
REAL-TIME PERFORMANCE MANAGEMENT FOR THE ENTERPRISE
RtPM
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OSISOFT USER CONFERENCES 2005
REAL-TIME PERFORMANCE MANAGEMENT FOR THE ENTERPRISE
RtPM

IEC 61850 and RtPM / PI

A glimpse into the near future

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Our agenda

- What is IEC 61850 and why is it different.
- The impact of IEC 61850 outside of the substation.
- How RtPM / PI can take advantage of IEC 61850.
- A look at a upcoming project in the UK.

IEC 61850 derives from:

Use of Ethernet for interlocking

Object modeling and function based semantics

Self description

Drive to lower life-cycle costs

In 1995

In 1999

2003-2005

IEC

Precise design and engineering

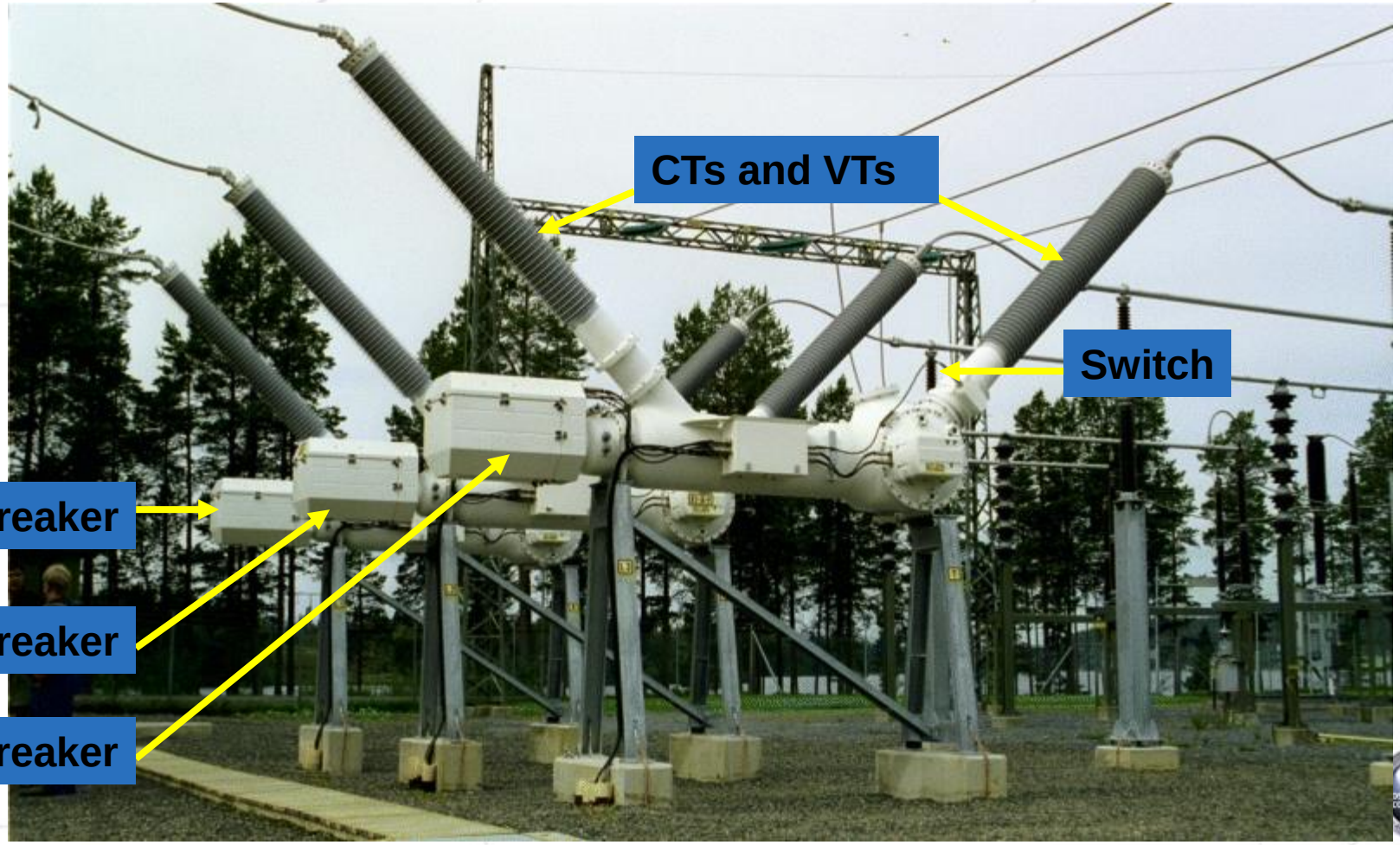
Knowledge of automated substations
Object modeling and function

