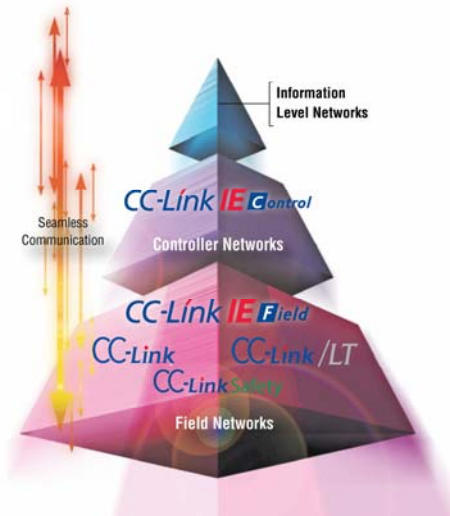


## CC-Link IE - Gigabit Industrial Ethernet

### A new integrated Ethernet network

**Open-technology, CC-Link IE Field brings vast new possibilities to the world of automation.**

To meet the changing demands for optimised control, openness, reliable, and deterministic handling of data on industrial communication networks, the CC-Link Partner Association (CLPA) announces this 1-Gigabit Ethernet-based integrated network. CC-Link IE enables seamless data communication from the plant-level enterprise network to the production floor network. This integrated industrial network philosophy also provides cost reduction for the total system engineering task from system start-up, operation, and maintenance



### High speed, deterministic Ethernet networking.

- CC-Link IE Field Network - An open standard 1Gbps Ethernet Fieldbus manufacturing network
- In addition to control data transmission, it enables information processing for maintenance and diagnostics to provide improved collaboration and productivity.
- High-speed 1Gbps data transmission uses widely-available, standard Cat5e copper cable and RJ-45 connectors.
- Determinism over Ethernet is ensured through the use of a token passing technique and does not require the use of additional switches.
- Seamless communication is enabled from the enterprise network layer to the controller network layer to the field network layer.

Because CC-Link IE Field is an open-technology network, the global CLPA organisation supports and assists partner companies in the development of their CC-Link IE Field compatible products. This allows the end-user to choose from a variety of value-added products for their automation systems.

Features of CC-Link IE Field

#### Ultra-high speed

One gigabit-per-second transmission and real-time protocol enables control of remote I/O field devices with essentially no transmission delay. This transmission rate is at least ten times faster than currently available Industrial Ethernet-based networks. CC-Link IE Field network is the first gigabit industrial Ethernet network extended down to the field device level. It combines the best of existing technologies and applies them in a highly reliable architecture that provides exceptional data bandwidth and transaction rates. The new network uses commercially available Cat5E cable and RJ45 connectors.

#### Inherent determinism without Ethernet switches

The significant difference between CC-Link IE Field Network and other Industrial Ethernet solutions is that CC-Link IE Field Network delivers deterministic control communications without requiring the addition of Ethernet switches. This feature eliminates the hardware costs

# CC-Link IE Field

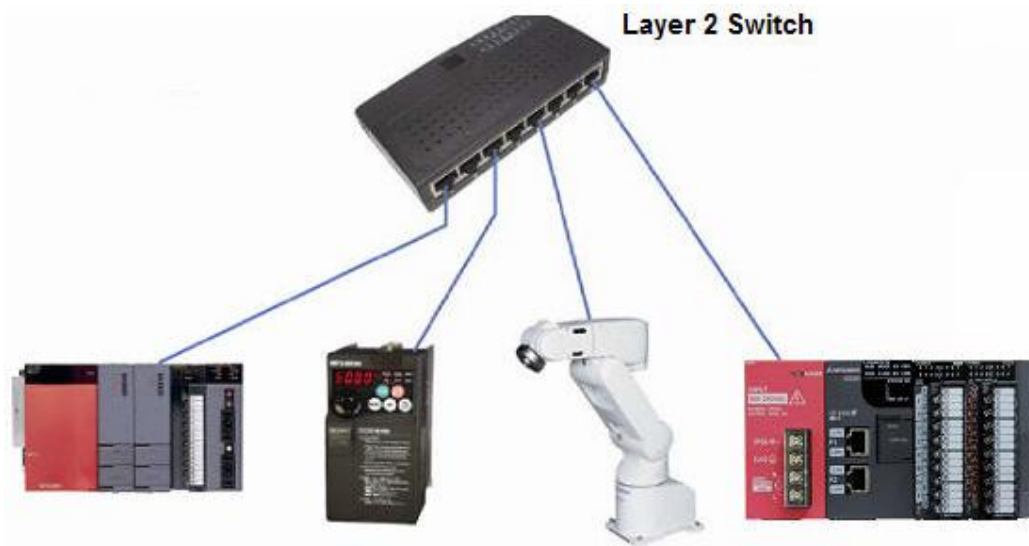
and engineering implementation costs of those switches. Also, the cost and need for developing communication statements to govern the flow of data is eliminated due to the shared memory concept of CC-Link IE Field and no knowledge of CC-Link IE Field protocol is required. Determinism is guaranteed by the CC-Link IE Field token-passing technique.

