EtherNet/IP™ Speak - Common Terms

This application note defines Common Terms used in conjunction with EtherNet/IP™ protocol and Ethernet IP hardware. Terms are listed in alphabetical ascending (A-Z) order.

AC Drive Profile	In CIP, several assemblies are defined with specific bits corresponding to functions and specific variables at specific memory locations for an AC drive. This is called the AC Drive Profile. By adhering to the AC drive profile, it becomes easier for programmers to integrate AC drives from various manufacturers as they all map data in the same basic way.
Adapter	This is the slave Ethernet IP device (i.e. the Ethernet IP communication module in the drive).
Assembly	A block of contiguous data messaged to a device (either implicit or explicit).
Attribute	In terms of Explicit messaging, Attribute basically selects a variable that a message will be sent to. An analogy for Class, Instance and Attribute is your home address: Class would be your zip code, Instance would be your street and Attribute would be your street address number. For example, in class 6e the Attribute is the Lenze subcode number.
Cat5e	Cat5e is a standard Ethernet cable specification suitable for most industrial applications. Cat5e is twisted cable.
CIP™	**Common Industrial Protocol.** CIP is the basis of several industrial communications protocols that originated from Rockwell Automation® including ControlNet™, CompoNet™, DeviceNet™ and EtherNet/IP™. CIP defines basic addressing and services used by these communication protocols.
CIP Generic	CIP Generic is a type of device as defined by CIP. Basically it is an uncategorized device (i.e. a communication adapter) that can be communicated using a standard data type on Ethernet IP.
CIP Motion™	CIP Motion™ is an extension of the EtherNet/IP™ protocol that allows for coordinated deterministic motion between devices on Ethernet IP. CIP motion equipped drives have no local programming or configuration capability. All configuration and operation is controlled by the master PLC. No Lenze products support CIP Motion™; however Lenze does offer products that support EtherCAT. EtherCAT is a competing deterministic Ethernet based protocol that allows coordinated motion between drives and a master on Ethernet.
CIP Safety™	CIP Safety™ is an extension of the EtherNet/IP™ protocol that incorporates a safety element in monitoring network traffic between Ethernet IP nodes and defines the reactions of those nodes to certain conditions. No Lenze products support CIP Safety™.
CIP Synch™	CIP Synch™ is an extension of the EtherNet/IP™ protocol that allows devices on an Ethernet network to synchronize their internal clocks to a defined amount of jitter facilitate coordinated motion. CIP Synch™ is required for CIP Motion™. No Lenze products support CIP Synch™.

Class	In terms of Explicit messaging, Class basically selects a type of variable that a message will be sent to. An analogy for Class, Instance and Attribute is your home address: Class would be your zip code, Instance would be your street and Attribute would be your street address number. For example, class 2A defines variables in the AC drive profile. Class 6e defines variables that are Lenze codes.
Communications Path	In Explicit messaging you will be prompted to enter a Communications path for the message to direct it from the PLC's CPU to the target device (our drive). This includes the slot number of the Ethernet IP adapter in the PLC in the path. The easiest thing to do is browse to the drive via tree navigation. This is possible in RSLogix™ 5000 providing that you configured the drive in the Ethernet network in the PLC's configuration (for implicit messaging).
Destination	In terms of an Explicit message, the Destination defines the tag (variable) in the PLC where you want to copy data read out of a drive to.
DLR	**Device Level Ring.** An add-on to EtherNet/IP's basic protocol, Device Level Ring allows DLR equipped devices to be connected in a physical ring configuration. This allows a single cable break at any point to maintain communications to all nodes on the network. Only DLR equipped devices may be used in a DLR ring. The E84AYCEO, E94AYCEO and EtherNet/IP™ equipped Protec and Motec drives all support DLR.
EDS file	EDS stands for **Electronic Data Sheet.** Basically this is a lookup table for the device in question. It states what objects are in the device in question, where they are and valid data ranges.
Explicit Message	Also known as Class 3 messaging on Ethernet IP, an explicit message is an asynchronous read or write from the controller to the drive. This is done to change a parameter or other infrequently changing data. The MSG logic instruction in RSLogix™ 5000 is used for explicit messaging.
Explicit Ownership	In Implicit messaging only one node has authority to write to a given slave device (adapter). The slave device (adapter) grants explicit ownership to the first scanner to poll it. The slave device (adapter) will ignore any implicit message write attempts from any other node until the scanner with implicit ownership loses communication and times out.
Ethernet	Ethernet is a networking architecture. The term accurately encompasses the physical and data transport layers used on a network; however it does not define the protocol. There are quite a few Industrial Ethernet protocols used on Ethernet networks (EtherNet/IP™, Modbus TCP/IP, EtherCAT® and PROFINET™ for example). It is very important to understand that while two devices may both be Ethernet devices, they may not use the same protocol and thereby cannot communicate (i.e. a device that supports EtherNet/IP™ cannot interface with a device that only supports PROFINET™).
EtherNet/IP™	A specific communication protocol established by Rockwell Automation® and governed by ODVA. This protocol is one of the CIP standard protocols.
Ethernet TCP/IP	This term is used quite often to just note that a device is an Ethernet equipped device (usually with a web page imbedded and some protocol). It does not denote that a product is compatible with EtherNet/IP™ protocol.

