



ACCELERATING
INNOVATION

Accelerating Value with Ethernet-APL: Innovative Solutions for Modern Networks

Session ID: 3-1856

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Important Reminders

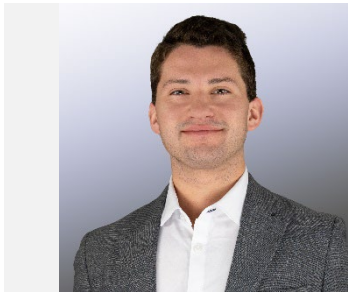
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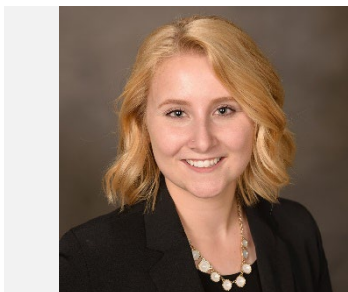
Anupa Beharrysingh

Product Marketing Manager, Ethernet-APL
Emerson



Wilson Pietruszewski

Product Manager, Connectivity
Emerson



Megan Wiens

Product Manager, Cross-Portfolio Technology & Innovation
Emerson



Outline

Megan

Wilson

Anupa

Megan

What is Ethernet-APL?




Why Ethernet-APL?

System Architecture

Development Roadmap

What is Ethernet-APL?

Multiple Connectivity Technologies Exist to Meet User Needs

Wired Connections	Local Wireless	Networked Wireless
<p>Measurement and Control</p>  <p>Examples:</p> <ul style="list-style-type: none"> • Control System Communication • Asset Management • Safety Instrumented Systems 	<p>Maintenance and Diagnostics</p>  <p>Examples:</p> <ul style="list-style-type: none"> • Device Configuration • Maintenance and Diagnostics • Local Troubleshooting 	<p>Monitoring and Optimization</p>  <p>Examples:</p> <ul style="list-style-type: none"> • Application Based Solutions • Remote Monitoring • Low-Update Measurements

Ethernet Has Been Extended Into Hazardous Areas with a New Physical Layer

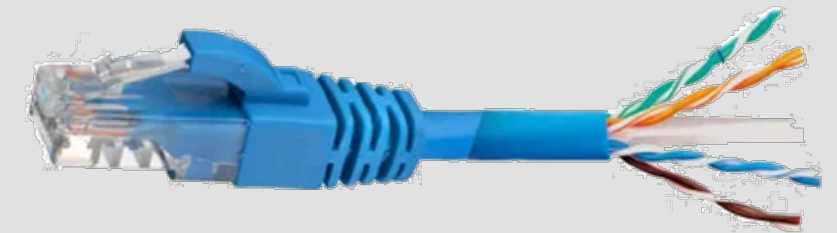


Features of Ethernet

- Transparent connection to any network
- Cybersecurity can be integrated
- IT/OT convergence enabled
- Supports multiple applications / protocols
- FAST communication: high bandwidth

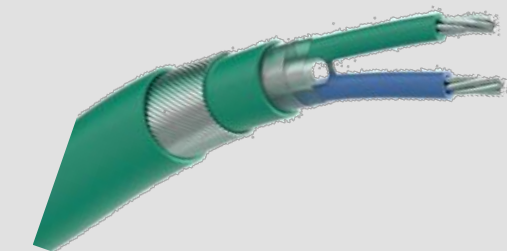
Process Industry Barriers:

- Not available on 2-wire instruments, 4-wire only
- Requires separate device power
- Not Intrinsically Safe – Difficult in hazardous locations



Features of Ethernet-APL

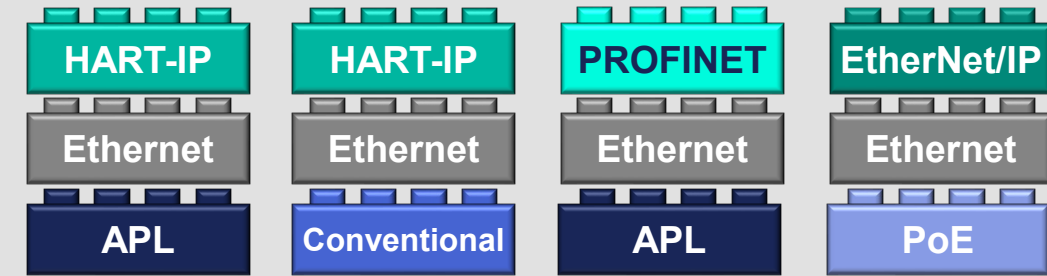
- All the benefits of Ethernet
- Targets market with explosive environments
- Two wires
- Delivers field power (multiple APL power classes)



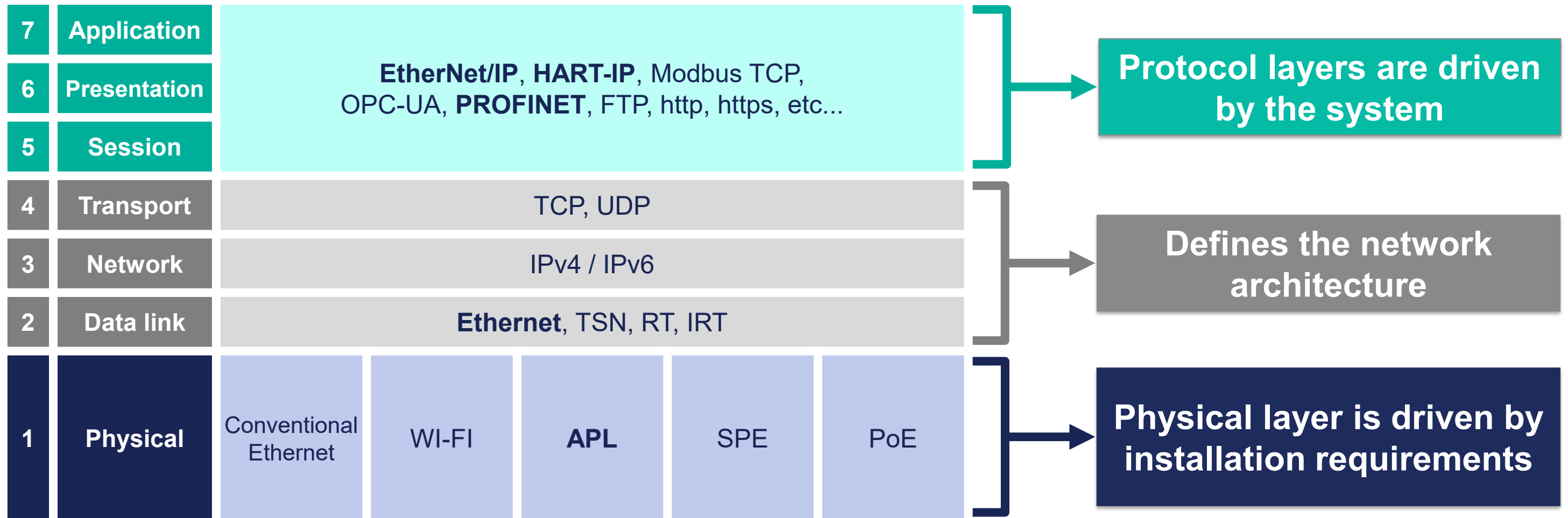
The Difference is in the Wiring!

