T83 - Easing the Deployment of a Converged Plantwide Ethernet (CPwE) Compliant Architecture

Using Rockwell Automation Pre-Engineered Solutions
Rockwell Automation Services
Minimize Risk. Maximize Productivity.

Product & Application Lifecycle Support
Workforce Training & Augmentation
People & Asset Safety
Information Infrastructure & Security
Asset & Plant Optimization
Challenges Facing Manufacturing

### The Skills Gap Challenge
- Dearth of qualified personnel \(^1\)
- Achieving productivity goals
- Lack of staffing to expand operations \(^2\)

### Asset and Plant Optimization
- Capacity expansion/upgrade of existing plants
- Aging infrastructure
- Increased downtime costs
- Energy management

### Speed and Innovation
- Increased demand in developing countries
- Improve time to market
- Adopt advanced technologies

### IT/OT Convergence
- Integration of new technologies
- Security against cyber and physical attacks
- Integrate: customer demand, supply chain and industrial processes
- Lack of expertise

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(1) ARC Supplier Provided Automation Services
(2) Aberdeen Group
Collaboration
Innovation with Rockwell Automation, Cisco and Panduit

Cisco
- Networking
- Switching Technology

Rockwell Automation®
- Industrial Automation

Panduit
- Infrastructure
- Industrial Data Center

Joint engineering and product development

Interoperability testing conducted

Enhanced infrastructure design
The Power of Collaboration

Alliance includes:

- Switches from **Cisco**
- Validate solutions, panel, cables, patch cords and cable management from **Panduit**
- Engineering, testing, on-site assembly, validation and support from **Rockwell Automation**

**Where we function (outside the box)**

- An architecture for managing and optimizing assets
- Investment protection; no need to ‘rip and replace’
- Open / non-proprietary
- Intelligent sizing to requirements

**Span of coverage (universal applicability)**

- Hardware interchangeability
- Worldwide deployment capabilities (same solution/multiple plants)
- Physical, virtual or cloud
- Flexible, scalable platform/future proof

**Uniformity (simplified management)**

- Architecture: common management, intelligence and optimization across incompatible and diverse devices
- One call Support Services
Minimize Risk

- Complex, custom non-validated design
- Separate support contracts for individual components from multiple vendors
- Validated CPwE compliant design
- Thermally tested design
- Integrated TechConnect℠ support

Validated, Rockwell Automation supported solution
Improving Efficiency

- Complex deployment (design, validate, procure, configure)
- Multi-discipline team required (Cisco certified, CPwE expert, panel design, panel build)
- Separate purchase orders (hardware, implementation and support)

- Remove 1-2 weeks of design procurement and build time
- Single PO for turnkey solution inclusive of support

Pre-engineered, expert installed, Rockwell Automation supported solution
Converged Plantwide Ethernet (CPwE) is an architecture that provides network and security services to the devices, equipment and applications found in an Industrial Automation and Control System (IACS) and integrates them into the enterprise-wide network. The networking requirements of an IACS often differ from a typical IT network.
Why CPwE?

**Transactional data:** orders, supply network, product design ...

**ERP**  **FINANCIALS**  **HR**  **LOGISTICS**  **QUALITY**  **CRM**  **…**

**IT**

**CONVERGENCE**

**OT**

**Real-time data:** control, safety, security ...

**EtherNet/IP**  **SENSORS, ACTUATORS**  **CONTROLLERS**  **MATERIALS & TRANSPORT**  **MACHINES & EQUIPMENT**
CPwE Compliant Pre-Engineered Solutions

Simplify and accelerate CPwE deployment
Logical and physical network design services
Pre-engineered solutions
Secure and reliable support
Delivery quantifiable through IT/OT convergence

IDMZ/Enterprise
Core
Distribution
Access
Industrial Data Center (IDC)

- Collaboration with industry leaders
  - Virtualization on the plant floor utilizing the Panduit Micro Data Center with hardware and software from Rockwell Automation, Cisco and other industry leaders

- IT-OT Trusted Design
  - Built to IT industry standards and industrially hardened for the plant
  - Assembled following robust physical infrastructure best practices, including cable management, thermal design and system grounding

- Uptime Reliability
  - Improve application availability with fault tolerance and automated fault recovery

- Easy installation and deployment
  - Rockwell Automation services included for design consulting, onsite implementation and support
CPwE Compliant Pre-Engineered Solutions

Industry-leading partners collaborating with Rockwell Automation to help your business realize the benefits of Networking through a pre-engineered, scalable infrastructure offering.

