



# *Intelligent Networked Manufacturing*

**Aug 2006**  
**Nara Plitponkarnpim**  
**Channel Systems Engineer**



# Manufacturing Network Architecture

# Network Intelligence Demand: Advanced Application on the Factory Floor

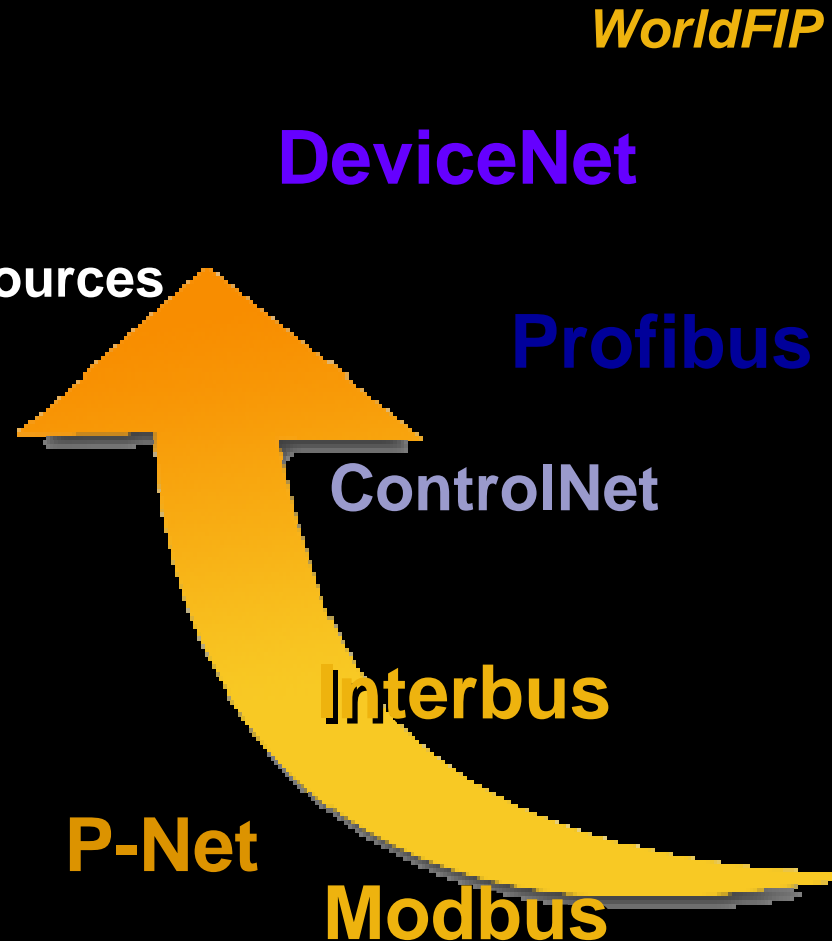
## Network Intelligence on the Factory Floor?



- More intelligent and different types of access devices
- New, advanced applications with less predictable traffic patterns
- Factory floor computing power increasing
- More real-time decision making on the factory floor
- More network connectivity

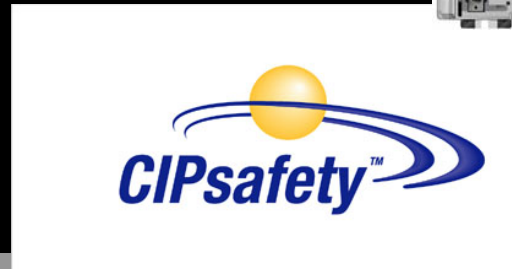
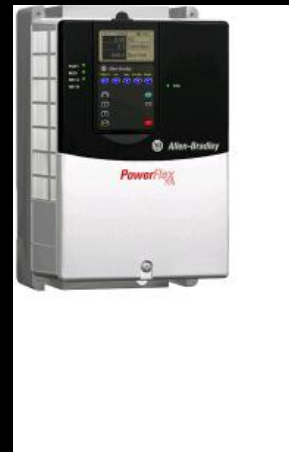
# Network Intelligence Demand: Lack of Commonality Drives up Costs

- Over 20 different implementations
- No economies of scale
- Duplication of training and support resources
- Multiple cabling infrastructure
- Lack real of time communication
- Limited internetworking capabilities

