Secure Architecture For Energy

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Agenda

- Introduction
- Safe Architecture For Energy (SAFE)
- Upstream Application of SAFE
- Downstream Application of SAFE
- Summary

Current Landscape

- **Volatile Feedstock / Oil prices**
  - Increasing demand for oil (emerging economies in Asia)
  - Volatility in supply
  - Political and social unrest
- **Focus on Productivity Gains**
  - Breakthrough Technology required to Streamline Business
  - New realm of Productivity
- **Critical Focus on Plant & Operations Safety**
- **Increasing Demand for Petrochemical Products**
  - Ethylene and Naphtha Demand Increasing
- **Increasing Competition**
  - Rapid Asia Petrochemical Market Expansion
  - Cost Reduction & Efficiency required to keep operations competitive
- **Industry consolidation**
  - Merger & Acquisition
  - Information sharing
- **Increasing focus on Corporate Environmental & Social Responsibility**

Current Industry Drivers

Today's Demands

- Capital Intensive
- Energy Intensive
- Reactive maintenance & hazardous events
- Challenging HSE compliance
- Explosion risk environment (Zone1/Zone2)
- Restrictive site wireless mobility
- Isolated process control environment
- Isolated real time data
- Intensive maintenance / Plant shutdowns

Revolutionizing the Plant Experience

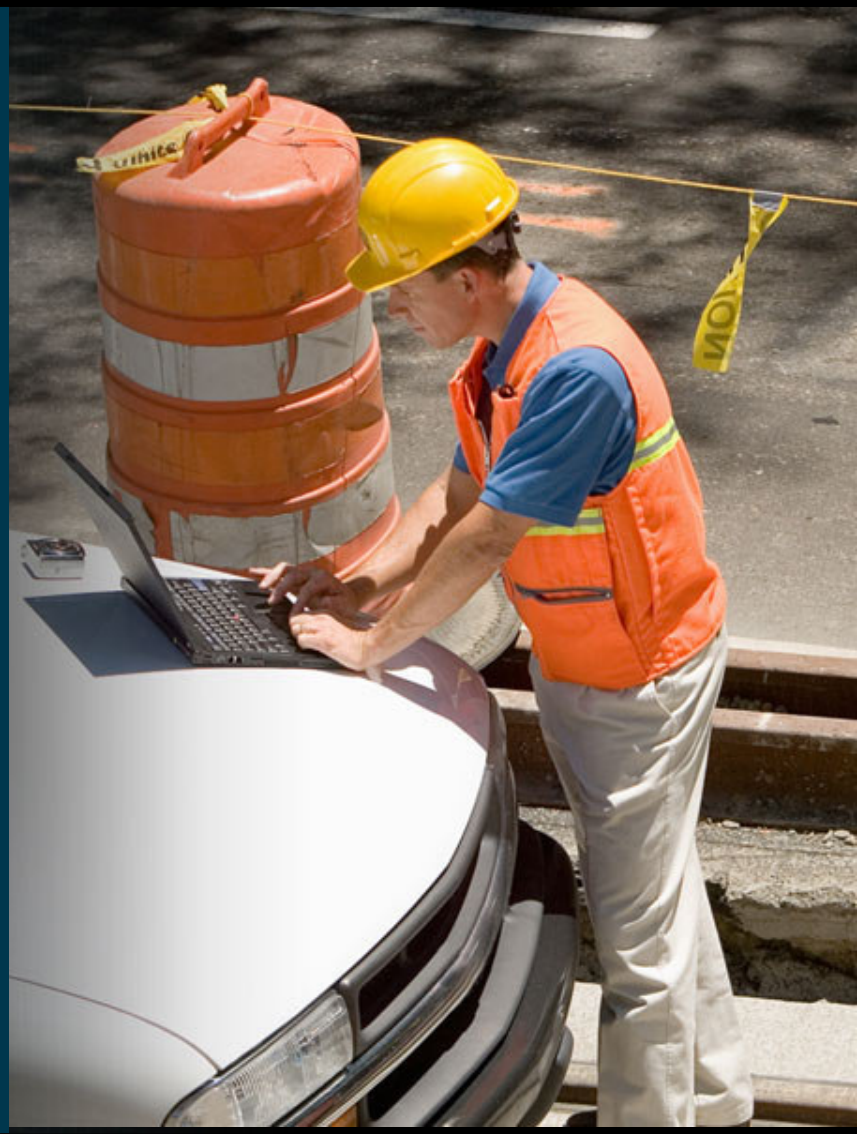
Today's Operating Environment

- Isolation at "point of activity" (POA)
- No real time access & collaboration with remote experts at POA
- Limited access to information at POA
- Critical information concentrated at Plant Control House
- Limited Collaboration Capabilities
- Highly wired environment
- Limited / No wireless capability

Revolutionizing the Plant Experience

Future Operating Environment

- Operators empowered with Mobility
- “Virtual” Operations
- Integrated Collaboration with PTT/RF & Traditional Voice Telephony solutions.
- Automated business & operations processes
- Empowered POA with real time access to information and solutions
- Wireless sensor, security & surveillance networks
- Connectivity everywhere



Operations Transformation

Oil & Gas Plant Transformation

Traditional Plant

Restricted & Isolated Static Environment

"Solid State"

Real Time

Plant of the future

Dynamic, Integrated Mobile, Real Time Connected Environment

"Liquid State"

Enhanced & Integrated HSE Monitoring & Compliance

Integrated logistics, Maintenance & Operations

Real Time Operations & Automation

Remote & Virtual Operations

Seamless Communications

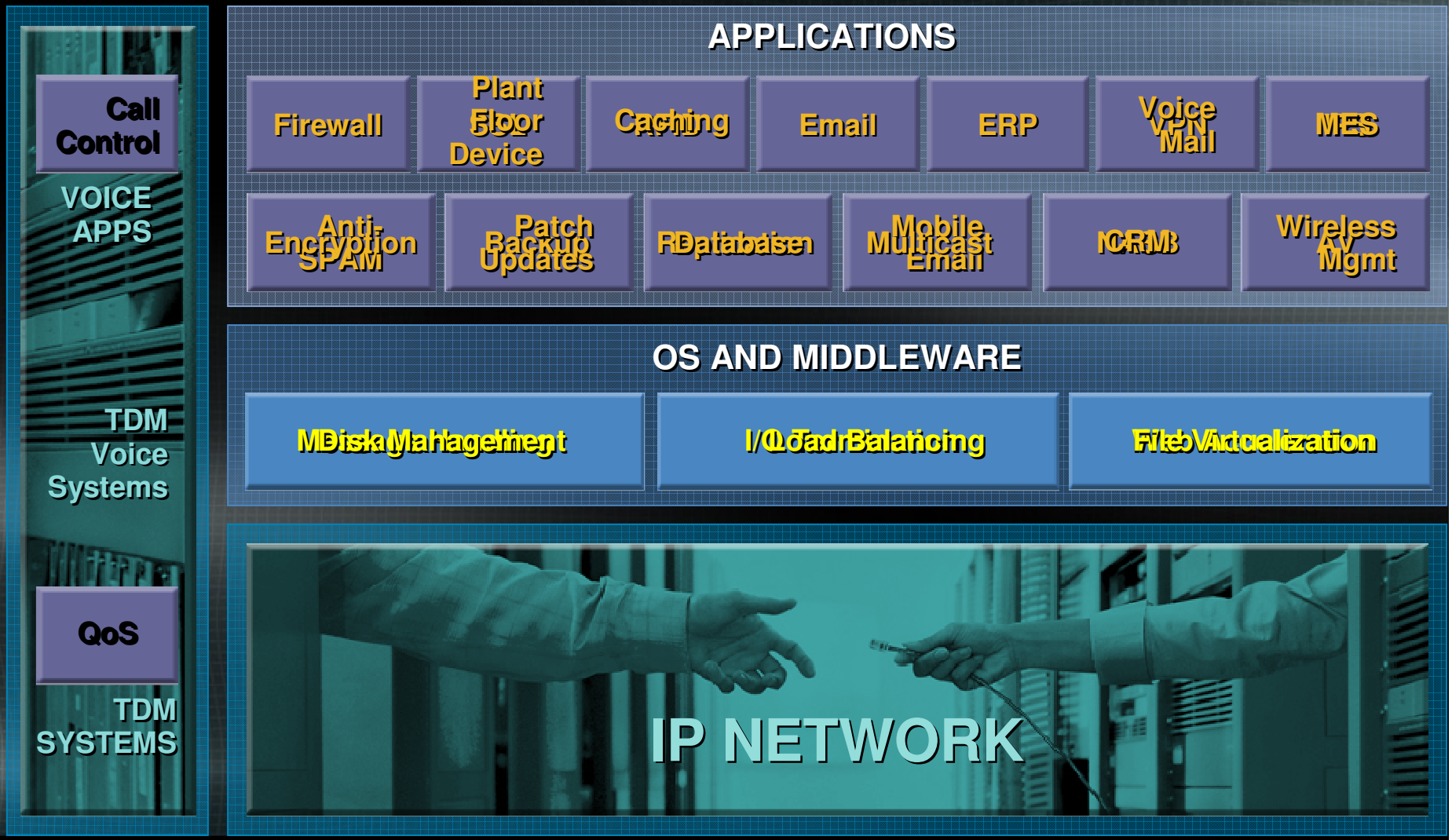
SAFE
(Secure Architecture For Energy)

The Network as a Platform

"SONA is an architectural approach to connect Network Services to Applications to deliver Business Solutions."

