MicroSCADA Pro SYS600
Total solution for Substation Automation System

Eko.Setiawan@id.abb.com
Substation Automation Systems Portfolio

Substation automation

Systems for control, protection and monitoring of transmission to distribution AIS, GIS and hybrid substations

Protection

Protection systems for the primary equipment in power plants, substations as well as industrial applications

Small SCADA

Monitoring and control systems for utilities, industries and infrastructure (e.g., railways, tunnels, large buildings, etc.)

Wide-area protection

Systems for online protection and control of power system stability based on current and voltage phasor measurements

Drop-in P&C houses

Prefabricated bay houses for substation automation, protection and control including communications and cabling for medium to high-voltage AIS & GIS substations

Integrated solutions for grid reliability, industrial productivity and energy efficiency

Robust global value chain to serve established and emerging markets

Extensive global network of value-added channel partners
ABB Portfolio and architecture

Tools

System Configuration

MicroSCADA Pro

IEC 61850-8-1

Frontend

IEC 61850-9-2

DMS600

smallSCADA

RTU560

RTU540

670 series

REB500

650 series

RTU540

620 series

MicroSCADA Pro

650 series

630 series

615 series

RTU511

RTU540

MIC

SAMU

SAMU

Combiflex

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Substation Automation Systems
Markets served

- Power plants
- Wind farms
- Electrical grids
- Industry
- Railways
Technology overview

Network level
Station level
Bay level
Process level

Conventional
Modern (retrofit)
Modern
Intelligent (retrofit)
Intelligent

Parallel, hardwired cabling
Parallel, hardwired cabling
Parallel, hardwired cabling
Parallel, hardwired cabling

Station bus
Interbay bus
Station bus
Interbay bus
Process bus
Conventional Vs Modern Architecture

Conventional Architecture

- RTU
- NLDC
- Control panels
- Protection panels

Copper connections

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What is going on in the market?

Functional integration

- Line
- Transformer
- Busbar
- Feeder
- Control


Figures for Reference Station - 220/33kV S/S - 6nos 220kV feeders & 8 nos 33kV feeders
Conventional Vs Modern Architecture

Conventional Substation Control

**Station Level**
- Fault Recording
- Bay Control
- Bay Protection
- Busbar Protection
- SCADA RTU
- Event Recording

**Bay Level**
- For each function a dedicated device and separate kiosks
- Extensive station wide cabling

**Process Level**
- Extensive bay cabling

Local Control

GIS or AIS Switchgear

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IEC 61850
The standard in substation automation

IEC 61850
Is the first truly global standard in the electric utility field
Has been established by some 60 experts from Europe and North America
Influences other areas like wind and hydro power plants, distributed energy resources, etc.

IEC 61850 provides:
- Process-oriented data model, independent of communication technology
- Standardized description of primary and secondary apparatuses and their functionality
- Compatible data exchange between engineering tools
- Real-time capabilities for vertical and horizontal (bay-bay) communication

IEC 61850 “Communication networks and systems in substations”
Substation automation solutions
The smart way to operate your substations

SAS 600 Series station-level solutions for:
Reliable local and/or remote control and monitoring of substations at
  All voltage levels
  Any configuration
  Every size
Integration of bay-level solutions
Fully distributed functionality
Open connectivity (to remote control centers, integration of third-party IEDs)
Typical structure of a Substation
Scalable architectures

Station level
- Functions
  - Station automation
  - Monitoring
  - Fault evaluation
  - Event & alarm viewing and Acknowledgement
  - Remote communication for Telecontrol & supervision

Bay level
- Protection
- Control
- Monitoring
- Interlocking
- Data acquisition
- GIS or AIS switchgear
- Instrument transformers
- Power transformers
- Surge arresters
- Non-conventional transformers

Process level

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ABB’s station and bay level solutions

SAS 600 Series
Station level solutions
Secure local and/or remote control and monitoring of all substations

BPS 600 Series
Bay protection solutions
Flexible realization of your protection philosophy and schemes

BCS 600 Series
Bay control solutions
Optimized packages for local and remote control in MV to EHV

Future-proof systems with IEC 61850 interoperability for optimal life cycle management and low lifecycle cost
ABB Substation Automation Systems Solution
Station Level

Advanced SAS
SAS690
SAS670

Enhanced SAS
SAS650
SAS630

Basic SAS
SAS610

Components
Station HMI
MicroSCADA PRO
Gateway
COM581
COM500
RTU560
Station bus
IEC61850-8-1
Substation automation solutions – Station Level
## Substation automation solutions
### General selection guide

<table>
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<tr>
<th>Customer requirements</th>
<th>SAS 605</th>
<th>SAS 610</th>
<th>SAS 630 / 635</th>
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RTU560G-based substation automation systems  
Compact low-end solution  
Smallest distribution applications, proxy

Main characteristics
- Centralized compact DIN-rail-mountable RTU
- Focus on remote control
- Connection of I/O modules
- Supports various protocols for IED integration (IEC61850, IEC103, DNP3.0 and Modbus)

