This Conference Prospectus provides dates, times, and descriptions of the various sessions comprising ODVA’s 2020 Industry Conference & 20th Annual Meeting.

Register today to attend the conference via the Event Registration Form posted on www.odva.org. Once registered, reserve your seat at specific sessions through the supplementary Session Registration Form.

The following schedule is subject to revision.

### MONDAY, MARCH 2, 2020

<table>
<thead>
<tr>
<th>Session</th>
<th>Description</th>
<th>Audience &amp; Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>ODVA Roundtable for EtherNet/IP (12:00 pm – 5:00 pm)</td>
<td>ODVA’s Roundtable for EtherNet/IP™ helps to promote adoption, technical leadership and interoperability of EtherNet/IP through exploratory discussion and collaboration between ODVA Members and industry and through interoperability PlugFests.</td>
<td>Member and Invited Expert participants who are experienced EtherNet/IP developers. Advanced registration required (separate from conference registration).</td>
</tr>
</tbody>
</table>

### TUESDAY, MARCH 3, 2020

<table>
<thead>
<tr>
<th>Session</th>
<th>Description</th>
<th>Audience &amp; Availability</th>
</tr>
</thead>
</table>
| Special Interest Group (SIG) meetings (Times vary.) SIGs scheduled to meet are:  
  • Common Industrial Cloud Interface  
  • Conformance  
  • Distributed Motion & Time Synchronization  
  • EtherNet/IP in the Process Industries  
  • EtherNet/IP Physical Layer  
  • xDS Digital Device Descriptions | SIGs are ODVA’s technical working groups that develop enhancements to the ODVA Specifications as well as guidelines and recommendations for the application of ODVA technologies. These SIG meetings are restricted to ODVA Members. | Open only to registered SIG participants from eligible ODVA Member companies. |

In the evening of Tuesday, March 3, ODVA will host a Meet & Greet Reception.

### WEDNESDAY, MARCH 4, 2020

<table>
<thead>
<tr>
<th>Session</th>
<th>Description</th>
<th>Audience &amp; Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical Review Board Update (8:00 am – 10:00 am)</td>
<td>ODVA’s Technical Review Board (TRB) regulates the technical programs of the corporation and reviews the technical activities of the corporation. The TRB authorizes Special Interest Groups (SIGs) and oversees the establishment of standards and specifications. Attend this session to hear directly from TRB members about the latest updates to ODVA technologies under consideration.</td>
<td>Open to all attendees interested in technical content.</td>
</tr>
</tbody>
</table>
CONFERENCE PROSPECTUS AND SESSION DESCRIPTIONS
as of January 20, 2020

Technical Track Paper Presentations
(Times vary and are listed on the session registration form; all are between 10:00 am – 4:00 pm)

With the theme of “Technology & Innovations,” the Industry Conference Technical Track is a forum for ODVA technology experts to present papers that investigate the application of ODVA technologies to solve a diverse range of challenges. Additional papers may be added prior to the event.

Open to all attendees interested in technical content.

Technical Tracks A-C

CIP Security and IEC 62443-4-2
Jack Visoky, Rockwell Automation; Joakim Wiberg, HMS Industrial Networks

ISA/IEC 62443 comprises a suite of standards focusing on cyber security in industrial control systems including policies, procedures, and requirements for system level installations as well as industrial control systems and devices. One part of ISA/IEC 62443, specifically ISA/IEC 62443-4-2, contains detailed technical requirement for industrial control systems and devices. IEC 62443-4-2 introduces the concept of Security Requirements as well as Security Levels used to classify the security features and security functionality for industrial control systems and devices. Devices fulfilling those Security Requirements and Security Levels may acquire a security certificate. In this paper we will look at how the feature set of CIP Security™, both the existing CIP Security Confidentiality Profile as well as the in-development CIP Security User Authentication Profile, maps to and fulfills requirements defined in IEC 62443-4-2. The Security Requirements in IEC 62443-4-2 have been reviewed and the paper presents an investigation on which security requirements are fulfilled by CIP Security and which are out of scope and need to be fulfilled by other means. A company developing products intended to be certified against a security level in IEC 62443-4-2 can leverage the information in this paper to facilitate their investigation and design. It will also help to reduce the difficulty for achieving a certification.

