# Open Architectures

## in Process Control

Profibus UK Conference Presentation

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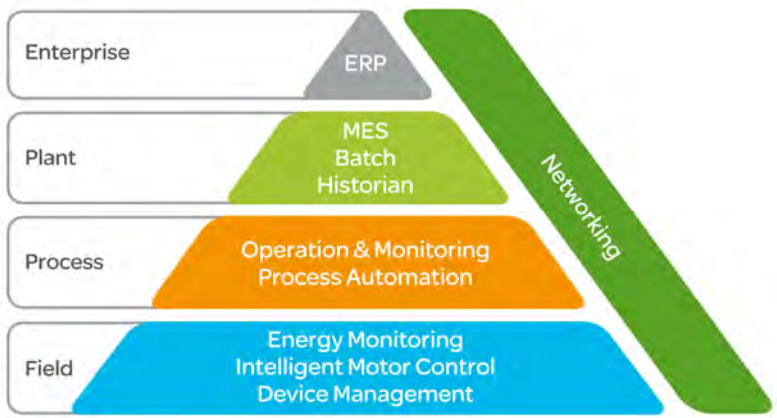
Schneider Electric

# What are customers looking for ?

# Customer requirements

- Cost-effective open solution
  - from field device to enterprise
- Access to plant floor process and equipment information
  - Remote Process Status & Diagnosis
  - Asset Management & Quality Control
  - Improve Operational Efficiency



