



CONNECT
the unconnected



IoT/loE Products and Solution from Cisco

IoT

Axel Dittmann

Consulting Systems Engineer IoT

Diplom-Betriebswirt (FH)

Diplom-Wirtschaftsinformatiker (FH)



Certified Information
Systems Security Professional

Cisco IoT – in O’ahu, Hawaii ?



Cisco IoT in O'ahu, Hawaii !



IoT: Cisco Aironet Outdoor Access Points

Industry's Best 802.11n & 802.11ac Series



Base 1530



- Low Profile, Low Price
- Europe: Low Profile
- Emerging SP: Low Price
- Enterprise: Low profile & Price
- 11n, 2G: 3x3:3; 5G: 2x3:2
- In/External Antennas

High-Functionality 1550



- High functionality
- Enterprise, MSO
- DOCSIS3.0 8x4
- 11n, 2x3:2
- In/External Antennas

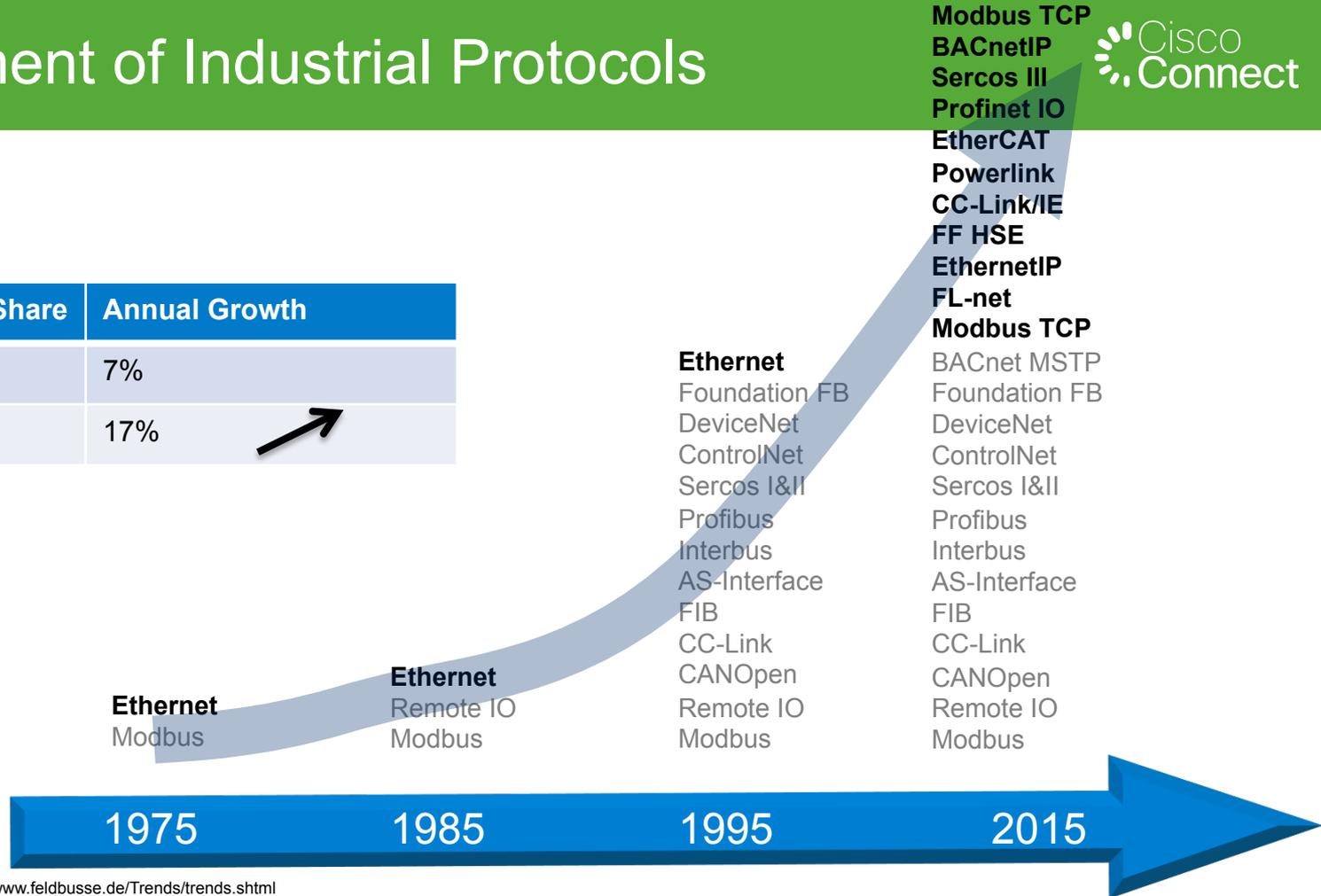
Best in Class 1570



- High-end Enterprise, MSO
- 11ac, 4x4:3
- NG-Cable: 24x8
- In/External Antennas
- Modular: Future proof

