The Connected Enterprise
TRENDS & TECHNOLOGIES

Production Demand

The Internet of Things

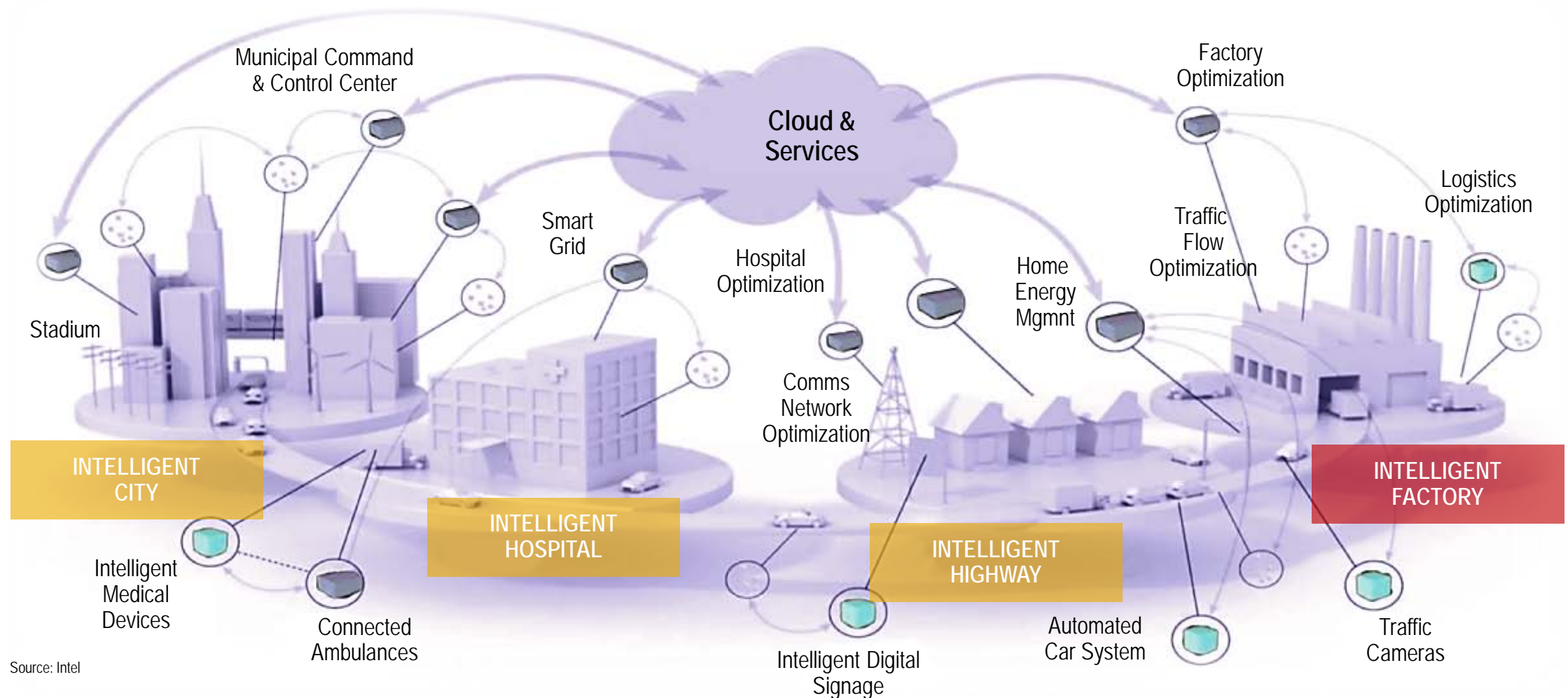Convergence

The Enablers

A Country, a City, a Company,
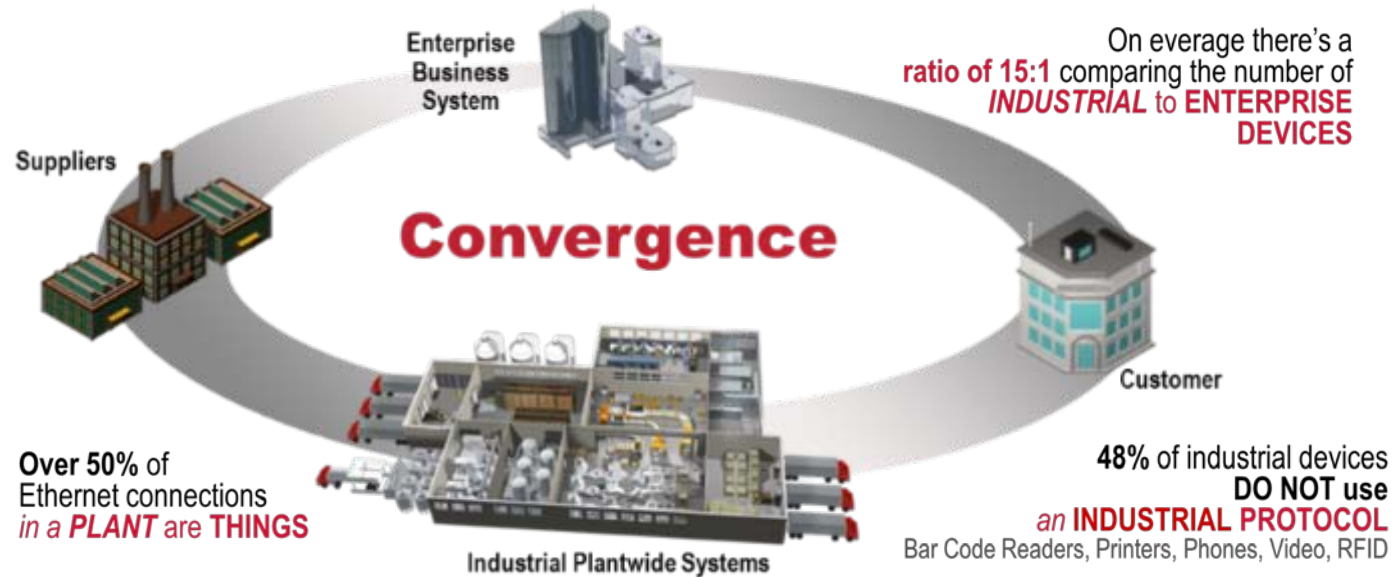
... Will CONVERGE over

Standard IP Networks

EVERYTHING

Municipal Command & Control Center

Cloud & Services

Factory Optimization

Smart Grid

Logistics Optimization

Hospital Optimization

Traffic Flow Optimization

Home Energy Mgmnt

Stadium

Comms Network Optimization

INTELLIGENT CITY

INTELLIGENT HOSPITAL

INTELLIGENT FACTORY

INTELLIGENT HIGHWAY

Intelligent Medical Devices

Connected Ambulances

Intelligent Digital Signage

Automated Car System

Traffic Cameras

Source: Intel

Understand **Enterprise** and **Automation** requirements

Enterprise Business System

Suppliers

Convergence

On everage there's a **ratio of 15:1** comparing the number of *INDUSTRIAL* to *ENTERPRISE* **DEVICES**

Customer

Over 50% of Ethernet connections *in a PLANT* are **THINGS**

Industrial Plantwide Systems

48% of industrial devices **DO NOT** use *an INDUSTRIAL PROTOCOL*
Bar Code Readers, Printers, Phones, Video, RFID

Standard Internet Protocol – **IP Network**

<u>Routing</u> protocols – **WAN**

High availability – **Redundant star**

Determinism, Latency, Jitter **– sec/msec**

Applications - **Voice**, **Video**, and **Data**

IP Addressing – **dynamic**

Security – **pervasive**

Combine Internet and **Industrial Protocols**

<u>Switching</u> – **LAN**

High availability – **Ring**

Determinism, Latency, Jitter – even > **msec**

Applications **I/O Control**, **Motion**, **Safety**, and **Sync.**

IP Addressing – **static**

Security – **emerging**

EtherNet/IP™ is an **Industrial Protocol** …
… compatibles at all levels with the **standards** OSI Model

Common Industrial Protocol (CIP)

Industrial Applications	Coexists with others Standard Protocols	CIP Motion profiles	Motor control profiles	Transducer profiles	I/O profiles	Other profiles	Semiconductor profiles	CIP Safety
		Object library: (communications, applications, time synchronization)						Safety objects
		Data management services – explicit and I/O messages						Safety services
		Connection Management, Routing						

