



16 OCTOBER 2019

ABB Ability™ System 800xA v6.1 Electrical Integration

Webinar: IEC61850 Update

IAPCP



Speakers

Speakers



Rajasekaran D

- Global Product Manager – Electrical Integration
 - Industrial Automation - Process Control Platforms
 - Bangalore.
-

System 800xA v6.1 Electrical Control & Monitoring Update

Agenda

- What is IEC61850
- ABB Ability™ System 800xA
- System 800xA Electrical Control & Monitoring
- IEC61850 Improvements
- Commercial Update
- Where to find stuff
- Technical presentation
- Q&A Session

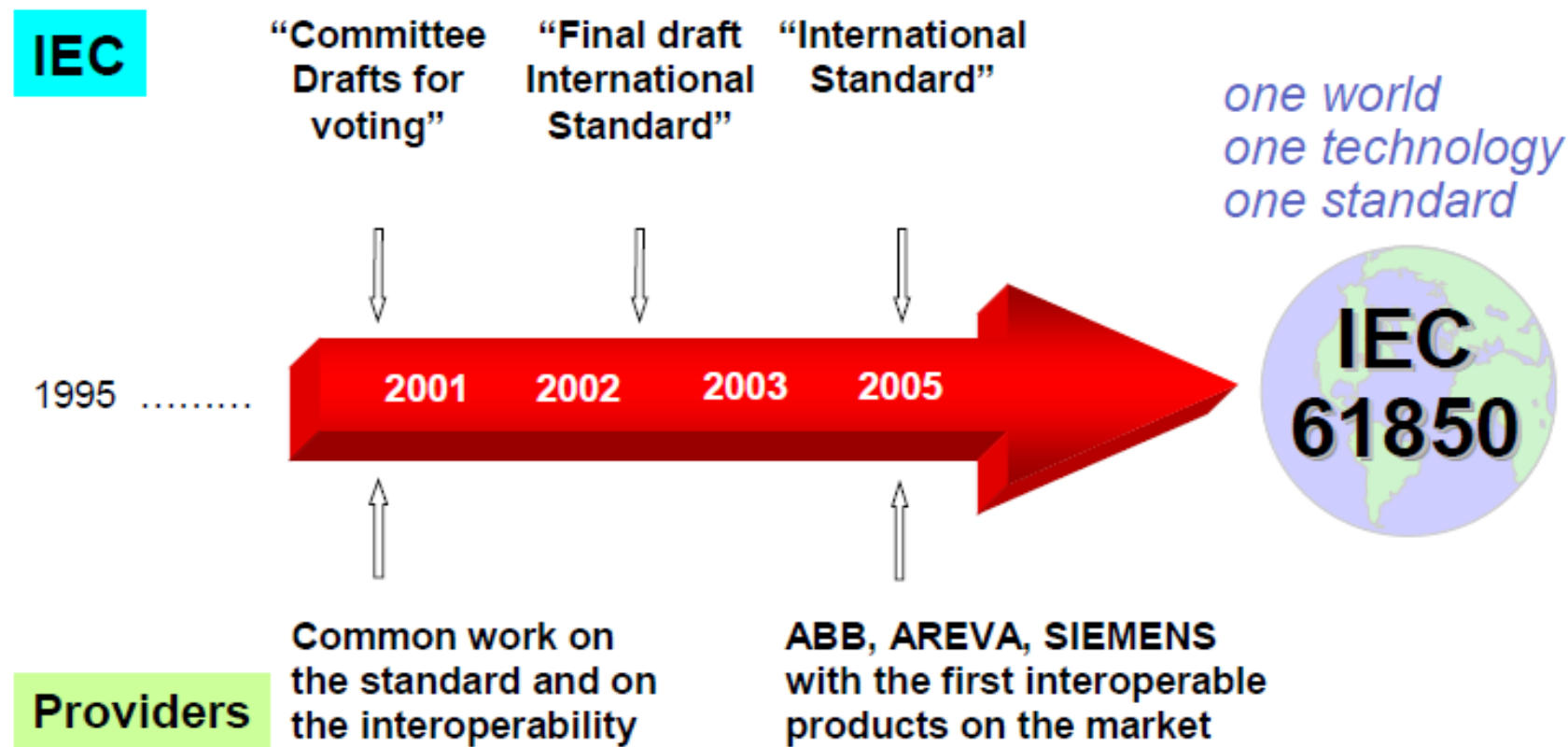
Need for a global Substation Automation Standard

IEC 61850 - combination of ANSI and IEC standards



Need for a global Substation Automation Standard

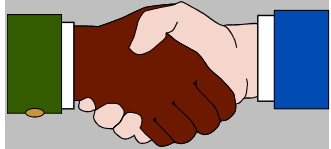
History of IEC 61850



Need for a global Substation Automation Standard

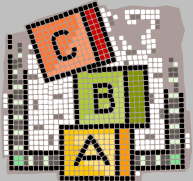
Requirements on the standard

Interoperability



The ability of IEDs from one or several manufacturers to **exchange** information and **use** the information for the their own functions.

Free configuration



The standard shall support different **philosophies** and allow a free allocation of functions e.g. it must work equally well for centralized or decentralized systems.

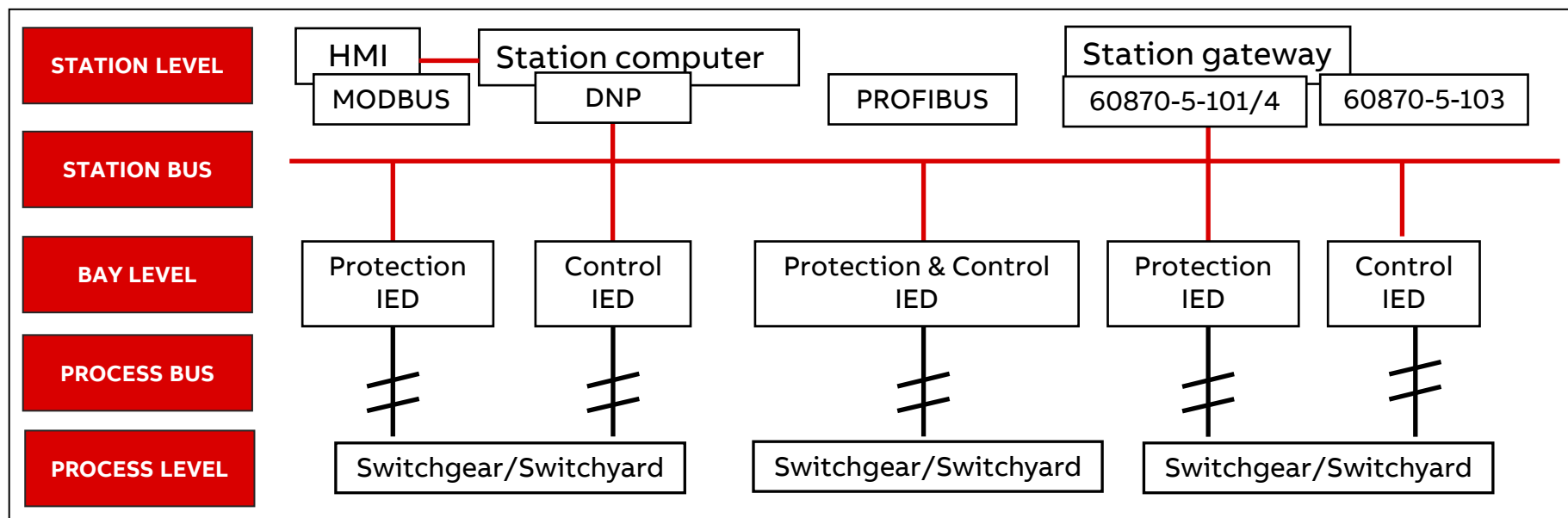
Long-term stability



The standard shall be **future proof**, i.e. it must be able to follow the progress in **communication technology** and the evolving **system requirements**.

Need for a global Substation Automation Standard

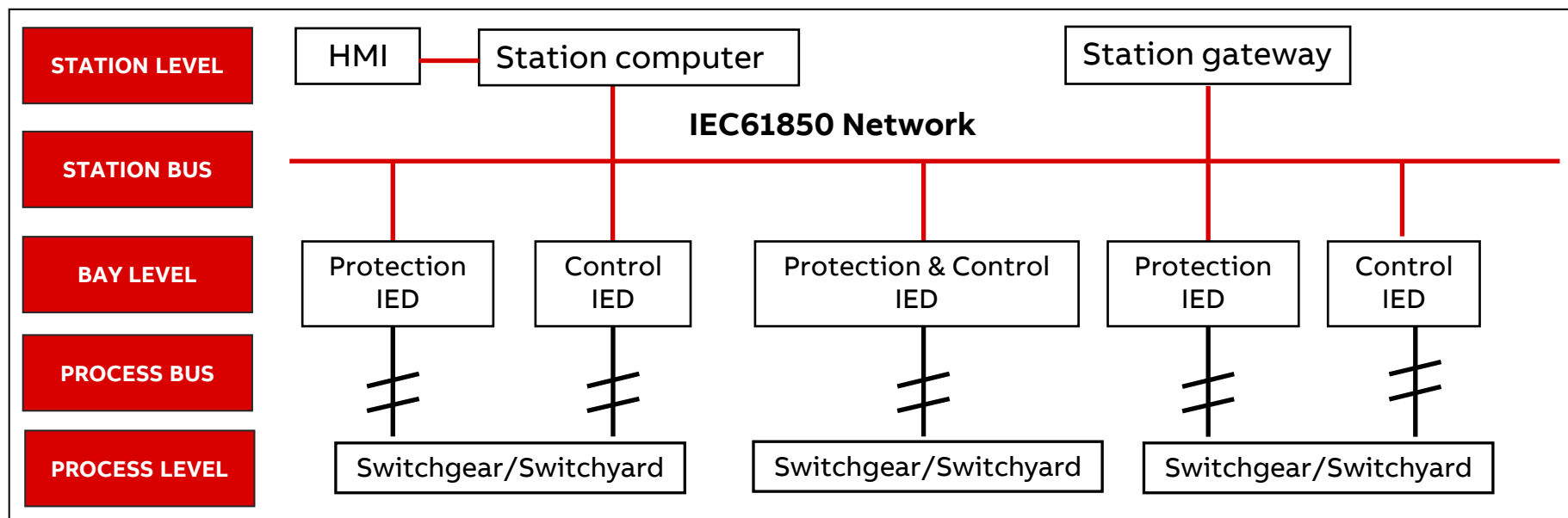
State before IEC 61850



- Serial communication for Substation Automation is recognized for some time
- However: A lot of different protocols and hardwiring used
- Poor interoperability between different vendors
- Large engineering, installation and maintenance costs
- The global, highly competitive market requests a standard for competitive performance and cost reduction

Need for a global Substation Automation Standard

IEC61850 replaces all protocols



Interoperability

- Through standardized modeling of the IEDs

Free configuration

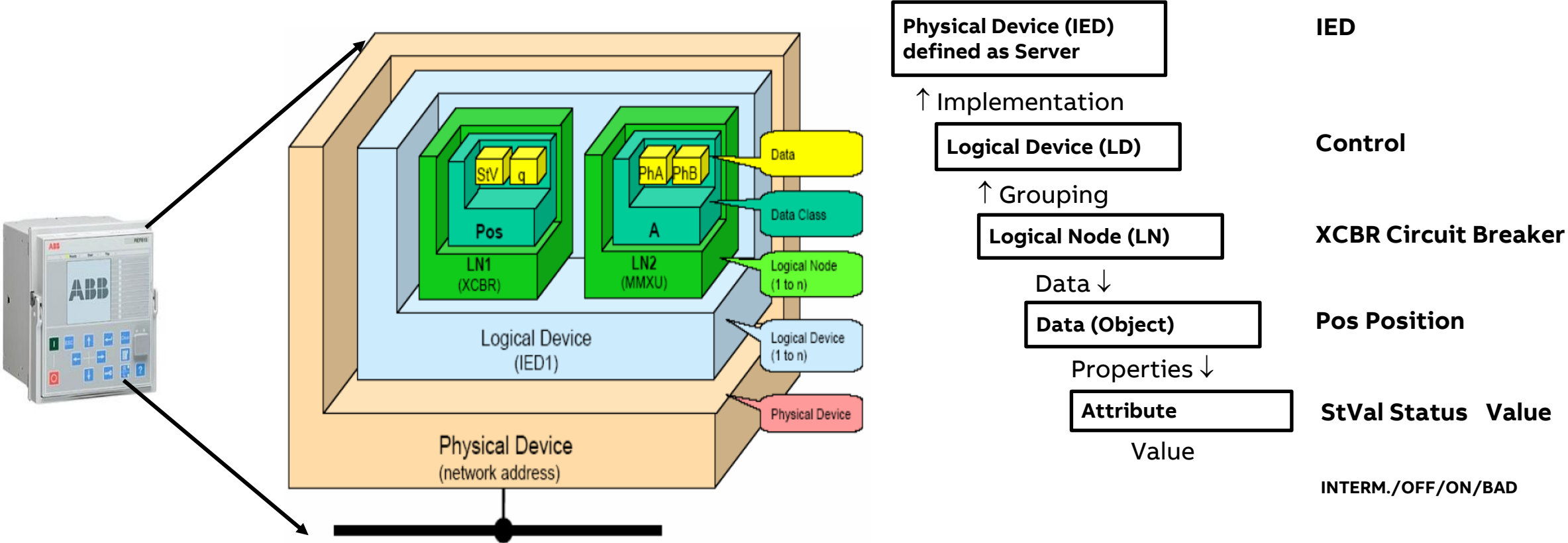
- By supporting all physical and functional architectures

Long term stability

- By using main stream communication technology

Data Model

Logical Nodes - Structure



Data Model

Logical Nodes – structured in groups (Logical Devices)

A Logical Device LD groups LNs which shall be managed together (e.g. Control, Protection etc)

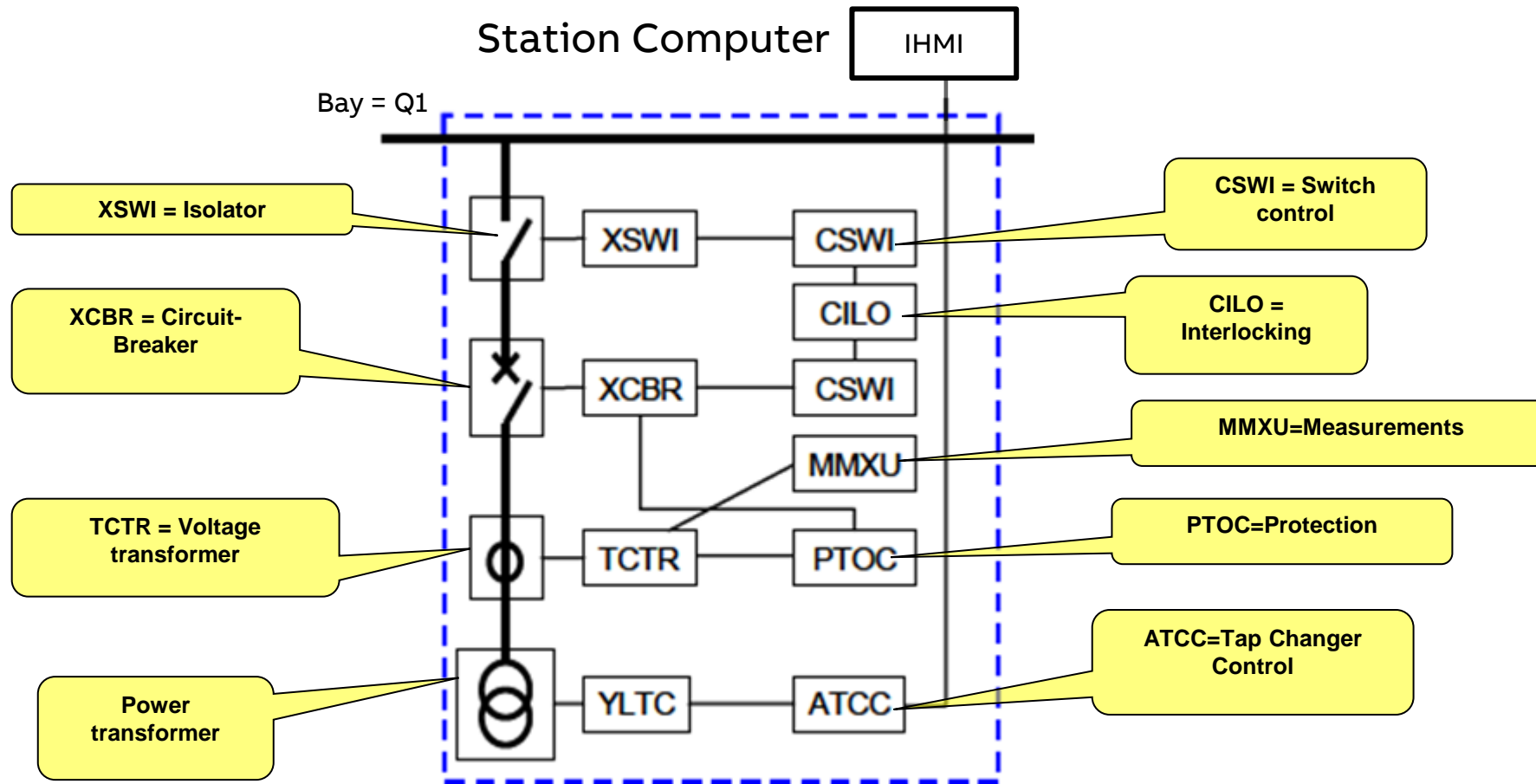
L System LN (2)	M Metering and measurement (8)
P Protection (28)	S Sensor and monitoring (4)
R Protection related (10)	X Switchgear (2)
C Control (5)	T Instrument transformers (2)
G Generic (3)	Y Power transformers (4)
I Interfacing and archiving (4)	Z Further power system equipment (15)
A Automatic control (4)	

