








Analysis of Merging Unit Based on IEC 61850-9-2

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August 2019

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Utilities' Requirements

Standardisation

IEC 61850

Goals of IEC 61850

Interoperability

61850 Structure

61850 Architecture

Process Bus

SMV & MU


Time Synch

Wrap Up

IEC 61850

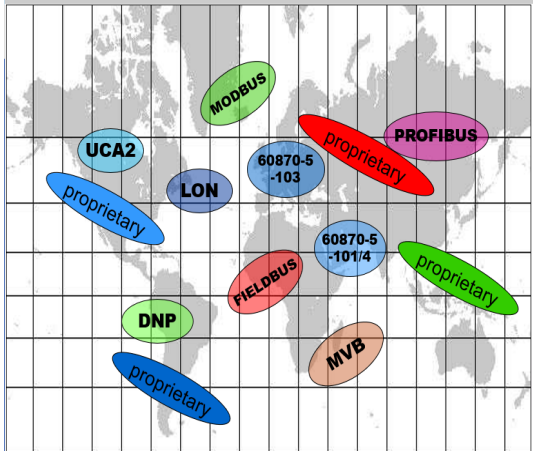
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- Long term expandability of systems
- Reducing complexity
- Simplify engineering



"Standardisation"

Ideal ?



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- Standardisation
- IEC 61850**
- Goals of IEC 61850
- Interoperability
- 61850 Structure
- 61850 Architecture
- Process Bus
- SMV & MU
- Time Synch
- Wrap Up

IEC 61850
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IEC 61850 - International Standard for Substation IT





IEC 61850

Global consideration

- Needs
- Experience
- Know-how


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The Goal of IEC 61850 Standard




Long term stability




The standard shall be **future proof**

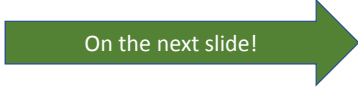
Free configuration




Support **different philosophies** & allow **free allocation of functions**

Interoperability





On the next slide!




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IEC 61850: Interoperability




**One manufacturer...
private**



**Two manufacturers...
by chance**



Three manufacturers ... interoperability !



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IEC 61850: Structure

System Aspects	Data Models
Part 1: Introduction and Overview	Part 7-4: Compatible Logical Node Classes and Data Classes
Part 2: Glossary	Part 7-3: Common Data Classes
Part 3: General Requirements	Abstract Communication Services
Part 4: System and Project Management	Part 7-2: Abstract Communication Services (ACSI)
Part 5: Comm. Requirements for Functions and Device Models	Part 7-1: Principles and Models
Configuration	Mapping to real Comm. Networks (SCSM)
Part 6: Configuration description Language for Communication in electrical Substations related IEDs	Part 8-1: Mapping to MMS and to ISO/IEC 8802-3
Testing	Part 9-1: Sampled Values over Serial Unidirectional Multidrop Point-to-Point link
Part 10: Conformance Testing	Part 9-2: Sampled values over ISO 8802-3



Process Bus

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IEC 61850: Architecture



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Standardisation

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End-to-End Cyber Security

Cloud

Apps and Data Analytics

IoT Interface

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Process Bus



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Previously

5 m

3.2 m

Copper cabling

Analog values

50 – 250 m

Control Center

Substation Controller

Station bus

Protection House

Parallel wiring

Digital

2.9 m

3.5 m

LPIT

Merging Unit

Fibre optic cabling

Ethernet IEC 61850-9-2

Control Center

Substation Controller

Station bus

Protection House

Process bus based on IEC 61850-9-2

IEC 61850


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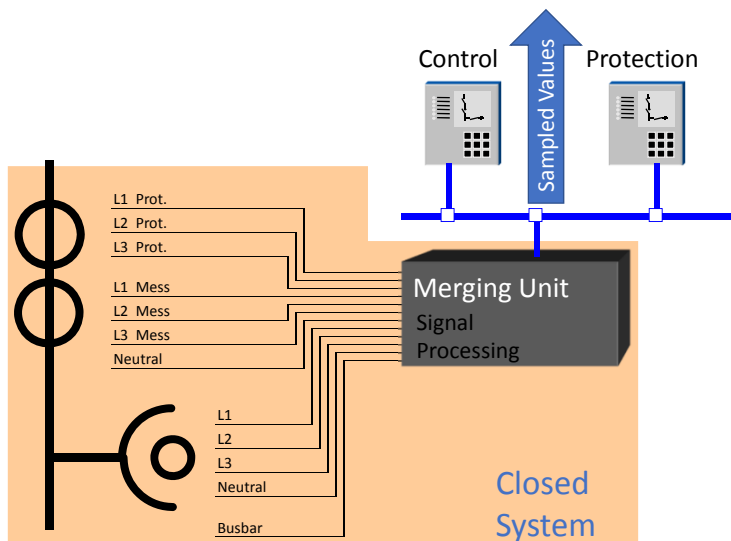
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Sampled Measured Values & Merging Unit