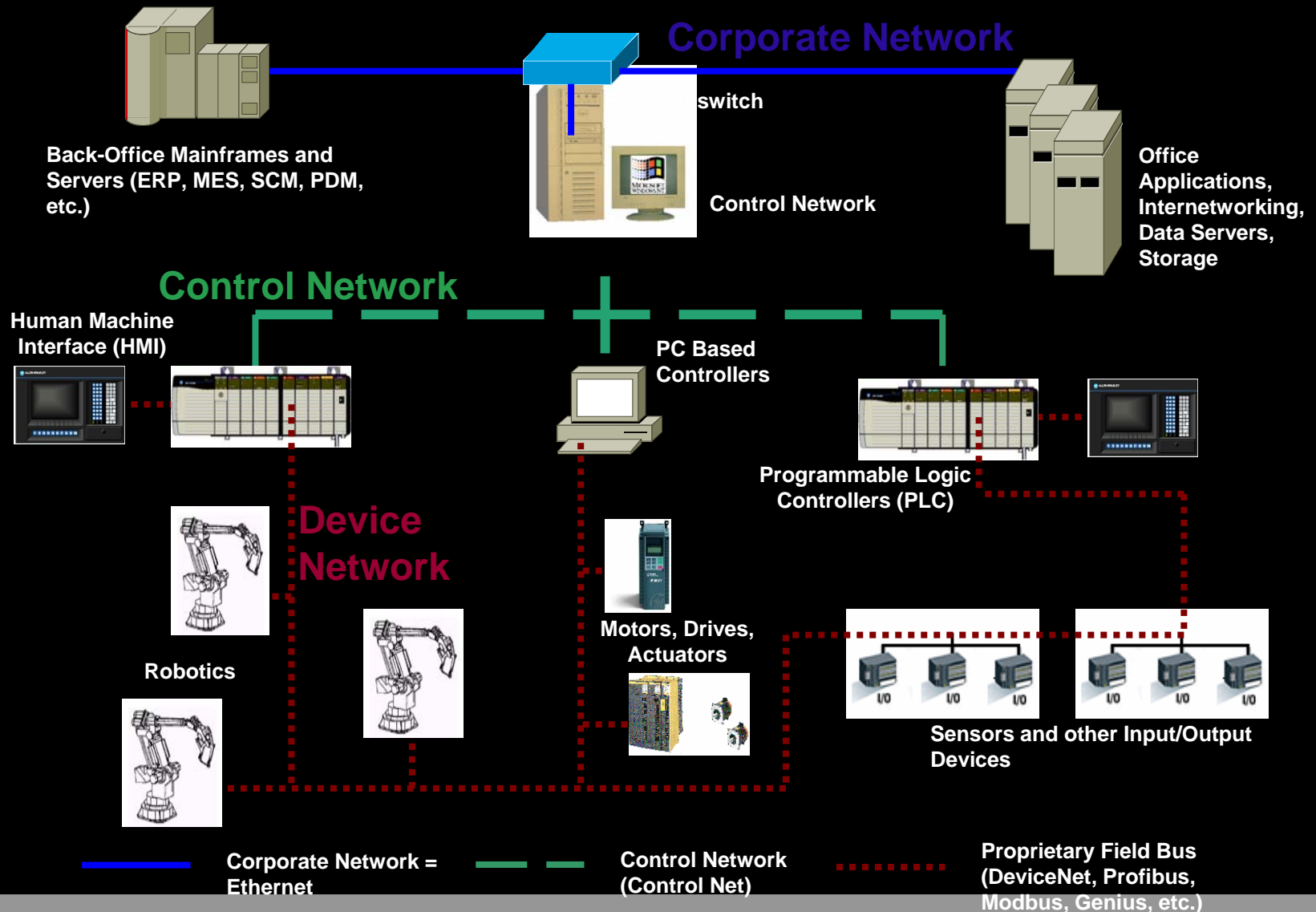


# Network Intelligence Demand: EtherNet/IP Road Map

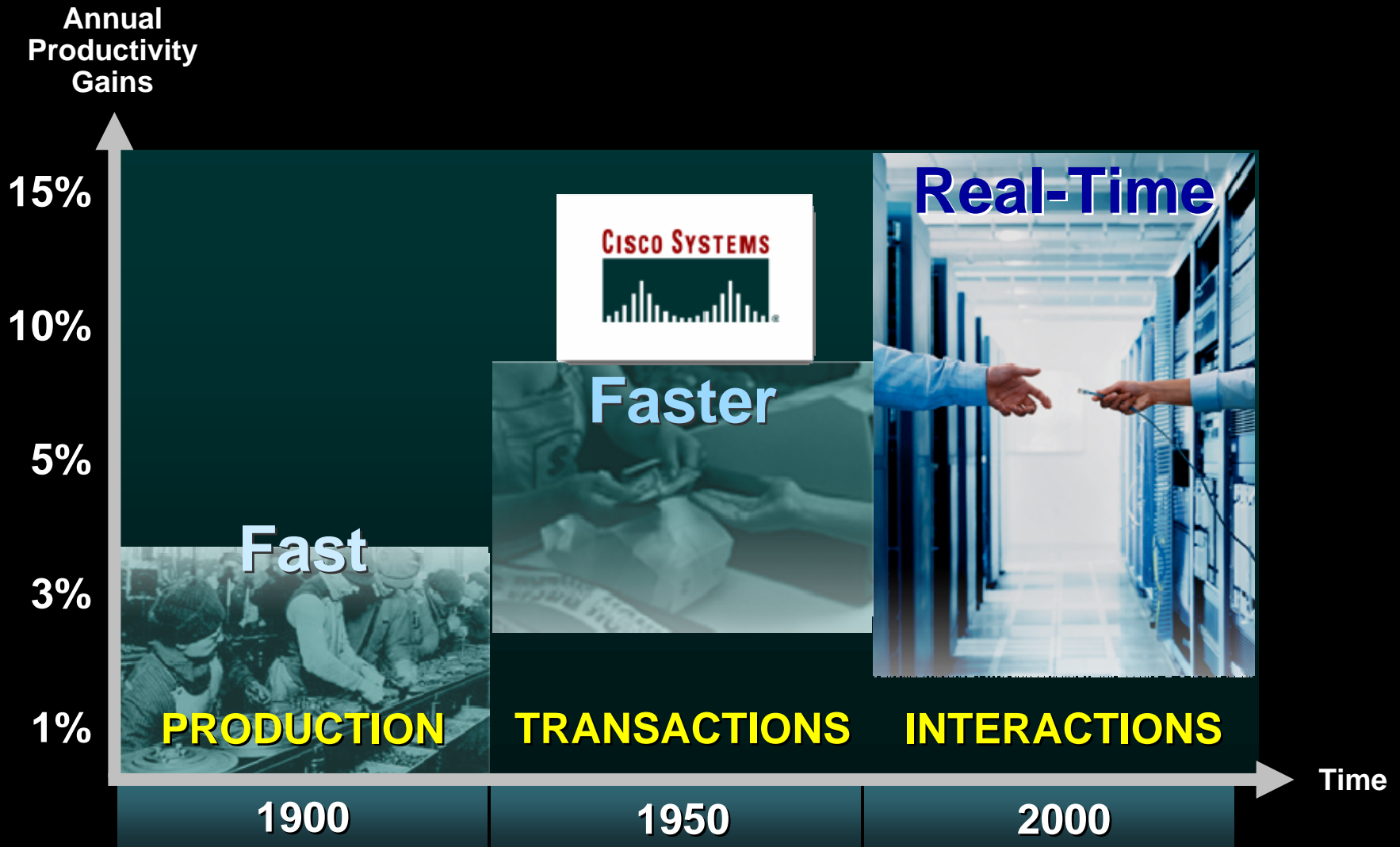
- HMI on EtherNet/IP
- PLCs on EtherNet/IP
- I/O on EtherNet/IP
- Drives on EtherNet/IP
- Safety on EtherNet/IP
- Synchronised EtherNet/IP
- Motion on EtherNet/IP



# Traditional Manufacturing Reality : Three Networks



# Source of Next Generation Productivity



# “The good things” with Ethernet

- *Simplicity & Flexibility*

Ethernet is open and non-proprietary

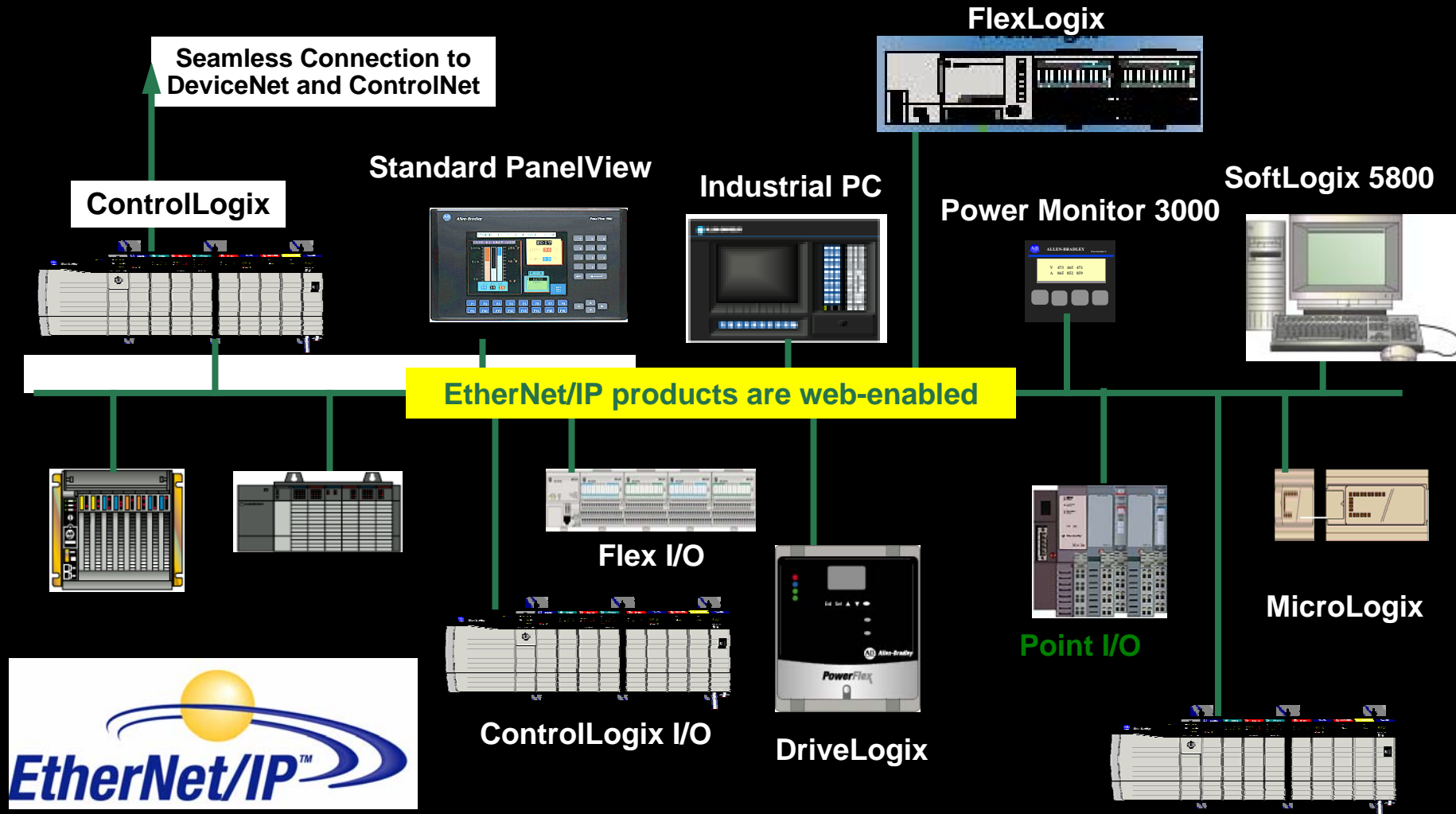
- *Low Cost*

Ethernet components are cost effective (commodity items).  
Total Cost of Ownership.

