Cisco Connected Factory Connects Everything On and Off the Factory Floor

BENEFITS

- **Reduce downtime and increase overall equipment effectiveness** (OEE) with a new class of self-aware assets that adjust automatically to changing conditions and alert operators to maintenance needs before breakdowns occur.

- **Deliver new products more rapidly** by helping information flow seamlessly throughout the entire manufacturing value chain. This helps managers and engineers react immediately to shifting needs, operational issues, and more - faster than ever before.

- **Protect against cyberthreats and data breaches** with the same network security operations that Cisco provides to organizations ranging from NASDAQ to government agencies handling classified intelligence.

- **Encourage innovation** by enabling collaboration between different teams of workers with a platform that connects siloed organizations and globally dispersed teams.

Meet business challenges head on with the intelligence and insight you'll gain by connecting your factory systems with enterprise and IT networks.

Seventy percent of manufacturing executives are focusing on plant-floor data initiatives to drive operational and business excellence, reports Aberdeen Group. How are you addressing issues such as recurring supply chain disruptions, production outages, or customer demand volatility? Do you face the challenge of dealing with cyberthreats, high-energy consumption, poor asset utilization, and challenging profit margins?

Cisco® Connected Factory is a portfolio of technologies and services that help you connect factory systems to business applications. It empowers your entire organization with the power of the Internet of Things (IoT) by linking equipment, sensors, and other machines and systems to databases, applications, plant workers, partners, and customers around the world. Based on a common standards IP network, it provides end-to-end, industrial-strength architecture for greater production flexibility, global visibility, enhanced mobility, and comprehensive security. Connected Factory is empowering factories of the future—today.

Manufacturing Reinvents Itself

Industrial enterprises are searching for technology platforms that will drive growth and profitability in an increasingly fast-moving, interconnected, and mobile marketplace. Today, legacy technology that divides manufacturing operations into factory and business silos is becoming outmoded and uncompetitive. Forward-thinking manufacturers are embracing converged networks that securely integrate factory floors with business systems, easily link to partner solutions, enable flexible manufacturing, and take advantage of networks of intelligent machines.

- Seventy percent of manufacturing executives are focusing on plant-floor data initiatives to drive operational and business excellence, according to Aberdeen Group.
- Companies are releasing products sooner and solving problems faster.
- Work teams are collaborating in real time with video, voice, and data that reach across the plant to the enterprise, to management, and to experts around the world.
- Control and device networks are merging with traditional IT networks to deliver plant performance information in real time, manage manufacturing processes, lower energy consumption, and immediately access talented, expert workers, regardless of their locations to increase OEE.
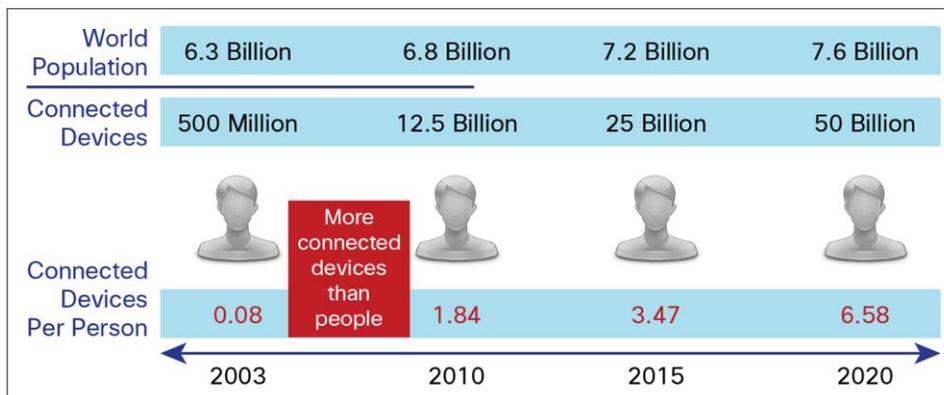
For years, traditional factories have been impeded by production environments with little or no connectivity between corporate business systems, supply chains, customers, and partners. These are also operations plagued with inconsistent Wi-Fi coverage in plants, loss of productivity searching for tools and equipment, lack of flexibility in reconfiguring assembly lines, and security concerns about unauthorized access and network intrusions. The result is nonoptimized plant throughput, lots of unplanned downtime, excessive cabling and recabling costs, and the consistent and looming threat of cyber attacks.