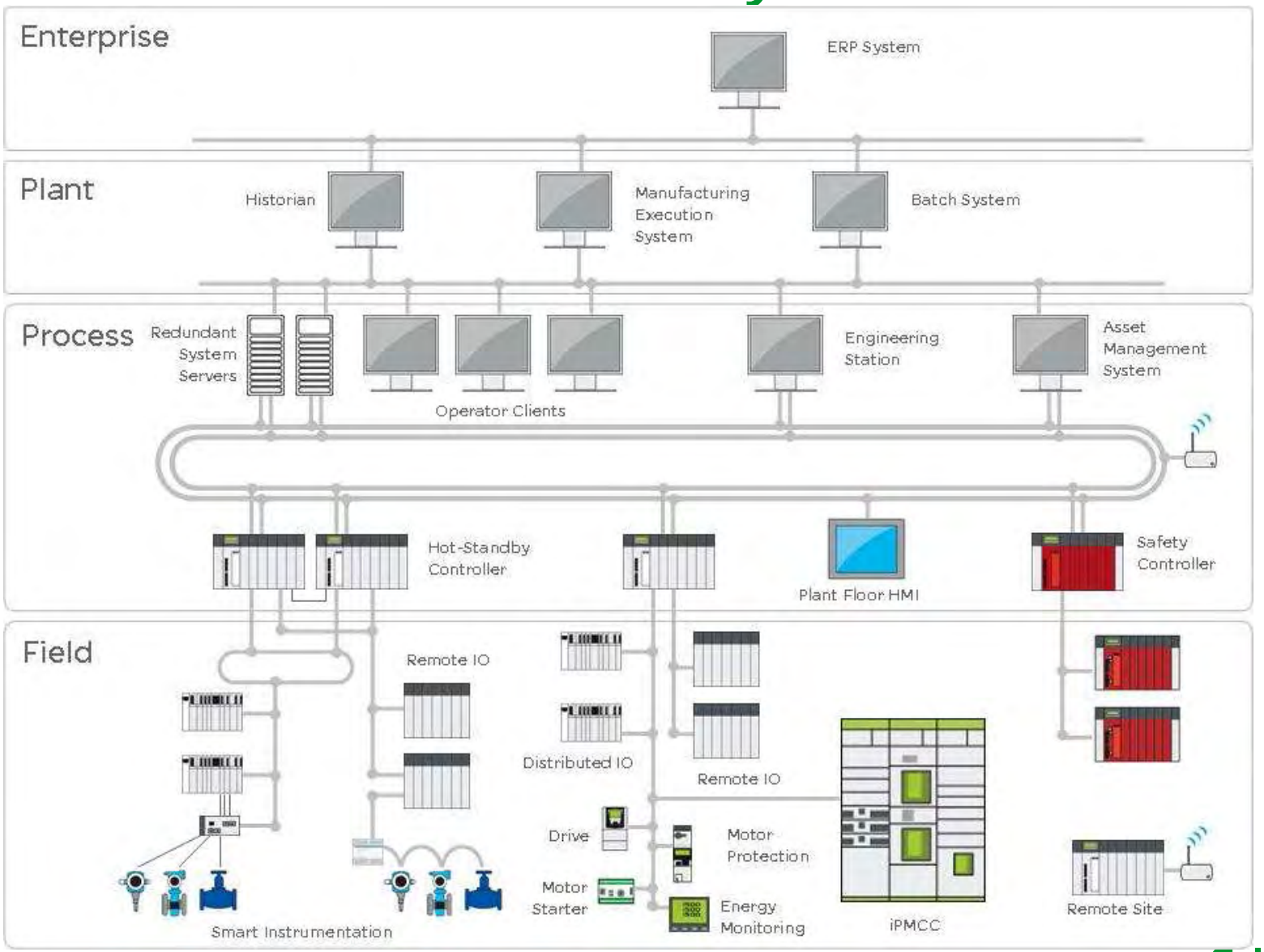

- Easy connectivity to multi-vendor and/or legacy installed systems
- Future-proof assurance while making today's purchase decisions
- Broadest selection of best-in-class products and easy interoperability
  - Solve demanding control applications
  - Not be restricted to a proprietary or vendor specific network

# This presentation will focus on how

- Open architecture IP based networks along with fieldbus networks
- Open standards for software

Can address these needs

# “Industrial” networked system

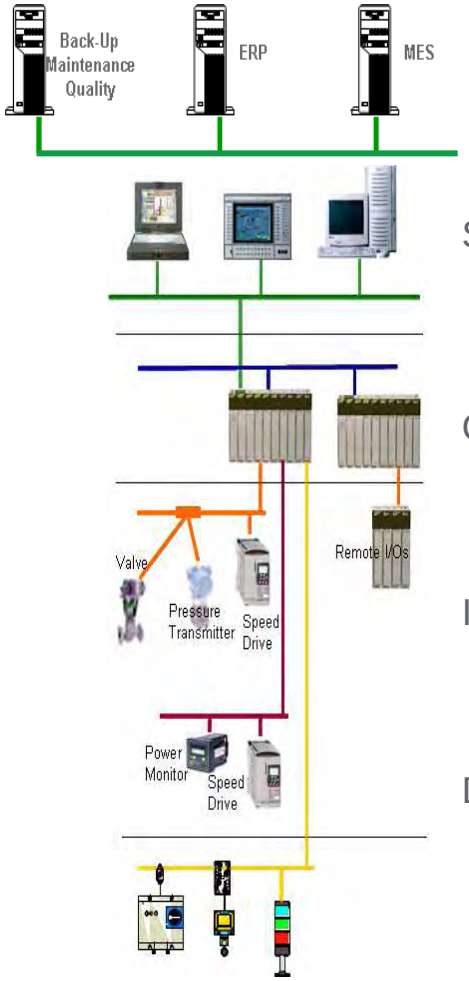


So, how do we achieve this ?

# “Old way”

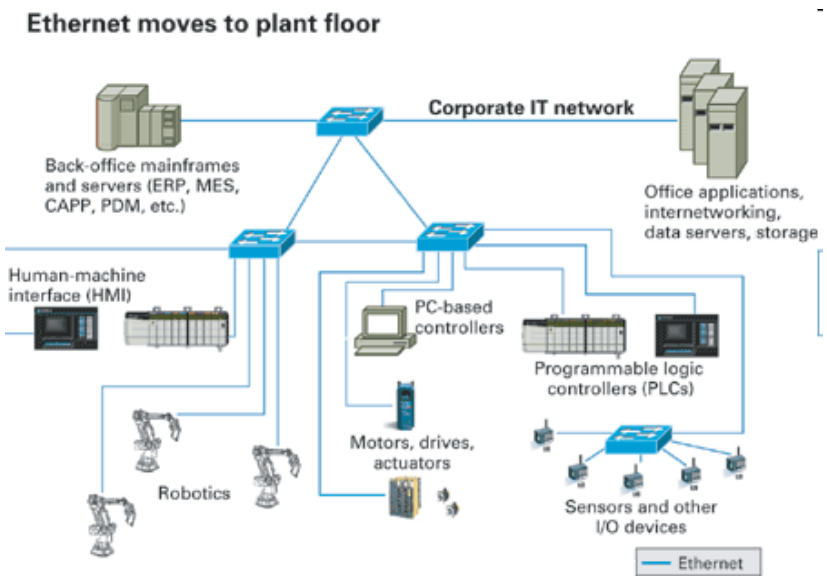
## Multiple networks and data conversion

- Combine multiple, proprietary technologies
  - Control, I/O and device networks used different technologies
  - Multitude of proprietary and vendor-specific solutions
  - Heavy use of hard wired connections for sensors
- Data was “transformed” at each layer
  - Bits to Bytes, Bytes to Data, Data to Information
  - Heavy burden on PLC and SCADA applications
- Technology decisions were vendor driven
  - Lack of common standards