## Flexible topology

A CC-Link IE Field Network allows for a topology best suited to the needs of the particular application — thus ensuring greatest flexibility. These topologies include star, line, mixed star and line, and ring. Within a single network there can be a total of 120 stations with up to 328 feet (100 meters) of Cat5E cable between each station. In addition, as many as 239 networks can be interconnected allowing vast exchange of data to suit any application.



Line Topology



Star Topology

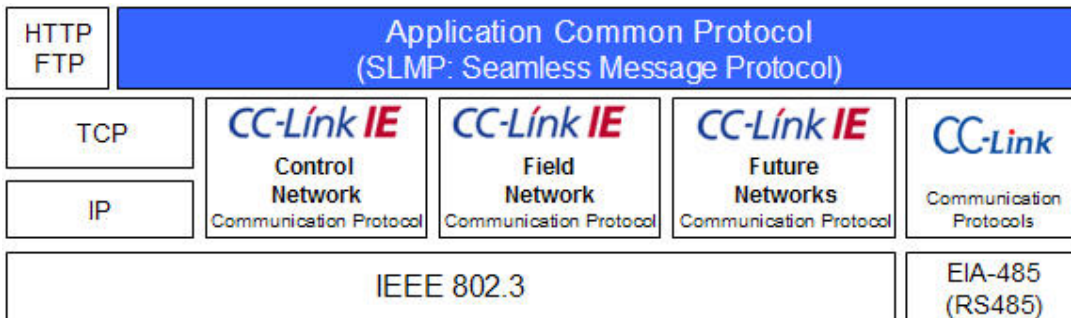
# CC-Link IE Field



**Mixed Topology**

## Seamless Communication

CC-Link IE Field networking enables seamless communication of data from field devices to controllers and from controllers to other controllers in order to form an integrated network for transmitting data at gigabit speed. An Ethernet adapter enables connection to 100 Mb Ethernet devices. CC-Link IE Field provides seamless data transmission between automation controllers such as PLCs and computers and field devices such as digital and analogue I/O, pneumatic valve manifolds, RFID readers, variable speed drives, motion controllers and other factory assets. It currently enables up to 120 stations to be interconnected on a single network while providing deterministic data exchange at gigabit speed without the need for Ethernet switches.