- *High Performance & Efficiency*

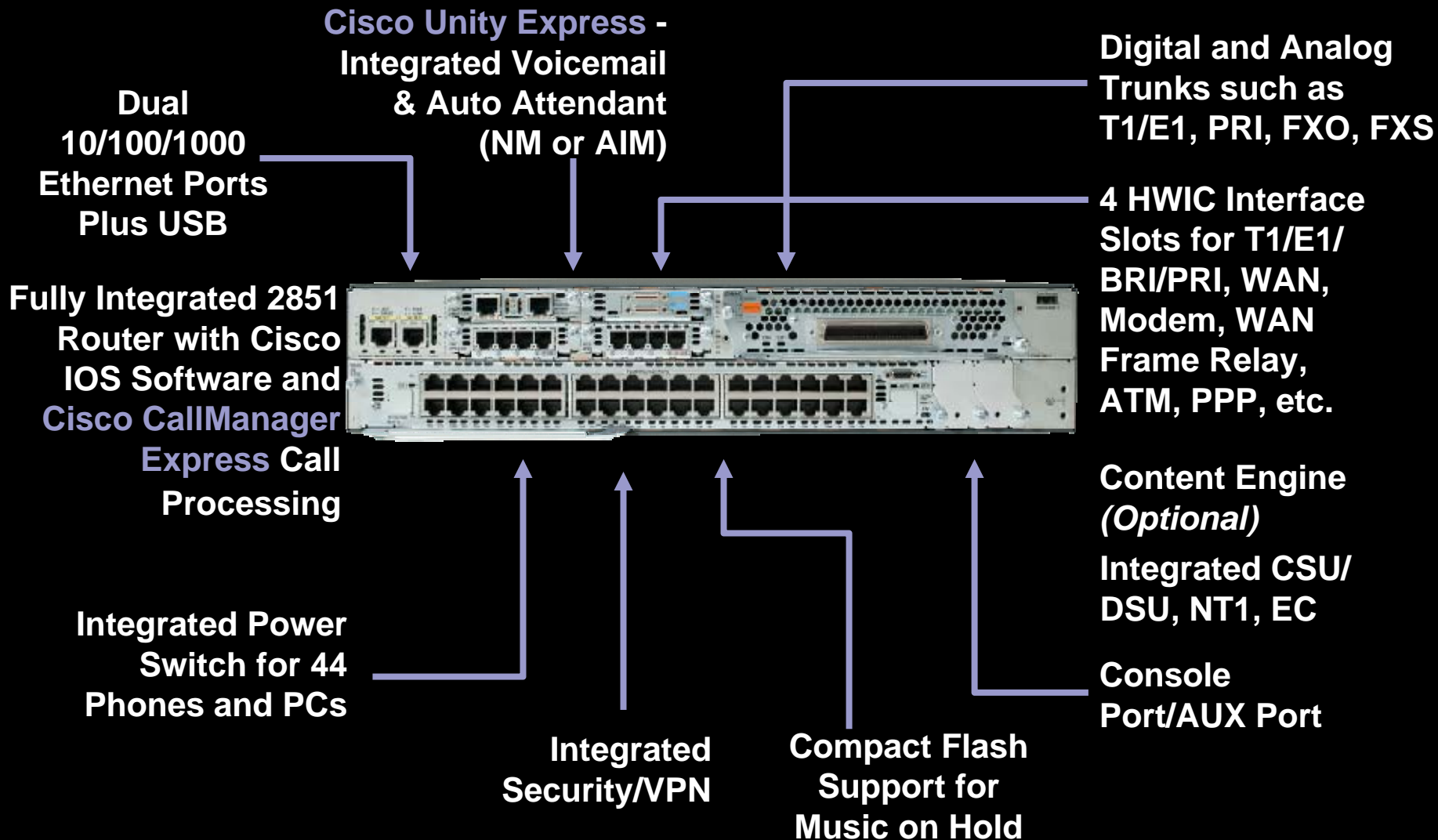
You have the ability to run one cable (fiber optic) around the plant picking up everything.  
More bandwidth & More management options.

# Network Intelligence Demand: EtherNet/IP Automation Product Portfolio



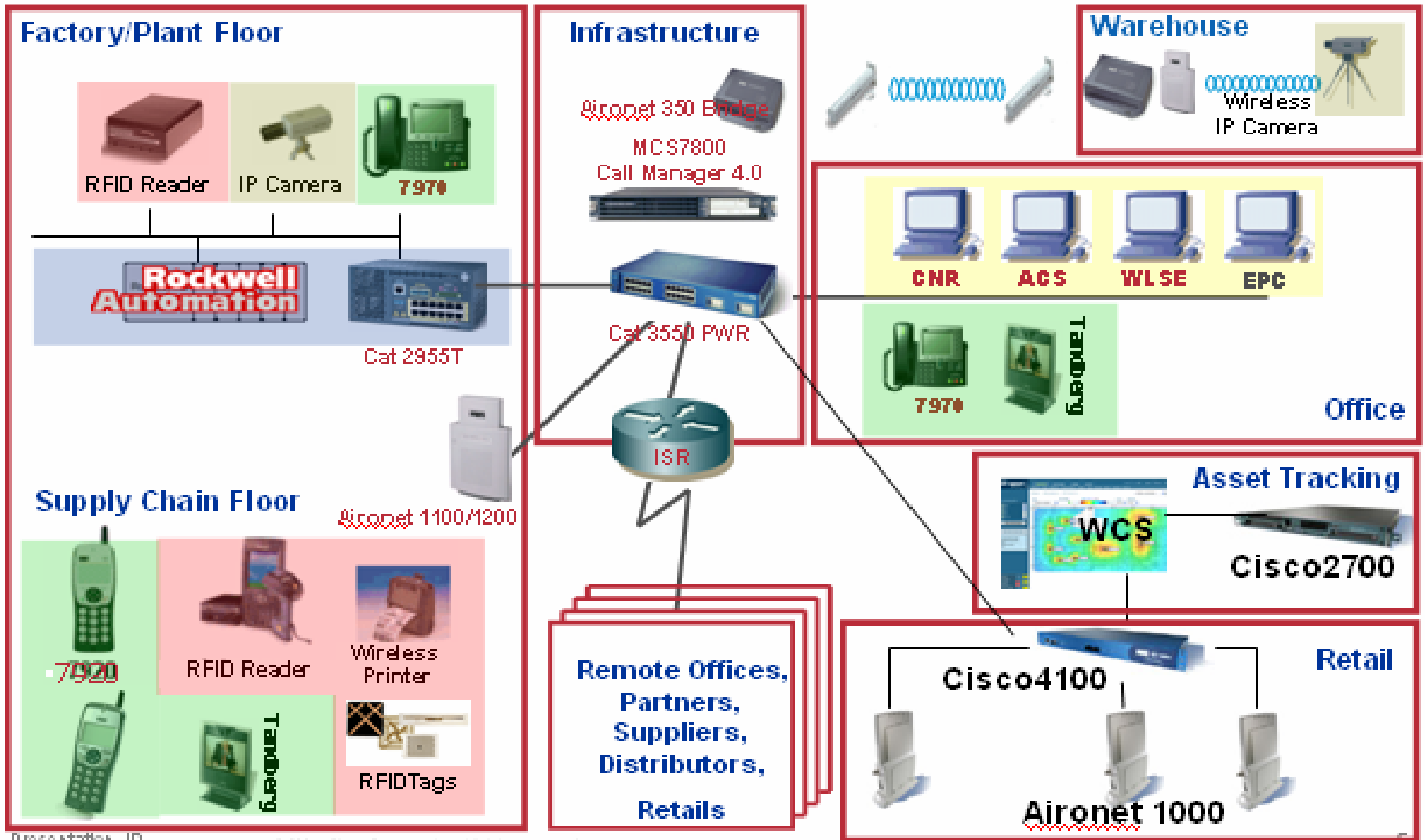
Green type indicates planned future products.