# Ethernet arrives

## Open technology built on standards for “industrial” applications



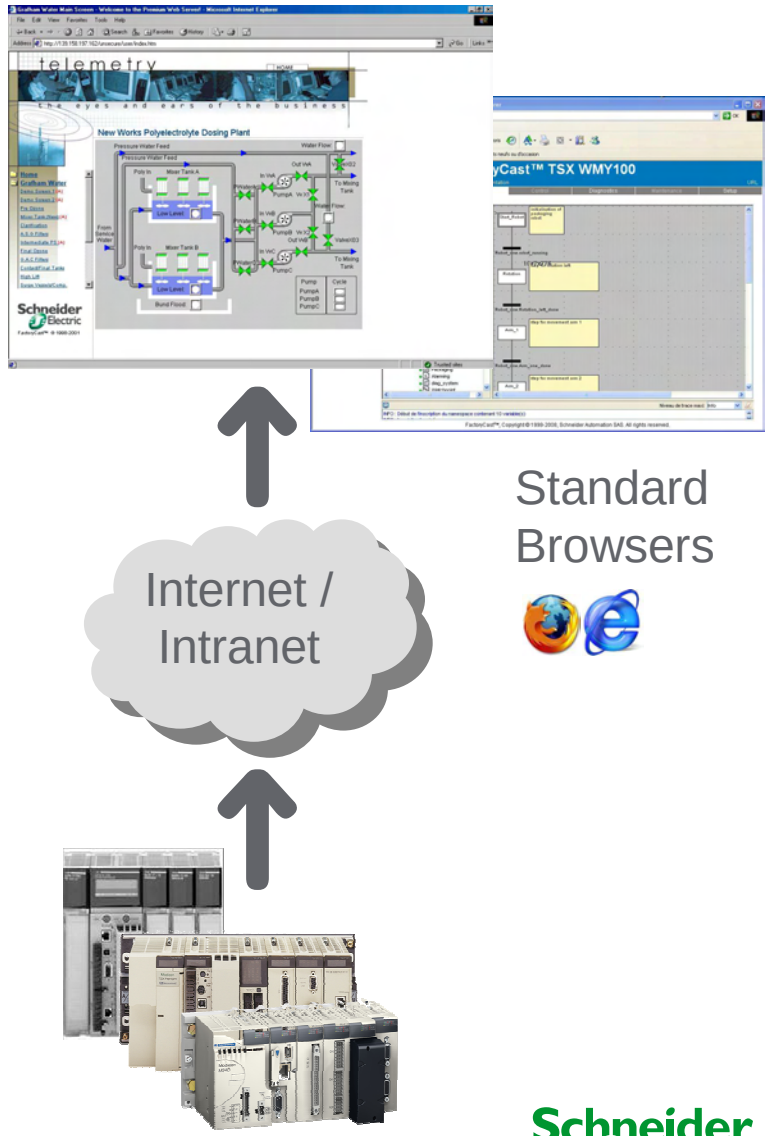

- In 1997 standard Ethernet TCP/IP introduced as solution for industrial control networking
  - Ethernet for different levels of devices
  - Same standards for installation, distances, topologies (for all network levels)
  - Accessible expertise, training
  - Open tools, accessories
  - Technology derived from IT market