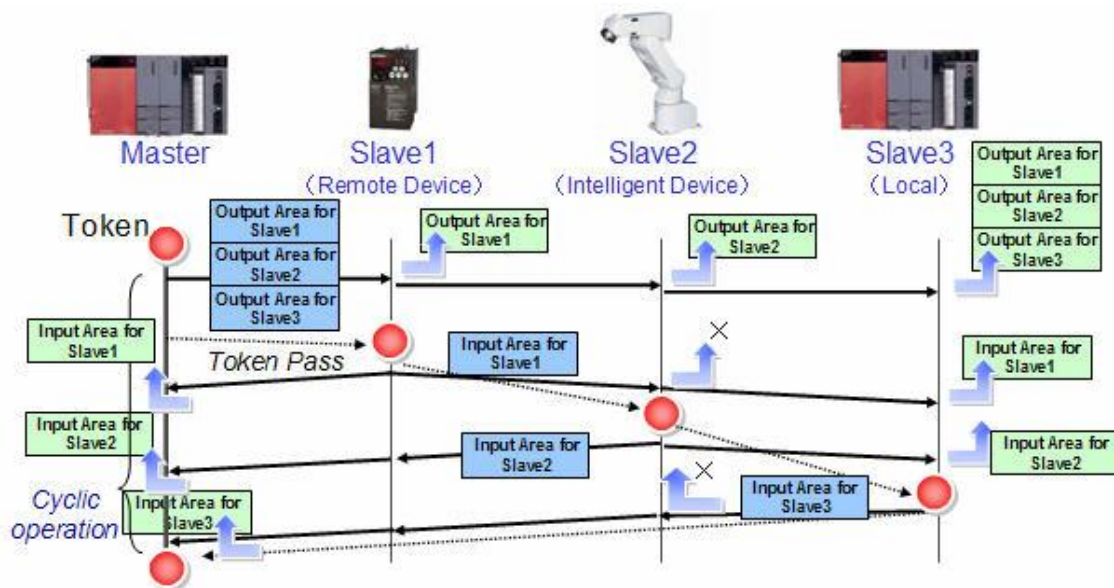
## Cyclic and Transient Messaging

CC-Link IE Field offers both "Cyclic" and "Transient" methods of data exchange based on well-proven token passing technology and an optimised protocol. Cyclic transmissions provide real-time, transparent data delivery services to all stations. A "common memory" model configured by a few simple parameter settings establishes deterministic data exchange for the entire network. Specific data delivery timing can be calculated accurately before a network is commissioned. The second method of CC-Link IE Field communication is the "Transient" mode. Transient messages are initiated "on-demand" from a specific station. Transient messages can be sent to one or more network stations and these stations can respond to Transient requests for data.

CC-Link IE Field allocates Transient mode bandwidth so that cyclic communication remains deterministic.

CC-Link IE Field cyclic (real-time) communication provides a transparent service to automation applications. The service is transparent because of the CC-Link IE Field shared memory model and the SLMP communication model. Applications can be designed without being aware of any networked communications, which are managed by the network independently. Applications do not know (or need to know) which data originates on the network, where data is sourced from, or where data must be delivered. The cyclic communication service automatically handles this service. Since the cyclic communication service is automatically built-in, minimal configuration is required in order to start up the real-time communications. This is an important distinction between CC-Link IE Field and other industrial Ethernet automation networks. Using this memory model and communication, high reliability as well as easy configuration and set up is assured. Other industrial Ethernet protocols require longer transmission cycles and exponentially complicated configurations as the size and complexity of the network expands.

Through the use of a token passing protocol, each CC-Link IE Field network device transmits its data then passes the token. This assures that real-time communication takes precedence over transient communication. Thus any spike in transient communication will have no impact on the real-time communication service; instead, the transient communication timing will vary should it exceed its allotted network capacity.



