

Emerging Regulation and Flexible Architecture Grow Support for CIP Safety

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Keywords

Bosch Rexroth, CIP Safety, EtherNet/IP, DeviceNet, Factory Automation, Functional Safety, Industrial Ethernet, ODVA, OMRON, Rockwell Automation, Schneider Electric, Sercos International, SERCOS III

Overview

ODVA recently briefed ARC Advisory Group concerning increasing investments in CIP Safety by leading industrial suppliers. These include

Supported by the broad membership of the ODVA, ongoing investments in CIP Safety have brought about a very media-independent safety protocol. With updated machine safety capability supplementing its existing automation framework, ODVA is now proceeding to develop frameworks for faster and more comprehensive machine integration.

ODVA member companies Bosch Rexroth, OMRON, Rockwell Automation, and Schneider Electric. According to ODVA, these investments result from rising demand by machine builders for a flexible safety network that can comply with new and emerging safety regulations. Increasingly, global manufacturers are also focusing on

technologies that help them to meet corporate productivity and sustainability objectives.

Users Demand Flexible Networks with Integrated Safety

First introduced in 2005, CIP Safety is a media-independent IEC 61508-compliant safety protocol for use in functional safety applications up to Safety Integrity Level 3 (SIL3). Three major industrial networks - EtherNet/IP, DeviceNet, and SERCOS III - have adapted the protocol. It is the only network configuration for functional safety authorized by ODVA and Sercos International to run on their respective networks. CIP Safety allows safety devices to communicate safety-relevant data while coexisting on a network with standard control devices and providing all capabilities of the transport network. According to ODVA, CIP Safety ensures the integrity of the safety control loop, no matter what combination of devices is used.

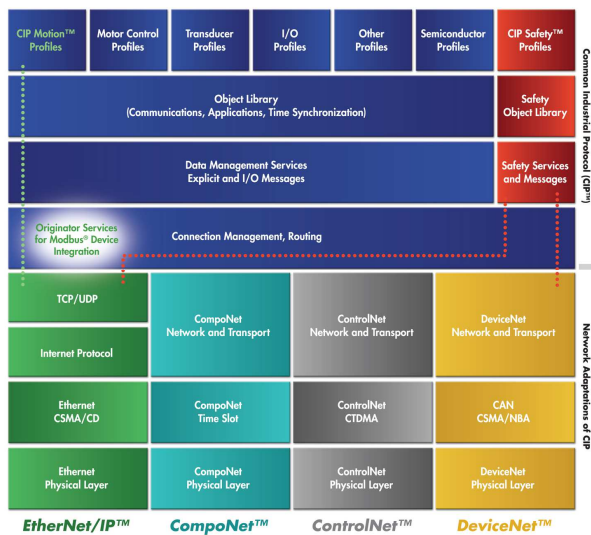


Today’s networked safety solutions result from the harmonization and standardization of safety norms in the late 1990s in Europe, as well as the evolution of industrial networks, especially industrial Ethernet. With the goals of achieving greater distances, increased flexibility, reduced cost and ease of maintenance, the industrial sector largely migrated from traditional, hardwired automation solutions to digital networks in the 1990s. Today, these same goals drive the replacement of hardwired safety systems with network-connected safety solutions.

The earlier safety networks were limited to only one specific media type or media access scheme, forcing users to change their approach to safety whenever they changed the network medium. This also forced users to employ safety gateways for applications that needed a safety chain with more than one network link. Since virtually all manufacturers deploy more than one network in their plants, a common safety protocol has a clear advantage in that it can be adapted to multiple networks.

CIP Safety in Practice

ODVA’s Common Industrial Protocol (CIP) allows different networks to route data independently. CIP Safety is a set of highly integrated safety services that leverage the underlying services of CIP to provide a scalable, routable, network-independent safety layer. CIP Safety enables both standard and safety communications to coexist in a multi-vendor environment on multiple networks that can span multiple subnets. Because all safety devices communicate using the same protocol, the user approach is consistent and network-independent.



CIP Safety Services Architecture

CIP Safety functionality resides in the end node. It provides key OEM and end user benefits, such as reduced engineering, lower installation and training costs, improved diagnostics, and increased architectural flexibility. Standard network infrastructure and diagnostics can continue to be used and the combination of fast-responding local safety cells and inter-cell routing of safety data allows users to create highly scalable safety applications with fast response times.

Developments Advancing CIP Safety Adoption

The international safety standards mandated by the European Commission's Machinery Directive are reshaping how manufacturers and machine builders approach safety system design. To help users meet these new challenges, ODVA and its membership have invested significant effort in the CIP Safety protocol to achieve the following goals:

- CIP Safety is certified by TÜV Rheinland and BGIA to IEC 61508 SIL3 and EN954-1 Cat. 4 applications, and recognized as international standard IEC 61784 (Functional Safety Communications).
- CIP Safety supports high-availability applications and high-noise environments, such as in process applications, SCADA, and wireless communication.
- In EtherNet/IP installations, the Device Level Ring (DLR) topology enables CIP Safety to be implemented in a "ring of devices" below the controller level. This technology relies on lightly managed embedded switches and replaces Ethernet's conventional hub-and-spoke network topology with a non-redundant ring network that provides a response time of less than three milliseconds. Central to the DLR value proposition is its ability to reroute messages at high speed in the event of a network break.
- CIP Safety on EtherNet/IP also supports the Address Conflict Detection (ACD) service to ensure that two devices with identical IP addresses may reside on the same network.
- Through its conformance testing process, ODVA has been issuing Declarations of Conformity for CIP Safety-compliant devices since 2005. Stacks are available from ODVA member companies.

With continued investments in CIP Safety by Bosch Rexroth, OMRON, Rockwell Automation, Schneider Electric and many other manufacturing leaders, the industrial sector can benefit from the advantages of a productive networked safety system.

CIP Safety Collaboration Leads to Broader Alliance

ODVA recently announced an alliance with Sercos International, another industrial networking consortium, on a broad-based Machinery Initiative. This partnership, which also includes the OPC Foundation, builds on the decision by Sercos International to adopt CIP Safety as the safety protocol

for SERCOS III. The ODVA specifications for CIP Safety on SERCOS III have now been published.

This new Machinery Initiative will develop an interoperability framework that will extend into the three major domains of an industrial system: pro-

The decision by Sercos International to adopt CIP Safety as the safety protocol for SERCOS III has led to a broader Machinery Initiative that addresses not only industrial production, but also enterprise integration and energy use.

duction, enterprise, and energy. A multi-year roadmap calls for this framework to extend into each of these domains and provide common, standards-based and simplified communication and integration. The functional areas targeted are:

- **Production Domain** (machine assets and systems, SCADA systems, MES, facility infrastructure, and energy systems)
- **Enterprise Domain** (utilities and materials cost, demand, and delivery; planning and analytics; financial and management accounting)
- **Energy Domain** (energy production & delivery, utility price, utility cost)

ODVA includes several major automation suppliers as active members. The collaboration effort required to develop CIP Safety for DeviceNet, EtherNet/IP, and SERCOS III will pave the way for additional value as these same collaborative processes and experiences expand into the functional areas now being addressed by the Machinery Initiative.

About ODVA

Founded in 1995, ODVA is a global trade association whose members include many of the world's leading automation companies that make and sell products that comply with ODVA technologies. ODVA's mission is to advance open, interoperable information and communication technologies in industrial automation. With open networks such as CIP Safety, safety controllers, and IO devices available from multiple vendors, safety toolkits are available to help new vendors get started and independent test labs verify the operation of the final devices.

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