# What do Ethernet technologies bring ?

# Ethernet brings internet technologies

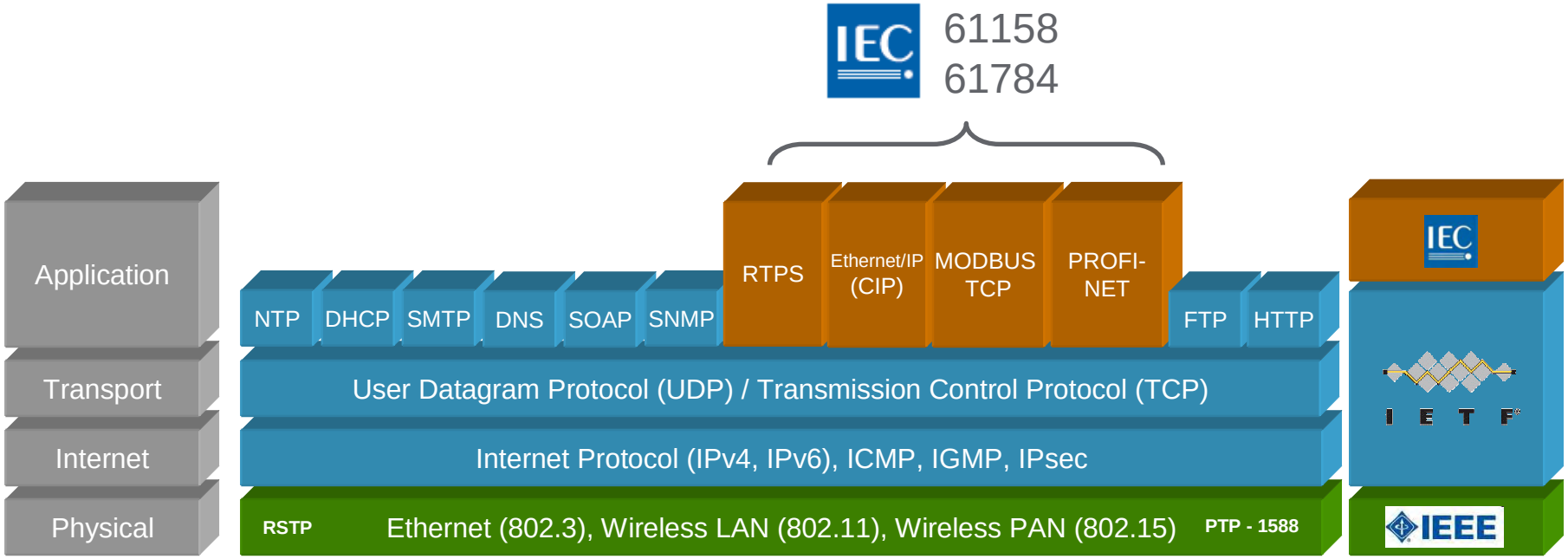
## Best of Control & IT technologies

- Internet technologies
  - Ethernet TCP/IP for SCADA to Control networking
  - Web Browsers for license-free remote access
- "Industrial" protocols
  - PROFINET, MODBUS, Ethernet/IP
  - Connects enterprise to control
  - Serial devices accessed directly via Ethernet to Serial Gateways
- Possibility of Plant-wide and Remote visibility enabled by Ethernet TCP/IP and HTTP



# Ethernet standards

## Industrial Ethernet is standards based



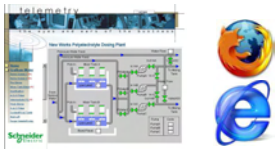

IEEE - Institute of Electrical and Electronics Engineers

IETF - Internet Engineering Task Force

IEC - International Electrotechnical Commission

# Ethernet brings much more

**> Web Servers**



**> Remote Access**

dnp

WITS Distributed Network Protocol

WATER INDUSTRY TELEMETRY STANDARDS

**> Device Communication**

- PROFINET
- Ethernet/IP (CIP)
- MODBUS

**> eMail / SMS**

**> Device Replacement**

**> IO Services**

**> Data Server**

MySQL

Microsoft SQLServer

ORACLE

**> NTP**

**> SOA / XML / XaML**

W3C WORLD WIDE WEB consortium

XML

Microsoft .NET

**> Services**

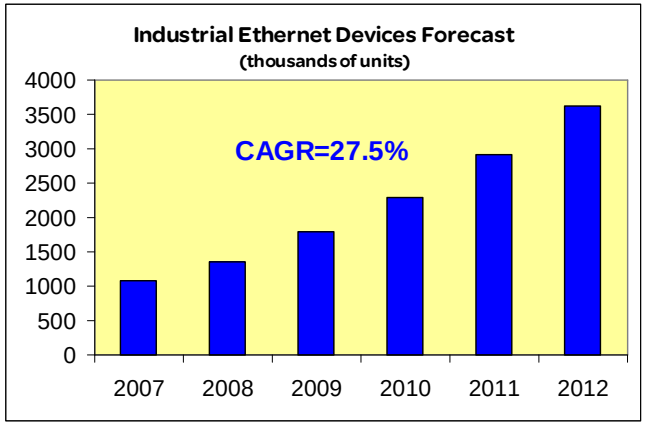
TCP/IP

Ethernet & IP based networks are growing

# Ethernet & IP based networks are the future

## Networking trends

- Ethernet and IP-based networks
  - IT industry continues to drive lower cost
  - Control systems are taking advantage of standard Ethernet services
- Standard Ethernet will be the common factor between
  - Process, Energy infrastructure, Building Management Systems
- Today, Ethernet is standard for information and control level