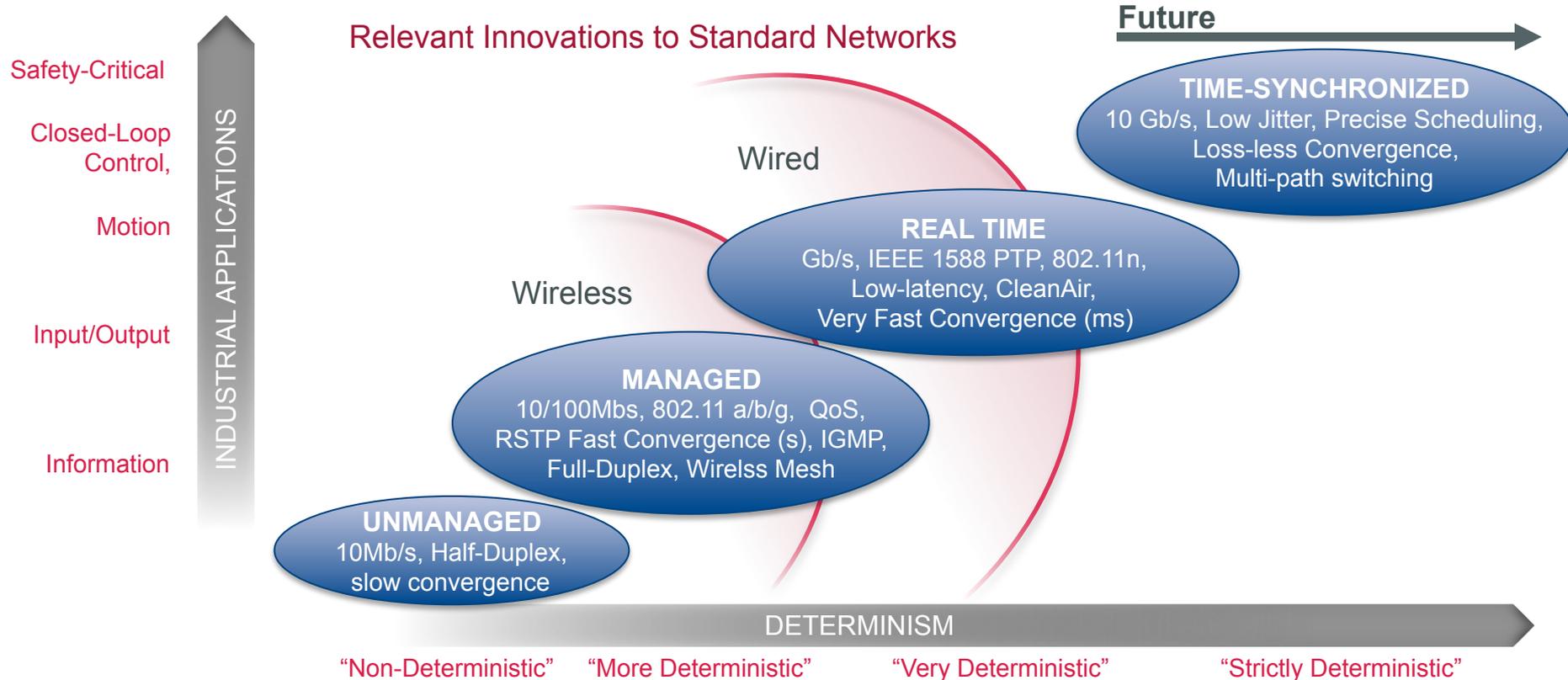
Development of Industrial Protocols

	Market Share	Annual Growth
Feldbusse	66%	7%
Ethernet	34%	17%

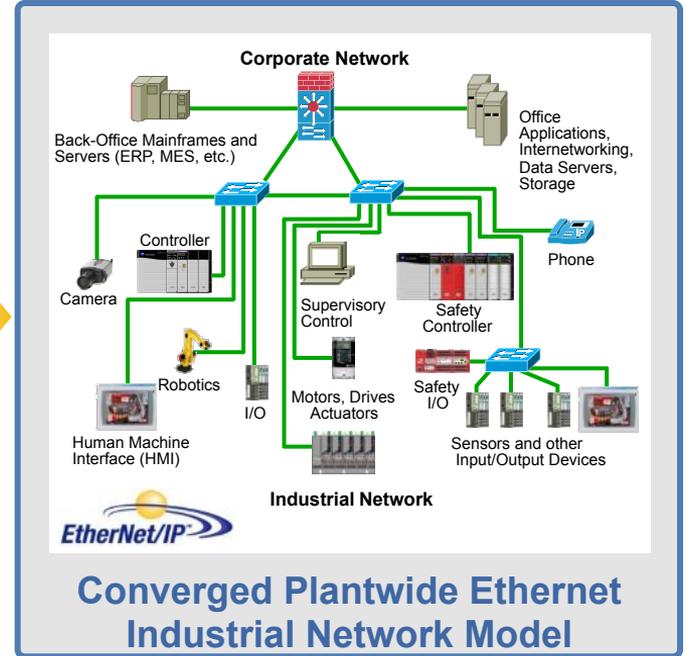
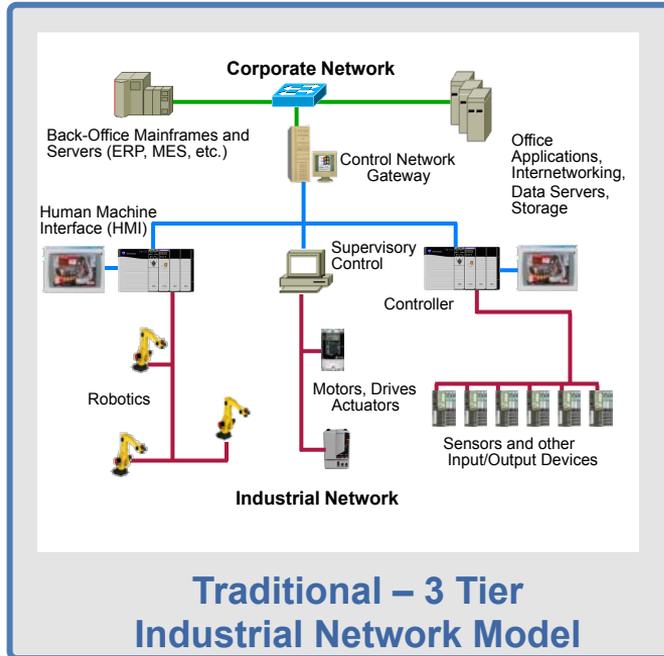


Quelle: <http://www.feldbusse.de/Trends/trends.shtml>

Industrial Intelligence Requires Evolution



Industrial Network Convergence



Convergence Driving Adoption of IoT



Sensors



**Real Time
Analytics**



**Personal
Devices**



Robots



**Security
Devices**

Sensors Everywhere | Machine-to-Machine | Pervasive Intelligence | Automation

Less Waste, More Efficiency, More Cost Savings

Constant Improvements in Productivity

Enhanced, Personalized Experiences

Networking Best Practices – Cell/Area Zone



Best Practices For Reducing Latency and Jitter, and to Increase Data Availability, Integrity and Security

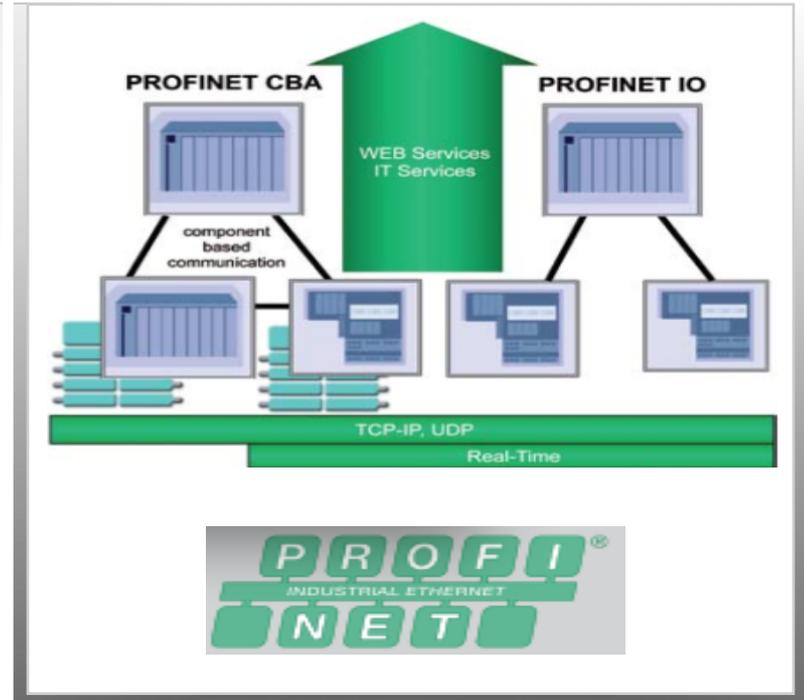
- IP Multicast Control
 - IGMP Management
- Segmentation
 - Virtual LANs (VLANs)
- Prioritization
 - Quality of Service (QoS)
- Apply Resiliency Protocols and multi-path topologies
 - Use Fiber-media uplinks for fast convergence
- Defense-in-Depth Security