The Internet of Things is a Powerful Opportunity

There are currently 1.5 smart devices for every human being on the planet. All over the world, sensors, smart objects, and other devices are connecting through the reach and power of the Internet. They're gathering, analyzing, and communicating intelligence in real time to boost operational efficiency, power new business models, and enable better decision-making. This is called the Internet of Things, or IoT.

Manufacturing operations are perfectly poised to benefit from such massive connectivity. Every year, manufacturers outfit more factory machines with sensors that connect to the cloud or enable communication with other machines and their human operators in real time (Figure 1). Already this has led to many innovations, from making supply chains more traceable to boosting factory throughput and OEE by 10 percent, or more, in some instances.

Figure 1.   Rise of the Connected Machines

	2003	2010	2015	2020
World Population	6.3 Billion	6.8 Billion	7.2 Billion	7.6 Billion
Connected Devices	500 Million	12.5 Billion	25 Billion	50 Billion
Connected Devices Per Person	0.08	1.84	3.47	6.58

More connected devices than people
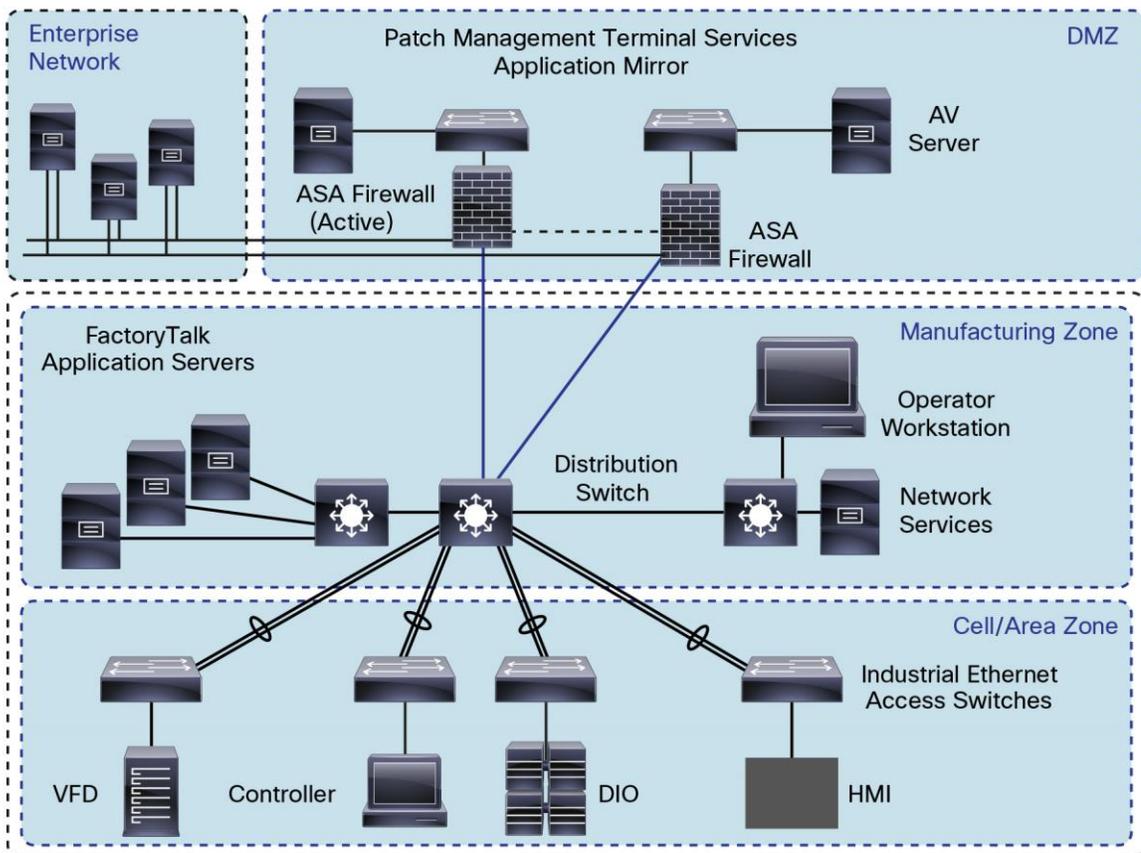
Connected Factory Security Features

