

CC-Link News

EUROPEAN EDITION

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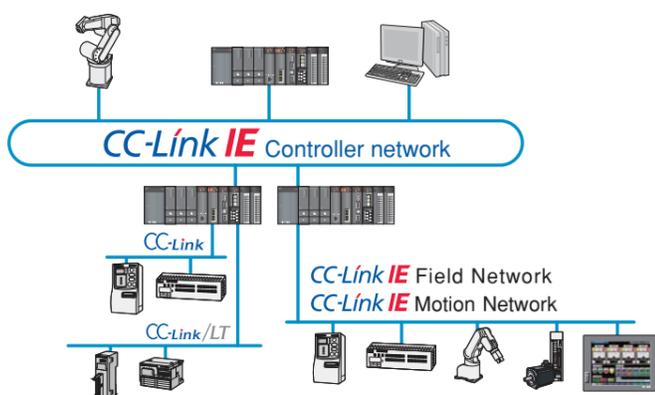
New Industrial Ethernet for intelligent applications

CC-Link IE extends Gigabit Industrial Ethernet to field level devices enabling new types of intelligent integrated manufacturing systems.

A major driver in the development of CC-Link IE was to deliver a high performance automation network for tomorrow's manufacturing without many of today's shortcomings: it should be simple to implement, easy to troubleshoot and use standard Ethernet tools. The result is CC-Link IE Field.

Network hierarchy

CC-Link IE is a family of integrated Industrial Ethernet-based networks designed for high performance deterministic control. It integrates networks from controller level to field and motion networks over Ethernet for a seamless data transfer without being aware of the hierarchy or boundary of the network. This also extends to the existing non-Ethernet based CC-Link control networks.



The CC-Link IE controller network is a high reliability trunk network for large scale controller-distributed control. It operates over a 1Gbps deterministic network using full duplex optical fibre. It has a 'floating' network master to maintain stable operations, automatic cable error detection and many other features.

Sited below the controller level, the new CC-Link IE field network is also a 1Gigabit deterministic network but over Cat 5e cable. This network offers the necessary connectivity for both existing and new types of manufacturing management.

Importantly, they can be used together or independently, and both will integrate the existing CC-Link and Safety networks.

Item	CC-Link IE Field Level
Ethernet standard	IEEE802.3ab(1000BASE-T)
Transmission speed	1Gbps
Cable, Connector	Metal cable (Category 5e), RJ-45 Connector
Media access control	Token passing
Network topology	Line, Star, Ring or Tree
Number of connected modules	254
Max. cable between stations	100m
Cyclic communication	Bit data: 4k byte. Word data 32k byte
Transient communication	Up to 2k byte

Field network communication

The CC-Link IE field network has been developed to enable the easy transfer of high speed control data and large scale message communication capability across networks with determinism and minimal latency. To achieve this, control data uses cyclic communication and a distributed shared memory, while messaging data uses transient/acyclic communication.

Cyclic communication refreshes the control data among all the stations by using token passing as media access control. Through the distributed shared network memory, each controller exchanges data with all other controllers, recognises the condition of other controllers, and performs its own control actions. As control data is exchanged in real time, it supports deterministic control.

Shared memory communication

The input and output area for each slave station is assigned to the distributed shared memory to control each slave from the master station. As seen overleaf, each station sends the data in the shaded area of the distributed shared memory as cyclic data, and the cyclic data from other stations are received in the un-shaded area.

The slave stations can hold the area that is assigned to the host station such as the slave station 1 or 2, and also the area that is assigned to other slaves such as the slave station 3 when a controller is connected as a slave station. When all areas, including areas assigned to other slave stations are held, the cyclic data of other stations can be monitored without accessing the master station, and a simplified controller network results. These transactions are made in real-time.



CC-Link Test Rig now available

The new CLPA-Europe CC-Link test rig is aimed at customers lacking experience with PLC-programming and CC-Link networks to undertake all pre-tests, which are required for certification.



HMS OEM user certification offer

CLPA-Europe and HMS have developed a joint programme of incentives exclusively for HMS users to join CLPA-Europe and test their products that connect to CC-Link using one of HMS's embedded communications devices.



CC-Link in action at BP-Castrol

When BP-Castrol looked at means of improving its tank monitoring systems as part of an upgrade to help eliminate the possibility of environmental hazards, it turned to CC-Link for an effective networked solution.