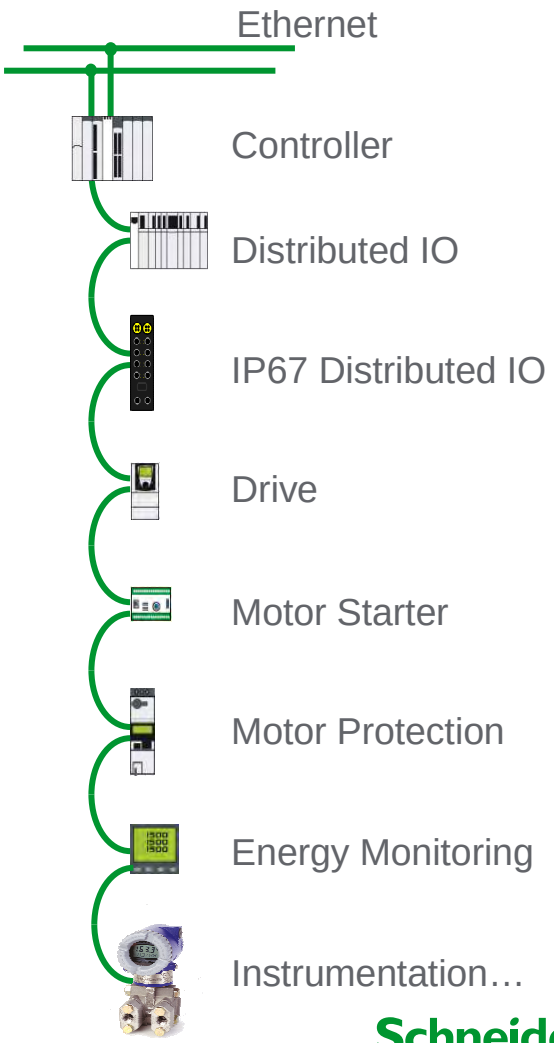



Data source: ARC 2008 Industrial Ethernet Study

# Ethernet suitability

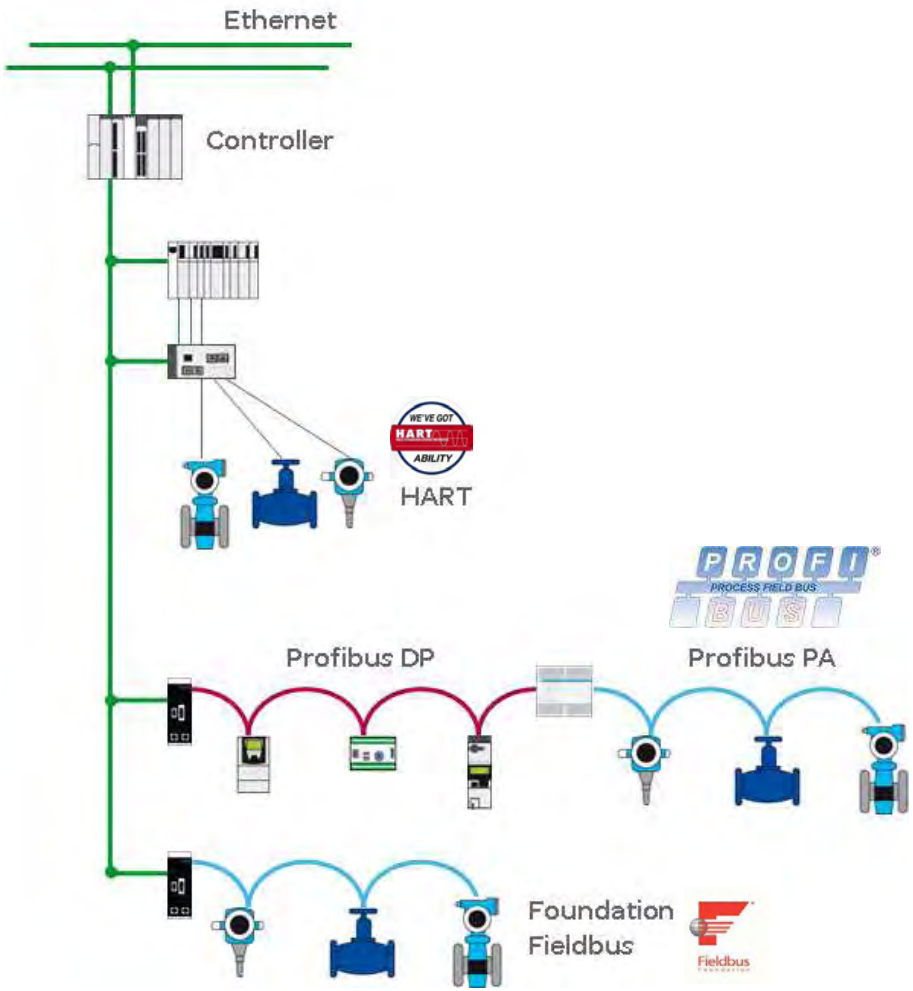
## Making Ethernet suitable for industrial environments

