II JORNADAS TECNICAS - ABB EN PERU, 6 DE ABRIL 2017

Distribution Automation Solution

with RTU500 series

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Agenda

Distribution Automation, Trends and Challenges?

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
- Need to deal with new protection and automation phenomena whilst maximizing efficiency
- Huge investment in distribution automation application
- Increasing power generation in some countries (e.g. China and India)
- Middle East has been increasingly focusing on expanding its industry capabilities from raw material supplier to finished goods
- Huge challenges for complete ABB Grid Automation value chain, from product through to turnkey automation systems

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

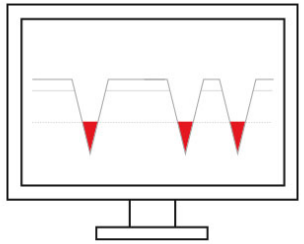
Industry and Infrastructure

- Load shedding, automatic transfer switch, power quality and harmonics
- Fault loop location and topography

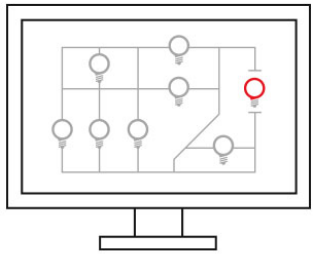
What is important for your business?

Distribution Automation Solutions

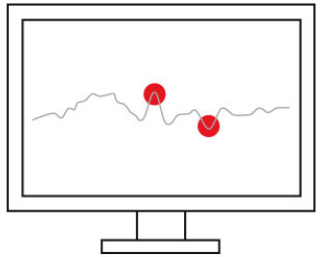
Reduce outage time



Existing Automation



Voltage Control



Bundle with primary equipment

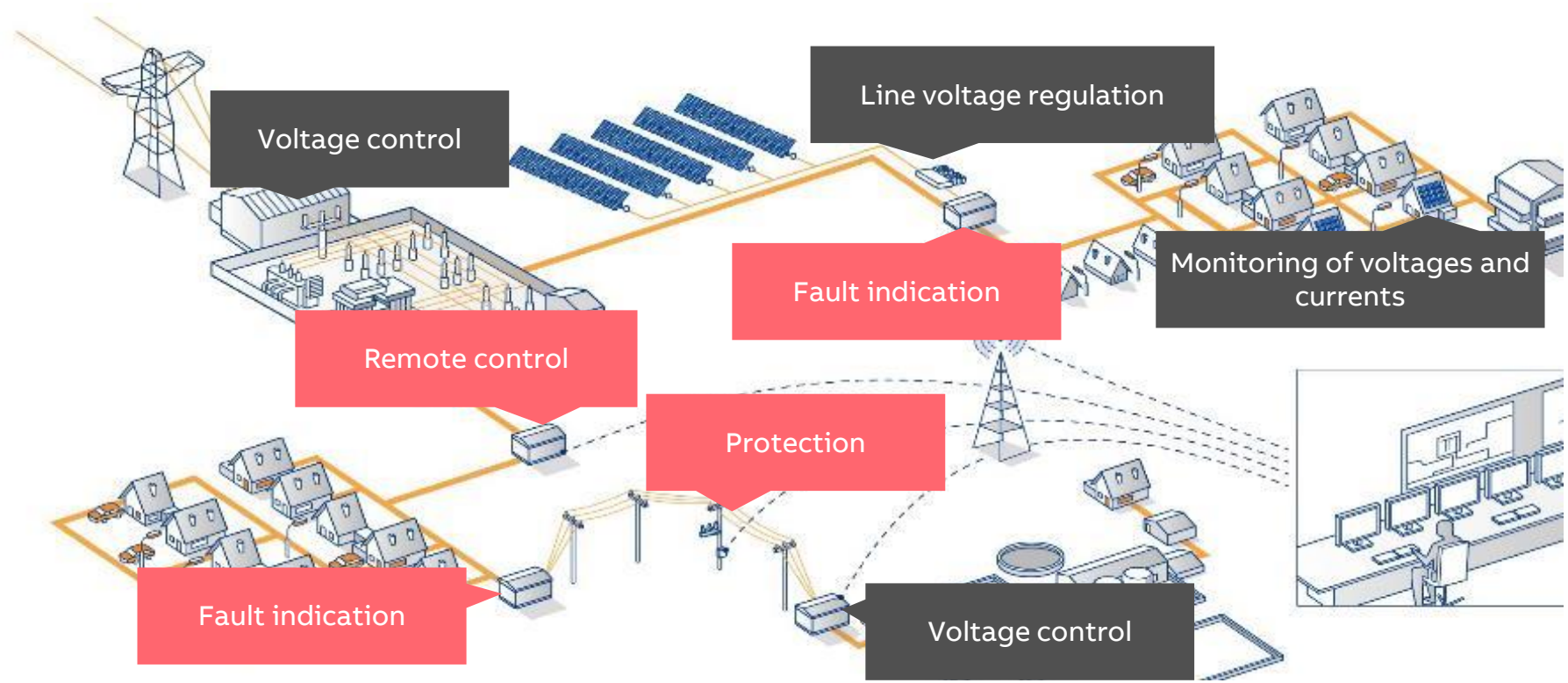
Integration of Renewables

Distribution Automation market

Utilities - Applications

Fault management
Reduce outage time

Volt-VAr management
Real-time power losses optimization

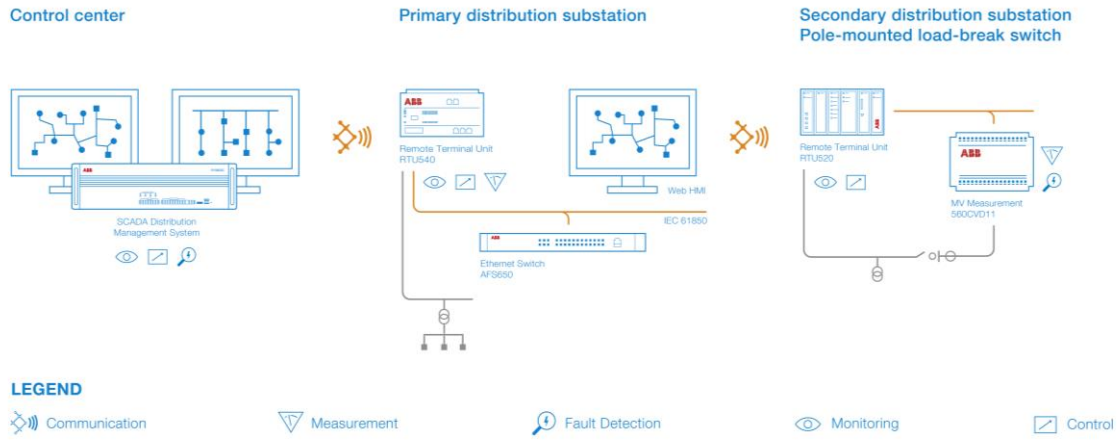


Portfolio and Application overview

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)