# Complete Integration: Routing, Switching, Voice (Call Processing and Gateway), Security, Content



# Manufacturing/RFID/Retail

## APAC Channel Tech Ops Solutions Demo Physical Topology



Presentation\_ID

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# Intelligent Networked Manufacturing

## Example –Supply Chain



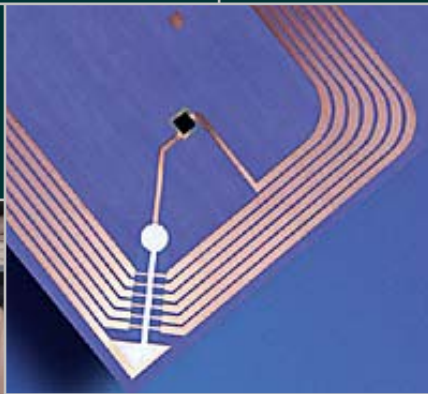
# RFID



# What is RFID?



**RFID uses Radio Frequency for the purpose of uniquely identifying and tracking an item to create business value**



**Typically, a reader communicates with a tag, which holds digital information in a microchip.**

**RFID has been used for several decades, and in many applications**



# RFID Vs. Barcodes

## RFID

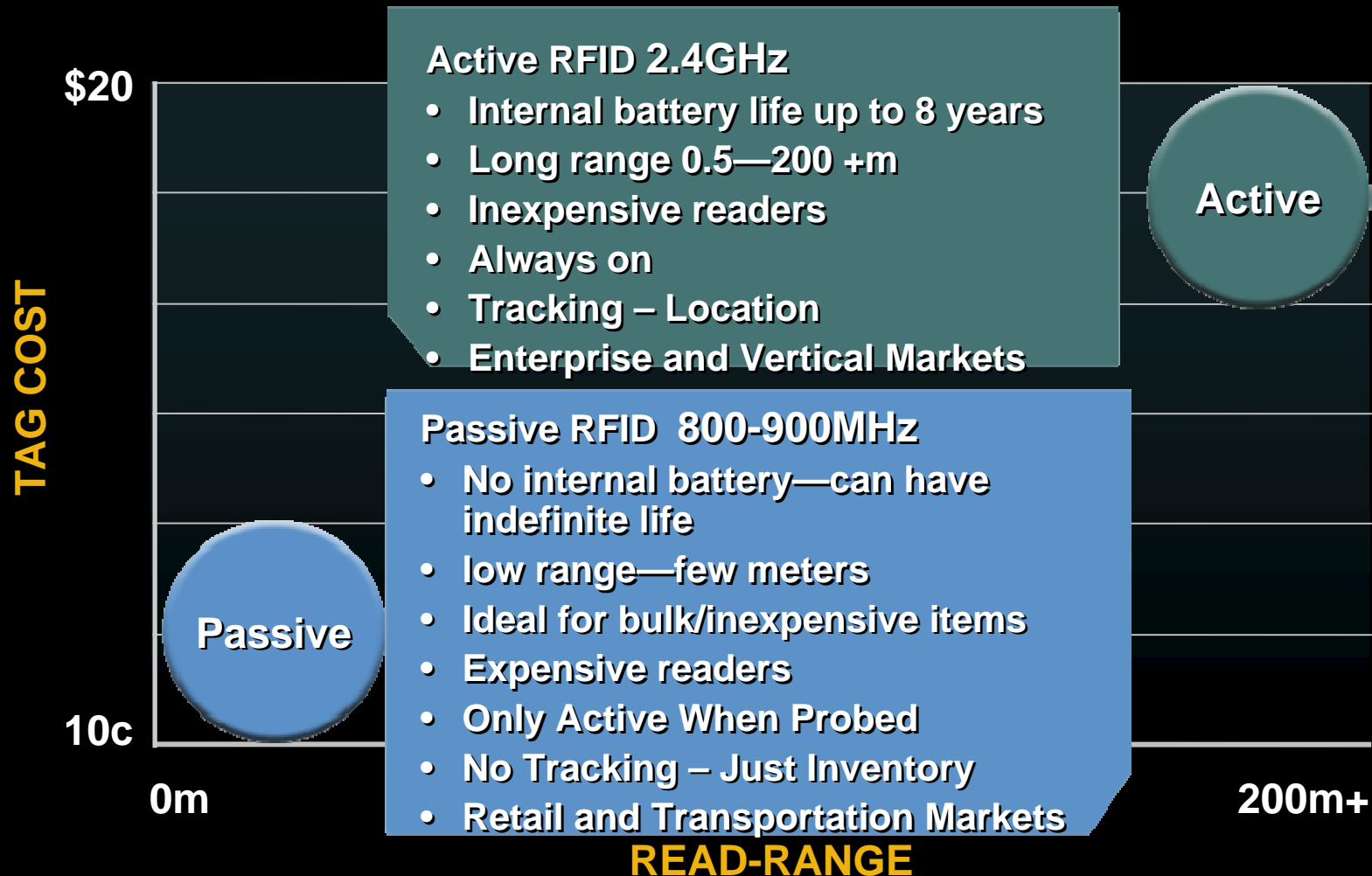
- Long range
- Emerging technology requiring investment
- High data storage capacity
- Reading can be done in concealed fashion
- Can capture changing info (ex. Temp)

## BAR CODES

- Short range/requires line of site
- Deployed everywhere/Work across different readers
- Static data
- Human readable
- Effected by environmental conditions (ex. Rain)



# There Are Many Types of Tags and Prices





# Manufacturing Challenges & Solution

## *Examples*

# What's the Challenge?

## Cisco Manufacturing

- **196** Major Product Models
- **4** Primary Contract Manufacturing Partners
- **2** Original Design Manufacturing (ODM) Partners
- **11** Manufacturing Sites
- **22,300** SKU's: (9,200 Hardware, 13,100 Software)
- **370** Active Suppliers (>1000 legacy)
- **90%** spend with ~90 suppliers
- **50,000** Active Part Numbers

**Outsource** (need help here)



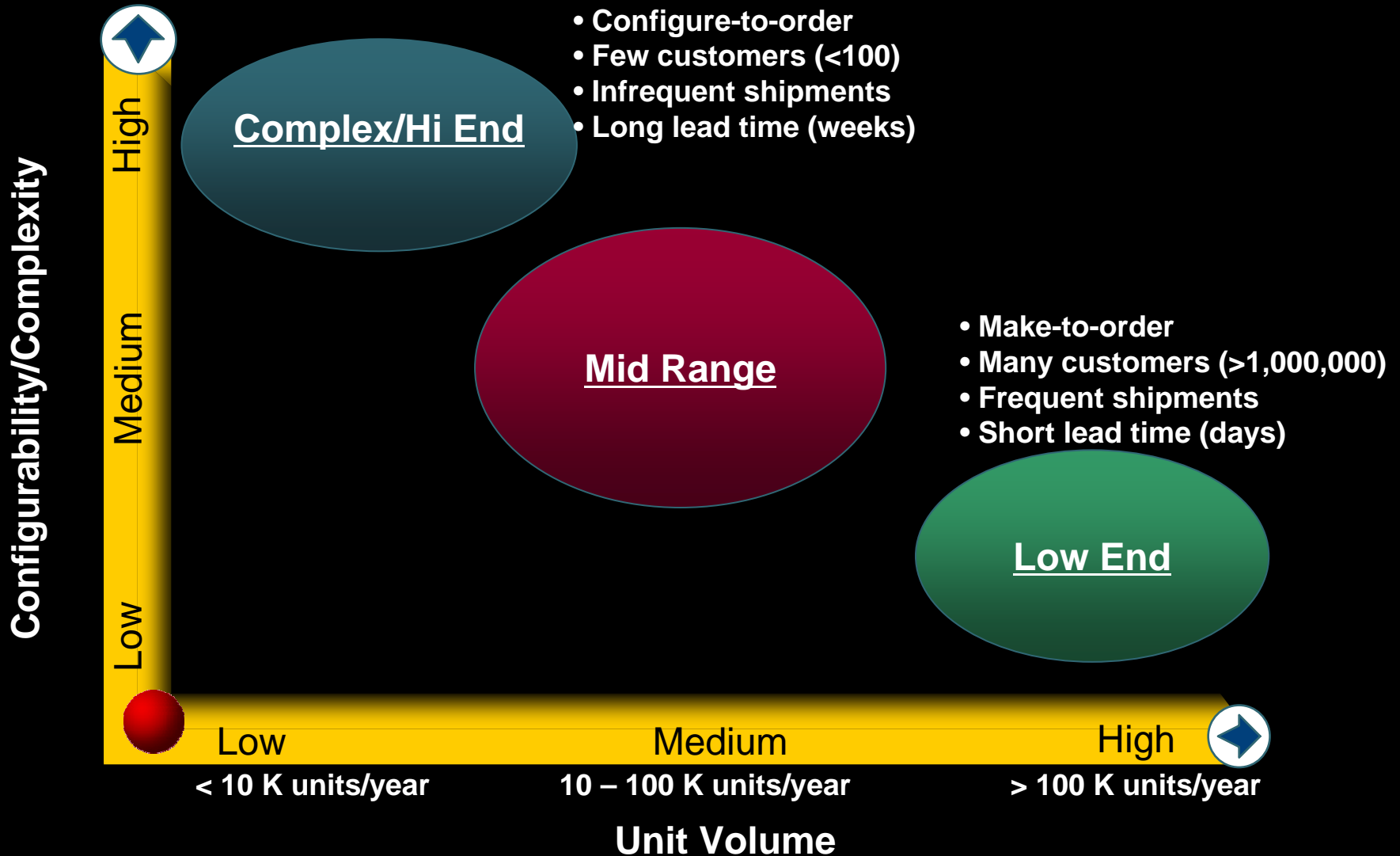
# What's the Challenge?