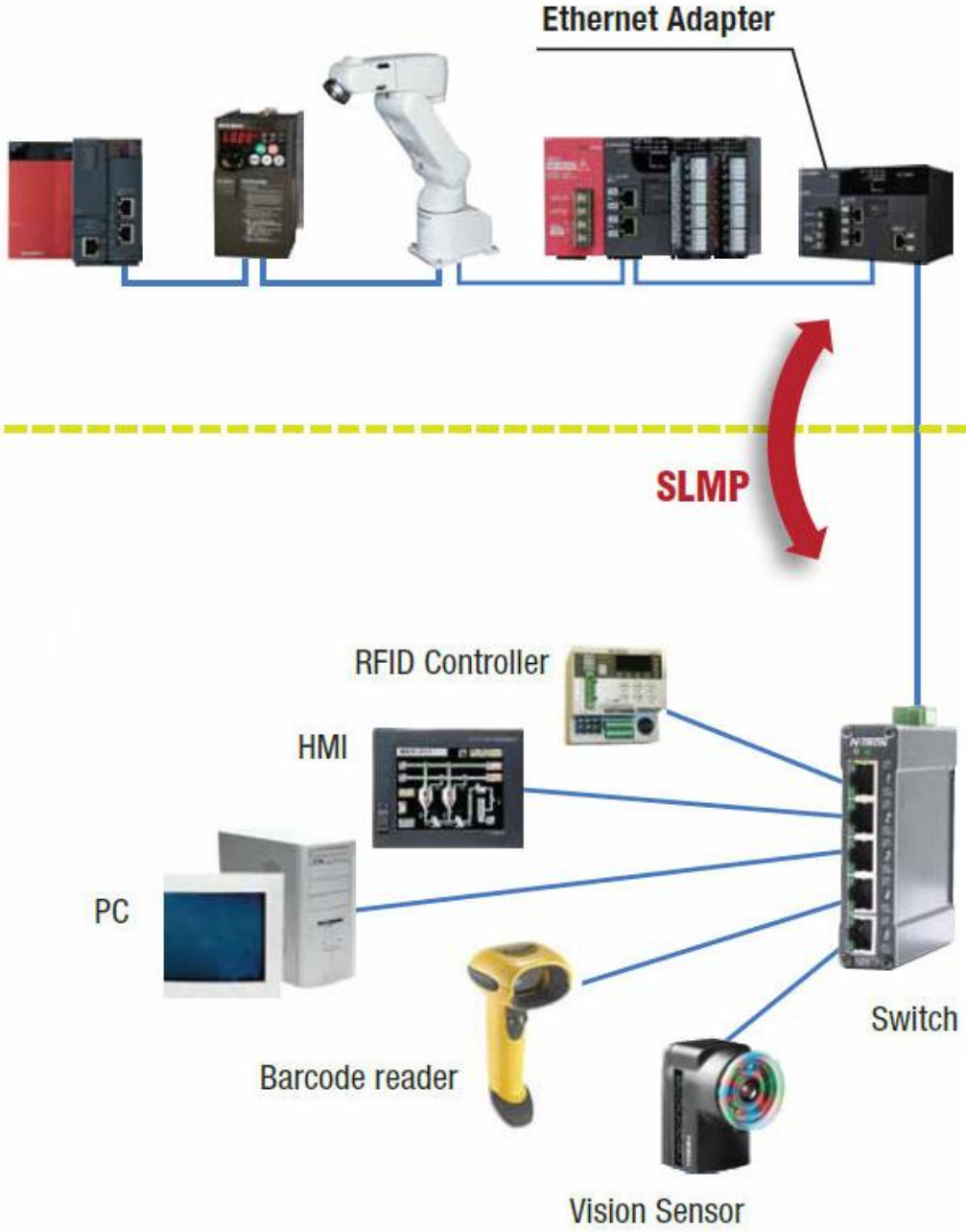
## Special TCP/IP and SLMP Communication Capabilities

Field devices having Ethernet ports and utilising TCP/IP communications can be connected to a CC-Link IE Field network through an Ethernet Adapter. TCP/IP communications are inherently non-deterministic; however, the use of the CC-Link IE Ethernet Adapter provides deterministic operation.

# CC-Link IE Field

**Allows Connection to  
TCP/IP Ethernet Devices**

**1 Gbps CC-Link IE Field**



**10/100/1000 Mbps TCP/IP**



## Specifications for CC-Link IE Field

### Specifications

Ethernet Standard	IEEE 802.3z (1000Base-SX)
Communication Speed	1Gbps
Ethernet Cable	Multimode Fiber Optic Cable (IEC60793-2-10 Types A1a.1(50/125μm))
Ethernet Connector	Type LC Duplex Connector (IEC61754-20)
Media Access Control	Token Passing
Network Topology	Duplex Loop (Ring)
Number of Stations	120
Maximum cable length between stations	550 meters between each station
Cyclic transmission (Common Memory Communication)	Max 32k bits (4,096 bytes) Max 128k words (256k bytes)
Transient transmission (Peer-to-Peer)	Message size: Max 960 bytes
Maximum number of interconnected networks	239