Ethernet - Open System Interconnect Model

Ethernet Building Blocks



ISO / OSI Model



Ethernet networks integrate easily, independent of protocol and physical layer



Power & Ethernet Communication Over 2 Wires

Traditional Ethernet



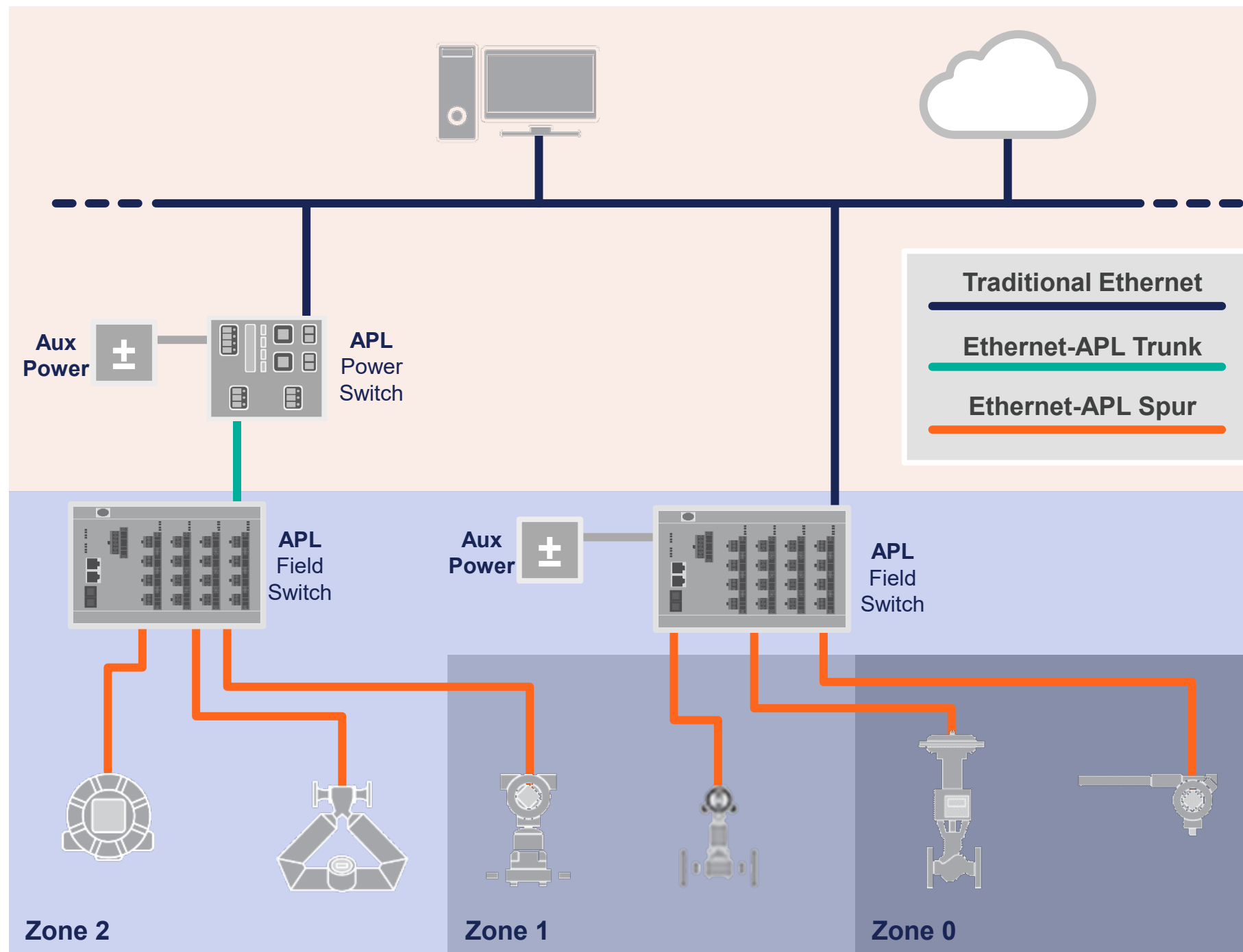
- RJ45 Copper Wire up to 100m or Fiber Communications up to 550mz

APL Trunk (Distribution)

- 10mbps Communications up to 1km / 3300ft
- Explosion Proof / Increased Safety
- 60W Power Delivery to Field Switch
 - 50+ field devices

APL Spur (Device Connections)

- 10mbps Communications up to 200m / 650ft
- Intrinsically Safe to Zone 0 / C1D1
- 540mW Power Delivery
 - >8x Power vs 4-20 mA

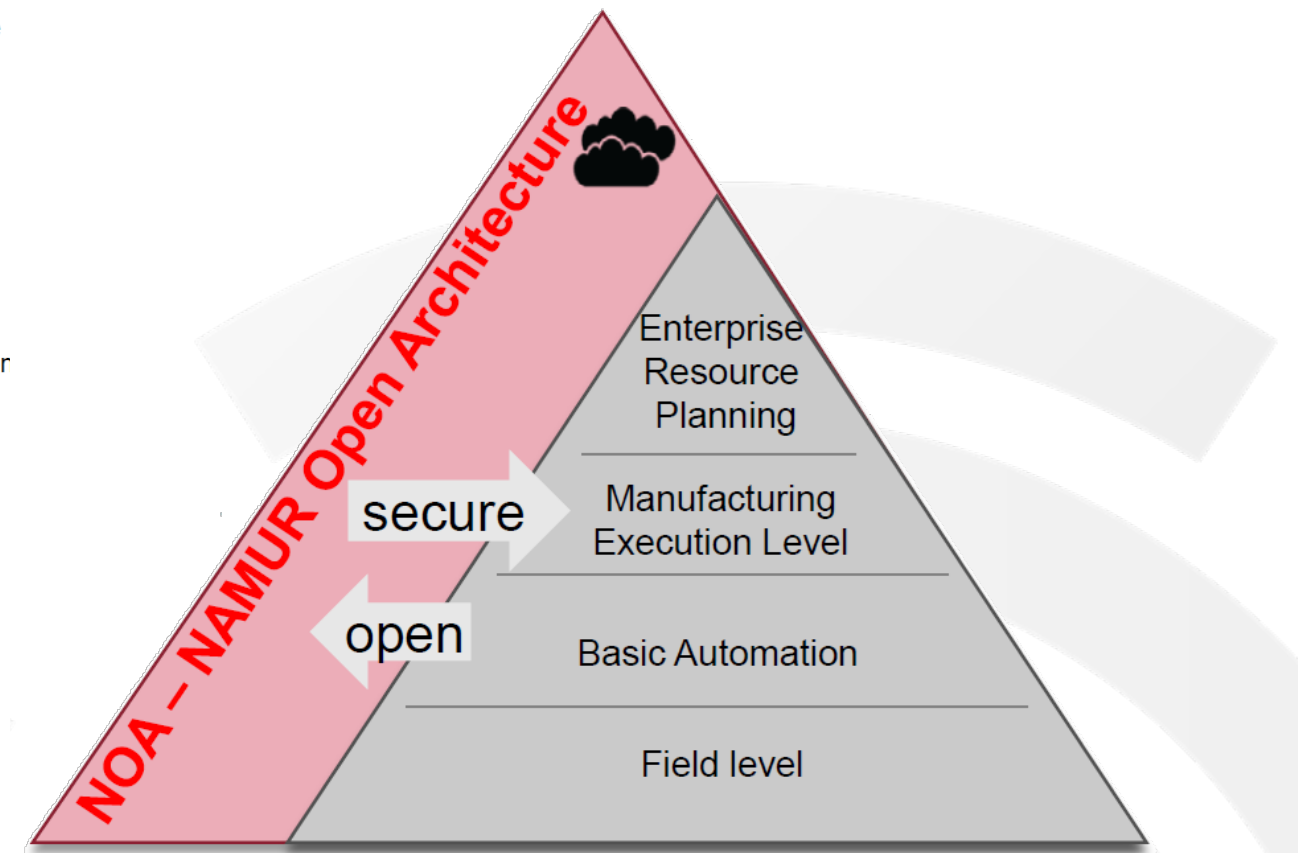
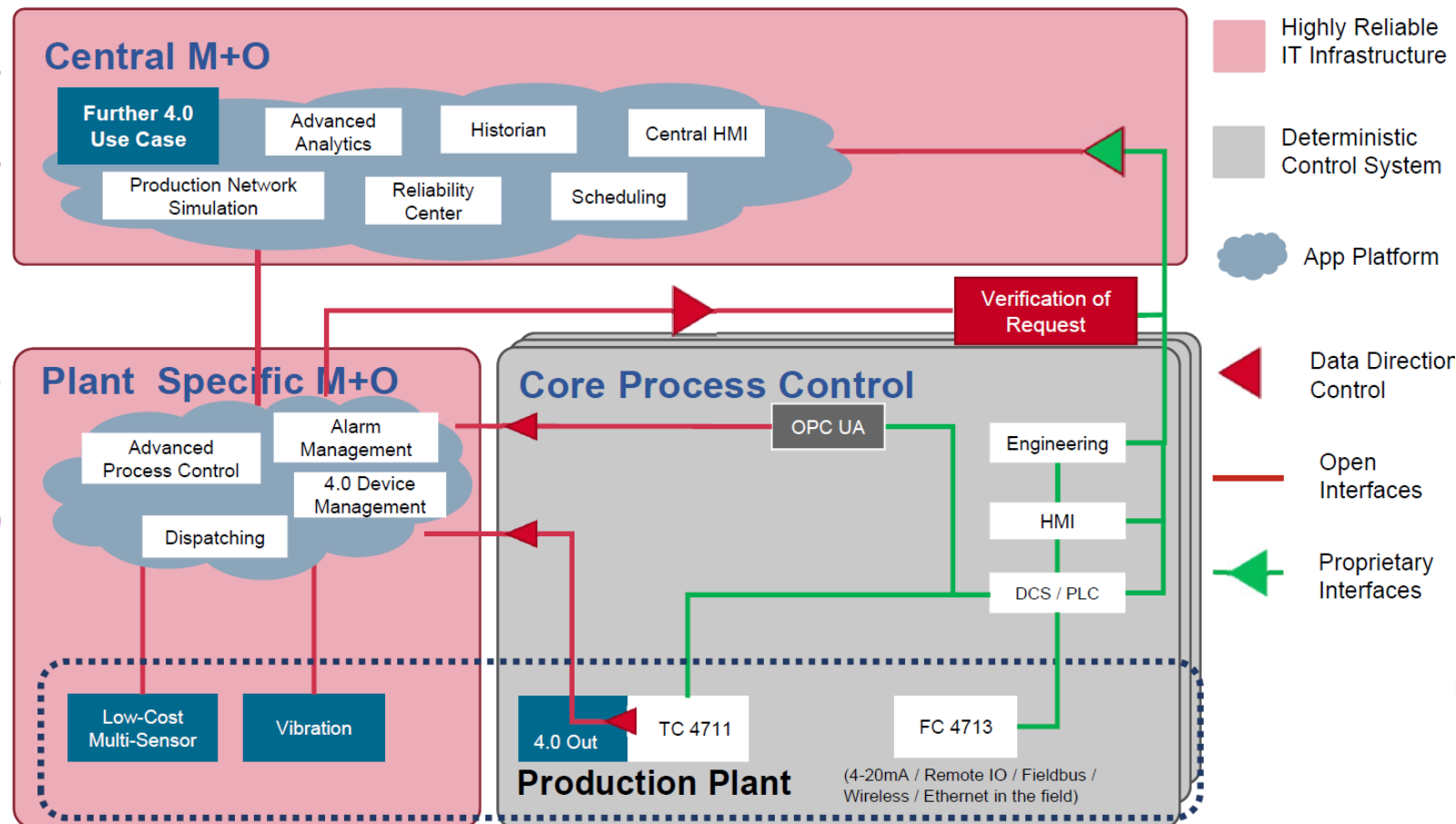