**12 TOTAL SITES**

**4 PARTNERS**

# What's the Challenge?



# How We Are Addressing The Challenge – Forecasting Process

## Problem:

- Need to move a **sales plan** (expressed in dollars) **to units** and sub assemblies.

## Solution:

- **Highly Collaborative Process** within Cisco & Between Cisco & Partners.
- “Forward Position” **Inventory** (identify needs in front of 16-20 week component lead times).
- Forecast derived in **i2/Oracle**, driven to partner (primarily **SAP**) ERP tools for component level forecasting/purchase execution.



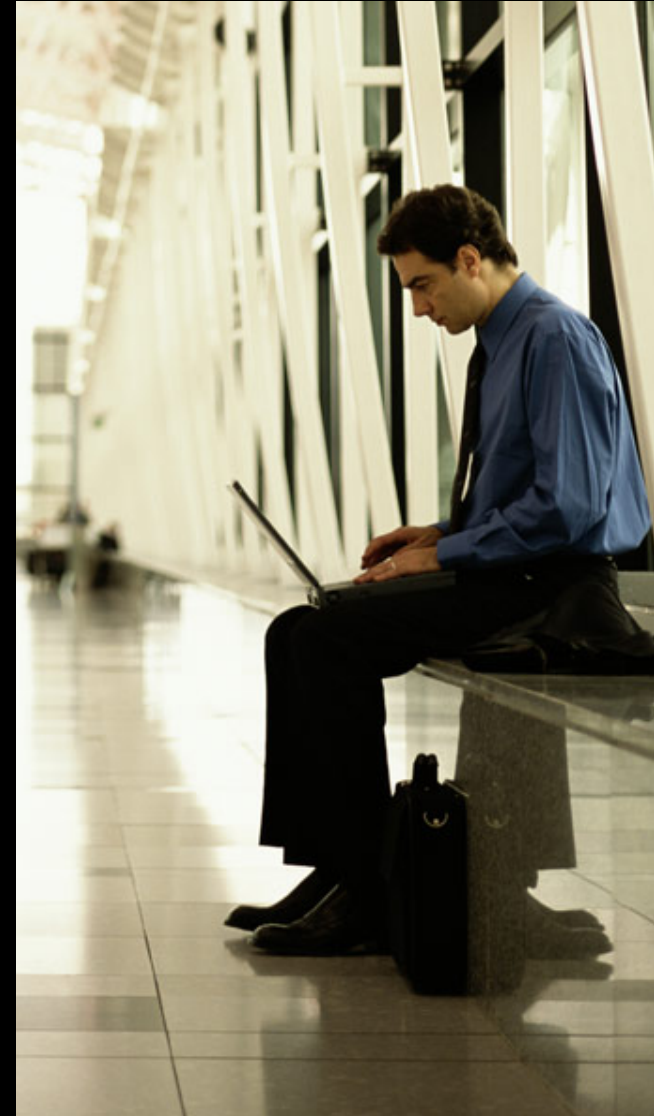
# How We Are Addressing The Challenge – Supply Chain Visibility

## Problem:

- Need to understand **material availability** to reconcile shortages and to **reserve materials** for customer orders.
- Material execution on partner system/order management on Cisco system.

## Solution:

- **Material planning** done in partner ERP tool. Material shortage reconciliation/escalation process done collaboratively between partner and Cisco Manufacturing.
- “Order book” loaded into partner ERP tools, **material reservations** made there.
- “eHub” used in place to help **reconcile** moving parts.



# How We Are Addressing The Challenge – Test & Configuration Management

## Problem:

- Need to insure product meets Cisco **quality requirements**.
- Need to insure product is configured to **customer requirements**.

## Solution:

- **“Autotest” network** implemented at all partner execution sites.
- Central database of all test processes – **insures updates** are managed across complex manufacturing network.
- Connects to Oracle order management system to **verify product configuration**/other important attributes are complete.



# How Do you Apply This to Other Manufacturing Organizations?

- **Real Time** Interactions
- Understand **Supply/Demand**
- Know the **Inventory & Regionalization** Requirements
- **Order Fulfillment** – once order is taken, how executed?
- Value the **massive data flow** required





# Manufacturing Application Partners

## *Examples*

# Focused sub-solutions with Application Eco-Partners



## Demand Driven Supply Chain

Data capturing through  
Intermec passive RFID & Barcode



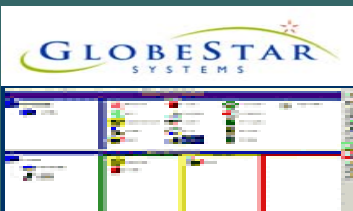
## Ethernet to the Factory

IP Surveillance through POE & Traffic  
Control with AXIS IP Camera



## Ethernet to the Factory

Asset Control through  
AeroScout active RFID tag & Mobile View



## Ethernet to the Factory

Converged connection  
with GlobeStar Alarm Event Management

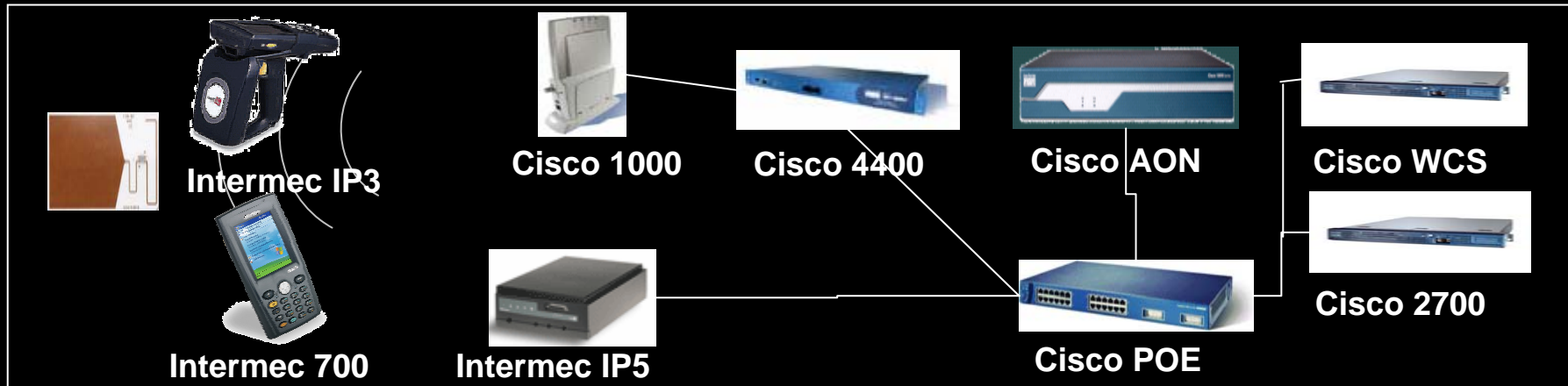
# Application Partner Intermec



## Applied Solution

Demand Driven Supply Chain Solution

## Solution Architecture



## Products from Cisco

Catalyst 2960/3560/3750, CE 500, ISR/AON, Aironet, WLSE Express, WCS, CNR, Cisco 4400, Cisco 2700, ASA, CSA, ACS etc.

