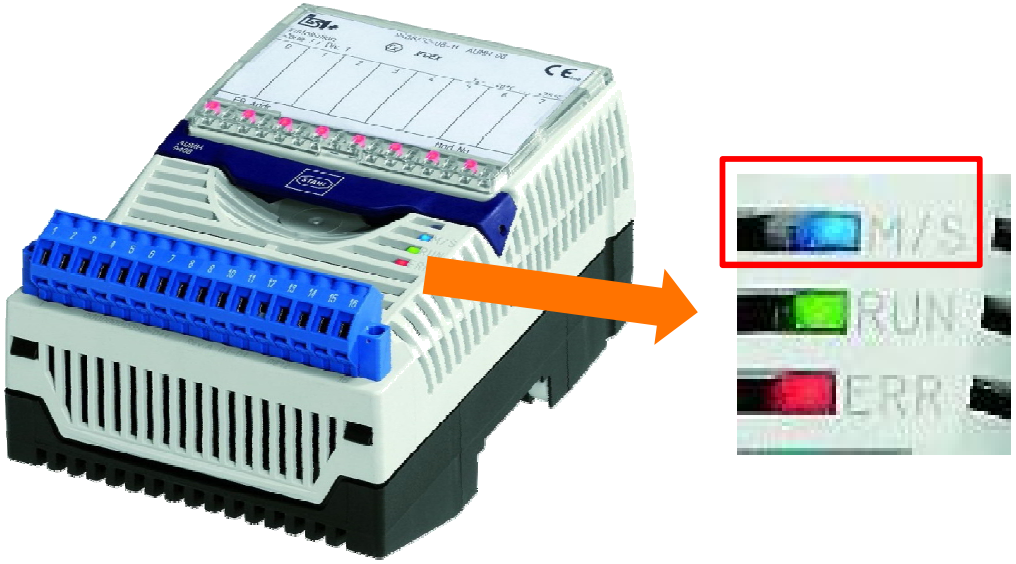
Remote I/O & NE107

New diagnostics



- "**ERR**": e.g. module is damaged, no function any more – replacement required immediately!
- „**M/S** "Out of Specification": e.g. module operates at too high ambient temperature – external action required (e.g. activate cooling)!
- „**M/S** "Maintenance Required": e.g. module potentially damaged (e.g. because of too high ambient temp.) or end of service life reached – replacement recommended

flash

When does failures happen…

…and no spare on stock

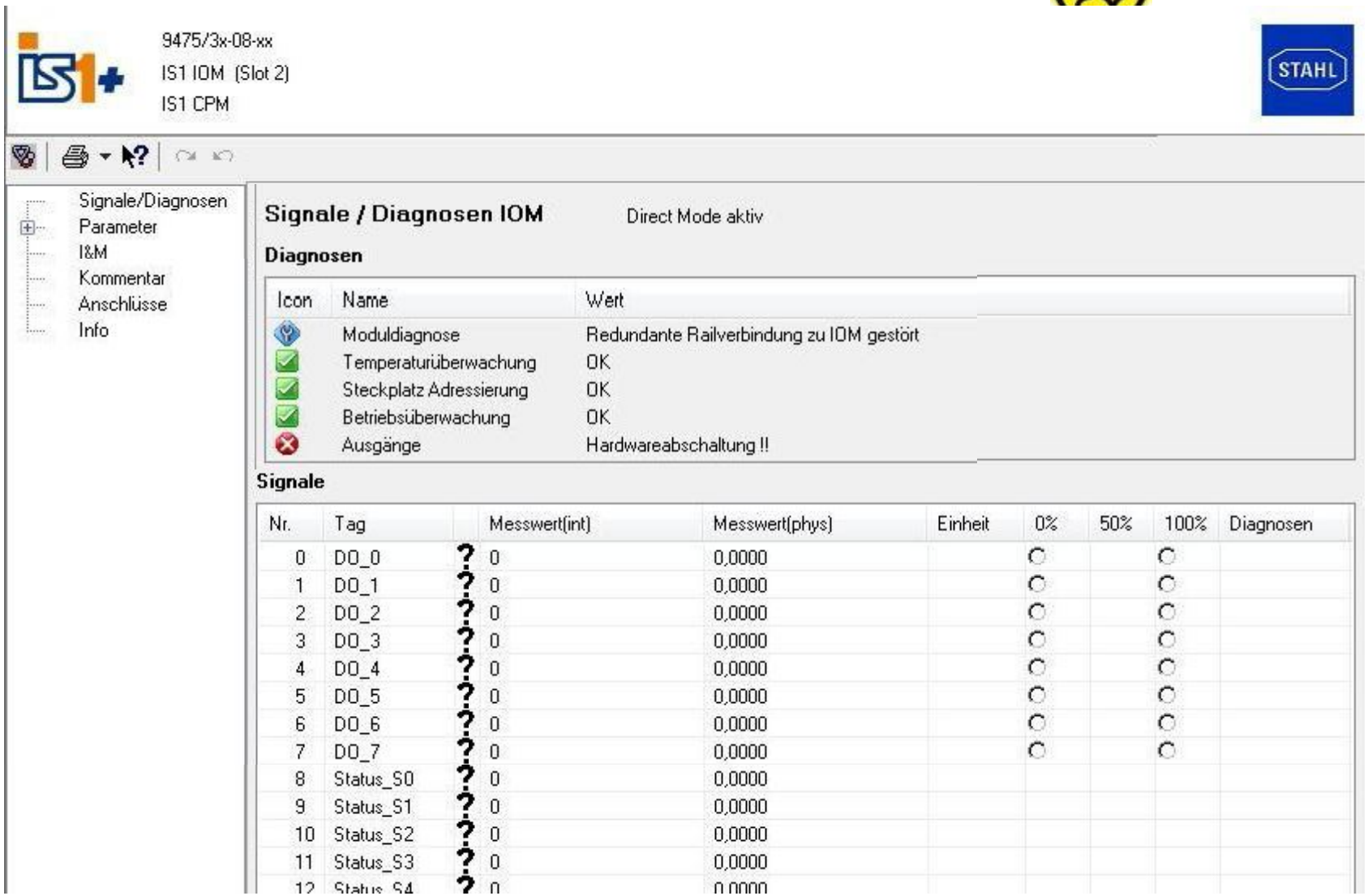
Remote I/O & NE107

Pro-active Maintenance!