Examples

- | | |
|---------------------------------|-------------------------------------|
| – PDIF: Differential protection | – CSWI: Switch controller |
| – RBRF: Breaker failure | – MMXU: Measurement function (unit) |
| – XCBR: Circuit breaker | – YPTR: Power transformer |

Data Model

Logical Nodes – Examples



Data Model

Logical Nodes – Examples

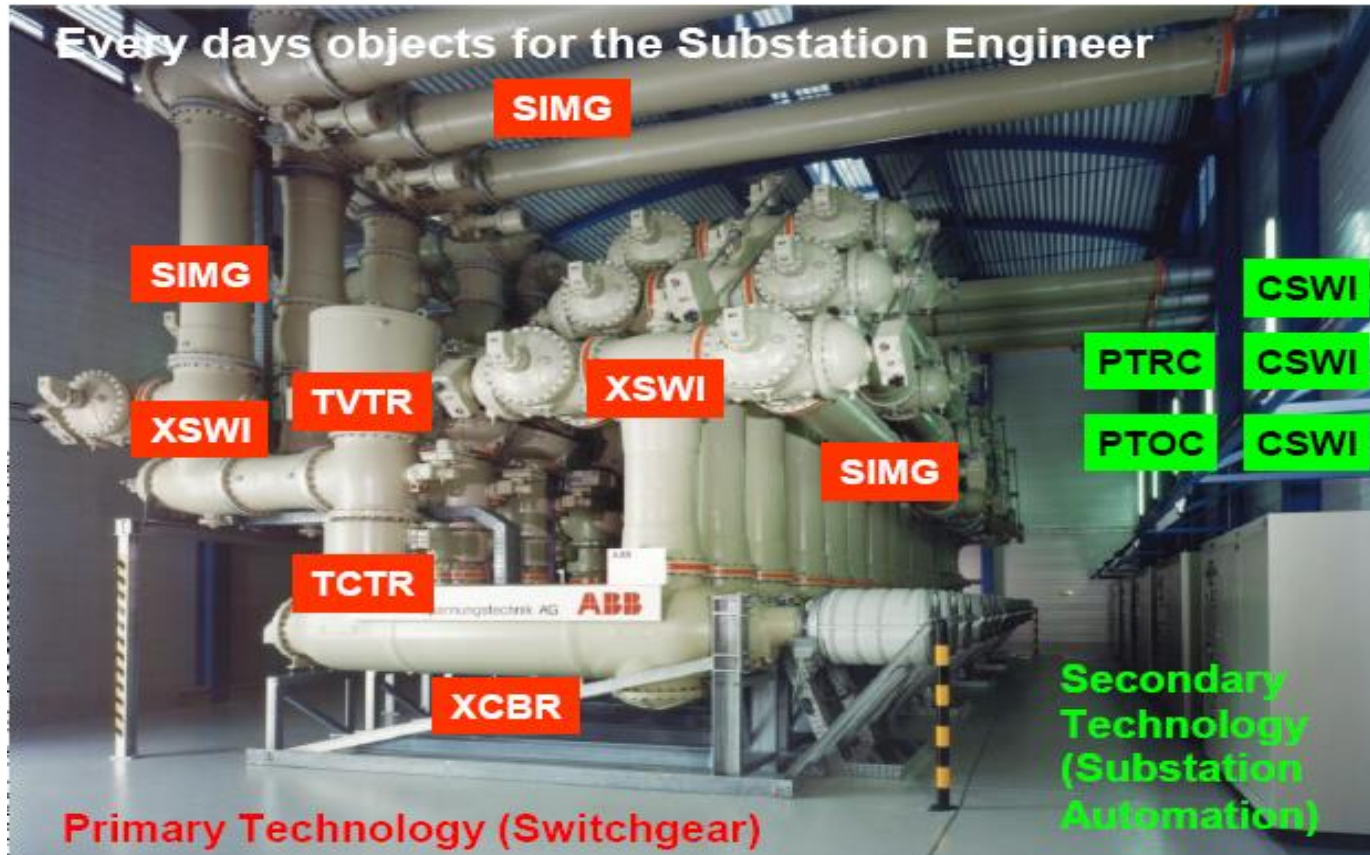


ABB Ability™ System 800xA

ABB Ability™ System 800xA – The Power of Integration

- **Collaboration enabler** : Multiple systems and applications in one collaborative environment to take advantage of unforeseen opportunities
- **Safe and Secure Operations**: High performance, feature rich, ergonomic operator environments based on industry best practices for safe and secure operations.
- **Intelligent Engineering** : Efficient multi-user, distributed engineering environment with purpose built libraries to ensure on-time, on-budget project deliveries.
- **Flexible I/O Solutions** : A wide variety of fieldbus technologies, hardwired, and wireless I/O solutions to match your automation project requirements.
- **Support for Life** : Software maintenance, training, and spare parts programs coupled with services to keep your system operating at its peak performance.

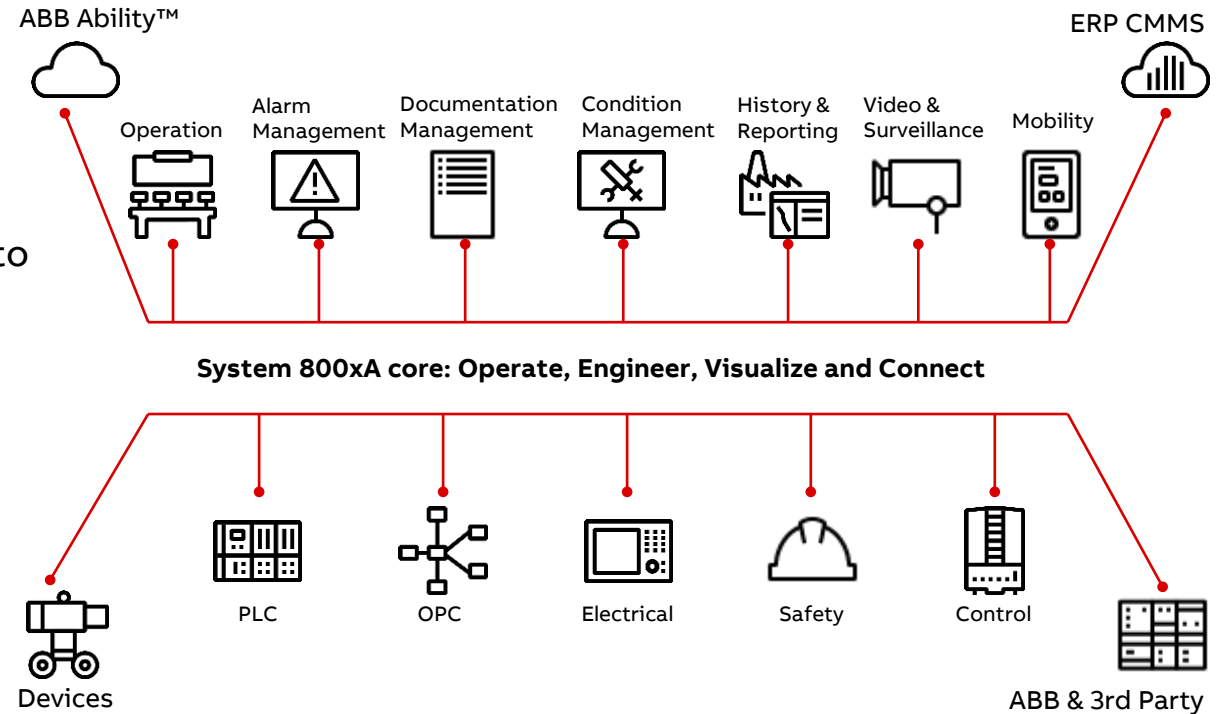


ABB Ability™ System 800xA

xA = Extended Automation

Promotes collaboration by enabling the sharing of information without barriers

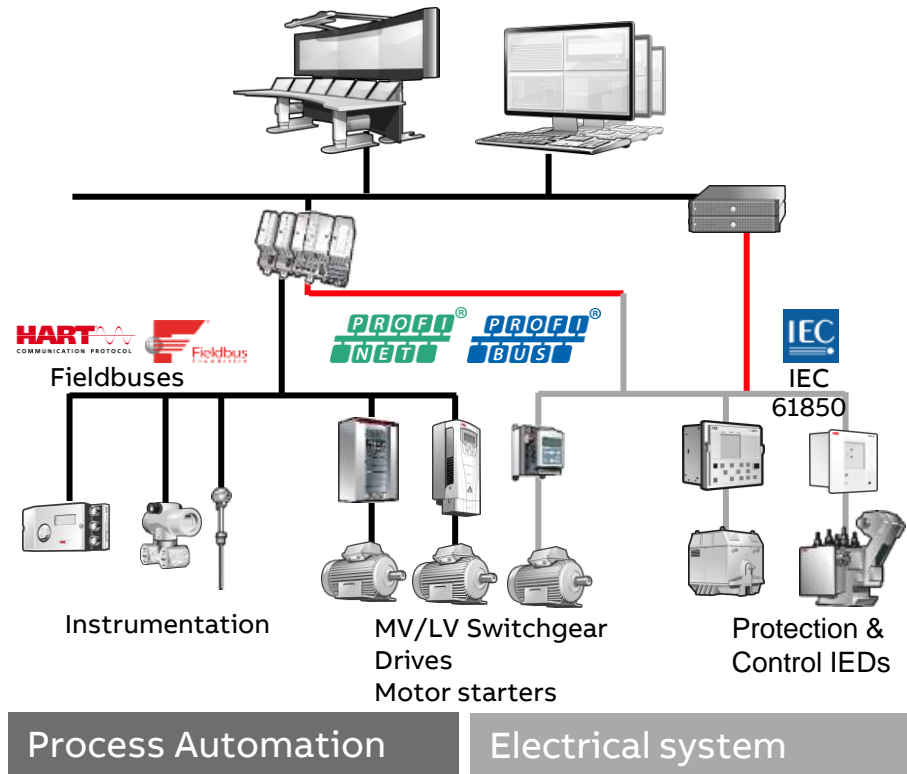
- Provides an **integration platform** with seamless connectivity to plant systems, applications, and fieldbus technologies
- Allows for simultaneous execution of various automation strategies in **one common environment**
- Includes embedded value added systems and applications providing a **lower cost of ownership**.



System 800xA is the collaboration enabler!

ABB Ability™ System 800xA

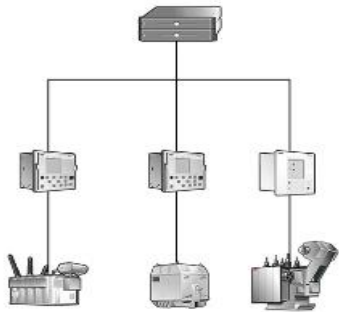
Electrical Control and Monitoring- IEC 61850 Definitions



- **IEC61850**- Global standard for Power utility automation
- **MMS**-Communication protocol used for monitoring and control
- **GOOSE**-Communication protocol used for managing time critical application ex: Load shedding
- **OPC**- Open Platform Communications
- **Horizontal Communications** – Communications between devices on the same level
- **Vertical Communications** – Communications from devices to a higher level such as the HMI or operator level
- **SCD**-Substation configuration description-A file contains
 - Entire substation configuration & Communication
- **IED**- Intelligent Electronic devices
- **IET600**- IEC61850 engineering tool for creating SCD file
- **PCM600**-ABB IED configuration tool/IEC61850 Engineering tool

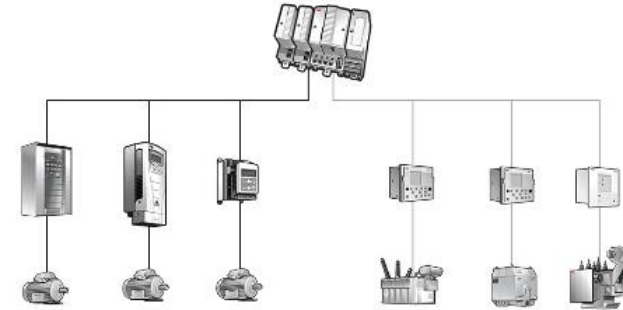
ABB Ability 800xA Electrical Control & Monitoring – Flexible Solutions

Electrical SCADA System



- Electrical equipment visualization/monitoring
- Alarm and events with SOE (Sequence of Events)
- Remote maintenance and parameterization
- Automatic upload of disturbance record files

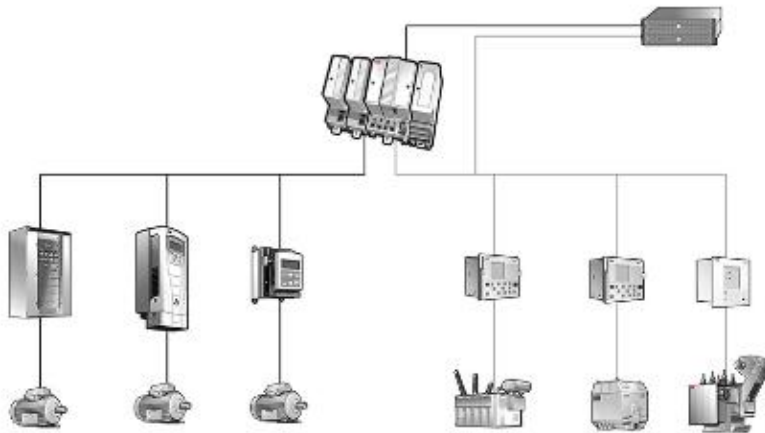
Power Management, Supervision and control



Suitable solution for small project

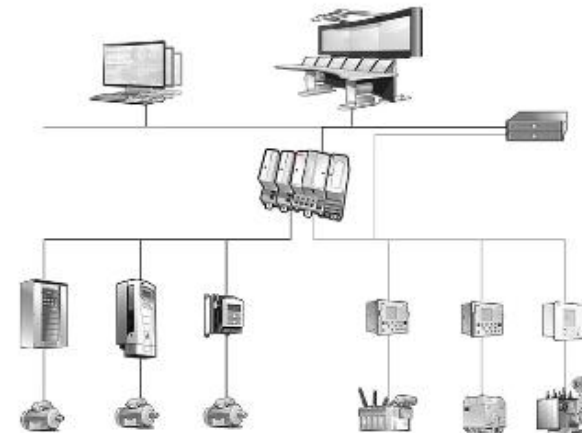
- Essential operation and supervision
- No IEC61850 Connect Server
- Power Management applications:
 - Load shedding;
 - Active and reactive power control
 - Busbar Synchronization

Power Management with Integrated SCADA



- Power Management applications:
 - Load shedding;
 - Active and reactive power control
 - Busbar Synchronization
- Remote operation and supervision
- Remote maintenance and parameterization

Integrated Electrical system with DCS



- Collaborative Process Automation / Total plant visualization
- Centralized operation and maintenance platform for both process and electrical control
- Possibility to combine production data with energy consumption in every level of the plant



MARCH | 2020

Technical Presentation: System 800xA v6.1 Electrical Integration

Speaker(s): Rajasekaran D



System 800xA v6.1 Electrical Integration

Description & Prerequisites

Description

This webinar will provide an overview of 800xA 6.1 Electrical integration which includes IEC61850 edition-2 support, new features, engineering workflow improvements of both vertical and horizontal engineering.