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<th>System functions</th>
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<td>Time synchronization</td>
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<tr>
<td>Basic user authority handling</td>
<td>✓</td>
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<tr>
<td>Group alarms, group signals</td>
<td>✓</td>
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<table>
<thead>
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<th>Basic monitoring and control functions</th>
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<tbody>
<tr>
<td>System supervision, alarms, events, status indications, measurements</td>
<td>✓</td>
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<tr>
<td>Remote control, monitoring and diagnostics (Gateway)</td>
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<tr>
<td>Uploading and storage of disturbance fault records</td>
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<table>
<thead>
<tr>
<th>System size</th>
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<tr>
<td>Number of bay-level IEDs (estimation)</td>
<td>1..20</td>
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<td>Max. number of data points (fix limitation)</td>
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<tr>
<td>Max. number of serial ports eg, for IEC101, IEC103, ..</td>
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<td>Max. number of Ethernet Ports eg, for IEC61850, IEC104, ...</td>
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SAS605 – flexible RTU-based solution
Distribution and sub-transmission applications

Main characteristics

Centralized RTU-based station computer
Direct I/O boards
Large number of protocols for IED integration and remote communication supported
Focus on remote control, optional basic local control

System functions
- Time synchronization
- Basic user authority handling
- Group alarms, group signals

Basic monitoring and control functions
- System supervision, alarms, events, status indications, measurements
- Remote control, monitoring and diagnostics (Gateway)
- Local control and monitoring (HMI)

Advanced monitoring and control functions
- Uploading and storage of disturbance fault records

System size
- Number of bay level IEDs: (estimation) 1..60
- Max. number of data points: (fix limitation) 5'000
- Number of remote links: 4
- Number of IEC61850 Networks: 1..3
SAS635 – flexible RTU-based solution
Distribution and sub-transmission applications

Main characteristics

- Distributed station level devices
- RTU-based gateway
- Large numbers of protocols for IED integration and remote communication supported
- Highly reliable remote control and advanced local control functionality

System functions

<table>
<thead>
<tr>
<th>Function</th>
<th>Available</th>
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<tr>
<td>Time synchronization</td>
<td>✔</td>
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<tr>
<td>Multi level user authorization handling</td>
<td>✔</td>
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<tr>
<td>Versatile language support, including operator-specific languages</td>
<td>✔</td>
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<tr>
<td>Group alarms, group signals</td>
<td>✔</td>
</tr>
<tr>
<td>Blocking list</td>
<td>✔</td>
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<tr>
<td>Zooming, panning, de-cluttering</td>
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Basic monitoring and control functions

<table>
<thead>
<tr>
<th>Function</th>
<th>Available</th>
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</thead>
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<td>System supervision, alarms, events, status indications, measurements</td>
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<tr>
<td>Remote control, monitoring and diagnostics (Gateway)</td>
<td>✔</td>
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<tr>
<td>Single line pictures and system supervision pictures</td>
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<tr>
<td>Control dialogues, select before execute for operation</td>
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Advanced monitoring and control functions

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<th>Function</th>
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<tr>
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<tr>
<td>Fault record analysis</td>
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<tr>
<td>Measurement reports</td>
<td>✔</td>
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<tr>
<td>Trends</td>
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<tr>
<td>External alarming (e-mail, short message, fax…)</td>
<td>✔</td>
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<tr>
<td>Dynamic busbar coloring</td>
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<tr>
<td>Automatic sequence control</td>
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System size

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<td>Number of bay level IEDs</td>
<td>(estimation) 1..60</td>
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<td>Max. number of data points</td>
<td>(fix limitation) 5’000</td>
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<td>Number of remote links</td>
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<tr>
<td>Number of IEC61850 Networks</td>
<td>1..3</td>
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</table>
SAS610…690 - high-end solutions
High-end solutions for a range of applications

Main characteristics

- Distributed station-level devices
- Scalable architecture and functionality (from single to fully redundant system architecture, from basic to advanced functions)
- Large systems supported (large numbers of IEDs, highest performance)
- Extremely high flexibility (functionality, communication topology)

<table>
<thead>
<tr>
<th>System Functions</th>
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<tbody>
<tr>
<td>Time synchronization</td>
<td>✓</td>
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<td>Blocking list</td>
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<td>Zooming, panning, de-cluttering</td>
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<td>Redundancy (hot stand-by)</td>
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<td>Fault record analysis</td>
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<td>Measurement reports</td>
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<td>Trends</td>
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<td>External alarming (e-mail, short message, fax…)</td>
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<tr>
<td>Dynamic busbar coloring</td>
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<td>Automatic sequence control</td>
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<td>Number of IEC61850 Networks</td>
<td>1..3 *)</td>
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</table>

*) more on request
SAS 610…690
Overview, basic functions
SAS 610...690
Overview, advanced functions
Bay Level - Protection Panel & a Modern control Panel

**BPS 6xx**
- **Line Protection**
  - Main 1 RED670
  - 87L
  - 67N
  - 79 AR
  - 25 DR
- **Line protection**
  - Main 2 REL650
  - 21 Z<
  - 67N
  - 79 AR
  - 25
  - 27 / 59