Establishing a Root of Trust (RoT) in EtherNet/IP CIP Security Devices
John Rinaldi, Real Time Automation

CIP Security™ for EtherNet/IP can assist manufacturers in preventing security breaches by requiring authentication and integrity of EtherNet/IP messages and providing confidential communications between trusted entities. However, no EtherNet/IP device can be secure without a mechanism for establishing trust. Key to any embedded security system, such as CIP Security, is the establishment of a Root of Trust (RoT) and effective protection of the certificates, passwords and keys of the Public Key Infrastructure (PKI). Failing to provide a RoT in a CIP Secure device can compromise the security of an entire manufacturing system. This paper examines the various mechanisms for establishing that trust in a secure EtherNet/IP device.

5G - Not Just For Cell Phones Anymore
David Brandt, Rockwell Automation

5G is an upgrade to the cellular system. It is not the same as prior generations, where the upgrade focused almost exclusively on improved rates for cell phones. Along with improved rate, there is higher device density, lower latency, increased reliability, and a push for private deployment - that all combine to target a wider range of applications. Expected usage includes real time control, augmented and virtual reality, and battery powered wireless. Not only did the cellular industry target industrial automation in the IMT2020 vision, but there is a coordinated effort to rally industrial automation behind 5G and to influence the 5G standards to meet industrial automation use cases and requirements. This paper presents an overview of this topic area.

Comparison/Contrast of TSN Frame Replication and Elimination for Reliability (FRER) and Parallel Redundancy Protocol (PRP)

George Ditzel, Schneider Electric

This paper will compare/contrast various protocols that can be used in providing high availability in EtherNet/IP systems. The protocols focused on in the paper are the Time Sensitive Networks (TSN) feature Frame Replication and Elimination for Reliability (FRER) defined in the IEEE 802.1CB-2017 standard and the Parallel Redundancy Protocol (PRP) and High-availability Seamless Redundancy (HSR) protocol, both defined in the IEC 62439 standard. Critical system applications are often required to maintain high availability of communication network components. For critical infrastructures and time sensitive processes, downtime is never allowed. The protocols focused on in this paper (FRER, PRP, HSR) provide zero recovery time. This paper will compare/contrast the protocols in Network Topology requirements, required frame structures, each protocols interoperability with the others, and cost to deploy.

An Approach to CIP Motion on TSN Networks

Paul Brooks, Rockwell Automation; Yi YU, Rockwell Automation; Paul Didier, Cisco Systems; Jordan Woods, Analog Devices, Inc.

There have been significant activities recently in the market around Time Sensitive Networking (TSN). In preparation for work inside ODVA extending the EtherNet/IP specifications to support TSN, a number of member companies have developed EtherNet/IP TSN test beds. This paper will give a report on the lessons learned from the test bed of CIP Motion over TSN, which has been cooperatively developed by Rockwell Automation, Cisco and Analog Devices Inc.

The test bed consists of TSN capable network bridges, embedded device prototype gateway boards and CIP Motion capable end nodes (PLC and Drive) with the prototype firmware supporting TSN. The key TSN features supported in this test bed include:
- IEEE 802.1Qbv which specifies a time aware shaper to schedule traffic. The CIP Motion traffic is inserted into a scheduled part of the network bandwidth
- IEEE 802.1Qcc which enhances the stream reservation protocol (SRP) and operates at the network control plane
- IEEE 802.1AS which provides peer-to-peer precision time clock synchronization, and is a profile of IEEE 1588 (while CIP Sync uses the default IEEE 1588 profile without peer-to-peer synchronization)

We will present an evaluation on the aspects of the TSN adoption method and the performance of TSN adoption for a CIP system. Based on the evaluation results, we demonstrate the feasibility of integrating EtherNet/IP systems into networks deploying TSN. We also propose both enhancements and requirements for the TSN incorporation into CIP technologies and EtherNet/IP specifications. We believe that these conclusions can help inform ODVA contributions to IEC/IEEE 60802 Industrial Automation Profile for TSN working group.