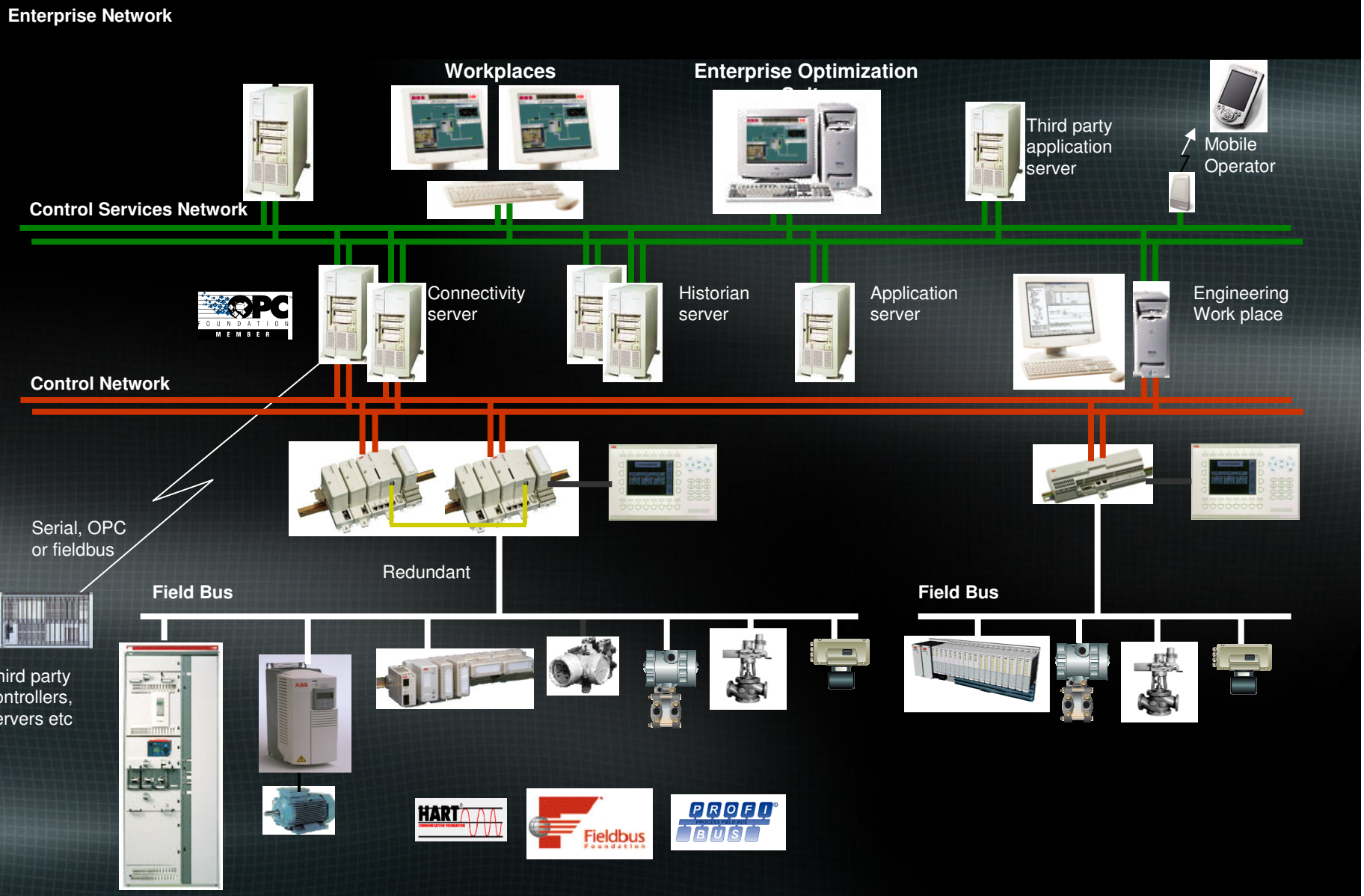
Intelligence Has Migrated into the Network

(Intelligence Leads to Reusability of Network Resources)