TCP - UDP
Internet Protocol (Layer 3) Rounting
Data Link (Layer 2) Switching
Physical Layer

but

Combine Internet and **Industrial Protocols**

Not all Industrial Ethernet Networks are equal

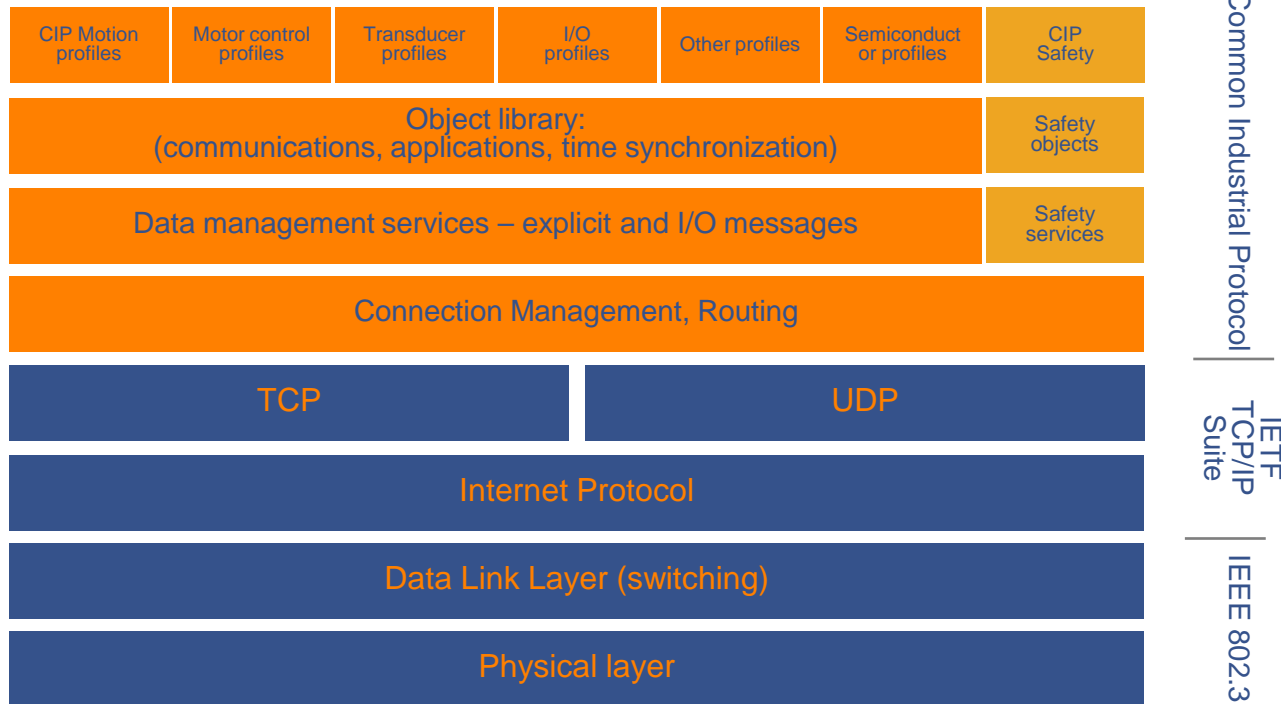## … many have been **modified** **the Internet Suite** for real-time control

… and some also the **media access layers**

The Internet Protocol

…is the **standard** that enables the **IoE** in the **manufacturing**

EtherNet/IP™

is

## fully compliant

with the Internet Protocol suite

CIP Motion profiles	Motor control profiles	Transducer profiles	I/O profiles	Other profiles	Semiconduct or profiles	CIP Safety
Object library: (communications, applications, time synchronization)						Safety objects
Data management services – explicit and I/O messages						Safety services
Connection Management, Routing						
TCP			UDP			
Internet Protocol						
Data Link Layer (switching)						
Physical layer						

