The Next Industrial Transformation with the Internet of Everything

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PSOIOT-2004

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IoE Transformations
Every Business, Country, and City is Becoming a DIGITAL / TECHNOLOGY Company

By 2020, **75%** of businesses will become fully digital or preparing

Only **30%** of these digitization efforts will be successful

#1 reason companies don’t succeed? Fail to Innovate and Reinvent
Digitization Trend Across Verticals

Key Trends

Vertical digitization enabled by IoE

LoB Outcomes – OT & IT

Solution key to simplification

Industrie 4.0
Grid Modernization
Omni Channel

Smart Cities
Connected Trains
Smart Space

IoE as the foundation

INCREASE OPERATIONAL EFFICIENCY
CREATE NEW BUSINESS SERVICES
IMPROVE PRODUCT QUALITY
Manufacturers have tied their machines to the enterprise network.

Nearly 75% of US manufacturing plants are more than 20 years old.
$3.3M Per month
($22K per hour, 5 hours per incident, 30 incidents per month)

$2M in excess inventory

$4M in lost revenue
Machines get connected with a converged resilient infrastructure
Boundaries Crumble

From.. Top Floor

To.. Shop Floor

3rd Party Vendors

FANUC
KUKA

IT+OT Convergence
Secure, Highly Resilient, Partners & Professional Services, Cloud Services, Collaboration, Intercloud
Public Sector

IoE Digital Platform
Collect | Analyze | Visualize | Act

- SCC Wi-Fi
- SCC Parking
- SCC Smart Traffic
- SCC Lighting

Leach Heads Mgt.
Traffic Mgt.
Street Lighting
Public Transport
Security Cameras
Parking

- Downtown traffic caused by parking search
- $82B spend required to modernize cities per state
- in value over 10 years with smart buses
- in value over 10 years with smart parking
- 44,000 new jobs created with startup innovation

City of Barcelona
Port of Hamburg

$28M $53M
Transportation

IoE Digital Platform

- Seamless Connectivity
- Train Control
- Fleet Management
- Efficient Maintenance

Collect | Analyze | Visualize | Act

- Bus
- Edge
- Trackside Sensors
- Traffic Light
- Ticketing
- Passengers
- Edge
- Trackside Signals
- Train

10-12% improved MTBF
20% higher ridership
21% lower CapEx
IoE Digital Platform
Collect | Analyze | Visualize | Act

- Omni-channel Personalization
- Employee Productivity
- Minimize Out-of-stock
- Shopper Analytics

17% more store traffic
20% increase in revenue/sq ft
15% higher productivity

Retail

Edge

21% lost customers due to stock outs
33% of customers need assistance

Omni-channel
Employee
Minimize
Shopper

Personalization
Productivity
Out-of-stock
Analytics

Collect
Analyze
Visualize
Act

Warehouses
Inventory

Shelves

Cameras

Suppliers

POS

Employees

Shopper Paths

Shopper Analytics

Personalization

Employee Productivity

Minimize Out-of-stock

Act

Employee

Productivity

Minimize Out-of-stock

Shopper Analytics

Showing Omnipresent Showrooming

17% more store traffic
20% increase in revenue/sq ft
15% higher productivity
IoT/IoE Economic Value by Industry

Spheres sized by amount of Economic Value

Industry Size ($B)

0 5,000 10,000 15,000 20,000

Retail trade (10%)
Information services (4%)
Administration (6%)
Manufacturing (Energy, Oil & Gas) (34%)
Public Sector (20%)
Healthcare (5%)
Finance & insurance (4%)
Professional services
Education

Degree of Impact (Value at Stake/Industry Size)

0% 5% 10% 15% 20% 25% 30% 35%

Source: Cisco Consulting Services.
Internet of Everything

New Insights
New Stakeholders
New Outcomes
Adoption Driven by Insights

- Lower operational costs: 58%
- Better customer service and support: 48%
- Business operations optimization and control: 36%
- Competitive differentiation: 28%
- Better SCM and logistics: 25%
- Product/service improvement: 23%

*Source: IDC (2014); N = 198 for discrete manufacturing*
New Outcomes

Mining

Solution: Predictive Maintenance
Investment - $1-$2M per mine
Single day of stoppage costs $5M

Manufacturing

Solution: Factory Automation
Investment: $300K-$500K per factory
Single minute of downtime costs $22K

Utilities

Solution: Field Area Network
Investment: $7M per site
Annual theft or loss costs $1B
New Outcomes – Manufacturing Industry

- Headquarters
- Supply Chain
- Factory
- Shipping and Warehouse
- Retail Store

11% | $84M

= IT

$50M

$25M
New Value – Manufacturing Industry

- Headquarters
- Supply Chain
- Factory
- Shipping and Warehouse
- Retail Store
OT & IT Collaboration Required

Corporate IT
- Security
- Network TCO
- Access control

Automation Controls Director
- Reduce downtime
- Device visibility

Plant Engineering Manager
- Real-time diagnostics
- Wireless

Facilities Manager
- Manage peak energy usage
- Track machine energy efficiency

Headquarters
Supply Chain
Factory
Shipping and Warehouse
Retail Store
Accelerated Opportunity
Total Global Economic Value of IoT