A Production Environment Architecture

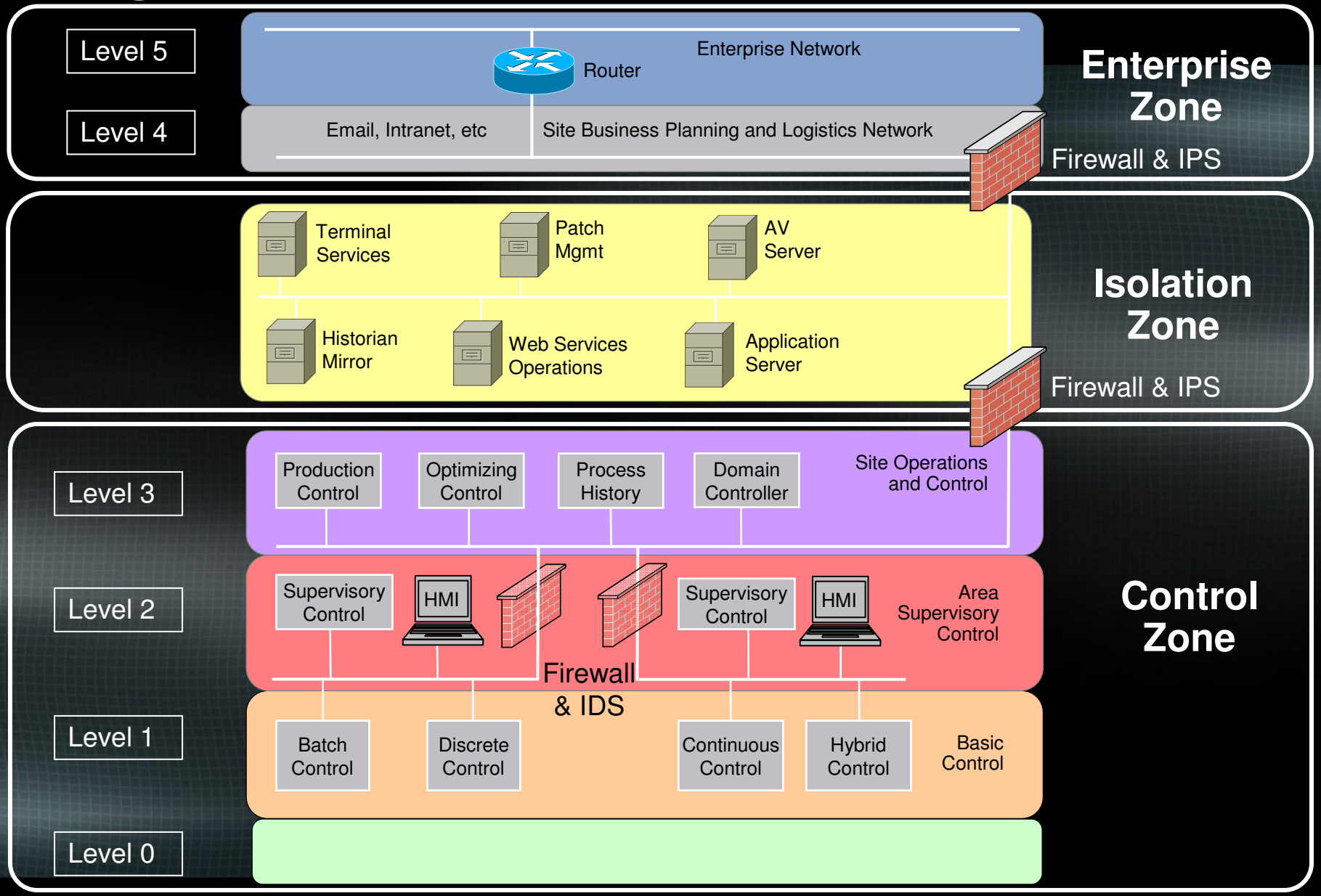
Typical Control System



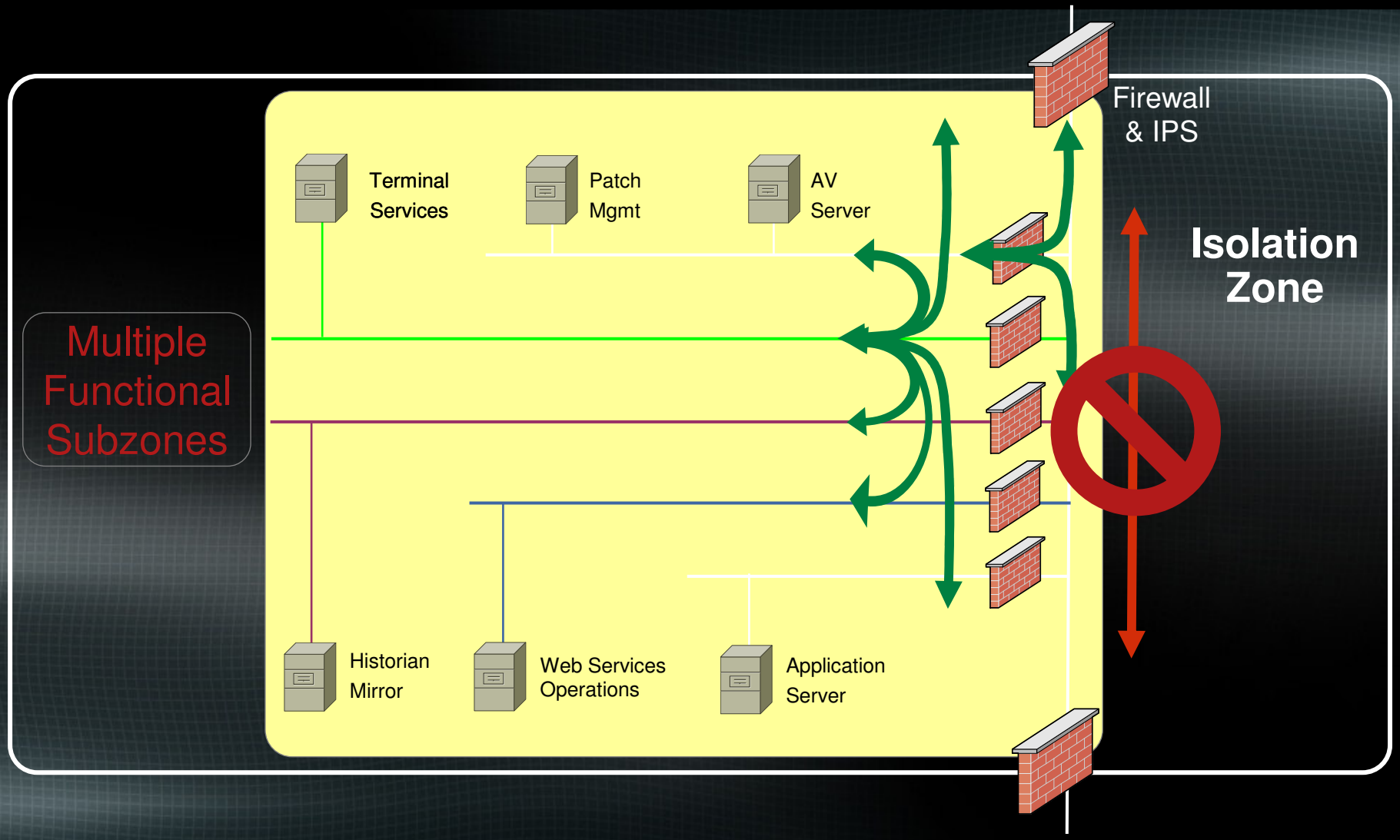
Technology Trends in Production Control Systems

- Adoption of IP Networking
  - Most new industrial devices have Ethernet ports
  - Many legacy protocols being embedded in TCP or UDP
    - e.g. Modbus/TCP, DNP3, Ethernet/IP, …
- Adoption of COTS technologies (Commercial Off The Shelf)
  - Windows OS, various embedded RTOSes
  - Apps - databases, web servers, web browsers, …
  - IT protocols - HTTP, SMTP, FTP, DCOM, XML, …
- Connectivity of control system to enterprise LAN
  - Improved business visibility and efficiency
  - Remote access to control center and field devices

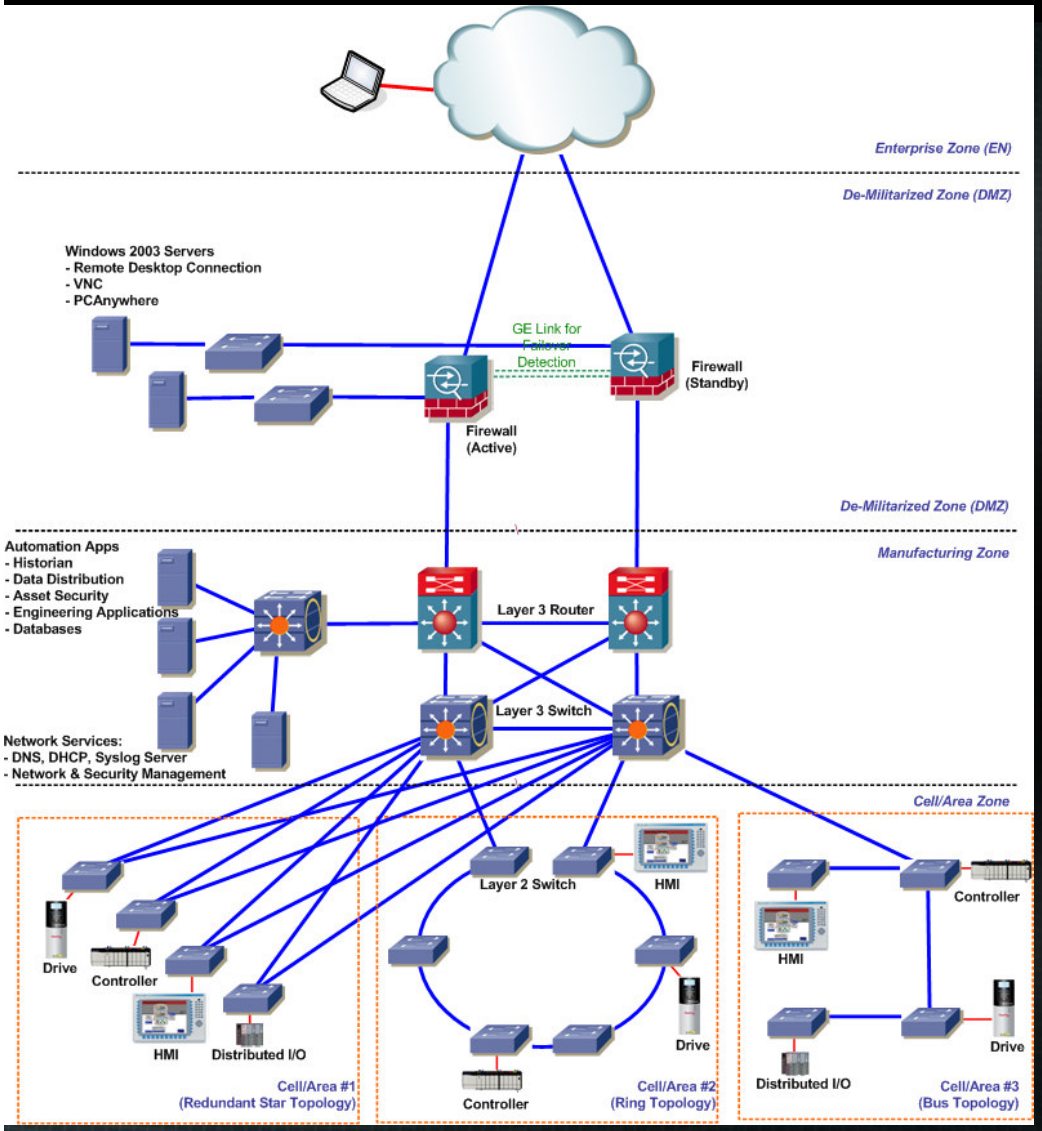
Logical Overview



Isolation Zone - Logical View



Reference Network Architecture



Enterprise Network Levels 4 - 5

Demilitarized Zone (DMZ)

