short reaction times when throughput rates are high.

Domains are the largest addressing units of all. They are used for producing whole - independent - subsystems, e.g. lighting systems, access control systems (when these need to communicate with each other). Therefore, Domains form virtual networks within the physical structure of the network. Each LON device can be accessed through two Domain addresses. One Domain can be assigned a maximum of 255 subnets each with 127 devices (making a total of 32,385 devices).

Echelon is the provider of LONWORKS technology. Echelon first launched its new developments on to the international market in December 1990. The financial capital for this innovative and risky development came from venture capital sources in the USA, including the semiconductor manufacturers Motorola and Toshiba. More information will be found on their website www.echelon.com.

Groups provide another form of addressing that is independent of Domain-Subnet-Node addressing. Up to 255 Groups per Domain can be formed whose members can all communicate with each other through the Group addressing. In each Group any number of devices can be members whereby, in turn, each device can be a member of up to 15 Groups.

Inter-operability is the aim and guiding principle of LONWORKS technology. Regardless of the chosen media of transmission, network topology, hardware details or operating system functions LONWORKS nodes should always be able to 'talk' to each other and 'work' with each other.

ISO OSI model is a model developed by the ISO (International Organisation for Standardization) for communication between nodes in networks. This model was named OSI (Open System Interconnection) and is based on 7 layers of communication.

Learning Routers are a special form of Configured Router. In this case all information is transferred by means of Group addressing and a learning process is active at the same time. A reset sets all the transmisson flags so that all information is transmitted. The Learning Router checks the subnet number each time information is received and cancels the corresponding flag on the other side so that gradually two transmission tables are produced in the same way as with the Configured Router. However, these are only stored in RAM so are lost after a reset. Nevertheless, the resulting tables can be read with a suitable tool and processed further so that the Router can subsequently be used as a Configured Router. Learning Routers are not so powerful as Configured Routers but they can be installed without any prior knowledge of network topology or communication structures.

LNO LNO The LNO – LON Nutzer Organisation e.V. (German LON User Organisation) is the association for companies, institutes and distributors who work with the LONWORKS technology within the German-speaking area. Members of the LNO can be anyone who develops, sells or uses devices and systems that use the LonTalk protocol as their communication.

LNS/LCA "LONWORKS Networks Services Architecture"/ "LONWORKS Component Architecture". A software platform developed by Echelon with functional and data interfaces for the implementation of tools for LON, for example for hand terminals, service stations, for PC visualisations and PC implementation tools.

LonBuilder is the high-end development system from Echelon. One can emulate hardware with it, compile application software and test it after downloading.

LonMark Association is an international association of more than 300 companies that deal with the standardisation of LON for specific task areas and devices, with the aim of guaranteeing interoperability. In the LONMARK Task Groups, the textual work is achieved. Thus there are standards (Functional Profiles), among other things, for blind control, lighting, sensors, actuators. For more information, please visit: www.lonmark.org

LonTalk is the protocol through which Echelon's system solution is specified. LonTalk defines how LON nodes communicate with each other on the individual layers of the ISO-OSI model. LonTalk describes hardware functions, operating system functions and compiler functions precisely, whereby the implementation remains concealed.

LONWORKS is the system description for the whole technology. Within it are included, for example, the Neuron Chips, the transceivers, the development tools, software packets, support. With LONWORKS, decentralised information processing structures are made possible that function without central control (for example PLCs). In this respect, LONWORKS distinguishes itself from conventional fieldbus solutions.

LPT-10 Link Power
This transport medium is also a twisted pair variant. It corresponds technically to the variant "free topology FTT10" with the added advantage that the power supply to the devices can be transported via the bus cable. LPT-10 requires the use of special link power electricity supply (input voltage, for example, 48-56 V, output voltage ca. 42V / 1.5 A) that are mostly very expensive. Besides, there are limits with respect to load capability – a link power network part can only supply a limited number of devices. Link power signals can also be switched to TP/FT-10 devices, if these contain the corresponding blocking capacitors that close off the supply voltage.

Neuron C is the programming language according to the ANSI-C standard for the application programming of Neuron Chips. Neuron C contains additional operating system functions for event-oriented programming and for network variables for process-related programming, as well as for more complex objects for I/O interfaces.

Node is the term for a device or a module with a Neuron Chip as a micro-controller. Nodes are the smallest addressing unit.

NodeBuilder is a low-end development system from Echelon (see LonBuilder).

Power-Line represents the data transmission via the 230 V network according to CENELEC.