## Products from Intermec

Intermec 700 series, Barcode tags, Wireless Printers, IP3 RFID mobile reader, IP5 RFID fixed reader, RFID tags etc.

## Training for Partners

X days sales training & X days Intermec handhelds hands-on training worth for \$XXXX

## Condition for Partnership

Partners need to purchase Intermec demo kit ( US\$ xxx ), if applicable

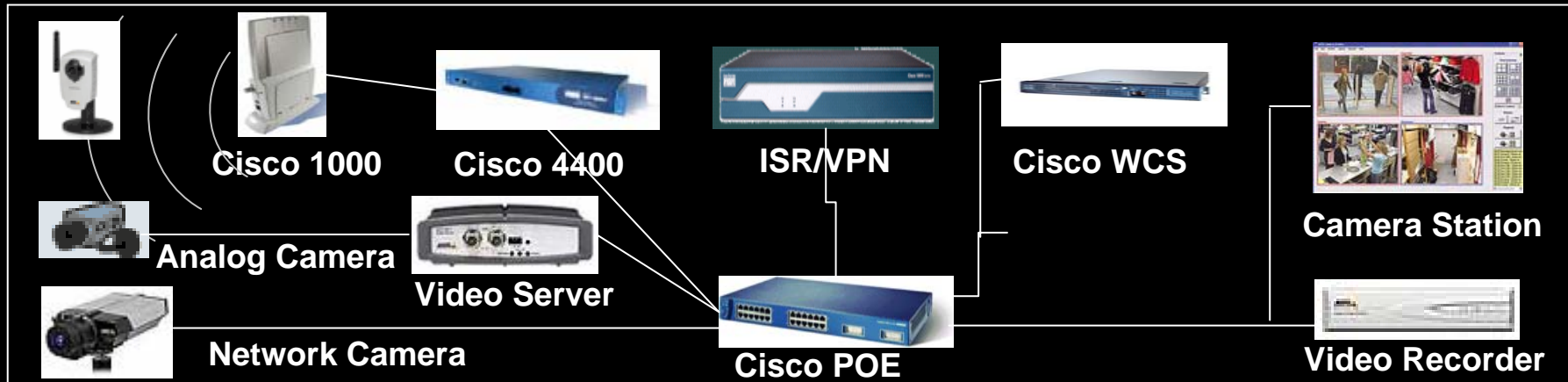
# Application Partner AXIS



## Applied Solution

Ethernet to the Factory Solution

## Solution Architecture



## Products from Cisco

Catalyst 2960/3560/3750, CE 500, ISR/VPN, Aironet, Cisco 4400, WCS, CNR, ASA, CSA etc.

## Products from AXIS

ASIX Network Camera, Video Server, Video Recorder, Management Station etc.

## Training for Partners

X days sales training & X days AXIS hands-on training worth for \$XXXX

## Condition for Partnership

Partners need to purchase AXIS demo kit ( US\$ xxx ), if applicable

# Application Partner

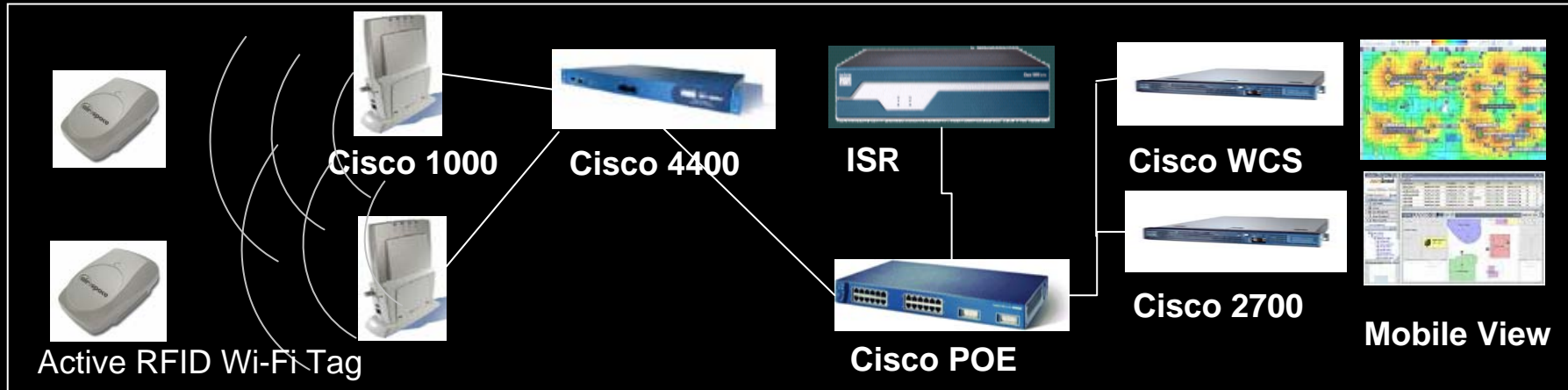
## Aeroscout



### Applied Solution

Ethernet to the Factory Solution

### Solution Architecture



### Products from Cisco

Catalyst 2960/3560/3750, CE 500, ISR/AON, Aironet, WLSE Express, WCS, CNR, Cisco 4400, Cisco 2700, ASA, CSA, ACS etc.

### Products from Aeroscout

Aeroscout Active RFID Wi-Fi Tag, Enterprise Visibility Software

### Training

X days sales training & X days Aeroscout hands-on training worth for \$XXXX

### Condition for Partnership

Partners need to purchase Aeroscout demo kit ( US\$ xxx ) , if applicable

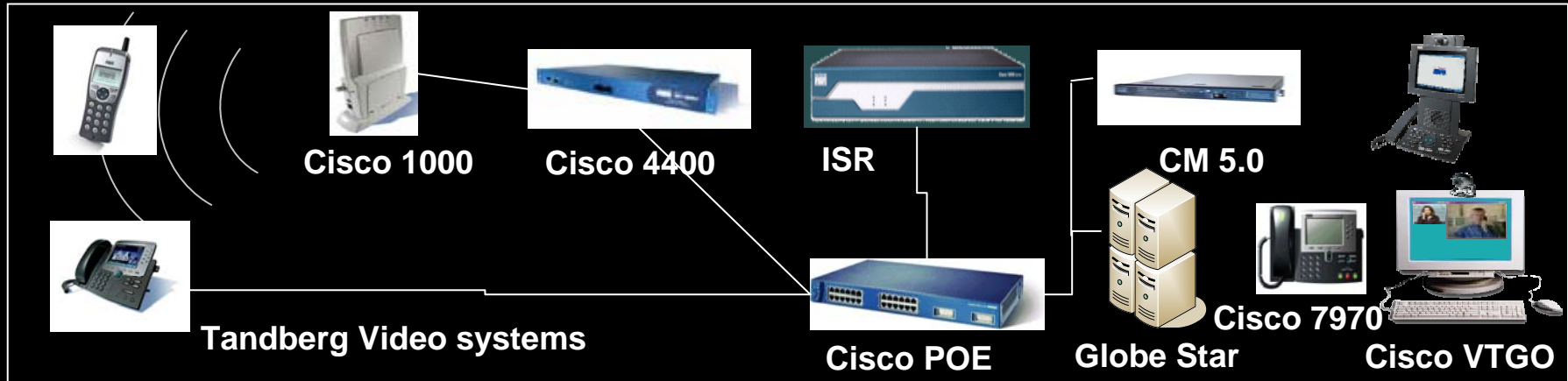
# Application Partner

## GlobeStar

### Applied Solution

Collaborative Product Development Solution

### Solution Architecture



### Products from Cisco

Catalyst 2960/3560/3750, CE 500, ISR/VPN, Aironet, WCS, ACS, CNR, CM 5.0, IPphone, VTGO, CSA, ASA etc.