Common Industrial Protocol

IETF TCP/IP Suite

IEEE 802.3

EtherNet/IP

EtherNet/IP and CIP are managed by

ODVA™

IT / OT Switching
Similarities and Differences

- **OT Switches:**
  - Industrial Cabinet
  - Panel or DIN mount
  - Managed or unmanaged
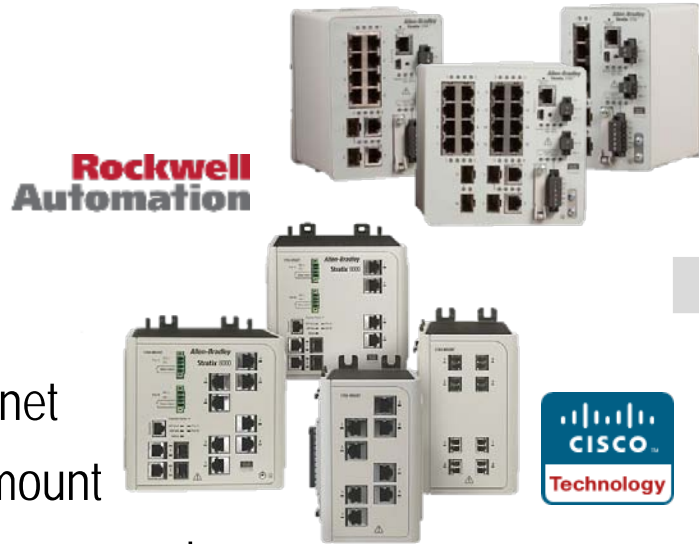
- **IT Switches:**
  - Data Center
  - 19″ rack mount
  - Managed
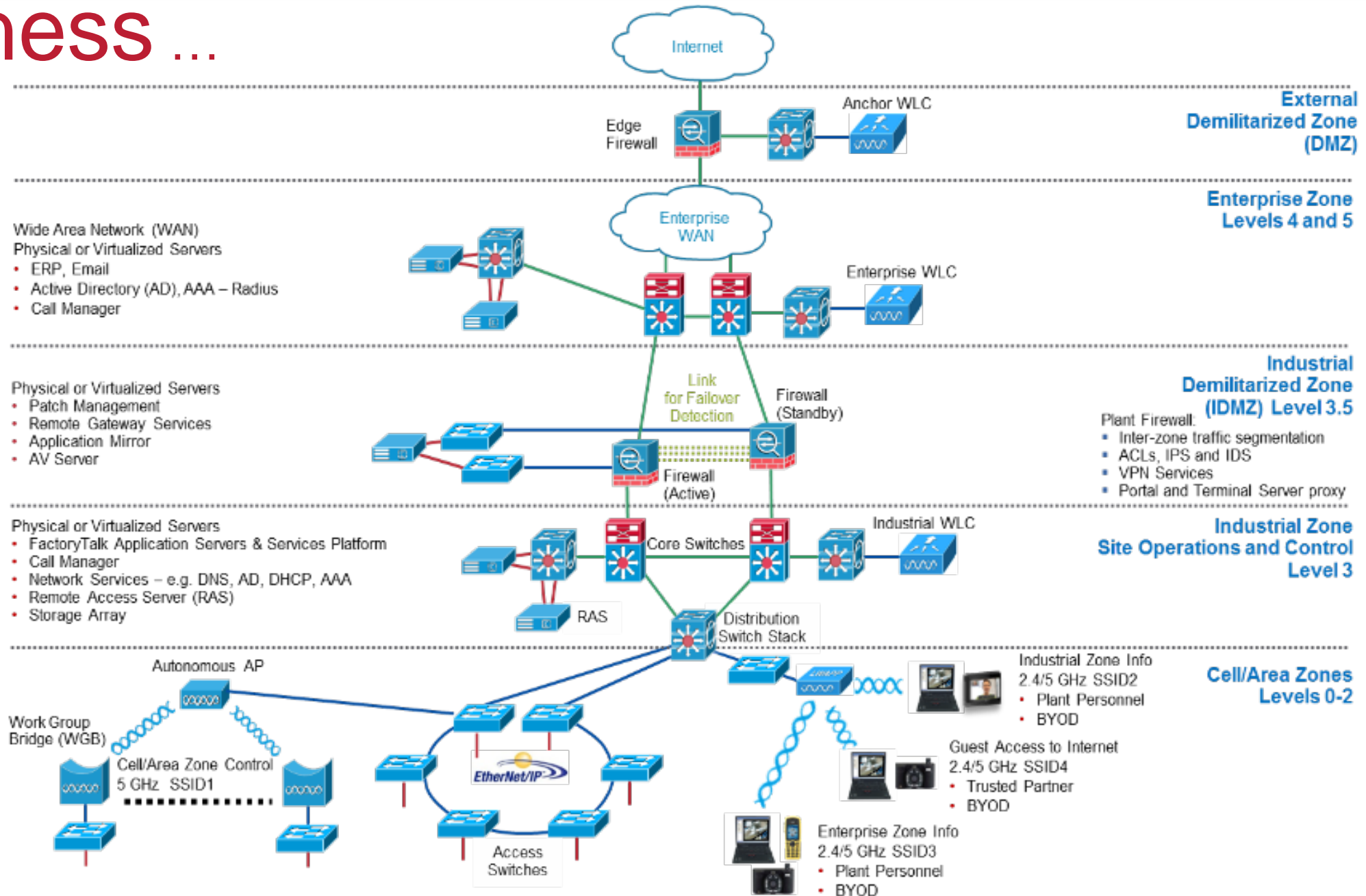
From **Business** …