Why Ethernet-APL?

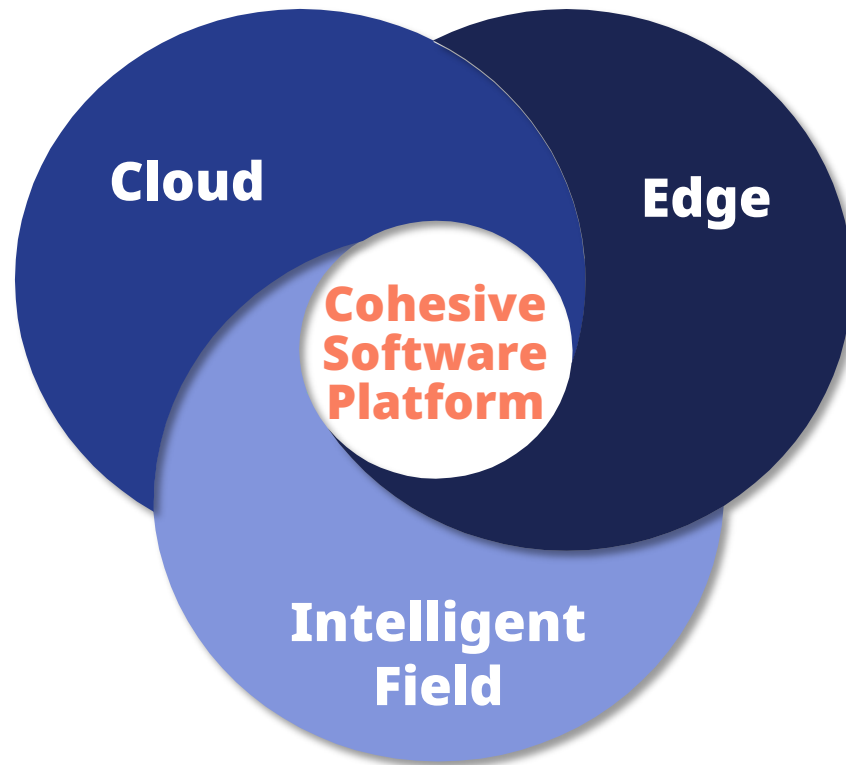
NAMUR Open Architecture (NOA): Unlocking Interoperability

- Seamless Connectivity across industries
- Scalability & Flexibility
- Enhanced Operational Efficiency

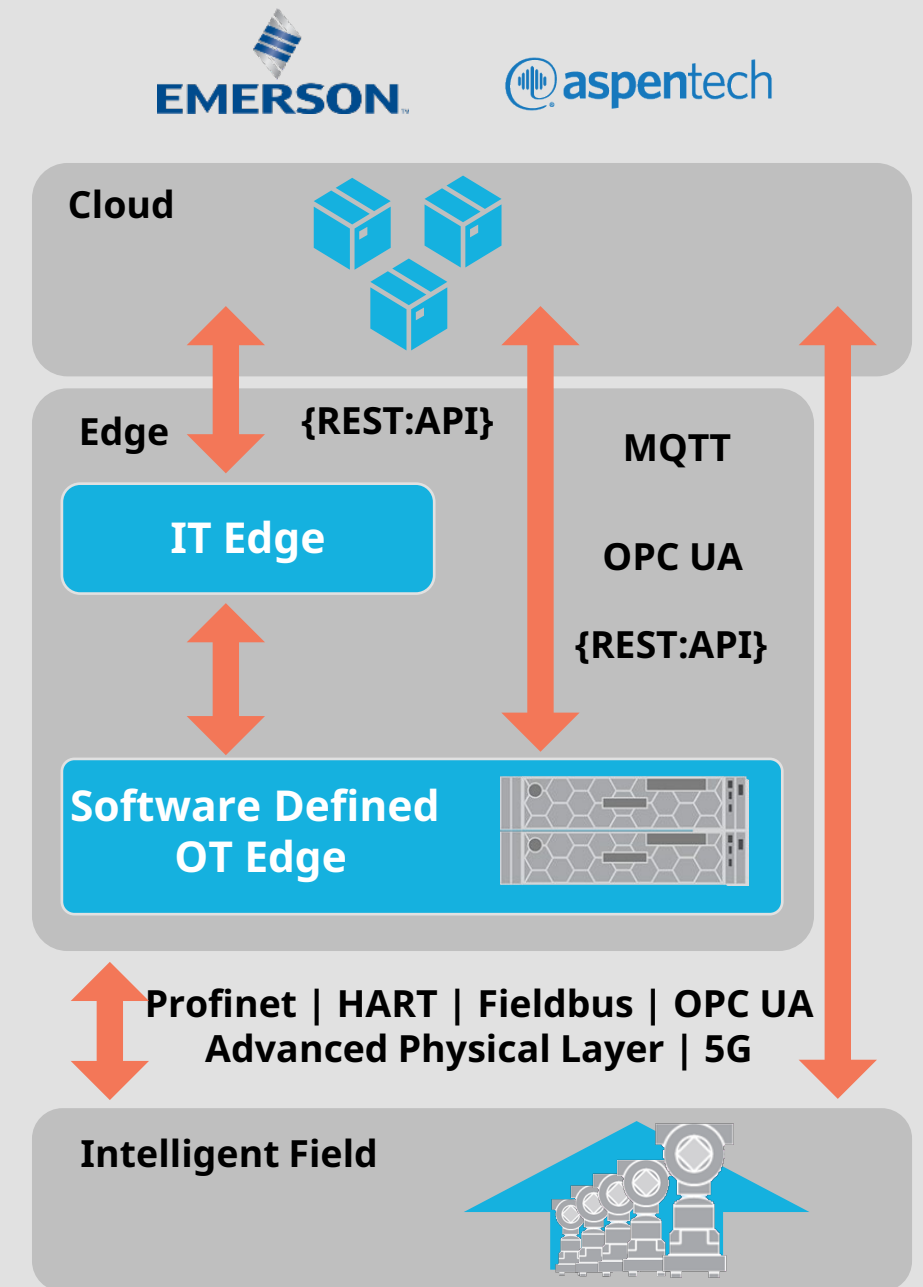
Monitoring and Optimization (M+O)



