



The CLPA announces the future of open industrial Ethernet

CC-Link IE TSN combines industry leading gigabit bandwidth with Time Sensitive Networking in order to deliver open networking solutions for smart factory construction

The CC-Link Partner Association (based in Nagoya Japan), the organization promoting the Ethernet-based integrated network CC-Link IE, has announced the completion of the specification for “CC-Link IE TSN” –a next generation network based on the current CC-Link IE. CC-Link IE TSN was developed to meet future market demands and has added Time Sensitive Networking (TSN) technology, which are additional standards related to IEEE Ethernet, to integrate Operational Technology (OT) and IT while further strengthening performance and functionality. Also, with the diversification of development methods, it has enabled flexible implementation for various types of equipment and also achieved mixed usage of information communications by utilizing Internet Protocol (IP) and control communication technology. It is expected that these will improve efficiency and reduce time for the construction of smart factories utilizing the IIoT. More details of the CC-Link IE TSN specification will be published on the CLPA Members Site.

Background of CC-Link IE TSN specification release

The CC-Link IE specification was released in 2007 as the first 1Gbps Ethernet-based open industrial network and has expanded its function and scope of application to motion and safety control after starting from general input/output control. Its features achieve a mixture of high-speed and large-capacity control communication (cyclic data) that combines with non-control communication (transient data). The two can coexist thanks to the 1Gbps bandwidth. Furthermore, it is easy to diagnose the cause of network errors. Since it is simple to build not only the system that controls and monitors a production site but also the system that collects and analyzes information on the production site, it is expected to bring benefits to a range of different industries.

On the other hand, as IIoT systems have progressed to the practical stage in recent years, market demands for utilizing a wide range of devices implementing general purpose Ethernet communication have increased. Moreover, requests for high function motion control equipment and protocol implementation for various types of equipment have increased. In order to meet these demands, we developed “CC-Link IE TSN”, a network which significantly improves the performance and functions of the current CC-Link IE. Furthermore, it has increased openness through utilization of TSN technology.

Features of CC-Link IE TSN

1. Flexible IIoT system construction
 - Adopts TSN Ethernet communication technology as a time sharing method
 - Enables collection of information from end devices by IP communication while securing real-time control communication

2. Faster time to market and reduced downtime
 - Easier network diagnosis by using general purpose Ethernet diagnostic tools compliant with SNMP
 - By means of time synchronization of compatible devices, it is easy to investigate the cause of problems
3. Further productivity improvement
 - With the improvement of communication performance, CC-Link IE TSN can offer a best in class motion control operation cycle time of better than 31.25 μ s
 - Segregation of high and low performance device communication, leading to optimized performance for all network stations and the system as a whole
4. Diversification of development methods
 - Offers hardware (ASIC and other device based) and software (protocol stack) development methods
 - Supports both 1Gbps and 100Mbps

Development status of CC-Link IE TSN compatible products

The detailed specification of CC-Link IE TSN will be released to CLPA partner companies through our website. Those partners who were involved in formulating specifications are considering product development and compatible products are expected to be released from 2019.

The CLPA partner companies that have considered development for CC-Link IE TSN compatible product as of November 2018 are listed below. Also we would like to introduce endorsement comments from our Board of Directors and partner companies.

Company names and logo (Alphabetical listing by company names)
52 companies

3M Company	MESCO Engineering GmbH
Advantech Co., Ltd	Mitsubishi Electric Corporation
Analog Devices, Inc.	Mitsubishi Electric Engineering Company, Limited
Anywire Corporation	Mitsubishi Electric Mechatronics Software Corporation
AUTONICS	Mitsubishi Electric Micro-Computer Application Software Co.,Ltd
Balluff GmbH	Mitsubishi Electric System & Service Co., Ltd.
BELDEN (Hirschmann Automation Control GmbH)	Molex Incorporated
Cisco Systems G.K.	M-System Co., Ltd.
CKD Corporation	NACHI-FUJIKOSHI CORP.
CKD NIKKI DENSO CO., LTD.	NEC Corporation
Cognex Corporation	NSD Corporation
CONTEC Co., Ltd.	OPTEX FA CO.,LTD.
DAIHEN Corporation	ORIENTAL MOTOR CO.,LTD.
eForce Co., Ltd.	Panasonic Industrial Devices SUNX Co., Ltd.
ELCO (TIANJIN) ELECTRONICS CO., LTD.	PHOENIX CONTACT K.K.
Festo AG & Co. KG	Renesas Electronics Corporation
Fortinet K.K.	RKC INSTRUMENT INC.
Hilscher Gesellschaft für Systemautomation mbH	Schneider Electric Japan Holdings Ltd.
Hirata Corporation	SecurityMatters B.V.
HMS Industrial Networks AB	SMC Corporation
HYUNDAI HEAVY INDUSTRIES HOLDINGS	STMicroelectronics K.K.
IAR Systems	TESSERA TECHNOLOGY INC.
IDEC CORPORATION	Texas Instruments Incorporated
Interface Corporation	Weidmüller
Kawasaki Heavy Industries, Ltd.	Yokogawa Electric Corporation
Koganei Corporation	ZUKEN ELMIC, INC

3M

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Anywire

Autonics

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A BELDEN BRAND

CISCO

CKD

NIKKI DENSO CKD NIKKI DENSO CO., LTD.