Standard Internet Protocols

CISCO   **PANDUIT®**

to

Shop Floor

Convergence

Industrial Protocols

Rockwell Automation

Secure Network Infrastructure Portfolio

Plant-Wide Optimization
Optimize the Operation of Production Line

- For small to complex networks
- Monitor and control distributed devices
- Plant floor and enterprise integration

Machine Builder Performance
Optimize the Effectiveness of Machine Building

Stratix 5410
Distribution Switch

Stratix 5950
Firewall
ASA 300 based
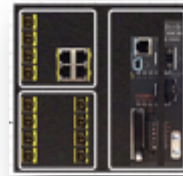
Coming soon

Stratix 5900
Firewall

Stratix 5400
Layer 2, Layer 3

Stratix 5100
Wireless

Stratix 5700
Layer 2

Stratix 2000
Unmanaged

ArmorStratix 5700

Stratix 8000/8300
Layer 2, Layer 3

ETAPs and Embedded 2-port

Secured IT-OT CONVERGENCE

Transactional information: orders, supply network, product design ...

ERP   FINANCIALS   HR   LOGISTICS   QUALITY   WAREHOUSE

IT

COMMON SECURE

NETWORK INFRASTRUCTURE

CISCO

Rockwell Automation

OT

Real-time data: alarms, events, states, energy, diagnostics, ...

INDUSTRIAL "THINGS"   PLCS & SCANNERS   MATERIAL & TRANSPORT   MACHINES & TESTERS   SHOP FLOOR PERSONNEL   PRINTERS & LABEL SERVICES

Collaborating to Meet IoT Challenges

THE CONNECTED ENTERPRISE
INTEGRATED CONTROL AND INFORMATION

Enterprise Optimization	Plant Manager / Production Manager / Quality & Operations	Business Management
Information Aggregation and Analytics	Operator / Maintenance / Engineer	Production Management
Network Infrastructure		Operations
Multi-disciplined Control		Engineering
Intelligent Assets		Maintenance
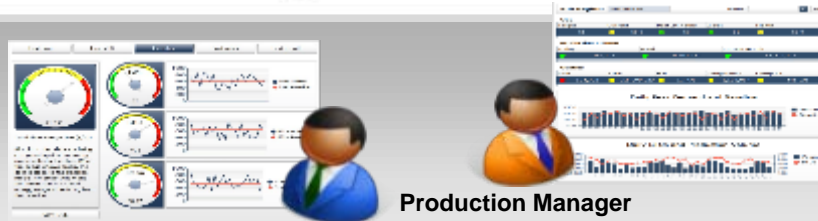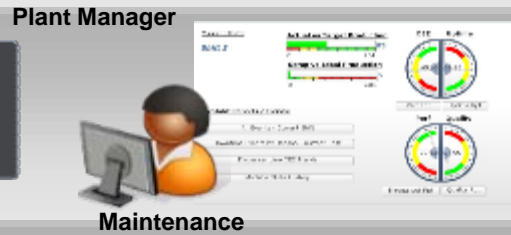
Common secure network infrastructure

