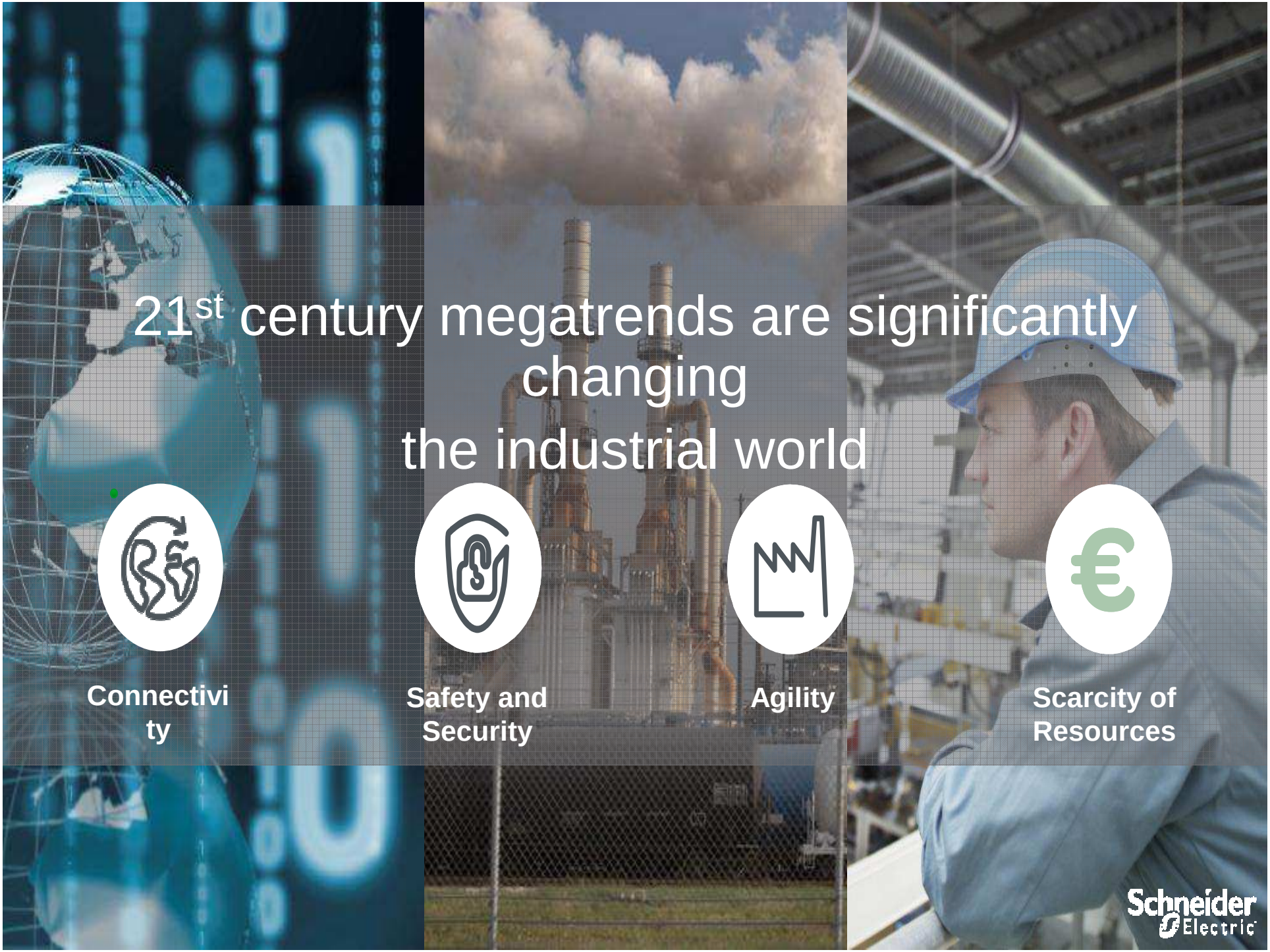
New concept in automation: ePAC

November 2015

OMICS International
Electronics and Electrical Engineering
November 03-05, 2015 Valencia, Spain


21st century megatrends are significantly changing
the industrial world
Connectivi ty
Safety and Security
Agility
Scarcity of Resources
Schneider Electric

Connectivity

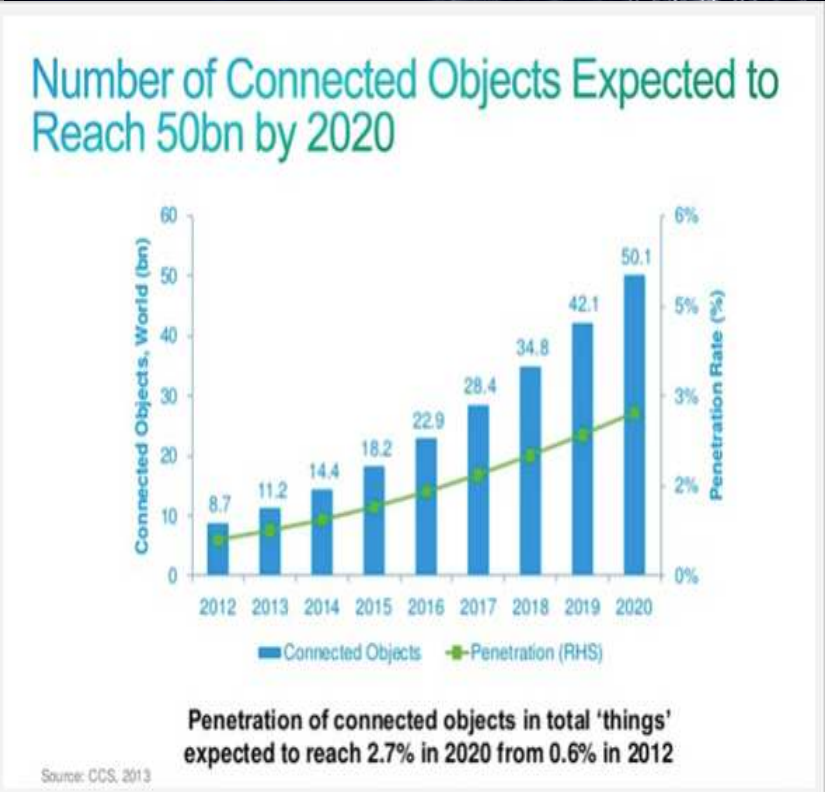


50 Billion of people & devices connected in 2020

Intelligence everywhere

Big Data

High Processing

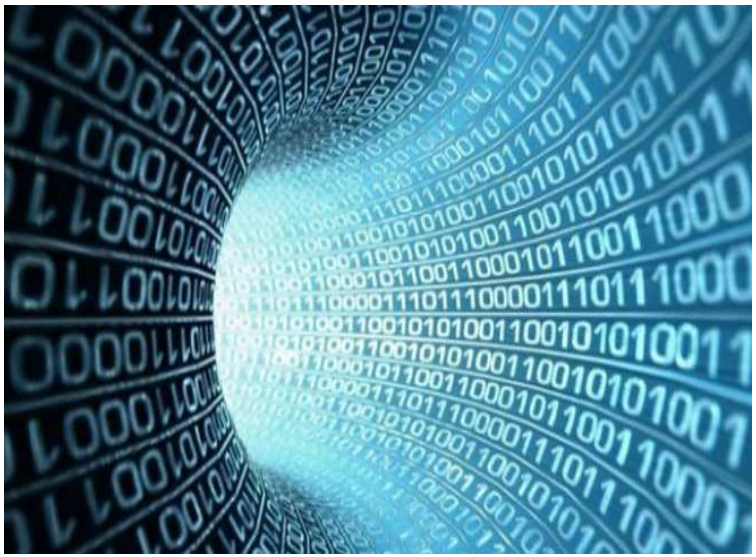


Source: Cisco

Connectivity Challenges in Automation

Challenges in automation are how to

- Interconnect large volumes of smart devices
- Converge IT/OT worlds for advanced analytics
- Manage huge flows of data
- Process high volumes of information



How we can help you to get the most of Connectivity

Unique ePAC concept provides **seamless connectivity** from shop floor to top floor for **productivity and efficiency**

- **Ethernet integrated everywhere** as the system bus
- **Open architecture** based on standards
- High accuracy thanks to **determinism**
- Native **integration of IT technologies**
- End to end native **Transparency** at 100 Mbps

5x **performances**

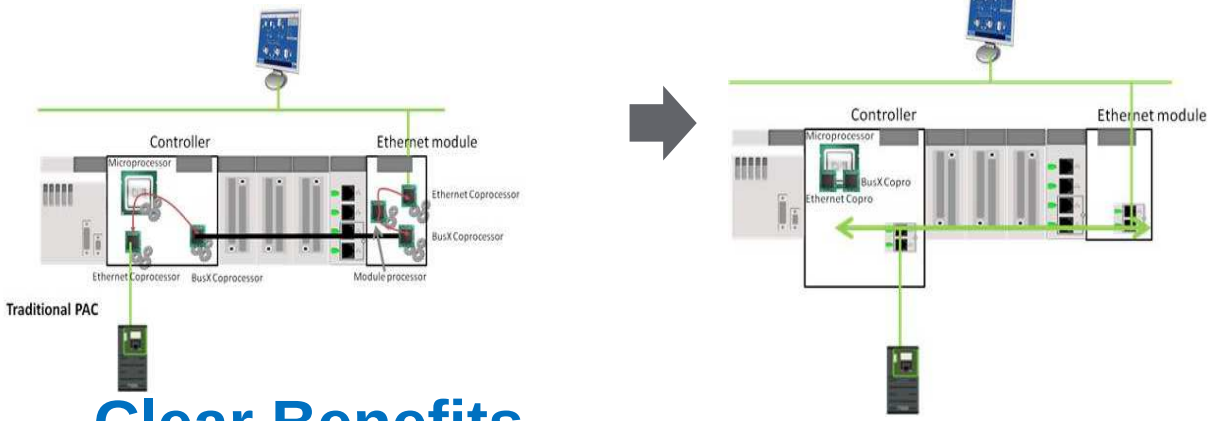
Save **up to +30%**
in design and cabling

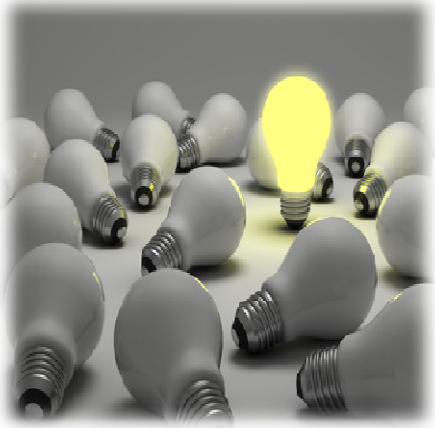
Save **up to +50%**
in architecture expenses

Diving inside ePAC concept

Standard Ethernet at the core of the system

For an unlimited tranparent and open architecture





Unique concept
on the market

Clear Benefits

- No more Ethernet co-processor for faster Ethernet processing
- Increase useful bandwidth thanks to CPU embedded switch
- No impact on performances even with big amount of communication

Diving inside ePAC concept

Do you remember when…?











Diving inside ePAC concept

Clear Benefits

- Simplify cabling
- Needless power supply
- Easy configuration
- Easy troubeshooting
- Reduce footprint
- Cost effective



X80 Integrated : switches, Wifi access point, optical fiber converter, serial, AS-i, CANopen*, and router*

Pillars of integrated automation

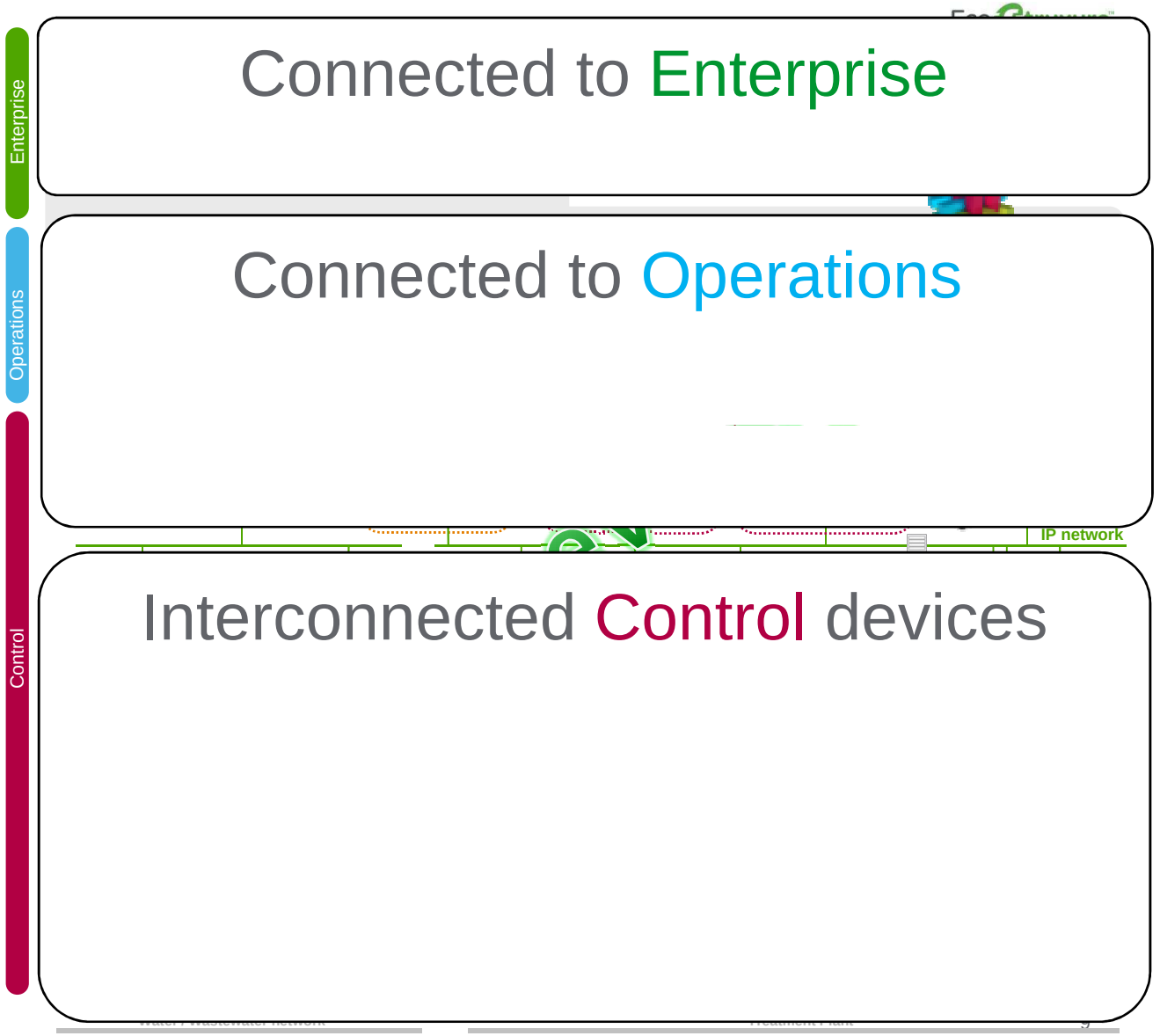
Connectivity

Interconnected Control devices connected to Operations and to Enterprise

With **standard** Ethernet and IP based protocols

Device integration

With **standard** based engineering software, Expert suite, and Web Services based StruxureWare