COGNEX

CONTEC

DAIHEN

eForce

ELCO
INDUSTRIAL AUTOMATION

FESTO

FORTINET

hilscher
COMPETENCE IN COMMUNICATION

Hirata

平田機工株式会社

hms

HYUNDAI

HEAVY INDUSTRIES HOLDINGS

IAR

SYSTEMS

IDEC

Interface

Kawasaki

KOGANEI

MESCO

MITSUBISHI ELECTRIC
Changes for the Better

MITSUBISHI ELECTRIC ENGINEERING

MSW

MMS

MITSUBISHI ELECTRIC SYSTEM & SERVICE

molex

MSYSTEM

NACHI

株式会社 不二越

Orchestrating a brighter world

NEC

NSD
NSD Corporation

OPTEX

ORA

Oriental motor

Panasonic

PHENIX CONTACT

RENESAS

RKC 理化工業株式会社
RKC INSTRUMENT INC.

Pro-face

by Schneider Electric

SECURITY MATTERS

SMC

ST life.augmented

TSSR
Technology

TEXAS INSTRUMENTS

Weidmüller

YOKOGAWA

Elmic



Endorsement comments:

“Recently, industrial networks that control various manufacturing equipment, robots and sensors are expanding rapidly with the demands for visualization of manufacturing processes and production improvement efficiency.

We welcome the release of "CC-Link IE TSN" to achieve further evolution with the "integration of IT and control". We will promote provision and development of network connectors and cable assembly products that realize high transmission reliability and robustness, and will support "CC-Link IE TSN" promotion activities globally.”

**Akiyoshi Funayama, Senior Manager,
Interconnect Sales and Marketing Dept. Electrical Interconnect Solution Division, 3M Japan Limited**

“We, Advantech Japan Co., Ltd, believe that CC-Link IE TSN will be the key product to ensure the construction of a flexible IIoT system, which is the basis of the new Ethernet technology and we would like to actively contribute to it.”

Takaaki Furusawa, Director, Industrial-IIoT Group iFactory Sector, ADVANTECH Japan Co.,Ltd,

“Analog Devices has a rich history of providing industrial communication solutions – from the early days of 4 to 20mA and serial fieldbuses to today’s Ethernet-enabled protocols for the factory of the future. Through this evolution, CC-Link has played a vital role solving customers’ most complex automation challenges. ADI strongly supports CC-Link with a robust portfolio of products that includes a roadmap of Ethernet solutions for CC-Link.”

Brendan O’Dowd , Automation Energy Group, Industrial Automation, General Manager, Analog Devices, Inc.

“Balluff, as a CLPA board member, has supported CC-Link and CC-Link IE for many years. Our slogan “Innovating Automation” expresses that we are a specialist in sensor and automation application, offering also solutions beyond the sensor core business. As a leading company in conveying IO-Link Data from intelligent sensors to the control, Balluff is a partner for digitalization and the IIoT strategy of our customers. Our CC-Link IE IO-block family gives high-speed data access in nearly any application. Balluff is looking forward to continuing the excellent relationship with the CLPA and will expand the portfolio with new solutions and products. “

Jürgen Gutekunst, Senior Vice President Mobility, Balluff GmbH

“Hirschmann Automation and Control GmbH is a pioneer in TSN. We’ve helped develop the technology since the early start in the IEEE 802 standardization years ago, and we are excited to see its adoption into the CC-Link IE TSN networks. By utilizing TSN technology, CC-Link IE takes the next step to supporting the applications of the IIoT and the smart factory of today and tomorrow. Hirschmann Industrial Ethernet Switches provide extremely high synchronization quality and high-precision transmission functions and we are looking forward to enable CC-Link IE TSN networks with our TSN portfolio.”

Oliver Kleineberg, Global CTO Core Networking, Hirschmann Automation and Control GmbH (a Belden brand)



“Cisco supports digital transformation that brings creative disruption to business. CC LINK IE TSN serves as a robust platform that helps manufacturing customers digitalizing their systems by integrating OT and IT at factories and promoting data trading, which will lead to creating business value.”

Kazuhiro Suzuki, Chairman, Cisco Systems G.K.

“CC-Link IE TSN, which enables high-speed I / O communication and information data transmission at the same time, will provide a lot of value to our customers. We welcome this release and will contribute to the promotion of CC-Link IE TSN through product development and sales.”