- **Integrated wear-out detection – better process availability – less stress!**
  - Modules measure continously all relevant operating parameters: ambient temp., temp. changes, load of module, no. of switch-on situations etc.
  - The nominal service life time (here: 15 years) is reduced accordingly.
  - before the end of service life is reached, a „maintenance required“ message is produced in time (here 12 months before the calculated end of service life) – opportunity based maintenance is possible now!

Asset Management and NE107

via e.g. DTM technology



NE107 via Fieldbus

PROFIBUS DP?

System	Status
DCS and PLC	partly implemented
Asset-Management Systems	mostly implemented by FDT/DTM and EDD
Fieldbusses	
PROFIBUS PA	OK (Profile 3.02)
FF H1	OK (FF-912)
PROFIBUS DP	**no**
HART	planned
PROFINET	OK
FF HSE / F-ROM	OK
other Ethernet protocols	**no** / vendor specific
Field devices	increasing *)
Remote I/O Systems	NEW

New: Status bit for process signals

used with PROFIBUS DP

- **Status Bit for process value:**

Status Bit	Signal	
0	not valid	✗
1	OK	✓

- **NEW:**

  Each signal comes with a status

  (similar to PROFIBUS PA, FF H1 etc.)

- **But:**

  Only limited good/bad information

  (1 Bit – PROFINET uses 1 Byte!)

Daten	Byte	Betriebsart						
		8AI	8AO	6AI+2AO	8AI/8AO	8AI +4HV	8AO +4HV	8A
Input	1	AI0	**S0 - S7**	AI0	AI0	AI0	**S0 - S7**	
	2		0				0	
	3	AI1		AI1	AI1	AI1	HV-P1	
	4							
	5	AI2		AI2	AI2	AI2		
	6							
	7	AI3		AI3	AI3	AI3	HV-P2	
	8							
	9	AI4		AI4	AI4	AI4		
	10							
	11	AI5		AI5	AI5	AI5	HV-P3	
	12							
	13	AI6		**S0-S7**	AI6	AI6		
	14			0				
	15	AI7			AI7	AI7	HV-P4	
	16							
	17	**S0 - S7**			**S0 - S7**	**S0 - S7**		S
	18	0			0	0		
	19 - 22					HV-P1		H
	23 - 26			-		HV-P2		H
	27 - 30					HV-P3		H
	31 - 34					HV-P4		H
	35 - 38	-			-		-	
	39 - 42					-		
	43 - 46							
	47 - 50		-					
Output	1-2		AO0	AO6	AO0		AO0	
	3-4		AO1	AO7	AO1		AO1	
	5-6		AO2		AO2		AO2	
	7-8	-	AO3		AO3	-	AO3	
	9-10		AO4	-	AO4		AO4	
	11-12		AO5		AO5		AO5	
	13-14		AO6		AO6		AO6	
	15-16		AO7		AO7		AO7	

Remote I/O with NE107 Diagnostics

Innovation & added value!

Conclusion and end:

When buying a new remote I/O system – make sure it supports NE107!

Thankyou

Setting the Standard for Automation™

ISA DELHI SECTION
Asia Pacific District

Asset Management System Interface with Field devices

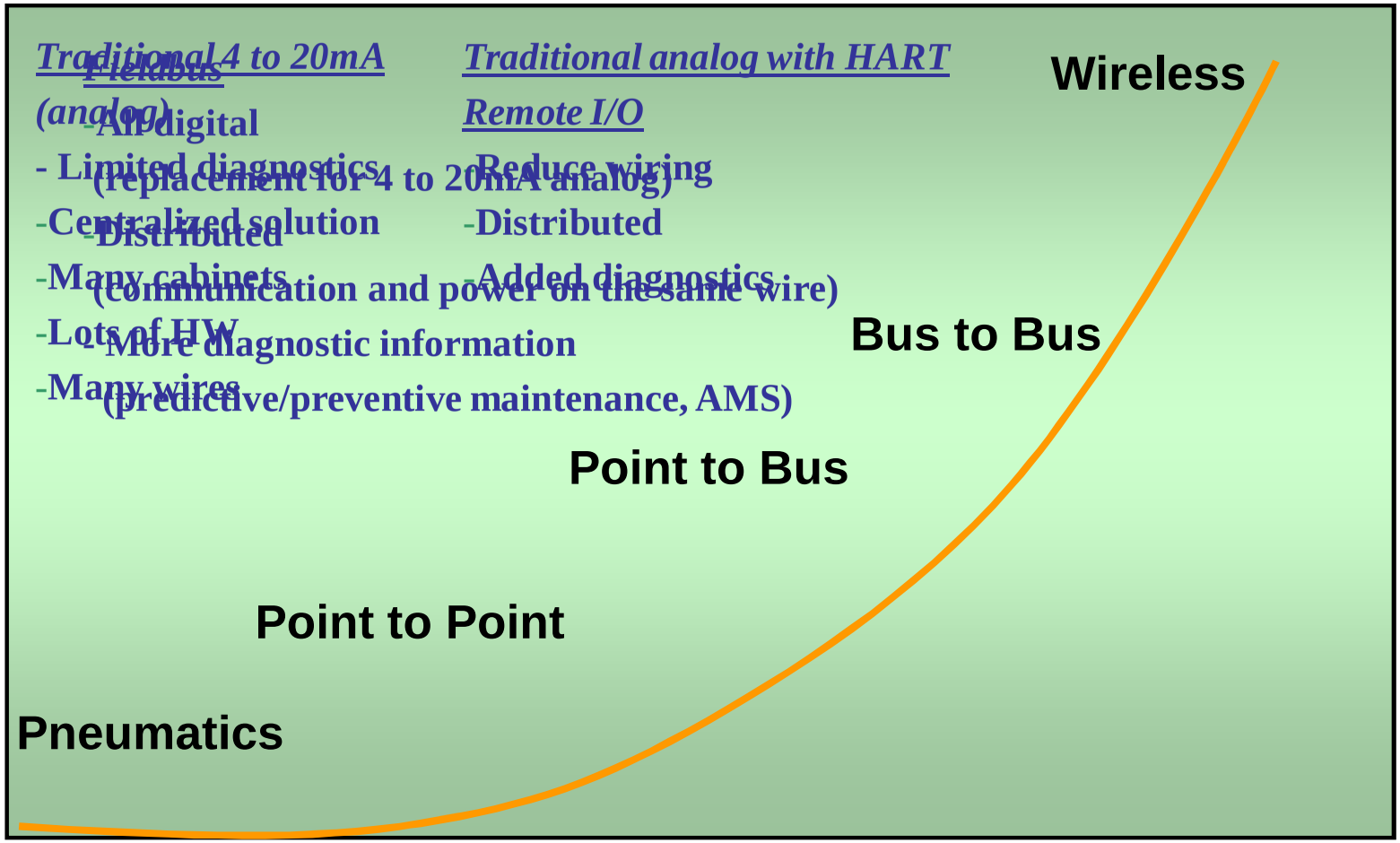
Unnikrishnan.R
Manager – Technical Support
Process Automation Division
Pepperl + Fuchs