Pillars of integrated automation

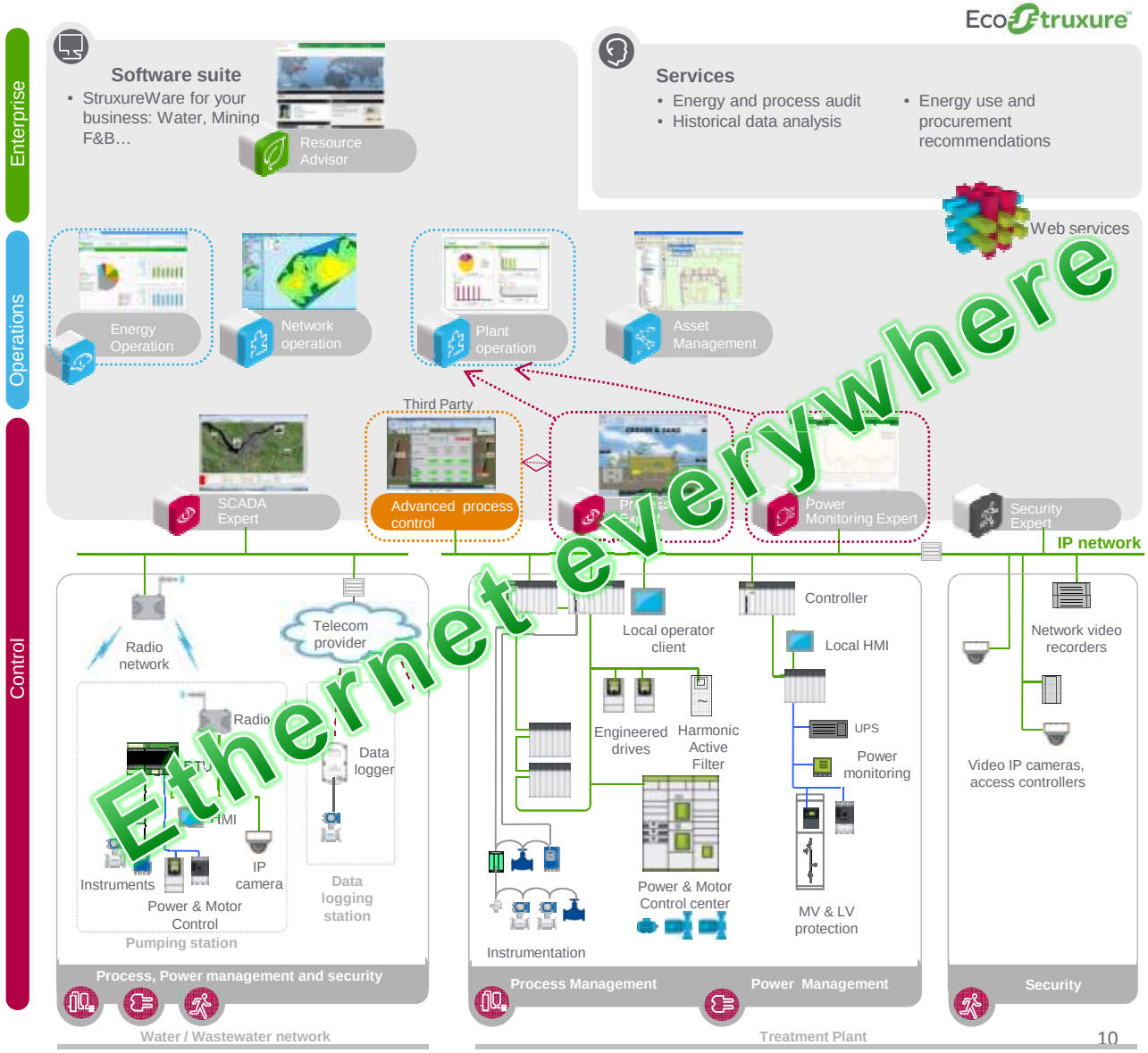
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Interconnected Control devices connected to Operations and to Enterprise

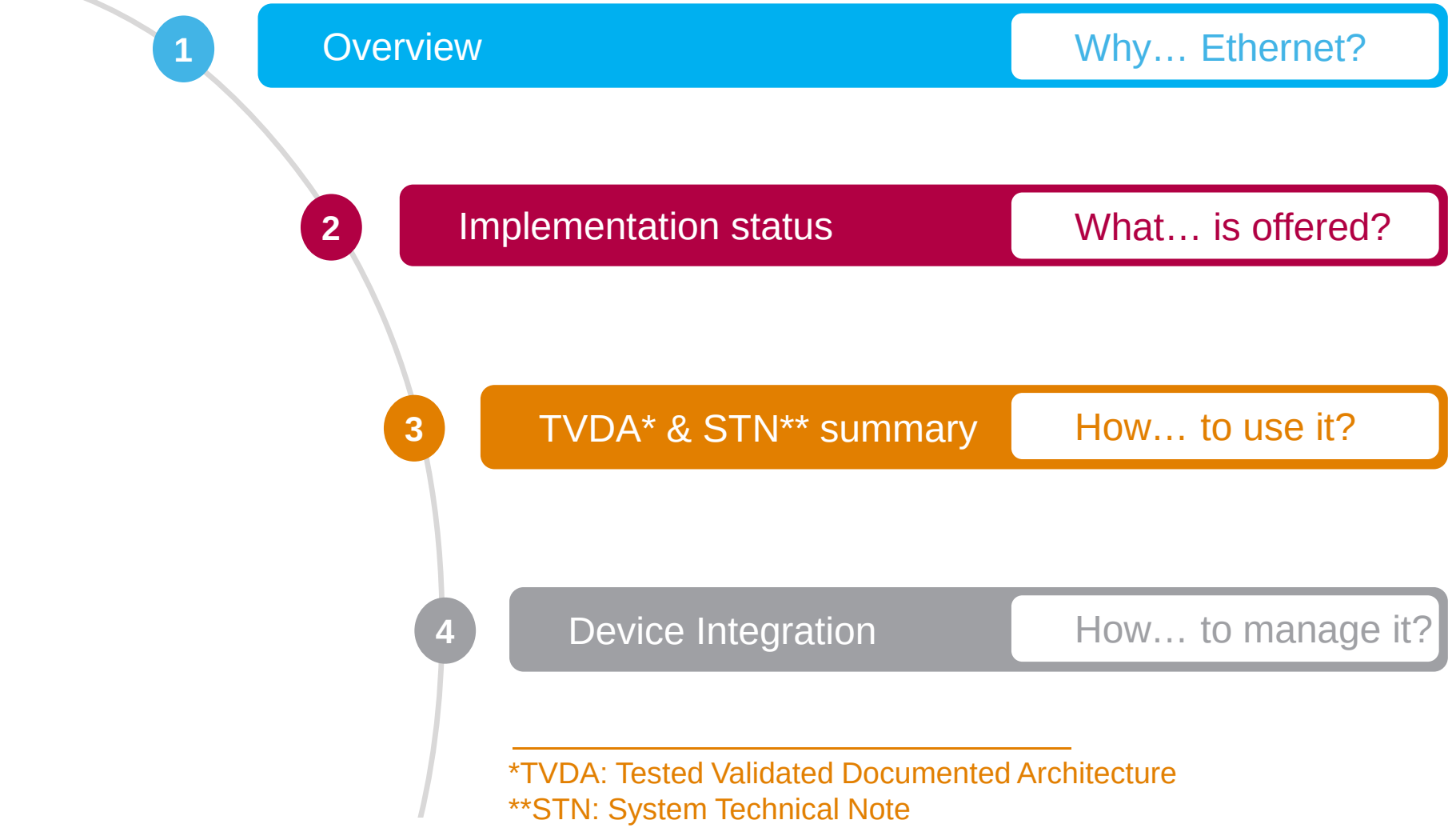
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Device integration

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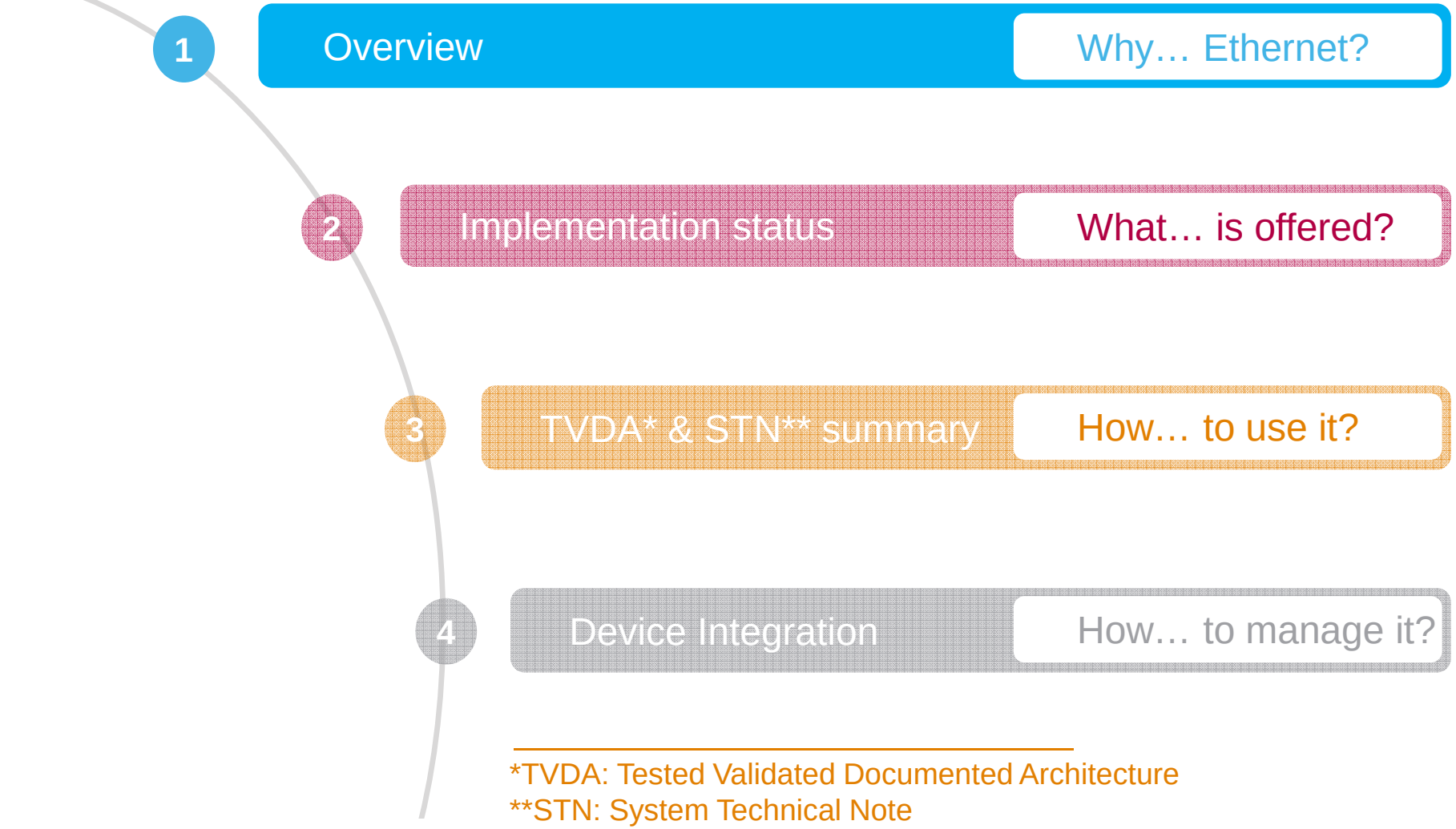


Ethernet at Industry



*TVDA: Tested Validated Documented Architecture
**STN: System Technical Note

Ethernet at Industry



*TVDA: Tested Validated Documented Architecture
**STN: System Technical Note

Your business demands

Ethernet & standard protocols offer



Scalability



Simplicity



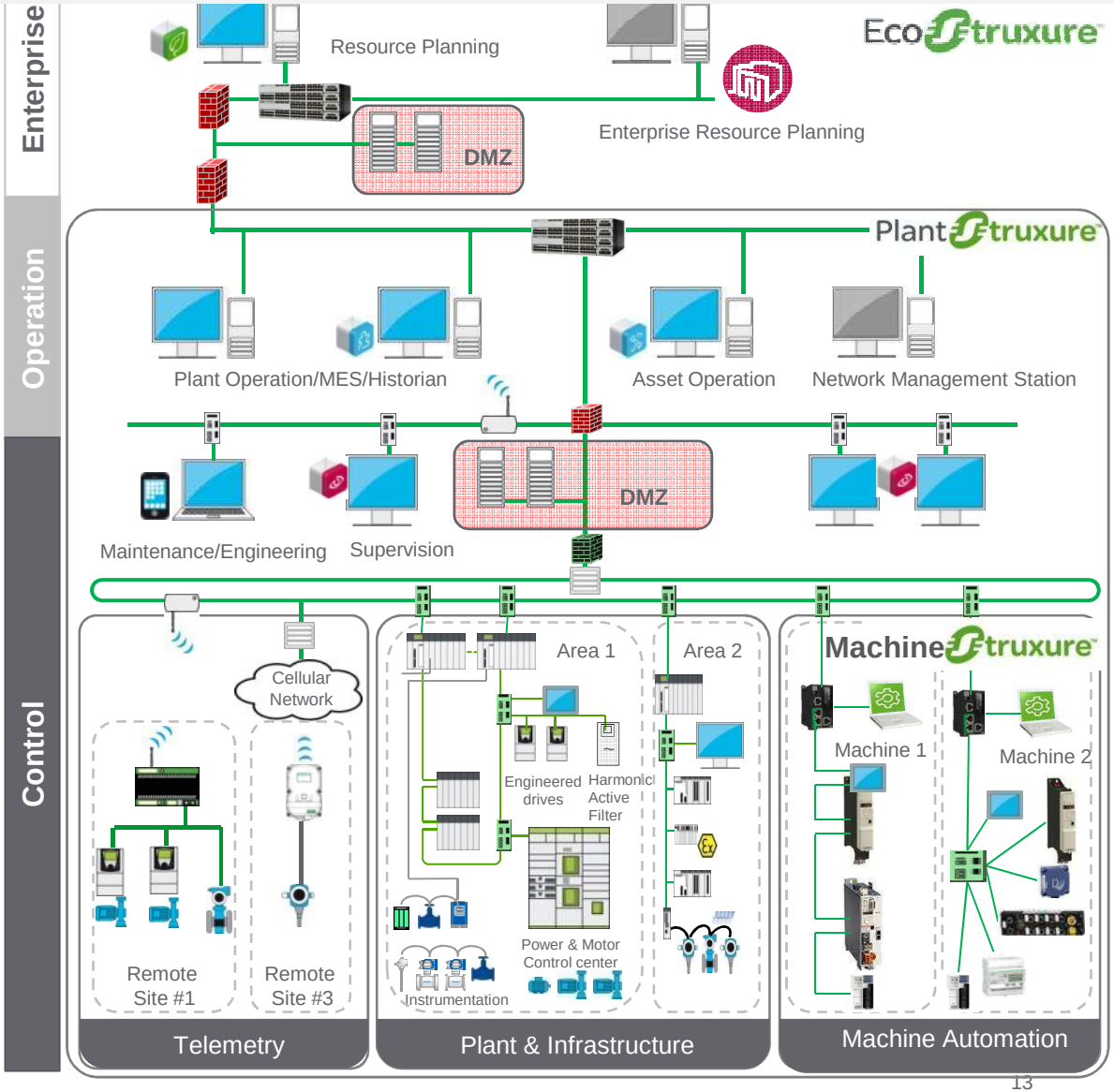
Efficiency



Availability

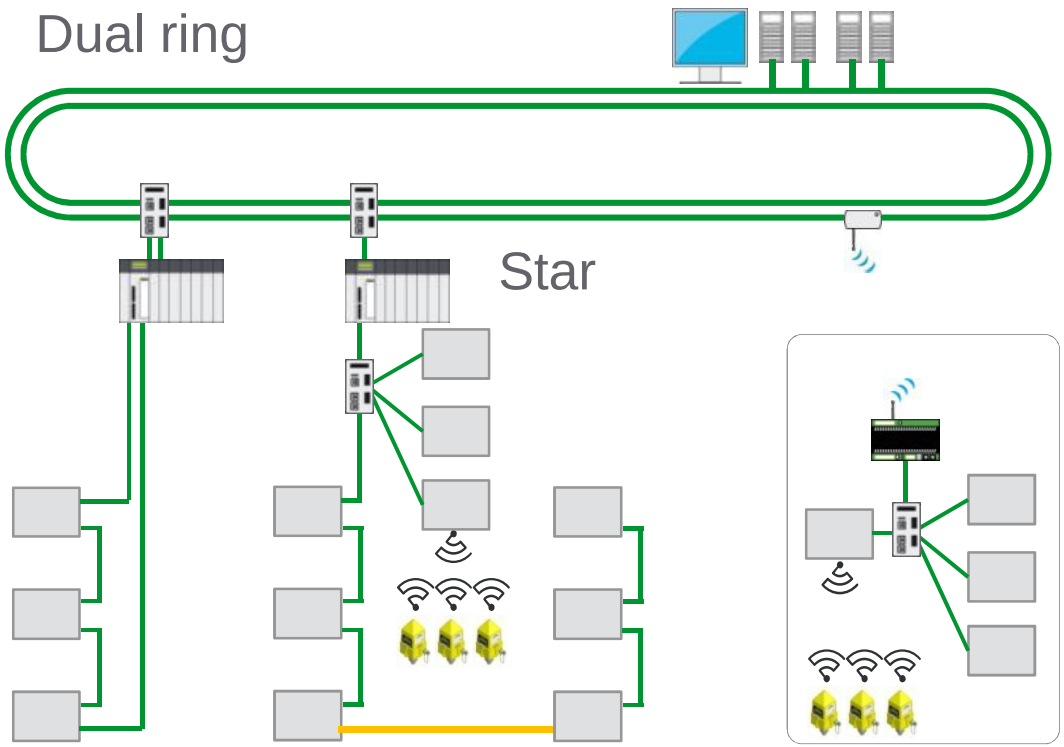


Protection



Scalability

Flexible topology: Mix

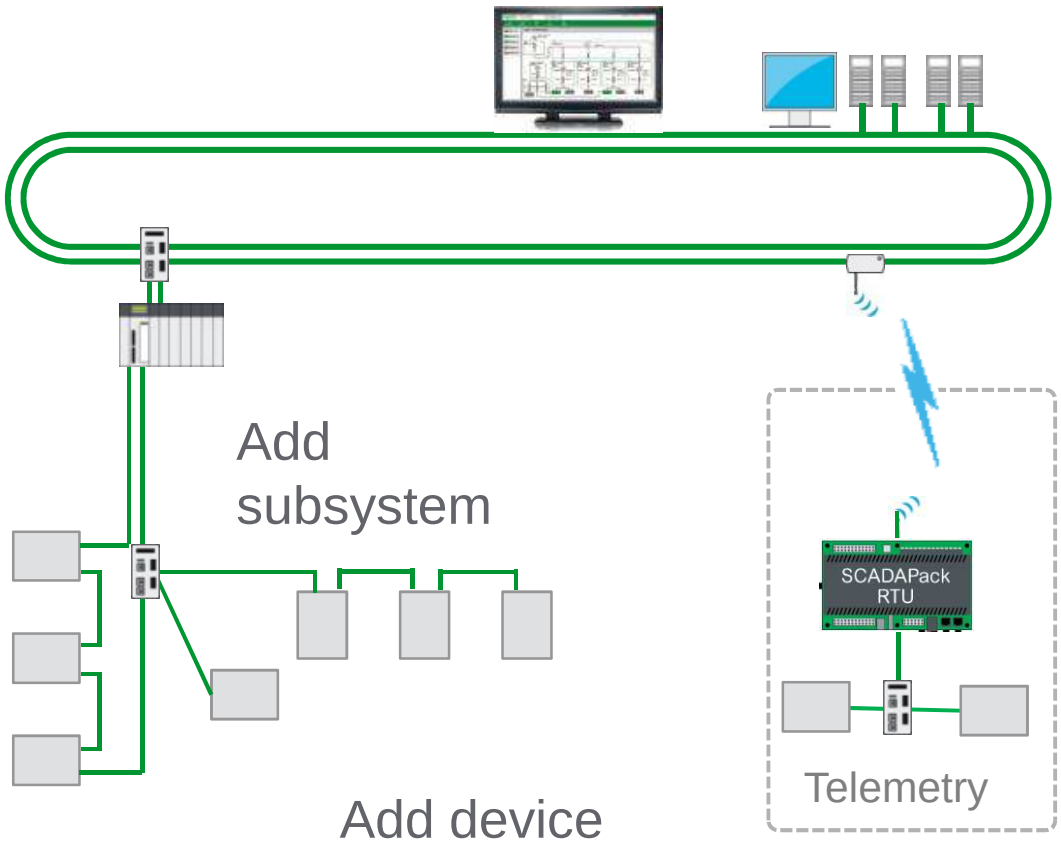


Protect your investment with

- Flexible topology: Mix
  - Star, daisy chain, ring, dual ring, long distance fiber, long haul radio, instrumentation wireless