### Products from GlobeStar

Connexall – Asset Management System

### Training

X days sales training & X days GlobeStar hands-on training worth for \$XXXX

### Condition for Partnership

Partners need to purchase Globe demo kit ( US\$ xxx ), if applicable

# Intelligent Networked Manufacturing Self Defending Network

## Threat Defense

### Defend the Edge:



- **Integrated Network FW+IDS**  
*Detects and Prevents External Attacks*

### Protect the Interior:



- **Catalyst Integrated Security**  
*Protects Against Internal Attacks*

### Guard the Endpoints:



- **Cisco Security Agent (CSA)**  
*Protects Hosts Against Infection*

## Trust & Identity



### Verify the User and Device:

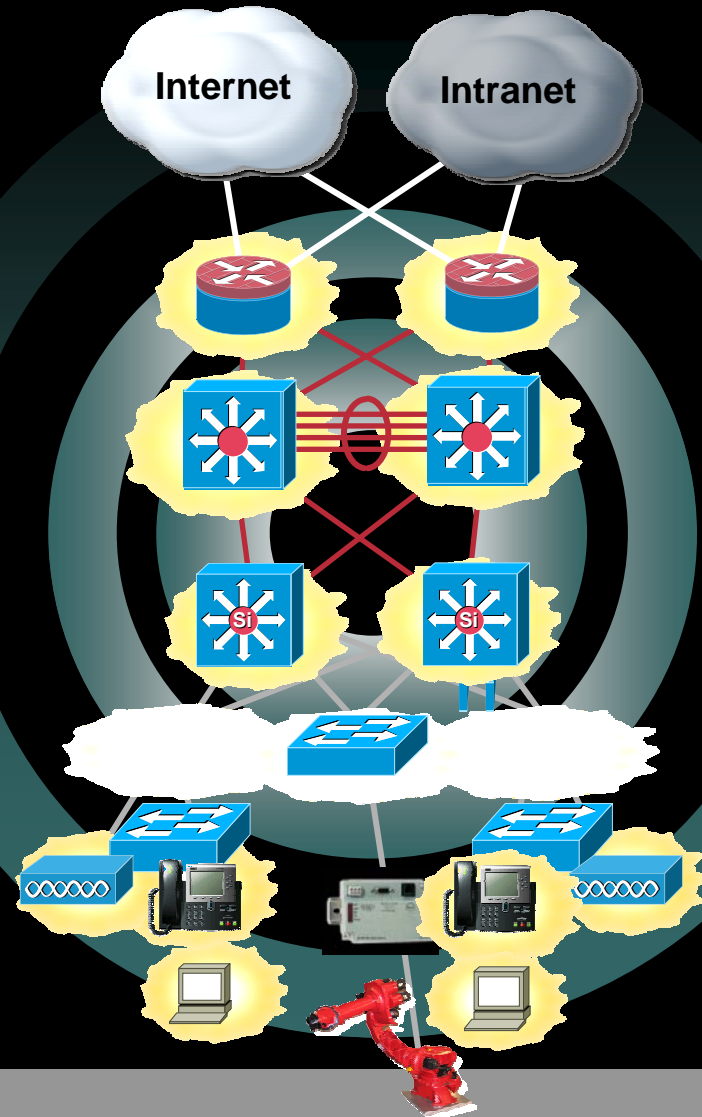
- **Identity Based Networking**  
*Control Who/What Has Access*