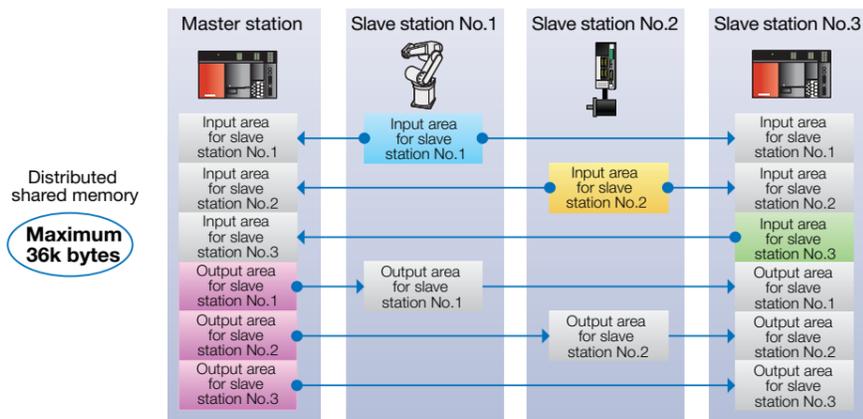


Promotion partner in Turkey

Since 2007 CLPA-Europe's Promotion Partner in Turkey has been GENEL TEKNİK SİSTEMLER LTD.ŞTİ or GTS for short. Since 1992 GTS has been involved in the automation market in Turkey.

Alternative language versions will be available in German, Italian, Polish, Turkish and Russian as a download via the news section of our website.

Continuation of article from front cover



Transient communication

The CC-Link IE field network also provides for direct peer-to-peer transient/acyclic communication between network stations for non-deterministic messaging. This process does not affect the cyclic real-time operation of the network as CC-Link IE assigns a relatively small portion of transmission bandwidth for transient communication.

Any device connected to the network can send and receive data from this common letterbox and therefore no specific CC-Link IE protocol knowledge is required. Importantly, this function has a seamless one-to-many relationship, so creating a control program that is logically a single hierarchy network regardless of physical configuration.

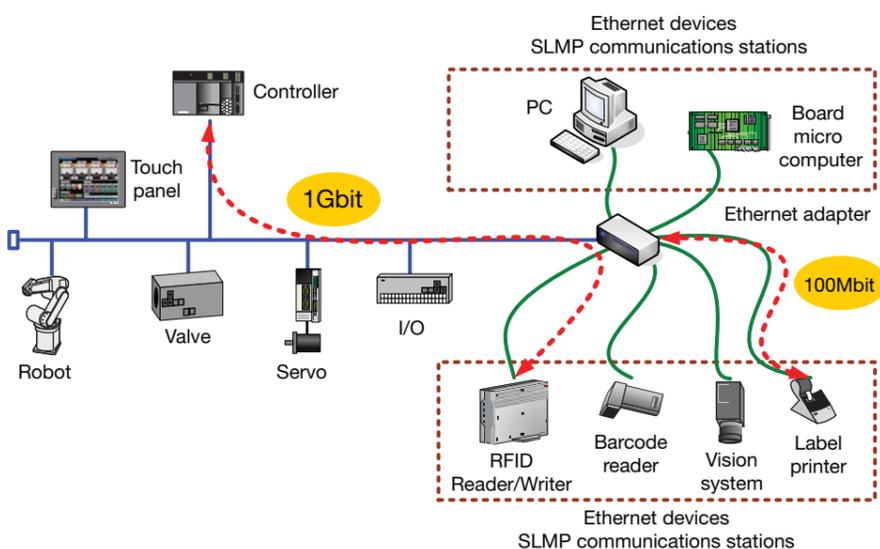
Network configuration

The CC-Link IE field network accesses field devices for configuration and maintenance purposes right across the network hierarchy by remote engineering tools. Remote management means that devices can be set or monitored from anywhere in the network. CC-Link IE field network can use line, star, ring and tree topologies with up to 254 connected modules and up to 239 networks can be connected in the multi-network system.

When adding new stations, they can be connected freely either to an empty port of a hub, or to a port on an existing station. This gives flexibility without constraint and is achieved using unmanaged hubs. The physical and data link layers of the network use Ethernet so that commercial Ethernet cables, hubs and network analysers can be used.

Seamless Messaging Protocol (SLMP)

The seamless communication function of the CC-Link family is achieved over TCP/IP through an application common protocol called SLMP. Since the SLMP is a simple client/server protocol it can be easily implemented into firmware for 100Mbps Ethernet devices by third-party vendors, and then connected as shown below. The device can then access devices across the CC-Link IE field network.



