



Industrial Data Center within a Converged Plantwide Ethernet Architecture

Rockwell Automation and Cisco Four Key Initiatives:

- **Common Technology View:**
A single scalable architecture, using open EtherNet/IP™ standard networking technologies, is paramount to enable the Industrial Internet of Things for achieving the flexibility, visibility and efficiency required in a competitive manufacturing environment.
- **Converged Plantwide Ethernet Architectures:**
Collection of tested and validated architectures developed by subject matter authorities at Cisco and Rockwell Automation. The content of CPwE is relevant to both Operational Technology (OT) and Information Technology (IT) disciplines and consists of documented architectures, best practices, guidance and configuration settings to help manufacturers with design and deployment of a scalable, robust, secure and future-ready plant-wide industrial network infrastructure.
- **Joint Product Collaboration:**
Stratix® 5950 Industrial Firewall, Stratix 5100 Wireless Access Point/Workgroup Bridge, and Stratix 5700, Stratix 5400 and Stratix 5410 Industrial Ethernet Switches, incorporating the best of Cisco and the best of Rockwell Automation.
- **People and Process Optimization:**
Education and services to facilitate Operational Technology (OT) and Information Technology (IT) convergence, assist with successful architecture deployment, and enable efficient operations that allow critical resources to focus on increasing innovation and productivity.

White Paper

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The prevailing trend in Industrial Automation and Control System (IACS) networking is the convergence of technology, specifically IACS operational technology (OT) with information technology (IT). Converged Plantwide Ethernet (CPwE) helps to enable IACS network technology convergence through the use of standard Ethernet, Internet Protocol (IP), network services, security services, and EtherNet/IP™. A reliable and secure converged IACS network technology helps to enable the Industrial Internet of Things (IIoT).

Successful deployment of IIoT IACS applications within CPwE Architectures (Figure 1) depends on a robust physical infrastructure design that addresses environmental and performance challenges with best practices from OT and IT. The Rockwell Automation Industrial Data Center (IDC), an example of OT-IT convergence, is a solution collaboration between Cisco, Panduit, and Rockwell Automation. The IDC is a building block for physical infrastructure deployment which helps customers address the physical deployment associated with Level 3 Site Operations of the CPwE Logical Model (Figure 2). As a result, users can achieve resilient, scalable infrastructure that supports proven and flexible CPwE Architectures designed to optimize plant-wide IACS application and network performance.

The IDC provides the switching, compute, and associated resources for applications, network, and security services needed to efficiently operate a plant-wide IACS architecture. The IDC is housed within a control room or other location on the premises. Level 3 Site Operations functionality housed by the IDC range from remote access server, network security, application security, and FactoryTalk® applications such as manufacturing execution systems (MES), process historians, asset management, and operations/safety/security dashboards. Continuity of service is imperative as these functions are used for daily decision making on an ever increasing basis. Reliable and secure network support for these applications keeps business communication and operations running smoothly.

Deploying IDC within a Converged Plantwide Ethernet Architecture CRD (Cisco Reference Design), which is documented in the *Deploying IDC within a Converged Plantwide Ethernet Architecture Design Guide*, outlines several use cases for designing and deploying end-to-end connectivity between the IDC located within Level 3 Site Operations to IACS assets located within various Cell/Area Zones. CPwE IDC CRD was architected, tested, and documented by Cisco Systems, Panduit, and Rockwell Automation.

**Note**

This release of the CPwE architecture focuses on EtherNet/IP, which uses the ODVA Common Industrial Protocol (CIP™) and is ready for the Industrial Internet of Things (IIoT). For more information on EtherNet/IP, see [odva.org](http://www.odva.org) at the following URL:

<http://www.odva.org/Technology-Standards/EtherNet-IP/Overview>

CPwE IDC CRD

CPwE is the underlying architecture that provides standard network and security services for control and information disciplines, devices, and equipment found in modern IACS applications. The CPwE architecture (Figure 1), through testing and validation, provides design and implementation guidance, test results, and documented configuration settings that can help achieve the real-time communication, reliability, scalability, security, and resiliency requirements of modern IACS applications for manufacturers.