Hub	A Hub is an Ethernet connection device that acts as a dumb repeater. Messages received on one port are broadcast to all other ports
IEEE 1588	IEEE 1588 is a method by which devices on Ethernet synchronize their internal clocks to a defined amount of jitter to facilitate coordinated events on Ethernet. Lenze does not use IEEE 1588 in its Ethernet IP module; however an equivalent method is used within EtherCAT. Lenze does offer products that support EtherCAT. EtherCAT is a competing deterministic Ethernet based protocol which allows coordinated motion between drives and a master on Ethernet.
Implicit Message	Also known as Class 1 messaging on Ethernet IP, an implicit message is a synchronous mode of polling a device where the device is read/written to at an fixed interval by the Scanner. This is used for control commands to or to read status from the drive.
Input Assembly	Assemblies are blocks of contiguous data polled from a device or written to a device by the Ethernet IP scanner. Input or Output are defined from the Scanner (PLC's) perspective. Input assemblies are generally status from a device read into the controller.
Instance	In terms of Explicit messaging Instance basically selects an object that a message will be sent to. An analogy for Class, Instance and Attribute is your home address: Class would be your zip code, Instance would be your street and Attribute would be your street address number. For example, in class 6e the Instance is the Lenze Code number.
Listen Only	An Ethernet IP Scanner can optionally establish a "Listen Only" connection to a device. A "Listen Only" connection can read Input Assemblies from a device; however it cannot write Output Assemblies to a device.
Multicast	This is a transmission mode on Ethernet used in Implicit messaging. All Lenze Ethernet IP devices support Multicast. Multicast allows multiple devices to listen to data transmitted over class 1 (implicit messaging).
ODVA™	**Open DeviceNet Vendors Association.** ODVA™ is the governing body that publishes the specification for **all** CIP protocols, including EtherNet/IP™. Today, ODVA goes by just the acronym "ODVA" since the group encompasses all CIP protocols. Their website is www.odva.org.
Output Assembly	Assemblies are blocks of contiguous data polled from a device or written to a device by the Ethernet IP scanner. Input or Output are defined from the Scanner (PLC's) perspective. Output assemblies are generally commands written from the controller to the device.
Packet Trace (or Trace)	Ethernet traffic analysis software (such as Wireshark™) can save a record of all messages seen on an Ethernet network and record the data within each message, the timestamp of each message, as well as the sender and receiver. This record is called a Packet Trace (or Trace). This is often useful in analyzing communication problems between Ethernet devices.
Port	Each type of message on Ethernet is directed to a given port number. For example, EtherNet/IP™ implicit messaging is directed to port 2222. Conversely all Modbus TCP/IP messages are directed to port 502. This port number is defined by the protocol.
RJ45	This is the standard Ethernet physical port connector used in most Ethernet devices.

RPI	**Request Packet Interval.** This defines in implicit messaging the rate at which the scanner polls the drive (adapter).
Scanner	This is the Ethernet IP master device (i.e. the Ethernet port in the master PLC)
Service Code	In terms of an Explicit message this defines if you want the message to be a write (Set Attribute Single) or a read (Get Attribute single) from the drive.
Source Element	In terms of an Explicit message, the source element defines the tag (or variable) in the PLC that contains the value you want to write to the drive.
Source Length	In terms of an Explicit message, the Source Length defines the length in bytes of the data you want to write to the drive.
Switch	A switch is an Ethernet connection device that limits traffic to pass only to the port to which the target device is attached. It is strongly recommended to use switches as opposed to hubs.
TCP	**Transmission Control Protocol.** This is basically a transmission type on Ethernet used for non-time critical applications. The transmitter of the message gets an acknowledgement from the receiver with this method. TCP is slower than UDP; however the messaging is confirmed and guaranteed as received in the order transmitted.
TCP/IP Socket	Each Ethernet device can maintain communications sessions with a limited number of devices concurrently. One socket is consumed per session
TTL	**Time To Live.** This defines the number of passes through routers a given message is allowed to propagate through. When the message is originated, the TTL value is set. This value decrements with each pass through a router. When the TTL value gets to 0, the message will no longer pass through routers. This is done to limit Ethernet traffic so that individual messages reach their destination; however do not propagate literally around the world.
UDP	**User Datagram Protocol.** This is basically a transmission type of data broadcasting on Ethernet used for fast transmission. In UDP the transmitter does not get an acknowledgement that the receiver got the data.
Unicast	This is a transmission mode on Ethernet used in Implicit messaging that became optional to use with RSLogix™ version 20. Unicast transmissions are point to point only.
WireShark®	Wireshark® is a common, free utility for capturing and analyzing Ethernet network traffic. It can be downloaded from the internet.