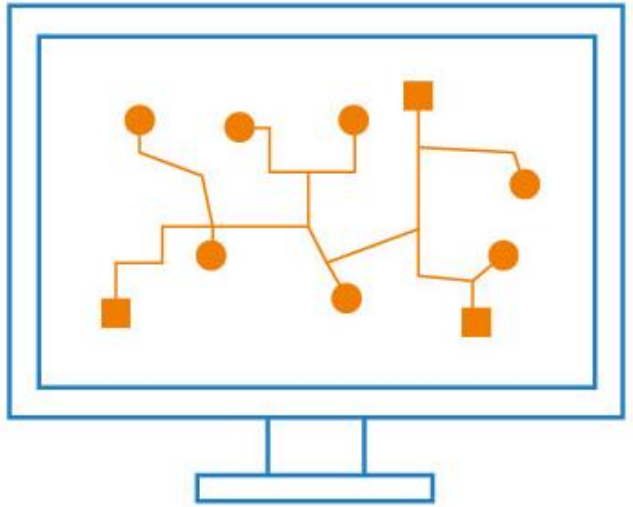


Portfolio and Application overview

Monitoring Control and Measurement

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

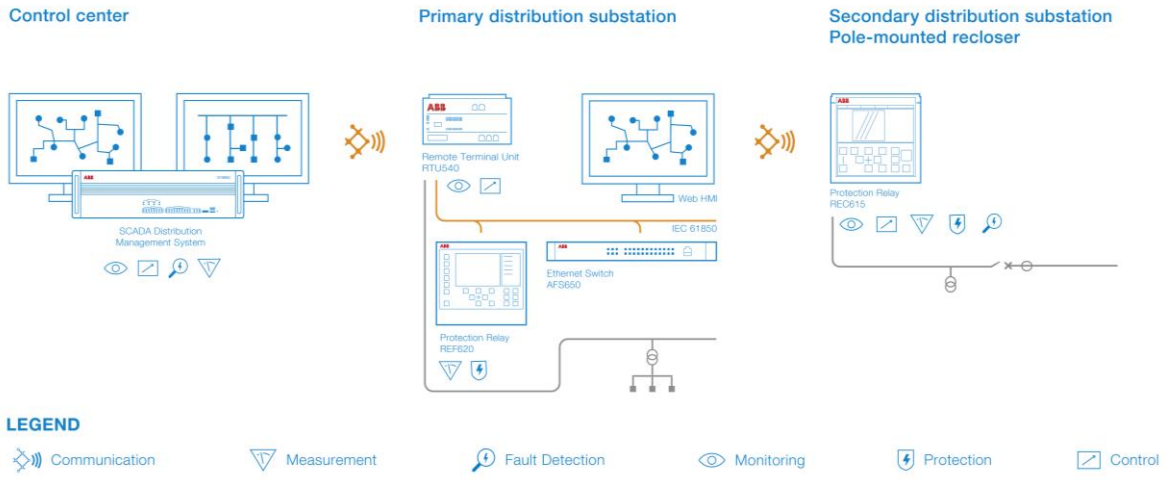


Portfolio and Application overview

System protection

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

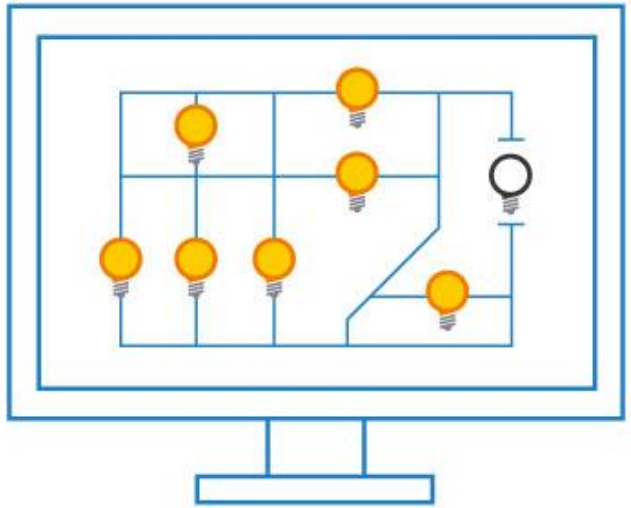