Economic Value
$8.0T Trillion
Based on 61 Real-World Use Cases

Value Sources

Private Sector
$6.4T

Public Sector
$1.6T

Value Sources

Innovation/Revenue
$2.1T

Customer/Citizen Experience
$0.7T

Asset Utilization
$2.1T

Employee Productivity
$1.2T

Supply Chain/Logistics
$1.9T
Cisco Investments
IoE Requires Multiple Technology Decisions

- IT Service Requirements
- Security Requirements
- Data Center and Storage Requirements
- Big Data Requirements
- IoT Platform
- Connectivity
- IoT Module

Cisco Live! Public
Cisco Solution Strategy

12 Verticals
Across the stack
Cloud Managed

New Value Creation
Vertical Solution
Scale
LH Validation

- Corporate IT 11% spend
- Facilities 89% spend

Peer Group

LH

IOE Playbook
Experimental Demo

Cities
- Oil & Gas
- Utilities
- Transportation
- Manufacturing
IOE End to End Solution Architecture

App Foundations for Digital Business

Application Enablement
- Internet of Things
  - IOx
  - Device Directory
  - Analytics
- Connected Mobile Experience
  - Location
  - Context
- Collaboration
  - Voice/Video
  - IM/Presence
  - Content

Cisco ONE Platform
- Network Automation (APIC SDN Controller)
  - Routing
  - QoS
  - Mobility
- Security
  - Access Ctrl & Remediation
- Cloud Orchestration
  - Virtualization
  - Elastic Compute
  - InterCloud
- Policy/Intent (ACI)
  - Users
  - Devices
  - Apps

Data Center
WAN
Access

Fog Compute Platform

Sensors
- Smart Parking
- Personnel Monitoring
- Wireless tooling
- Distribution Automation
- Pipeline monitoring
- Smart shovels
- Trackside/roadway monitoring
- Store inventory
- Tower monitoring
- Patient Media Experience
Partner Opportunities on the IoE Architecture

**App Foundations for Digital Business**

- **Application Enablement**
  - IOx
  - Internet of Things
  - Device Directory
  - Analytics
  - Connected Mobile Experience
  - Location-based apps

- **Cisco ONE Platform**
  - Network Automation (APIC SDN Controller)
  - Security
  - Access Ctrl &
  - Elastic
  - Virtualization
  - Managed Services

- **Cloud Orchestration**
  - Cloud
  - Users
  - Devices
  - Apps

- **Data Center**
  - Scalable infrastructure deployment

- **Access**
  - Traffic

- **Fog Compute Platform**
  - Fog

- **Connected Analytics**
  - Connected Experiences

**Transformative applications**

**Connected Processes**

**Connected Experiences**

**Cisco ONE Platform**

- **Policy/Intent (ACI)**
- **Voice/Video**
- **IM/Presence**
- **Content**

**Collaboration**

**Internet of Things**

- **Connected Mobile Experience**
  - Location-based apps

- **Connected Processes**

- **Connected Experiences**

**Application Enablement**

- **Cisco ONE Platform**

- **Network Automation (APIC SDN Controller)**

- **Security**

- **Cloud Orchestration**

- **Data Center**

- **Zero-touch deployment**

- **Managed Services**

- **Smart Parking**

- **Personnel Monitoring**

- **Wireless tooling**

- **Distribution Automation**

- **Pipeline monitoring**

- **Smart shovels**

- **Trackside/roadway monitoring**

- **Store inventory**

- **Tower monitoring**

- **Patient Media Experience**

**Sensors**

**Connected City**

- **Connected Public Safety**

- **Connected Factory**

- **Connected Utilities**

- **Connected Oil and Gas**

- **Connected Mining**

- **Connected Transportation**

- **Connected Retail**

- **Connected SP/M2M**

- **Connected Health**

**Transformative applications**

**Connected Processes**

**Connected Experiences**

**Cisco ONE Platform**

- **Zero-touch deployment**

- **Managed Services**

**Application Enablement**

- **Cisco ONE Platform**

- **Network Automation (APIC SDN Controller)**

- **Security**

- **Cloud Orchestration**

- **Data Center**

- **Zero-touch deployment**

- **Managed Services**

**Application Enablement**

- **Cisco ONE Platform**

- **Network Automation (APIC SDN Controller)**

- **Security**

- **Cloud Orchestration**

- **Data Center**

- **Zero-touch deployment**

- **Managed Services**
Case Study Interviews
Digital Manufacturing: A Holistic View

- Single Pane of Glass including Mobile
- Rapid customer feedback
- Production/supply chain planning
- IOE enabled design

- Remote support & maintenance
- Machine health & quality
- New Service Models

- Rapid support & maintenance
- Connected Products
- New buying experiences

- Predictive Delivery
- Warehouse automation
- Video based Quality

- Data ingest & storage
- Industrial & Enterprise apps
- Video based Quality

- Automation networks
- Wireless tooling & mobile control
- Asset & Things tracking
- Physical & cyber security
- Factory Big Data