For the full article, please visit the downloads section of our website: www.clpa-europe.com

CC-Link Test Rig Now Available

A new CLPA-Europe CC-Link test rig has been developed for customers lacking experience with PLC-programming and CC-Link networks, which automatically runs all pre-tests required. The test rig is extremely simple to use and contains an HMI and a PLC that are pre-programmed to test connected devices. Controlling of the test rig uses simple to follow steps. Since the test rig is a standalone application, no external programming devices



are needed for configuring the network parameters. To suit some applications, the PLC's I/O parameters may have to be setup beforehand by CLPA-Europe, but from a users perspective it needs no external configuration.

Designed to test slave devices, the test rig can be used for testing a single connected CC-Link device. CC-Link slave device types supported by the test rig are Remote I/O-Stations, Remote device stations and Intelligent device stations.

By following simple commands the user can set up the rig to test their appropriate connected device. It is operated via the touch-screen HMI, with the user following the on-screen guidance.

Settings performed include:

- Setting of the station device type
- Extended cyclic settings
- Set occupied stations
- Set station number
- Change station number
- Parameter confirmation

Tests undertaken include:

- Hardware test errors
- Time-out errors
- CRC errors
- Line errors
- Invalid XCDs detected
- Buffer overflow errors

After the pre-tests have been completed it is also possible to save test data onto a compact flash card that can be inserted into the HMI to aid in product test documentation.

Using this self contained test rig will allow manufacturers to save time as they do not have to learn about the actual end user operation of CC-Link. Using this test rig will ensure that certification testing of their connected devices completes all of the requires stages. For rental prices please contact CLPA-Europe by email at partners@clpa-europe.com

Cognex Joins CLPA Board

Vision system specialist Cognex Corporation has joined the Board of Director Companies of the CLPA (CC-Link Partners Association), one of the world's leading fieldbus organisations, whilst simultaneously launching the most comprehensive suite of communications capabilities ever offered in a vision system.

Cognex joins some of the greatest names in global communications and control on The Board of Director Companies - Digital Electronics Corporation, IDEC Corporation, Mitsubishi Electric Corporation and NEC Corporation. It replaces Molex, which has stepped down from the Board and resumes its status as a regular member of the Group.

CLPA's General Manager Europe, Steve Jones, says: "We are delighted to have Cognex on board. It broadens our technology base and brings skills associated with developing worldwide markets for innovative products. Because its systems are so widely used outside mainstream automated manufacture, it will help us introduce CC-Link to whole new industries."

Castrol tunes in to CC-Link for effective tank monitoring

When BP-Castrol needed to improve its tank monitoring systems as part of an upgrade to help eliminate the possibility of environmental hazards, it turned to CC-Link for an effective networked solution.

Across the world, companies working with hazardous substances are under increased public and governmental pressure to make their environmental responsibilities a priority. BP-Castrol used the opportunity to significantly upgrade its tank monitoring systems at its facility in Rio de Janeiro, Brazil.

Their engineers wanted to upgrade the overflow monitoring system at the facility to provide a greater degree of reliability. Overflow monitoring was a manual process, with inspections requiring engineers to climb ladders and visually examine the status of ninety-eight tanks every day.

Although the inspections were thorough, the inability to monitor all tank levels on a continuous basis meant the facility was still susceptible to product overflows and other supply issues.

Local system integrators recommended a PLC based control system. CC-Link was selected as the network due to its ability to operate reliably at the long distances involved making it ideal for their environment.

The heart of the system is a Mitsubishi Q Series controller equipped with a CC-Link master. This provided high speed communications to five additional controllers acting as local stations on the CC-Link network, with level sensors measuring the fill level within each tank.

The benefits of the system were quickly proven, with BP-Castrol engineers realising a number of advantages of using the network. Not only would the continuous monitoring prevent overflows, but the system also provided the operators with accurate and up-to-date tank level information which allowed them to better utilise tank capacity for improved productivity.



The early success of the system provided the justification for further expansion by adding dual-level sensing for multiple alerts, and networking various pumps and valves on the CC-Link system. This gave operators control over the flow of products and the ability to shut the filling process down if required. The first level alerts the operators to a potential overflow problem, allowing them to manage the situation manually. The second level automatically stops the process.

The networking of the valve control system controlling the transport of additives between tanks to produce different lubricant blends has also improved productivity by allowing the operator to remotely monitor and control the blending process.