- Complete turnkey solution including:
  - Hardware
  - Pre-engineered
  - On-site configuration
  - Documentation
  - TechConnect support

Standard pre-engineered industrial solution to simplify deployment making commissioning and maintenance easier, scalable and more supportable.
Industrial Network Distribution Solution (INDS)

- Rapidly deploy 19" rack mount switches in a zone architecture within plant environment
  - Accommodates two distribution layer switches (Cisco 3850X)
  - Three access layer switches (Cisco 2960S) with UPS
  - Double hinge feature allows front and rear access to network switch equipment
  - Cable management features to secure horizontal fiber and copper in a reliable, consistent manner
  - UL Type 4/12 and IP66 enclosure
  - Thermally tested and validated for a highly reliable system

- Scalability
  - Single part number simplifies the design and execution for a fast and repeatable solution

- Security
  - Protect the integrity of cabling media and also enable physical layer access control over critical network systems
## Network Zone System Overview

<table>
<thead>
<tr>
<th>Included in One Part Number</th>
<th>Do-it-yourself</th>
<th>Pre-Configured</th>
<th>Switch Ready</th>
<th>Integrated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allen-Bradley® Stratix™ Switch(es)</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Active/Electrical</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Factory Tested</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Installed Cable Management</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Grounding Infrastructure</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>High Voltage Barrier</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Copper/Fiber Connectivity</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Thermally Validated</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Standards Compliant</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

**Assembly Time**

- Factory Assembly
- DIY

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[Image of network zone system overview with checkmarks indicating inclusion in different configurations.]
Thermal Validation
Offering and Value
Flexible Purchase Options

- Pre-engineered hardware housed at customer’s facility
- Multi year service contract as opposed to one time buy
- Rockwell Automation hardware/software
- Inclusive of 24x7 monitoring and administration

### Capital Expense (Outright Investment or Equipment)

### IaaS Operational Expense (Monthly)

**IaaS allows you to realize a Connected Enterprise today**
Offering and Value
Scalable Remote Support Options

- Network, firewall, virtualized infrastructure, automation devices and applications
- Dedicated 24 x 7 x 365 phone line and e-mail
- Average response time of <3 minutes

- Program manager
- Dedicated central doc database
- Faster resolution to issues
- Reduced training time

- Change management
- Fast image recovery
- Minor system changes
- Periodic reviews of activity
- Issue reduction strategies

- IT approved remote access
- Remote notification of system alarms and events
- Immediate support action and engagement

- Diagnostics & Troubleshooting
- Remote Monitoring
- Knowledge Management System
- Administration
The Value of Remote Monitoring and Administration Support

- The **response time** that Rockwell Automation achieves exceeds customer OT expectations
- Rockwell Automation **expertise** is virtually placed on the customer's plant floor, making them more efficient and sustainable
- Proactive **maintenance** significantly increases system reliability
- 24/7 monitoring of customer’s key performance indicators **prevents** outages and system failures
Response Time
Does IT response time meet OT demands?

- Rockwell Automation response time averages under 3 minutes
  - This would be an impressive response time for an IT team in an OT setting
- If running a 24/7 business, 2/3 of the customer’s business is at risk
  - If an issue arises during the off-shifts, the amount of downtime incurred easily offsets the cost of the upgraded service
- Improvements in productivity

“What I do see is faster response time and turn-around so that downtime and negative impact of a server related issue is minimized” – KRAFT

What is the customer’s average downtime from a server-related event?