- Industrial grade infrastructure
  - Extended temperature, EMC
  - IP20, IP67
  - Industrial RJ45, M12 connectors
- Daisy chain will reduce cost of deployment
  - Embed switch in the device
  - Combine star topology with bus architecture
  - Daisy chain loop to improve availability
- Standard Tools and Device Description improve diagnostics and integration
  - Wireshark (Ethereal)
- For high speed applications with cycle times of sub 10ms / sub 1ms specific solutions exist



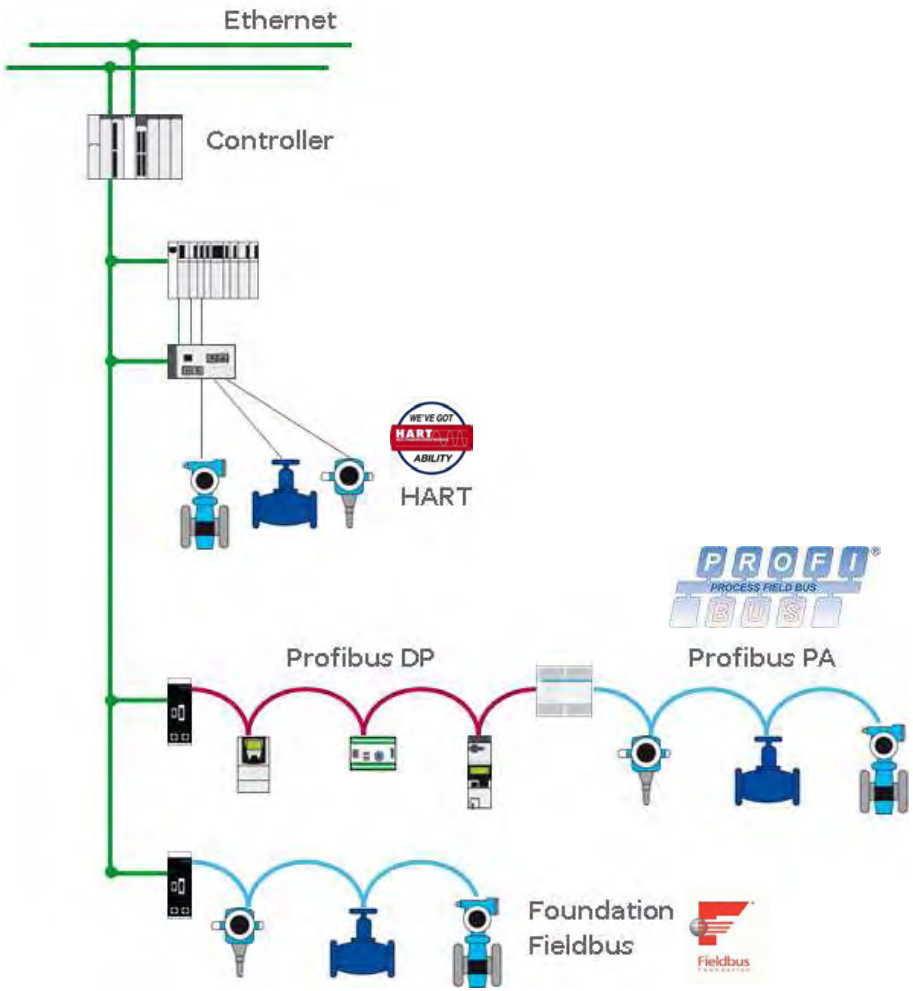
# Process Fieldbus integration

# Process Fieldbus simplicity and savings




- Provide savings
  - Wiring and **operational cost reduction**
  - **Interoperability**
  - **Transparent access** from tools (AMS) to device data for calibration, diagnostic, maintenance, …
- **PROFIBUS PA**
  - Safety certified solutions
  - Bus powering and IS capability
  - Widespread support
  - PROFIBUS strength is the **link with DP and simplicity**