Portfolio and Application overview

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

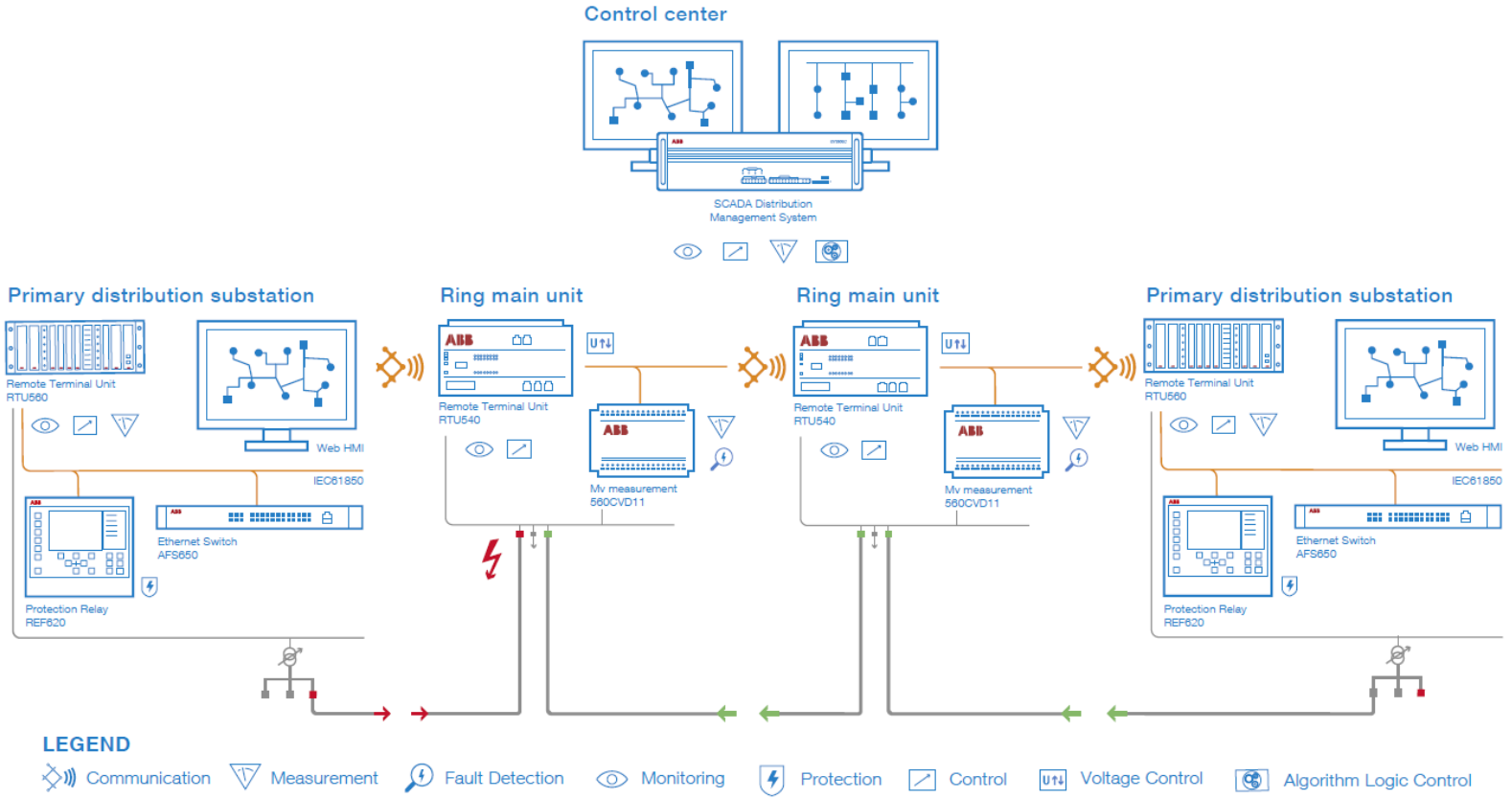


Portfolio and Application overview

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



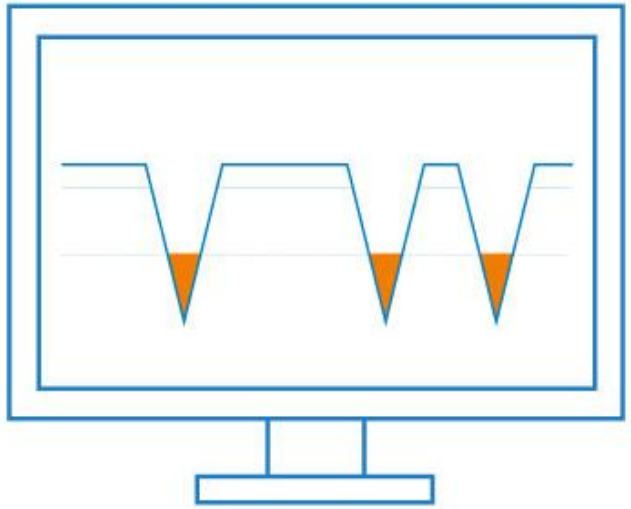
Advanced application for distribution network with standardized devices for maximum reliability and performance