The latest security release of both the Cisco Connected Factory - Security (Cisco branded solution) and Converged Plantwide Ethernet, or CPwE - a jointly branded and developed Cisco-Rockwell Automation solution - includes the following capabilities:

1. **Converged Plantwide Ethernet Architectural Framework - Resiliency**
   a. Redundant IDMZ ASA firewalls
   b. Redundant Cisco Identity Service Engine (ISE) administration nodes
   c. Redundant Cisco Wireless LAN Controllers
   d. Redundant distribution-aggregation Ethernet switches

2. **Identity Services Engine (ISE)**
   a. AAA (RADIUS)
   b. Secure wired on-premises access from the Industrial Zone (convenience port)
   c. Secure wireless guest and employee Internet access from the Industrial Zone

3. **Traversing the IDMZ**
   a. IACS applications
      i. FactoryTalk access
      ii. Secure historian file transfer to the enterprise
   b. Network Services
      i. Active Directory Domain Controller
      ii. Identity Services Engine
      iii. Secure remote Internet access through the use of remote desktop protocol (RDP)
      iv. Secure enterprise access through the use of RDP
      v. Remote Desktop Gateway
      vi. Network Time Protocol

4. **Network Address Translation**
   a. Within the cell and/or area zone

Components of Connected Factory

The Cisco Connected Factory Solution is an end-to-end architecture specifically designed, tested, and validated to provide predictable performance and system resiliency for industrial applications, from plant automation systems to MES. It provides a clear set of architectural guidelines and products that tie together factory automation systems, enterprise applications, and the wider ecosystem of supplier and partner solutions (see Figure 2).

Figure 2.   Cisco Connected Factory Architecture

The Connected Factory Solution covers five main areas of factory operations: automation, wireless, security, remote monitoring and response, and energy management.

Connected Factory Automation

By converging previously siloed sensors, machines, cells, and zones, Factory Automation helps integrate manufacturing systems and business systems and bring everything online on a single network. This integrations gives you flexibility to quickly adapt to changes, whether new product introductions, planned product line change-overs, or other adjustments. Each affected zone, from the enterprise to the plant floor, gets real-time alerts about changes through networked mobile devices, video monitors, and human machine interfaces (HMIs). The real-time information also links back to the entire supply chain, so each step in the manufacturing value chain from supply through to distribution can quickly respond as needed.

Connected Factory Wireless

Factory Wireless creates new flexible communication opportunities between things, machines, databases, and people throughout the plant. From asset tracking to visibility of automation controls and HMIs, a wireless network environment on the shop floor can increase productivity and production speed. A unified wireless infrastructure delivers the reliability and performance needed for mission-critical plant-floor applications, such as wireless torque tools. It can also be a platform for additional industrial global applications, such as Wi-Fi asset tags or mobile HD video cameras. Wi-Fi asset tags help increase productivity by making it easy to find production assets and inventory, while mobile HD video enhances remote troubleshooting and collaboration.

Connected Factory Security

Factory Security solutions work with Factory Automation networks to create plant security for both digital and physical assets. You get detailed control of plant network access by user, device, and location. For example, a plant manager can limit a remote or onsite expert's access to just the machines they support. Identity and policy is further enforced in ruggedized Cisco switches in a centrally configured, automated manner, rather than switch by switch.

Factory Remote Monitoring and Response

Enterprise leaders continue to face fierce global competition in a very cyclical industry. They are looking for ways to innovate faster and shorten time to market. With Connected Factory solutions, they can buy machines as a service (MaaS) from partners, such as robot makers, who can monitor, control, and support their machines remotely. This allows enterprise leaders to deploy new capabilities more quickly and at lower cost and meet the growing demand for custom individualized products and lower TCO.

Security Solutions

Cisco's industry-leading security solutions combine security products with a system-level approach for IACS networks so that manufacturers can maximize uptime and protect their company assets, employees, and intellectual property.

Cisco Connected Factory - Security, also developed with Rockwell Automation, provides flexible, secure plantwide connectivity between things, machines, workflows, databases, and people. Also, it supports new models of policy-based, protected plant floor access so companies can:

- Securely access and aggregate machine data on the plant floor, aggregate, it, and apply data analytic algorithms to determine optimal operation and supply chain workflows for improved efficiencies and cost savings.
- Securely share intellectual property with global employee, partner, and vendor ecosystems to drive innovation and scale expert resources.
- Mitigate risk through posture-assessment capabilities to ensure policy compliance.
- Deploy flexible communications between machines and people located throughout the plant to remotely improve decision-making and maximize uptime.