Cost conscious

Other 61850 projects

- 2004-2005 Known Projects
  - Terna – Italy
  - Irberdrola – Spain
  - TenneT – Netherlands
  - EDF – France
  - NGC – UK
- Mexico has specified its use for distribution and transmission

Standardized objects with semantic meaning



IEC 61850 outside the substation

IEC:

Hydro – IEC TC57 WG18

Wind

CHP

Solar

US Post Office:

Sorting machines

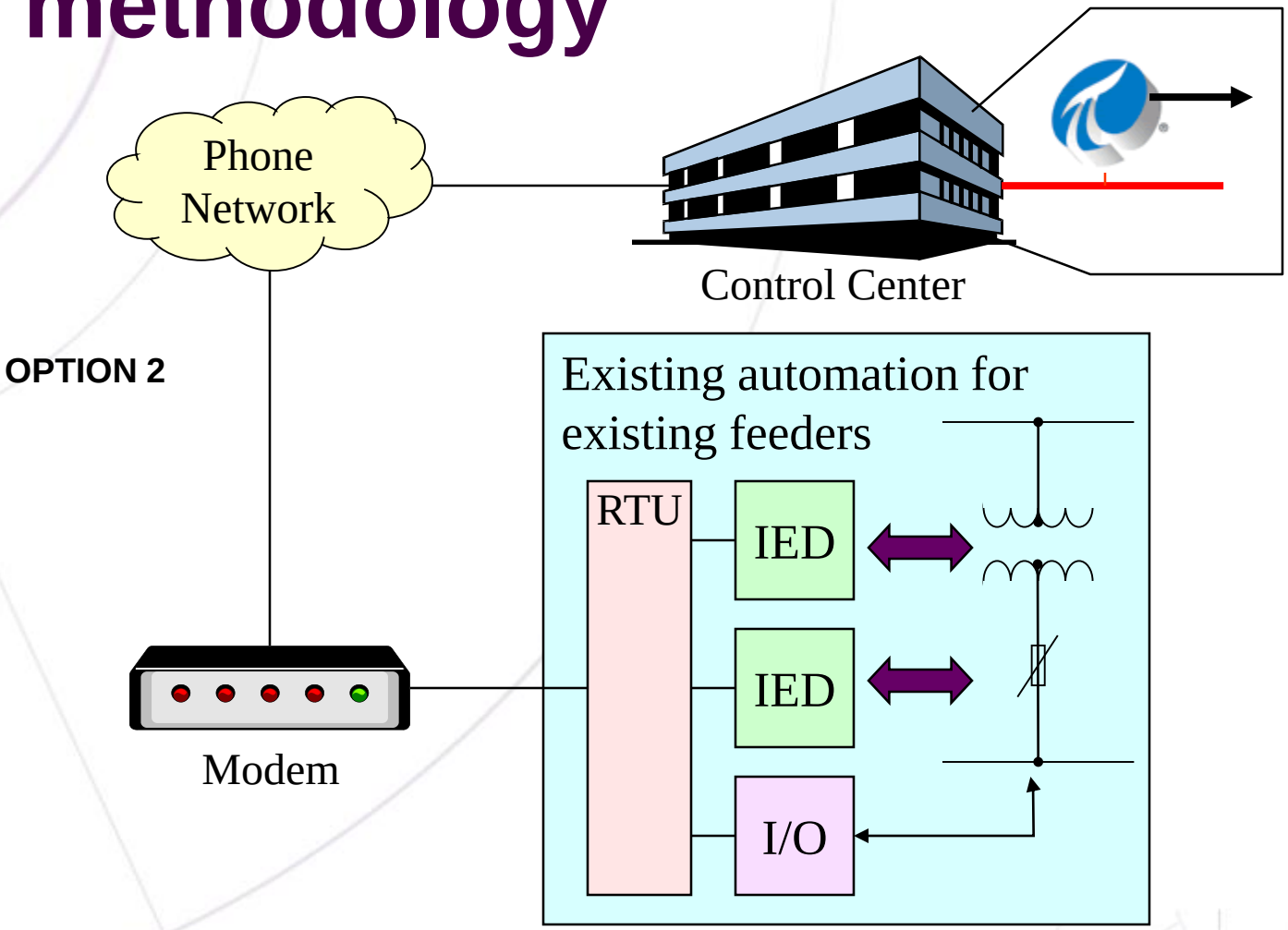
Applicability in industrials

Adding new objects/semantics: pump, valve, heat exchanger, turbine, envelope, address, etc.