Support for Profinet

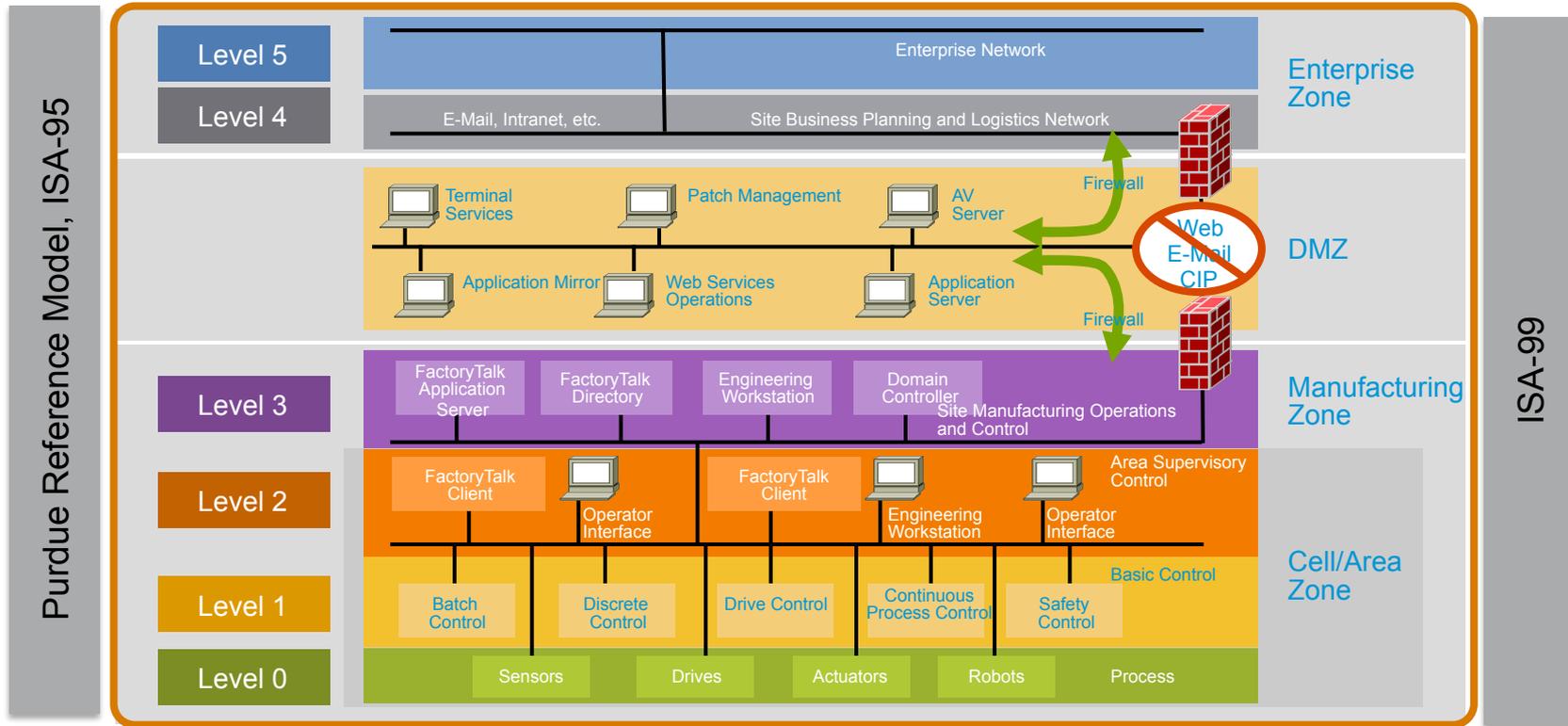
Highly Secure Integration With Corporate Networks, and Integration with Profinet-Based Devices

- PROFINET v2 certification, with PROFINET conformance class B compliance
- Cyclic data exchange between Profinet enabled programmable logic controllers, IO devices, and other mMotion controllers
- Support of ProfiSafe (Safety) applications with wire-speed switching

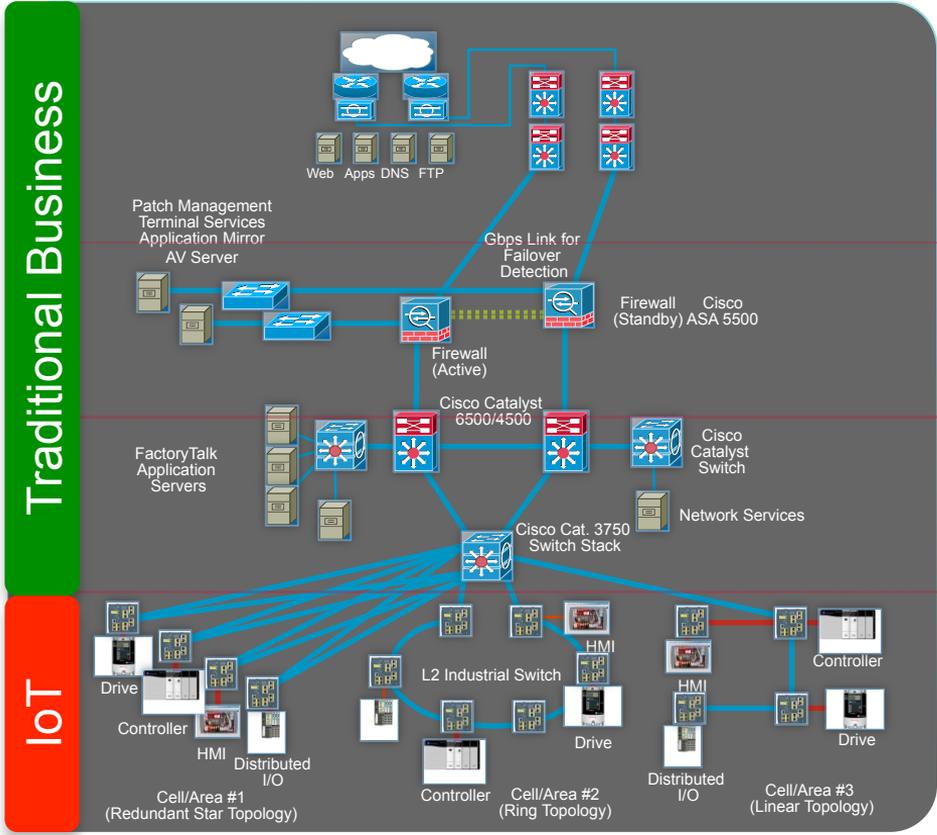


Logical Framework

- Strong Segmentation



Converged Plantwide Ethernet Architecture (CPwE)