This webinar will include the following details: Electrical Integration new features, Xstream Engineering concepts, Simplified workflow, Improvements on control builder-IEC61850 import wizard, Capacity and performance improvement of the CI868, Network redundancy capabilities, improvements on the control commands support , Support reading timestamped events from the IEDs.

Prerequisites

T314 and T315 course

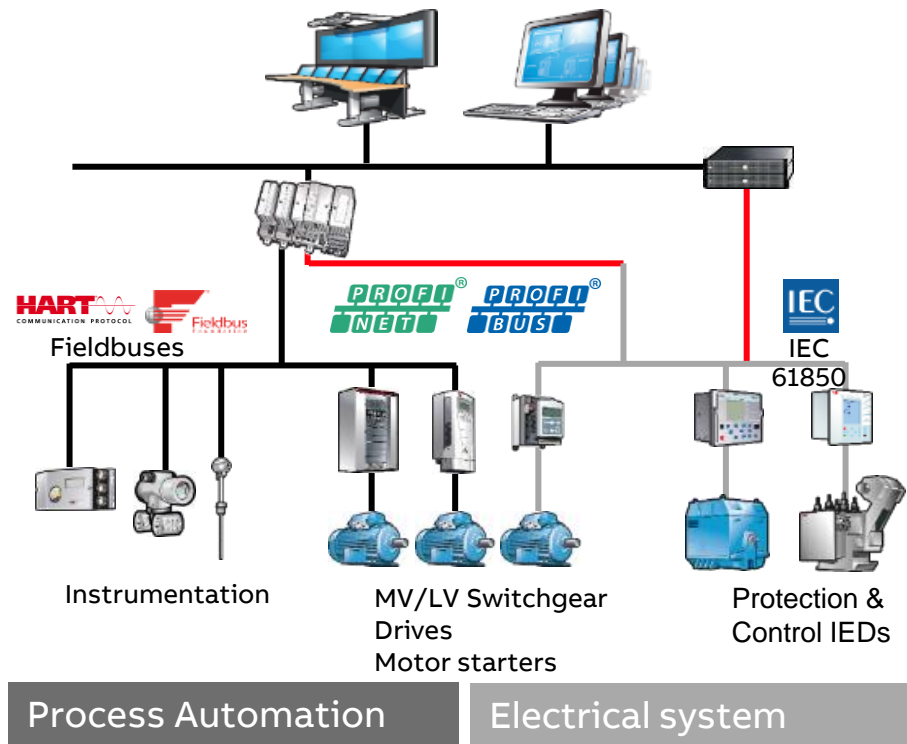
Basics of IEC61850 communication

Agenda

- CI868 communication Interface Improvements
 - IEC61850 Edition-2 Support
 - SNTP server support
 - IEC61850 Import wizard/Control builder improvements
 - Online Reconfiguration
 - Reading timestamped events from the IED
 - New Command types
 - Capacity and performance Improvements
- IEC61850 connectivity server
 - Simplified configuration
 - XStream Engineering workflow
 - Network Redundancy through PRP communication

ABB Ability™ System 800xA

Electrical Control and Monitoring- IEC 61850 Definitions



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- SCD-Substation configuration description-A file contains entire substation configuration & communication
- IED- Intelligent Electronic devices
- IET600- IEC61850 engineering tool for creating SCD file
- PCM600-ABB IED configuration tool/IEC61850 Engineering tool

ABB Ability™ System 800xA 6.1

IEC61850 Enhancements

IEC61850 edition 2

Support for latest revision of the IEC61850 standard.

- IEC61850 OPC server Supports communicating with both **Ed.1 & Ed. 2 IEDs/Devices**. (Specifications).Support configuring all edition- 1 & 2 “Logical nodes” (92 -> 200+)
- Control builder supports all logical nodes which are part of edition-1 & 2 .
- **Increased Network availability–PRP** Parallel Redundancy protocol supported in IEC61850 connectivity server

Simplified Engineering Workflow

Simpler, more efficient workflow removing dependencies between tasks

- **Simplified configuration**- Reduction from multiple SCD import to Single SCD for import
- **Flexible Configuration**- Configuration can be made from any Node (Aspect server, Connectivity server, Client)
- **xStream Engineering** – Designing of HMI Graphics, Alarm configuration, Bay typicals, Faceplates using basic input documents (SLD,I/O list). Late binding with SCD file when available.

Operational Performance

Improved performance with the communications capabilities.

- **Double the communication capacity** of the CI868.
- **Support all type of commands** (Controlling of Breaker, Switches, Transformer tap position, Setpoint)
- **Reduce the cost of GPS clock:** CI868 can act as a SNTP master for the IEDs (Suitable for small projects)
- **CI868 Support SOE** for SPS,DPS and Enum data type
- **Improved operational flexibility** – No restart of CI868 needed when making changes/additions.

ABB Ability™ System 800xA 6.1

IEC61850 Import wizard & CI868 communication interface-Improvements

Edition 2 compliant

- IEC61850 edition-1 & 2 LNs are supported
- No restriction on LN type
- Vendor specific LNs are supported (Ex: QCBAY)
- Combined Editions- are supported in same project

CI868 as SNTP Server

- Suitable for small projects (No GPS clock required)
- All IEDs time synchronized with CI868
- Option for enable/disable SNTP server from CBM

Command Enhancements

- All commendable LNs are supported (Ex: CSWI, XCBR, GGIO)
- New Function block for command management
- Single point control (Direct/SBO)
- Analog setpoint command & step change control

Online reconfiguration

- CI868 won't restart when adding new IED
- IED can be added when system is online
- More flexibility for reconfiguration

Alarm & Event with IED timestamp

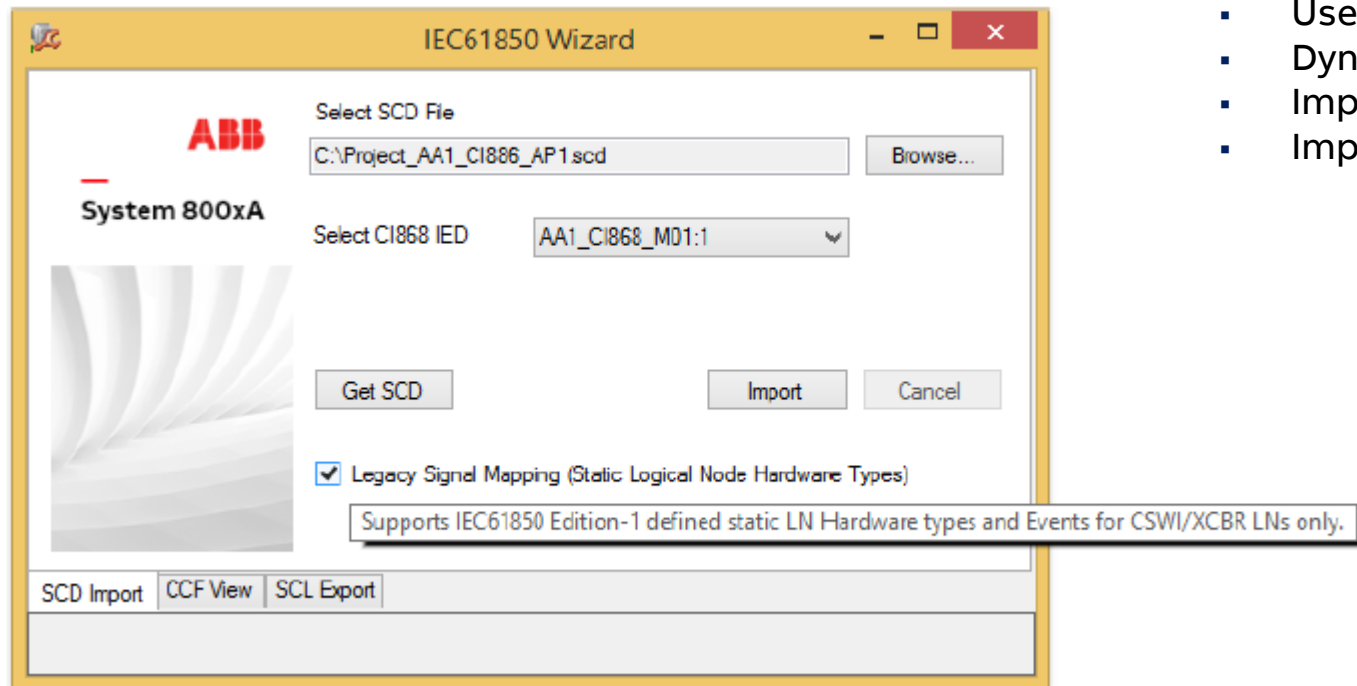
- Alarm and event generation from protection LNs (PTOV)
- Alarm and event generation from control LNs (CSWI,GGIO,XCBR,CSWI)
- Alarm Enable/disable option at IED level
- A&E Enable/disable option at LN level.

IEC61850 Import wizard improvements

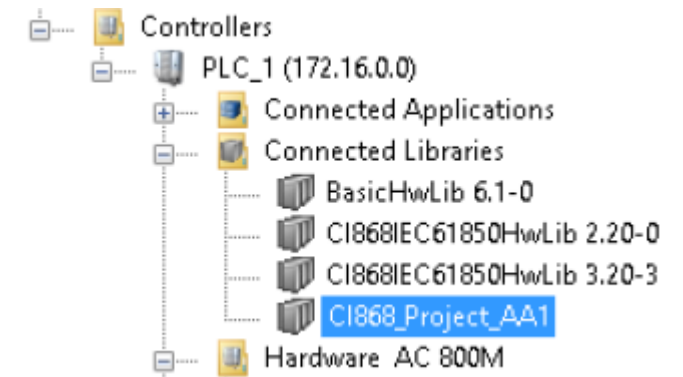
- More than 200 Logical nodes (Both Edition-1 and 2)
- Vendor specific LNs are supported (Ex: QCBAY)
- Common structure for both MMS and Goose communication

CI868 Enhanced CBM IEC61850 Wizard

- Legacy LN Import Option – Backward Compatibility
- Significant Optimization of SCD-file Import duration

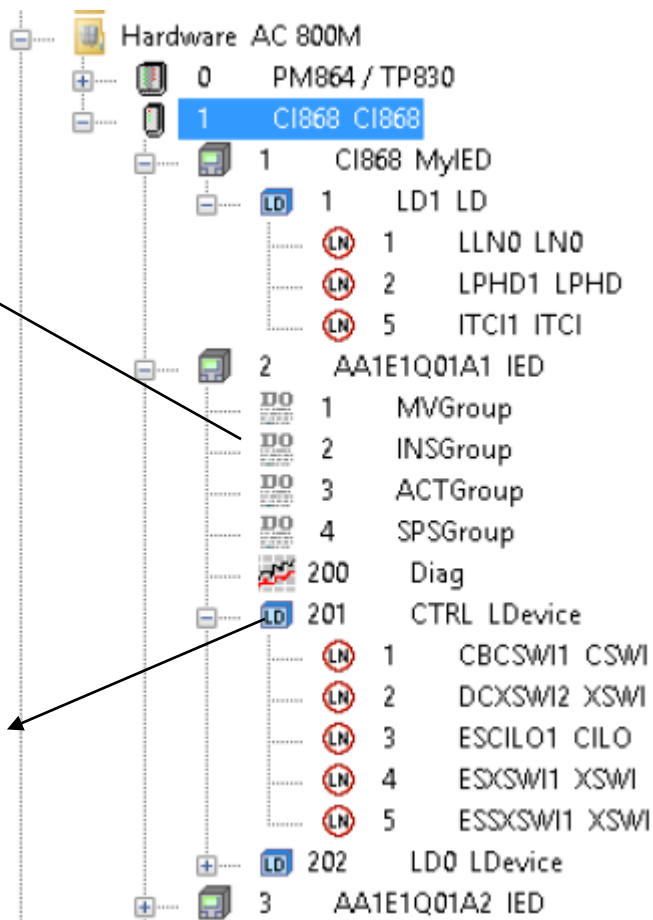


- User Hardware Library during Instantiation
- Dynamically generated LN Hw Units
- Import Standard & Vendor specific LN Types
- Import Standard & Vendor specific DO Names



CI868 Enhanced CBM Hardware Tree

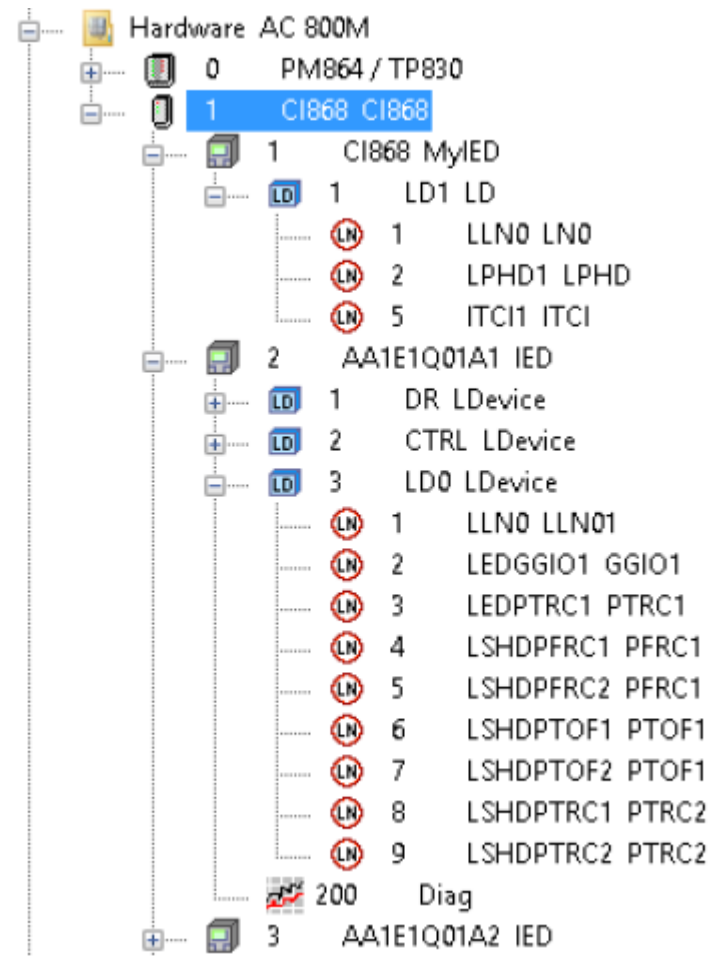
- Legacy LN Hw Tree



Goose LNs are listed under different Groups

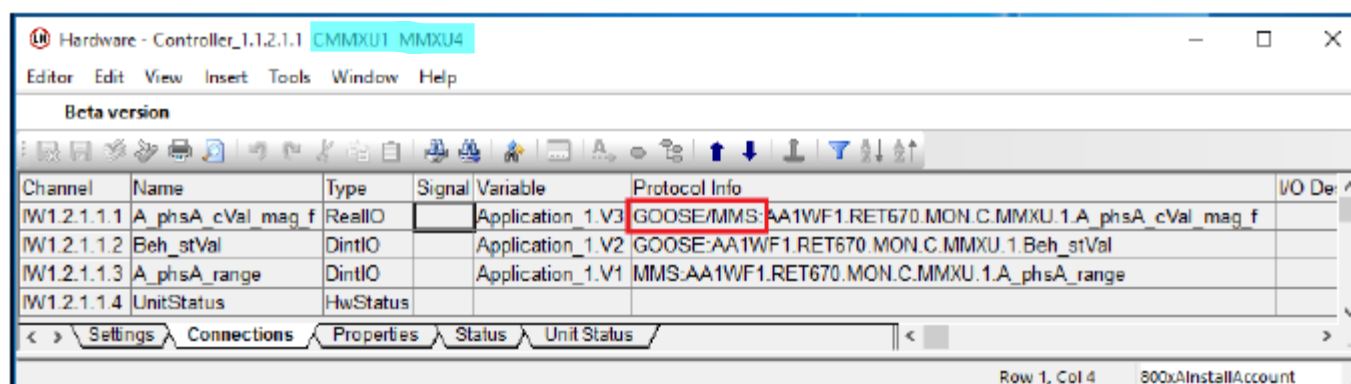
MMS Logical nodes are derived from the predefined template