Separation between Control & Enterprise Networks

Production Zone Level 3

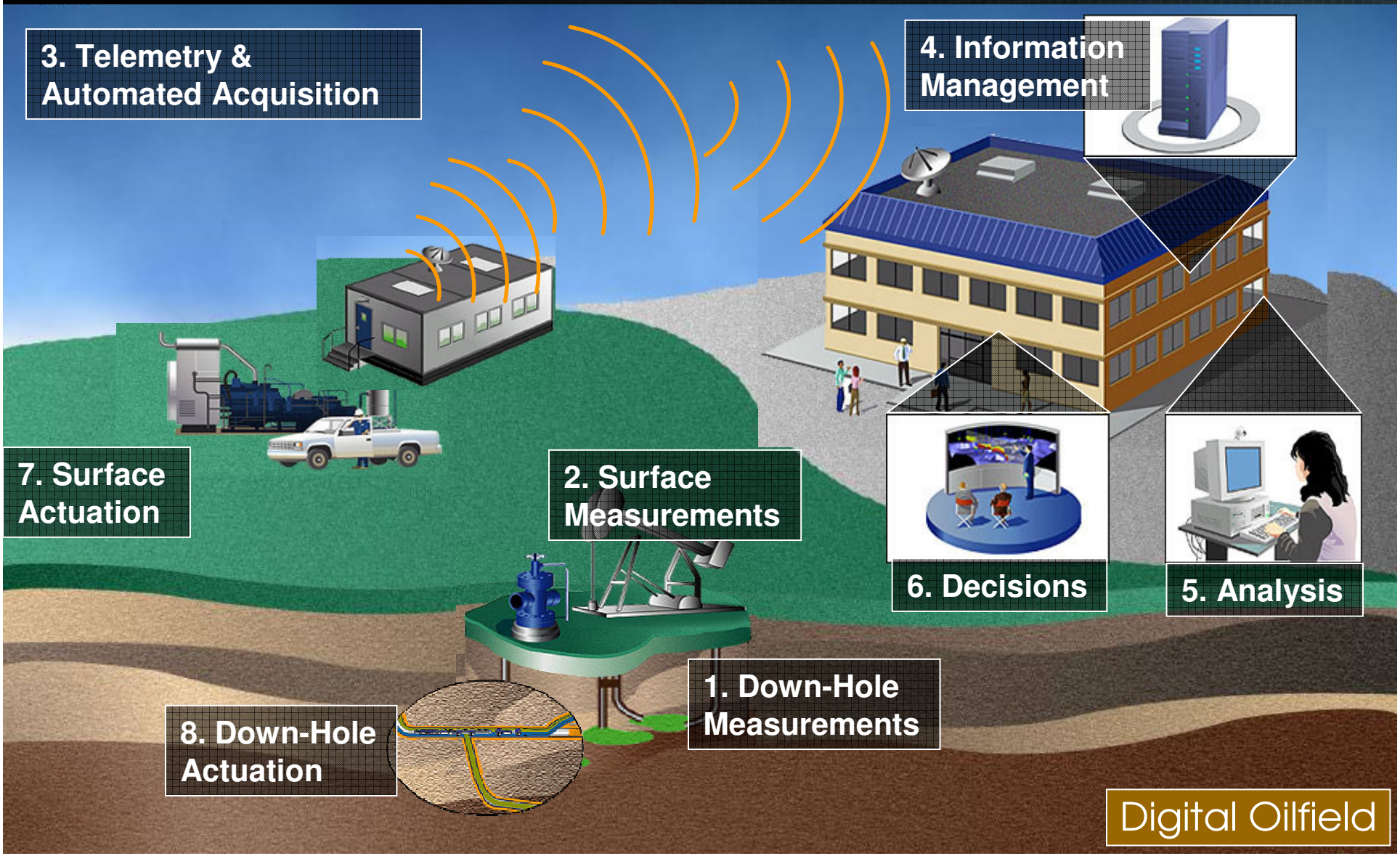
Interconnection between Cell Zones, Server Farms, and DMZ

Cell Zone Levels 0-2

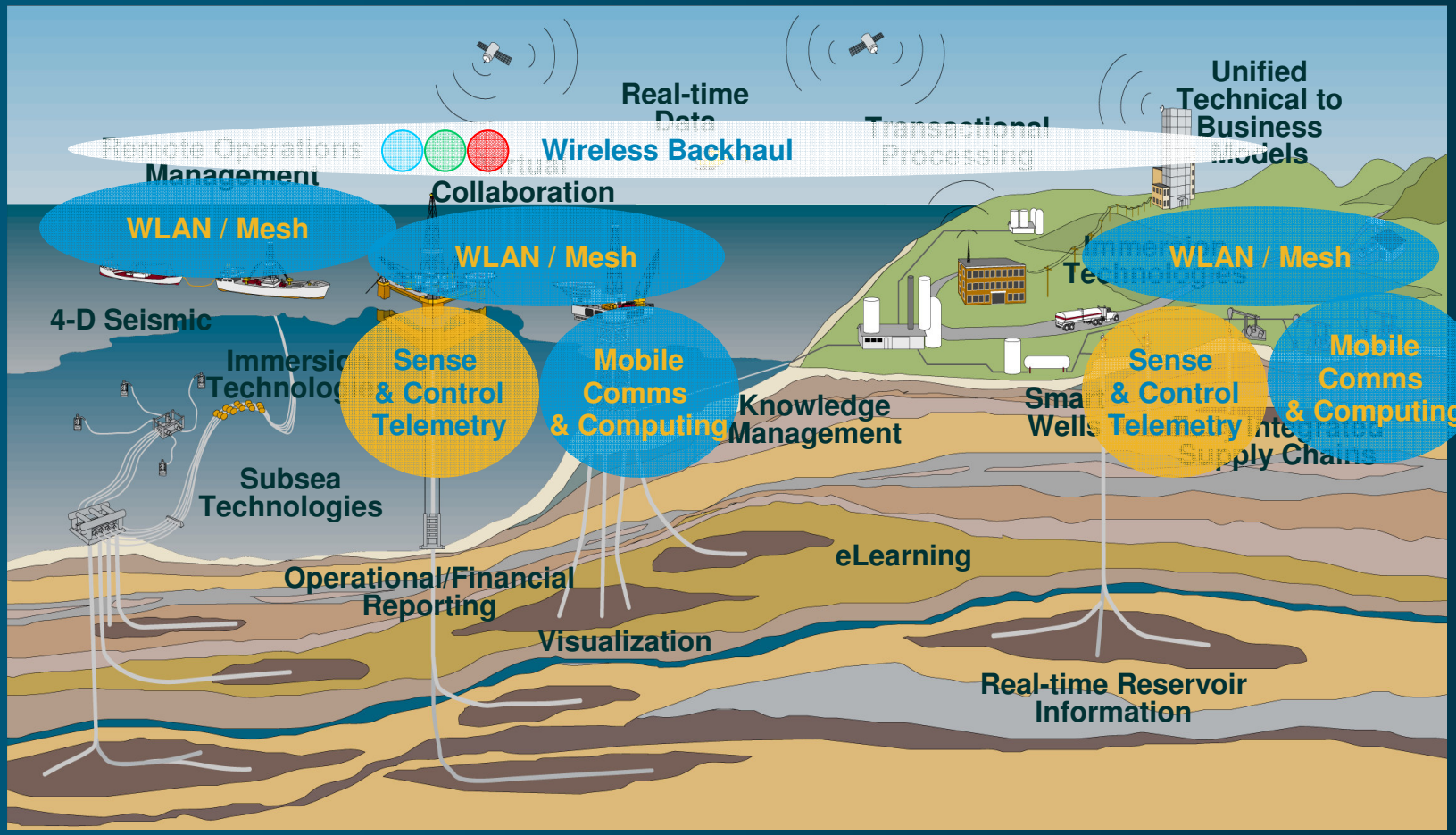
Network Connection for PLCs, HMIs, I/Os, & Valves

First Mile Wireless Solution

Exploration and Production Monitoring



First Mile Wireless

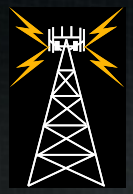


802.15.4 Wireless Sensor 802.11 WIFI LAN 802.16 WIMAX MAN VSAT

Wireless in the OilField

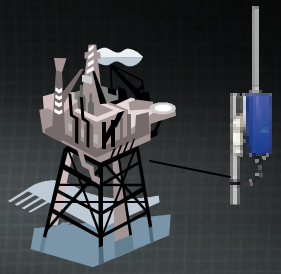
"FIRST Mile" Connectivity

Field Operations Real-Time Integration w/802.11 mesh

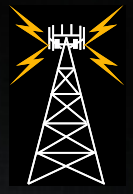


Wireless bridge/repeater

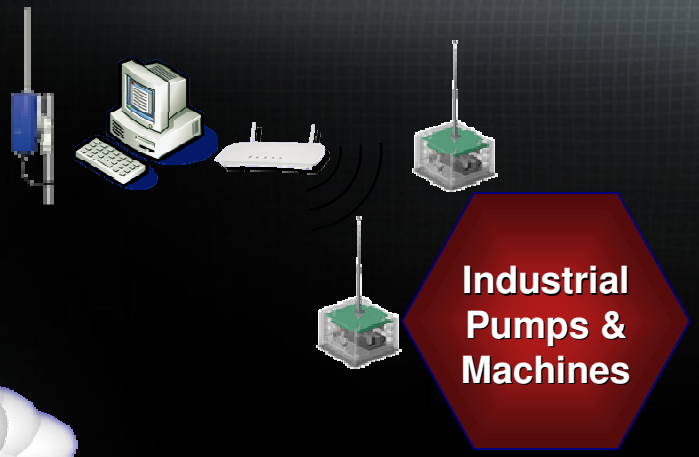
Remotely Monitor and Control Jobs and Equipment