Contextualized data

The Connected Enterprise
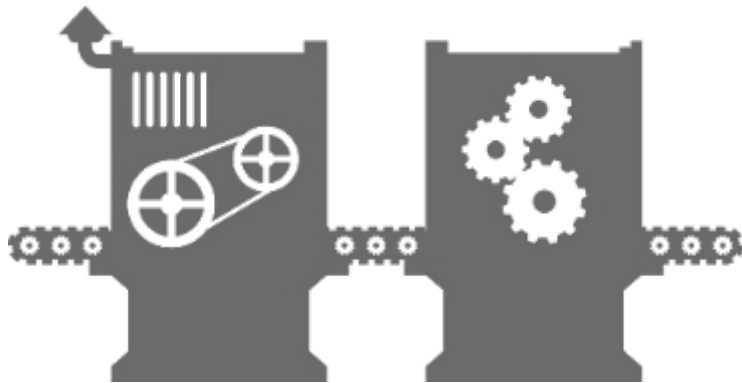# TRENDS & TECHNOLOGIES

The Internet of Things

Production Demand

Convergence

The Enablers

The Connected Enterprise Enablers

INDUSTRIAL
Internet of Things

- Machine to machine coordination – high speed
- Mission critical assets – safety
- Integrated Control and Information

$1T

Productivity investment

- Cloud
- Analytics
- Mobility
- Smart Things
- Security

52% of MANUFACTURERS said they will migrate to hybrid clouds within 2 Years

Cloud traffic will increase **sixfold** *over next 5 yrs*

Source: Cisco

Real-time Visibility to RemoteAssets

Analytics

Alarms **Process History** **Reports**

Windows Azure

Remote Monitoring Services

$20B Cost Of Unscheduled Down Time

8%
Is spent figuring out if there is a real problem

21%
Is spent diagnosing the problem

47%
Is finding the resources to fix the problem

76%
of the time before the fixing even starts

REMOTE MONITORING & DIAGNOSTIC solution that help resolve issues faster, eliminate unneeded maintenance activity, and get you back up and running faster!

90% of World's data created in last 2 years

40% of data will come from sensors by 2020

More new data generated in 2012 than in prior 5000 years

Information Management
and ANALYTICS

4.4M JOBS

Prediction: By 2017, 4.4 million jobs will be created around DATA.