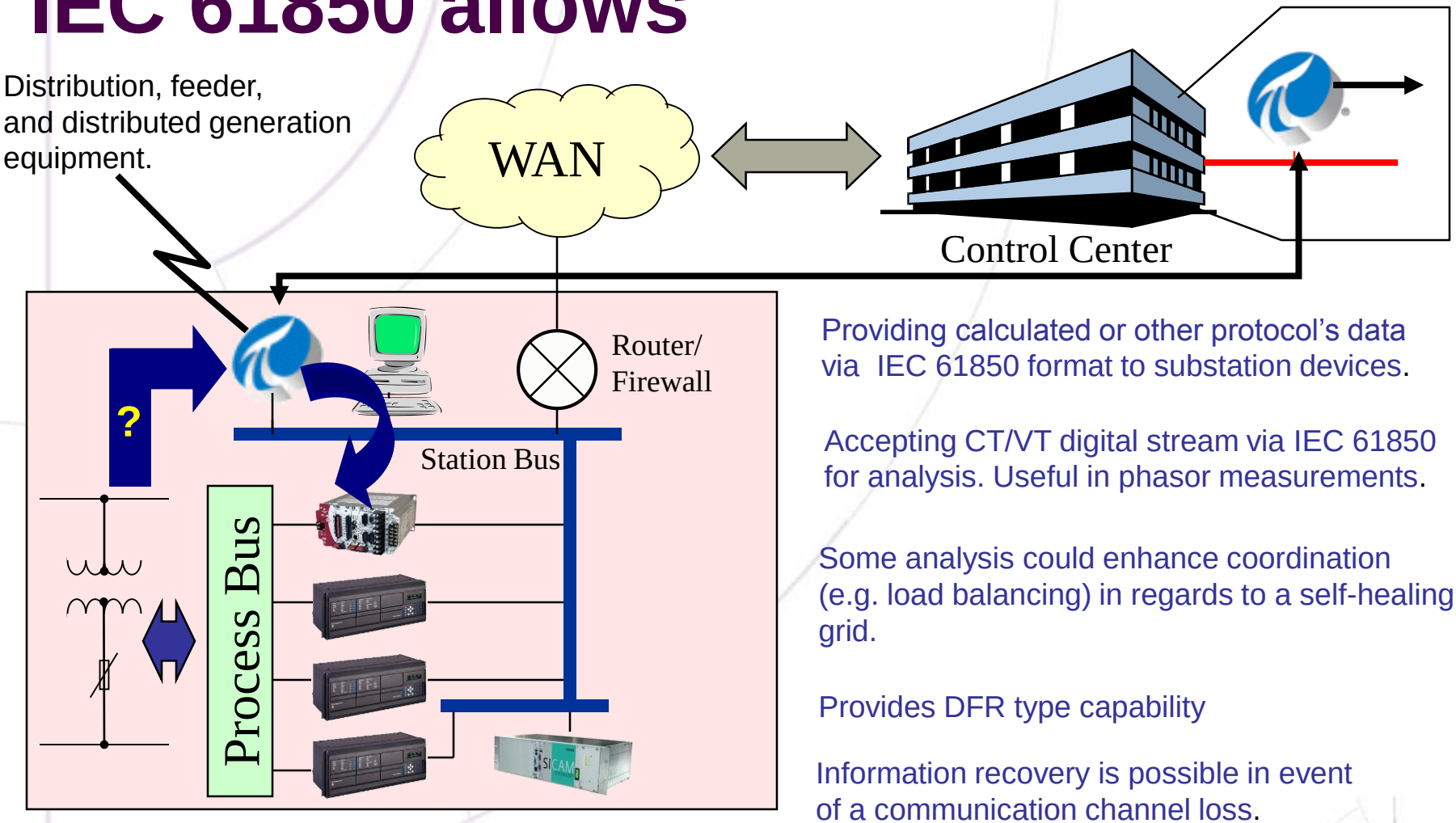
What makes it different

- SCADA links can't convey some of IEC 61850's high speed communications
- IEC 61850 has a concept of data concentration and "Bay" controllers.
- IEC 61850 is a "peer-to-peer" standard not a master slave standard.
  - Most devices are both client and server
  - Allows distributed intelligence within the substation with no "centralized coordination" required.
  - Moves the industry towards a self-healing grid.

Current methodology



IEC 61850 allows



Providing calculated or other protocol's data via IEC 61850 format to substation devices.

Accepting CT/VT digital stream via IEC 61850 for analysis. Useful in phasor measurements.