Standards
Certification
Education & Training
Publishing
Conferences & Exhibits

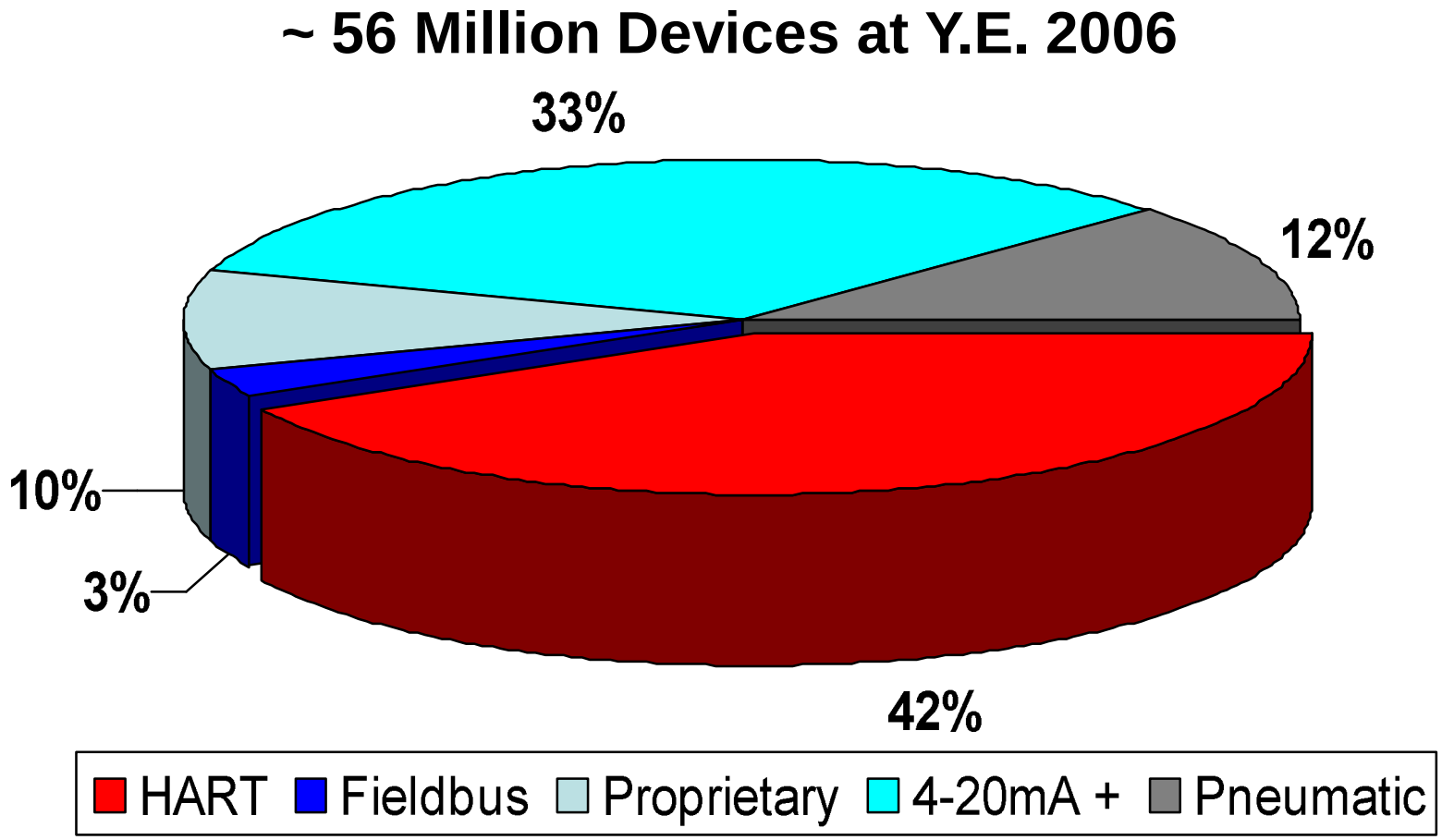
Agenda

- Introduction
- Control System History
- Asset Management System
- Asset Management in HART Technology
- Asset Management in Fieldbus Technology