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Persistent remote access
Server
RC1 detects servo weld gun encoder condition change
RC1 Needs encoder replacement
Change Encoder

Preventative Maintenance Vision: ZDT

Source: IMTS

RC1 detects servo weld gun encoder condition change

FANUC

CISCO

Robots
IT-OT Convergence

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

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

**Common Secure Network Infrastructure**

**Rockwell Automation**

**CISCO**

**IT**

**OT**

**Industries**
- ERP
- Financials
- HR
- Logistics
- Quality
- Warehouse

**OT**
- Industrial “Things”
- PLCs & Scanners
- Material & Transport
- Machines & Testers
- Shop Floor Personnel
- Printers & Label Services

**IT**

**CiscoLive!**
Cisco Intelligent, Efficient Manufacturing Vision: Enabled by IT/OT Convergence

Converged Plant Information
- FOG: New Compute Models
- PLM/ERP/MES/PLC Integration
- Collaborations in Factory Apps

Converged Plant Security
- Physical
- Proximal
- Remote Access
- DMZ Traversal
- Open Port

Converged Plant Wireless
- Mobile Control Room
- Wireless Machines
- Remote Monitoring/Control
- Converged Communications
- Guest Worker Access

Converged Network
- Automation
- Flexible Production
- Resiliency
- Visibility
- Manageability
- Visual Factory
- Speed
- New Services

Cisco IOT Solutions

OEE and Efficiency
- Risk reduction
  - IP theft
  - OT to IT damage
  - Downtime

Customer Benefits
- Cost Reduction
  - OEE – Fast Response
- Cost Reduction
  - Uptime
- Flexibility
How to Drive IT/OT Convergence

**Discovery Workshop with OT and IT**
- Business challenges
- Best practice sharing
- Joint IT/OT use case brainstorming and prioritization

**TCO and OEE Quantification**
- Quantify top value opportunities

**Pilot Design**
- Run pilots to prove the value and technology

**End State Architecture Assessment**
- Document future state architecture (e.g., 3 to 5 years out), gaps, and phased plan to get there

**Joint IT/OT use case**
- Brainstorming and prioritization
- Quantify top value opportunities

**Document future state architecture (e.g., 3 to 5 years out), gaps, and phased plan to get there**
Connected Transportation Sectors

Connected Maritime
Connected Roadway
Connected Vehicle
Connected Aviation
Connected Freight and Logistics
Connected Mass Transit
Connected Rail
Vertical Solution & Use-case Creation

Business Domain

Foundational Solution

Applications Enabled

Use Cases

Supporting Architectures

Connected Rail

- Mobile Routing for onboard systems
- Phy Sec for onboard systems, passenger safety & security
- Positive Train Control (Connected Train + Connected Trackside)
- Lineside telephony
- SCADA for electrification
- Backhaul of GSMr
- Optimized Rail Dispatch/Call Flow

Connected Train

Connected Trackside

- Video Surveillance for Passenger Safety
- Public Notification/Media Displays
- Interoperable Comms/PA
- Help Point Telephones

Connected Station

- Cisco IP CCTV Cameras
- Cisco Video Surveillance Operations and Storage System
- Cisco IP Video Surveillance Cameras
- GAI-Tronics IP Help Points
- Video-based Public Address System
- Telepass Management Application
- Cisco Access Control Gateway

Supporting Architectures

- Vertical Solution & Use-cases
- Applications
- Positive Train Control
- Phy Sec for onboard systems
- Telephony
- Optimized Rail Dispatch/Call Flow
- SCADA for electrification
- Video Surveillance for Passenger Safety
- Public Notification/Media Displays
- Interoperable Comms/PA
- Help Point Telephones
Connected Trackside
Reduce Capex by 21% over multiple proprietary SCADA networks.

Next over the top Passenger Wi-Fi for their 1.3 Billion Trips per year.

**Business Outcome Summary – Trackside**

**Connected Trackside**

- Keeping trains safe and running on time
- Lower Total Cost of Ownership
- Enabling new business models through converged networks
How to Leverage Cisco’s Investments
Investments Across the Portfolio

**Network Platform**
- Cloud
- Intelligent Network
- Data Center
- Fog Computing

**Technology Portfolio**
- Net Connectivity
  - Routing, Switching, Wireless
- Security
  - Cyber and Physical
- Net Management
- App Enablement
  - Fog Computing

**Investment Fund**
- $250M so far
- Alchemist Acceleration
- Ayla Networks
- EVERYTHNG

**Innovation Centers**
- London, UK
- Rio de Janeiro, BR
- Songdo, KR
- Toronto, CAN
- Barcelona, SP
- Tokyo, JP

**IoT World Forum**
- 2nd Year
- Chicago
- Oct 14-16
- 1500 Attendees

**Global Partner Ecosystem**
- Rockwell Auto.
- Schneider Electric
- Itron
- AGT
- Emerson
- Honeywell
- Black and Veatch

**Standards Development**
- IEEE
- IETF
- 3GPP
- IIC
- Wi-SUN
OT + IT is key to the 10x opportunity
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TOMORROW starts here.