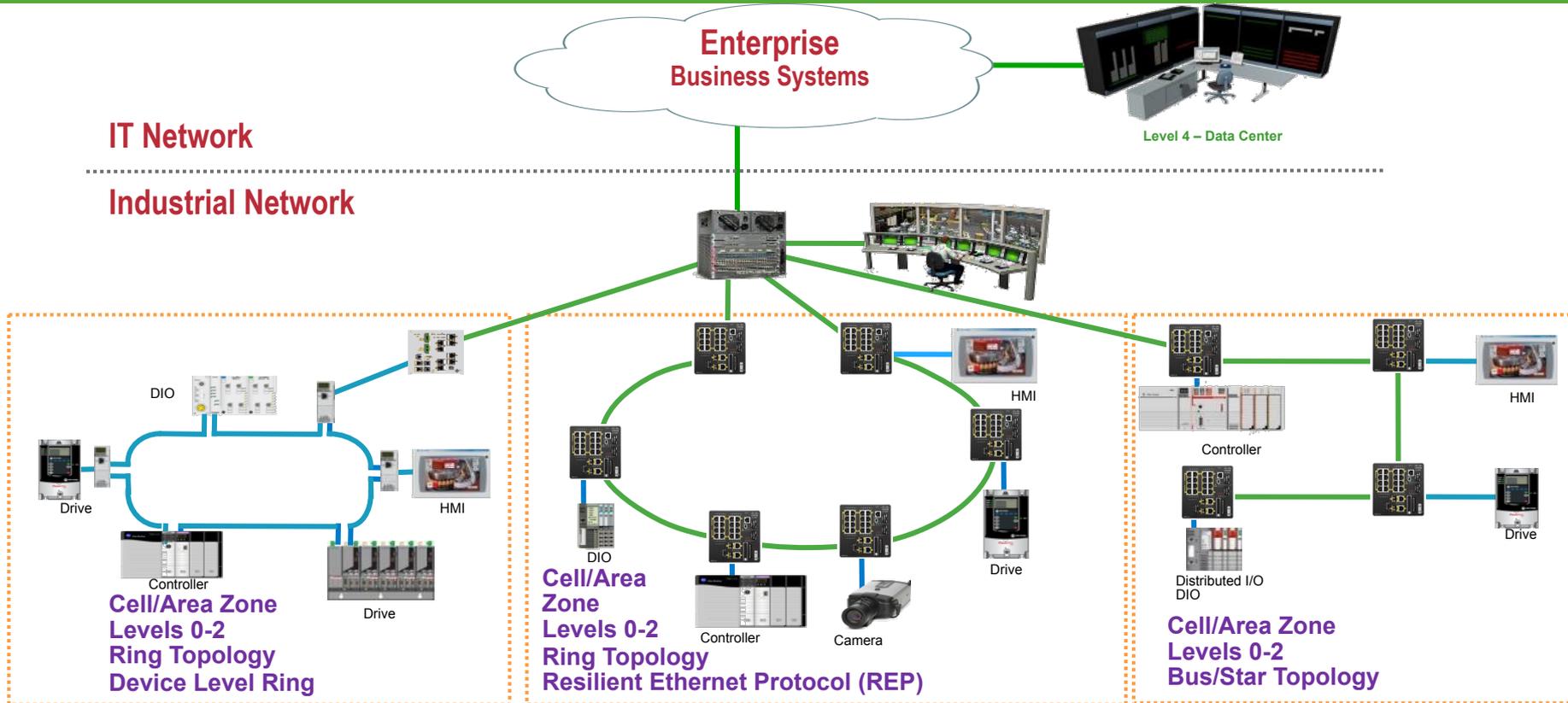
ISA 95

CVD CPwE

Enterprise Network Levels 4–5	Enterprise/IT Integration Collaboration Wireless Application Optimization
Demilitarized Zone (DMZ) Firewalls	Application and Data share Access Control Threat Protection
Manufacturing Zone Level 3 Distribution and Core	Site Operations and Control Multi-Service Networks Network and Security Management Routing
Cell/Area Zone Levels 0–2 Layer 2 Access	EtherNet/IP (Industrial Protocols) Real-Time Control Multiple Topologies, Fast Convergence Traffic Segmentation and Management Ease of Use

Plantwide Architectures

Converged Industrial and IT Network



Industrial Switching Portfolio



IE2000



L2 NAT
PoE(+)
PTPv2
DM

IE3000



Modular/Scalable
L2/L3/PoE(+)
DIN Rail

IE3010



L2/L3/PoE(+)
1RU
Access/Aggregation

Connected Industries with Enterprise S/W

Connected Energy Metro+Ent S/W

IE2000U



PTP (C37.238)
PRP Redbox
HSR H/W Capable

New
IE 4000
Gigabit Ethernet
L2/L3



CGS2520



CGS2k FastBoot,
Multiservice – Voice VLANs
ESM – CG Swap Drive
PoE+ on CGS2520



Demo



Demo

```
alarm contact 1 description Magnet_Open
alarm contact 1 severity major
alarm contact 1 trigger open
```