Using Time Synchronization to Improve Determinism of Application Response Time in Industrial Control Systems

Rick Blair, Schneider Electric

In a modern PLC system, one of the key performance factors is Application Response Time (ART). ART is the time it takes a PLC system to set an output based upon a change in an input. The ART value can have a wide variation due to all the independent tasks present in the system. This paper will demonstrate the use of time synchronization to synchronize many of these asynchronous tasks to improve the predictability of ART.
Enhancements to Single-pair Ethernet for Constrained Devices
Chirag Malkan, Rockwell Automation; David Brandt, Rockwell Automation; Tony Wang, Rockwell Automation; Jeff Martin, Rockwell Automation

Industrial Ethernet has exhibited rapid growth, with EtherNet/IP emerging as a leader. The reality is that fieldbuses and sensor networks still retain a large position and many potential network nodes remain hardwired. End users understand and seek the advantages of a harmonized network - based on EtherNet/IP and the related open ecosystem. Benefits include reduced complexity and cost by minimization of gateways and elimination of hardwiring, expansion of the qualified labor pool, and improved optimization and maintenance opportunities via Cloud connectivity and analytics. With these benefits numerous industries have flooded into IEEE to develop enhancements for enabling Ethernet to displace other networks at the edge. The resulting Single Pair Ethernet suite offers reduction in wiring, node cost, size, and power consumption, delivering communication and power over a single pair. A deterministic Ethernet bus variant targets very constrained devices, such as in-cabinet components. Prior years’ papers proposed a set of enhancements, adopted from or inspired by IETF and IEEE, to extend EtherNet/IP into constrained applications, further enabling the single network vision. This year with an operational concept, the paper discusses IEEE P802.3cg, the current standard and probable follow-on for T1S PHY specification upgrades to expand the market for PHYs, work in the EtherNet/IP System Architecture Special Interest Group and EtherNet/IP Physical Layer Special Interest Group covering UDP-only, capability discovery, profile concepts and modular additions of PHYs, cables, connector, and profile concepts.

Mapping EtherNet/IP (CIP) Object Model to OPC UA Information Model

OPC is the most widely adopted interoperability standard for secure, reliable and platform-independent information exchange in the Industrial automation space and other industries. Mapping OPC UA Information model to EtherNet/IP (CIP) object model for example Identity, Assembly etc. enables the reliable and secure exchange of information between the EtherNet/IP devices and enterprise level applications using standard OPC UA Services. This white paper explains in detail three ways of mapping EtherNet/IP object into OPC UA Information model, pros and cons, possible use cases for each of them.

Use Cases for a CIP Companion Specification for OPC UA
Paul Brooks, Rockwell Automation

This paper explores the user stories and use cases against which a potential OPC UA companion specification should be developed. It builds on the work undertaken for the Common Industrial Cloud Interface and benchmarks them against best practices inside OPC Foundation including the Device Integration model, the PAdIM specification for process instrumentation, and the Field Level Communications initiative. It proposes a harmonization model that will allow CIP technologies to integrate seamlessly with the latest OPC UA specifications.

