Distribution Automation Solution
with RTU500 series

Jose Molina | Sales Manager, Global Asset - RTU500 Series (Germany)
Agenda

Why RTUs in Distribution Automation?
Two major problems: Fault Management & Voltage control
Solution together with primary equipment
Integration of Renewables into the grid
RTU500 Series - Our offering
Contact
Distribution Automation
The Global Market Trends

Applications Challenges and Solutions
- Distributed generation resulting into new integration challenges
- Huge investment in distribution automation application
- Increasing power generation in some countries (e.g. China and India)
- Increasingly focus on expanding its industry capabilities from raw material supplier to finished goods

Automation Applications
- Utility - Secondary substation and feeder
  - Remote monitoring and control
  - Fault and outage management
  - MV and LV renewables integration
  - Battery energy storage
  - Volt/Var optimization
  - Demand response/Advanced metering infrastructure
- Industry and Infrastructure
  - Load shedding, automatic transfer switch, power quality and harmonics
  - Fault loop location and topography
RTU500 series
Intelligence distributed across your power grid

RTU500 series modules

RTU500 series functions and software

RTU650 product line

RTU540 product line

RTU520 product line

Feeder automation  Secondary distribution substations  Primary distribution substations  Transmission / sub transmission
Distribution Automation

Overview of automation

Utilities and renewable integration

- Extend automation beyond substation zone, downstream in MV and LV grid
- Ensure reliability of power energy delivery and increase efficiency utilizing integrated control and enterprise software

New automation extend automation more downstream in MV and LV grid
Distribution Automation Challenges

Fault Management/ Volt-Var management

- **Fault management**
  - Reduce outage time

- **Volt-VAr management**
  - Real-time power losses optimization

- Voltage control
- Remote control
- Fault indication
- Protection
- Line voltage regulation
- Monitoring of voltages and currents
- Voltage control
Portfolio and Application overview
Monitoring Control and Measurement

**Functions**

- Remote Monitoring and Control
- Fault detection and direction information
- Power quality
- Low voltage and medium voltage energy measurements
- Detailed power flow analysis
- Central management of security events and user accounts
- Fault Detection, Isolation and Restoration of power (FDIR)
**Portfolio and Application overview**

**System protection**

**Functions**

- Remote monitoring, control, measurement and protection
- Fault Detection, Isolation and Restoration of Power
- Low and medium voltage energy measurements with highest accuracy
- Advanced fault location information for system restoration and verification
Portfolio and Application overview
Fault management

**Functions**

- Fault Detection, Isolation and Restoration (FDIR)
- Outage management
- Real time location of earth and overcurrent faults in distribution networks
- User-friendly central management of security events and user accounts
- Workforce management

Advanced application for distribution network with standardized devices for maximum reliability and performance
Portfolio and Application overview

Fault management

Benefits

- Improved quality of service for end user
- Operational efficiency through better tools for operators and field crew
- Safety for the utility personnel through more exact fault location
- Use existing infrastructure to its full potential
- Improved operational efficiency SAIDI (System average Interruption Index), SAIFI (System Average Interruption Frequency Index)
- Single solution for fast restoration of the entire grid
Decentralized Fault Detection, Isolation and Restoration

- High reliability and reduced recovery time needed
- Automatic FDIR with fast fault detection
  - Each device participate in the Fault Analysis action,
  - independent from SCADA system
- Use IEC 61850 GOOSE to transfer the necessary information for fault isolation
- Use IEC 104 to transfer the events to SCADA System

Reduced fault investigation and patrol time
- Reducing recovery time to 15 seconds only
- Providing solution which can be easily extended

Customer challenge
Customer benefit
**Portfolio and Application overview**

**Volt-VAr management**

**Functions**
- Enhanced voltage control
- Network reconfiguration
- Grid storage
- Conservation voltage reduction (CVR)

Keeping the voltages within the limits for reduced power losses and increased grid efficiency
Portfolio and Application overview
Volt-VAr management

Benefits
- Improved quality of power supply through better voltage profiles
- Reduction of technical energy losses
- Increase network hosting capacity
- Significant improvement of voltage control
- Most efficient utilization of the distribution network
Smart automation harmonizes multiple energy sources
Integrating renewable energy with ease

Customer challenge
A new solar plant with 134 kW was installed
Result was violation of voltage limits in LV grid
Distribution transformer did not have regulation function

ABB solution
ABB’s remote terminal unit as control unit within LV-LVR
Monitoring and control function adjust line voltage

Customer benefit
Improved power quality
Avoided to spend high costs for a new transformer
Operational savings
Cyber-secure communication
Solution together with primary equipment change
Distribution Automation Solutions

**MV/LV Distribution**
- MV/LV Distr. station
  - Packaged solution for remote monitoring of a distribution substation
    - Endpoint station
    - Ring Main Units

**Main MV station - cities**
- Main MV Station
  - Cities - underground line
    - Intelligent Compact Secondary Substation

**Overhead Lines**
- Overhead lines
  - Outdoor apparatus
    - Sectos
    - Recloser
    - Outdoor CB (PVB)
Solution together with primary equipment change

Distribution Automation Solutions installation with RMU example

<table>
<thead>
<tr>
<th>Inside of enclosure</th>
<th>Inside of RMU</th>
<th>On side of RMU</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Safelink automation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Outdoor enclosure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Old application in IN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- RTU 511 (but principle could be reused again)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- CSS (metal or concrete)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Position on side</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
RiesLing - Implementation of an intelligent grid control
Predictive Load Flow based on forecasts of DER’s

Customer challenge
New challenges caused by high share of distributed energy resources (DER)
Voltage control and optimization
Implementation of automation equipment in secondary substations