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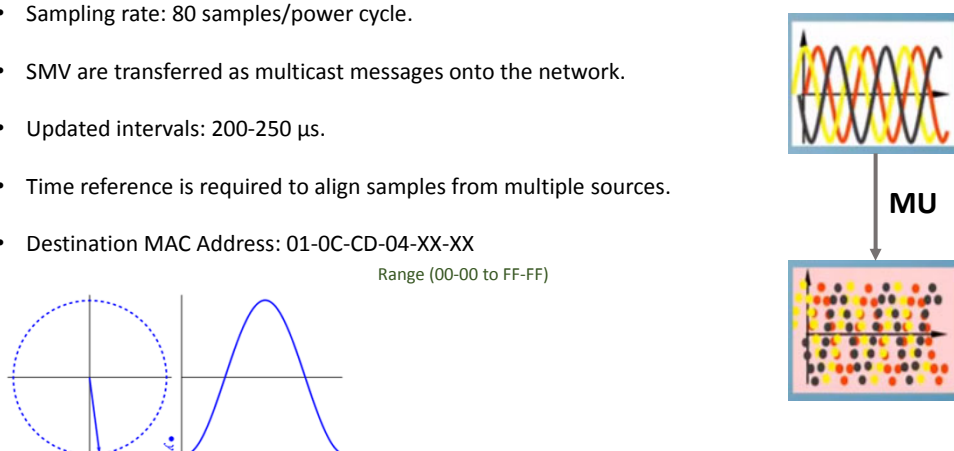
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Sampled Measured Values & Merging Unit

- Merging Unit samples the analogue data & converts it to a sampled measured value.
- Sampling rate: 80 samples/power cycle.
- SMV are transferred as multicast messages onto the network.
- Updated intervals: 200-250 μ s.
- Time reference is required to align samples from multiple sources.
- Destination MAC Address: 01-0C-CD-04-XX-XX
Range (00-00 to FF-FF)




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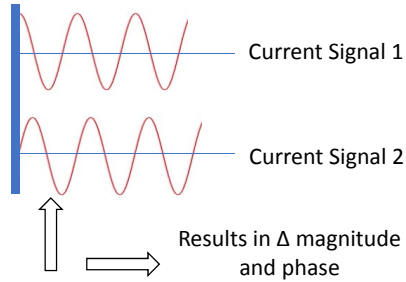
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Time Synchronisation

- IEC 61850-9-2 specifies the following for Synchronisation:
 - Time source accuracy: 1 μ s
 - System accuracy: 4 μ s
- Time synchronisation types:
 - 1PPS - 1 Pulse Per Second
 - PTP - Precision Time Protocol

Based on
↓
Best Master Clock Algorithm






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Process Bus: Key Benefits

Do you know ...

Non-Conventional Instrument Transformers (LPITs) will reduce HV switchgear size by 30%	You can achieve higher performance in measurement	You can save cost by reduced wiring
Non-Conventional Instrument Transformers weight 90% less	You gain flexibility throughout lifetime to adapt easily to future needs	Remote maintenance and testing saves cost

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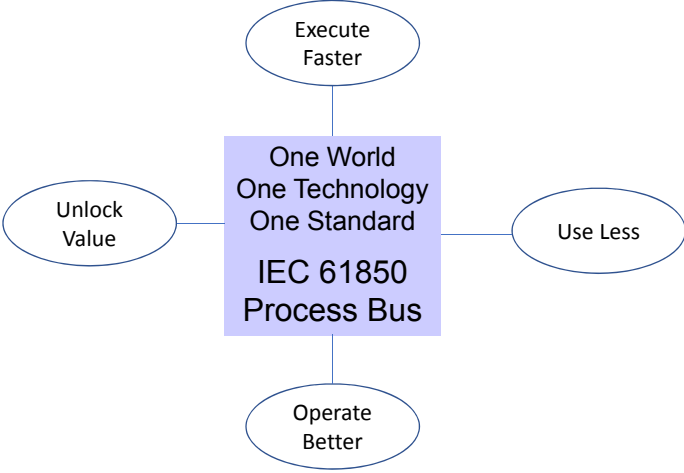
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Summary

Execute Faster

Unlock Value

One World
One Technology
One Standard

IEC 61850
Process Bus

Use Less

Operate Better

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Ingenuity for life

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Thank you!

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