Emerson's Boundless Automation Leads the Way to the Next Architecture Paradigm



- **Flexible computing domains** seamlessly interact and exchange data
- A common, **consistent data model** provides **ease of use** and application of usable data at all levels
- **Functional “systems”** (control, reliability, etc.) as suites of software distributed across common compute infrastructure
- Zero trust security architecture **provides dynamic functional “zones” of authorization**





ethernet-apl™
advanced physical layer

Ethernet Changes How Users Work with Field Devices



Innovation

- Ethernet-APL provides a new frontier for innovation and development around our world class Automation platform
- Agile integration between field devices, control systems, and enterprise layers

Improved Diagnostics & Maintenance

- Flexible, fast access to rich datasets from devices
- Supports firmware updates and proactive maintenance without disrupting operations
- Power and bandwidth enables new diagnostic possibilities

Simplified Network Architecture

- No longer need multiple, complicated network architectures because data can be shared across automation applications
- Scalability and flexibility in network design

Remote Device Access

- Access full device information remotely from the network
- Web-based user interface simplifies configuration and maintenance without specialized equipment or local device access

Enterprise-Level Insights

- Transmit large volumes of data to cloud and edge applications for advanced data processing and analytics
- Ethernet enables connectivity between industrial devices and enterprise-level systems

High-Speed, Rich Data

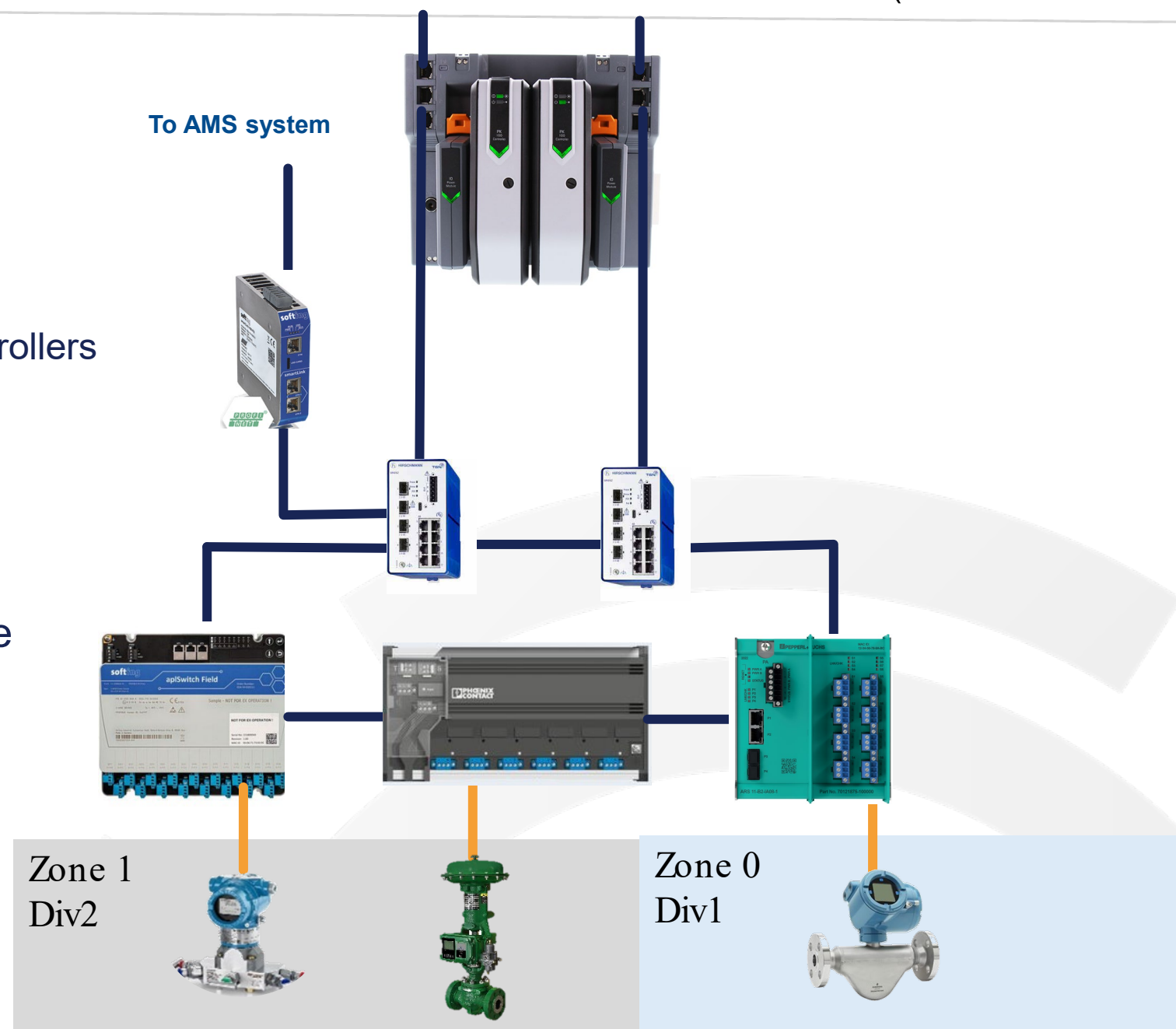
- Increased data throughput allows for more detailed and comprehensive process monitoring and optimization
- Bandwidth and speed enable easier access to more complex datasets from instruments

System Architecture

The 1st Generation Ethernet-APL Solution

DeltaV ACN (Area Control Network)

- Profinet MRP Ring Topology
 - MRP ring limitation is ~ 50 devices per ring
- Device limitations per system
 - 1000 device limitation, spread across multiple controllers
 - A single PK can handle up to 250 devices
- Reconnection time upon failure in ring
 - <200ms
- Ethernet-APL switches are a single point of failure
- Distance limitations
 - APL Spur 200m