Field Communications including VideoolP, VoIP



Wireless bridge/repeater

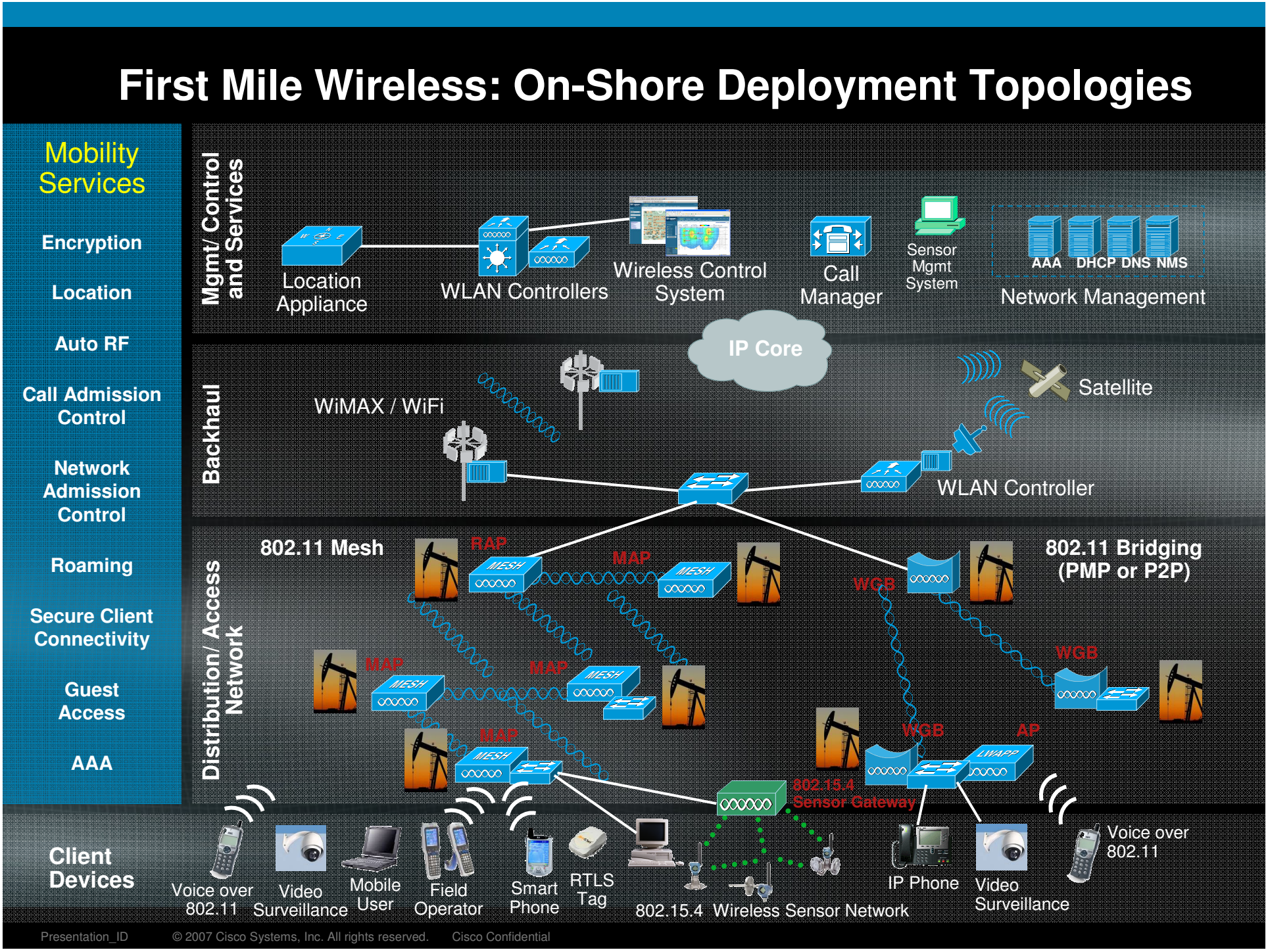


Data Capture & Analysis (SCADA, DCS, PLC)

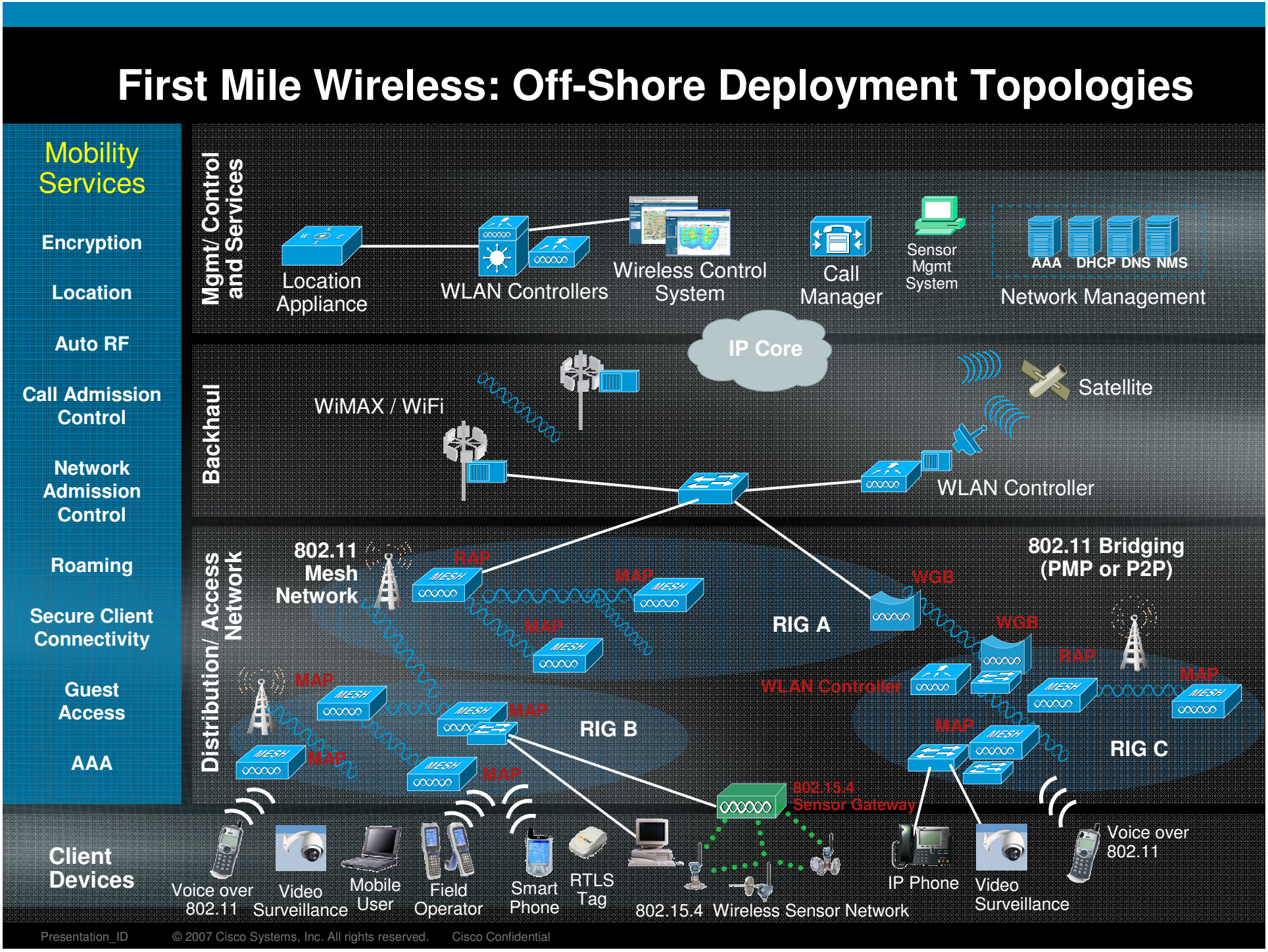
Internet and Wired Infrastructure

Operations Center and Enterprise

First Mile Wireless: On-Shore Deployment Topologies



First Mile Wireless: Off-Shore Deployment Topologies



Case Study

Petrobel, Egypt

- **Challenge:**

  Improve communications and decision making by connecting drilling supervisors to company men at central office directly from anywhere on the platform

- **Solution:**

  Cisco First Mile Wireless, based on Cisco Aironet 1505 outdoor mesh and Cisco Unified Communications

- **Benefits:**

  Reduction in Downtime, resulting in $9 million savings annually (potential)