Scalability

Expandable architecture

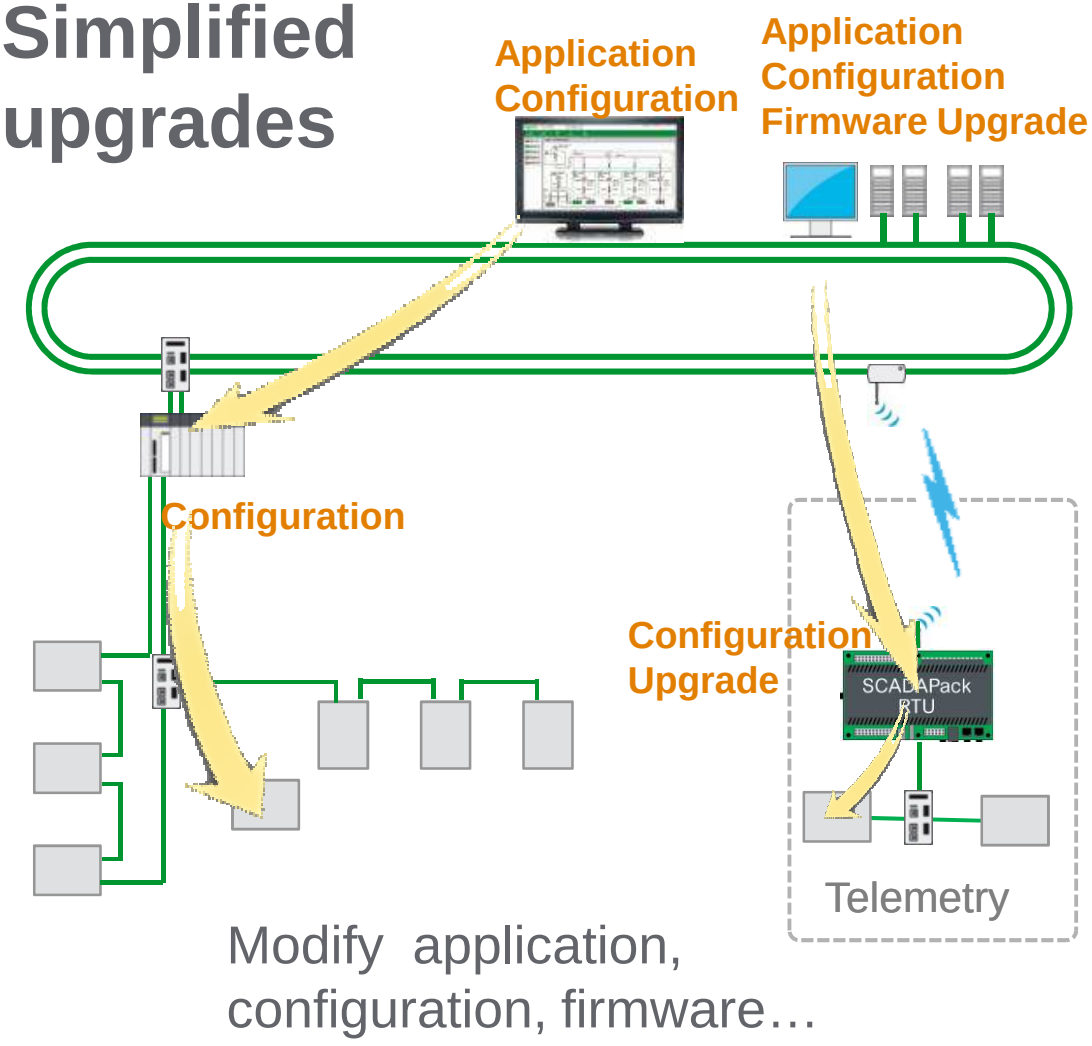


Protect your investment with

- Flexible topology: Mix
  - Star, daisy chain, ring, dual ring, long distance fiber, long haul radio, instrumentation wireless
- Expandable architecture
  - Add device, add subsystem

Scalability

Simplified upgrades



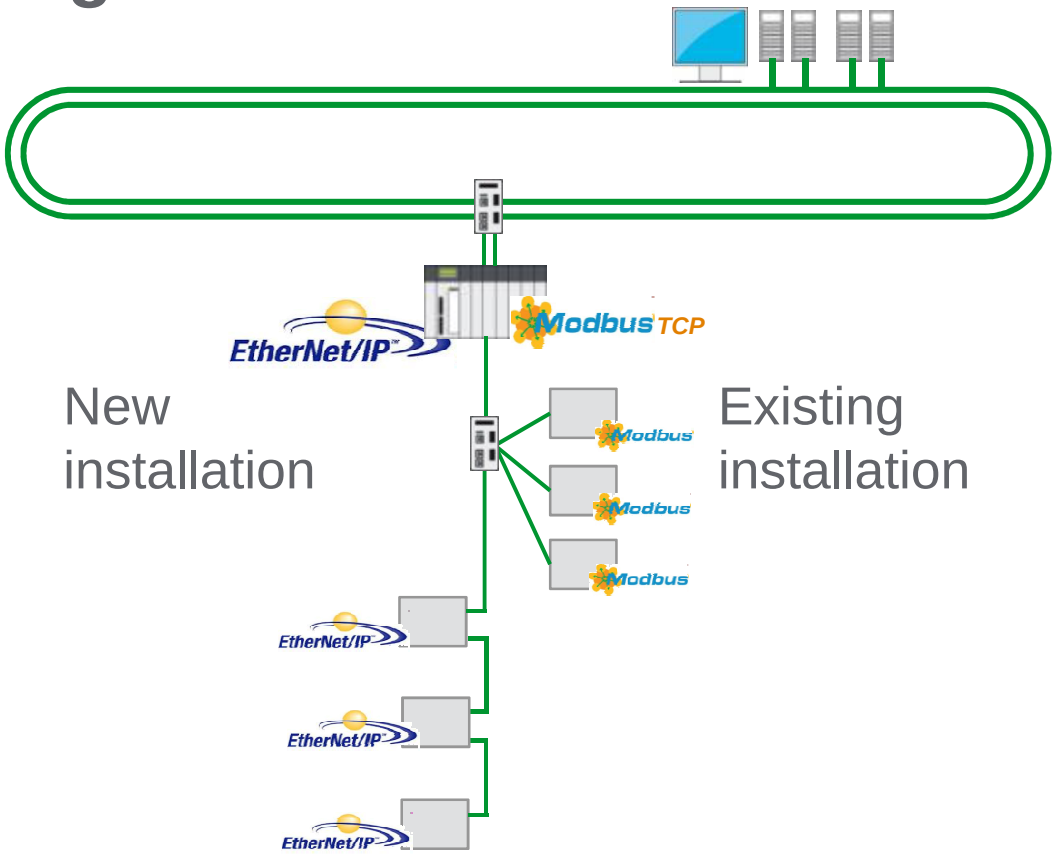
Modify application, configuration, firmware…

Protect your investment with

- Flexible topology: Mix
  - Star, daisy chain, ring, dual ring, long distance fiber, long haul radio, instrumentation wireless
- Expandable architecture
  - Add device, add subsystem
- Simplified upgrades
  - Modify application, configuration, firmware…

Scalability

Smooth migration



New installation

Existing installation

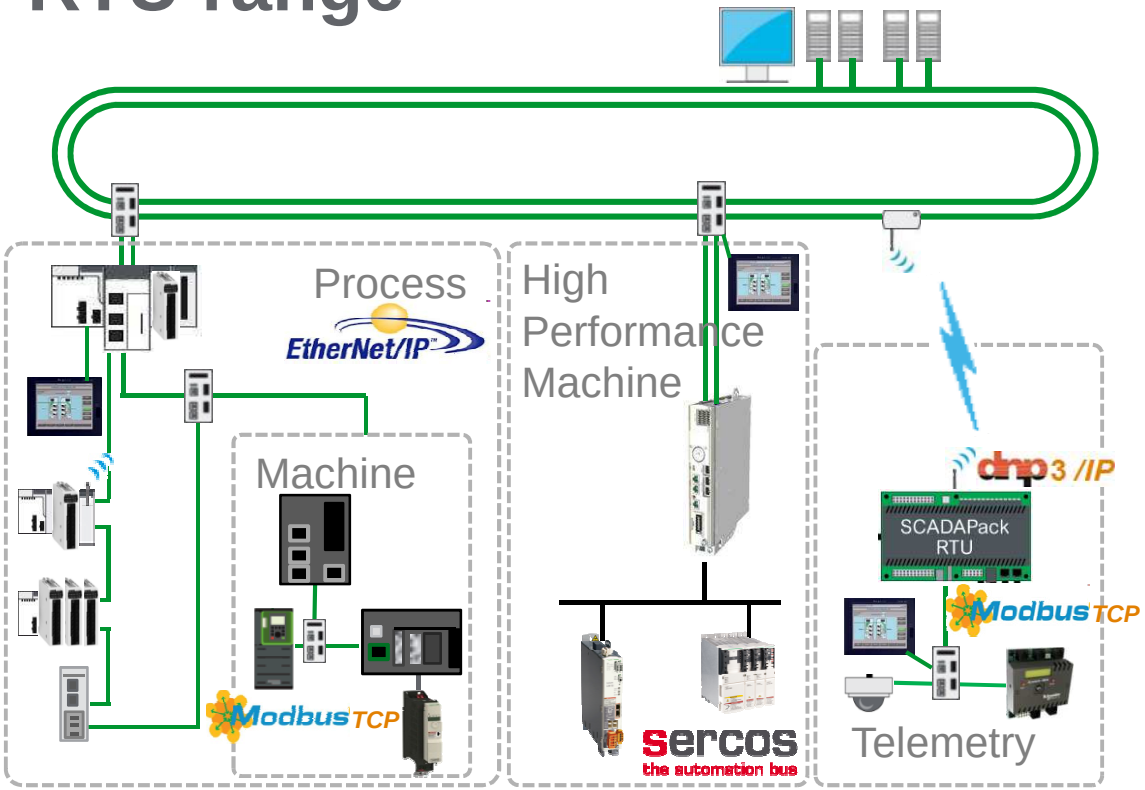
Protect your investment with

- Flexible topology: Mix
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- Expandable architecture
  - Add device, add subsystem
- Simplified upgrades
  - Modify application, configuration, firmware…
- Smooth migration
  - From existing to new installation

Scalability

Full PAC & RTU range

… and complement of devices



Process control

Machine control

High Performance Machine control

Telemetry

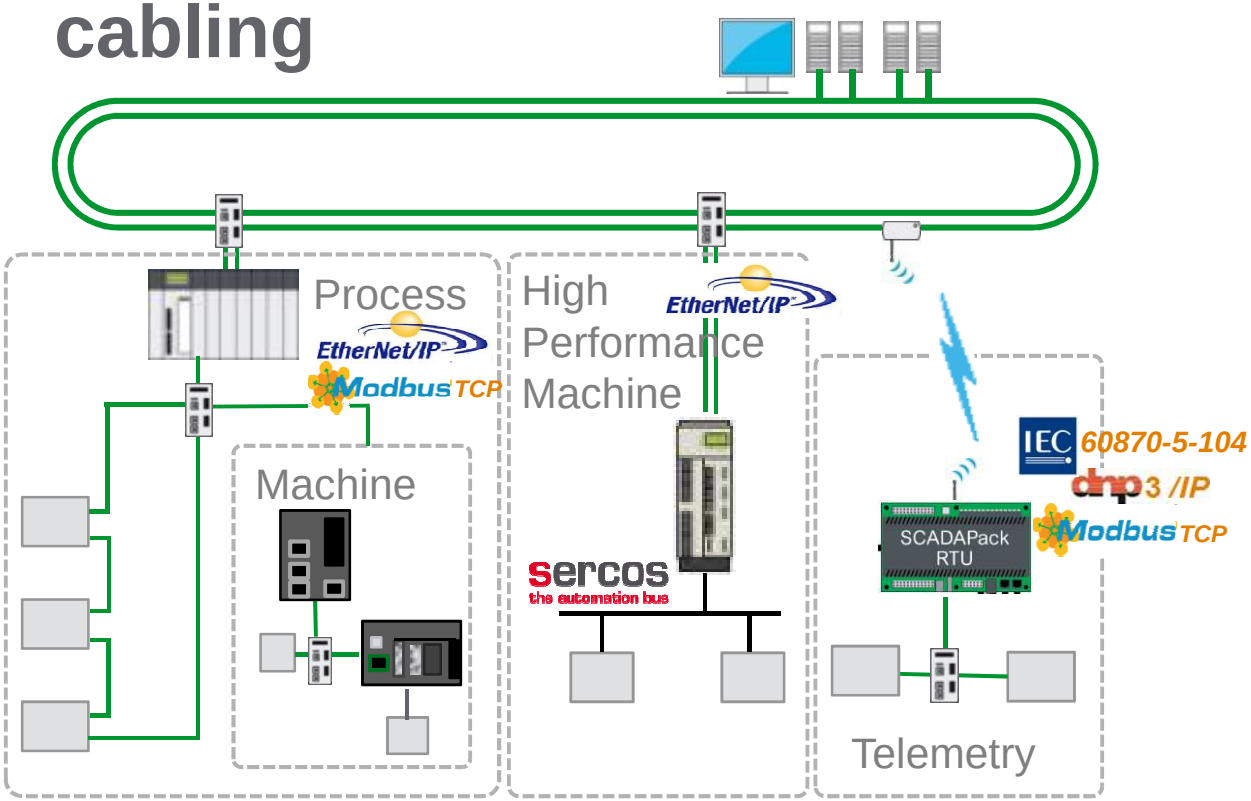
Protect your investment with

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- Expandable architecture
  - Add device, add subsystem
- Simplified upgrades
  - Modify application, configuration, firmware…
- Smooth migration
  - From existing to new installation
- Full controller & RTU range and complement of devices