Hiroyuki Mizuno

General Manager, Network Engineering Department, Components Business Division, CKD Corporation

“CC-Link IE TSN is a breakthrough in interoperability and performance in network technology. Cognex vision sensors help automate the manufacturing process and communicate critical Industry 4.0 data. The flexibility of this network architecture will make it easier to collect this data by a variety of existing data management, diagnostic and monitoring systems. In addition, the high speed, high precision synchronization feature enables advanced vision - motion solutions leading to improved productivity. Cognex sees CC-Link IE TSN as a significant advancement in network technology that will help create smarter factories.”

Justin Testa, Vice President, In-Sight Business Unit, Cognex Corporation

“CC-Link IE TSN is a major innovation that evolves machine tools and robots. We expect that with the integration of motion control and the combination of TSN technology support with Contec's IPC and IIoT solutions, it would bring new value creation to customers.”

Katsutoshi Fujiki, President and CEO, CONTEC Co., Ltd.

“We have had a close partnership with the CLPA since we started to develop the first CPV valve terminal with the CC-Link fieldbus in 2001. During the development of these and following products like CC-Link for CPX and CTEU, we've received excellent support from the CLPA Testing Center and also from CLPA who helped us to establish our network in Asia between the subsidiary there and our colleagues in Japan, Korea, China. We're pleased that based on increased demand for the next generation gigabit-capable fieldbuses we've started a CC-Link IE Field project. We know we can also count on good cooperation and support in this project.”

Lale Hübner, Product Management IO Terminals, Festo AG & Co. KG

“I am very pleased about the completion of the CC Link IE TSN specification. As IIoT is becoming common in manufacturing industry, this network based on TSN technology will play a key role in accelerating use of IIoT. Fortinet continues to support efforts conducted by CC-Link Association and contribute to industrial security.”

Norio Kubota, Country Manager & VP Sales for Japan, Fortinet Japan K.K.



“Hilscher is one of the key technology suppliers for industrial communication solutions.

We have been supporting the CC-Link technology portfolio over the years, following up with the innovative standards CC-Link IE and CC-Link IE Field Basic. Therefore, it is a must for us to stay on track with this success story for CC-Link IE TSN within our Product portfolio. With this new technology we see the enablement of devices for IIoT, with Sensor to Cloud Communication.”

Sebastian Hilscher, Division Manager, Development, Hilscher Gesellschaft für Systemautomation mbH

“HMS Industrial Networks, world leading provider of connectivity solutions to the automation industry, is taking the next step to provide industrial grade communication from factory floors all the way to Enterprise and IT levels worldwide. With the announcement of CLPA's latest network at SPS/IPC/Drives 2018, we are excited to continue our journey together which began with our collaboration on reliable Anybus products enabling communication for CC-Link and CC-Link IE Field. This collaboration between HMS Industrial Networks and CLPA has been a great success and will continue to be so.”

Christian Bergdahl, Product Marketing Manager, HMS Industrial Networks AB

“We are pleased to see that our market-leading software development toolchain IAR Embedded Workbench® for Arm has been selected as a reference tool for enabling CC-Link IE TSN because of verified sample protocol stacks from various companies. We believe that this joint activity will help to expand the industrial network market as well as boost the use of our powerful toolchain.”

Kiyofumi Uemura, APAC Director & Japan Representative Director, IAR Systems

“As the trend of IIoT expands globally, we welcome the release of CC-Link IE TSN, which will be expected to spread globally with the collaboration with other industrial networks. We will contribute to the expansion of CC-Link IE TSN through compatible product development and sales of network equipment, code reader and switching devices.”

**Hiroki Matsumoto, General Manager, Automation Solutions, Products & Markets Strategy Division, ,
Sales & Marketing Headquarters, IDEC CORPORATION**

“MESCO is your partner for innovative software and hardware development in the field of process and factory automation with unique knowledge in industrial communication, functional safety and explosion protection.

CC-Link IE TSN fulfills high performance requirements for industrial communication. CC-Link IE Safety enables the technology for safety critical implementations. MESCO develops a CC-Link Software Development Kit to make the technology available to the market and to facilitate developments. It includes CC-Link IE TSN Stack, CC-Link Safety IE Stack, evaluation board for safe/non-safe applications.

Additionally, MESCO provides coaching and service for customized hardware and software development with use of CC-Link IE TSN SDK.”

Peter Bernhardt, Head of Sales & Marketing, MESCO Engineering GmbH

“We have been supporting CC-Link and CC-Link IE for many years, as well as developing and selling a variety of FA products and proposing e-F@ctory FA Integrated Solutions. We will adopt TSN technology which



will become the mainstream of future industrial networks as soon as possible and will lead to the expansion of CC-Link IE TSN. We will contribute to the development of the FA industry by providing solutions utilizing CC-Link IE TSN.”