← Alarm contact definition

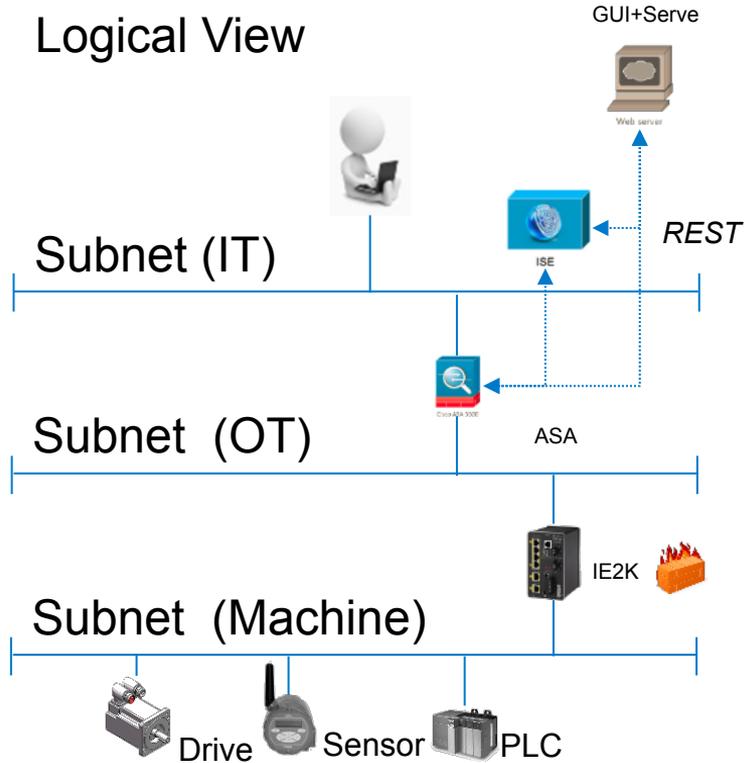
```
event manager applet port_shut
event syslog pattern "PLATFORM_ENV-1-EXTERNAL_ALARM_CONTACT_ASSERT: Alarm asserted: Magnet_Open"
action 1.0 cli command "enable"
action 1.5 cli command "config t"
action 2.0 cli command "interface GigabitEthernet1/9"
action 2.5 cli command "shutdown"
action 3.0 cli command "end"
```

Applet:
Reaction to syslog event

```
event manager applet port_up
event syslog pattern "PLATFORM_ENV-1-EXTERNAL_ALARM_CONTACT_CLEAR: Alarm cleared: Magnet_Open"
action 1.0 cli command "enable"
action 1.5 cli command "config t"
action 2.0 cli command "interface GigabitEthernet1/9"
action 2.5 cli command "no shutdown"
action 3.0 cli command "end"
```

Use Case: Key-Locked Remote Support

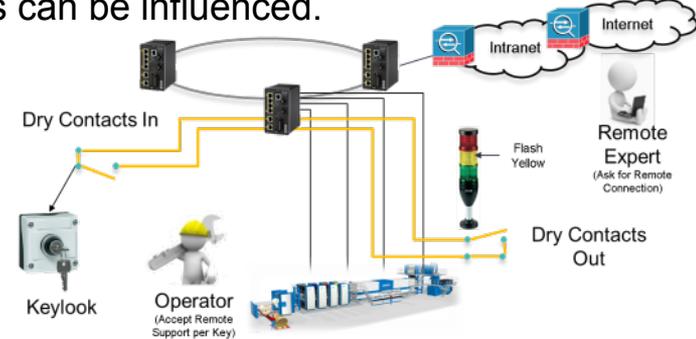
Logical View



Problem Statement:

manufacture with more than 100 location needs a simplified solution to allow and deny remote support per machine or production line. The target is that the process of commissioning and decommissioning can be handled automatically without a engagement of the IT department. The machine operator must authorize the remote access per HW key to confirm that he is aware about remote manipulation with the possibility that machine safety systems can be influenced.

Physical View



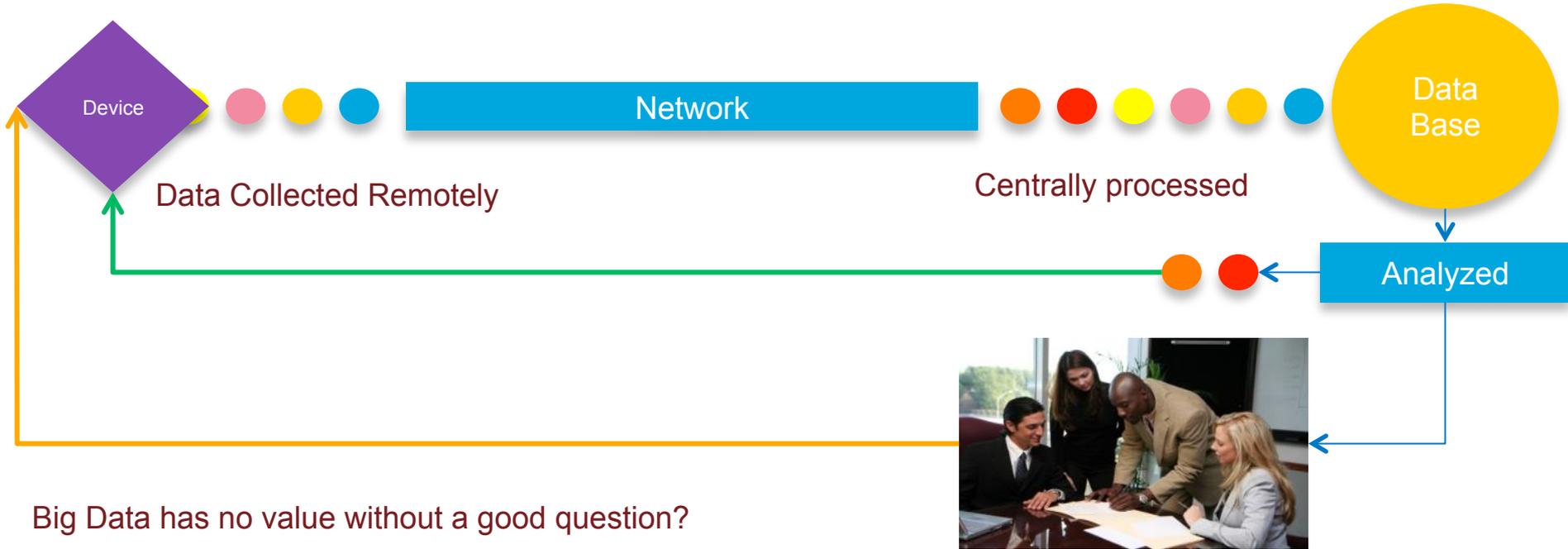
Use Relevant CLI

```
alarm facility input-alarm 1 relay major
```

```
ip access-list extended normal_operation  
permit ip 192.168.100.0 0.0.0.255 any  
deny ip any any  
ip access-list extended remote_operation  
permit ip 192.168.100.0 0.0.0.255 any  
permit ip 10.0.0.0 0.255.255.255 any  
deny ip any any
```

```
event manager applet remote_operation  
event syslog pattern "%PLATFORM_ENV-1-EXTERNAL_ALARM_CONTACT_ASSERT: Alarm asserted: external alarm contact 1"  
action 1 cli command "enable"  
action 2 cli command "conf t"  
action 3 cli command "interface GigabitEthernet1/1"  
action 4 cli command "ip access-group remote_operation in"  
action 7 cli command "exit"  
event manager applet normal_operation  
event syslog pattern "%PLATFORM_ENV-1-EXTERNAL_ALARM_CONTACT_CLEAR: Alarm cleared: external alarm contact 1"  
action 1 cli command "enable"  
action 2 cli command "conf t"  
action 3 cli command "interface GigabitEthernet1/1"  
action 4 cli command "ip access-group normal_operation in"  
action 7 cli command "exit"
```