Simplicity

One cabling

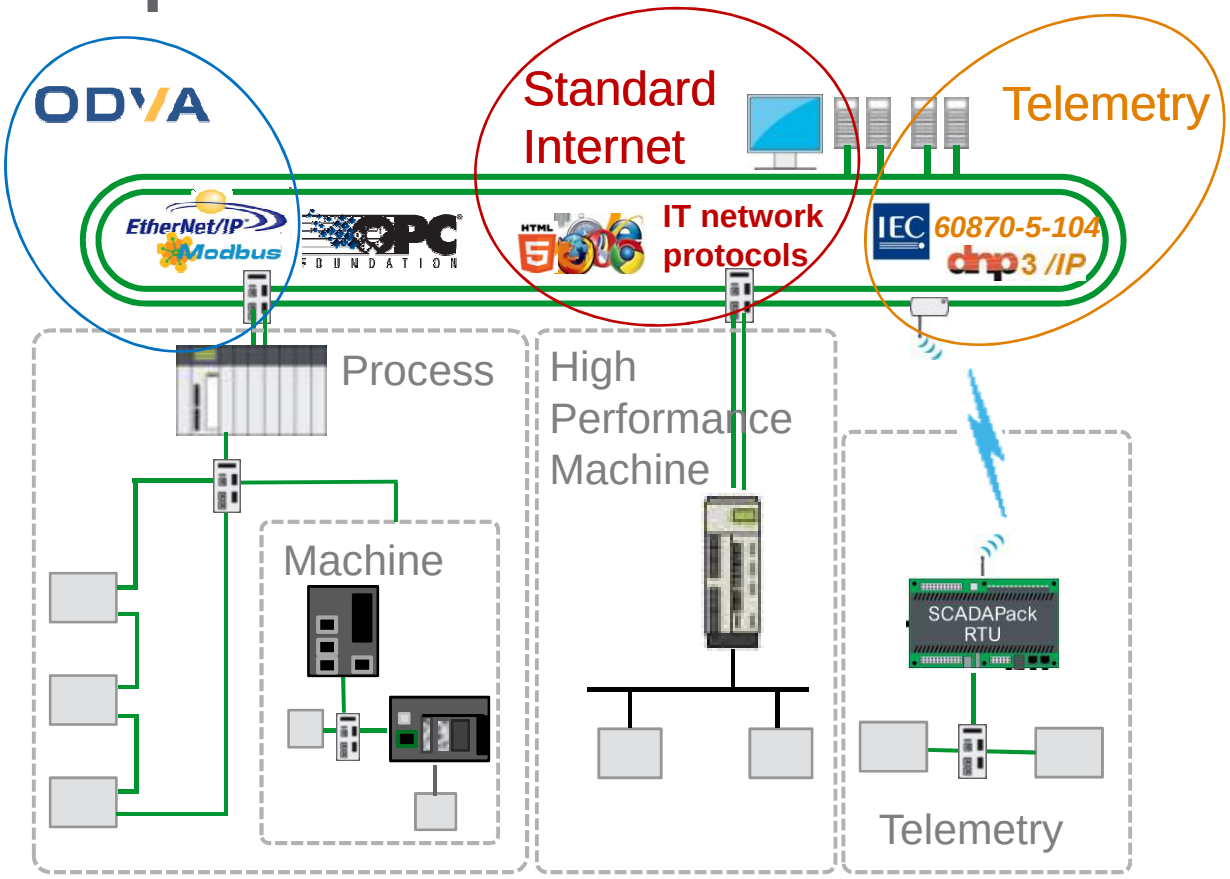


Lower your costs with

- Lower on-site installation labor
  - One cabling

Simplicity

Open network standards



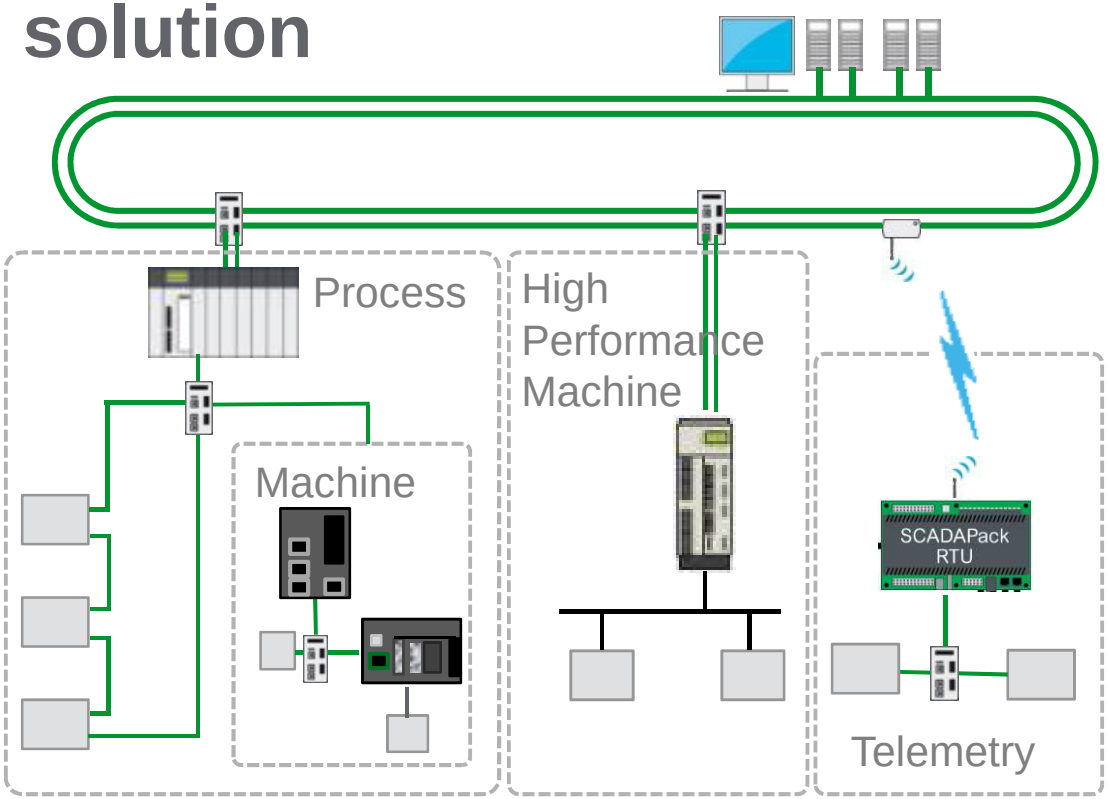
Lower your costs with

- Lower on-site installation labor
  - One cabling
- Faster design time
  - Open network standards

Simplicity

SCADA Expert

Complete solution



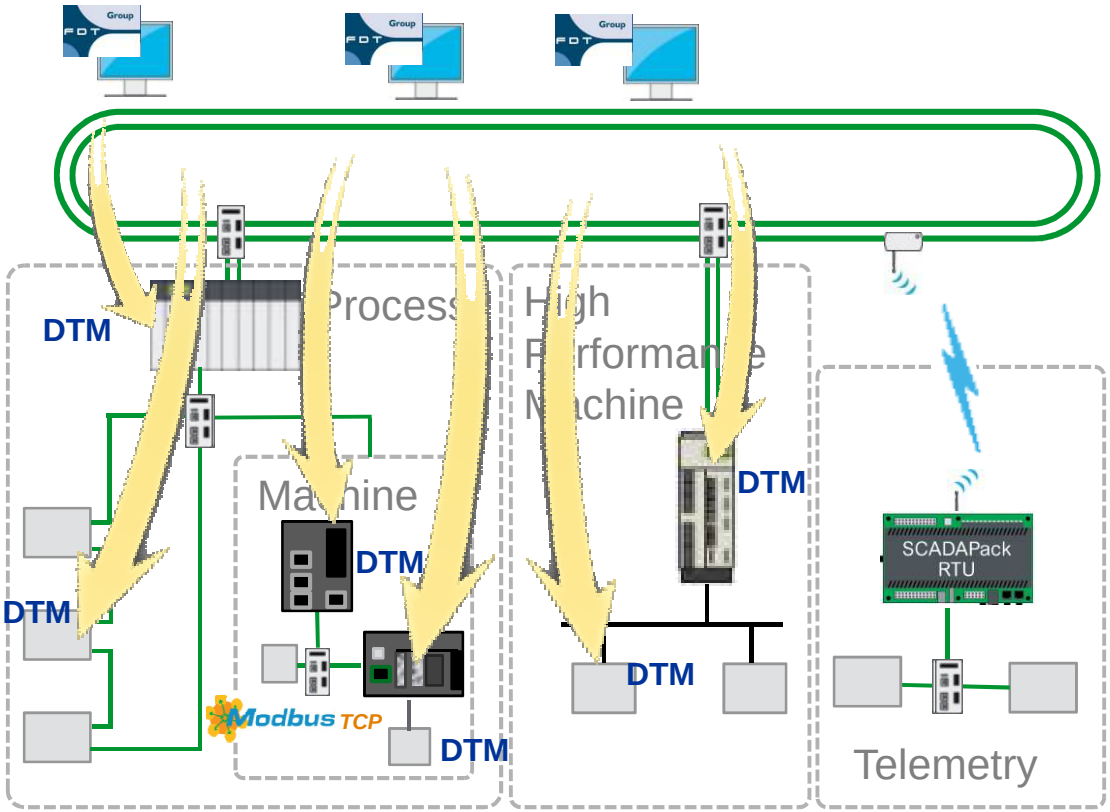
Process Machine Telemetry

Lower your costs with

- Lower on-site installation labor
  - One cabling
- Faster design time
  - Open network standards
- Reduced learning & engineering time
  - Complete solution

Simplicity

Uniform engineering software & transparency



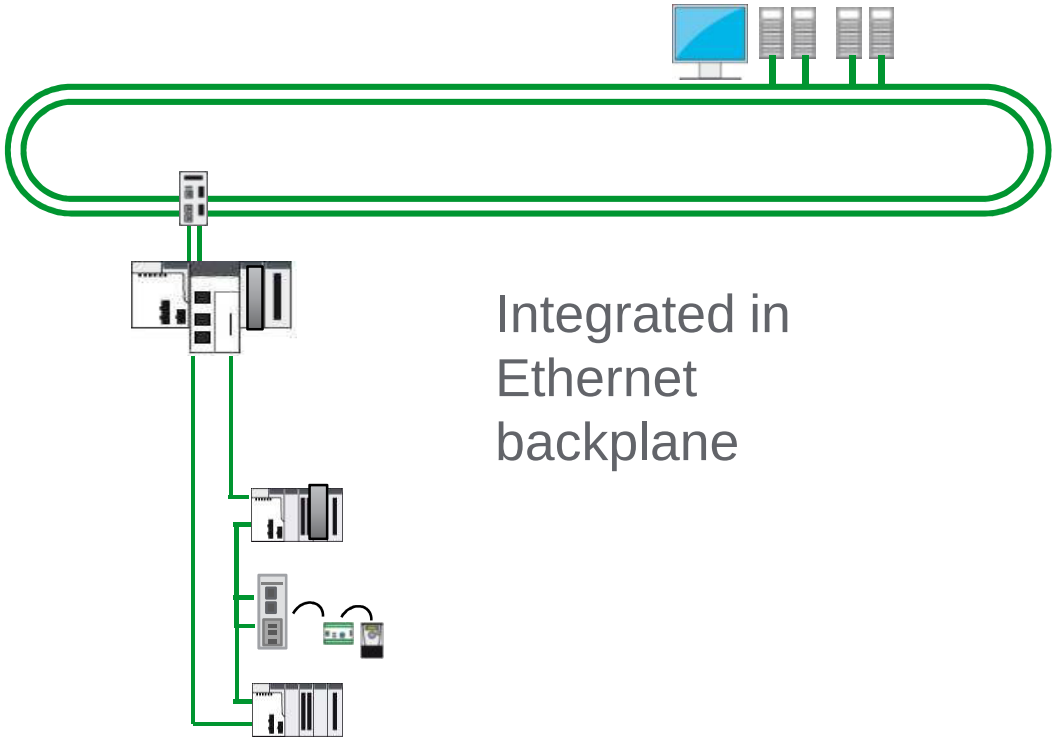
Lower your costs with

- Lower on-site installation labor
  - One cabling
- Faster design time
  - Open network standards
- Reduced learning & engineering time
  - Complete solution
- Speedy setup time
  - Uniform engineering software & transparency



Simplicity

3rd party innovative solutions



Integrated in Ethernet backplane

Integrated in architecture

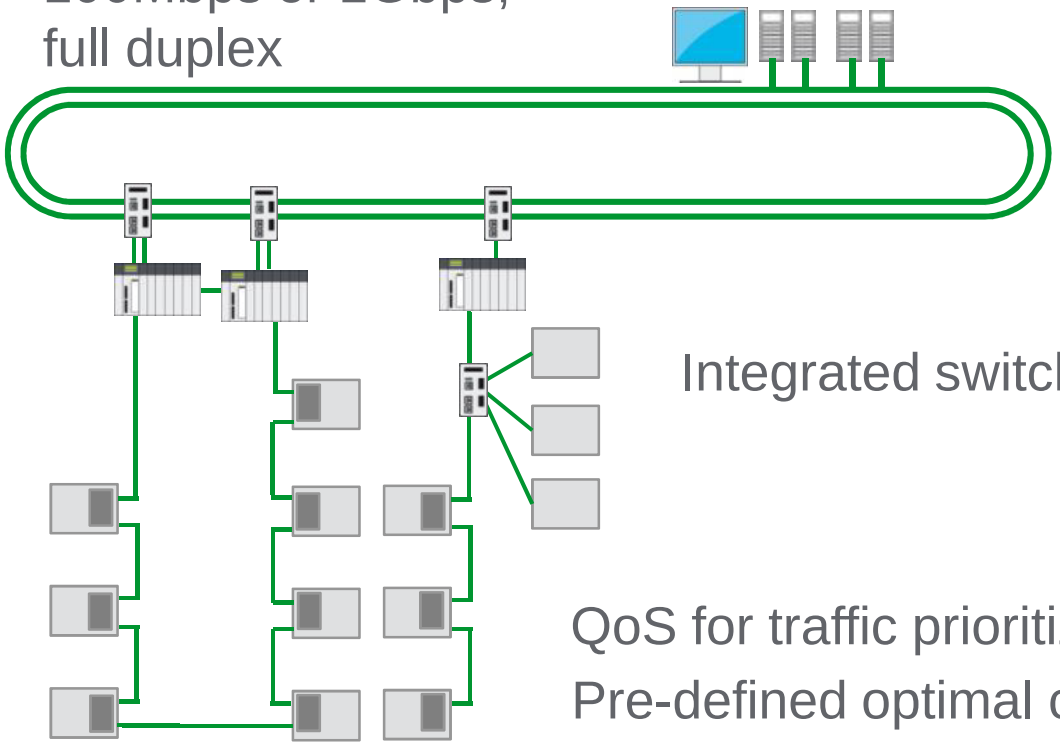
Lower your costs with

- Lower on-site installation labor
  - One cabling
- Faster design time
  - Open network standards
- Reduced learning & engineering time
  - Complete solution
- Speedy setup time
  - Uniform engineering software
- Quick adoption of innovation
  - 3rd party innovative solutions

Efficiency

Real Time Performance

100Mbps or 1Gbps,
full duplex



Integrated switches

QoS for traffic prioritization

Pre-defined optimal configuration

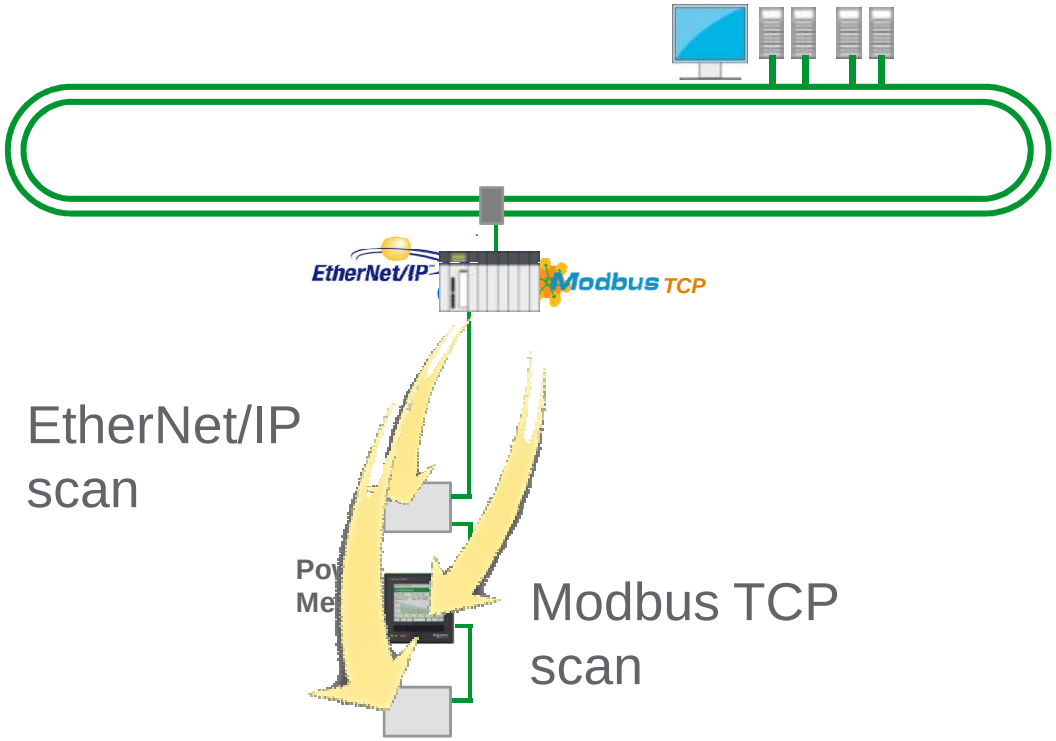
Embedded switches in devices

Boost your operational intelligence with

- High productivity
  - Real time performance due to 100 or 1000Mbps full duplex connectivity, integrated & embedded switches, traffic prioritization, predefined optimal configuration