Prog-ID Every LON device contains a special software that implements the application. Fundamentally, a LON device can be delivered with different software (functional variants). In order to differentiate them, the PROG-ID is used. This is a chain of characters that is saved in a special place in the memory. Implementation tools use the PROG-ID to differentiate between devices with the same hardware, but nevertheless differing functions. LONMARK has defined specifications as to how the PROG-ID is to be coded and used.

Repeaters are the physical amplifiers without their own processing functions. They are used to achieve larger transmission distances, or when the maximum number of nodes of 64 devices per twisted pair segment is exceeded. The repeater counts as a node, meaning that per segment 63 nodes + 1 repeater can be used. In TP/FT-10 networks, only one physical repeater is allowed to be located between two nodes. It is also possible to implement the router as a repeater. In this way, the limitations experienced with physical repeaters are inapplicable and a change of media is also possible.

Routers combine neighbouring subnets where the router works with addresses and protocols from layer 3. This layer is independent of the hardware so that routers are able to undertake the transition into another transport medium. Routers can be operated in the operational types: repeaters, bridges, learning routers and configured routers.

Service Pin is a special input/output of the node for service purposes. As a rule, this pin is fed outward by the module manufacturer to a sensing device and an LED. Upon activating the service sensor, the Neuron Chip sends a broadcast message that contains the Neuron ID and the programme ID. In this way, a node, for example, a tool, can be registered (allocation of a physical node to a logical node in the project). As an output, the service pin signalises the current status of the Neuron (application and configuration) and thus enables a fundamental diagnosis.

SNVTs (Standard Network Variable Types) are type-bound network variables in the Neuron-C programming language, standardised by LONMARK, for the implementation of logical communication channels between LON nodes.

Subnets are the next smallest addressing unit after the domain. By means of subnet addressing, certain groups of devices (for example, in a room or in a manufacturing cell) can be addressed. Subnets can contain a maximum
of 127 devices.

Terminators serve the correct termination of a network with respect to impedance on the basis of twisted pair technology. Independent of the transceivers and the topology used (bus or free topology), various terminators from Echelon may be used according to the specification. Terminators are also partly integrated into LON devices and are then, as a rule, able to be activated via a switch or jumper. Missing or incorrect termination of a network does not have to immediately have an ostensible effect, but can be the cause of irregularly occurring communications problems.

TP/XT-78 Twisted Pair 78 kBit/sec
This transport medium with a transport connection was very widespread in the first years of LON. In the form of a linear bus topology, up to 64 devices can be switched to a segment. The length of the bus cable of a segment can amount to up to 2000 m. TP/XF-78 is LONMARK certified, but should not, however, be used for new developments.

TP/XT-1250 Twisted Pair 1250 kBit/sec
Parallel to TP/XT-78, TP/XP-1250 was introduced. This is also a linear bus with a transport connection of up to 64 devices per segment, nevertheless limited to a length of 130....400 m. The considerably higher physical transmission rate brings only little profit in data throughput and reaction speeds. Applications therefore remain limited to a few exceptions (for example in time-critical backbone buses in control cabinets or for spezial transmission tasks with large data packets), especially as particular requirements are placed on the topology in detail.
TP/XF-1250 is not LONMARK certified, observe wiring guidelines exactly.

TP/RS-485 Twisted Pair RS-485
Various device manufacturers tried in the start phase of LON to absolutely minimise the transceiver costs through implementation of RS-485. In reality, problems arise with RS-485, such as during galvanic separation and during management of mass-related potential between various devices. If one wishes to implement RS-485 interfaces in a CE-conformant way, efforts need to be made that are comparable to those in the case of other twisted pair variants. RS-485 is, therefore, no longer supported by Echelon.

TP/FT-10 Twisted Pair free Topology TP/FT-10
This is, without doubt, the most widespread transport medium today. The TP/FT-10 channel allows both linear bus topologies, as well as free topologies. As a linear bus, 64 participants can again be connected to a segment of up to 2700 m long. The transmission rate is 78 kBit/sec. In free topology, an expansion of the network of up to 500 m can be achieved with 64 devices. TP/FT-10 facilitates the greatest degree of freedom in the spatial configuration.
TP/FT-10 is LONMARK certified.

Transceivers are the bus building blocks between the Neuron Chip and the transport medium. Important representatives are: TP/XF-78, TP/XF1250, TP/FT-10, LPT-10 and PLT-21. Furthermore, transceivers are available for radio transmission or for the connection with fibre-optic cable systems.

Wink is the possibility of the node to make itself noticeable in various ways (optically, acoustically etc.) after it has received a wink message. Thus an installation tool can search for unconfigured nodes in the network and send a wink message to the node that reports itself first. This node then makes itself noticeable in a defined way, if it is prescribed in its application, so that the technician can create the allocation to the physical node.