Diagnostics Means Customer Freedom
Michael Voegel, Endress+Hauser

Industrial Ethernet protocols in the present technological marketplace have become more significant with the application of IIoT concepts for the improvement of process responsiveness and efficiency. EtherNet/IP can contribute to the application of IIoT by improving connectivity, efficiency, scalability, time and cost savings for process industrial organization. The EtherNet/IP in the Process Industries SIG proposed the Process Device Diagnostics Object, and it was published in the EtherNet/IP Specification in 2019. Based on the device’s current diagnostics and the NE107 status (NAMUR), the Process Device Diagnostics Object through the asset controlling and monitoring are going to bring simplicity, precision and rapidity of execution to the different stakeholders including application programmers, operators and field technicians. “Avoid any problem before it happens” that is the perfect maintenance process scenario a plant director can have, let’s make this vision come true. This paper will provide detailed and accurate explanation and project you in this solution full of potential.
Today, Industrial Ethernet is mainly used in Factory Automation and only partly in Process Automation (as a backbone or for field devices with separate power supply in non-hazardous areas). However, the advantages for Ethernet field devices are better performance, ease-of-use and interoperability. In addition, smart instruments with Industrial Ethernet are vital for Industry 4.0 and IIoT use cases. Smart instruments which are already on the market today, are not suitable for use in all areas of Process Industry, e.g. in hazardous areas or where separate power is not available. Main issues occur with the physical layer which does not fulfill all requirements of Process Industries: long distance, power supply and communication via the same cable (2-wire) and intrinsic safety.

To solve these problems, the user organizations PI (Profinet & Profinet International), FieldComm Group and ODVA cooperate together to define the necessary specifications. The IEEE 802.3cg Task Force focuses on a specification which ensures 10 Mb/s and power delivery over one single-paired cable while reaching trunk lengths of 1000 m in Zone 1, Division 2 and spur lengths of 200 m in Zone 0, Division 1. These enhancements of the IEEE 802.3 were finalized in 2019. As the definition is made on the physical layer (layer 1), the integration of the specification is neutral to communication protocols. This integration in the respective IPR-based protocol standards will be done in 2020. Afterwards, devices for the complete network infrastructure are expected. Based on the diversity of the mentioned organizations, the large number of industry partners who contribute to the Ethernet-APL project, the resulting global IEC standard and on the focus on customer needs, this technology will achieve major advantages for the process industry. All these aspects are in focus of this paper and will be described in more detail.

Developer’s Workshop: Session A – Network Conformance Testing 2020

This session will detail the latest enhancements to the conformance test suite and will outline the rules of the conformance testing process. Attend this session to learn how to avoid development mistakes that can delay timely product launch and to gain a solid understanding of the steps you can take for a conformance test that runs quickly and successfully.

Developer’s Workshop: Session B – CIP Safety™ Conformance Testing 2020

Intended for current or prospective developers of CIP Safety products, this session will present the latest developments in CIP Safety Conformance Testing plus techniques you can use to prepare for a lab test that runs smoothly. A clear understanding of these responsibilities before and during product development can avoid costly, product-delaying problems and rework.

In the evening of Wednesday, March 4, ODVA will host a Conference Reception & Dinner.

THURSDAY, MARCH 5, 2020

ODVA 20th Annual Meeting of Members (8:00 am – 12:00pm)

This meeting is also open to nonmembers of ODVA, and will feature presentations from ODVA senior management, members, and industry.

Audience & Availability
Open to all

Presentations currently include:

20th Term in Review: Report on the Activities of the Association

ODVA senior management will provide a report to the membership on the activities and achievements of the organization over the past 18 month term.

5G and WiFi 6 – What will this really mean for ODVA end users?

5G has been promoted that it will provide the features manufacturers need to take production to the next level with better reliability and lower latency than previous generations of cellular, and there is a coordinated effort to rally industrial automation behind 5G and to influence the 5G standards to meet industrial automation use cases and requirements. The WiFi Alliance and IEEE 802.11 have also been improving their standards for industrial applications. EtherNet/IP and CIP can easily make use of 5G, as has been done for WiFi, by being based on standard technologies. However, will end users find 5G or WiFi 6 valuable enough to install? Will industrial vendors build the devices and systems that incorporate these technologies? This panel will discuss specific use cases to highlight the advantages of utilizing 5G or WiFi 6, as well as constraints both technically and politically that might cause challenges.

Voices from Industry

Perspectives from those in the field – details to be announced!

21st Term: Looking Ahead

ODVA senior management will announce new initiatives and activities for the organization in which Member companies can participate in the 21st term.

The event will conclude on Thursday, March 5 with a hosted conference lunch.