GARTNER

15% of **ENTERPRISES** will adapt their information technology abilities for …

● *Extreme data*   ● *Socially mediated content*   ● *New connected devices*

2 Exabytes
Manufacturing generates more DATA than any other sector.

MCKINSEY & COMPANY

Transform Data into Decision Making

COLLECT   **AGGREGATE**   **VISUALIZE**

Enterprise

Site

Executive

Machine and Line

Production Management

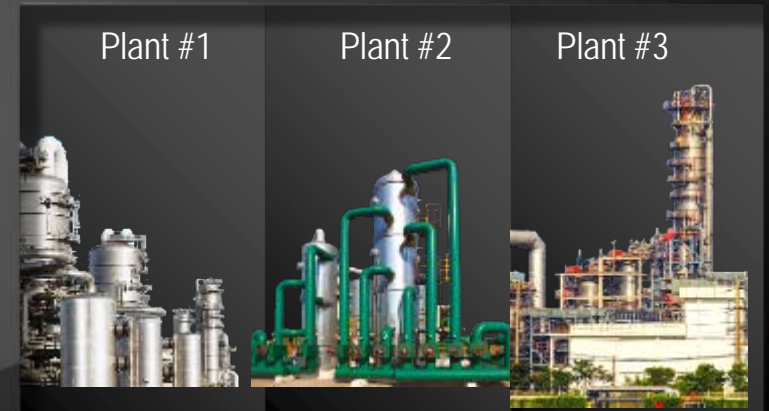Business Data

Plant Floor Operator

Historical Data

Live Data

Plant #1   Plant #2   Plant #3

Mobility is Inevitable

46% OF **BUSINESSES** govern devices on the corporate network

Manufacturing Enterprise Communications Research Services, June 2012

63% of businesses permit employees to **"BRING THEIR OWN DEVICES"**

Source: Manufacturing Enterprise Communications Research Services, June 2012

$60B was spent on Global Cyber Security in 2011

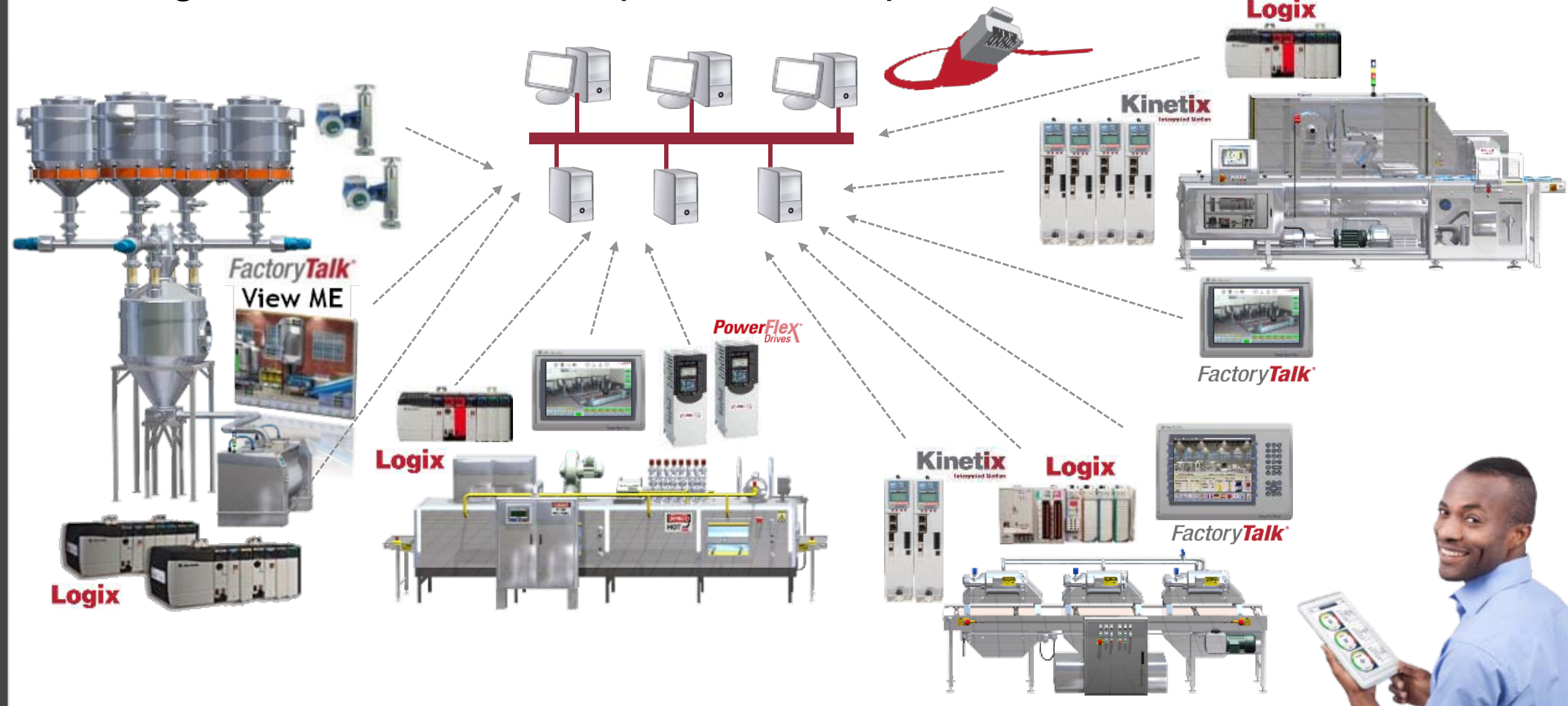Price Waterhouse Coopers LLP, Nov 2011

85B Apps downloaded in 2014

5tb Amount of Manufacturing **data viewed on a mobile** device in the last year.

BY 2016

60% OF **INFORMATION WORKERS** will interact with content applications via a mobile device

Smart Things

Building better Machines for production Optimization

Converge to a Common **Security Model**
... using a Logical Framework for Strong Segmentation