# Process Fieldbus integration

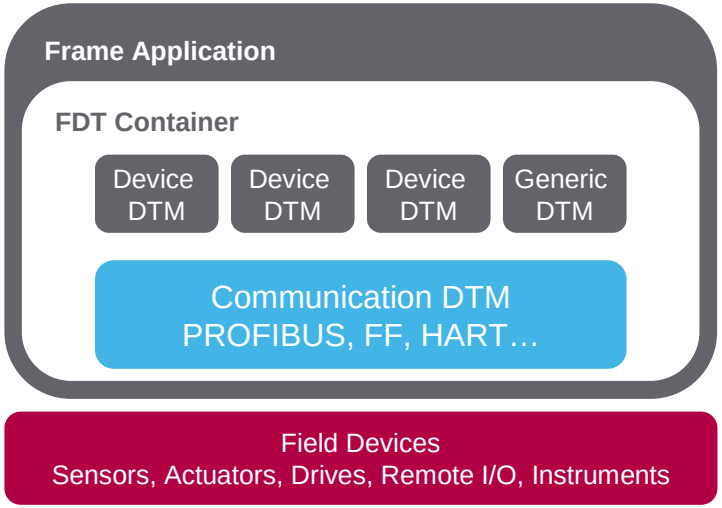



- Control system integration
  - In-rack modules
  - Remote Masters on Ethernet
    - ›High degree of flexibility with topology
- High level of software integration
  - FDT/DTM

# FDT for open access

# What is FDT ?

- FDT is a specification
  - standardizes the interface between field devices and frame applications
- Enables access to the most advanced features of field devices
  - irrespective of the device supplier, system supplier or communication protocol
- FDT delivers benefits at all stages of the device life cycle,
  - particularly in commissioning and in maintenance/asset management




FDT is an international standard, IEC 62453

*"The FDT technology is the recommended platform for advanced asset management applications, intelligent device diagnostics and efficient user environment."*

*WIB/Shell test report*

# FDT value proposition

- FDT technology is truly open engineering environment designed to
  - integrate any intelligent field device
  - in any host system
  - using any communication protocol

## Value to Users

- Drivers are designed and built by the device manufacturers
  - advanced features of the devices are automatically available to the user
- Provides maximum value through free selection of all components of the automation infrastructure
  - easy integration into automation and asset management systems
  - standard open access to manufacturers parameter sets

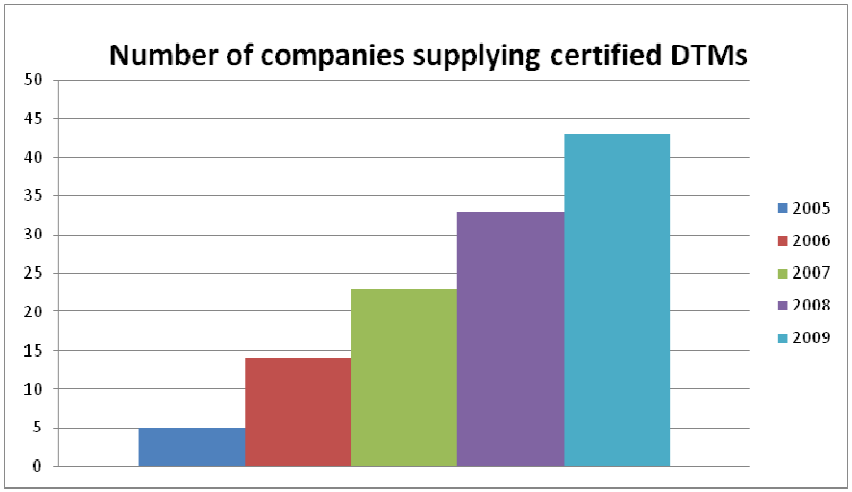
# FDT supports many protocols

- Support of many communication protocols
  - CANopen, CompoNet, ControlNet, DeviceNet, EtherNet/IP, FOUNDATION Fieldbus H1/HSE, HART, INTERBUS, IO-Link, MODBUS SL/TCP, PROFIBUS DPV0/V1 PA, PROFINET IO

## Technology Achievements

- Release of dtmINSPECTOR 2.0
  - Essentially a quality seal for the DTM
  - Checks and validates all types of DTM Communication, Device, Gateway etc.
  - Built on the latest FDT-Specification 1.2, including the Addendum
- Release of frameINSPECTOR
  - Essentially a quality seal for the Frame application
  - New frameINSPECTOR tool automates the process
  - First certified frame: Endress+Hauser achieves certification for FieldCare

# FDT certified DTMs




Certified DTM and Frames Catalogues:
http://www.fdtgroup.org/product-catalog/certified-dtms
http://www.fdtgroup.org/product-catalog/certified-frames

- Certified DTMs ensure compatibility with the FDT Standard
  - Carried out by independent, audited test laboratories
  - Membership in FDT not required for certification
- More than 2400 devices are now supported by certified DTMs
  - Many more by non-certified versions