Takayuki Tsuzuki, General Manager, FA Systems Div. Mitsubishi Electric Corporation

“CC-Link IE TSN realizes high-speed computing, motion control and visualization that integrates IT and OT to accelerate the construction of the IIoT.

We will also contribute to the popularization of CC-Link IE TSN through product development and collaborations such as network I/O, safety system and edge computing related products.”

Riky Comini, Director, Industrial Automation, Transportation and Industrial Solutions, Molex Incorporated

“We believe that expansion of CC-Link IE TSN will further strengthen cooperation of existing IT and FA, and bring new business opportunities to both industries. We will not only enhance interoperability and security of IT and FA systems, but also promote technological development enabling wireless CC-Link IE TSN.”

Yoshimitsu Okayama, Digital Platform Division, Senior Manager, NEC Corporation

“We are focusing our attention on CC-Link IE TSN as one of the core networks of the future. We will consider development of stepping motors/actuators that will lead to CC-Link IE TSN as the control for networks that contribute to the construction of IIoT systems.”

Ryuta Sugimoto, Chief Product Planning Department Sales Headquarter, ORIENTAL MOTOR CO.,LTD.

“As the trend towards implementing the IIoT is accelerating, network compatibility is strongly required for control devices. We will develop CC-Link IE TSN compatible products for sensing and safety products and contribute to IIoT for FA industries.”

**Jun Kasugai, General Manager Product Planning Department Sensing Division,
Panasonic Industrial Devices SUNX Co. Ltd.**

“Industrial networks are one of the most important technologies in the digitalized Factory Automation industry. CC-Link IE TSN is a leading-edge technology that integrates control and system networks, and Renesas sees this technology as a key driver for the evolution of the industry. Renesas has been providing products supporting the CC-Link Family and we plan to continue to expand our line up to support the next-generation standards.”

**Yuji Mori, Director,
Industrial System Solution Department, Industrial Automation Business Division, Industrial Solution Business Unit,
Renesas Electronics Corporation**



“As a CLPA board member, we plan to manufacture CC-Link IE TSN compatible products that will offer

real-time extensions supported by world standard technology.

Pro-face HMI multi-connectivity strategy will be further enhanced thanks to participating in CC-Link IE TSN and orchestrating win-win relationship with partner companies”

Tomoa Ishii, VP, Industry Business, Digital Plant, HMI Activity, Schneider Electric

“SecurityMatters has over 15 years of experience ensuring mission-critical industrial cyber-resilience. We have a proven track record of protecting industrial environments from undetected threats, process flaws and maintenance issues. In this context, CC-Link IE and CC-Link have always been vital components. Their secure, open and complete specifications have allowed the most advanced network analysis. This enables better cyber protection and preventative maintenance of complex industrial automation networks. CC-Link IE TSN will provide a strong foundation for Smart Factory applications and Industry 4.0. On this solid foundation, we will work together to develop even better protection capabilities.”

Damiano Bolzoni, Chief Executive Officer, SecurityMatters B.V.

“SMC welcomes CC-Link IE TSN. We will contribute to disseminate CC-Link IE TSN by product development and sale of it in the market. We cultivate advanced technology trusted by customers, and strive to develop products that meet customer needs.”

Fumio Morikawa, General Manager, Product Development Division, SMC Corporation

“With the “CC-Link IE TSN” support for the STM32 family, developers of CC-Link IE devices have access to the industry’s most popular variety of Arm® Cortex®-M core microcontroller to accelerate Industrial IoT development with optimized cost and higher flexibility.”

Paolo Oteri, Director, Microcontroller & Digital ICs, STMicroelectronics K.K.

“As global trend of smart manufacturing using IIoT is accelerating, we expect CC-Link IE TSN from Japan will bring customer productivity and profitability to a new level.

ZUKEN ELMIC has been actively developing products ranging from protocol stacks to software packages, based on networking, video streaming technology and CC-Link as well.

We will continue active marketing and development efforts on CC-Link IE TSN.”

Takashi Fujii, General Manager, Development Division, ZUKEN ELMIC, INC



About The CC-Link Partner Association (CLPA)

The CC-Link Partner Association (CLPA) is an international organization with over 3,400 member companies worldwide. The partners' common objective is promotion and technical development of the family of CC-Link open network technologies, helping their joint customers achieve their integrated manufacturing aspirations. The CLPA organization is the driving force behind developing new standards in industrial communication while also supporting the device development activities of its members as well as certification of those devices.

In addition the CLPA actively conducts promotional activities on behalf of its members to gain the wider acceptance and use of advanced CC-Link based networking technologies. The current Board of Directors includes: 3M, Balluff, Cisco, Cognex, IDEC, Mitsubishi Electric, Molex, NEC, and Schneider Electric Japan Holdings.

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