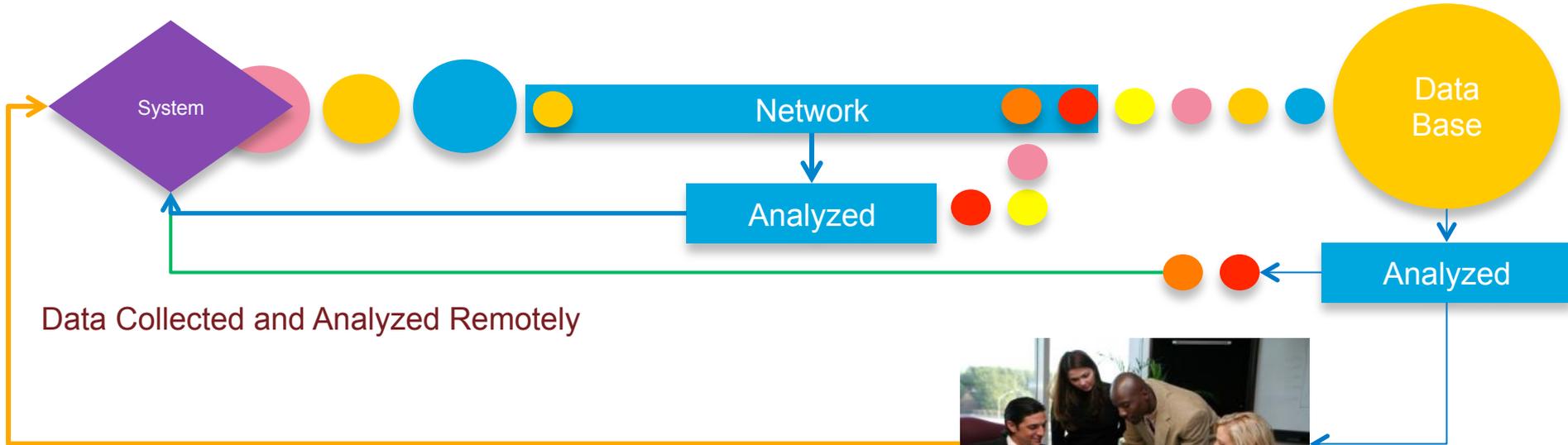
Big Data Today



Big Data has no value without a good question?

Big Data in Manufacturing

Analyzed Further Centrally



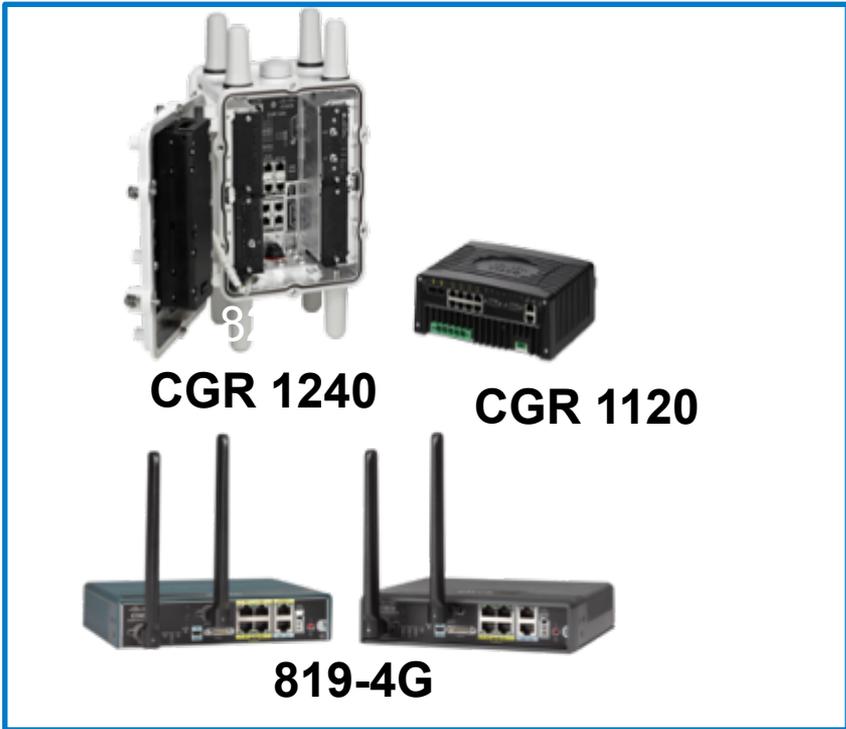
Data Collected and Analyzed Remotely

- Data Collected may need an immediate response and the location or latency of the network is too great to wait for an answer.
- Deterministic Control Loop



IoT Routing Portfolio

IOx - Fog enabled



Not available in every country yet



Java/Python/C/C++ enabled



EHWIC - 4G / 3G



CGR 2010

ASR 900 Series



IR 500

(only where
9xxMHZ is
allowed)