For more details of the latest Cisco Connected Factory Security release, see sidebar, Connected Factory Security Features, in this overview.

Strategic Partnerships

Cisco has strategic relationships with leading suppliers of industrial automation equipment and control systems including Rockwell Automation, Honeywell, and Emerson as part of a strong factory and plant partner ecosystem to deliver best of integrated and tested OT and IT solutions.

Use Cases

Food Processing	• Big data and analytics for forecasting, proactive maintenance, and automation • Real-time data stream analysis
Vehicle Manufacturing	• Uniform design for multiple plant networks under a single remote engineering team to monitor and troubleshoot • Standardized IP networks enabling all devices to communicate with operations and business systems and enable flexible manufacturing • Factory-supplier-customer communication and collaboration enablement • Out-of-the-box machine usability
Tools Manufacturing	• RFID-enabled real-time location system for asset tracking on the factory floor • Wi-Fi tags integrated with programmable logic controller to identify and address manufacturing process bottlenecks • Real-time inventory visibility

Realize More Value from Your Connected Factory Solution with Cisco Services

Use Cisco Services to accelerate deployment of your Connected Factory. We help you realize greater ROI with an outcomes-based, integrated approach from strategy though execution. You'll experience faster improvements in plant automation, mobility, and security using validated solutions. We also help you reduce risk by combining the most advanced technology with vertical expertise and proven methodologies. And we'll continue to help you maintain optimal productivity with ongoing, industry-leading support.

Use these services to accelerate your business transformation:

- **Connected Factory Architectural Roadmap:** Reduce deployment costs and delays by assessing business requirements and defining the overall communications strategy, architecture, and required platform.
- **Connected Factory Micro Engagement:** Optimize platform functions with a limited set of assessment or architectural services and align these with use cases.
- **Connected Factory Starter Kit:** Experience a limited Cisco Connected Factory deployment with a prepackaged set of equipment and services, including wireless site surveys.
- **Connected Factory Design and Build Service:** Reduce risk and delays with detailed design and implementation services.
- **Solution Optimization Service:** Maintain optimum solution performance with ongoing guidance, change management support,and management of your operational technology (OT) and ITenvironments.
- **Product Support Service:** Rapidly resolve critical network issues to keep systems running at peak performance with world-class technical support. You receive advance parts replacement, optional on-site services, system software updates, and access to online resources.

Global Mineral Smelting Company Takes Control
Challenge

The smelting plant of the Emirates Aluminum Company Ltd. (EMAL) at Taweelah in Abu Dhabi needed to converge its separate processes and production areas in a way that still kept them independent (yet interdependent) for quality and security purposes.

Solution

Cisco developed an innovative solution using industrial demilitarized zones (DMZs) to focus on high availability, the security of edge devices, and protection of the factory automation investment while delivering a controlled end-to-end information flow to enterprise decision makers.

Results
- Increased plant efficiency through a robust, scalable, and flexible network architecture
- Better monitoring of products through handheld scanners ensured more timely deliveries
- Reduced maintenance and support costs with IP networking, which allows field personnel to complete tasks supported by a central IT team

Read more about the transformation of EMAL's aluminum processing plant here.
http://www.cisco.com/c/dam/en/us/products/collateral/switches/catalyst-6500-series-switches/emal_v2cs.pdf

Why Cisco?

Cisco is the only company with the breadth of infrastructure and strategic partnerships to converge business IT and operational technology in a secure, reliable, and comprehensive manner. Cisco Connected Factory is purpose built to run mission-critical plant floor systems while enabling improved visibility, faster problem resolution, and new business models without compromising reliability, security, or network response time.

As the networking industry leader for 25 years, we have the proven expertise, worldwide partners, and enterprise-level technology that can help transform your manufacturing company and keep it competitive.

Next Steps

To learn more about transforming your manufacturing operation to a Cisco Connected Factory with an end-to-end platform to securely connect your OT with a global IT infrastructure, visit http://www.cisco.com/web/strategy/manufacturing/connected-factory-solution.html.

To speak with a Cisco representative about planning, building, managing, and supporting a Cisco Connected Factory, contact your account manager.

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