Efficiency

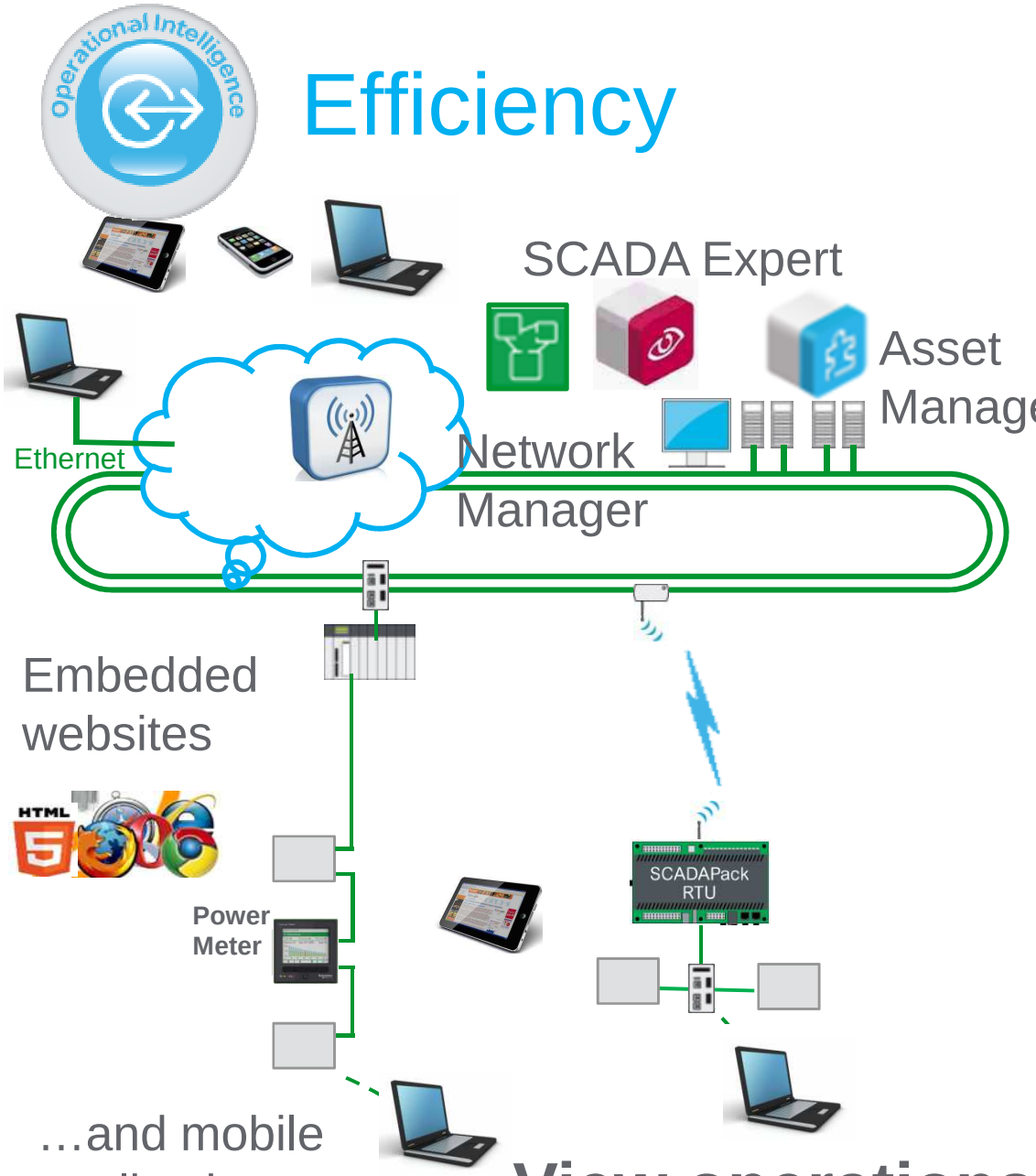
Mix protocols & scan rates



Boost your operational intelligence with

- High productivity
  - Real time performance due to 100 or 1000Mbps full duplex connectivity, integrated & embedded switches, traffic prioritization, predefined optimal configuration
- Optimized process control & energy efficiency
  - Mix protocols & scan rates

Efficiency



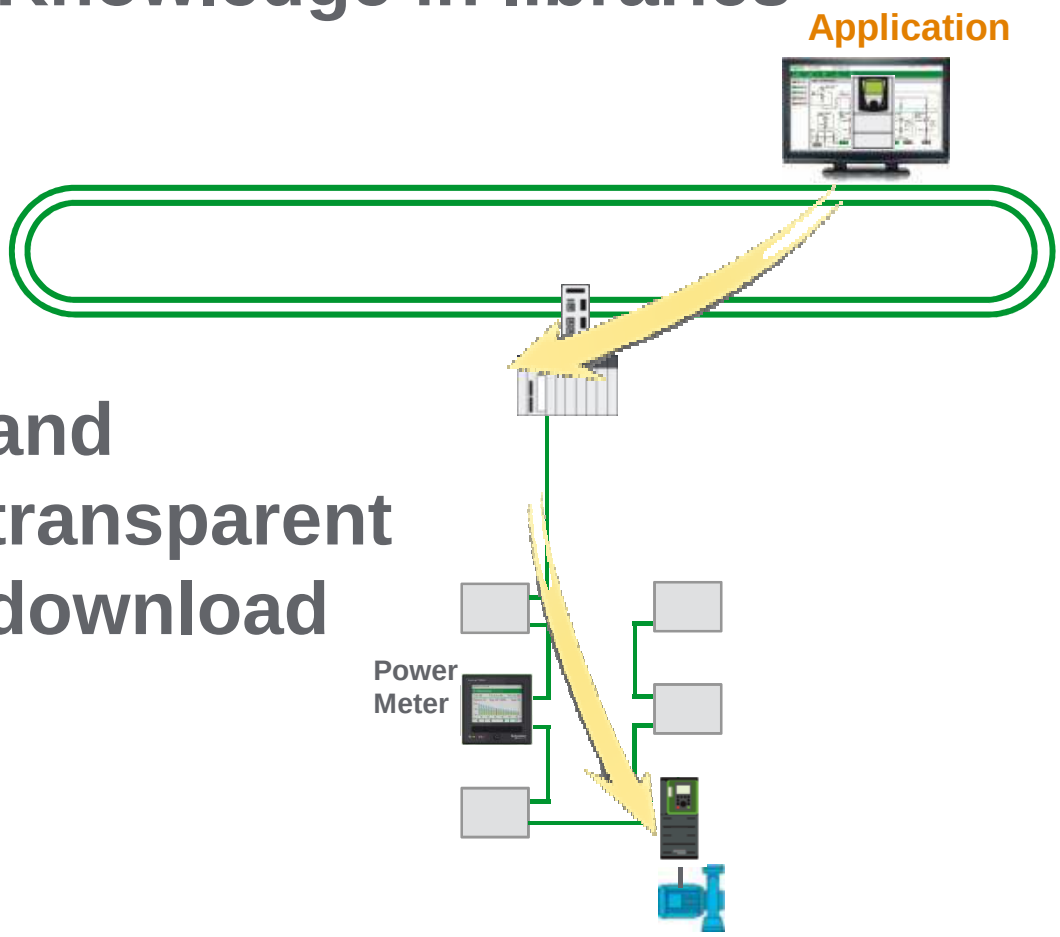
Boost your operational intelligence with

- High productivity
  - Real time performance due to 100 or 1000Mbps full duplex connectivity, integrated & embedded switches, traffic prioritization, predefined optimal configuration
- Optimized process control & energy efficiency
  - Mix protocols & scan rates
- Remote monitoring
  - View operations from everywhere you need

View operations from everywhere

Efficiency

Knowledge in libraries



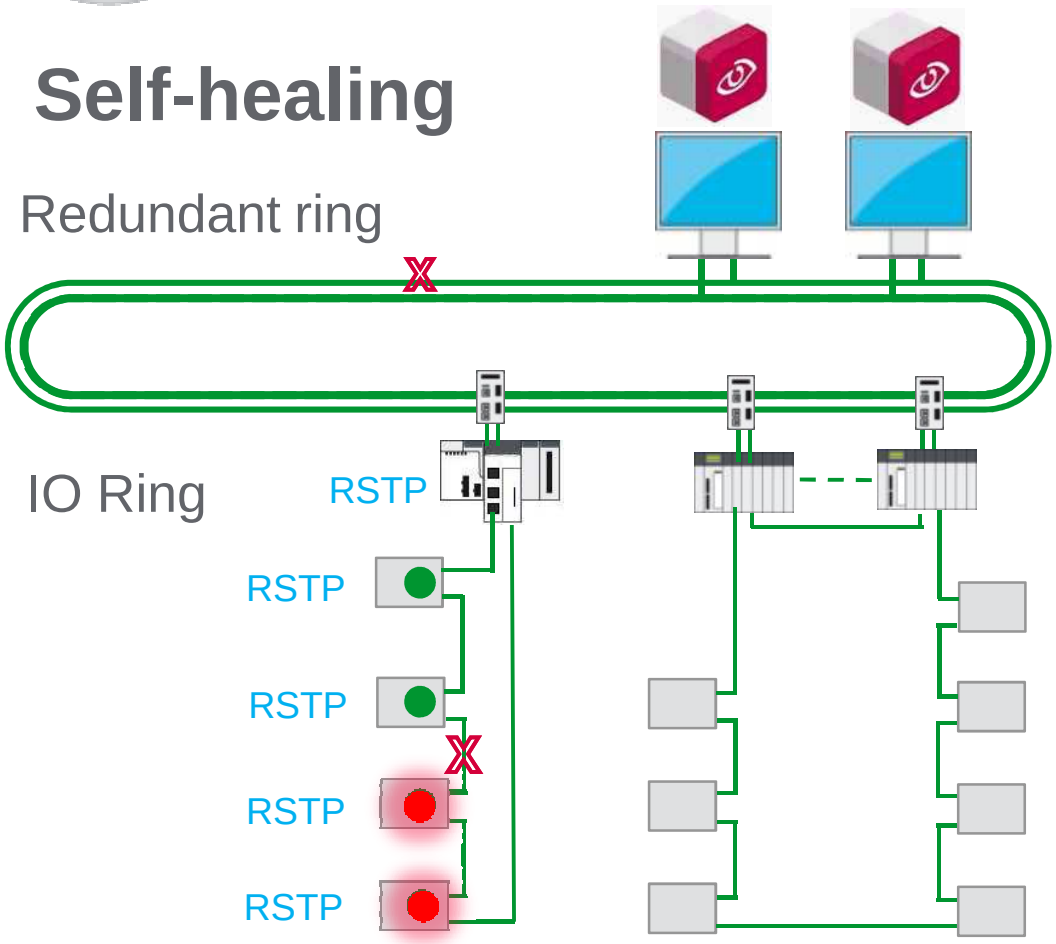
and transparent download

Boost your operational intelligence with

- High productivity
  - Real time performance due to 100 or 1000Mbps full duplex connectivity, integrated & embedded switches, traffic prioritization, predefined optimal configuration
- Optimized process control & energy efficiency
  - Mix protocols & scan rates
- Remote monitoring
  - View operations from everywhere you need
- Rapid application adaptation
  - Knowledge in libraries & transparent download

Availability

Self-healing



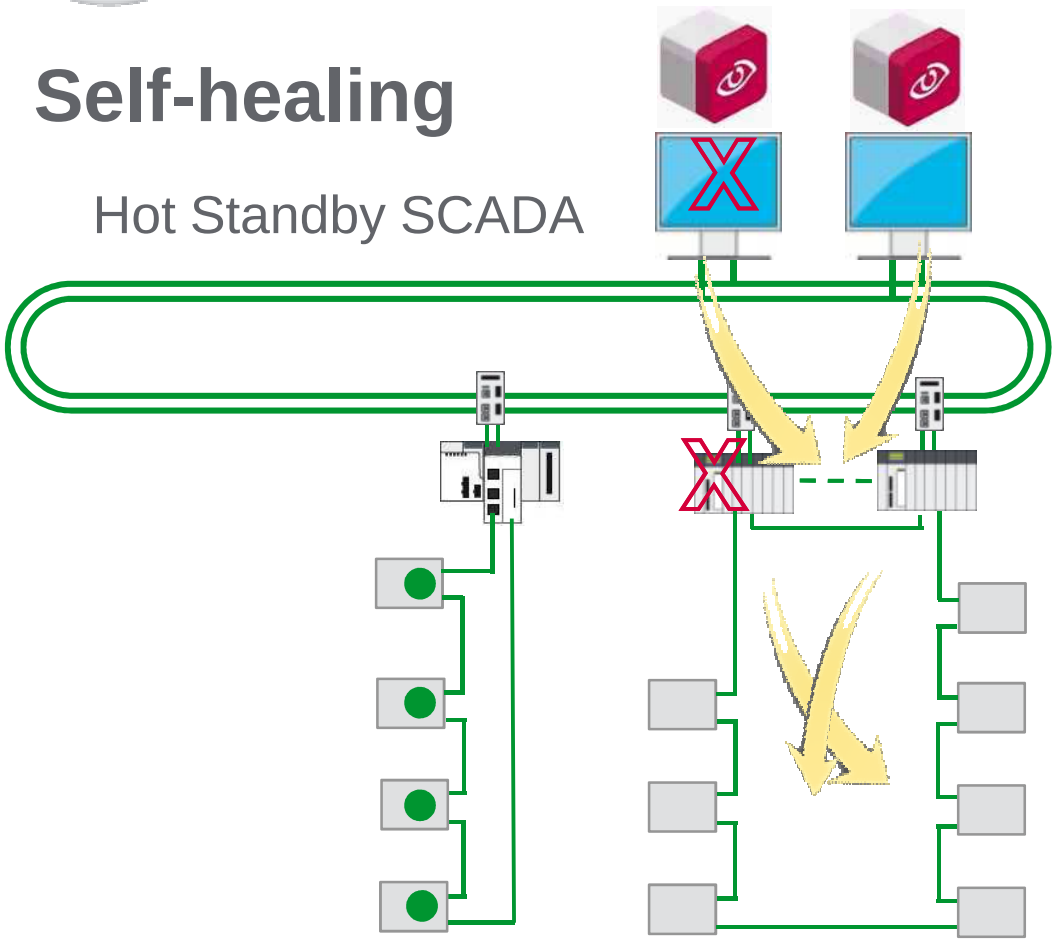
Bring your maintenance to the next level with

- Maximized operation uptime
  - Self Healing: Redundant Ring, IO Ring,

Availability

Self-healing

Hot Standby SCADA



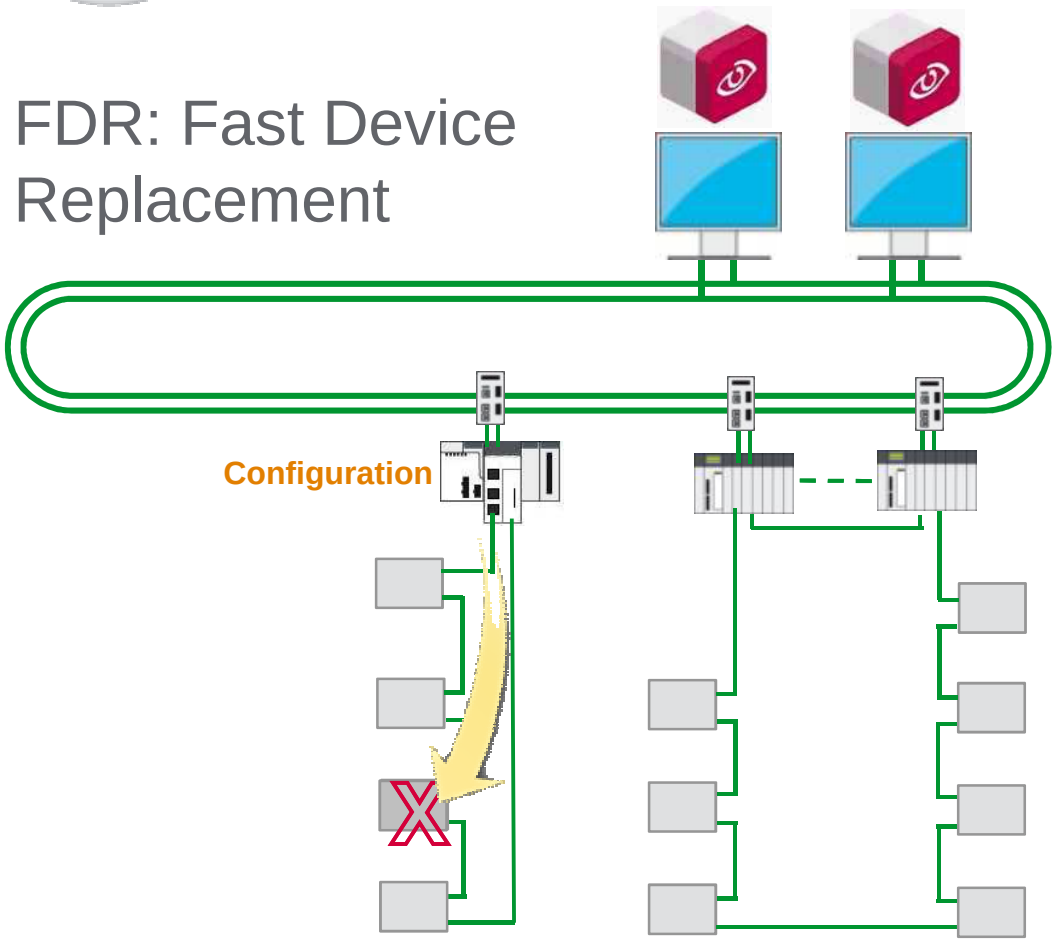
Bring your maintenance to the next level with