- Dynamic LN Hw Tree

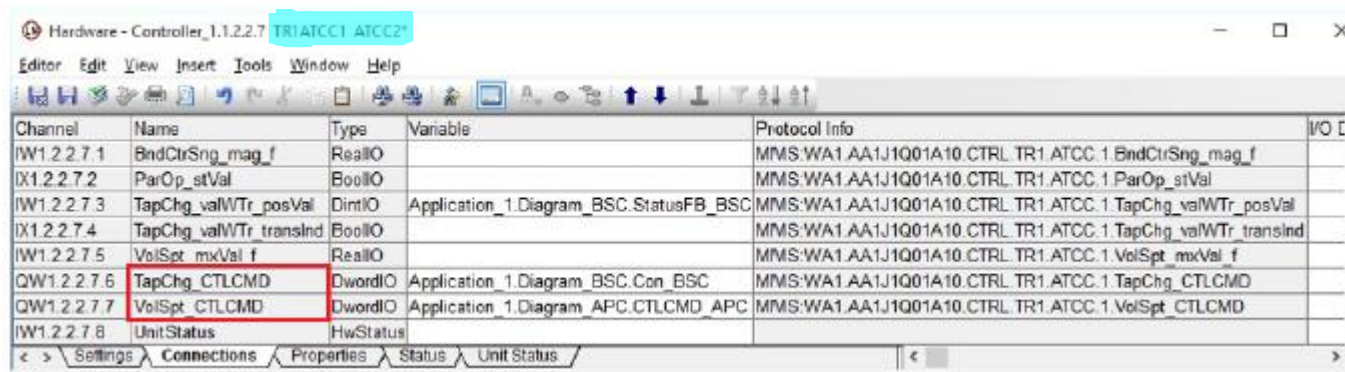


CI868 Compact LN Hardware Units

- Compacted LN Unit IO Channels
- No Empty LN IO Channels (Channels without Protocol Info)
- GOOSE / MMS Signal Type Prefixed in Protocol Info

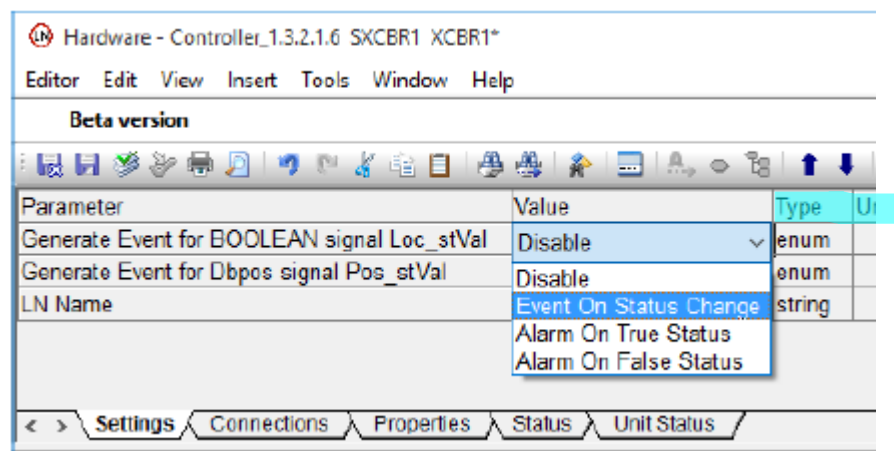
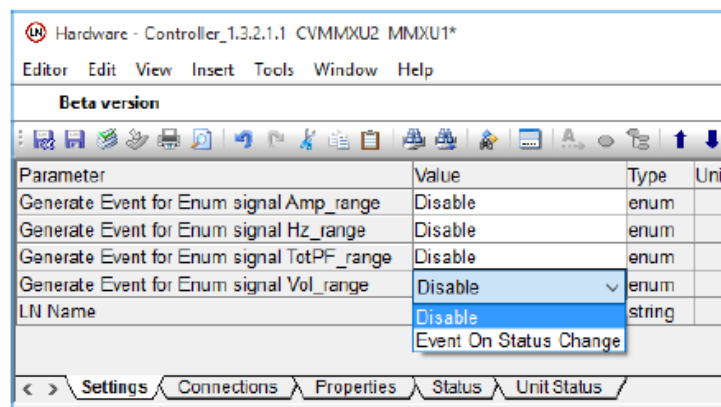
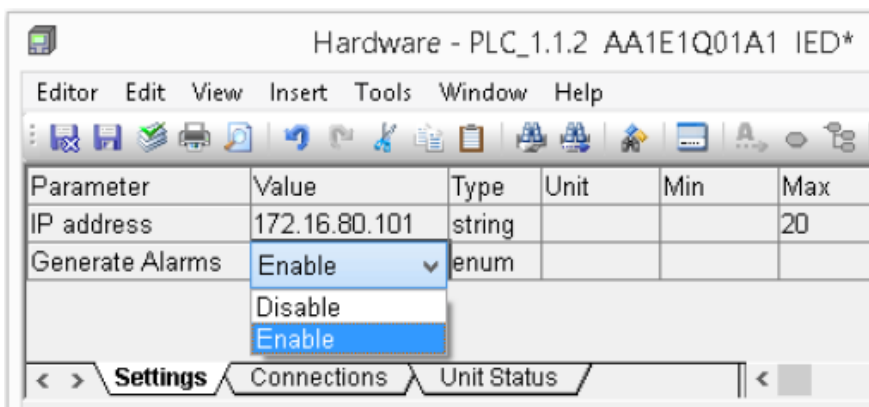


Channel	Name	Type	Signal	Variable	Protocol Info	I/O De
IW1.2.1.1.1	A_phsA_cVal_mag_f	RealIO		Application_1.V3	GOOSE/MMS:AA1WF1.RET670.MON.C.MMXU.1.A_phsA_cVal_mag_f	
IW1.2.1.1.2	Beh_stVal	DintIO		Application_1.V2	GOOSE:AA1WF1.RET670.MON.C.MMXU.1.Beh_stVal	
IW1.2.1.1.3	A_phsA_range	DintIO		Application_1.V1	MMS:AA1WF1.RET670.MON.C.MMXU.1.A_phsA_range	
IW1.2.1.1.4	UnitStatus	HwStatus				



Channel	Name	Type	Variable	Protocol Info	I/O De
IW1.2.2.7.1	BndCtrSng_mag_f	RealIO		MMS:WA1.AA1J1Q01A10.CTRL.TR1.ATCC.1.BndCtrSng_mag_f	
IX1.2.2.7.2	ParOp_stVal	BoolIO		MMS:WA1.AA1J1Q01A10.CTRL.TR1.ATCC.1.ParOp_stVal	
IW1.2.2.7.3	TapChg_valWTr_posVal	DintIO	Application_1.Diagram_BSC.StatusFB_BSC	MMS:WA1.AA1J1Q01A10.CTRL.TR1.ATCC.1.TapChg_valWTr_posVal	
IX1.2.2.7.4	TapChg_valWTr_transInd	BoolIO		MMS:WA1.AA1J1Q01A10.CTRL.TR1.ATCC.1.TapChg_valWTr_transInd	
IW1.2.2.7.5	VolSpt_mxVal_f	RealIO		MMS:WA1.AA1J1Q01A10.CTRL.TR1.ATCC.1.VolSpt_mxVal_f	
QW1.2.2.7.6	TapChg_CTLCMD	DwordIO	Application_1.Diagram_BSC.Con_BSC	MMS:WA1.AA1J1Q01A10.CTRL.TR1.ATCC.1.TapChg_CTLCMD	
QW1.2.2.7.7	VolSpt_CTLCMD	DwordIO	Application_1.Diagram_APC.CTLCMD_APC	MMS:WA1.AA1J1Q01A10.CTRL.TR1.ATCC.1.VolSpt_CTLCMD	
IW1.2.2.7.8	UnitStatus	HwStatus			

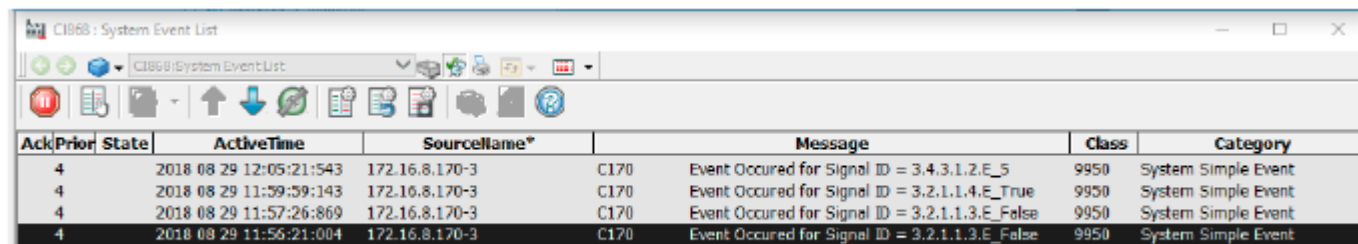
CI868 LN Hw Unit – Enable alarm and event Configuration



CI868 Event Properties

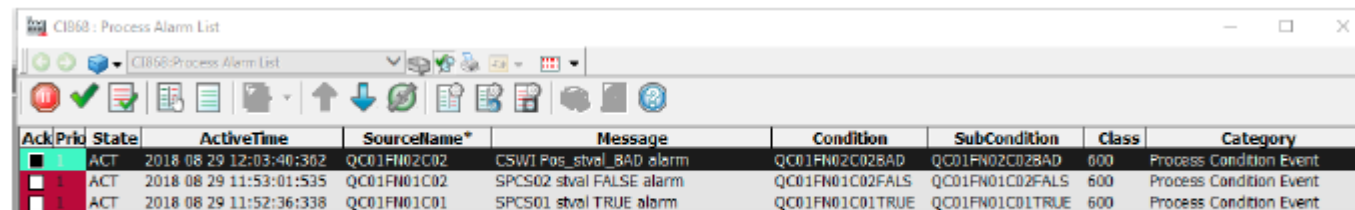
Table 4.1: CI868 Signal ID Hardware Addressing

Event Configuration	Signal Value	Signal ID	Example	Event Severity
Signal Type: BOOL				
Disable	-	-	-	-
Event On Status Change	True	<HwAddress>.E_True	1.3.2.7.1.E_True	400
Event On Status Change	False	<HwAddress>.E_False	1.3.2.7.1.E_False	400
Alarm On True Status	True	<HwAddress>.A_True	1.3.2.7.1.A_True	600
Alarm On False Status	False	<HwAddress>.A_False	1.3.2.7.1.A_False	600
Signal Type: Dbpos				
Disable	-	-	-	-
Event On Status Change	0 (Intermediate)	<HwAddress>.E_Int	1.3.2.7.2.E_Int	400
Event On Status Change	1 (Open)	<HwAddress>.E_Off	1.3.2.7.2.E_Off	400
Event On Status Change	2 (Close)	<HwAddress>.E_On	1.3.2.7.2.E_On	400
Event On Status Change	3 (Fault)	<HwAddress>.A_Bad	1.3.2.7.2.A_Bad	600
Signal Type: ENUM				
Disable	-	-	-	-
Event On Status Change	0 - 63	<HwAddress>.E_<Num>	1.3.2.7.3.E_26	400



Ack	Prior	State	ActiveTime	SourceName*	Message	Class	Category
4			2018 08 29 12:05:21:543	172.16.8.170-3	C170	Event Occurred for Signal ID = 3.4.3.1.2.E_5	9950 System Simple Event
4			2018 08 29 11:59:59:143	172.16.8.170-3	C170	Event Occurred for Signal ID = 3.2.1.1.4.E_True	9950 System Simple Event
4			2018 08 29 11:57:26:869	172.16.8.170-3	C170	Event Occurred for Signal ID = 3.2.1.1.3.E_False	9950 System Simple Event
4			2018 08 29 11:56:21:004	172.16.8.170-3	C170	Event Occurred for Signal ID = 3.2.1.1.3.E_False	9950 System Simple Event

Figure 4.14: CI868 System Events



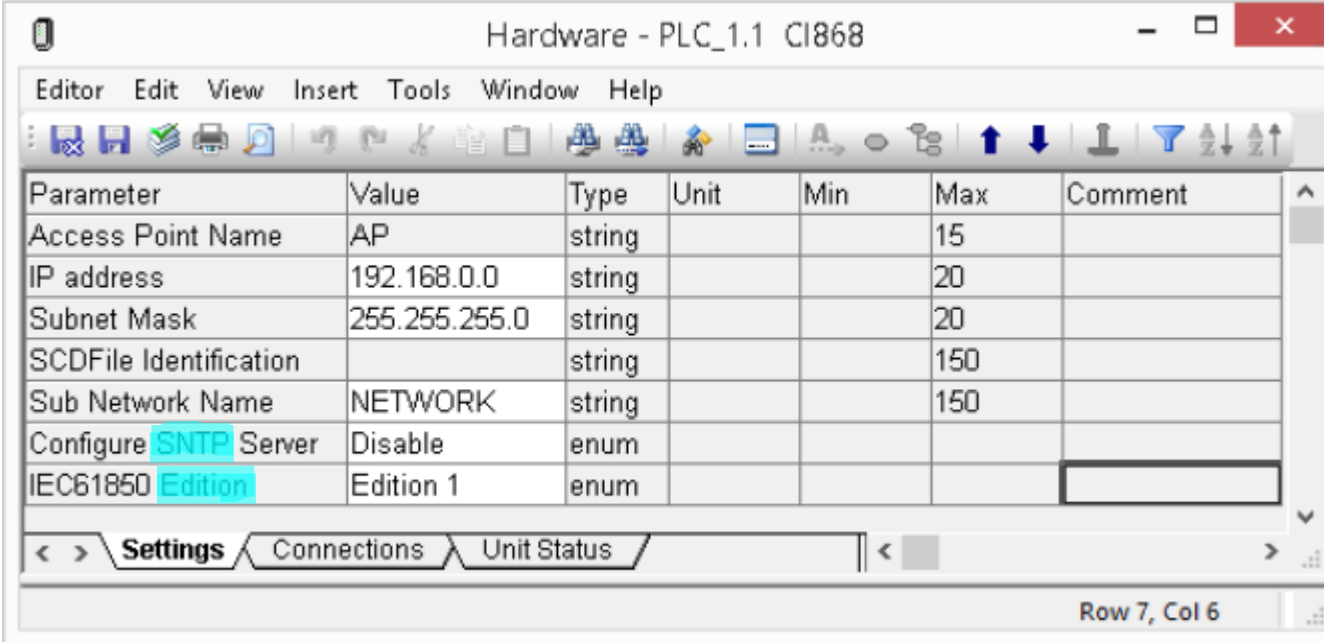
Ack	Prior	State	ActiveTime	SourceName*	Message	Condition	SubCondition	Class	Category
		ACT	2018 08 29 12:03:40:302	QC01FN02C02	CSW1 Pos_stval_BAD alarm	QC01FN02C02BAD	QC01FN02C02BAD	600	Process Condition Event
		ACT	2018 08 29 11:53:01:535	QC01FN01C02	SPCS02 stval FALSE alarm	QC01FN01C02FALS	QC01FN01C02FALS	600	Process Condition Event
		ACT	2018 08 29 11:52:36:338	QC01FN01C01	SPCS01 stval TRUE alarm	QC01FN01C01TRUE	QC01FN01C01TRUE	600	Process Condition Event

Figure 4.16: CI868 Process Alarms

```
AlarmCond
- Signal          CondState
- TransitionTime  Error
- ExtTimeStamp    Status
- SignalID
- UseSigToInit
- SrcName
- CondName
- Message
- Severity
- Class
- Inverted
- AckRule
- FilterTime
- EnDetection
- AckCond
- DisCond
- EnCond
```

CI868 SNTP server and Edition selections

- SNTP Server Parameter for other IEDs to Synchronize to CI868 Time
- IEC61850 Edition Parameter – To Start CI868 in Ed1 / Ed2 Mode
- No CI868 Restart for Hw Tree Parameter Change and Download (Unlike earlier versions)