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

Pudong Smart City

Customer challenge

High reliability and reduced recovery time needed

ABB solution

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

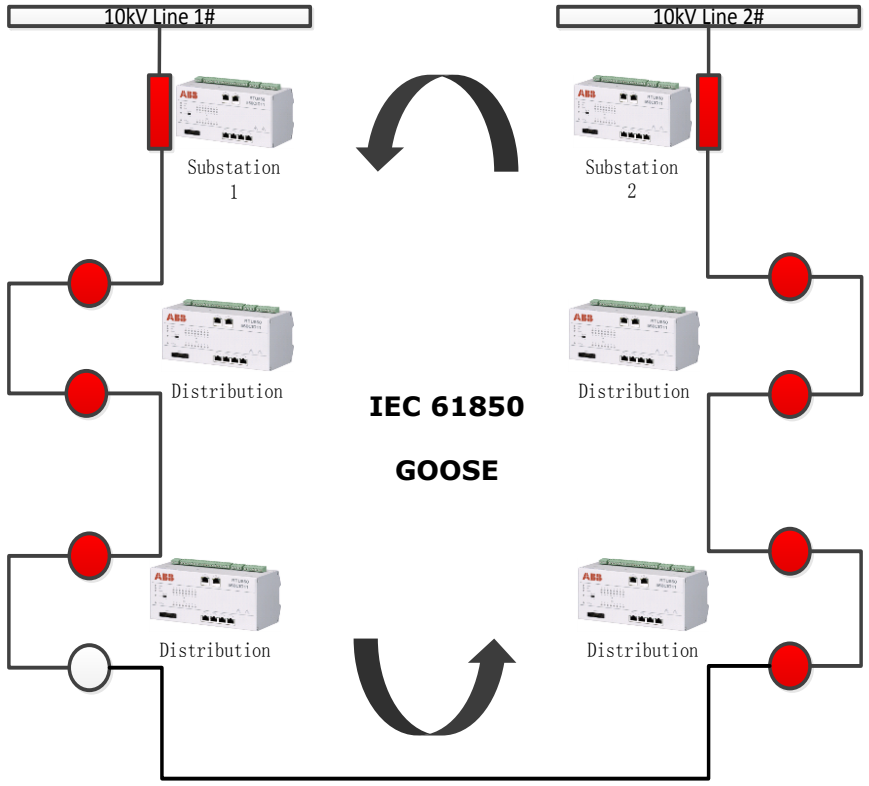
Use IEC 104 to transfer the events to SCADA System