Time Value ➔ Monetary Value
# Typical Response Time – inhouse vs. Remote Monitoring Support

- Remote Monitoring and Administration Support allows for customers to surpass the IT overhead and quickly complete virtual infrastructure requests

<table>
<thead>
<tr>
<th>Request</th>
<th>IT (Typical)</th>
<th>RMAS (Typical)</th>
</tr>
</thead>
<tbody>
<tr>
<td>User Account Maintenance</td>
<td>60 minutes</td>
<td>30 minutes</td>
</tr>
<tr>
<td>User Policy Maintenance</td>
<td>Request sent in 72 hours prior to CAB review and performed during non-production hours</td>
<td>60 minutes</td>
</tr>
<tr>
<td>Image Creation</td>
<td>Request sent in 72 hours prior to CAB review and performed during non-production hours</td>
<td>2 hours</td>
</tr>
<tr>
<td>Image Management</td>
<td>Request sent in 72 hours prior to CAB review and performed during non-production hours</td>
<td>60 minutes</td>
</tr>
<tr>
<td>Image Backup / Snapshot Management</td>
<td>2 hours</td>
<td>60 minutes</td>
</tr>
<tr>
<td>DNS Server Administration</td>
<td>Request sent in 72 hours prior to CAB review and performed during non-production hours</td>
<td>60 minutes</td>
</tr>
<tr>
<td>DHCP Server Administration</td>
<td>Request sent in 72 hours prior to CAB review and performed during non-production hours</td>
<td>60 minutes</td>
</tr>
</tbody>
</table>
Expertise
Virtually places a necessary skill set onto the plant floor

- Remote Monitoring & Administration Support team is already familiar with the customer’s system
  - Rockwell Automation engineers design, deploy and configure the product to be functional in each customer’s unique system
  - Customers are unlikely to have a dedicated resource managing networks
- Remote Monitoring & Administration Support team conquers related tasks and issues much more quickly and efficiently because they are dedicated to managing and monitoring the customer’s systems, unlike personnel in the plant that are pulled in several different directions
- Allows the customer to outsource tasks that come up related to a dedicated team that conquer the efforts more efficiently while the people in the plant are focused on other issues
Expertise
Virtually places a necessary skill set onto the plant floor

- Rockwell Automation support is critical to expanding systems
  - Many mission critical applications via Rockwell Automation hardware/software
    - The customer cannot effectively go to a 3rd party for support

  The IDC is powerful and does a lot of things, but the resources to support these products are decreasing in the plant. The complexity of systems is increasing, and so is the ability to remotely troubleshoot these systems. Add these all up and purchasing support is a no-brainer” – Mondelēz

- It is a simple check to determine if a customer needs a support contract or not
  - Does the customer have the in-house expertise to support their IDC and its network?
    - The IDC is a complicated piece of equipment to manage and interact with especially if the customer wants to use it at its greatest potential/productivity

- Customers use the provided service model to eliminate keeping expertise in-house so that in-house personnel can focus on making a good product and getting it out the door
Maintenance

Who will ensure that the system is always operating at peak performance?

- Database and server administration is necessary but focus is typically else where in manufacturing facilities
- It’s one thing to run servers to failure, but it’s another to run them efficiently and effectively to extend their life
- In order to elongate the lifespan of the servers in the IDC, our Remote Monitoring and Administration Support provides routine maintenance to ensure that they are optimally performing
  - Examples of maintenance tasks that our engineers fulfill are:
    - User account, user group, user policy maintenance
    - Image creation and management
    - Template creation and deployment
    - VSwitch configuration
    - Image backup/snapshot management
    - Storage array management
Prevention

Does the customer have the ability to monitor key factors for potential system failure?