Control System History



Worldwide Installations



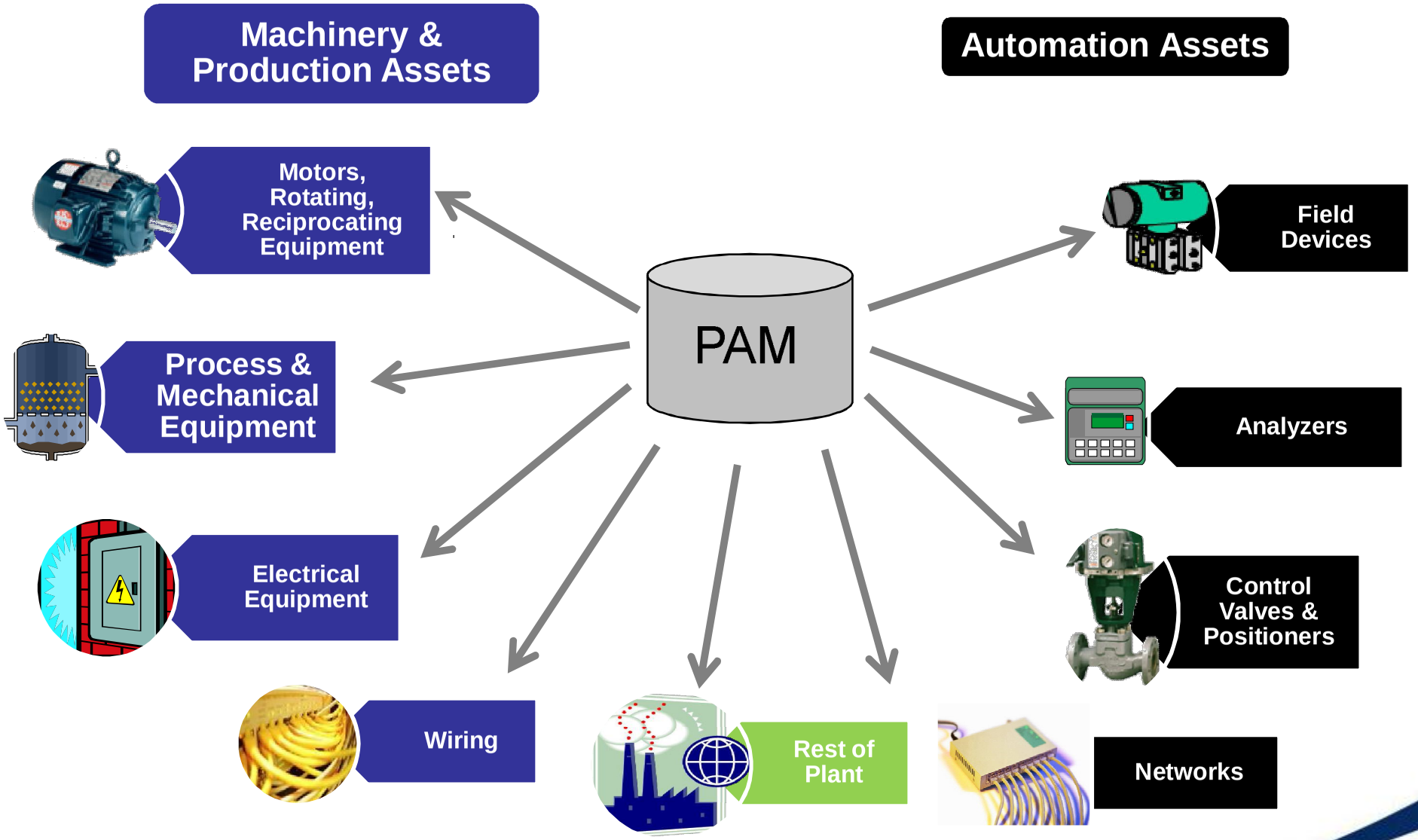
ASSET MANAGEMENT SYSTEM

1.Asset management is the system of monitoring and maintaining things of value to an entity or group.

2. It is a systematic process of operating, maintaining, upgrading, and disposing of assets cost-effectively.

3. Asset Management System helps in predictive analysis and using the extracted data to predict future trends and behavior patterns.

PAM Manages Performance, Availability, and Reliability of Plant Assets



Source: ARC Advisory Group – Courteously Paul Sereiko

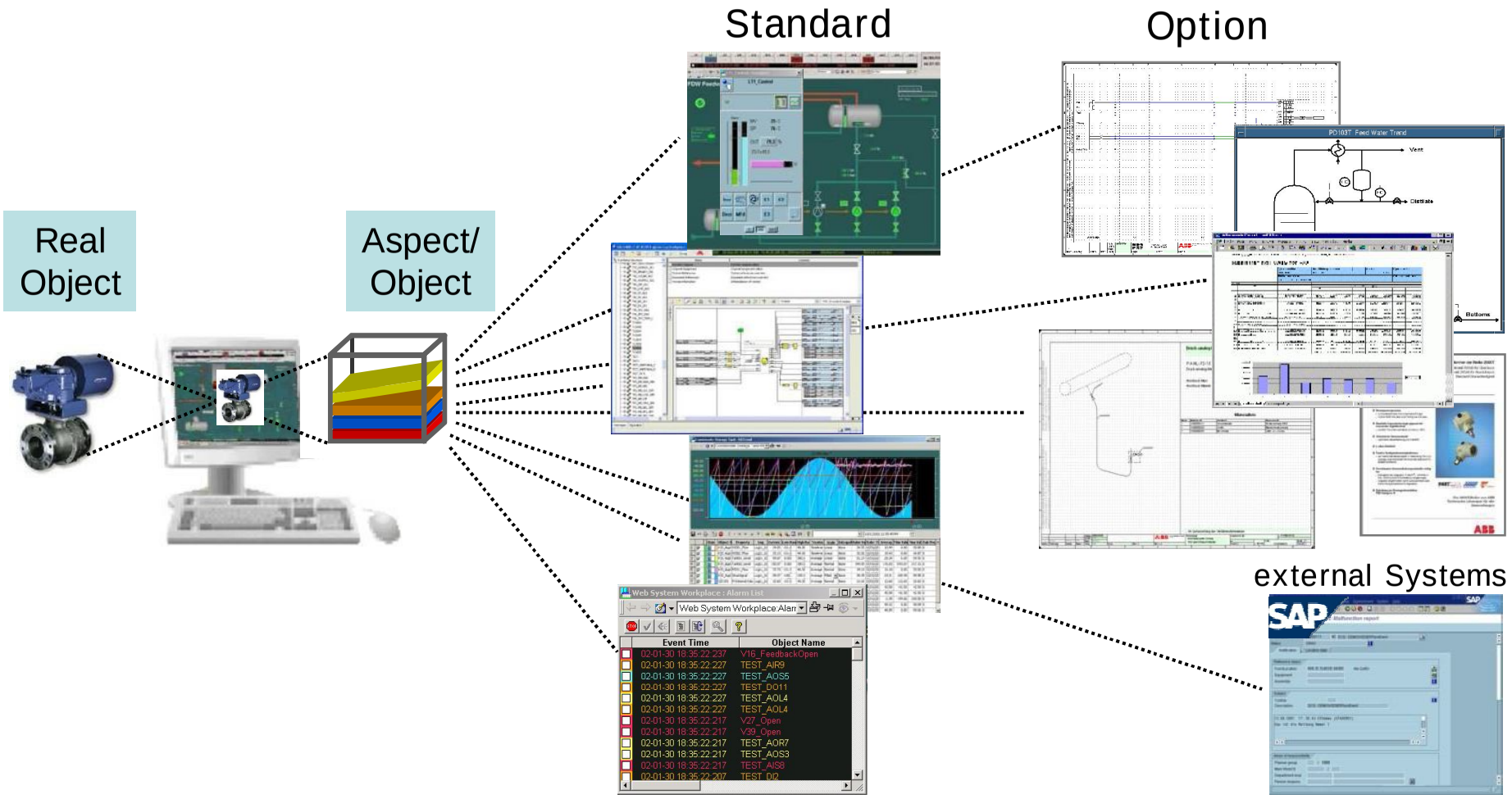
Example Suppliers of PAM Systems

- ABB
- Bently Nevada
- Bruel Kjaer Vibro
- Emerson Process Manageme
- FLIR Systems
- Honeywell
- Invensys
- Rockwell Automation
- SKF Condition Monitoring
- Yokogawa
- ……