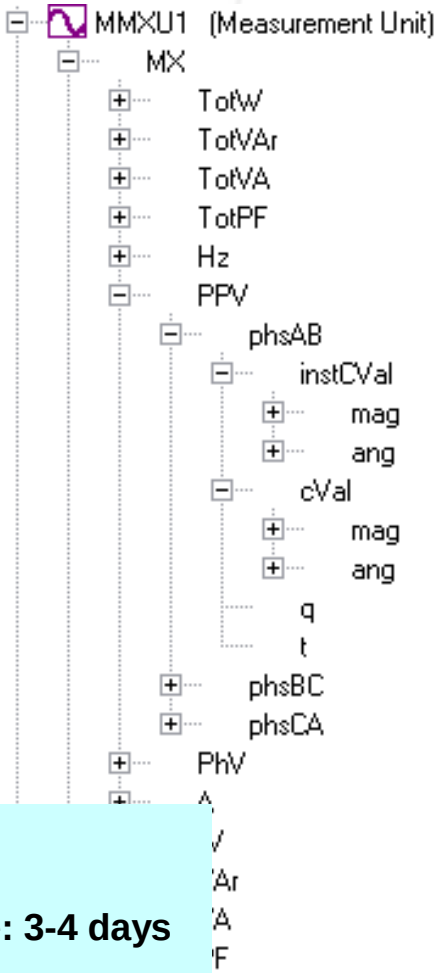
Some analysis could enhance coordination (e.g. load balancing) in regards to a self-healing grid.

Provides DFR type capability

Information recovery is possible in event of a communication channel loss.

IEC 61850 and Foundation*

- 61850 self-discovery and standardized semantics decrease configuration and life cycle costs.
- OPC auto-point sync can lower it further.



Comparison from Grant County PUD:

Time to configure/integrate 870-5/DNP device: 3-4 days

Time to configure/integrate 61850 device: 15-30 minutes

Wind power project objectives

Upcoming Project:

Network and monitor 500 turbines

Wind Power

- May contribute to 20% of countries energy
- Requires good design
- Application to specific geographical area's of a country
- Requires dynamic information for good output
- Requires full integration to the National grid

Specific Wind Power Sites

- Rural area's
- Close to high wind locations
- Good interfacing to the National grid
- Operational sub-systems supplying metrological data for efficient operation and delivery of power to the grid
- Main area's in UK – Scotland

SCADA system development

- Supervisory Control and Data Acquisition
- Remote operation and control of data over utility networks
- Applicable to: Electricity, Gas, and Water
- Also Process Control Applications

Information needed

- Real time data monitoring
- Economic and technical information
- Monitoring of the utility system
- High speed collection of data
- Security of system and data

RtPM/PI is applicable.

Gathering of information

- Data typically controlled and gathered through:
  - SCADA system
  - Energy management system (EMS)
  - With 61850 can allows PI direct access to non-SCADA and non-operational data.
- Systems integrated into and part of the control centre.
- All system types needed for distributed energy resources (DERs)

Prime control centre information

- Forecasting – fuel, load, and weather (PI and EMS)
- Planning – data gathering (PI, EMS, SCADA)
- Scheduling – transaction evaluation and asset maintenance (Maintenance Management System,PI)
- Monitoring – through 61850 (SCADA, EMS, and PI)
- Control of the system (SCADA, EMS)
- Electrical system security analysis (EMS)
- Information security and monitoring (PI)
- Reporting system (EMS, PI)

Security Issues

- Provide restricted access to application data (PI Trust).
- Physical security
- Mechanism to prevent data corruption and loss
- The ability to verify the submission or reception of data (PI audit records)
- Data Encryption mechanisms for specific information and protocols (IEC 61850)

Communication Integration Objectives

- Provide both LAN and WAN networks (Ethernet, TCP/IP, and BPL)
- Provide security to the data
- Build in preventive interference mechanisms and immunity to electromagnetic interference.
- Seamless integration
- Use of open systems and standards
- Common protocol
- Use of TCP/IP

The steps

- Analyse the architecture of the utility network
- Establish the vulnerability of sub systems and individual devices –classify them with respect to attack
- Assess for immunity to interference
- Establish priority of data transmission and reception
- Apply IEC 61850 and BPL as the basis for the system design


LITTER

Other Distributed Energy Resources

- Combined Heat and Power
- Photo-voltaics
- Micro-turbines
- Wind Power
- Solar Power

For more information on 61850

Advancing Interoperability for the Utility Enterprise

http://www.ucausersgroup.org

Thank You

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