**Busbar Protection**
- 500BU02
- BBP
- BFP

**BCS 6xx**
- **Modern Bay Control**
- BCM 800
- REC650
Relion® Product Family - Positioning

Application
Functionality
Performance

670 series
650 series
630 series
615 series
610 series
605 series

Distribution
Sub-transmission
Transmission
Relion® Product Family
Actual portfolio per application

Covers all applications, from interconnected transmission grids to secondary distribution kiosks

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<th>Application</th>
<th>Type</th>
<th>670 series</th>
<th>650 series</th>
<th>630 series</th>
<th>615 series</th>
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<td>REC</td>
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<td>Line differential protection</td>
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Power Grid – Grid Automation
Local Team Support

PGGA

Sales
- Mr. Anton Bangun (Manager)
- Mr. Irwan Santoso (Key Account)
- Mr. Eko Setiawan (SAS)
- Mr. Ridzky Arya (Telcom)
- Ms. Ulil Ulya (Tech Support)

Engineering
- Mr. Moh Adil (Manager)
- Mr. Mustafa
- Mr. Insanul Azis
- Mr. Rifqi Marzuqi
- Mr. Rahmad
- Mr. M Yaqin
- Mr. Irfan

Project Management
- Mr. Hario P (Manager)
- Mr. Parlin Sihotang
- Ms. Genesia

Field Service
- Mr. M. Hanafi (Manager)
- Mr. Ayub S
- Ms. Lia
- Ms. Alfais
- Mr. Harfizuldy
Our Project References

Package 9 Jawa Region

*Kudus 150 kV S/S*
Consist of 11 Bays (8 Line Bays, 2 Transformer Bays, 1 Bus Coupler)
SAS using MicroScada Pro Software & RTU560 as Gateway

East Kalimantan

*Kayutangi 150 kV S/S*
Consist of 3 Bays (2 Line Bays, 1 Transformer Bays)
SAS using MicroScada Pro Software & RTU560 as Gateway

South Kalimantan

*Batulicin 150 kV S/S*
Consist of 3 Bays (2 Line Bays, 1 Transformer Bays)
SAS using MicroScada Pro Software & RTU560 as Gateway
Redundant SAS Server (Hot & Standby)
## Our Several Local Project References

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<th>Site</th>
<th>Location</th>
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<td>Kayutangi 150 kV</td>
<td>Kalimantan Selatan</td>
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<td>Batu Licin 150 kV</td>
<td>Kalimantan Selatan</td>
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<td>Kedung Badak, Depok, Mandirancan 150 kV (ADB)</td>
<td>Jawa Barat</td>
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<td>Pringgabaya 150 kV</td>
<td>Nusra</td>
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<td>Nguntoronadi 150 KV</td>
<td>Jawa Tengah</td>
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<td>Serang 150 kV</td>
<td>Banten</td>
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<td>Meulaboh kV</td>
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<td>Betano 150 kV</td>
<td>Timor Leste</td>
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<td>Lautan Steel 150 kV</td>
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<tr>
<td>PLTU Kaltim</td>
<td>Kalimantan Timur</td>
<td>2012</td>
</tr>
<tr>
<td>KDL Pass 150 kV</td>
<td>Jawa Barat</td>
<td>2012</td>
</tr>
<tr>
<td>Gumawang</td>
<td>Sumatra Selatan</td>
<td>2013</td>
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The next steps towards Digital Substation
Evolution of process bus

Station level
- SAS600 series of substation automation solutions with IEC 61850 station bus

Bay level
- 670 series control and protection IEDs
- REB500 Busbar Protection system
- IET600 SAS Expert Engineering & ITT600 SA Explorer to Access and monitor Applications

Process level - NCIT
- Non Conventional Instrument Transformer
  - ABB NCITs for GIS, CP-MU merging unit for ELK-CP14 and ELK-CP3 (*current* and *voltage*)
  - ABB LTB with integrated Fiber Optic Current Sensor FOCS-MU (*current* only)
Evolution of process bus

Scalable and modular I/O platform for process level installations

Make process bus available for any convention instrument transformer

9-2LE for Conventional Current and Voltage Transformer from any primary equipment vendor

Combine newest ABB FOCS technology with Conventional Instrument Transformer

Merge NCIT Current with Conventional Voltage Transformer to 9-2LE
SAM600 I/O System
Digitizing Primary signals made easy

- Modular I/O Platform for interfacing primary equipment
  - Fully IEC 61850 compliant
  - Extendable Bus architecture to chain up multiple Modules
  - Conventional current or voltage transformers (1.0)
  - High Precision Time synchronization
  - Circuit breaker, Disconnector, Earthing switches (2.0)

- Optimized form factor for Indoor and Outdoor Application
  - Bay cubicles for retrofit applications
  - Marshaling kiosks, VT terminal boxes for new or retrofit installations

- Customizable Termination for primary cabling
  - Process interface terminals are part of SAM600
  - Analog modules include binary inputs for MCB supervision and test switch indication
Power and productivity for a better world™