Bently Nevada™ Asset Condition Monitoring

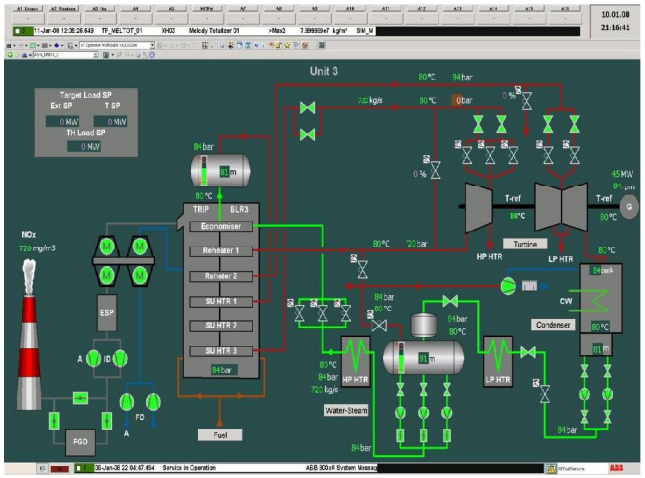
Brüel & Kjær Vibro

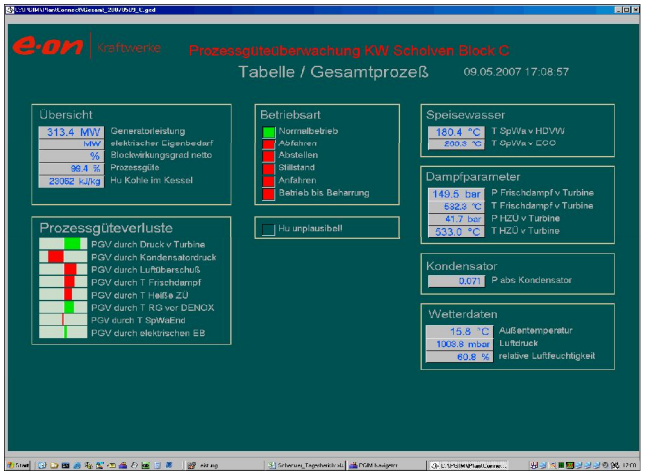
Integration of information



Roll based, optimized workplaces

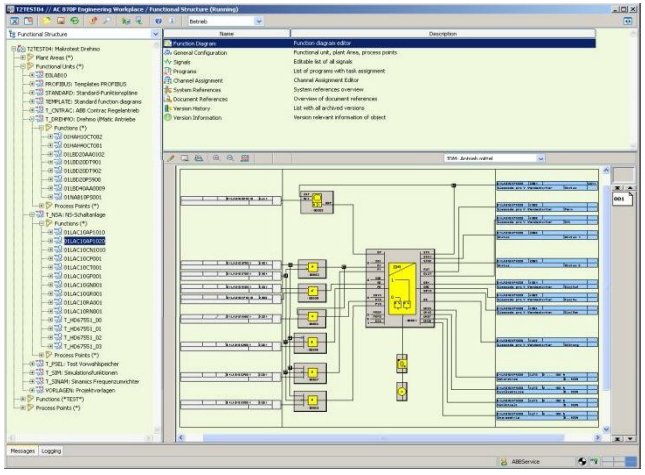
Operation

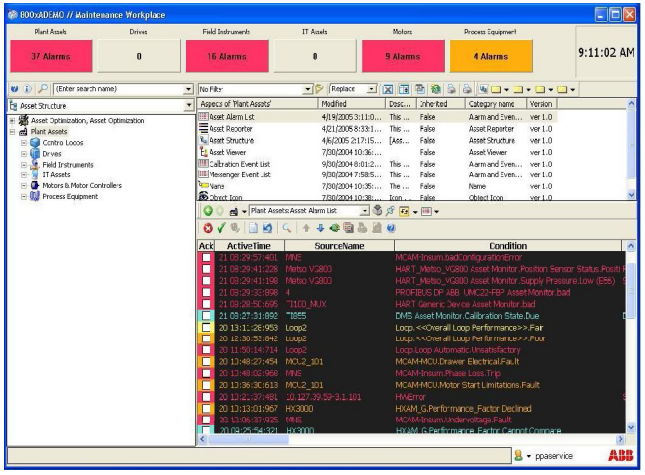




Plant optimization

Service

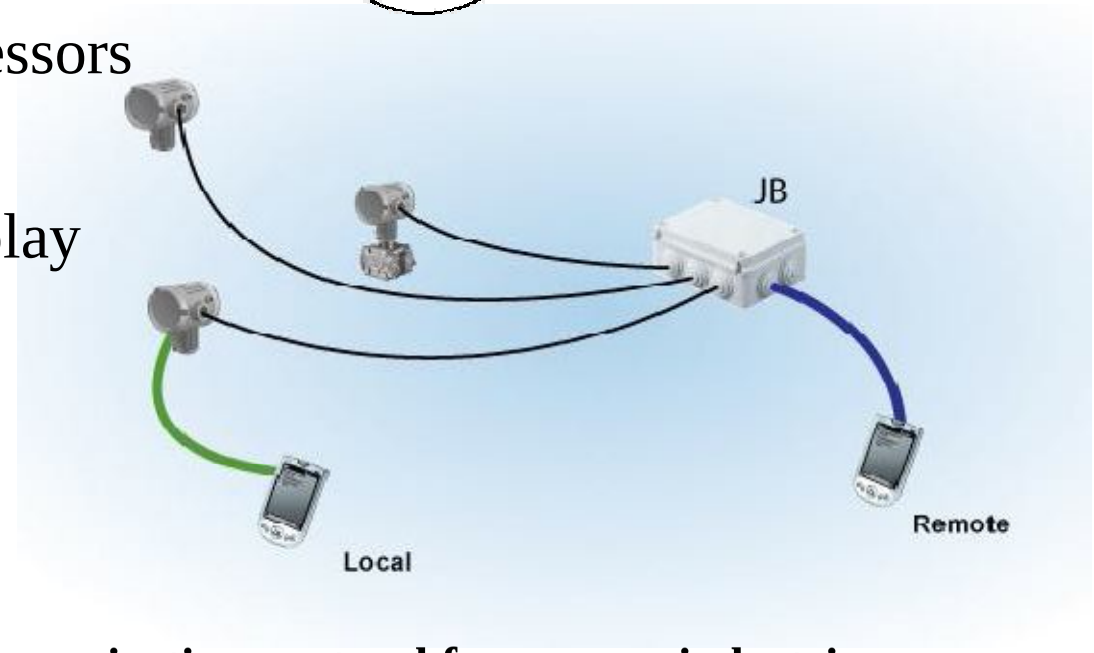




Diagnosis and maintenance management

HART = Highway Addressable Remote Transducer

- Allows local and remote access to instrument configuration
- Instruments have microprocessors
  - More sophisticated
  - May not have a local display