  Improved Decision Making

Field Wireless Solutions -TOTAL

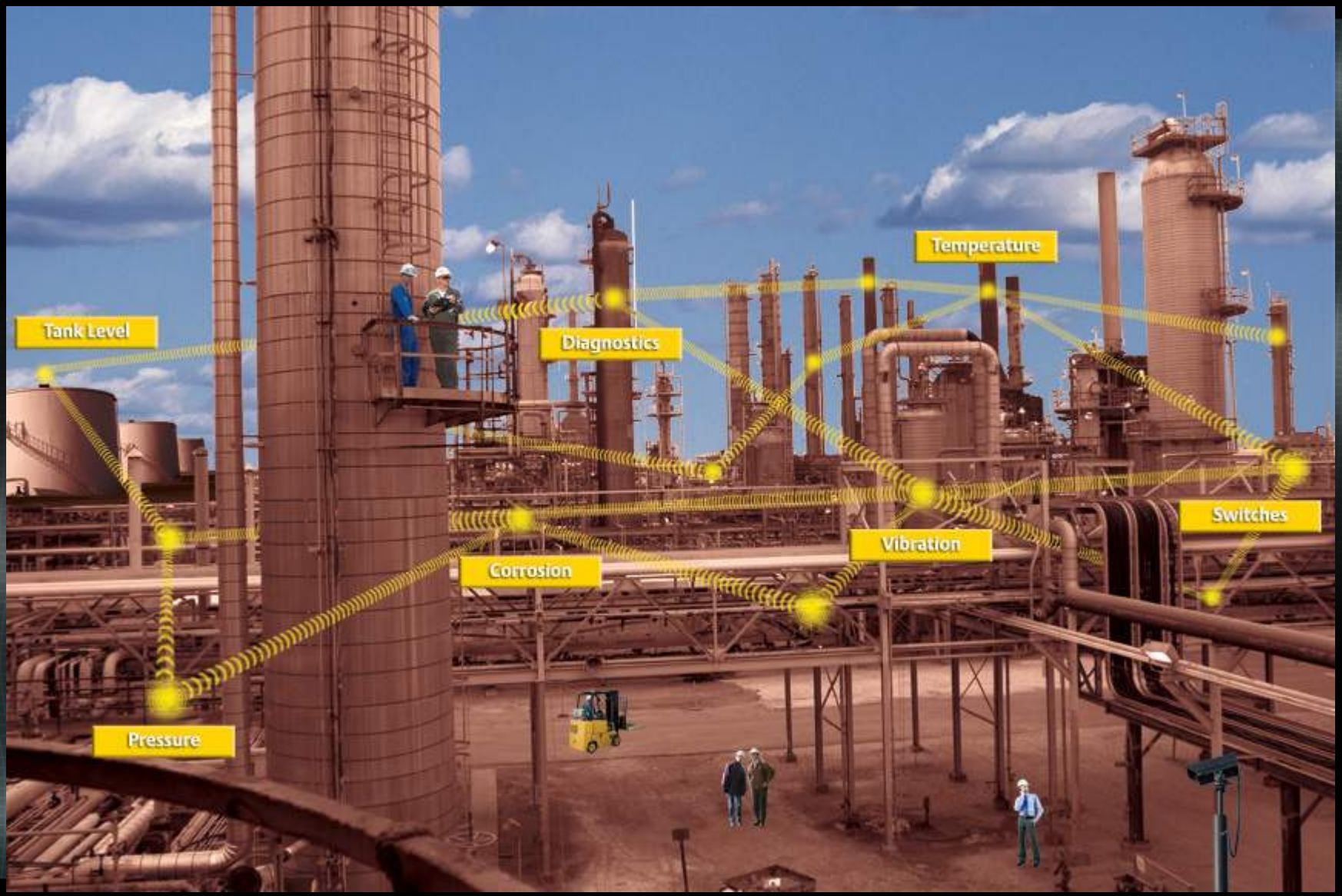
- **Business Requirement:**
  Provide a reliable high speed communications medium to a fleet of swamp barges in the Mahakam Delta to allow use of next generation data acquisition solutions

- **Our Answer:**
  Pilot driven, custom Engineering project
  Wimax based solution
  Roaming solution allowing seamless switching between base stations, combined with excellent coverage
  2 previous failed pilots had client doubting technology was viable, We proposed solution and it worked first time

- **Customer Benefit:**
  Mind shift in capabilities in regards to IT enablers on the swamp barges
  Seamless extension of the office environment into the field.
  Increase in collaboration and knowledge changing how people work, the processes they use, and ultimately the organization itself .