BP-Castrol reports that the CC-Link control network has been instrumental in enabling it to obtain ISO 14000 environmental certification. It also gave them improved productivity by better inventory control, traceability for product manufacture and a more effective control of its processes.

CC-Link in building automation

In terms of complexity, environmental control systems in modern office buildings can match those of large sophisticated manufacturing control systems. In both, there is a demand to simplify cabling, reduce installation and commissioning, simplify maintenance, and to make reconfiguration easier. CC-Link is equally at home in both factory and building automation.

CLPA's UK office is on the first floor of a large office building in Hatfield. The building is about 25 years old and the owners wanted to improve the environmental and energy performance.

Fairly typically, the building was originally open plan, but over the years a significant percent of the floor space has been converted to offices and meeting rooms. This meant the original environmental controls were no longer adequate, so new controls and energy metering were installed.

Each main feeder in the incoming switch panel was fitted with CTs wired to a new panel containing sixteen energy meters. CLPA member ND Metering Solutions makes CC-Link network compatible energy meters, so it was decided to use their meters. Using a CC-Link open network the meters were then connected to a local PLC.



As CC-Link does not require the more complex set up or slave device files of other open networks, it is easy to install and extend if further devices are necessary. Installation was quick and achieved at low cost.

What made it interesting was that the PLC uses an Ethernet TCP/IP connection directly to the adjacent office LAN. That meant very little cabling and the data can be accessed from any PC on the office network with the right access authority. Using a PC based monitoring package then enabled us to see the demand immediately, set sampling times and continuous demand monitoring.

After six weeks of data collection, it was realised that 20% of the daily consumption was at night when the offices were empty. Investigation identified that equipment in the kitchen was being left on 24 hours a day including the weekend, and that bank holidays were not programmed into the existing controller's calendar. These alone made the energy meter project worthwhile, but also identified were further potential savings that could be addressed over time.

The next stage is occupancy monitoring so that areas can be powered down when empty, and to implement green technologies such as photovoltaic panels and ground source heating.

Overall our expectation is to reduce energy consumption and running costs by 25-30 percent, and using CC-Link simplified the data collection and will be used to help implement new controls.

If you want to become one of the growing group of Machine Builders integrating CC-Link compatibility into their machines visit www.clpa-europe.com for full details

New CC-Link compatible products

igus Energy Chain



The key design feature of the igus energy chain series "E6", is that the classical pin/bore connection have been replaced by a resilient polymer spring. The so-called polygon effect that can occur when an energy chain is unrolled, is now reduced to a minimum. This leads to extremely low noise development and almost vibration-free running of the energy chain.

- Extremely low noise operation up to 46 dB(A)
- Low vibration
- High speeds and acceleration
- Wear-resistant
- Suitable for clean rooms

Balluff de-centralised I/O modules



The BNI-CCL Decentralised I/O modules allow sensors and actuators to be connected onto CC-Link in an IP67 rated connection which is needed in harsh environments. The modules are designed to make decentralised design philosophy simple by being able to connect directly onto the machine.

- Display of the station address and communications speeds
- LEDs can be controlled by the Master
- Display bar can show data from the Master
- Various models available including 16 input, 8 Output, 16 input/output (1 amp), and 8 Input /output (2 amp) modules
- Robust housing and flat space saving design
- High performance 2 Amp outputs with current overload detection
- Large bright LEDs for easy viewing of status and mode

Cognex vision systems



Cognex In-Sight® vision systems are unmatched in their ability to inspect, identify and guide parts. These self-contained, industrial grade vision systems combine a library of advanced vision tools with high-speed image acquisition and processing. Best of all, configuring and deploying an In-Sight vision system has never been easier.

- Simple-to-follow EasyBuilder® configuration software helps users of all experience levels to quickly setup their entire In-Sight application—no programming or spreadsheet knowledge required.
- The Cognex Connect™ suite of communications capabilities ensures that In-Sight vision systems easily integrate with CC-Link and any other factory network or automation control system.
- The VisionView® operator display panel provides a "plug-and-go" solution for monitoring the runtime operation of any In-Sight vision system on the network.

Promotion Partner in Turkey



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Heading the CLPA activity for GTS is Nurretin Cegcel. Nurretin studied at the Electronics University of Uludag, which literally translates to Great Mountain, and has been instrumental in providing technology such as CC-Link to the university.

Nurretin's major success whilst running the Promotion Partner activity in Turkey was to establish CC-Link as the defacto network to be used in feed factories throughout Turkey. Another major success was to get CC-link installed throughout Pirelli tyres largest factory in Europe at Izmir.