# FDT developments

- Updated FDT standard
  - Members will receive draft end June 2010, expected approval end 2010
- Key highlights
  - Backward compatibility
  - Latest Microsoft technology (.NET environment)
  - Simpler to implement and ensure compatibility
  - Improved performance
  - Support of FDI Device Packages (EDDL + FDT = FDI)
  - Many more new features / capabilities
- FDTExpress
  - Tightly integrated with Microsoft Visual Studio
  - Designed to speed the development of DTMs
  - Has received rave reviews from seasoned developers

# FDT ~70 member companies

# FDT co-operates with many groups

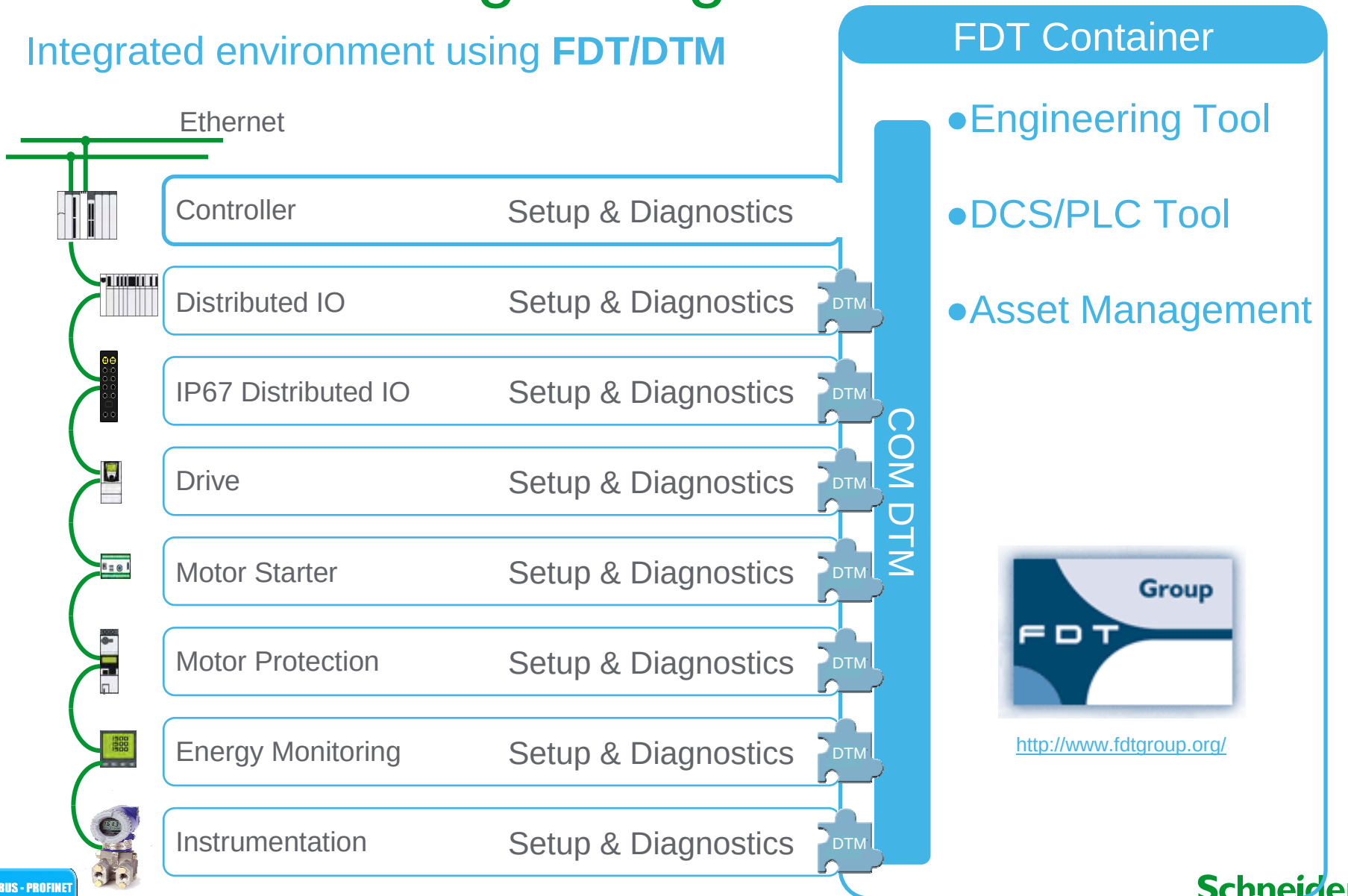







# FDT/DTM brings integration

## Integrated environment using **FDT/DTM**




http://www.fdtgroup.org/

# In conclusion

Use open standards to deliver interoperability through

- open networks
- open software

# Thank You

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