**ESR Series
Embedded**



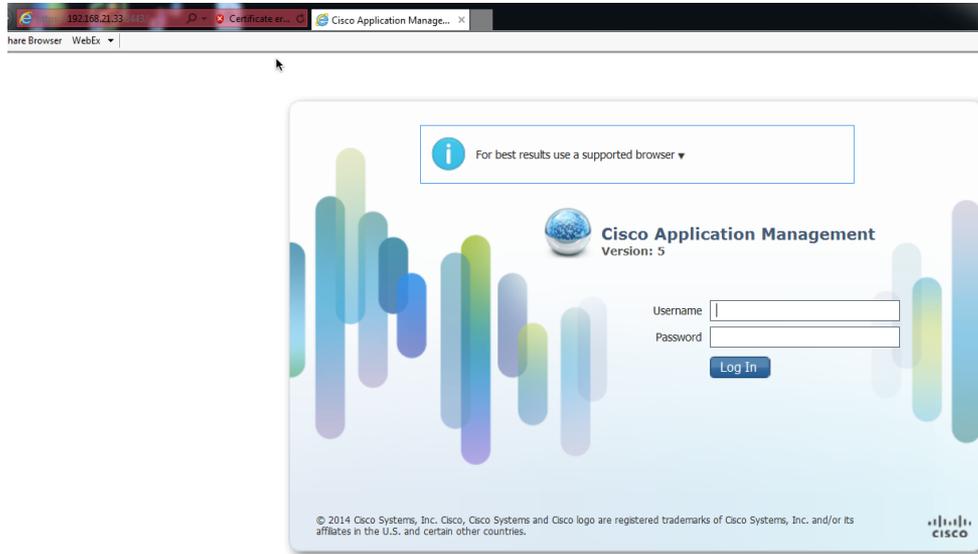
**Cisco IOS[®]
SOFTWARE**



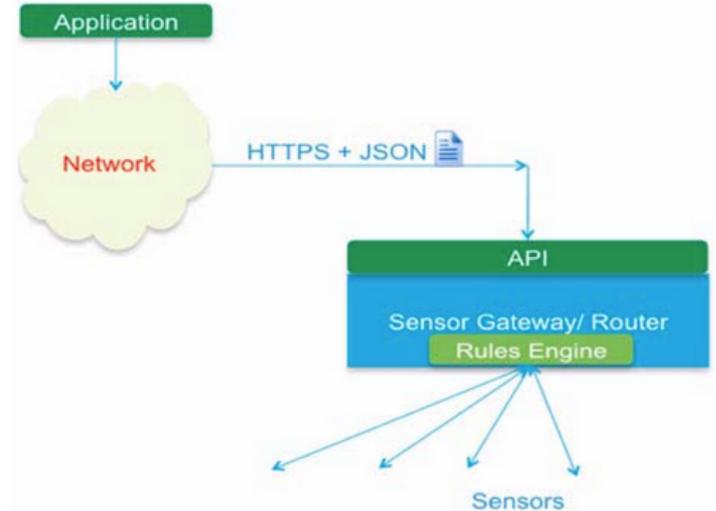
819-3G

IOx / DMO on 819-4G

IOx



DMO



Data to Information Capabilities

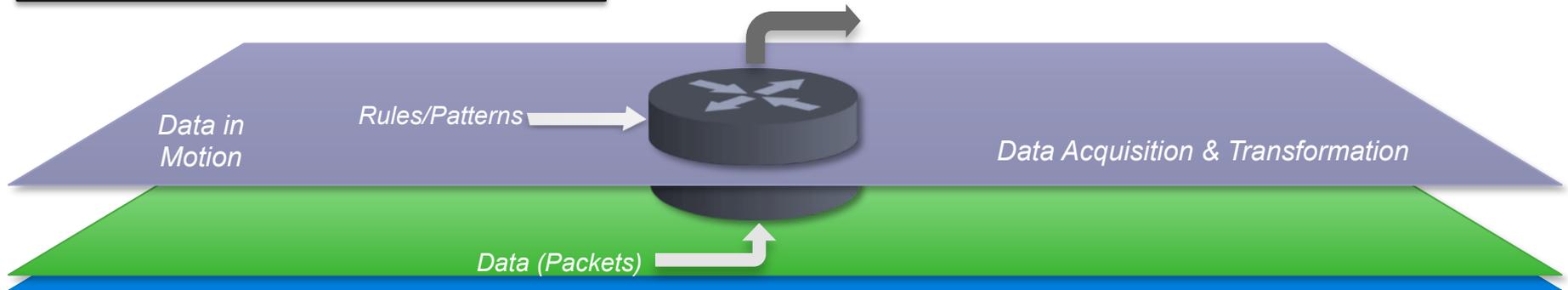
- Event Detection & Aggregation
- Rule-Based Data Normalization
- Dynamic Sensors Polling
- Unstructured Data Understanding
- Data & Information Caching
- μ -CDN (Controlled Distribution)
- Pub-Sub API (Eclipse IDE)

