T13 - The Future of Manufacturing in a Connected World
Today’s Discussion

- **Why** we build Connected Enterprises
- **How** to achieve a Connected Enterprise today with multi-capability industrial architectures
  - New solution areas of Converged Plantwide Ethernet (CPwE)
  - Demo example
- **What** steps to take to capture huge new value
  - Process, Partners, and Products
Why we build Connected Enterprises
The Internet of Things is Enabling a Connected World in Manufacturing

- Rapid Adoption rate of digital infrastructure: 5X faster than electricity and telephony
- 50 Billion “Smart Objects”
- World Population
The Internet of Things (IoT)
Continuing Trend in Industrial Applications

- “Things” are communicating using the same network technology as the Internet → EtherNet/IP (Internet Protocol)
- “Things” become the catalyst for better understanding complex processes and adapting to changes quickly → Smarter Machines
- Smarter machines can be better controlled thereby increasing efficiency → “Plant-wide Optimization”
- Securing the architecture means data authentication and access control become increasingly important → “Unified Secure Infrastructure”

Faster Time to Market
Lower Total Cost of Ownership
Improve Asset Utilization
Enterprise Risk Management
THE CONNECTED ENTERPRISE
Optimized for Rapid ValueCreation
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Optimized for Rapid Value Creation

PRODUCTIVITY
- R&D / Innovation
  - $503B

SUSTAINABILITY
- Smart Grid
  - $94B
- Supply Chain
  - $931B

AGILITY
- Workforce Enablement
  - $212B

- Plant Automation / Output
  - $2086B
- Customer Experience
  - $164B

Source: Cisco IoE Value Practice Survey
Network Convergence

From Basic Connectivity…
…to a Critical Part of the Infrastructure

From Proprietary Standards…
…to Open Standards

From Disparate IT and OT Networks…
…to Converged, Secure and Collaborative Operations
IT-OT CONVERGENCE

**Transactional information:** orders, supply network, product design …

**Real-time data:** alarms, events, states, energy, diagnostics, …

ERp   FINANCIALS   HR   LOGISTICS   QUALITY   WAREHOUSE

**IT**

**COMMON SECURE**

**NETWORK INFRASTRUCTURE**

**OT**

**INDUSTRIAL “THINGS”**

**PLCS & SCANNERS**

**MATERIAL & TRANSPORT**

**MACHINES & TESTERS**

**SHOP FLOOR PERSONNEL**

**PRINTERS & LABEL SERVICES**
Multi-Capability Industrial Architectures
Multi-Capability Industrial Architectures

Industrial Customer Drivers
- Faster Time To Market
- Lower Total Cost of Ownership
- Improved Asset Utilization and Optimization
- Enterprise Risk Management

Solution Sets
- Scalable & Complementary
- Automation Infrastructure
- Security & Compliance
- Mobility
- Video & Collaboration
- Industrial Compute & Cloud
- Remote Expert & Remote Services
- Energy Management

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Automation Infrastructure

**Pain Point:** Getting data from everywhere and getting it to the right place at the right time in the right context…seamlessly

**Value Prop:** Common network infrastructure, brownfield ready and future proof

**Outcome:**
- Faster time to market/new product introduction (NPI)
- Ability to change production capabilities without having to totally reconfigure the machines/operations
- Reducing changeover times
- Lower downtime

**Solution:**
- Stratix™ family of automation network infrastructure products
- Converged Plantwide Ethernet (CPwE) architectures
Security and Compliance

Pain Points: Availability of the industrial automation control systems (IACS) including:
- Unwanted access or activity on the network and to intellectual property
- Unwanted activity and modifications to applications

Value Prop: Risk and downtime avoidance; enabling the Connected Enterprise

Outcome:
- Permitting communication only between entities for which there is a need
- Protecting the ability to view, edit, and use specific pieces of control system content (e.g., logic, formulations, recipes, HMI displays, etc.)
- Managing policies across applications, networks and systems

Solution: Defense in depth security approach including:
- Stratix 5900™ Services Router
- Intellectual property protection and licensing capabilities built into development tools, end devices, and other applications
Mobility

**Pain Points:** Connectivity to mobile people, assets, and tools is hard to move

**Value Prop:** Operations and maintenance productivity improvement

**Outcome:**
- 80% faster response in decision making

**Solution:**
- Stratix™ 5100 Wireless Access Point
- Architectures to manage radio frequency interference in plants
- CPwE document “Deploying 802.11 Wireless LAN Technology within a Converged Plantwide Ethernet Architecture” includes wireless access equipment connectivity use cases
Video and Collaboration

**Pain Points:**
- Ease of use for video and audio integration with the control system
- Cost to deploy and configure video

**Value Prop:** Converged network – video and controls with Quality of Service (QoS)

**Outcome:**
- Reduce frequency of downtime, and especially micro stops
- Reduce mean time to repair (MTTR)

**Solution:**
- Cisco Video Surveillance Management (VSM) solution
- IP cameras
- Video collaboration for remote expertise and remote support
Industrial Compute and Cloud