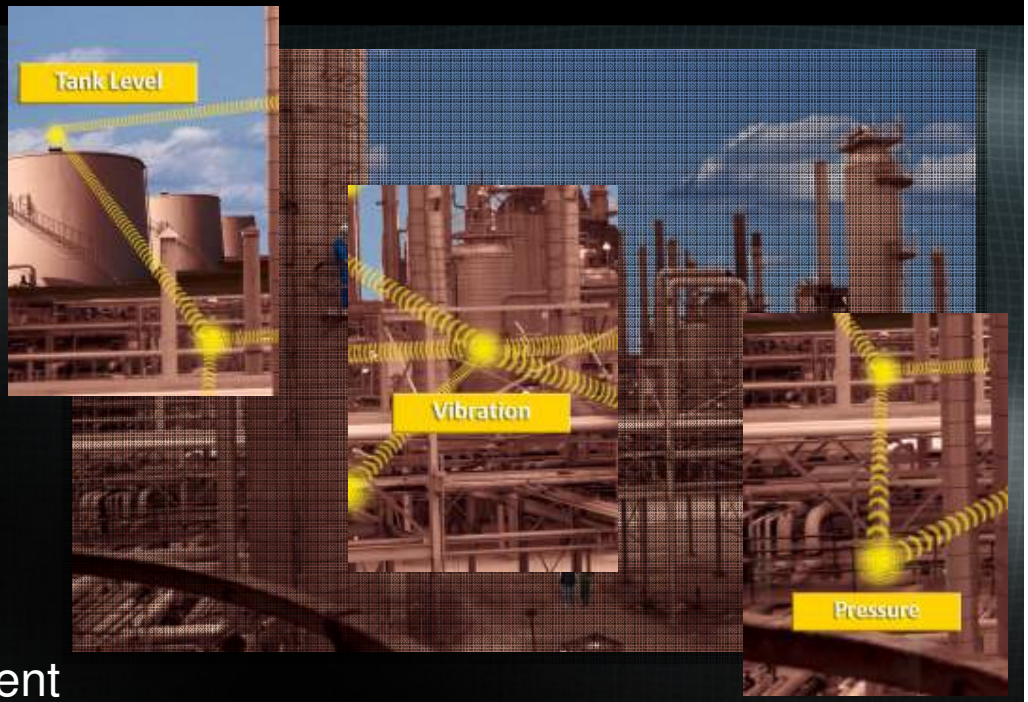
Wireless Production Environment

Smart Wireless Sensor Network - WSN

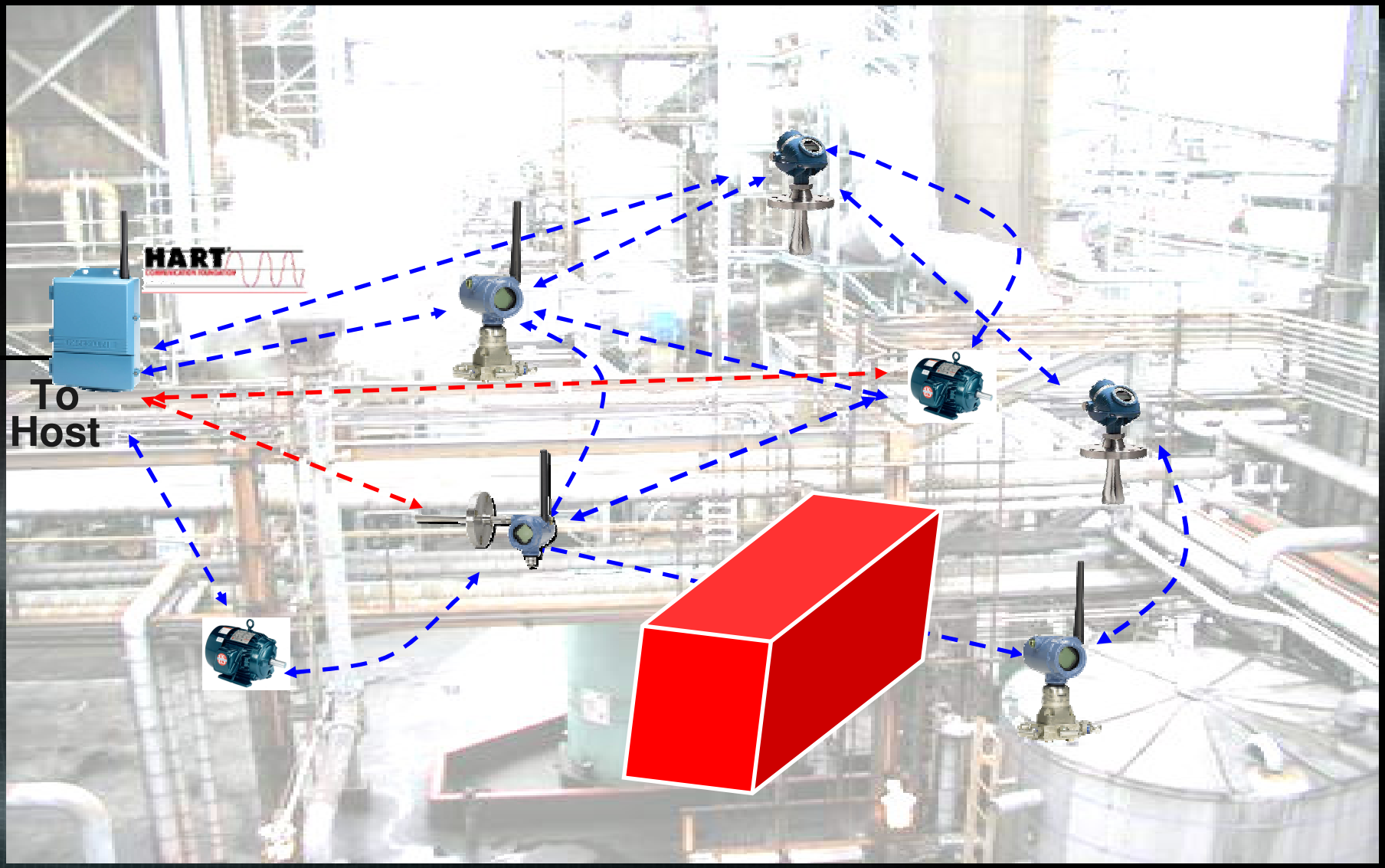


Process Industry Has Some Very Specific Requirements

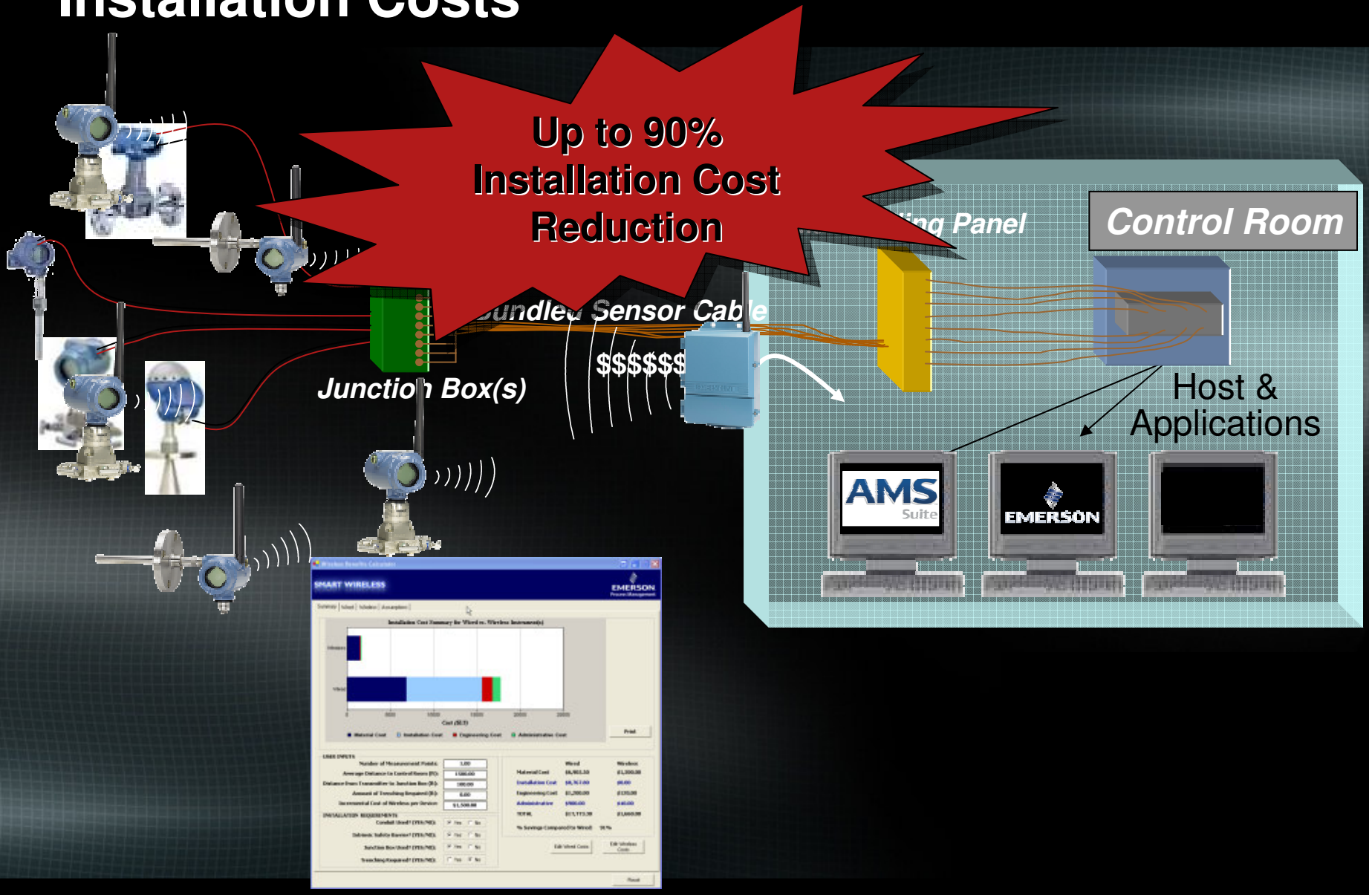
- Process Applications:
  - Sensing,
    condition monitoring,
    control and diagnostics
- Bandwidth:
  Short, high priority
  communications
- Security/Reliability:
  We cannot ‘drop a call’
  - Must coexist and perform
    in dynamic, harsh plant environment
- Standards:
  - Essential for market adoption
  - Driven by Process community



Smart Wireless Solutions are Easy to Install, Use and Are Reliable!

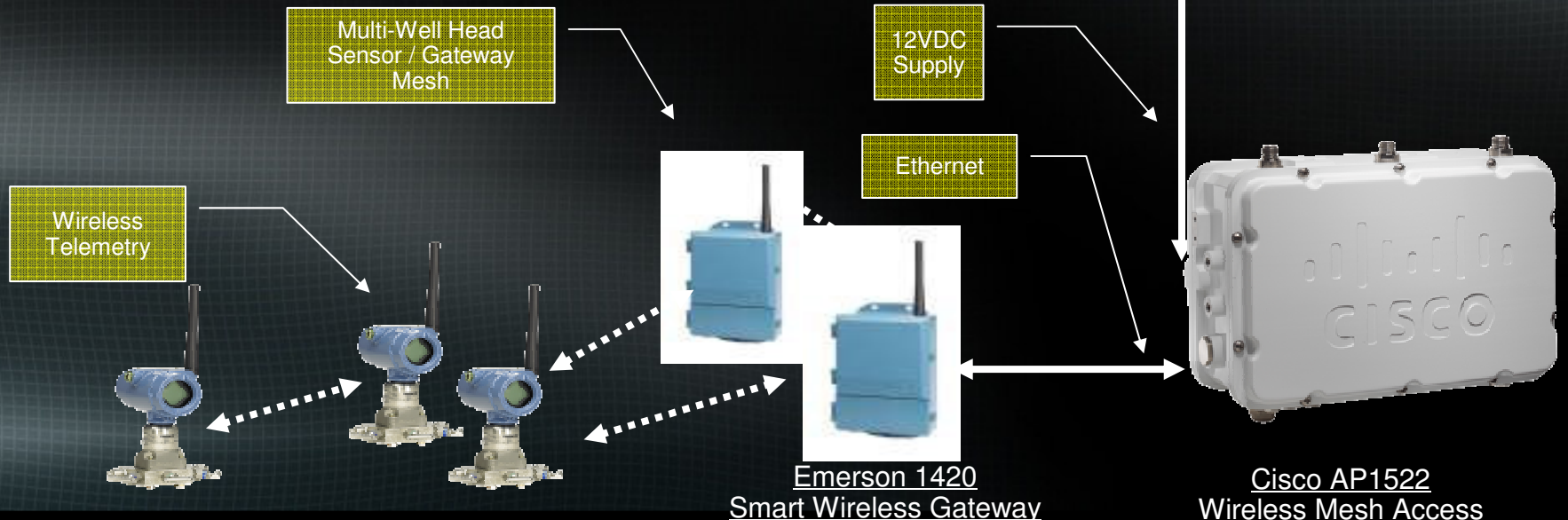


Smart Wireless Significantly Reduces Your Installation Costs



Wireless Sensor Network

- 802.15.4 WSN provides telemetry connectivity to Sensor Motes
- Hybrid WSN Gateway Nodes Provide Bridging Capabilities
- Mesh WLAN provides Medium Range Resilient Backbone



Emerson 1420
Smart Wireless Gateway

Cisco AP1522
Wireless Mesh Access Point

Wired and Wireless Infrastructure Enabling Innovative Plant Applications

- Plant/Business Applications:
  - Video, voice, mobile tools, tracking
- Bandwidth: High; multiple applications must share the service
- Security/Reliability: Industrial security and robust coexistence essential
- Standards:
  - Essential to capture innovation
  - Driven by IT community