Parameter	Value	Type	Unit	Min	Max	Comment
Access Point Name	AP	string			15	
IP address	192.168.0.0	string			20	
Subnet Mask	255.255.255.0	string			20	
SCDFile Identification		string			150	
Sub Network Name	NETWORK	string			150	
Configure SNTP Server	Disable	enum				
IEC61850 Edition	Edition 1	enum				

Settings Connections Unit Status

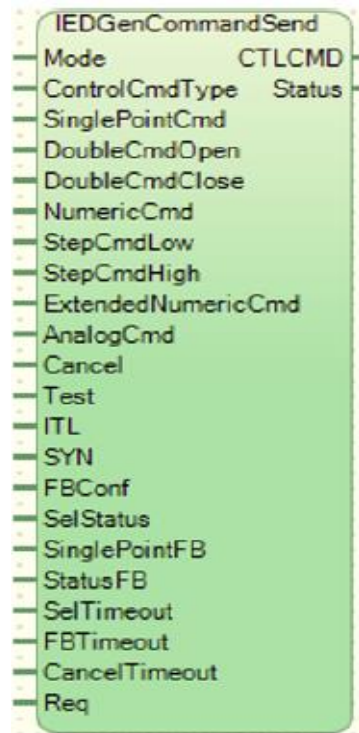
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ABB Ability™ System 800xA 6.1

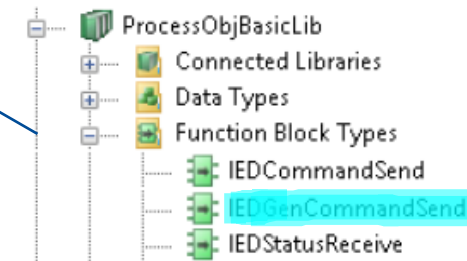
Enhancement- CI868- Command management & Library

Command Enhancements

- All commendable LNs are supported
(Ex: CSWI, XCBR, GGIO)
- New Function block for command management
- Single point control -SPC
- Analog setpoint command (INC & APC)
- Transformer step change control (BSC/BAC)



- Control Mode: 1=Direct; 2=SBO else LGV
- Control Command Type. 1= SPC, 2 = DPC, 3 = ENC, 4 = BSC, 5 = ISC, 6 = BAC, 7 = INC, 8 = APC else LGV
- Input Command for SPC type
- Open Command for DPC type
- Close Command for DPC type
- Input Command for ENC/ISC types. Range -64 to 63 else LGV
- Step Lower Command for BSC/BAC types (pulse)
- Step Higher Command for BSC/BAC types (Pulse)
- Input Command for INC type. Range -32768 to 32767 else LGV
- Input Command for APC type. Range -65504 to 65504 else LGV



Performance Improvements

Double the CI868 Communications Capabilities



CI868 Capacity and Performance	800xA 6.0	800xA 6.1	Notes
Maximum IEDs supported Per CI868 (MMS)	20	40	For projects/applications requiring both monitoring and control (MMS). Suitable for small projects.
Maximum IEDs supported per CI868 (GOOSE)	80	120	Power management Applications requiring GOOSE
Maximum IEDs supported per CI868 (MMS and GOOSE)	20	40	Both Power management & Monitoring and control Applications
Maximum signals supported Per CI868 for monitoring and control application (MMS)	1000	2000	
Maximum signals supported for Power management Application (GOOSE)	800	1200	

Approximately - 50% Reduction of CI868s required!

IEC61850 connect- Simplified configuration

Reduction of engineering steps

800xA 6.0 or Older versions

- Primary connectivity server –Import SCD in CET
- Secondary connectivity server- Import SCD in CET
- Primary or secondary server – Plant explorer
- Alarm and event configured in CET (Both Primary & Secondary server)
- Connectivity server Installation –OPC server, CET,SQL express

800xA 6.1

- Single SCD upload from Plant explorer-Control structure
- No manual configuration required for CET (Automatic)
- IEC61850 OPC servers gets **Alarm & Event** configuration during update
- CET and SQL Express are installed in Aspect server
- OPC server is installed in the connectivity server

IEC61850 connect- New project vs Upgradation

Node Functions Compact ability with Legacy Engineering

Greenfield Customer

- A new User who requires new IEC61850 Edition-2, need to follow **new node Functions**
- Aspect Server will have CET+ SQL Express Deployed
- IEC61850 Connectivity Server contains only OPC Server

Migration from earlier versions of 800xA to 6.1

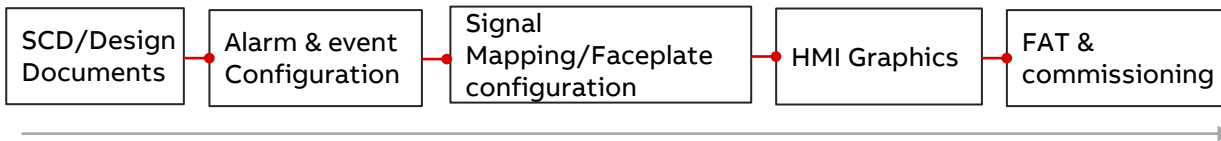
- User must deploy Legacy IEC61850 Connectivity Server node function
- User gets the IEC61850 Connectivity server as per previous releases of 800xA
- IEC61850 Connectivity Server Contains CET+ SQL and OPC server
- Supports Only IEC61850 Edition 1 Specification
- Mix Not allowed.

Electrical Integration- Enhanced Engineering Workflow

xStream Engineering Concept

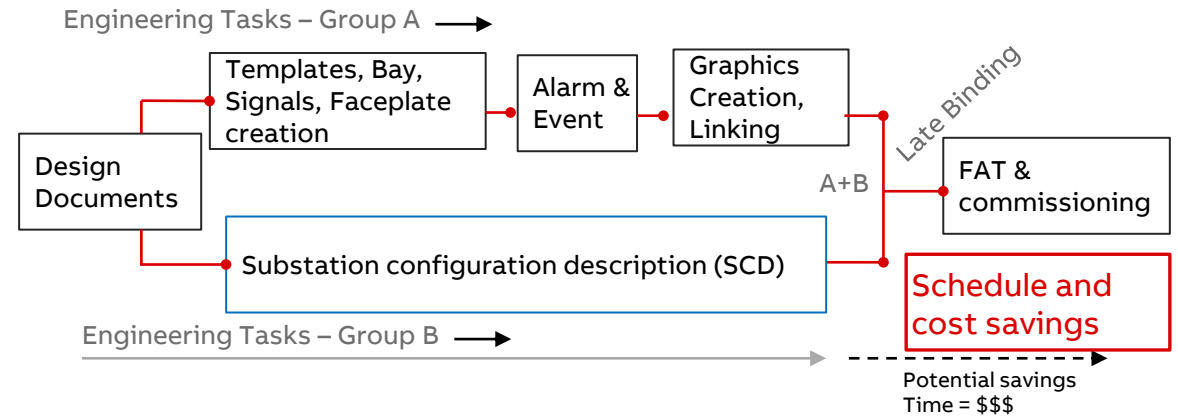
SLD-Single Line diagram
SCD-Substation configuration description
A&E-Alarm and event configuration
Typical- Template configured in Object types
FB-Faceplate
Late Binding –Map IED (SCD) with Bay typical and IED typical

System 800xA v6.0



- Serial project execution model
- SCD configuration (with substation) is Mandatory
- Without SCD further engineering cannot be started
- Engineering task needs to be done in a sequential manner
- Potentially large impact when making late changes

System 800xA v6.1

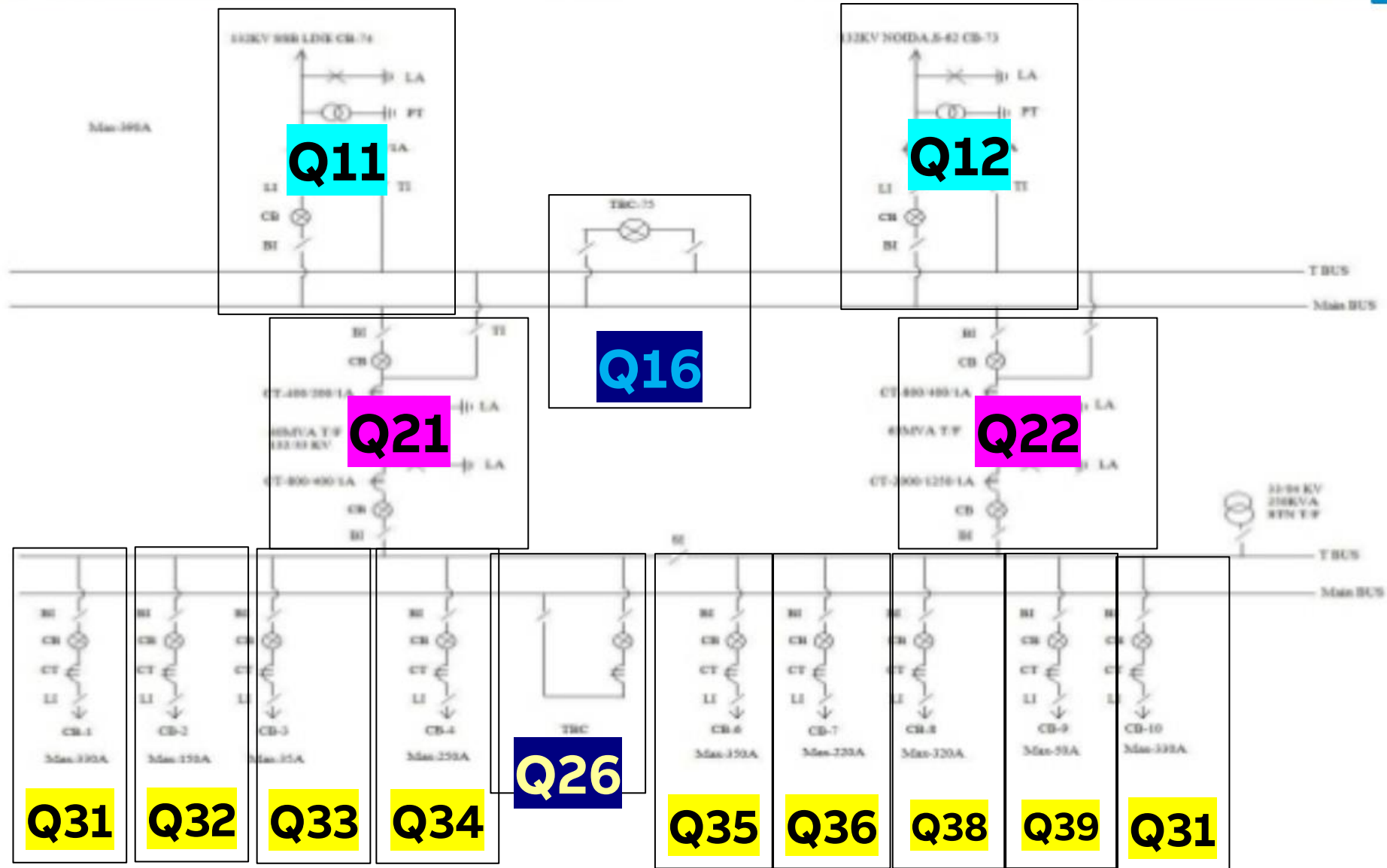


- Parallel project tasks
- Start Engineering with basic design documents (SLD, I/O List)
- Create substation configuration, A&E, FB, Graphics in Plant explorer
- Late Binding when SCD is available (Waiting for SCD from 3rd Party)

Parallel engineering = Project efficiency = Early startup

SINGLE LINE DIAGRAM OF 132KV

SUBSTATION

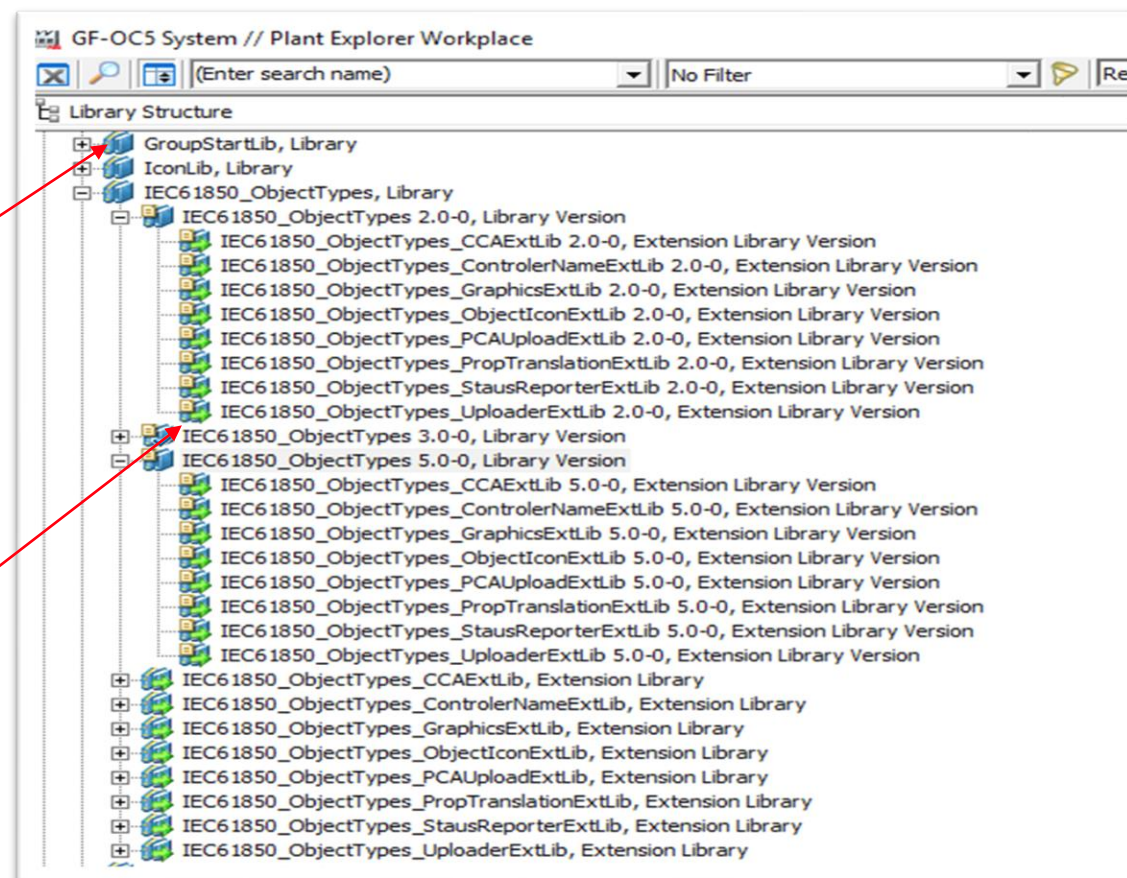


IEC61850 Object type library

Start Engineering- Creating Child library

IEC61850 OBJECT TYPES 2.0-0
PARENT LIBRARY

IEC61850 OBJECT TYPES 5.0-0
CHILD LIBRARY

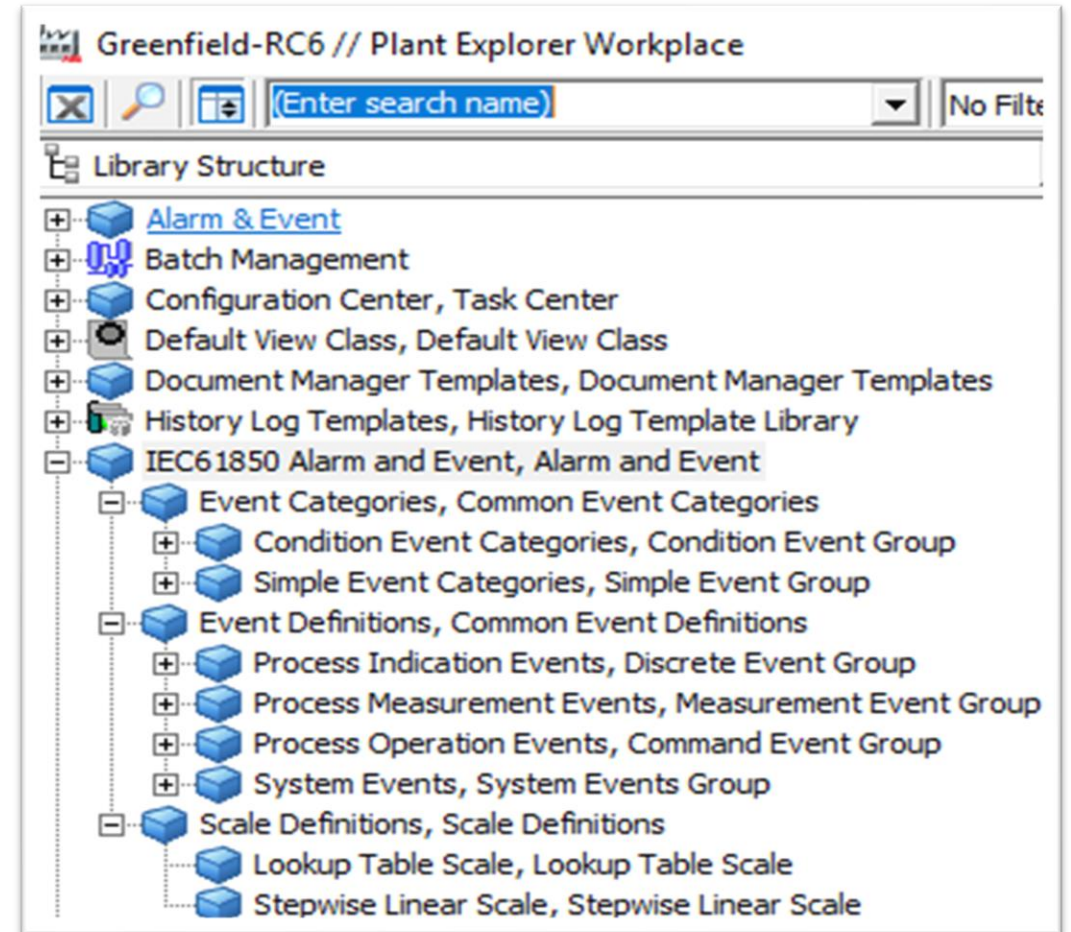


Configure IEC61850 Event Definitions

IEC61850 Alarms and Events for a particular Data Object (DO) are based on Event Definition.