**Pain Points:** Deployment cost and complexity of application delivery and maintenance

**Value Prop:** Compute resources where they are required – at the edge, in the cloud, or in between

**Outcome:**
- Reduce cost to deploy 30-50%
- Collect and process increased data from the production environment
- Execute more optimization applications in the production environment at a lower cost
- Flexibility to add new intelligence and applications easily

**Solution:**
- IOx – compute at the edge (Fog)
- Industrial Data Center
Remote Expert and Remote Services

Pain Points:
- Cost to monitor and maintain remote assets (e.g., unnecessary “truck rolls”)
- Skills gap leading to insufficient workers to maintain and fix automation systems

Value Prop: Proactive engagement by experts leveraging contemporary collaboration tools

Outcome:
- Faster response to avoid impending outages
- Narrowing of the skills gap through outsourced services
- More data for production optimization

Solution:
- TechConnect™ monitoring and manages services
- M2M connectivity – Internet Protocol, cellular
Energy Management

Pain Points:
- Energy cost is becoming critical to meet sustainability and profitability goals
- Little visibility into where energy is being consumed in the context of manufacturing

Value Prop: Architecture that delivers safe, secure and sustainable automation

Outcome:
- Reduce energy cost by 5-30% with better control over smarter equipment
- Energy correlated to asset lifecycle

Solution:
- Energy intelligence leveraging Cisco EnergyWise and CIP Energy
- Field area network
Multi-Capability Industrial Architectures are Achievable Today
### Multi-Capability Industrial Architectures – Value Impact

<table>
<thead>
<tr>
<th>Value Impact where customers see value</th>
<th>Lower downtime</th>
<th>Faster line expansion</th>
<th>Faster NPI</th>
<th>Risk reduction (board level issue)</th>
<th>Enablement of new PoF business models</th>
<th>Faster MTTR</th>
<th>Faster decision making</th>
<th>Faster ECNs</th>
<th>Lower costs 30-50%</th>
<th>Lower downtime</th>
<th>IOT data enablement</th>
<th>Faster MTTR</th>
<th>Faster NPI</th>
<th>Faster ECNs</th>
<th>Lower downtime</th>
<th>Lower scrap</th>
<th>Quality</th>
<th>Lower energy costs by 5-30%</th>
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**Industrial Fabric Solution Sets**
- Scalable & Complementary

**Automation Infrastructure**

**Security & Compliance**

**Mobility**

**Video & Collaboration**

**Industrial Compute & Cloud**

**Remote Expert & Remote Services**

**Energy Management**
Steps to Take to Capture Huge New Value
Integrated, Pre-Tested Solution Architectures From Cisco and Rockwell Automation® Can Ease Skill Gaps and Accelerate Value

Q. What are the top barriers to implement your factory of the future strategy?

- Processes are not consistent across multiple manufacturing facilities: 74%
- Low maturity/lack of production technology: 73%
- Change management: 73%
- Finding skilled people: 71%
- The company doesn’t have a factory of the future strategy: 61%
- Difficulty in demonstrating ROI/cost: 58%

Source: IDC Manufacturing Insights 2012 – N=81

Lifecycle Services
Faster Deployment
Better ROI
Business Risks Reduced
Industry Leading Partners

Plus lowers costs for plant design and network engineers
The Internet of Everything (IoE)
Networked Connections of People, Process, Data, Things

**People**
Connecting people in more relevant, valuable ways

**Process**
Delivering the right information to the right person (or machine) at the right time

**Data**
Turning data into more useful information for decision making

**Things**
Physical devices and objects connected to the Internet and each other for intelligent decision making

Events ... Networked ... Into Data ... Actioned by People
Assessment
Secure, Upgrade
Working Data Capital
Analytics
Collaboration
Where are You on Your Journey Today?

- Automation Infrastructure
- Security & Compliance
- Mobility
- Video & Collaboration
- Industrial Compute & Cloud
- Remote Expert & Remote Services
- Energy Management

Assessment
Secure, Upgrade
Working Data Capital
Analytics
Collaboration
Rockwell Automation® and Cisco Can Help You Capture the Value Opportunities – Next Steps

Discovery Workshop with “OT” and IT
- Business challenges
- Best practice sharing
- Use case brainstorming and prioritization
- Connected Enterprise Maturity Modeling

Proof of Concept Design
- Run POCs in a Showcase manufacturing facility to prove the value and technology

TCO or OEE Opportunity Quantification
- Quantify top value opportunities for senior management (TCO, OEE, and overall benefit models)

End State Architecture Assessment
- Document future state architecture (e.g., 3 to 5 years out), gaps with today, change management, and phased plan to get there
How can Rockwell Automation® and Cisco help you achieve your plant of the future?