Enabling
Plant Operation, Maintenance & Repair

Trend

Good maintenance and support practices are an integral component of optimized production processes and lean manufacturing

Key Issues

1. Manufacturers are focused on improving the efficiency of production
2. As production capacity rises above 80% utilization, efficiency and productivity in plant maintenance and repair is mandatory
3. Return on Assets (ROA) is becoming the primary driver of equipment investment

Application Opportunities

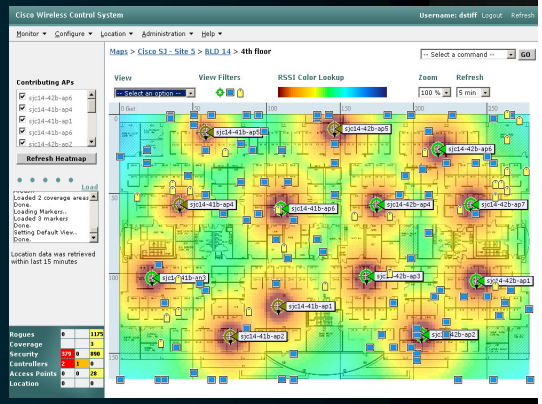
1. In-premise and extra-premise preventative maintenance
2. Break-Fix operations
3. Dispatching for optimized production

Solution components

1. Class 1 Div 2 Hand-held terminals
2. Integrated barcode/RFID reader
3. CISCO WLAN infrastructure
4. GPS or Bluetooth support

Enabling
Real Time Location Services

- An enterprise visibility solution for manufacturers
- Enabled through 802.11 Wireless LAN and Location Services
- Tracks the presence and real time location of high value manufacturing assets & Personnel
- Increases operational efficiency and asset utilization in the manufacturing supply chain



Enabling
Comprehensive Communication

- "Push-to-Talk Everywhere"
- Any-to-any voice
- Speech to text to application
- Video and data integration
- Bridging the old and the new

Enabling
Physical Security Ecosystem

Video Surveillance

- Sypixx Acquisition
- Leverage the Network
- Centralized Video Surveillance and Analytics

Facility Security

- Automated & Integrated Physical Security
- Centralized Surveillance Capability
- Integrated Alert, Alarm & Operations Notifications via any Medium
- Integrate into Unified Communications system

Cisco Stream Manager

Dashboard | Admin

Welcome, root | Logout

Report: POS Dwell Count

Zoom: Focus: Iris: Layout: 2x2

Cameras

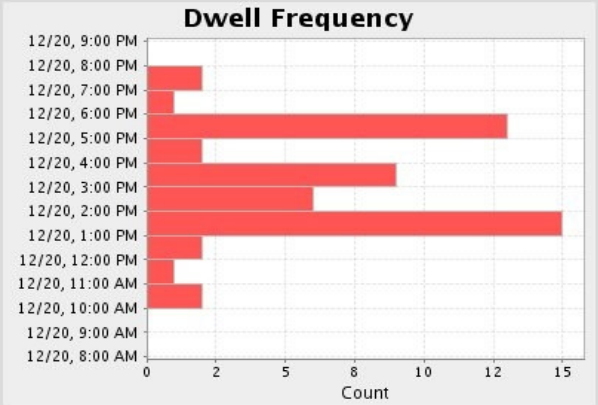
- POS
  - POS-1 Camera
  - POS-2 Camera
- Analytics
  - Count Camera
  - Dwell Camera
- Store
  - PTZ Camera
  - Panasonic IP

Stand & Dwell Report

Camera: Dwell Camera Date Range: 12/20/2006 8:00 AM 12/20/2006 9:00 PM Interval: 1 hour

Video

Chart



Dec 20, 2006, 5:58 pm

Dec 20, 2006, 6:55 pm

Dec 20, 2006, 7:03 pm

Dec 20, 2006, 7:36 pm

Close

Events

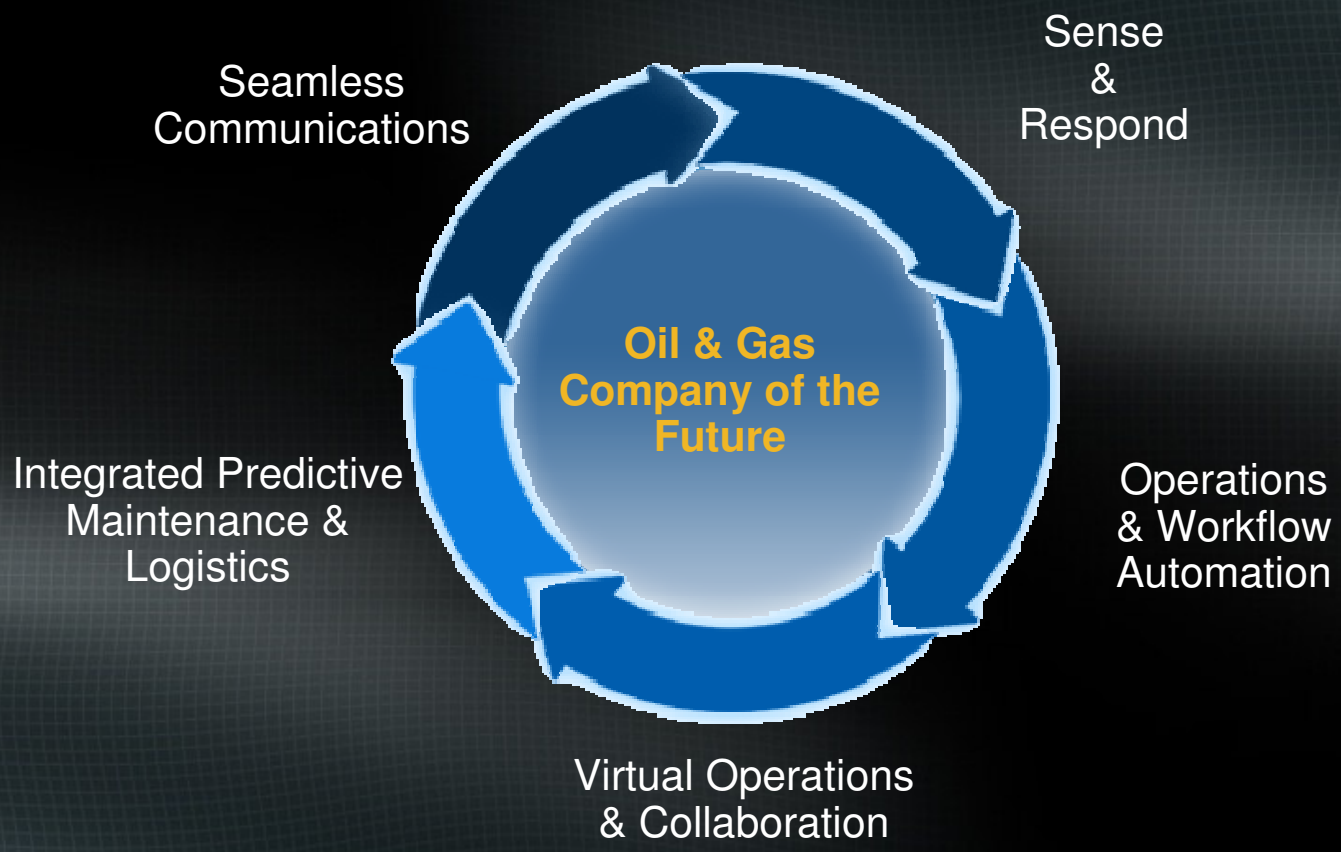
Id	Sev	Vid	Type	Resource	Description	Date
321	MN		Count	Count Camera	Person entered the Aisle	Dec 20, 2006 8:27 pm
312	MN		Count	Count Camera	Person entered the Aisle	Dec 20, 2006 8:03 pm
311	MN		Count	Count Camera	Person exits the Aisle	Dec 20, 2006 8:01 pm
310	MN		Count	Count Camera	Person entered the Aisle	Dec 20, 2006 7:48 pm
309	MN		Count	Count Camera	Person entered the Aisle	Dec 20, 2006 7:41 pm
308	MJ		Dwell	Dwell Camera	Person is interested in the commercial advertisement	Dec 20, 2006 7:36 pm

Valero Energy

- Rapid acquisition of refining assets placed a premium on the integration of technology and communications
- Chose Cisco based on “end-to-end” solution and ability to take advantage of internal skills
- Currently 14,000 phones at 17 refineries
- Migration of remaining 10,000 phones is under way

Summary

Cisco Unified Solutions Vision



SAFE - Summary

- Integrated Wireless Sensor Telemetry
- Connected SCADA / PLC Control Systems
- Secured & Managed Assets
- Extended Collaboration, Computing & Communications Capabilities
- Improved HSE & Compliance Monitoring
- Improved Facility Operation & Control
- Improved Quality Management