- Maximized operation uptime
  - Self Healing: Redundant Ring, IO Ring, Hot Standby SCADA, Hot Standby PAC

Hot Standby PAC

Availability

FDR: Fast Device Replacement

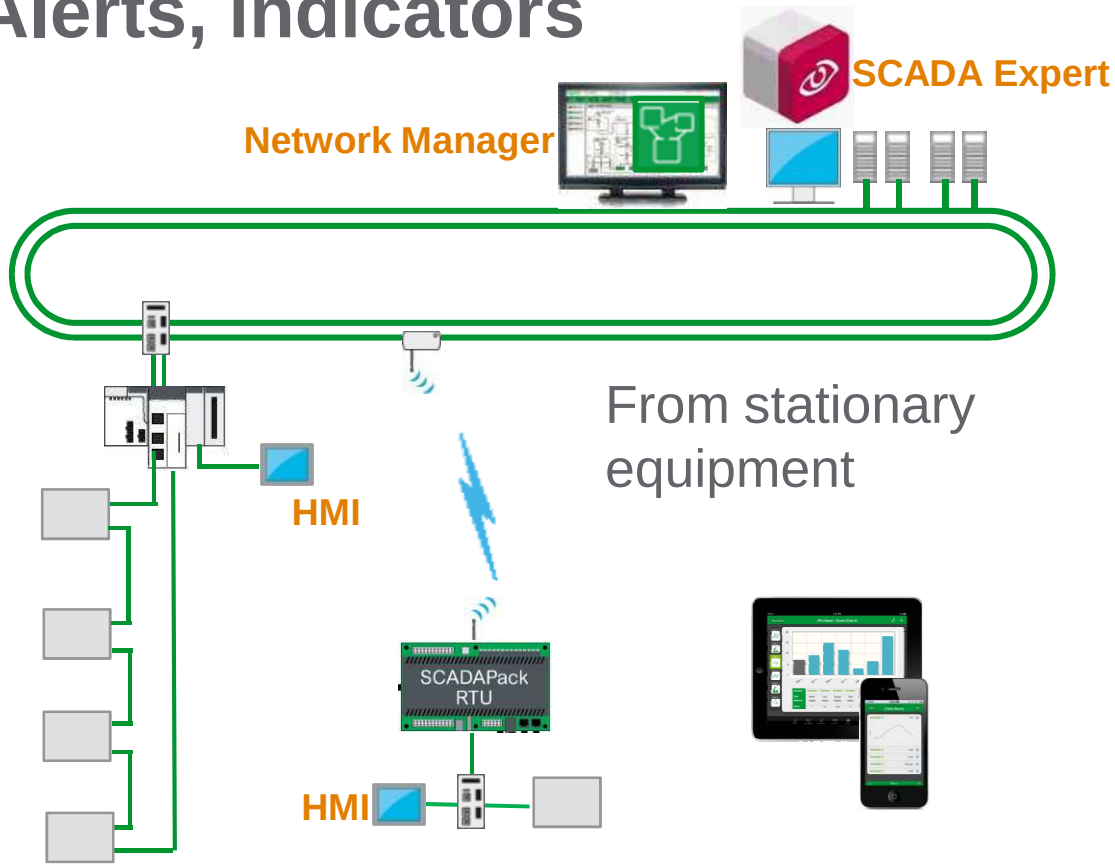


Bring your maintenance to the next level with

- Maximized operation uptime
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  - Fast Device Replacement

Availability

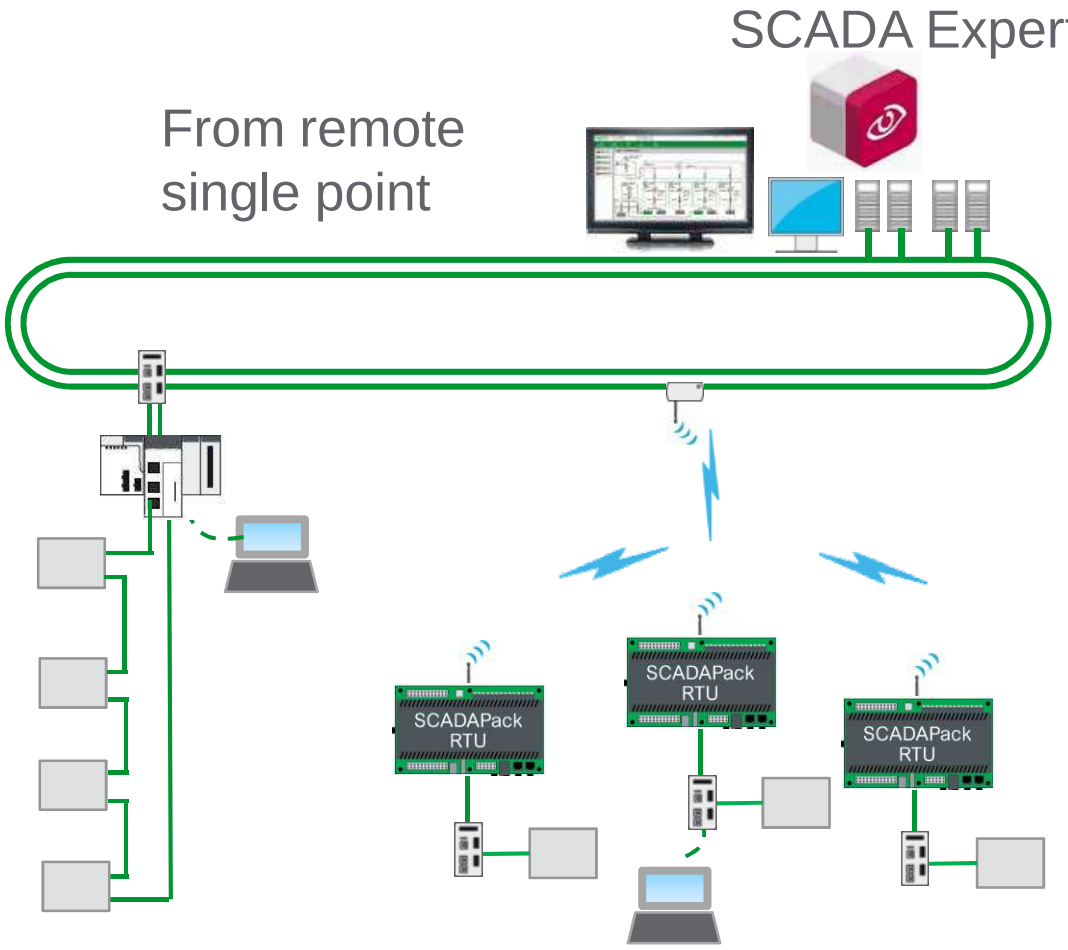
Alerts, indicators



Bring your maintenance to the next level with

- Maximized operation uptime
  - Self Healing: Redundant Ring, IO Ring, Hot Standby SCADA, Hot Standby PAC
  - Fast Device Replacement
- Preventive monitoring
  - Alert, indicators: from stationary equipment… and from mobiles

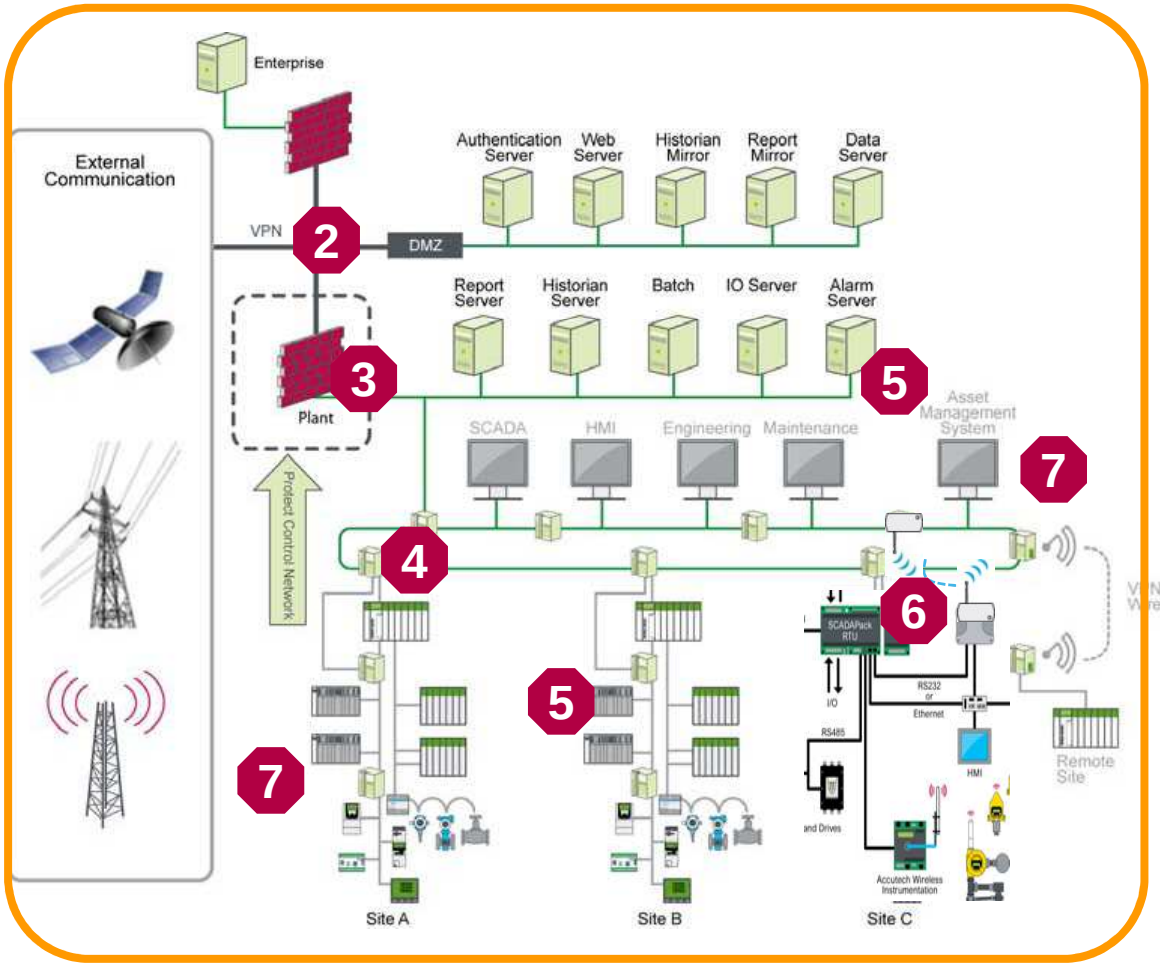
Availability



Bring your maintenance to the next level with

- Maximized operation uptime
  - Self Healing: Redundant Ring, IO Ring, Hot Standby SCADA, Hot Standby PAC
  - Fast Device Replacement
- Preventive monitoring
  - Alert, indicators: from stationary equipment… and from mobiles
- Transparent diagnostics and debug access
  - Right at the device, from remote single point, from one remote site to another

Protection



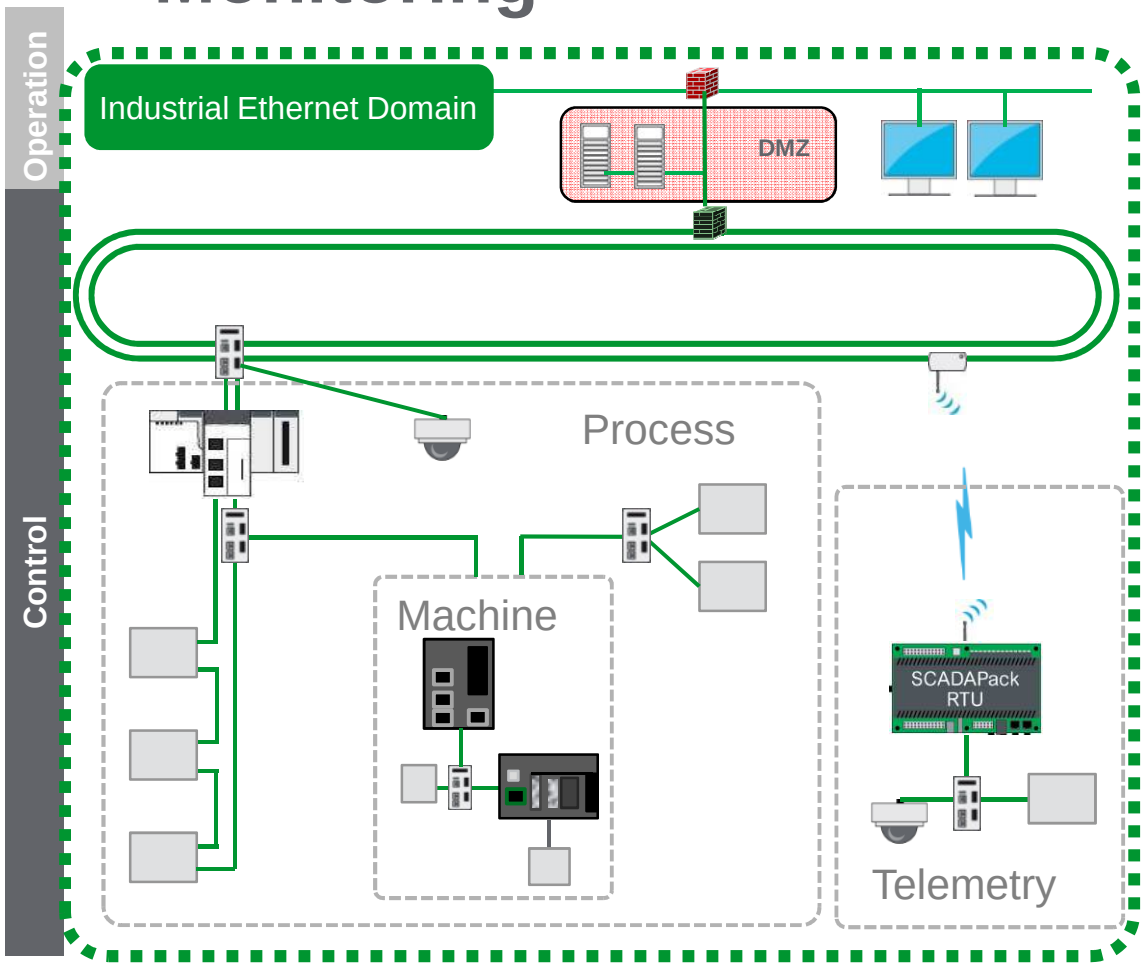
Secure your people and assets with

Defense in depth

1. **Security Plan**
2. **Network Separation**
3. **Perimeter Protection**
4. **Network Segmentation**
5. **Device Hardening**
6. **Functional Security**
7. **Monitoring & Update**