Nurretin quotes "The success of CC-link in Turkey is based on its reliability, which is so very important in the varied Turkish environments removing any installation problems that other networks cannot do".

HMS OEM User Certification Offer

CLPA-Europe and HMS have developed a joint programme of incentives exclusively for HMS users to join CLPA-Europe and test products that use HMS embedded devices to connect to CC-Link network products.

This programme was developed because it is not always appreciated by producers of automation products that using a certified embedded communications interface (gateway) does not make their device CC-Link certified. Uniquely, testing of CC-Link compatible devices includes EMI in addition to the more normal communications, aging, and soak tests. Only through certification can CLPA guarantee that CC-Link connectable products can operate as per the CC-Link specifications in any environments, especially harsh EMI conditions.

This offer from CLPA Europe and HMS is as follows:

- First year's free CC-Link Regular membership, which has a value of 1000€.
- A complete pre-conformance test at the reduced price of 650€, saving 350€ from the standard price which will be completed in the CLPA's new test laboratory in Düsseldorf, Germany.
- A reduced price for full conformance testing of 1600,00€, saving 400€ from the standard price

After successful certification testing CLPA-Europe will ensure that all companies that take part will have:

- Free inclusion of their products on all CLPA stands at major European exhibitions
- Free promotion in CLPA-Europe's regular newsletters, website, presentations, seminars and other applicable marketing mediums
- Free promotion of their certified products to potential CC-Link end users
- Free inclusion of certified products into the CC-Link global product catalogue
- Products will be recommended by the CLPA when requested free of charge
- Free access to general automation market information held and created by CLPA-Europe
- Free promotion of certified products to other CLPA offices worldwide
- General Membership benefits as detailed on the CLPA-Europe website

The programme was started at the CC-Link Implementation Seminar on 20 October 2009 in Frankfurt. This special offer runs until the end of June 2010 and all participants forms must be received by either HMS or CLPA-Europe by this date. If you require a form please contact CLPA-Europe directly.

Test Condition	Standard Price	HMS Price	Saving
Abbreviated pre-conformance test	1000€	650€	350€
Full conformance test	2000€	1600€	400€
First year regular membership	1000€	Nil	1000€
Totals	4000€	2250€	1750€

CLPA European members

3M Deutschland
ABB AS Robotics
ABB OY
AGH University of Science and Technology
APS Ltd
APV Products
Askon
Atlas Copco Tools AB
ATYS-co
AutoCont Control Systems
Automatec Sp. Z o.o.
Automation Research Centre, University of Limerick
Balluff GmbH
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Kitron AS
Koning & Hartman
Krakow University of Technology
L C Automation Ltd
Lemvigh Muller Industriel & Aytomation

Leoni Special Cables Friesoythe GmbH & Co.KG
Leuze Electronic GmbH + Co KG
Lütze Ltd
Manuel Jehkul
Medicion Y Control, S.A.
Meltrade Automatika Kft
MESCO Engineering GmbH
Mikrol
Mitsubishi Electric Europe
MPL Technology Sp z o. o.
Newton Tesla (Electronic Drives) Ltd
Northern Design (Electronics) Ltd
Ogrody Podlaskie Kowalewsey sp.j.
Oliver IGD Ltd
OptionExist Limited
Oriental Motor (Europe) GmbH
Panasonic Electric Works Europe AG
Parker SSD Drives
Patelite Corporation

Pepperl & Fuchs GmbH
Pitz GmbH & Co.
Pneumatic Lines Ltd
Pro-face Europe BV
Pronar Sp. Z. o. o.
Prosoft Technology
S C Johnson
Safronics Limited
Schneider Electric SA
Severn Controls Ltd
SICK AG
Sirius Trading & Services SRL
Slavutich PPA
SMC European Technical Centre
Softing AG
Sotrinic Ps. Z.o.o.
ST Microelectronics
Tambrands-Ukraine Ltd
TC Ltd
Technikon Ltd

The Silesian University of Technology
Trigla Ltd
U.I Lapp GmbH
Ukrbiotal Ltd
Ukr-PAK Ltd
VAT Vakuun ventile AG
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Volev Firma
WAGO Kontakttechnik GmbH
Warsaw University of Technology
Weidmueller Interface GmbH & Co KG
Westermo Data Communications Ltd
Westermo Research & Development AB
Western Automation
Westside International Ltd.
Woodhead Software & Electronics sasu (Molex)
Zaklad Elektroniki i Informatyki Chip
ZAO "Automatika-Sever"