HART is a fully open and de-facto communication protocol for process industries
Almost 70% of SMART field devices are HART capable

HART data is available anywhere on the 4-20mA

HART Benefits

Benefits	HART Instruments
Accuracy and stability	✓
Reliability	✓
Multivariable	✓
Computations	✓
Diagnostics	✓
Multiple sensor inputs	✓
Ease of commissioning	✓
Tag ID	✓
Remote configuration	✓
Loop checks	✓
Adjustable operational parameters	✓
Access to historical data	✓
Multidrop networking	✓
Access by multiple host devices	✓
Extended communication distances	✓
Field-based control	✓
Interoperability	✓

HART Load Requirement

HART protocol has a min. sensitivity of 200 mV p-p.
This also means that for 1 mA p-p
(+0.5 mA to –0.5 mA) FSK current modulation,
min. load is 200 Ω according to Ohm's Law.

HART protocol specified load requirement for the loop

230 Ω ··· 1,100 Ω

HART Network: Point-to-Point

AI device

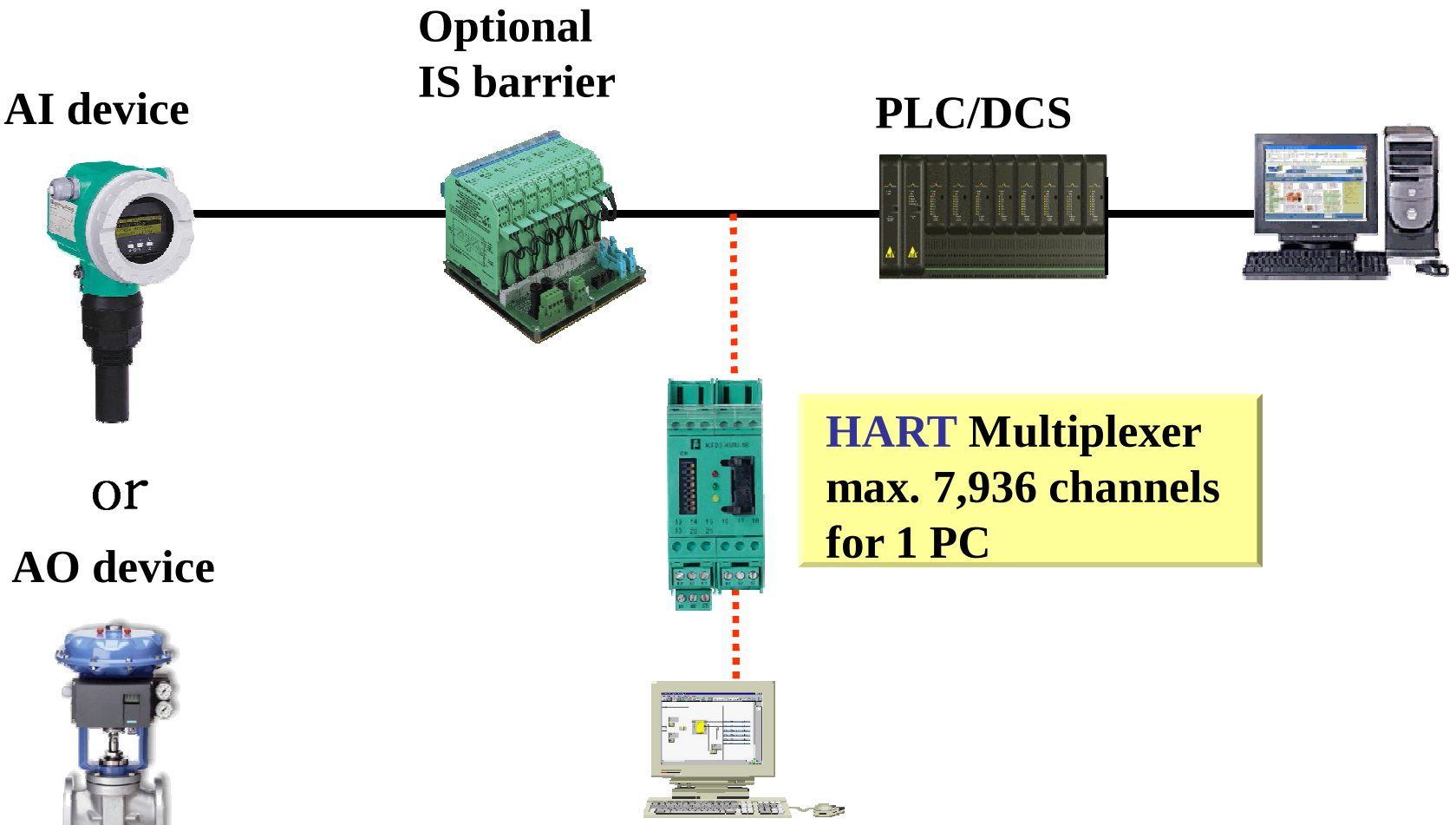
PLC/DCS

or

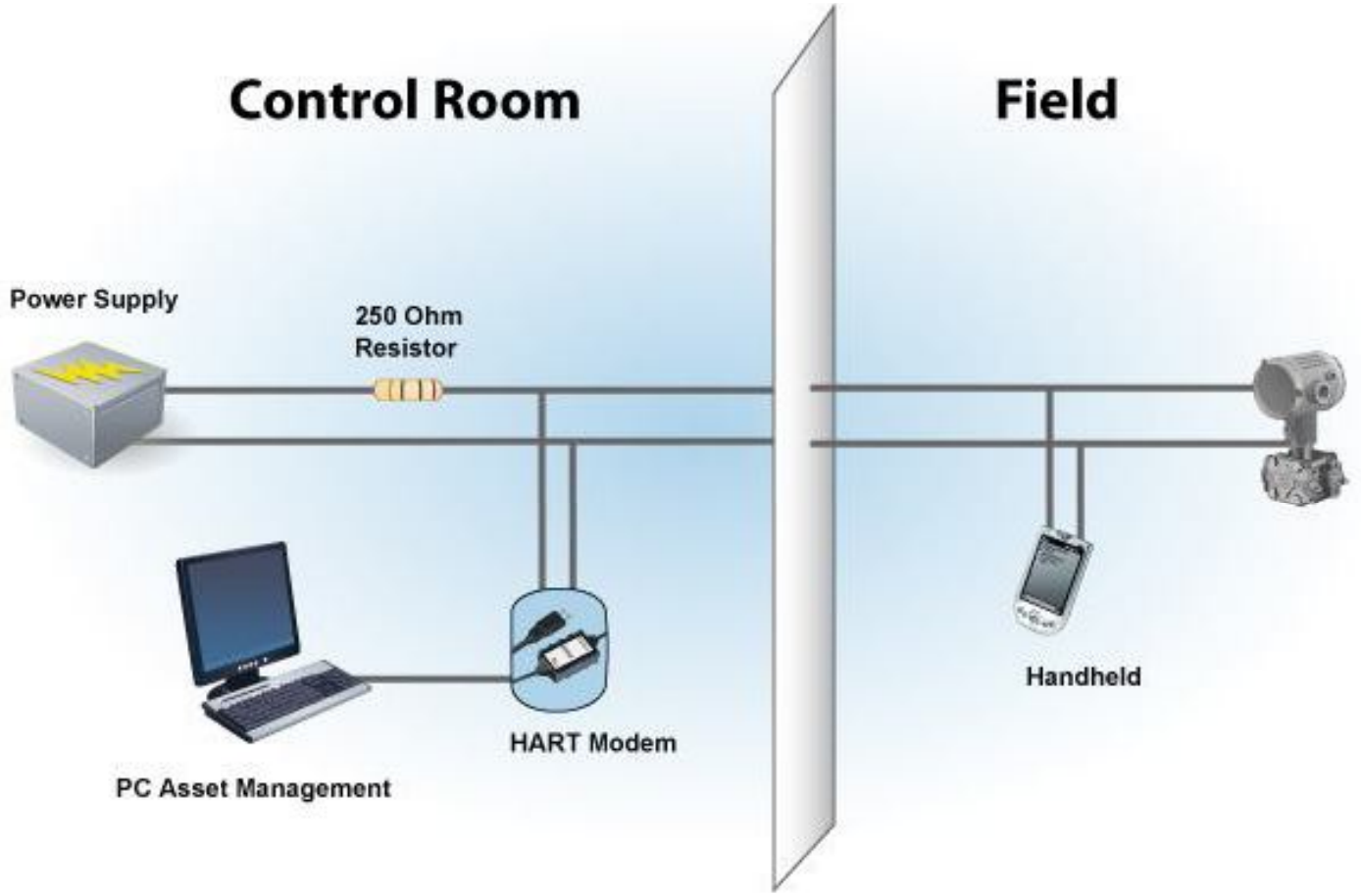
AO device

Point-to-point network
Hybrid:4/20 mA+ HART
Polling address = 0

HART Network: HART Multiplexer

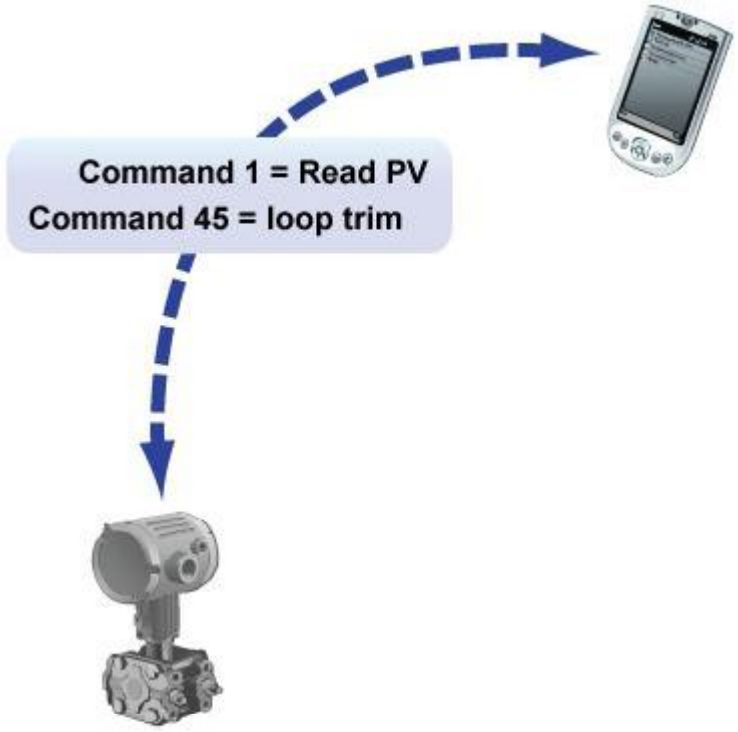


Understanding HART Electrical Connection



Understanding HART Commands

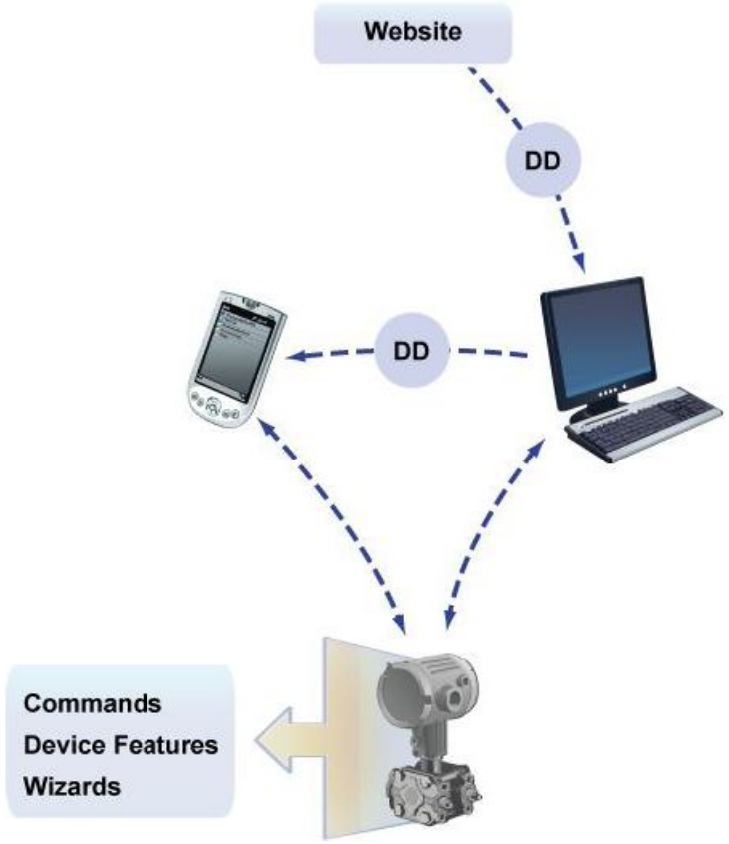
- There are three classes of HART commands
  - Universal
    - PV – TAG – Diagnostic
  - Common Practice
    - Calibration – PV range
  - Device Specific
    - Linearization tables – Technology specific