Protection

Monitoring



IP cameras

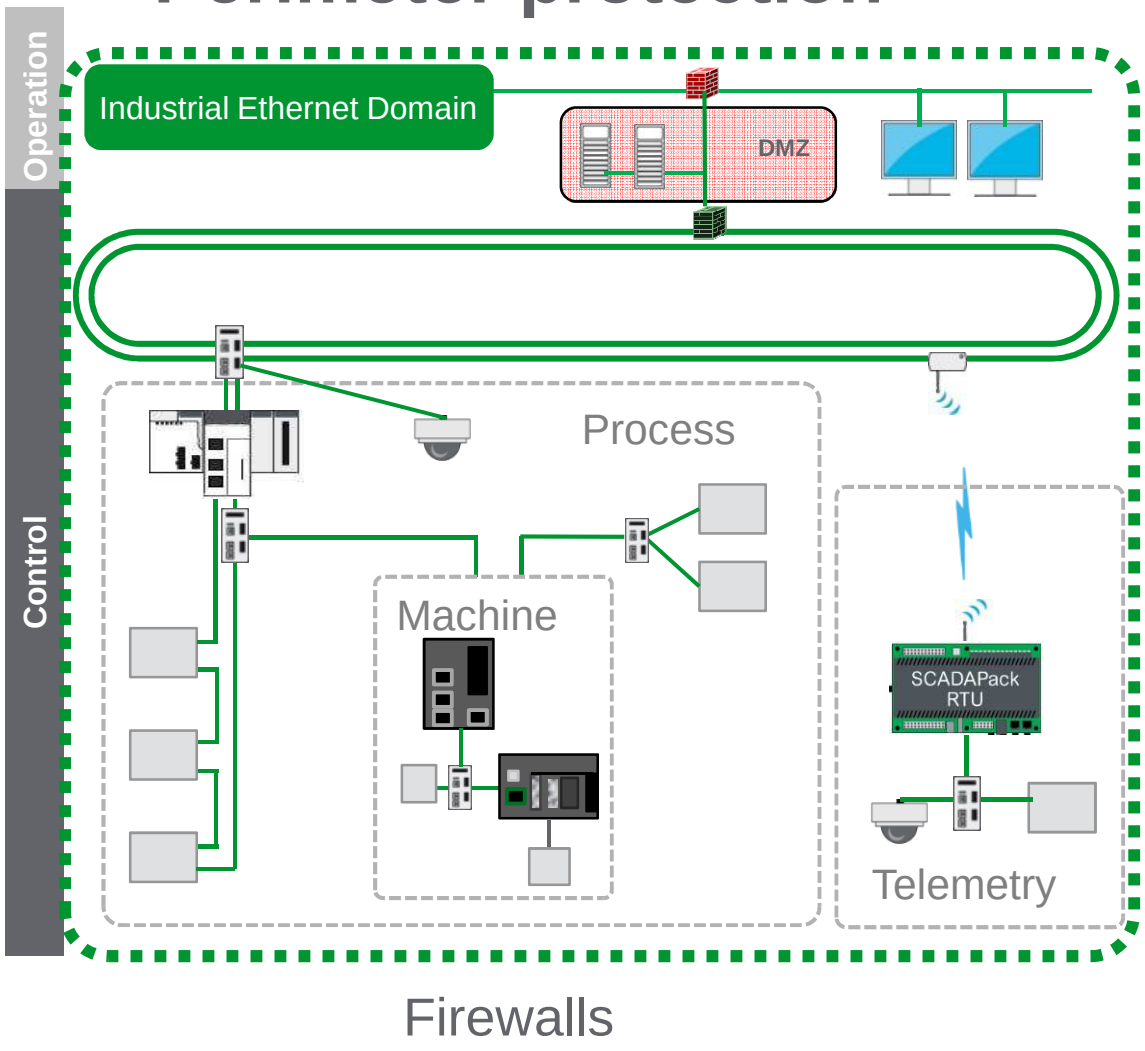
Secure your people and assets with

Defense in depth

- Monitoring: IP cameras

Protection

Perimeter protection



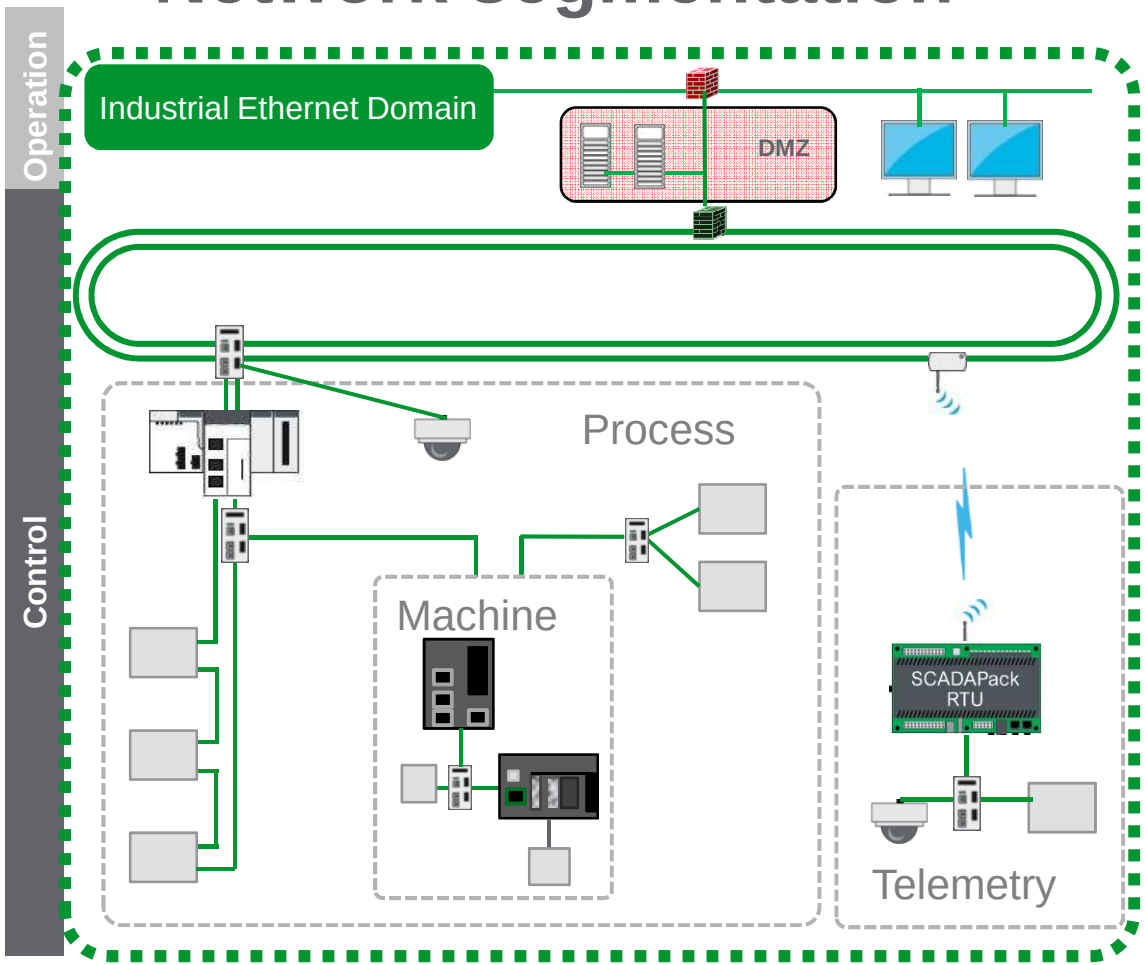
Secure your people and assets with

Defense in depth

- Monitoring: IP cameras
- Perimeter protection: firewalls specialized for Industrial Control systems

Protection

Network segmentation



Switches

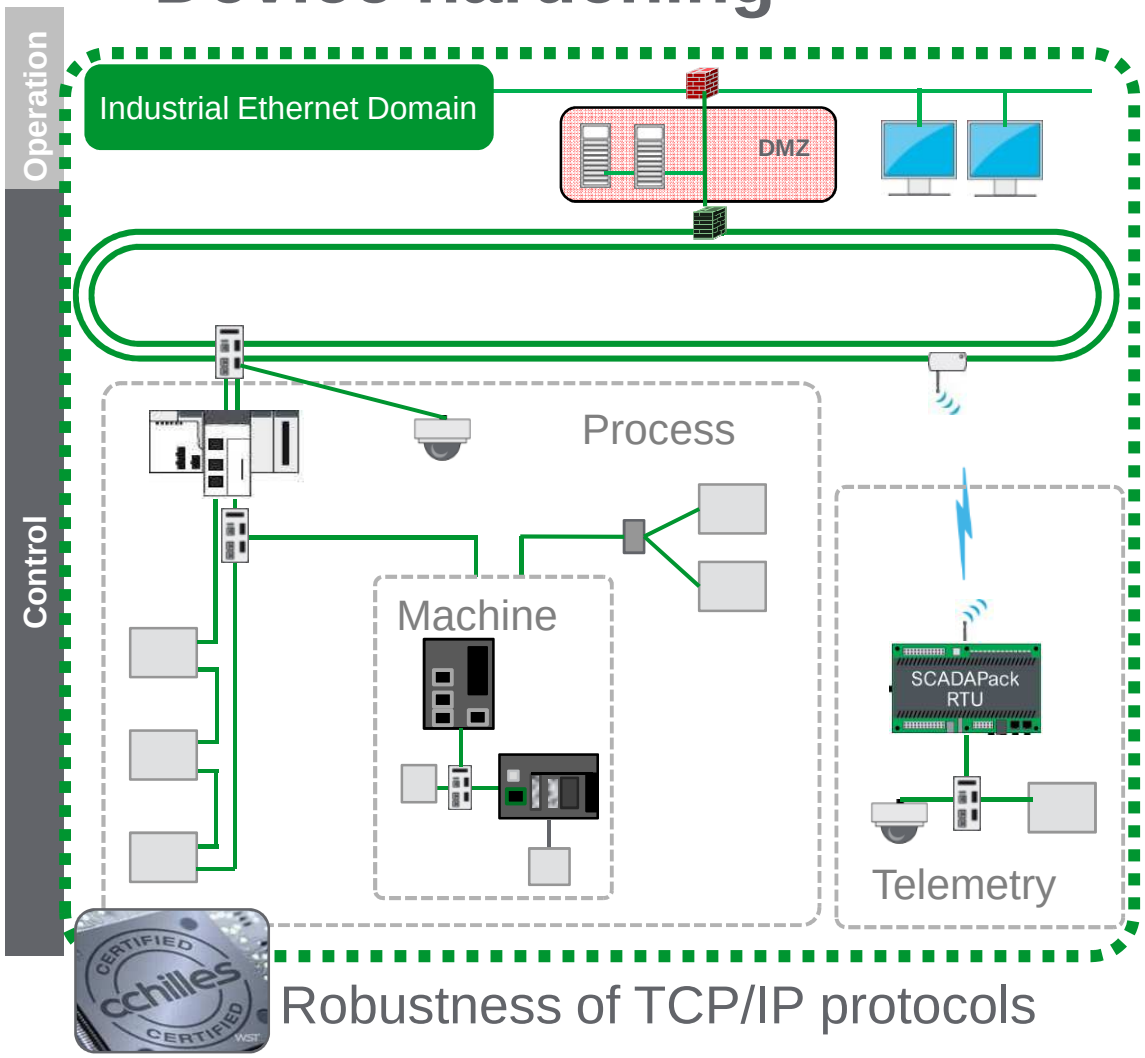
Secure your people and assets with

Defense in depth

- Monitoring: IP cameras
- Perimeter protection: firewalls specialized for Industrial Control systems
- Network segmentation: switches

Protection

Device hardening



Secure your people and assets with

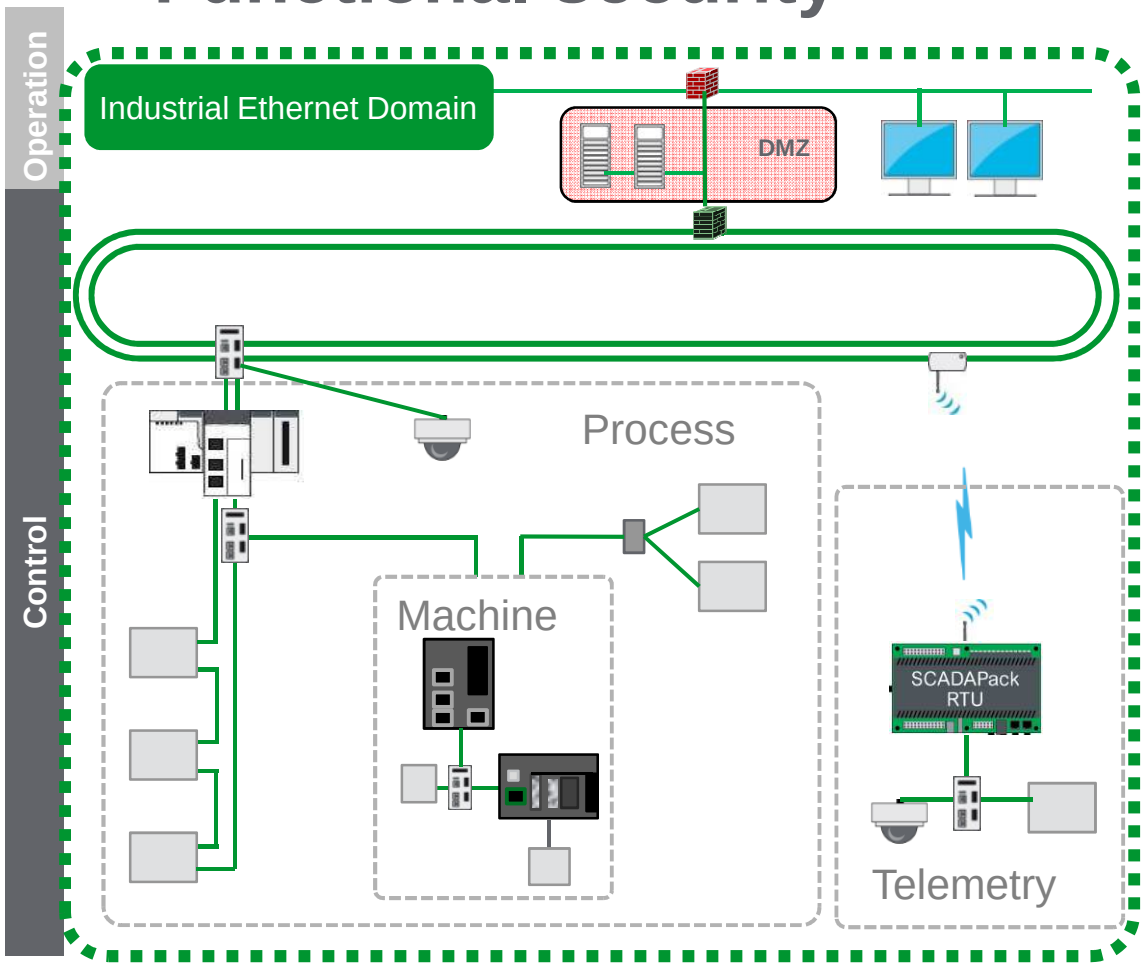
Defense in depth

- Monitoring: IP cameras
- Perimeter protection: firewalls specialized for Industrial Control systems
- Network segmentation: managed switches

- IEC 62443 / ISA99 based
  - Device hardening

Protection

Functional security



Access control, data integrity, confidentiality…

Secure your people and assets with

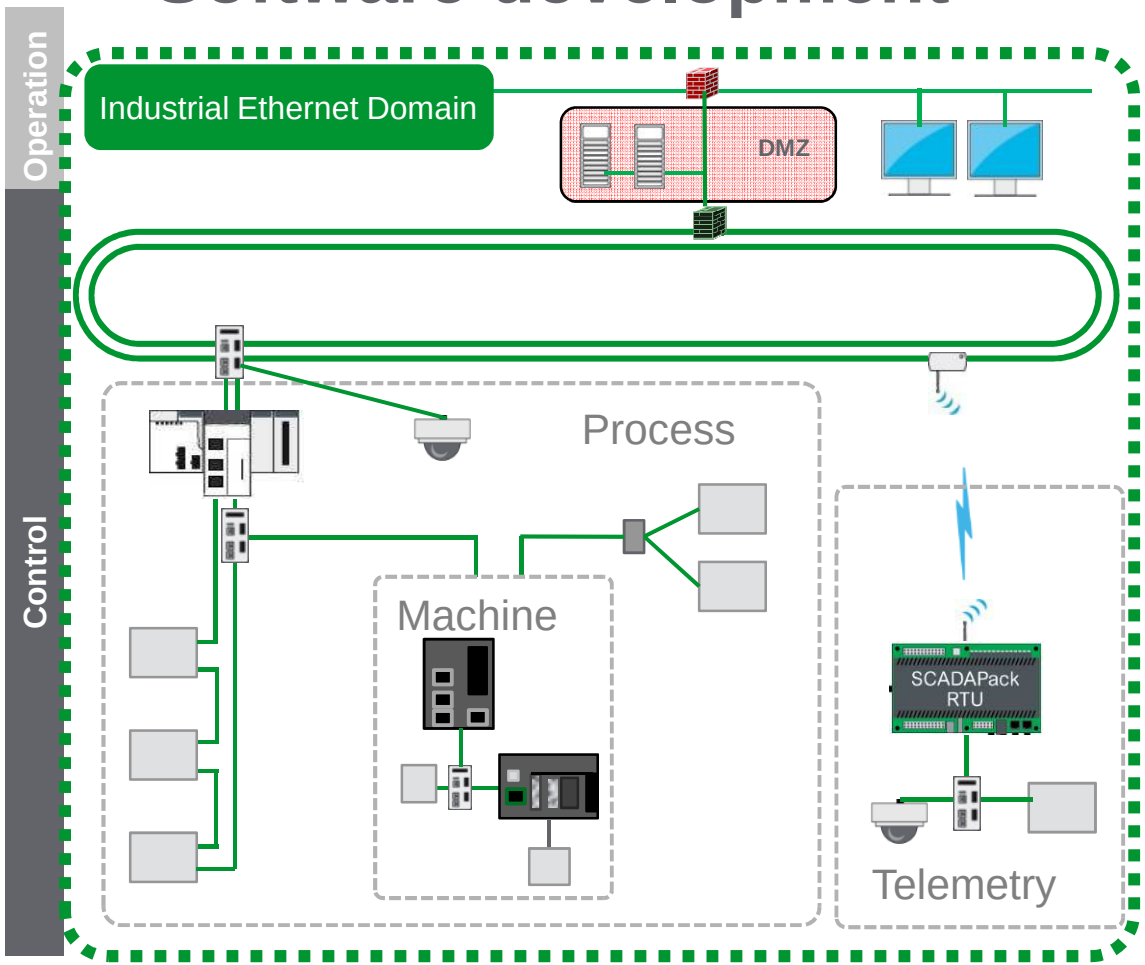
Defense in depth

- Monitoring: IP cameras
- Perimeter protection: firewalls specialized for Industrial Control systems
- Network segmentation: switches