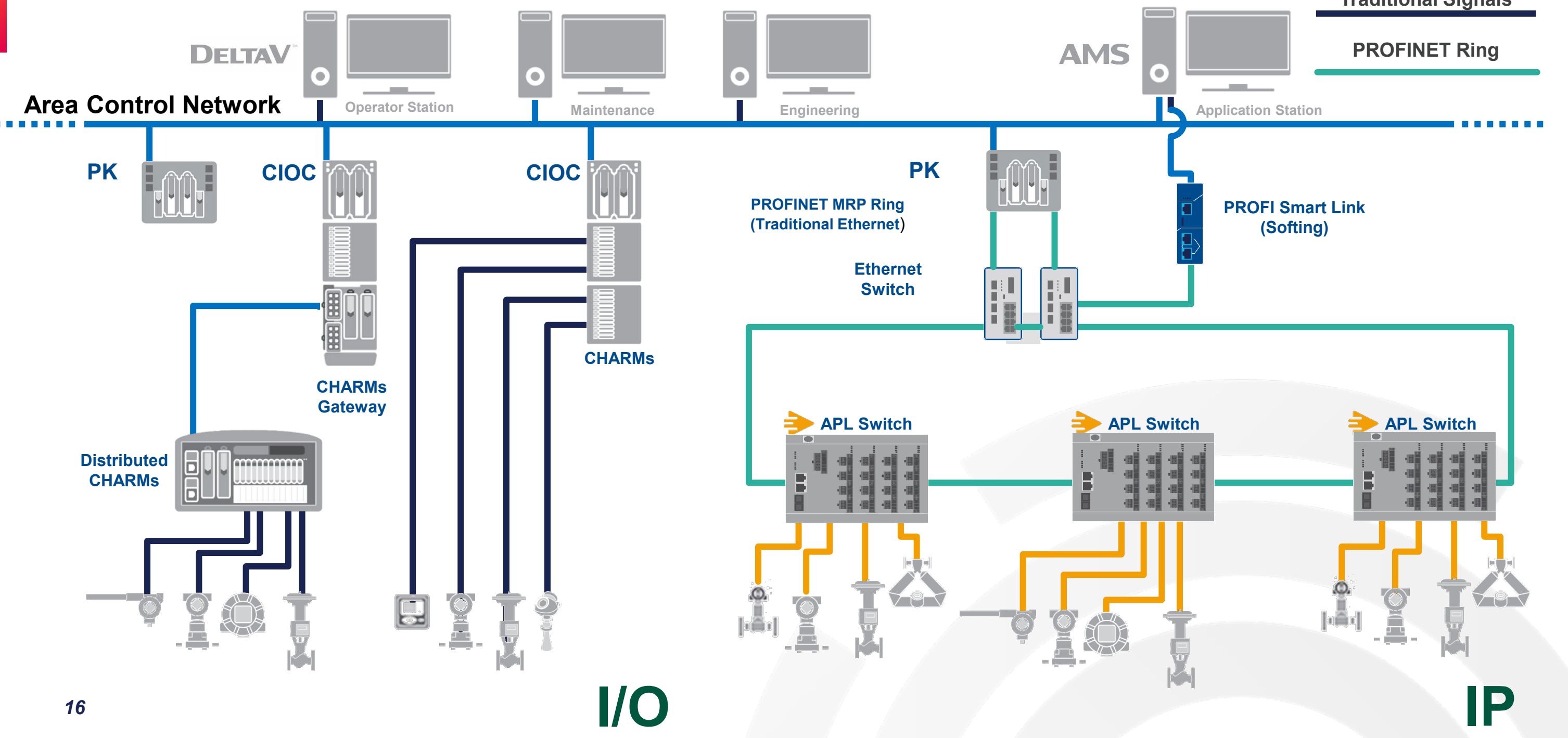
Ethernet-APL First Generation System Architecture

Traditional Ethernet

Ethernet-APL

Traditional Signals

PROFINET Ring



APL Devices and Cybersecurity

Why Don't We Worry About Security on Today's Wired Devices?

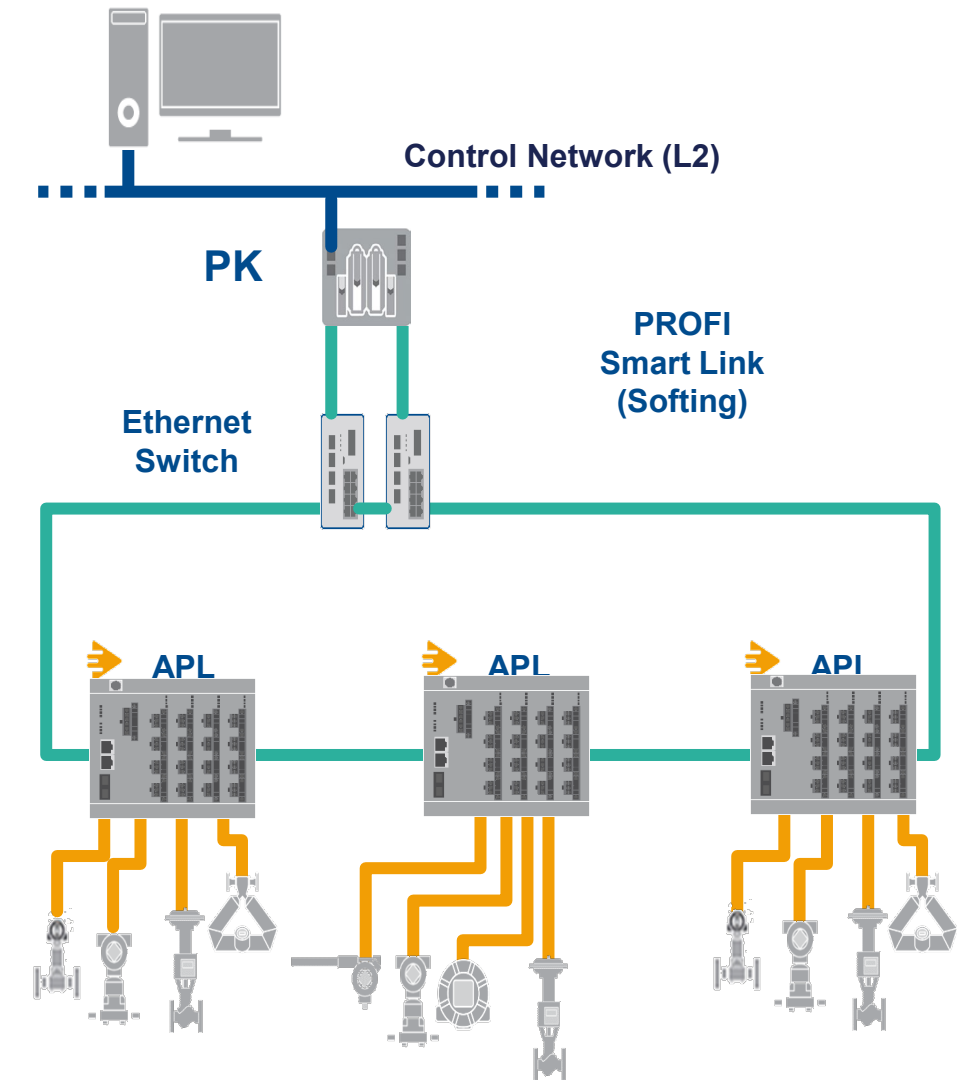
- Today's protocols are serial / bussed interfaces requiring an I/O subsystem
 - vs. IP Devices are routable and available across the network
- Physical security is often considered good enough