- Preventative vs. reactive monitoring/support
  - Customer cannot afford to go down, call and then wait for a resolution
  - Understanding the leading indicators of issues
  - Mission critical applications are what make money

- Customers note that they have conversations with us on a daily basis regarding alarms that the monitoring team received or to discuss maintenance requests
  - Ongoing issues with access to applications, updates that are needed, or remote monitoring needed
  - Rockwell Automation support prevents time delays and well as road blocks in the customer’s everyday operations

- To prevent possible server fault or failure, we monitor:
  - CPU and memory utilization
  - Disk utilization and failure
  - Up/down status of infrastructure components
  - Fan and power supply status
  - Temperature
**Prevention**

Do you have the ability to monitor key factors that can potentially fail your system?

<table>
<thead>
<tr>
<th>Network Switching Infrastructure</th>
<th>Monitoring/Alarming</th>
<th>Thresholds</th>
<th>Alarm Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up/Down Status Alarming</td>
<td>X</td>
<td>Up/Down</td>
<td>Critical</td>
</tr>
<tr>
<td>Environmental Status (Fan, Temp, Power)</td>
<td>X</td>
<td>OK / Not OK</td>
<td>Critical</td>
</tr>
<tr>
<td>Critical Syslog Events Alarming</td>
<td>X</td>
<td>Alert, Critical, Error</td>
<td>Critical</td>
</tr>
<tr>
<td>Line Card Module Status Alarming</td>
<td>X</td>
<td>OK / Not OK</td>
<td>Warning</td>
</tr>
<tr>
<td>CPU Utilization Alarming</td>
<td>X</td>
<td>75% (5 min)</td>
<td>Warning</td>
</tr>
<tr>
<td>MAC Flap Alarming</td>
<td>X</td>
<td>Condition Exists</td>
<td>Warning</td>
</tr>
<tr>
<td>Err-disabled Port Alarming</td>
<td>X</td>
<td>Condition Exists</td>
<td>Warning</td>
</tr>
<tr>
<td>Reboot Occurrence</td>
<td>X</td>
<td>Condition Exists</td>
<td>Warning</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Virtual Environment Infrastructure</th>
<th>Monitoring/Alarming</th>
<th>Thresholds</th>
<th>Alarm Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Utilization</td>
<td>X</td>
<td>90% (5 min)</td>
<td>Critical</td>
</tr>
<tr>
<td>Memory Utilization</td>
<td>X</td>
<td>95% (5 min)</td>
<td>Critical</td>
</tr>
<tr>
<td>Power Supply Status</td>
<td>X</td>
<td>Up / Down</td>
<td>Warning</td>
</tr>
<tr>
<td>Network Interface Status</td>
<td>X</td>
<td>Up / Down</td>
<td>Warning</td>
</tr>
<tr>
<td>Fan Status</td>
<td>X</td>
<td>Up / Down</td>
<td>Warning</td>
</tr>
<tr>
<td>Temperature</td>
<td>X</td>
<td>40 degrees C</td>
<td>Warning</td>
</tr>
<tr>
<td>Device Layer SAN</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up/Down Status</td>
<td>X</td>
<td>Up / Down</td>
<td>Critical</td>
</tr>
<tr>
<td>Disk Failure</td>
<td>X</td>
<td>Up / Down</td>
<td>Critical</td>
</tr>
<tr>
<td>Disk Utilization</td>
<td>X</td>
<td>75%</td>
<td>Warning</td>
</tr>
</tbody>
</table>

![Rockwell Automation](image)
Prevention
Do you have the ability to monitor key factors that can potentially fail your system?

- When asked to describe any situations where our support has aided in resolving any significant issues, our customers explained that because of Rockwell Automation monitoring and handling of smaller issues on a day to day basis, they haven’t had any catastrophic events

  - Why?
    - Our Remote Monitoring and Administration Support prevents such catastrophic events from ever occurring
    - Providing regular maintenance and monitoring the system allows Remote Monitoring and Administration Support to proactively service the customer’s system so it is running at its greatest efficiency all of the time
How to enable CPwE?
Connected Services Portfolio
Thank You!

www.rockwellautomation.com