Four Types of Event Definitions are available

- Process Indication Events like Status of DO : Ind.stVal (binary), Pos.stVal : Ex: Breaker trip/Close
- Process measurements Events like Analog Values : Reactive Power TotVar.mag, Frequency HZ.mag (Ex:Voltage high)
- Process Operation Events for Control Command, example SBO : CSWI_1.Pos.ctlOperOn: Breaker open command issued
- System Events , Signals related to System Devices , IED's , Network etc: Ex:IED health

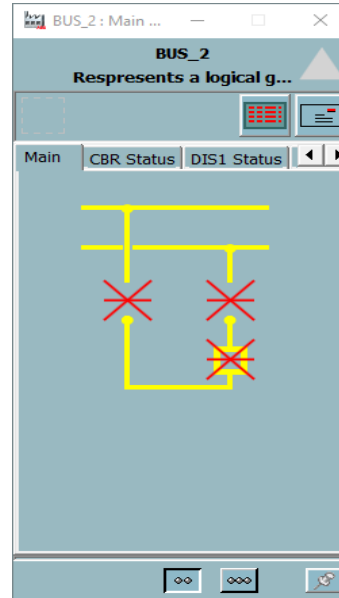


Define Bay typical

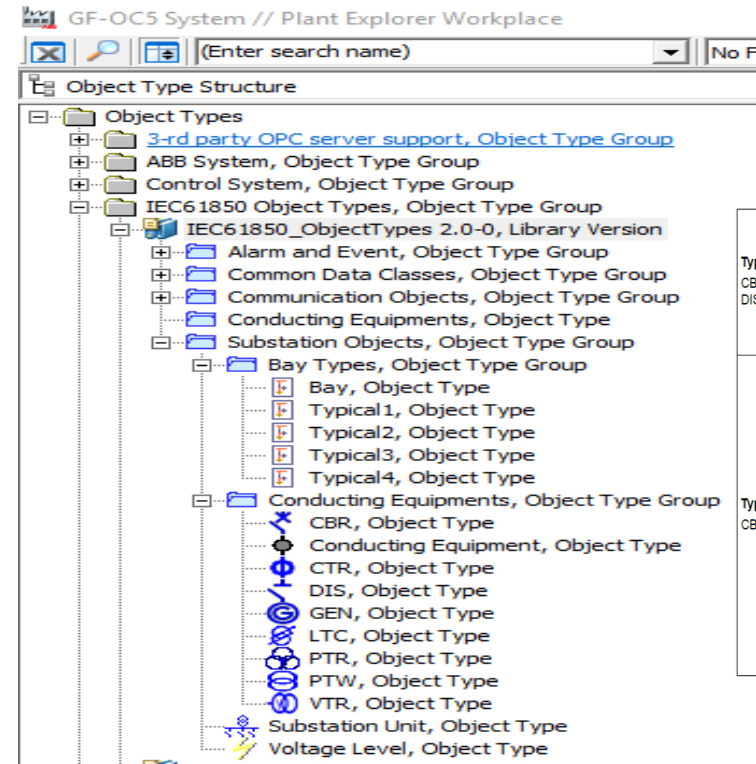
Templates creation Bay typical

Bay typical

- Bay Contains conducting equipment's
- Bay Contains Measuring instruments (CT & PT)
- Bay Contains one or more IEDs
- Create Graphic elements
- Create Faceplate
- Map the IED signal name with Faceplates



Object Type Structure -Create bay typical



Typical1 CBR + DIS1/ESW + DIS2/ESW					
Typical2 CBR + DIS/ESW					

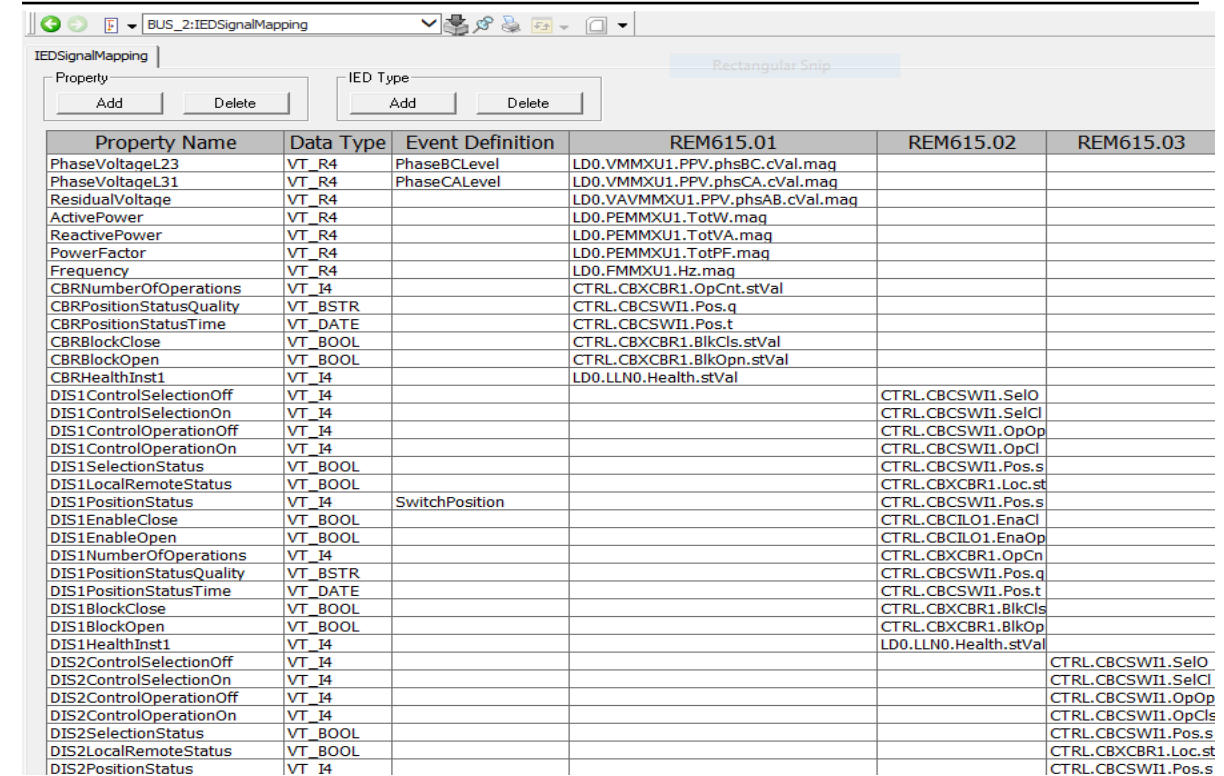
Define IED typical

Templates creation IED typical

IED typical

- Property name mapped with IED signals
- Event definition assigned for each signals
- Same IED type with multiple signal variants can be mapped

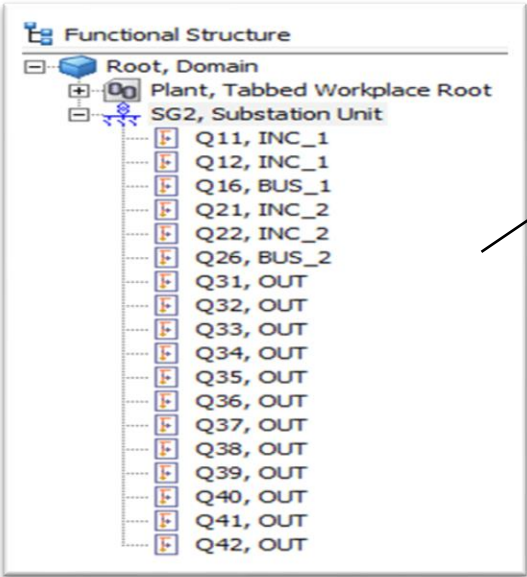
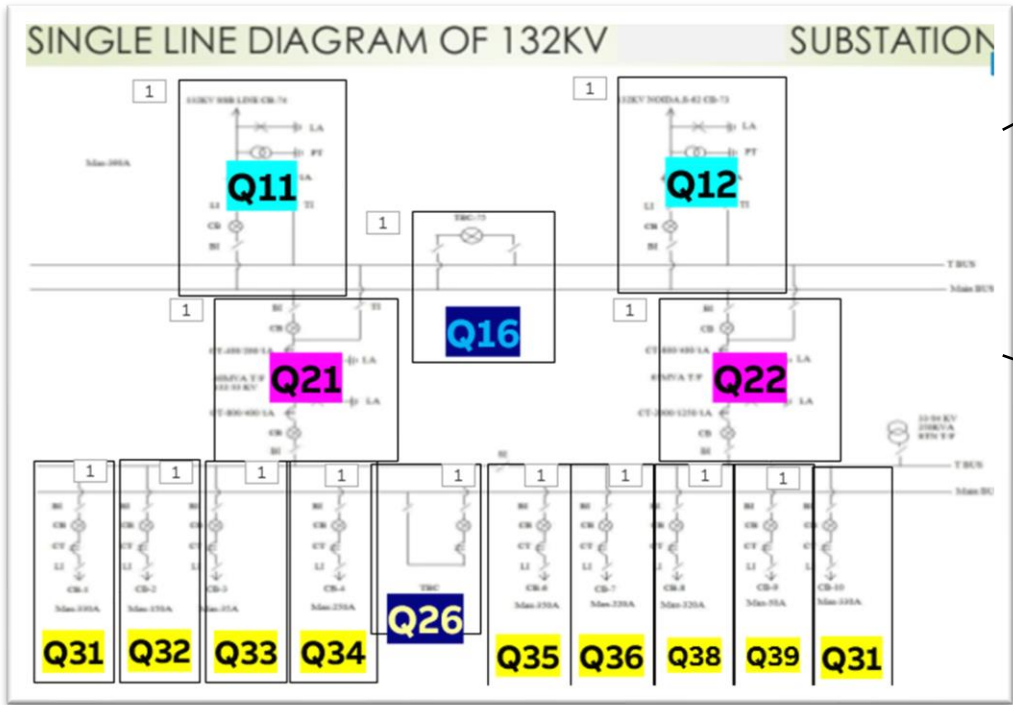
IED Signal Mapping Aspect



The screenshot shows the 'IEDSignalMapping' application window. It features a toolbar at the top with icons for file operations and a search bar. Below the toolbar, there are two tabs: 'Property' and 'IED Type'. The 'Property' tab is active, displaying a table with columns: Property Name, Data Type, Event Definition, and three REM615.x columns. The table lists various IED properties and their corresponding data types and event definitions. The 'Event Definition' column contains specific IED signal names, while the REM615.x columns contain generic IED signal names.

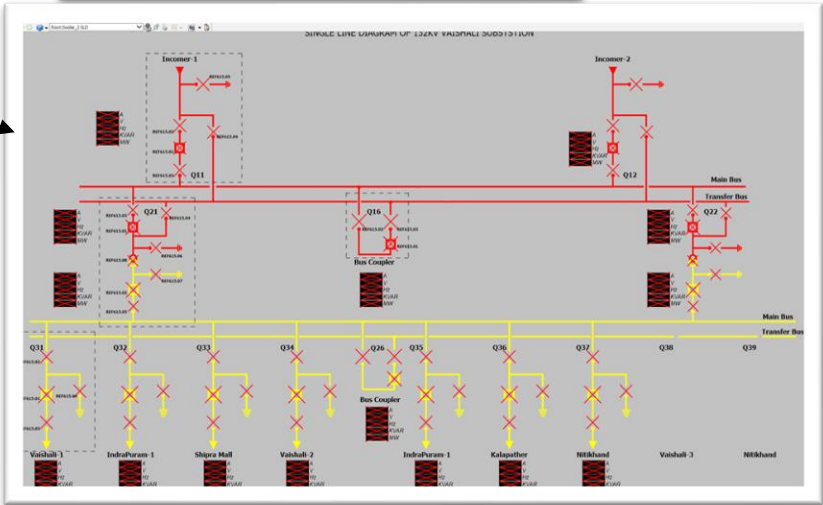
Property Name	Data Type	Event Definition	REM615.01	REM615.02	REM615.03
PhaseVoltageL23	VT_R4	PhaseBCLevel	LD0.VMMXU1.PPV.phsBC.cVal.mag		
PhaseVoltageL31	VT_R4	PhaseCALevel	LD0.VMMXU1.PPV.phsCA.cVal.mag		
ResidualVoltage	VT_R4		LD0.VAVMMXU1.PPV.phsAB.cVal.mag		
ActivePower	VT_R4		LD0.PEMMXU1.TotW.mag		
ReactivePower	VT_R4		LD0.PEMMXU1.TotVA.mag		
PowerFactor	VT_R4		LD0.PEMMXU1.TotPF.mag		
Frequency	VT_R4		LD0.FMMXU1.Hz.mag		
CBRNumberOfOperations	VT_I4		CTRL.CBXCBR1.OpCnt.stVal		
CBRPositionStatusQuality	VT_BSTR		CTRL.CBCSWI1.Pos.q		
CBRPositionStatusTime	VT_DATE		CTRL.CBCSWI1.Pos.t		
CBRBlockClose	VT_BOOL		CTRL.CBXCBR1.BlkCls.stVal		
CBRBlockOpen	VT_BOOL		CTRL.CBXCBR1.BlkOpn.stVal		
CBRHealthInst1	VT_I4		LD0.LLN0.Health.stVal		
DIS1ControlSelectionOff	VT_I4			CTRL.CBCSWI1.SelO	
DIS1ControlSelectionOn	VT_I4			CTRL.CBCSWI1.SelCl	
DIS1ControlOperationOff	VT_I4			CTRL.CBCSWI1.OpOp	
DIS1ControlOperationOn	VT_I4			CTRL.CBCSWI1.OpCl	
DIS1SelectionStatus	VT_BOOL			CTRL.CBCSWI1.Pos.s	
DIS1LocalRemoteStatus	VT_BOOL			CTRL.CBXCBR1.Loc.st	
DIS1PositionStatus	VT_I4	SwitchPosition		CTRL.CBCSWI1.Pos.s	
DIS1EnableClose	VT_BOOL			CTRL.CBCILO1.EnaCl	
DIS1EnableOpen	VT_BOOL			CTRL.CBCILO1.EnaOp	
DIS1NumberOfOperations	VT_I4			CTRL.CBXCBR1.OpCnt	
DIS1PositionStatusQuality	VT_BSTR			CTRL.CBCSWI1.Pos.q	
DIS1PositionStatusTime	VT_DATE			CTRL.CBCSWI1.Pos.t	
DIS1BlockClose	VT_BOOL			CTRL.CBXCBR1.BlkCls	
DIS1BlockOpen	VT_BOOL			CTRL.CBXCBR1.BlkOp	
DIS1HealthInst1	VT_I4			LD0.LLN0.Health.stVal	
DIS2ControlSelectionOff	VT_I4				CTRL.CBCSWI1.SelO
DIS2ControlSelectionOn	VT_I4				CTRL.CBCSWI1.SelCl
DIS2ControlOperationOff	VT_I4				CTRL.CBCSWI1.OpOp
DIS2ControlOperationOn	VT_I4				CTRL.CBCSWI1.OpCls
DIS2SelectionStatus	VT_BOOL				CTRL.CBCSWI1.Pos.s
DIS2LocalRemoteStatus	VT_BOOL				CTRL.CBXCBR1.Loc.st
DIS2PositionStatus	VT_I4				CTRL.CBCSWI1.Pos.s

Instantiating Bay in Functional Structure



Multiple Bay created from typical

Graphics page created at earlier stage



Late binding –Assign substation path

Functional structure

- SCD file has no substation section
- Substation section created in plant explorer workplace
- Substation section associated with SCD

The screenshot displays the 'Select Object' dialog box in the background, showing a tree view of the functional structure. The 'SG2, Substation Unit' is selected. In the foreground, the 'Configuration' tab of the 'Hody_Substation:Substation Configuration' window is active. It shows the 'SCD File' as 'C:\Shoolagiri_2_20IED.scd' and the 'Substation Path' as 'Root/SG2'. A blue arrow points from the 'SG2, Substation Unit' in the dialog to the 'Substation Path' field. The 'Substation Path' field is annotated with the text 'Substation path assigned from functional structure'. Below the 'Substation Path' field, the 'Selected Library' is 'IEC61850_ObjectTypes 5.0-0' and the 'Substation Source' is 'Functional Structure'. The 'Configuration' tab also shows the 'IED Assignment' section with 'Primary' and 'Secondary' options set to 'OPC1' and 'OPC2' respectively. The 'Subnetwork' is 'CC1WF1' and the 'Substation Source' is 'IEC61850_SG_Hody_Substation_OPC1_1'.