Wireless Required Security to be on All the Time

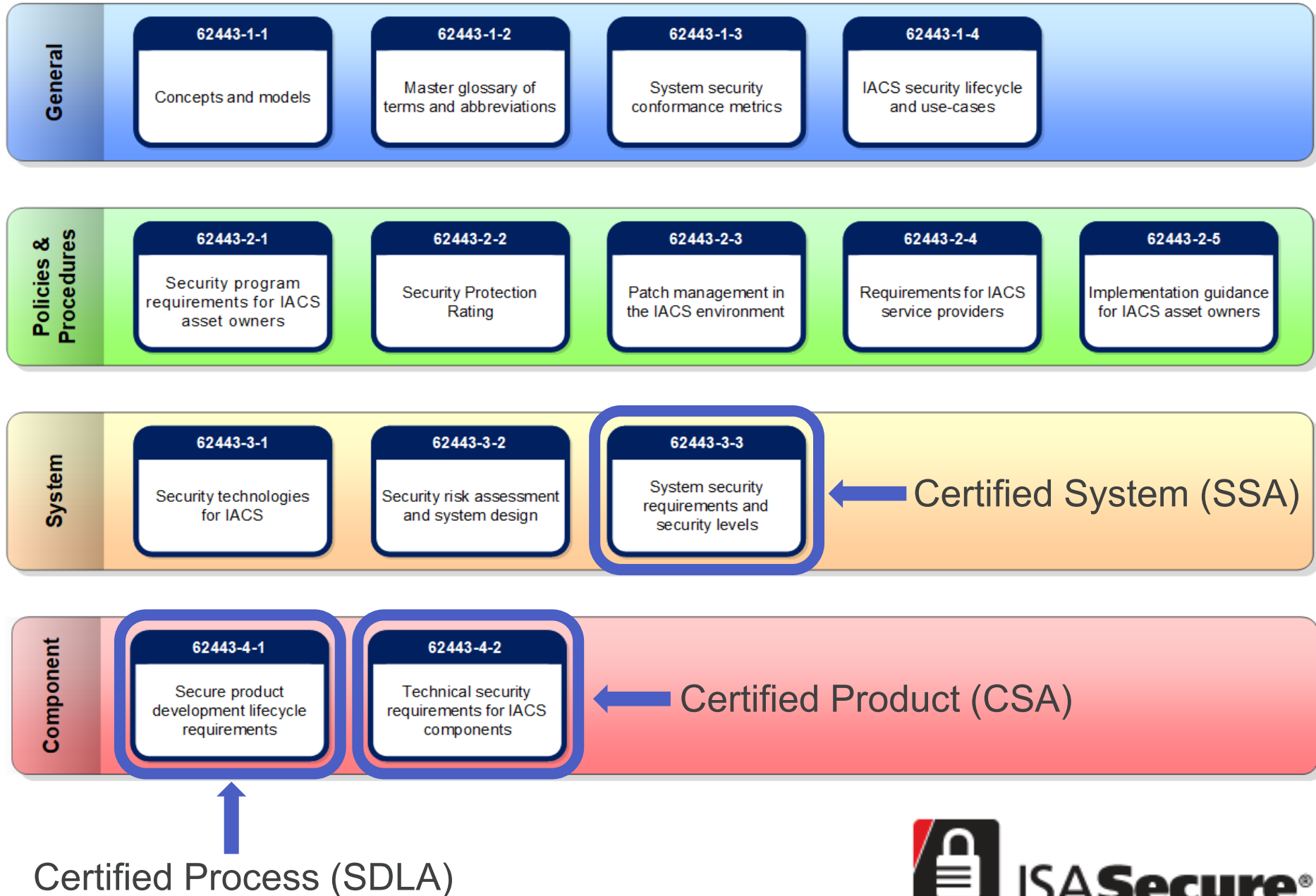
- Both the WirelessHART and ISA100 protocols communicate using encrypted channels

Ethernet-APL Requires Physical Isolation or a Secure Protocol

- APL is just a physical layer – security is determined by the protocol
 - HART-IP and OPC-UA use secure communications
 - PROFINET, EtherNet/IP, and Modbus TCP don't currently have secure communications
- We recommend following the Purdue Model for Network Layers (ISA-95)
 - Process Control Systems are isolated behind firewalls (L2)
 - We recommend physically isolating APL devices below the control network (L0)
- Devices and Systems are recommended to be certified to ISASecure
 - ISASecure certifies to the IEC 62443 family of standards (CSA Certification)



IEC-62443 Cybersecurity Standards



- ISASecure certifications are based on IEC 62443 standards
- Emerson Ethernet-APL development groups are certifying their processes to the ISASecure Secure Lifecycle Development Assurance (SDLA)
- Emerson Ethernet-APL capable Control Systems are certifying to the ISASecure System Security Assurance (SSA)
- Emerson Ethernet-APL Field Devices will pursue ISASecure Component Security Assurance (CSA)

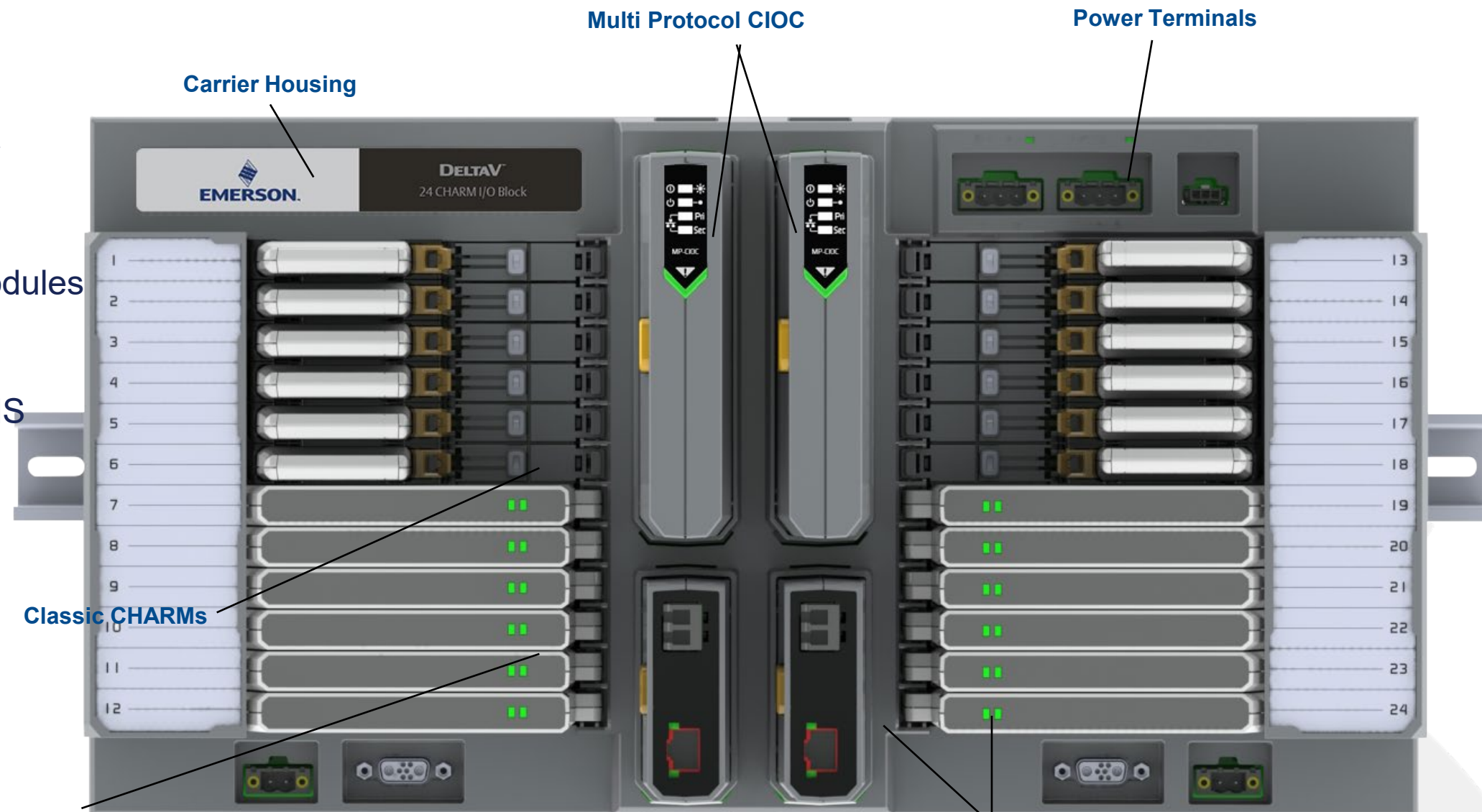


New Generation Electronic Marshalling - 24 CHARM I/O Block Carrier

- 24 CHARM mix and match capability
- Multi Protocol CIOC
- Redundant Fiber or Ethernet IOP Modules
- No single point of failure
- Expandable to 72 traditional CHARMS