ABB solution
Equipment for monitoring, voltage control and fault detection
Predictive Load Flow based on forecasts of DER’s
Topology change by remote controllable RMU via MicroSCADA Pro/ DMS600

Customer benefit
Modular, scalable solutions
Detection of bottlenecks and voltage problems in advance
Integration of Renewables into the grid
Distribution Automation Solutions

Solar Parks

- Solar plants < 30 kW
- Reduce the feed-in power in the event of imminent system overload or
- Limit the maximum feed-in to 70% of the installed power

Wind Parks

- Solar plants between 30 and 100 kW
- Reduce the infeed remotely at any time in the event of imminent system overload

Hydro power plants

- Small hydro power plants < 100 kW
- 25% of power generation from renewables by 2018

Growth on non-hydro renewables for 8%
Wind park - application example with RTU540
Thai solar plant
Energy from sun, delivered by ABB

Customer challenge
Amongst the largest installation using thin-film photovoltaic panels

<table>
<thead>
<tr>
<th>ABB solution</th>
<th>Customer benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTU (Remote Terminal Units)</td>
<td>Improve the reliability of the operation and it’s efficiency</td>
</tr>
<tr>
<td>MicroSCADA Pro</td>
<td>Disturbances to be quickly identified</td>
</tr>
<tr>
<td>Meteorological sensors collect and combine information with the power being generated</td>
<td>Live updates to the national grid</td>
</tr>
</tbody>
</table>
RTU500 series
Cyber security

New features

- Secure the communication by encryption in the complete application
  - Secure IEC870-5-104
  - Support of customer certificates
- Unauthorized access to network prevented, protect the SCADA system
  - Secure authentication IEEE802.1X
  - Integrated self configurable firewall
- Maintain and Monitor by using SDM600 in the RTU560
  - Backup and recover configuration and firmware files remotely
  - Centralized cyber security logging

Overview and Benefits

1) Requires RTU500 Release 12 and SDM600 1.2
**RTU500 series**

Unique integrated test function

**Traditional testing approach**

- Complex
- Time consuming
- High operational costs

**With integrated test function**

- Easy & Safe testing environment
- Additional hardware no longer required
- Automatically generated Test reports
- Significant cost reduction during engineering, testing, commissioning, FAT, SAT processes
RTU500 series
New WEB server

User centric approach to improve usability for untrained users

Feature
- State of the art technology is used (HTML5 based)
- Guided workflows
- Multi language support

Benefits
- Improved usability
- Simplification of user interface
- Future open and harmonized solution
**RTU520**

Highly efficient engineering for bulk distribution application

**New engineering approach**

Clear split between
- engineering (pre engineered solution) and
- final configuration (change of local parameters)

Benefit
- Simple adaptation of typical solution to local conditions without special know-how
- Also possible from Remote
- Saves costs during project execution
## RTU500 series applications

Intelligence distributed across your power grid

<table>
<thead>
<tr>
<th>RTU500 series modules</th>
<th>RTU500 series functions and software</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feeder automation</td>
<td>Secondary distribution substations</td>
</tr>
<tr>
<td></td>
<td>Primary distribution substations</td>
</tr>
<tr>
<td></td>
<td>Transmission / sub transmission</td>
</tr>
</tbody>
</table>

- **RTU560 product line**
- **RTU540 product line**
- **RTU520 product line**
Portfolio and Application overview

The offering

**Products**
All the essential distribution automation elements from high voltage to low voltage exist to meet the challenges

**Engineered packages**
Primary, secondary and communication equipment packaged together and factory tested

**Turnkey Systems**
Complete and coherent solution from automation, electrical distribution to grid connection
Service team to support planning, engineering, project, commissioning and maintenance
RTU500 series a strong partner

More than 100,000 installed RTUs spread over more than 100 countries active portfolio since 45 years

World market leader in medium and large RTU applications

More than 2,000 customers buy around 10,000 RTUs per year.

More than 100,000 installed RTUs spread over more than 100 countries active portfolio since 45 years
Distribution Automation Solutions with RTU500 Series

Jose E. Molina L.
Sales Manager
Global Asset – RTU500 Series Factory
Mannheim – Germany

E-Mail: jose.molina@de.abb.com
Mobile: +49 171 2271292
**Benefits**

- Use existing infrastructure to its full potential
- Accurate awareness of the status of the distribution network
- Improved operational efficiency (SAIDI (System average Interruption Index), SAIFI (System Average Interruption Frequency Index))
- Minimizing the outage time
- Reduction of non-technical losses
**Portfolio and Application overview**

**System protection**

**Benefits**

- Improved safety for the utility personnel through exact fault location
- Minimization of the amount of energy not supplied
- Reduced number of outages in the event of faults
- Outages limited to a restricted part of the distribution
What is important for your business?
Distribution Automation Solutions

- Reduce outage time
- Existing Automation
- Voltage Control

Bundle with primary equipment
Integration of Renewables
Flexible and ready to use solution
Seamless integration of renewables in a higher control system

Customer challenge
- Monitoring and control of renewable sources
- Secured communications

ABB solution
- Engineered packages with GPRS communication and connection to SCADA

Customer benefit
- Better grid visibility
- Cyber-secured communication
- Scalable and flexible solution
Sundom Smart Grid - Sustainable energy solutions integration
Enhance reliability of overhead lines with grid automation

Customer challenge
- Enable integration of renewable sources
- Enhance distribution reliability and efficiency
- Reduce the need for infrastructure investments

ABB solution
- Automatic FDIR with fast reclosing shorten average fault duration and frequency
- Reclosers provide protection of cable networks from faults in overhead lines

Customer benefit
- Less outages
- Shorter duration
- Boosted customers satisfaction
- Less penalties