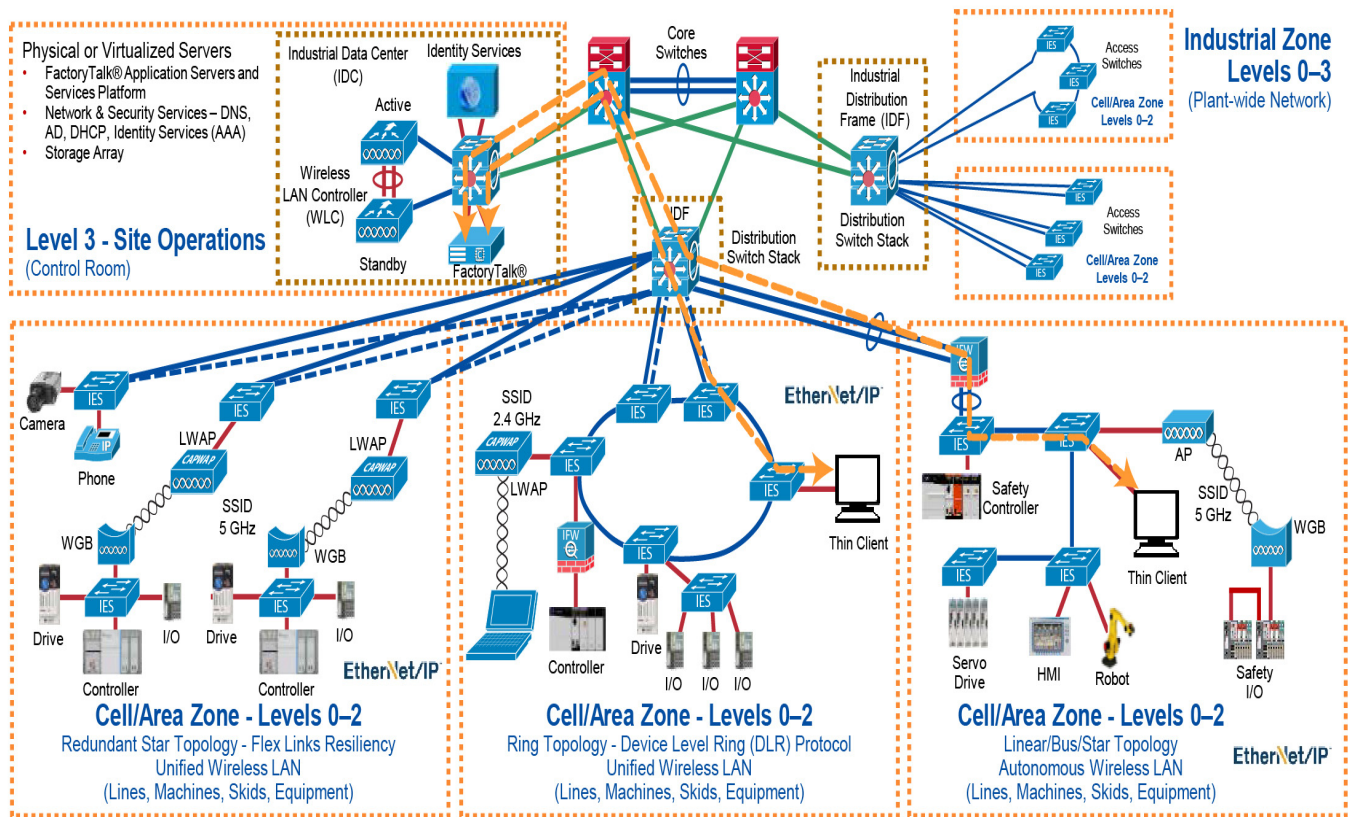
An IACS is deployed in a wide variety of discrete and process manufacturing industries such as automotive, pharmaceuticals, consumer packaged goods, pulp and paper, oil and gas, mining, and energy. IACS applications are made up of multiple control and information disciplines such as continuous process, batch, discrete, and hybrid combinations. One of the challenges facing manufacturers is the need to establish reliable and secure connectivity from IACS assets within the Cell/Area Zone(s) to IACS operational applications within Level 3 Site Operations (Figure 2).

CPwE IDC CRD outlines the concepts, requirements, and technology solutions for IDC (Level 3) connectivity use cases that were architected, tested, and documented by Cisco, Panduit, and Rockwell Automation.

The following is a synopsis for CPwE IDC CRD:

- IDC Overview and Design Considerations
- Virtualization for Manufacturing:
 - Application Servers
 - Operator Workstations
 - Engineering Workstations
 - Network Services
 - Security Services
- Thin Client Technology:
 - PC over IP (PCoIP)
 - Remote Desktop Protocol (RDP)
 - ThinManager
- Level 3 IDC Use Case Overview:
 - End-to-end EtherNet/IP connectivity from the IDC to IACS assets within the Cell/Area Zone (Figure 3)
 - End-to-end ThinManager® software connectivity from the IDC to thin clients within the Cell/Area Zone (Figure 4)

Figure 4 CPwE IDC ThinManager Connectivity Use Case



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Summary

CPwE is a collection of tested and validated architectures that are developed by subject matter authorities at Cisco and Rockwell Automation. The testing and validation follow the Cisco Validated Design (CVD) and Cisco Reference Design (CRD) methodologies.

The content of CPwE, which is relevant to both OT and IT disciplines, consists of documented architectures, best practices, guidance, and configuration settings to help manufacturers with design and deployment of a scalable, reliable, secure, and future-ready plant-wide industrial network infrastructure. CPwE also helps manufacturers achieve the benefits of minimizing costs using proven designs that can help lead to quicker deployment and reduced risk in deploying new technology. CPwE is brought to market through a strategic alliance between Cisco Systems and Rockwell Automation.

The *Deploying IDC within a Converged Plantwide Ethernet Architecture Design Guide* outlines several use cases for designing and deploying end-to-end connectivity between the IDC located within Level 3 Site Operations to IACS assets located within various Cell/Area Zones. The Design Guide highlights the key IACS application requirements, technology, and supporting design considerations to help with the successful design and deployment of these specific connectivity use cases within the framework of CPwE. CPwE IDC CRD was architected, tested, and documented by Cisco, Panduit, and Rockwell Automation.

More information on CPwE Design and Implementation Guides can be found at the following URLs:

- Rockwell Automation site:
<http://www.rockwellautomation.com/global/products-technologies/network-technology/architectures.page?>
- Cisco site:
http://www.cisco.com/c/en/us/solutions/enterprise/design-zone-manufacturing/landing_ettf.html
- Panduit site:
<http://www.panduit.com/cpwe>

Panduit Corp. is a world-class provider of engineered, flexible, end-to-end electrical and network connectivity infrastructure solutions that provides businesses with the ability to keep pace with a connected world. Our robust partner ecosystem, global staff, and unmatched service and support make Panduit a valuable and trusted partner.

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Rockwell Automation is a leading provider of power, control and information solutions that enable customers to be more productive and the world more sustainable. In support of smart manufacturing concepts, Rockwell Automation helps customers maximize value and prepare for their future by building a Connected Enterprise.

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