New APL CHARM Modules



Classic CHARMs

New Fiber IOPs

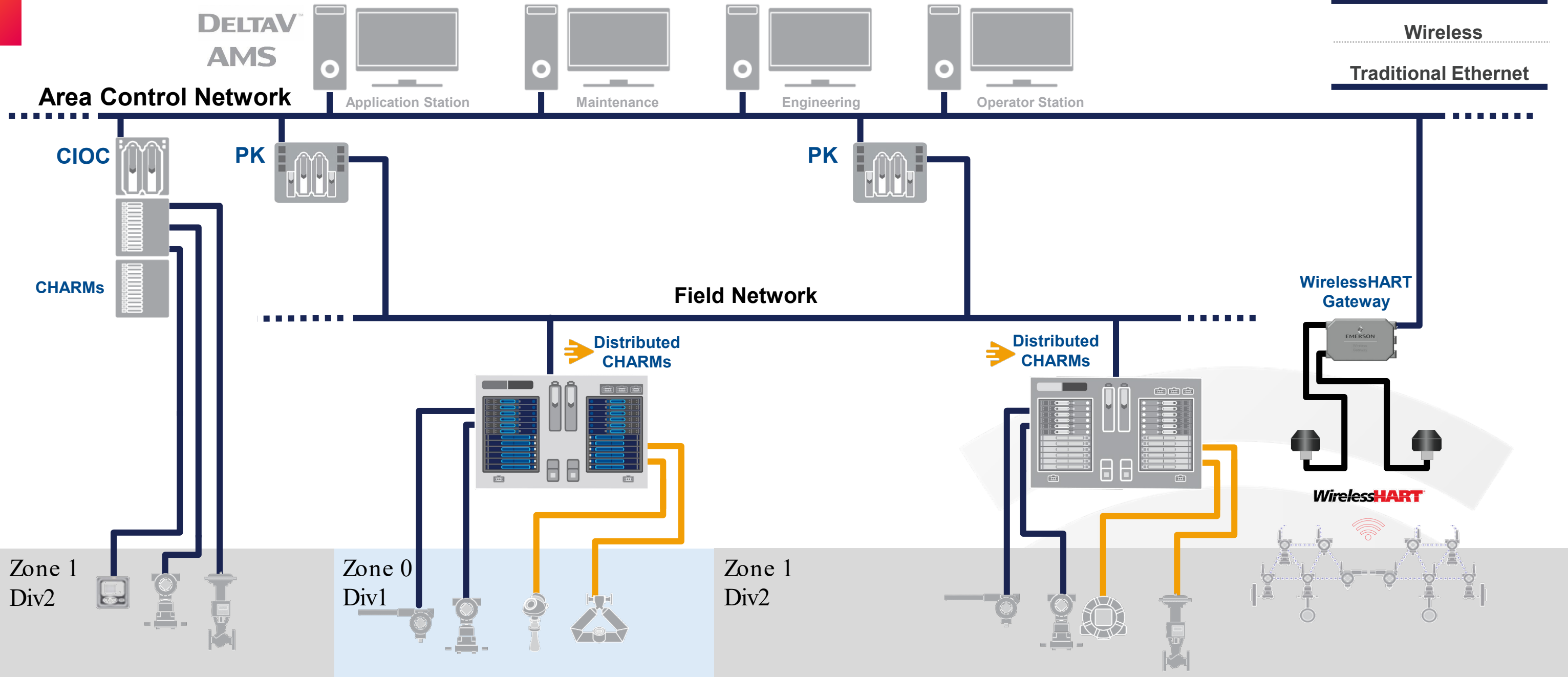
Ethernet-APL Impact on System Architecture

Ethernet-APL

Traditional Signals

Wireless

Traditional Ethernet



AMS Device Manager Connectivity

Start-up & Commissioning

Improving Reliability

Troubleshooting

Compliance

Emerson Control Systems
DeltaV, Ovation and
OpenEnterprise
APL CHARMs

APL Switches
HART Multiplexers
Fieldbus Gateways

Emerson Wireless
Gateways

Third Party Systems
ABB 800XA, Kongsberg Maritime
Honeywell, Triconex, HIMA,
HART-IP, Allen-Bradley /
Rockwell PLC's