## Secure Comm.

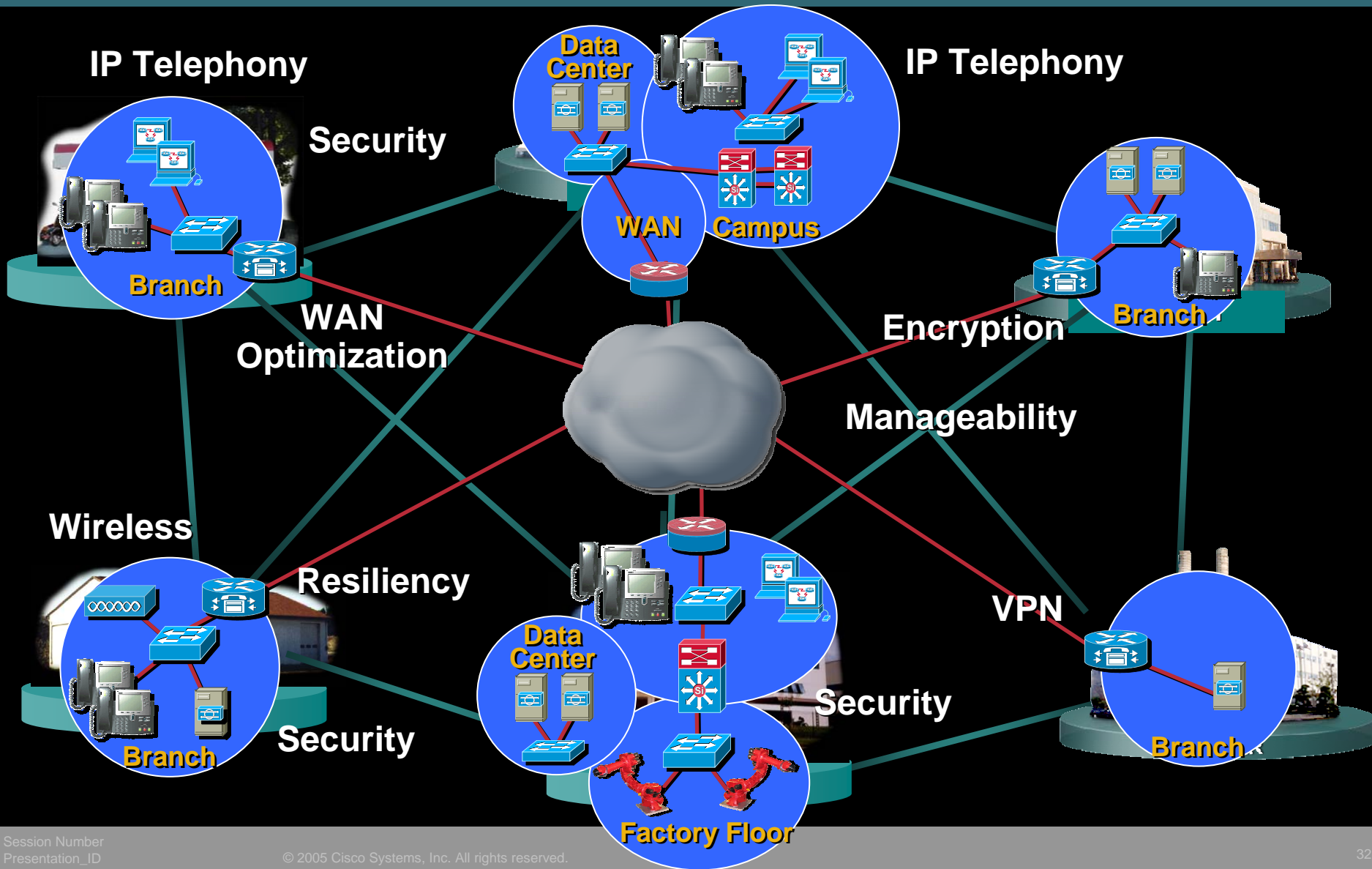


### Secure the Transport:

- **IPSec VPN**  
*Protects Data/Voice Confidentiality*



# Intelligent Networked Manufacturing Tech. architecture





# Business Drivers for WLAN Manufacturing

# Today's Challenges facing Manufacturers



## Economic slowdown

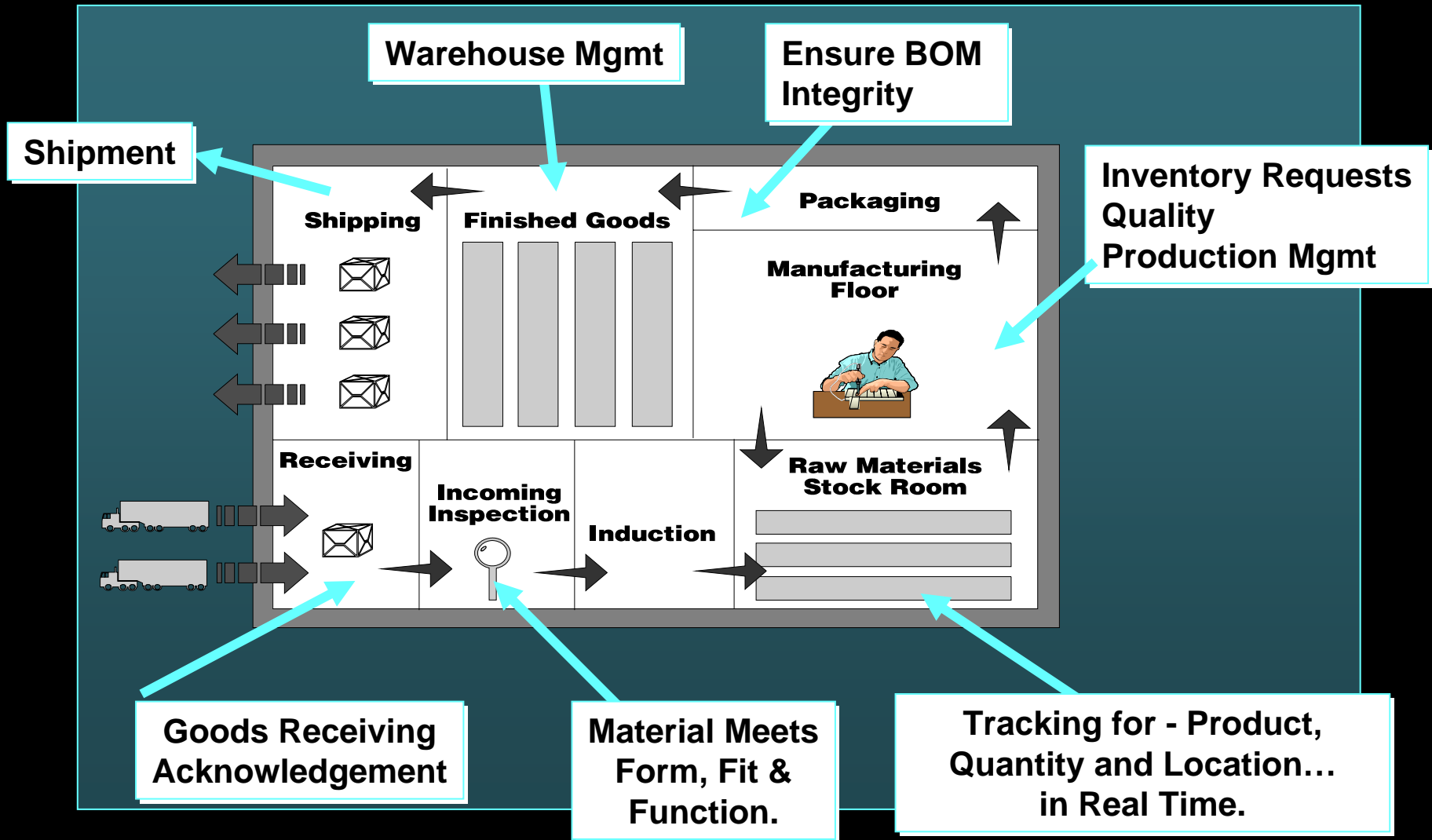
- Cost cutting measures
- Need greater responsiveness to customer/ market demand to drive competitive advantage

## Managing an extended supply chain

- Increased supplier collaboration
- Real-time updates to production plans
- Optimisation and decision support

*Leading Manufacturers  
Strive For **Compliance** with  
**Zero Defects, Quick  
Response, Elimination of  
Waste & Mass  
Customisation***

# Where does WLAN fit in?



# WLAN Applications in Manufacturing

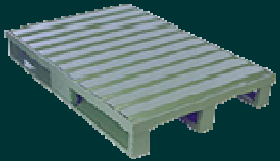
## Top 3

- **Inventory Management**
- **Production Management**
- **Asset Maintenance**



# Intelligence at the Edge Is Critical

## PALLETS/CASES/ITEMS



Pallet



Case



Item

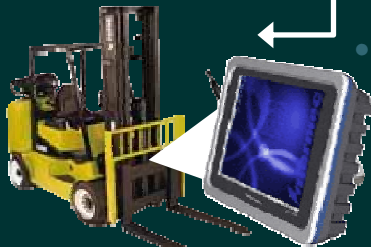
## READERS



Wireless



Fixed



Vehicle-mounted

- Read EPC
- Eliminate duplication/false reads

## NETWORK ACCESS POINTS



- Authentication
- Management
- Security
- Eliminate reader duplication

## B2B GATEWAY

- Packetize EPC data and
- Aggregate data
- Multicast packet

# Location Tracking Over Time

**Cisco Systems WCS**

MONITOR CONFIGURE ADMIN LOCATE

Network Maps Controllers Access Points Clients Tags Security Alarms Events Reports

Logged in

Maps > SJC14 > 3rd Floor

View: -- Select an option -- View Filters: RSSI Color Lookup: -35 dBm to -85 dBm Zoom: 75 % Refresh: 5 min

Contributing APs:

- Conf Room A
- ap:1a:f2:d0
- NorthEast
- Conf Room B

Refresh Heatmap

Working pending refresh...  
Loading AP information... Done.  
Loading heatmaps... Done.  
Loading RogueClients... Loaded 2 out of 2 RogueClients Done.

Rogues	0	94
Coverage	0	0
Security	0	0
Controllers	0	0
Access Points	0	1
Location Servers	0	

Map Labels: dt-athomson, dt-athomson, dt-athomson, dt-athomson, ap:1a:f2:d0, Conf Room B, Lobby, NorthEast, Conf Room A, Breakroom

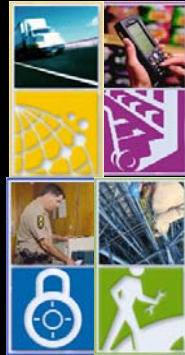
CISCO SYSTEMS BUILDING 14, 3RD FLOOR (SJC3-CISCO-WM1) Monitored: 02/14/14

# Markets and Applications

## Industrial Products



## Government Healthcare



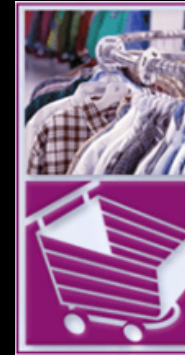
## Logistics/Trans.



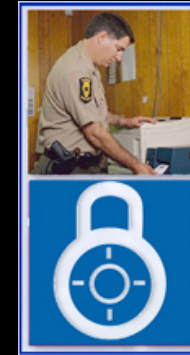
## Consumer Products



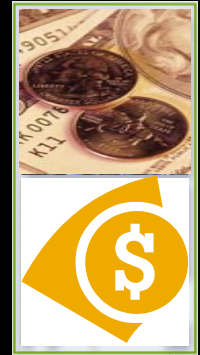
## Retail



## Homeland Security



## Financial



### Supply Chain

Track Product and Containers Through Supply Chain (Palettes, Cases, Individual Items)

### Asset Tracking

Efficiently Use Expensive Assets (Tractors, Medical and Manufacturing Equipment)

### Security & Regulatory

Identify People, Vehicles, and Other Items to Insure Regulatory and Security Compliance

# CISCO SYSTEMS