Aspects of 'Hody_Substation'	Modified	Modified by	Desc...	Inherited	Category name	Version
Control Structure	12/5/2019 11:23:...	800xAInstaller	[Con...	False	Control Structure	1
IEC Generic Property Aspect	12/5/2019 11:28:...	800xAInstaller		False	IEC Generic Pro...	1
Name	12/5/2019 11:02:...	800xAInstaller	The ...	False	Name	1
Object Icon	11/6/2018 11:08:...	{36ECD8A5-92...	Icon ...	True	Object Icon	1
Substation Configuration	12/6/2019 11:47:...	800xAInstaller		False	IEC61850 Subs...	1
Substation Network Type Reference	12/5/2019 11:02:...	800xAInstaller	Repr...	False	Substation Net...	1

Configuration IED Assignment Upload Update

SCD File C:\Shoolagiri_2_20IED.scd SCD file without substation

Substation Path Root/SG2 Substation path assigned from functional structure

Selected Library IEC61850_ObjectTypes 5.0-0 Substation Source: Functional Structure

IEC61850 OPC Server IEC61850 Service Group(DA And AE) IEC61850 Cor

Subnetwork: CC1WF1

Primary:	Secondary:	Substation Source
OPC1	OPC2	IEC61850_SG_Hody_Substation_OPC1_1
		GF-OC5
		None

Late binding –SCD file with Bay & IED typical

IED Assignment Tab for Bay Typical with IED Typical

SCD File

Hody_Substation:Substation Configuratio

Configuration

IED Assignment

Upload

Update

Plant explorer workplace

SCD File

Add Row

Delete Row

IED Name	IED Type		Functional Obje	Functional Object	IED Typical
IED03	REM615		Q11	INC_1	REM615.03
IED04	REM615		Q11	INC_1	REM615.04
IED05	REM615		Q11	INC_1	REM615.05
IED06	REM615		Q12	INC_1	REM615.01
IED07	REM615		Q12	INC_1	REM615.02
IED08	REM615		Q12	INC_1	REM615.03
IED09	REM615		Q12	INC_1	REM615.04
IED10	REM615		Q12	INC_1	REM615.05
IED11	REM615		Q21	INC_2	REM615.01
IED12	REM615		Q21	INC_2	REM615.02
IED13	REM615		Q21	INC_2	REM615.03
IED14	REM615		Q21	INC_2	REM615.04
IED15	REM615		Q21	INC_2	REM615.05
IED16	REM615		Q21	INC_2	REM615.06
IED17	REM615		Q21	INC_2	REM615.07
IED18	REM615		Q21	INC_2	REM615.08
IED19	REM615		Q22	INC_2	REM615.01
IED20	REM615		Q22	INC_2	REM615.02

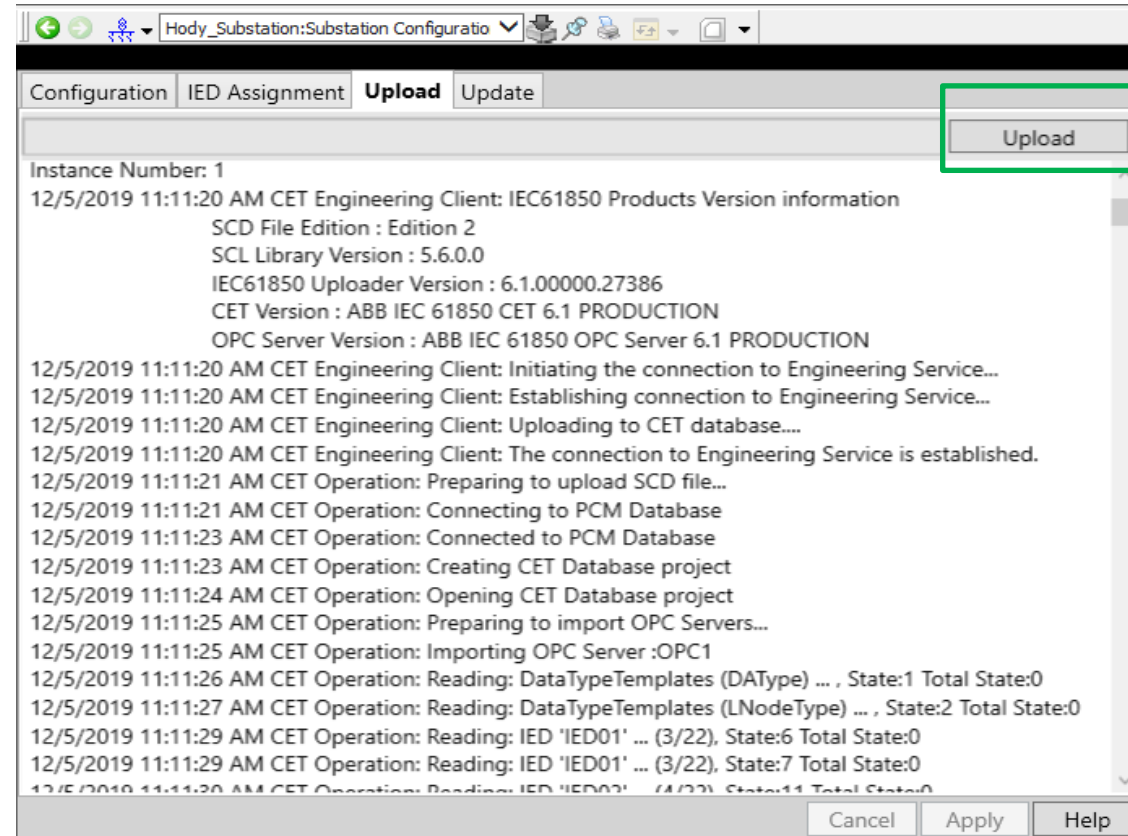
Late Binding

Late Binding

Sub-Station Configuration Aspect – Uploading SCD file

SCD Uploading Process

- A new CET project is created Automatically
- Automatically Imports SCD file to the CET project
- Generates OPC configuration file and transfers it to the Targeted IEC61850 Connectivity Server (Primary and Secondary)
- Retrieve Process that Generates the OCS file for Control Structure and Functional Structure
- After Retrieve, Append Process Starts to extract from the OCS file
 - in Control Structure IED communication objects are instantiated
 - in Functional Structure it fills the Control Connection Aspect for Bays , Breakers other conducting equipment's
- OPC -DA / AE Services For this Substation Networks are created
- Save's the SCD file to Aspect directory.



Bay-Control connection Aspect update

GF-OC5 System // Plant Explorer Workplace

Functional Structure

- Root, Domain
 - Plant, Tabbed Workplace Root
 - SG2, Substation Unit
 - Q11, INC_1
 - Q12, INC_1
 - Q16, BUS_1
 - Q21, INC_2
 - Q22, INC_2
 - Q26, BUS_2
 - Q31, OUT
 - Q32, OUT
 - Q33, OUT
 - Q34, OUT
 - Q35, OUT
 - Q36, OUT
 - Q37, OUT
 - Q38, OUT
 - Q39, OUT
 - Q40, OUT
 - Q42, OUT

Aspects of 'Q11'

	Modified	Modified by	Desc...	Inherited	Category name	Version
Alarm List	11/6/2018 3:32:2...	{36ECD8A5-92...	This ...	True	Alarm and Even...	1
AlarmControl	5/12/2016 12:32:...	ABB 800xA Base	Grap...	True	Graphic Elemen...	1
Bay Child Equipment Names	11/7/2018 9:33:4...	{36ECD8A5-92...		False	General Propert...	1
Bay Display Configuration	11/6/2018 3:32:2...	{36ECD8A5-92...		True	General Propert...	1
Bay Instance Information	12/5/2019 11:23:...	800xAInstaller		False	IEC Generic Pro...	1
Control Connection	12/5/2019 11:26:...	800xAInstaller	Holds...	False	OPC Control Co...	1

Q11:Control Connection

Property View | Property Info | Additional Info | OPC | Item Properties | System

Property:

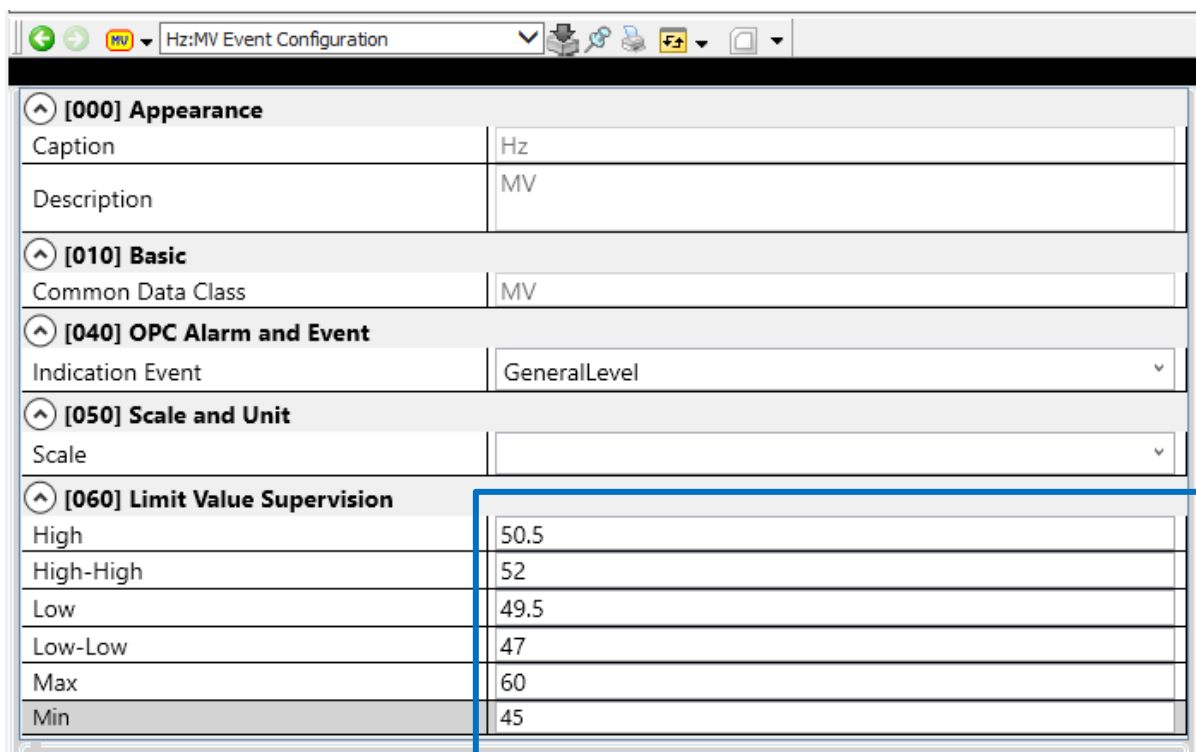
Item ID:

Access Path:

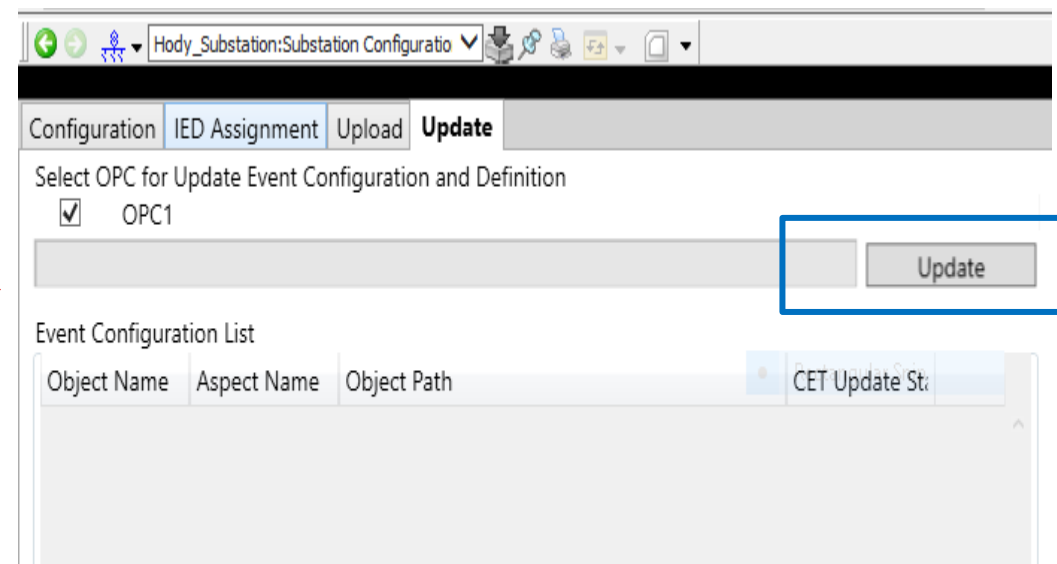
Property	Item ID	Access Path
CBR1LocalRemoteStatus	CC1WF1\IED01\CTRL\CBXCBR1\Loc\stVal	
CBR1NumberOfOperations	CC1WF1\IED01\CTRL\CBXCBR1\OpCnt\stVal	
CBR1PositionStatus	CC1WF1\IED01\CTRL\CBCSWI1\Pos\stVal	
CBR1PositionStatusQuality	CC1WF1\IED01\CTRL\CBCSWI1\Pos\q	
CBR1PositionStatusTime	CC1WF1\IED01\CTRL\CBCSWI1\Pos\st	
CBR1SelectionStatus	CC1WF1\IED01\CTRL\CBCSWI1\Pos\stSeld	
CBRHealthInst1	CC1WF1\IED01\LD0\LLN0\Health\stVal	
DIS1BlockClose	CC1WF1\IED02\CTRL\CBXCBR1\BlkCls\stVal	
DIS1BlockOpen	CC1WF1\IED02\CTRL\CBXCBR1\BlkOpn\stVal	
DIS1ControlOperationOff	CC1WF1\IED02\CTRL\CBCSWI1\OpOpn\general	
DIS1ControlOperationOn	CC1WF1\IED02\CTRL\CBCSWI1\OpCls\general	
DIS1ControlSelectionOff	CC1WF1\IED02\CTRL\CBCSWI1\SelOpn\stVal	
DIS1ControlSelectionOn	CC1WF1\IED02\CTRL\CBCSWI1\SelCls\stVal	
DIS1EnableClose	CC1WF1\IED02\CTRL\CBCILO1\EnaCls\stVal	
DIS1EnableOpen	CC1WF1\IED02\CTRL\CBCILO1\EnaOpn\stVal	
DIS1HealthInst1	CC1WF1\IED02\LD0\LLN0\Health\stVal	
DIS1LocalRemoteStatus	CC1WF1\IED02\CTRL\CBXCBR1\Loc\stVal	
DIS1NumberOfOperations	CC1WF1\IED02\CTRL\CBXCBR1\OpCnt\stVal	
DIS1PositionStatus	CC1WF1\IED02\CTRL\CBCSWI1\Pos\stVal	
DIS1PositionStatusQuality	CC1WF1\IED02\CTRL\CBCSWI1\Pos\q	
DIS1PositionStatusTime	CC1WF1\IED02\CTRL\CBCSWI1\Pos\st	