Field Communicators
275, 375, 475, AMS Trex

Fire and Gas Systems
Det-Tronics EQP

Calibrators

Modems
HART, Profibus, Fieldbus

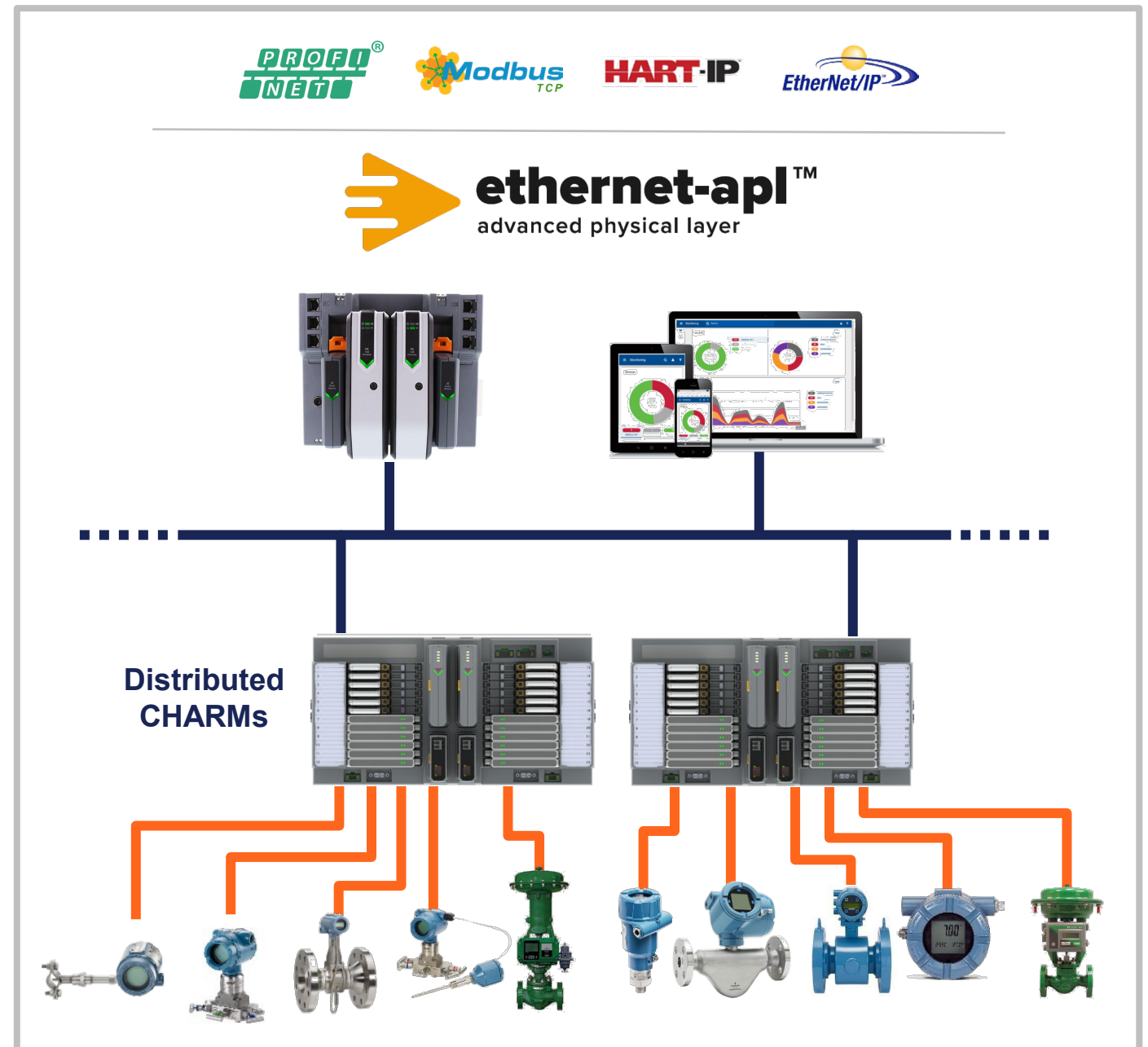


Development Roadmap

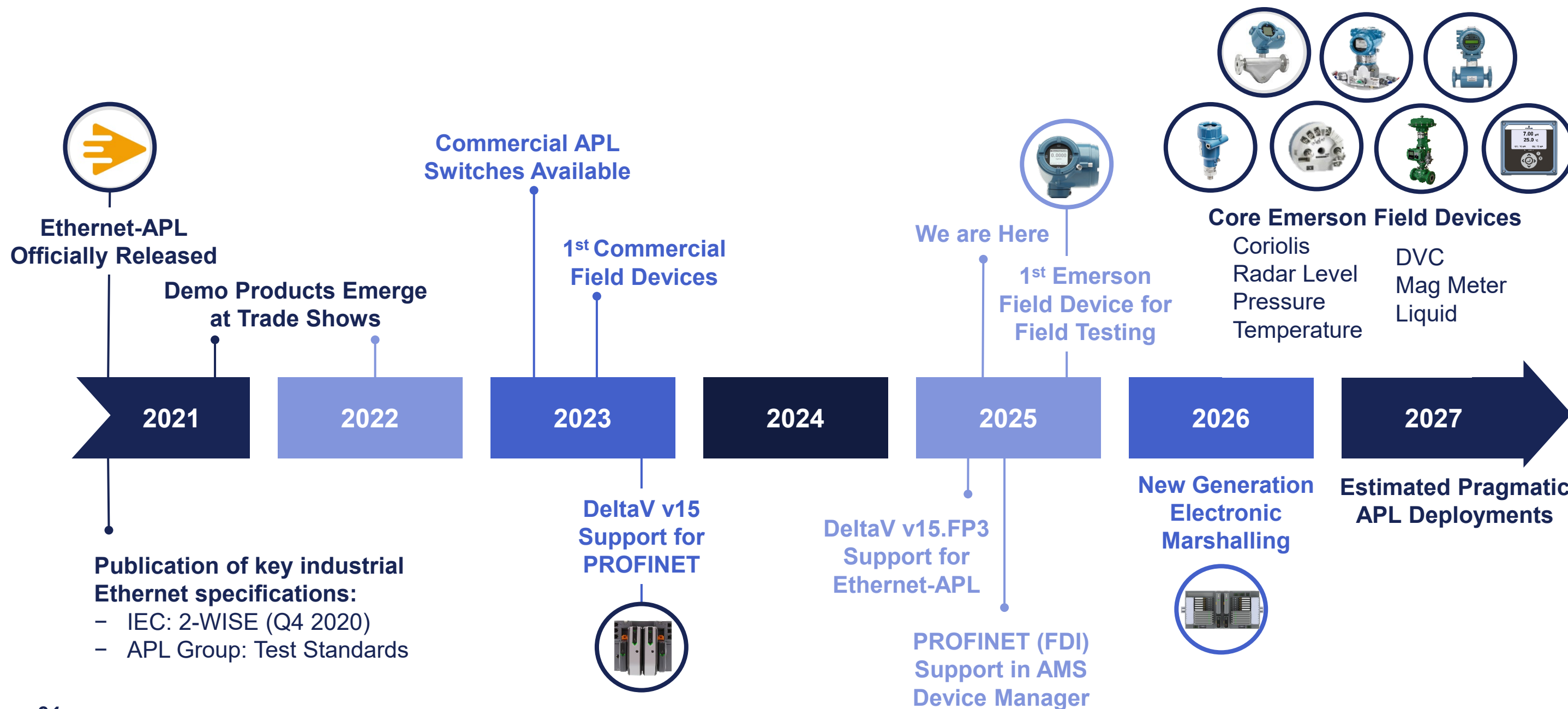
Emerson is Focused on a Cohesive Ethernet-APL Ecosystem

- 💡 Flexible, Easy to Use, Open Ecosystem
- 💡 Single Infrastructure for APL and Traditional I/O
- 💡 Multiple Protocols Planned:
PROFINET, Modbus TCP, EtherNet/IP, HART-IP, OPC-UA
- 💡 IEC 62443 ISASecure Security Certifications
- 💡 IEC 61508 Functional Safety for Devices

DELTA V™ **AMS** **FISHER™**
ROSEMOUNT™ **FLEXIM**
MICRO MOTION



Ethernet-APL Development Timeline

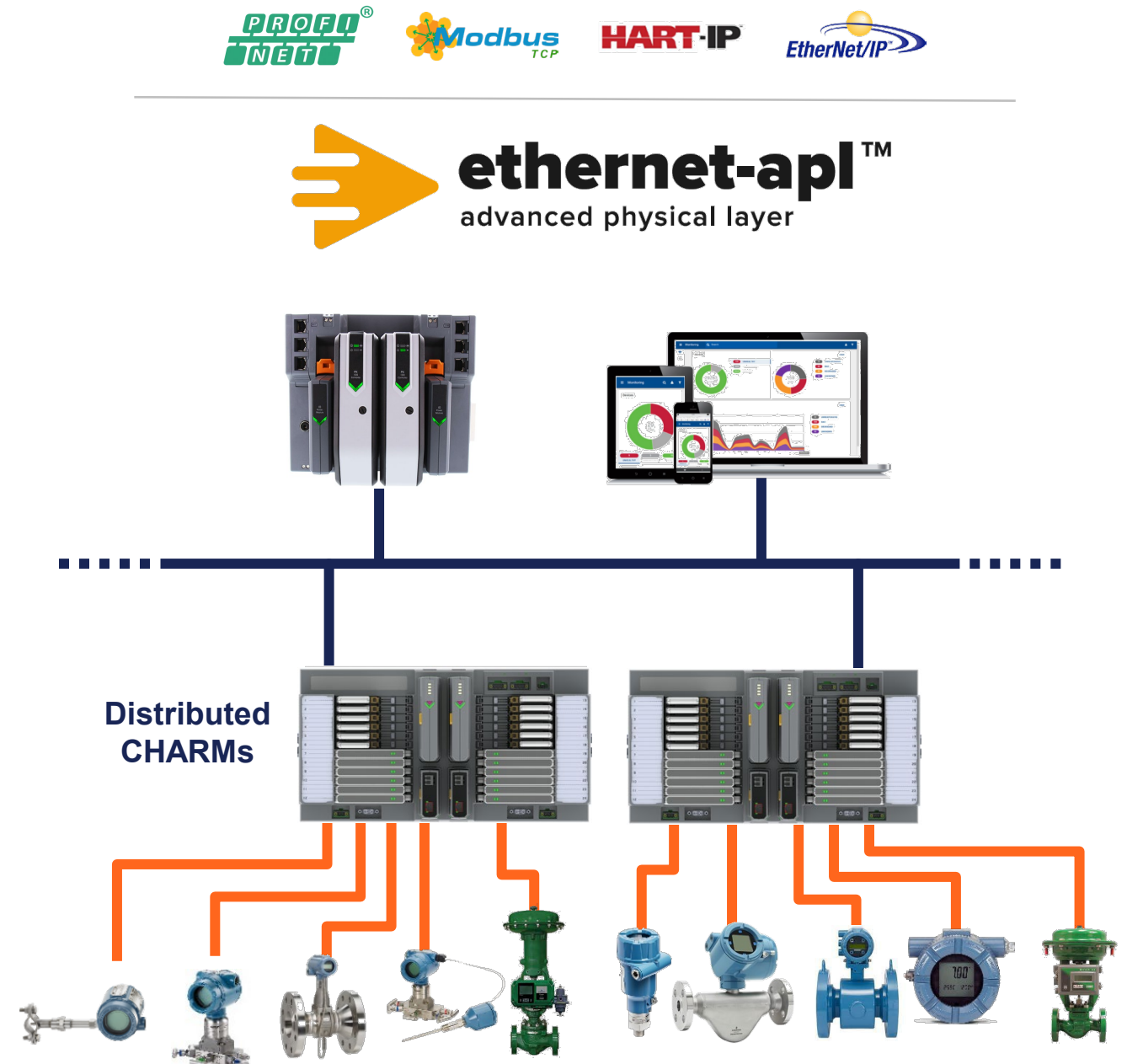


Conclusion



Conclusion

- Ethernet-APL is just a wire. APL brings *Ethernet* to the field
- Features and benefits come from the protocol and how the technology is implemented in the system
- Emerson is actively developing an Ethernet-APL ecosystem
 - From device to asset management to system
 - Simple, secure, and flexible!



Find us at Exhibit #350

DeltaV Ethernet-APL Solutions

Find More Information

[Ethernet-APL For Intelligent Field Device Connectivity | Emerson US](#)

[DeltaV Ethernet-APL | Emerson US](#)

Contacts

Anupa Beharrysingh: Anupa.Berharrysingh@emerson.com

Wilson Pietruszewski: Wilson.Pietruszewski@emerson.com

Megan Wiens: Megan.Wiens@emerson.com





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Thank You