- IEC 62443 / ISA99 based
  - Device hardening
  - Functional security

Protection

Software development



Secure coding, testing, quality checks…

Secure your people and assets with

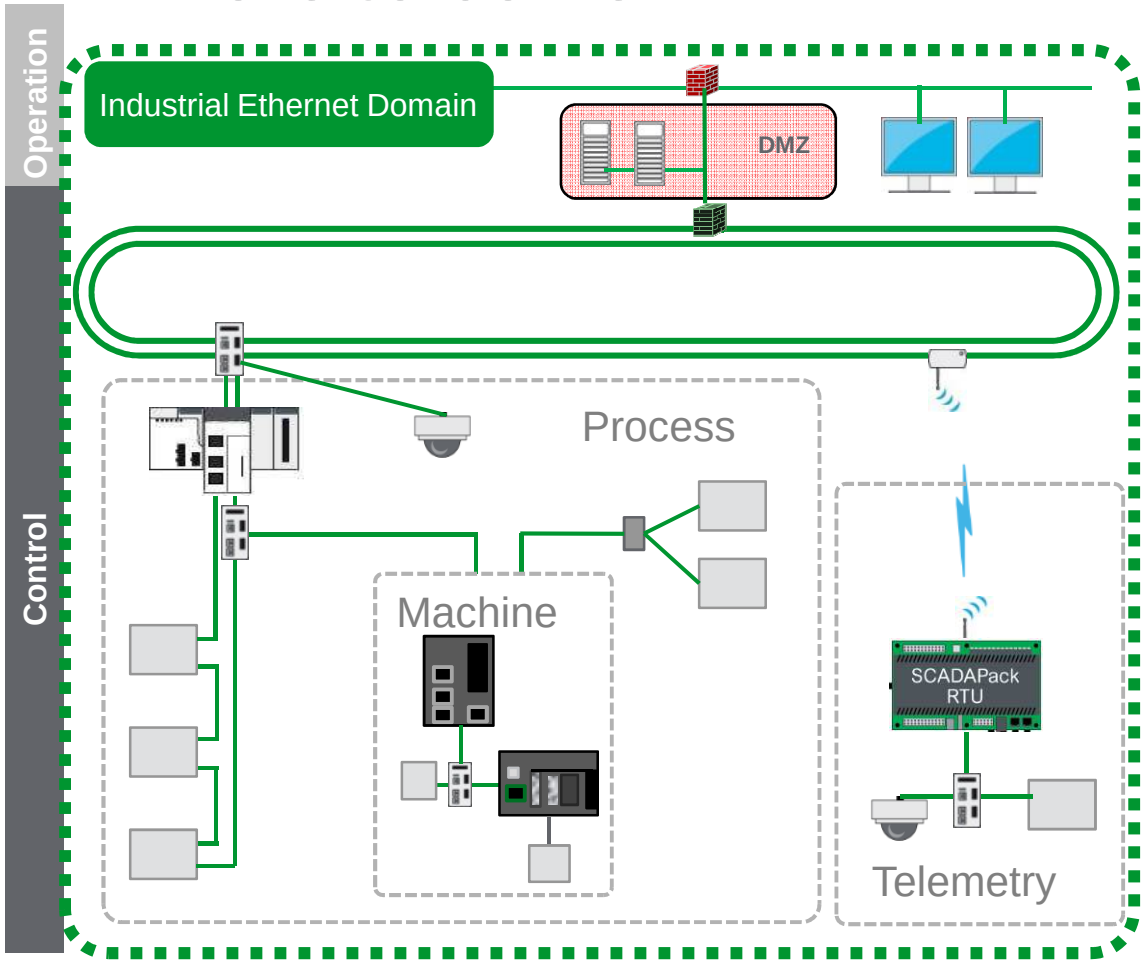
Defense in depth

- Monitoring: IP cameras
- Perimeter protection: firewalls specialized for Industrial Control systems
- Network segmentation: switches

- IEC 62443 / ISA99 based
  - Device hardening
  - Functional security
  - Secured software development

Protection

More to come



Secure your people and assets with

Defense in depth

- Monitoring: IP cameras
- Perimeter protection: firewalls specialized for Industrial Control systems
- Network segmentation: switches

- IEC 62443 / ISA99 based
  - Device hardening
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  - Secured software development

More to come

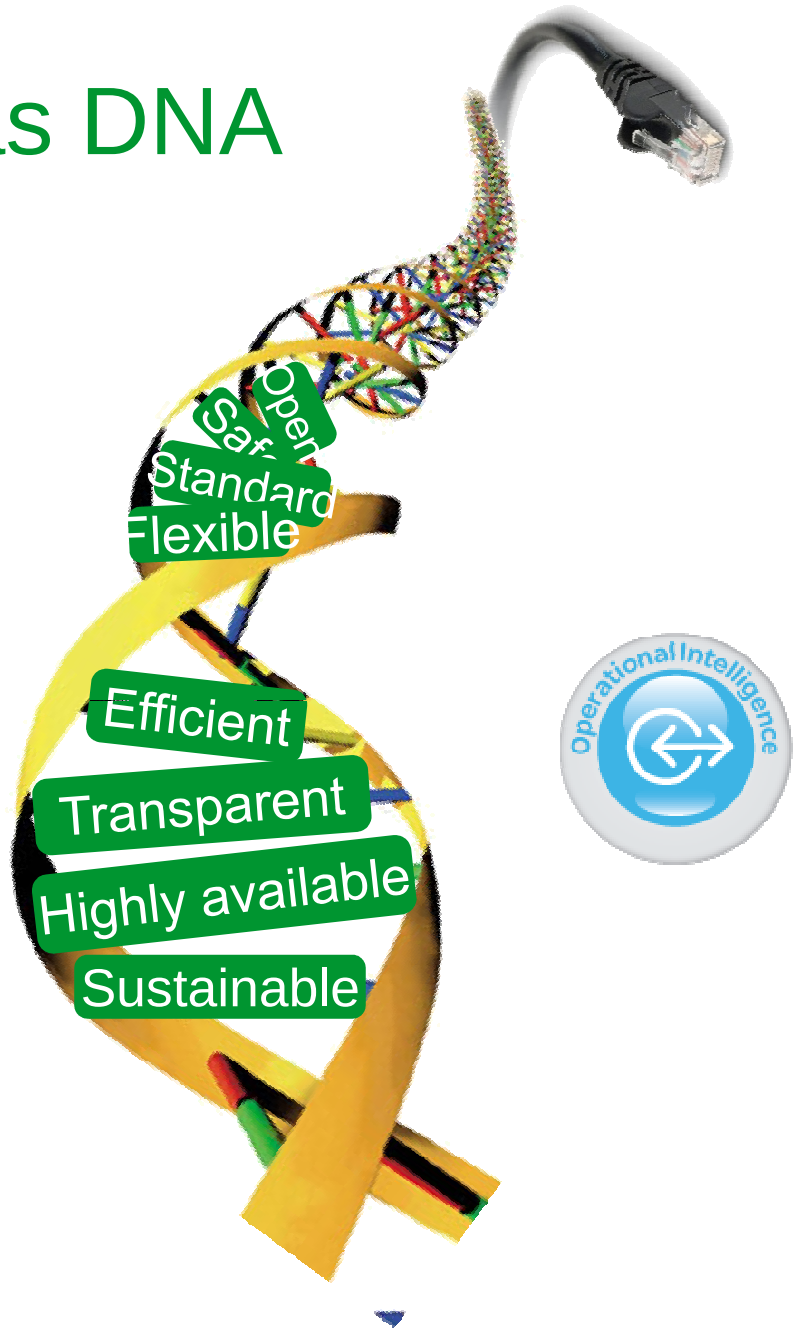
ePAC M580 Ethernet as DNA

System Target

Let's transform our architectures !

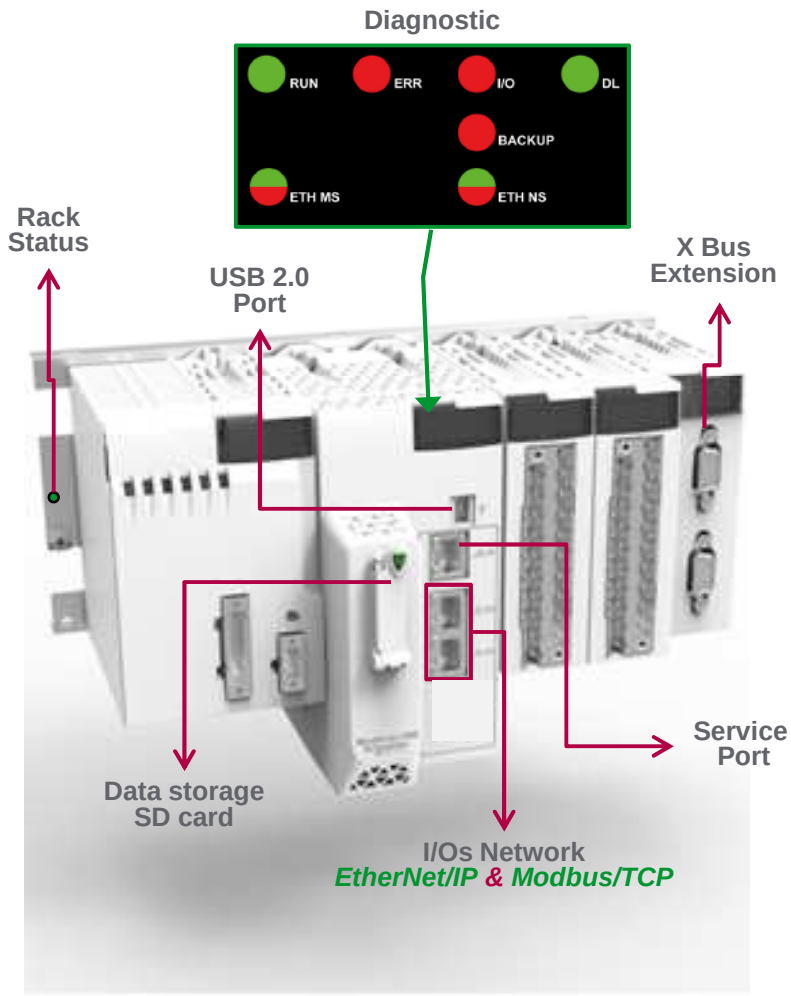
From Ethernet everywhere to Ethernet inside the system …

… the Ethernet Backbone !



ePAC M580 Controller Overview

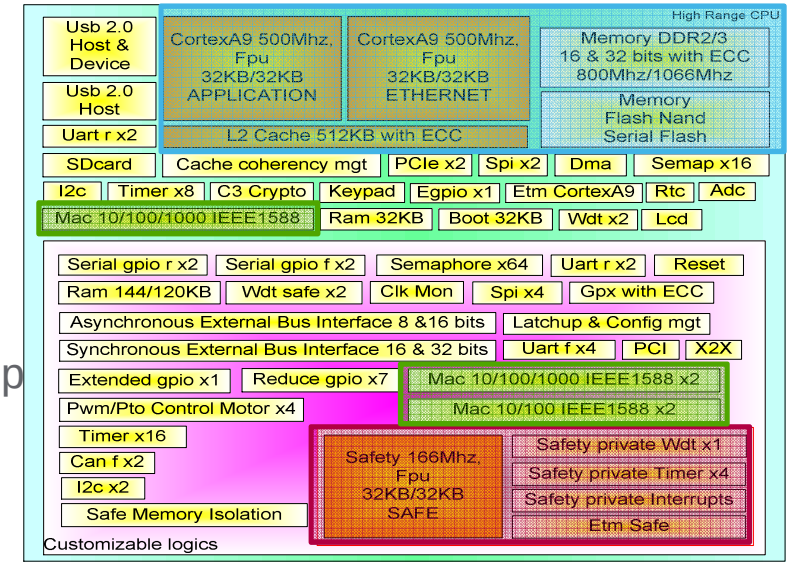
- ***High Performances***
  - Dual Core ARM processor
    - Compact with high performance
  - ***Native Ethernet***
- ***Scalable Offer*** to match ***Customers needs***
  - 4 Memory Levels
    - P5810xx, P5820xx , P5830xx , P5840xx
  - 2 Performances levels
    - 30 & 40 twice faster than 10 & 20
- Inherit from ***50+ years*** of ***Know How***
  - M340 Enhanced Architecture
    - 200 000 CPU, ***bug free***
  - X80 I/O quality & sustainability
    - ***Ethernet backplane***
  - Controller MTBF : ***15+ years***



ePAC M580 in Depth

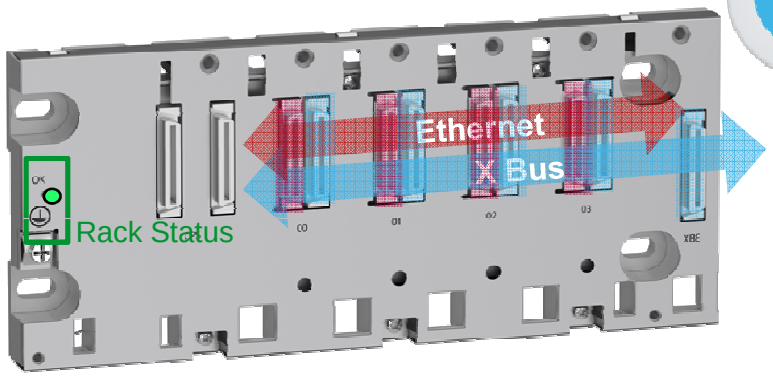
- Powerful ***MultiCore Controller*** (ARM - 600MHz dual-core)
  - ***4 Tasks***: MAST, ***FAST***, AUX 1 & 2
    - *RIO Task Synchronization*
  - ***IEC 61131-3*** programming ***languages***
    - FBD, LD, ST, IL, SFC… , Object model oriented
  - ***High*** execution ***Performances*** (theoretical) 7.5 - 30 Kinst/ms
  - ***Communication*** - Up to 40 req (1k)/scan
- ***Service continuity***
  - ***Change Configuration On The Flight*** (CCOTF)
    - ***Add*** hardware ***In Operation***
      - Electrical protection
    - Change ***Configuration*** & ***Settings*** without Stop
      - ***Automatic*** module ***reconfiguration*** on hot swap
      - ***Modify channel*** parameters (Scale, Fall back…)





ePAC M580 Ethernet Backplane

- ***Ethernet Everywhere***
  - First ***Native Ethernet*** architecture



Standard & ***Open***

Based on ODVA *Standards*

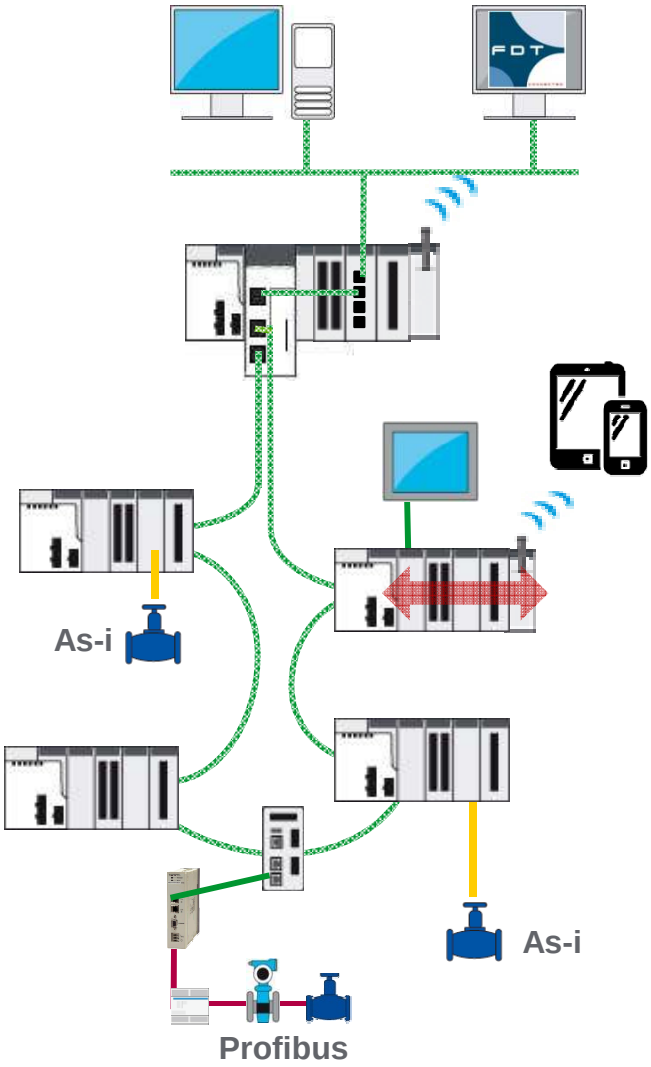
Open with FDT/DTM techno

Cyber Secure & ***Transparent***

- ***BME XBP*** from 4 to 12 Slots
  - Local or Remote (BME CRA 312 10)
  - X80 I/O range
  - Open to partnership
    - Weighting…
  - High Availability services (CCOTF)
    - BME CRA Drop head

	Standard rack	Ethernet rack
CPU	Yes	Yes
I/O	Yes	Yes
BMX CRA	Yes	Yes
BME CRA	No	Yes
BME NOC	Yes	Yes
Expert module	Yes	Yes
Ethernet only module	No	Yes

Modicon M580 ePAC Controller



Innovative

Open Ethernet *architecture* backbone
High-tech ePAC
High data ***Precision***

Easy & flexible

Design your architecture without constraints
Modify your process and architecture in run
Diagnose remotely

Sustainable

Secure investments
Smooth migration
Quality driven