Substation Configuration

Update Tab



[000] Appearance	
Caption	Hz
Description	MV
[010] Basic	
Common Data Class	MV
[040] OPC Alarm and Event	
Indication Event	GeneralLevel
[050] Scale and Unit	
Scale	
[060] Limit Value Supervision	
High	50.5
High-High	52
Low	49.5
Low-Low	47
Max	60
Min	45



Configuration IED Assignment Upload **Update**

Select OPC for Update Event Configuration and Definition

☒ OPC1

Update

Event Configuration List

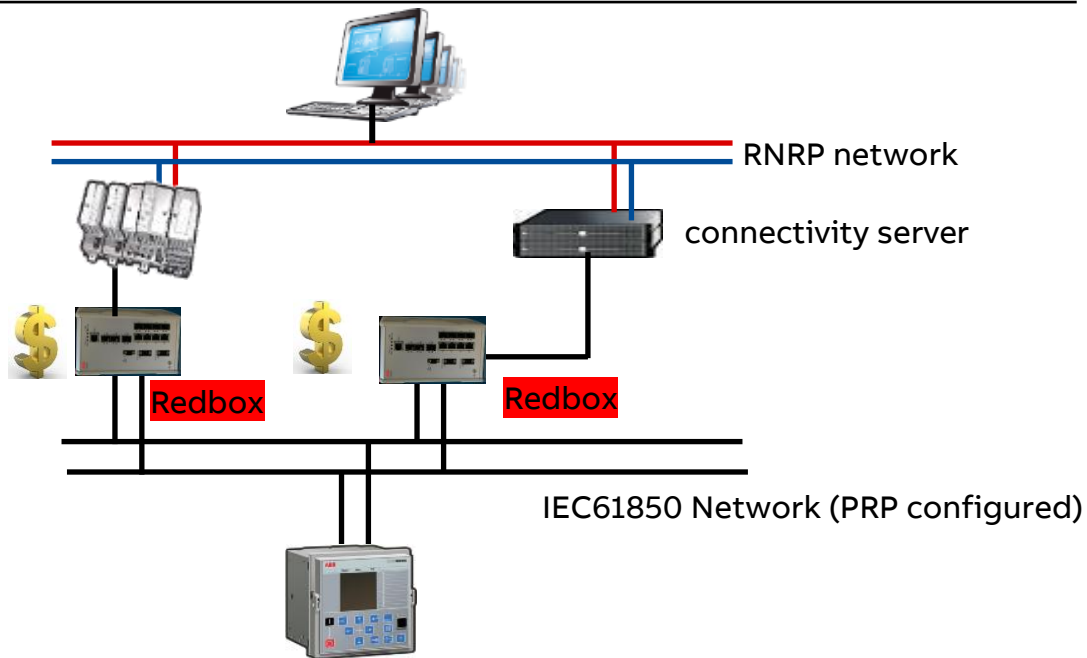
Object Name	Aspect Name	Object Path	CET Update St
-------------	-------------	-------------	---------------

- Update required mainly for deploying alarm and event configurations
- Primary and secondary IEC61850 server Gets updated

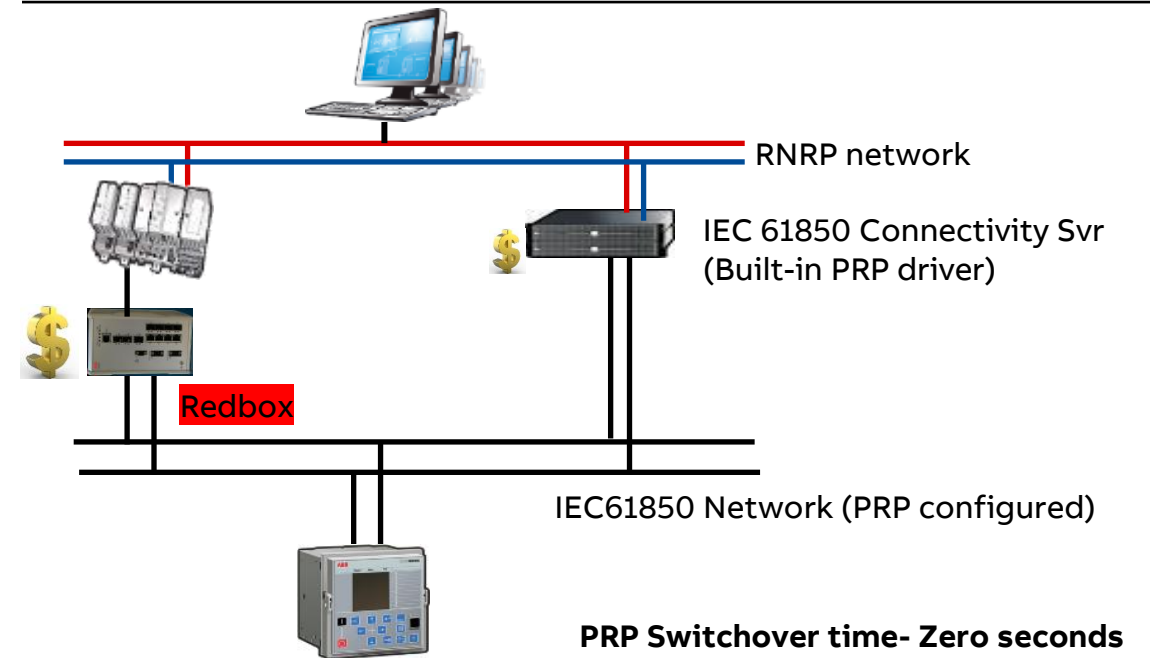
IEC 61850 Edition 2

Network redundancy-Parallel Redundancy Protocol

System 800xA v6.0.x



System 800xA v6.1

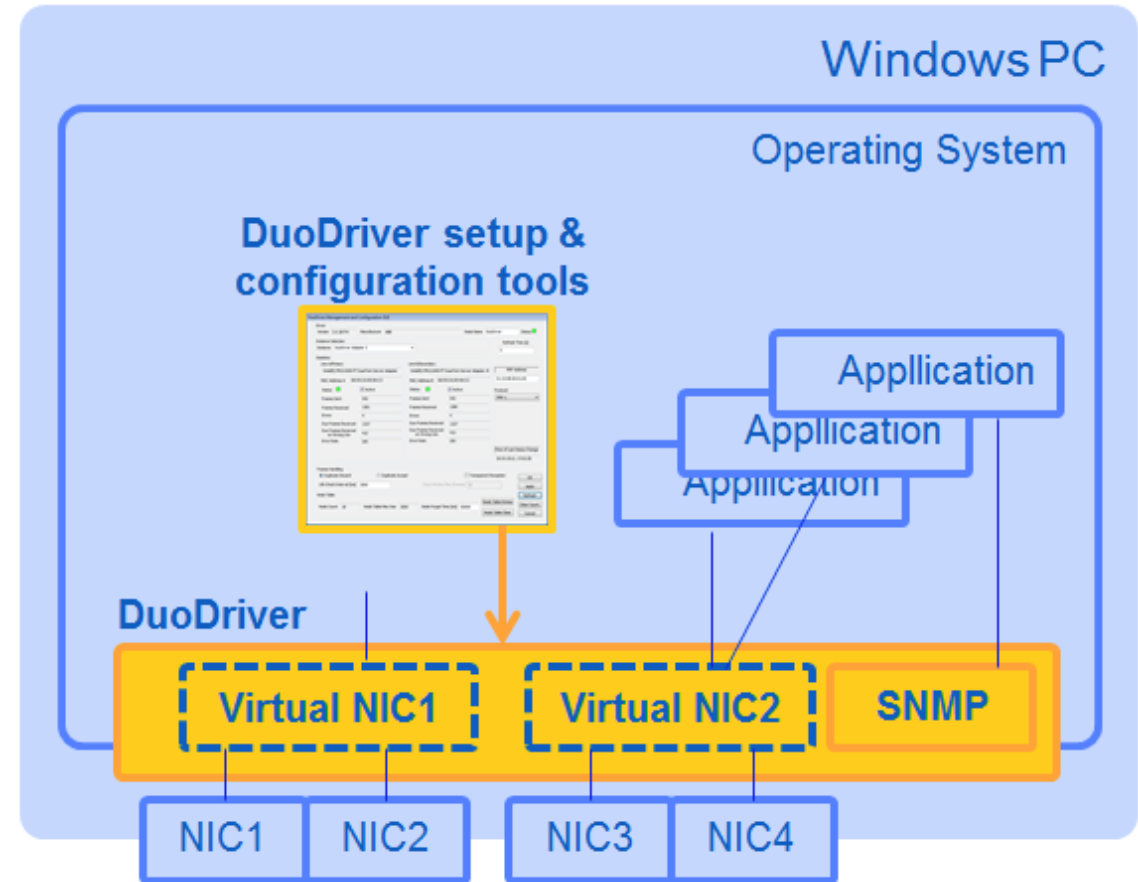


Improved redundancy schemes without extra hardware (only for vertical Integration).

Duo Driver

Support for PRP (network) Redundancy

- Supports IEC 62439 -2 PRP Standard
- Licensed application (Independent License Option)
- IEC61850 Connectivity Server Can Communicate to two Parallel redundant IEC61850 Subnetworks
- Duo Driver Pairs two physical network interface cards on Windows PC to work in redundant mode
- Once paired the Windows OS detects the two physical port as a single Virtual NIC Card.
- When any one network fails, there is no impact to 800xA IEC61850 Operations as the PRP switchover time is 0 seconds.



Commercial Changes

IEC 61850 License

System 800xA v6

IEC 61850-Ed1 Connect	Article no.
For order of IEC 61850 related products, local organizations must comply with the Demands on the Purchaser to secure successful sales of IEC 61850 with System 800xA. Ref doc, 3BSE058798.	
IEC 61850-Ed1 Connect Allows operation clients to access data and alarm and event values from Intelligent Electronic Devices (IEDs) according to IEC 61850-Ed1 (Edition1). Package includes IEC 61850 OPC server software with configuration tool on Connectivity Servers. You have to order number of used OPC server instances (max. 16 per System). IEC 61850 Substation Operation Library with Faceplates to control substation equipment (Bay, Breaker, Switch, ..) is included	3BSE078884R1
Redundant IEC 61850-Ed1 Connect Option Allows operation clients to access data and alarm and event values through redundant OPC-servers from Intelligent Electronic Devices (IEDs) according to IEC 61850-Ed1 (Edition1). Package includes IEC 61850 OPC server software with configuration tool on Connectivity Servers. You have to order the number of used OPC server instances. (max. 16 per System) IEC 61850 Substation Operation Library with Faceplates to control substation equipment (Bay, Breaker, Switch, ..) is included. Requires IEC 61850-Ed1 Connect.	3BSE078885R1

-By IEC 61850 Connect

System 800xA v6.1

10 IEC 61850 Non-Redundant Devices Allows operation clients to access data and alarm and event values from Intelligent Electronic Devices (IEDs) according to IEC 61850, through Non-Redundant IEC 61850 Connect server. Each IED instance created in System 800xA counts as one. Package includes license to Parallel Redundancy Protocol (PRP) Duo Driver software for connecting with redundant-network IEDs through PRP protocol.	3BSE089953R1
100 IEC 61850 Non-Redundant Devices Allows operation clients to access data and alarm and event values from Intelligent Electronic Devices (IEDs) according to IEC 61850, through Non-Redundant IEC 61850 Connect server. Each IED instance created in System 800xA counts as one. Package includes license to Parallel Redundancy Protocol (PRP) Duo Driver software for connecting with redundant-network IEDs through PRP protocol.	3BSE089954R1
10 IEC 61850 Redundant Devices Allows operation clients to access data and alarm and event values from Intelligent Electronic Devices (IEDs) according to IEC 61850, through Redundant IEC 61850 Connect server. Each IED instance created in System 800xA counts as one. Package includes license to Parallel Redundancy Protocol (PRP) Duo Driver software for connecting with redundant-network IEDs through PRP protocol.	3BSE089955R1
100 IEC 61850 Redundant Devices Allows operation clients to access data and alarm and event values from Intelligent Electronic Devices (IEDs) according to IEC 61850, through Redundant IEC 61850 Connect server. Each IED instance created in System 800xA counts as one. Package includes license to Parallel Redundancy Protocol (PRP) Duo Driver software for connecting with redundant-network IEDs through PRP protocol.	3BSE089956R1

- Now scaled by IEDs / Redundant IEDs

800xA 6.1 Licensing is based on the number of IED's

- If the Architecture has single connectivity server then Refer to the Article numbers 3BS089953R1 and 3BS089954R1
- If the Architecture has redundant connectivity server then Refer to the Article number 3BS089955R1, 3BS089956R1
- Network Redundancy –PRP driver License price is separate from this price book. It needs to be requested to Finland ABB- Consider separate cost when bidding. (PRP = Parallel Redundancy Protocol)
- For Ordering and activating PRP Duo Driver License please directly contact pact.operationscenter@se.abb.com.
- IET600 tool is part of substation automation price book , For ordering contact support-sl@pl.abb.com

Summary

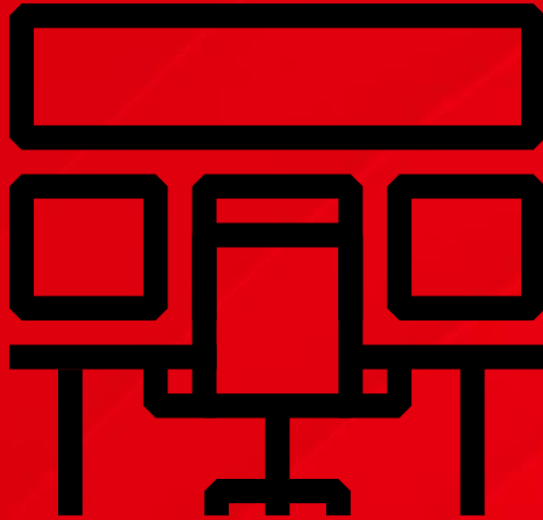


- System 800xA Electrical Control & Monitoring remains a market leader
- System 800xA v6.1 has many benefits that will help us retain our competitive position
 - Support for latest standards - IEC 61850 edition 2
 - Improved engineering workflow that aligns with engineering efficiency / late binding concepts
 - Improved performance of the Communications Interface module (CI868) to reduce infrastructure requirements
- NOTE: coming soon... Web Tech Talk in Nov/Dec including details on engineering workflow.

Happy Hunting!

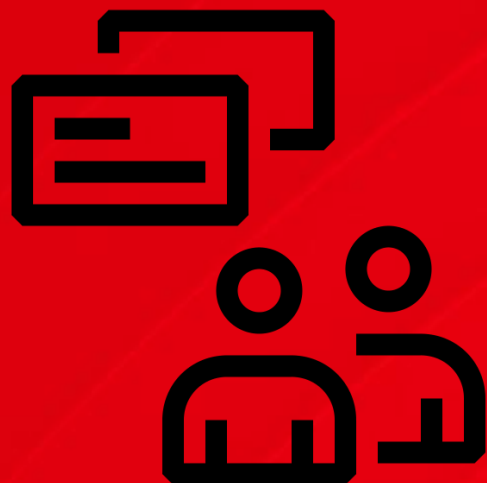


Live Demo



—

Q & A



ABB