Understanding HART Device Description (DD)

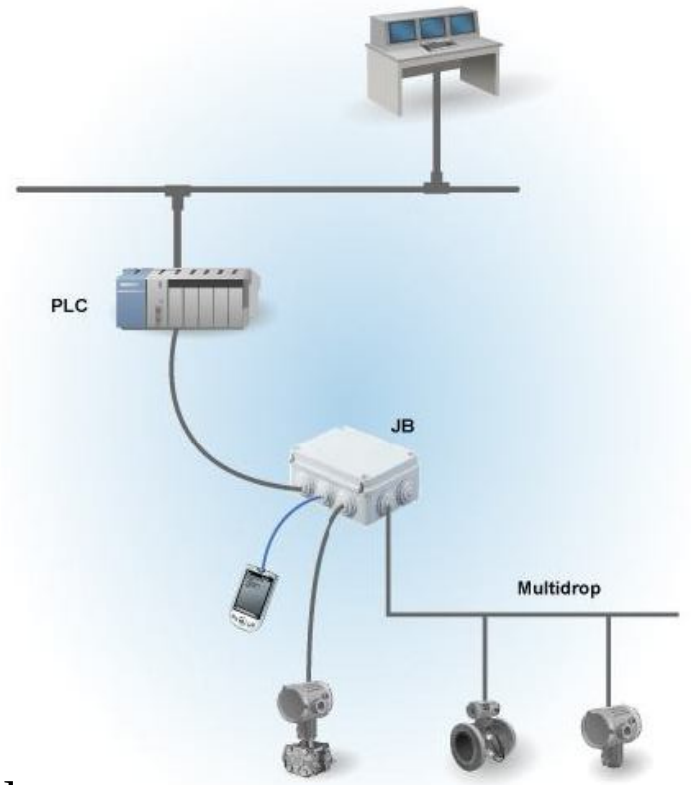
- All the information needed by the host to fully communicate with a field device.

- Handheld host
  - Simple instruments
  - IS version for hazardous areas
- PC-based host
  - Asset management
  - Condition monitoring



Understanding HART Communication Modes

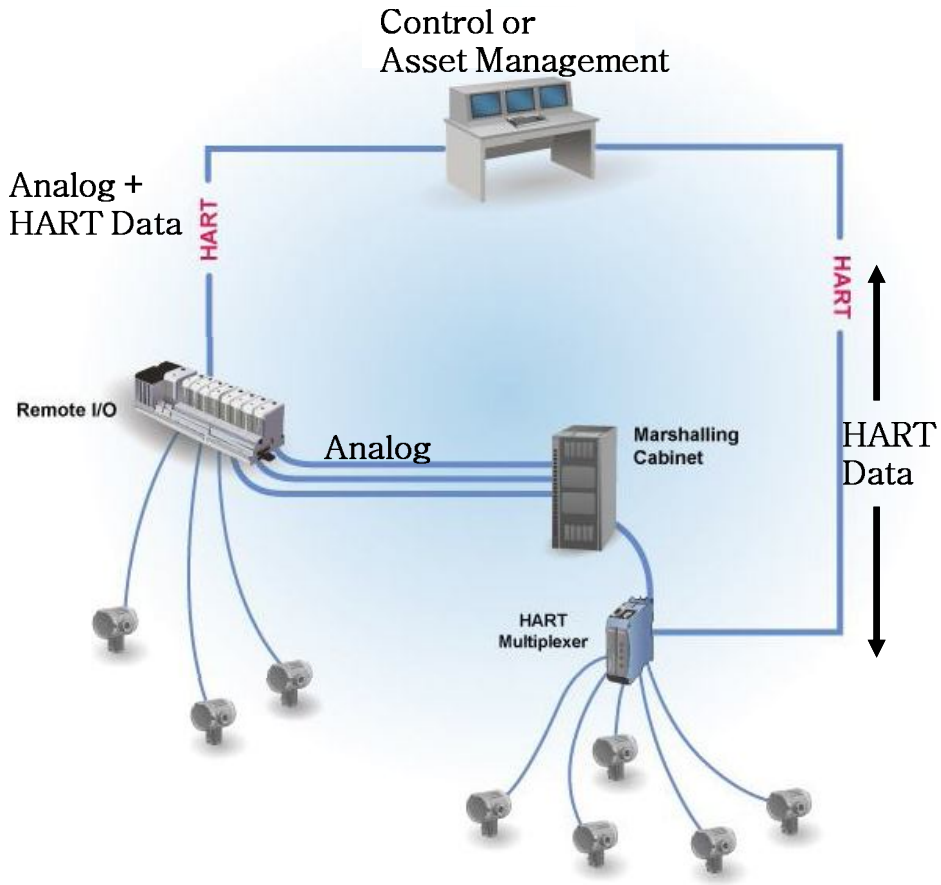
- Master-Slave Mode:
  - Communication is initiated by a master device
  - Point-to-point or multi-drop
- Primary Master:
  - Control room (system)
- Secondary Master:
  - Handheld
- Burst Mode:
  - Master instructs the slave device to continuously broadcast a standard HART reply message (e.g. PV) until instructed to stop.



Understanding HART Multiplexer/Pass through Operation

- HART multiplexers
  - Monitor PVs
  - Typically a PC (SCADA) acts as the host
  - Can be added as retrofit

- Remote I/O can pass HART commands to the host
  - Connect to I/O as though it were a modem
  - Read/write all data



From HART COMMUNICATION FOUNDATION to WirelessHART Expanding the Possibilities

- Wireless is a new enhancement to the HART Technology
- Idea
  - Keep the well known and proven protocol
  - Change the physical layer from the modulated sinus on the 4 to 20 mA loop to radios and create the first wireless standard for Process Automation