Use Cases

- Data Reduction and Compression
- Sensor Virtualization and Plug & Play

Supported Platforms

- UCS-E/Blade
- C8xx with IOx



Cisco & azeti – Management and Predictive Maintenance



Prime Analytics

Real-Time View

Connected Analytics

Derive Value from Data

Data Virtualization

Data Consolidation

Data in Motion

Data Consumption

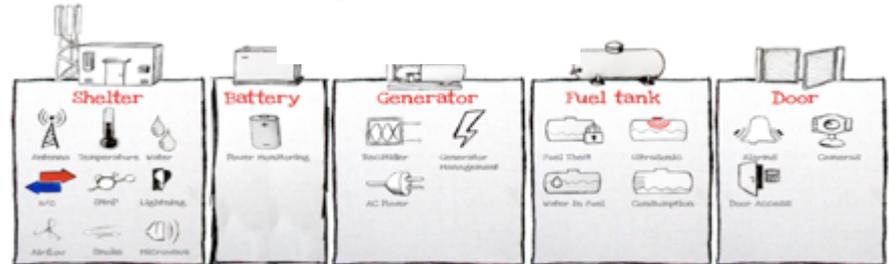
azeti SONARPLEX @ Cisco IOT

Intelligence at the Edge

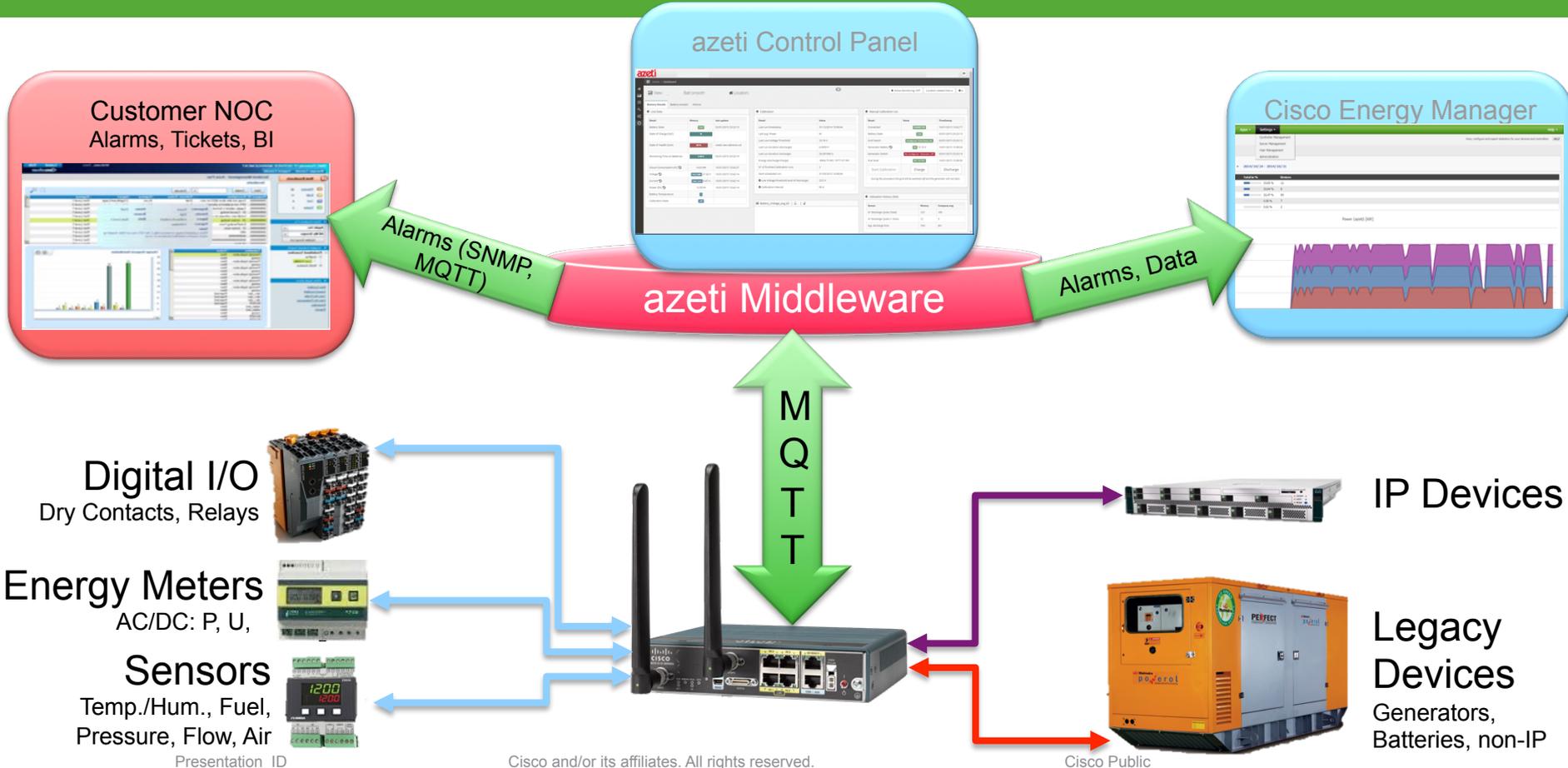
Edge
Devices



Cisco
IR900



azeti - Overall Architecture

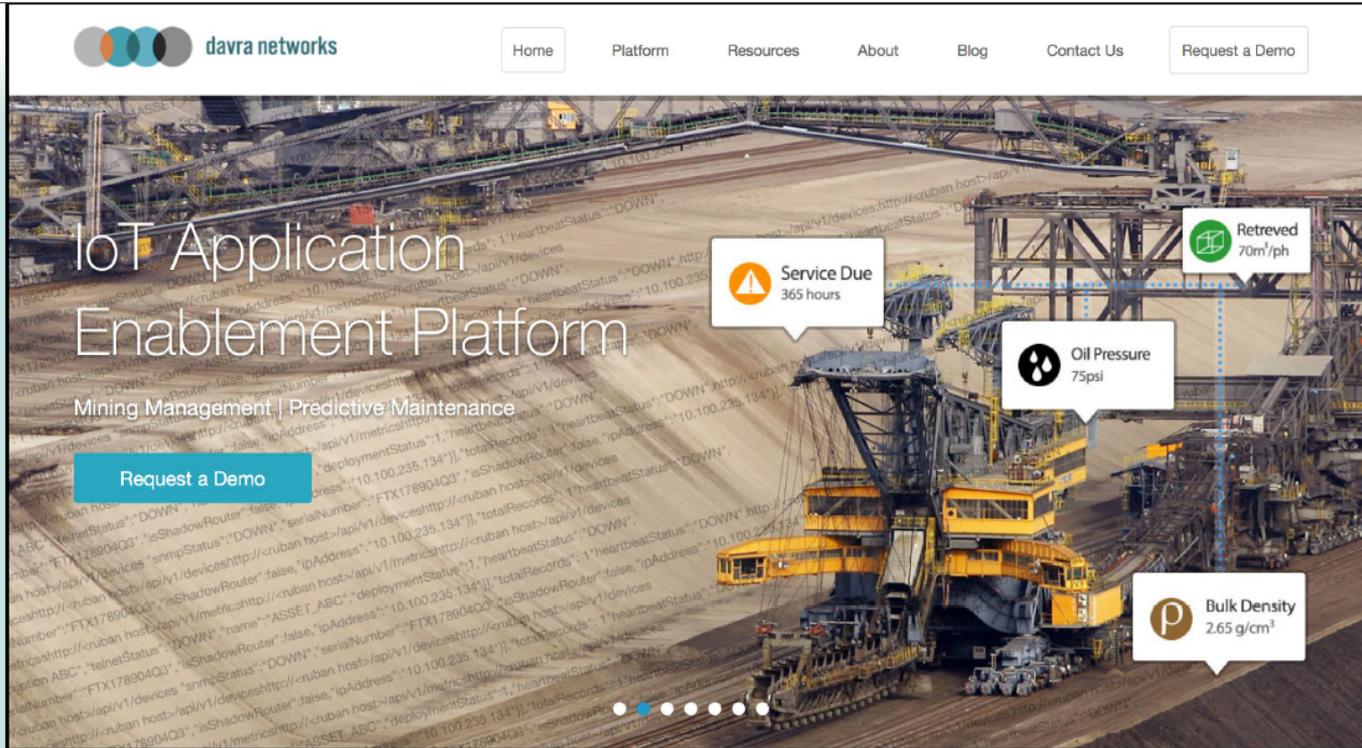


Create the Connected Vehicle

- Onboard Wi-Fi
- Preventative maintenance
 - Tie into existing program
 - Keep vehicles in operation for better service
- Driver information records
- Always Connected



- Real-time scheduling, notifications, & advisories
- Onboard video surveillance
 - Safety and security
- Location based mobility apps
- GPS / WiFi tracking of assets
- Real-time services & communications



Davra RuBAN platform is now on Cisco GPL

IoT Asset Management 'Davra Networks' RuBAN

Embedded Products

Embedded Routing



Cisco 5915 ESR
Conduction cooled model



Cisco 5915 ESR
Air-cooled model



Cisco 5940 ESR –
Conduction-cooled model



Cisco 5940 ESR – Conduction-
cooled model

Impact Tactical Deployable Baseband

Impact Tactical

- Small Footprint, Modular Baseband
- Server, Router, Switch, MANET and UPS Modules
 - Cisco ESR 5915 Router
 - Cisco ESS 2020 Switch
- Supports VM Applications
- Rapid, Low Cost LRU
- 20 Lbs Fully Populated
- 12"x14"x6.5"
- Supports Cisco CME



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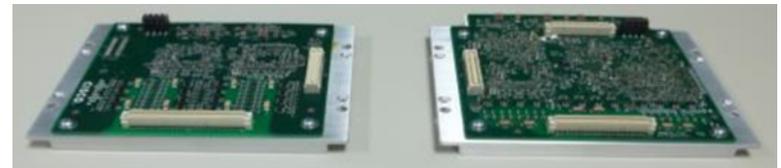
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Embedded Switching



Cisco ESS 2020

Questions?





CISCO