Customer benefit

Reduced fault investigation and patrol time

Reduce the recovery time to 15 seconds only

Providing solution which can be easily extended

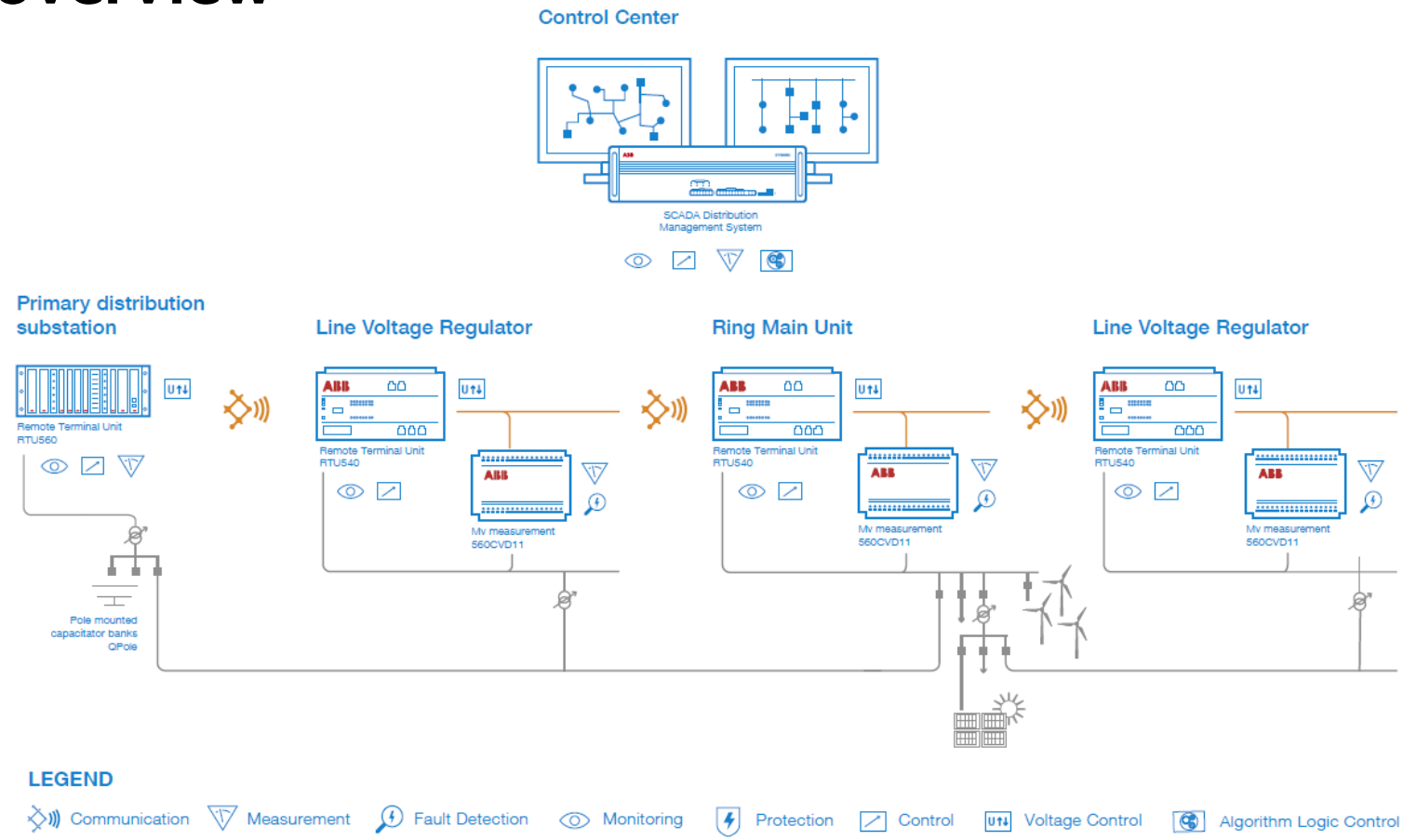


Portfolio and Application overview

Volt-VAr management

Functions

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



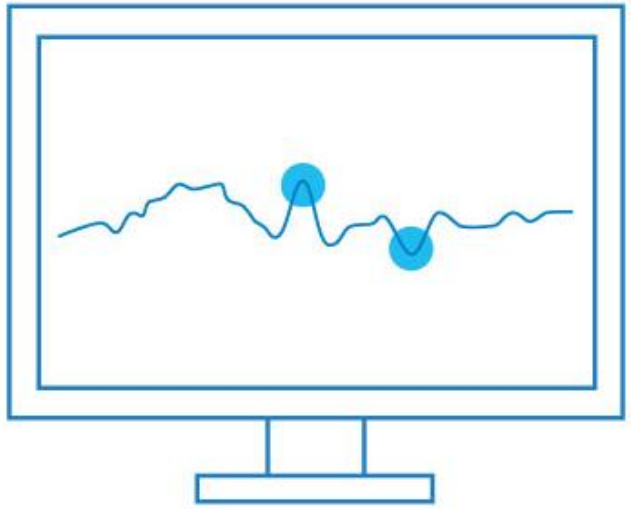
Keeping the voltages within the limits for reduced power losses and increased grid efficiency

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



BKW, Switzerland

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

Inside of encloser

– Safelink automation
– Outdoor enclousure

Inside of RMU

- Old aplication in IN
- RTU 511 (but princple could be reuse again)

On side of RMU

- CSS (metal or concrete)
- Position on side

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 P 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

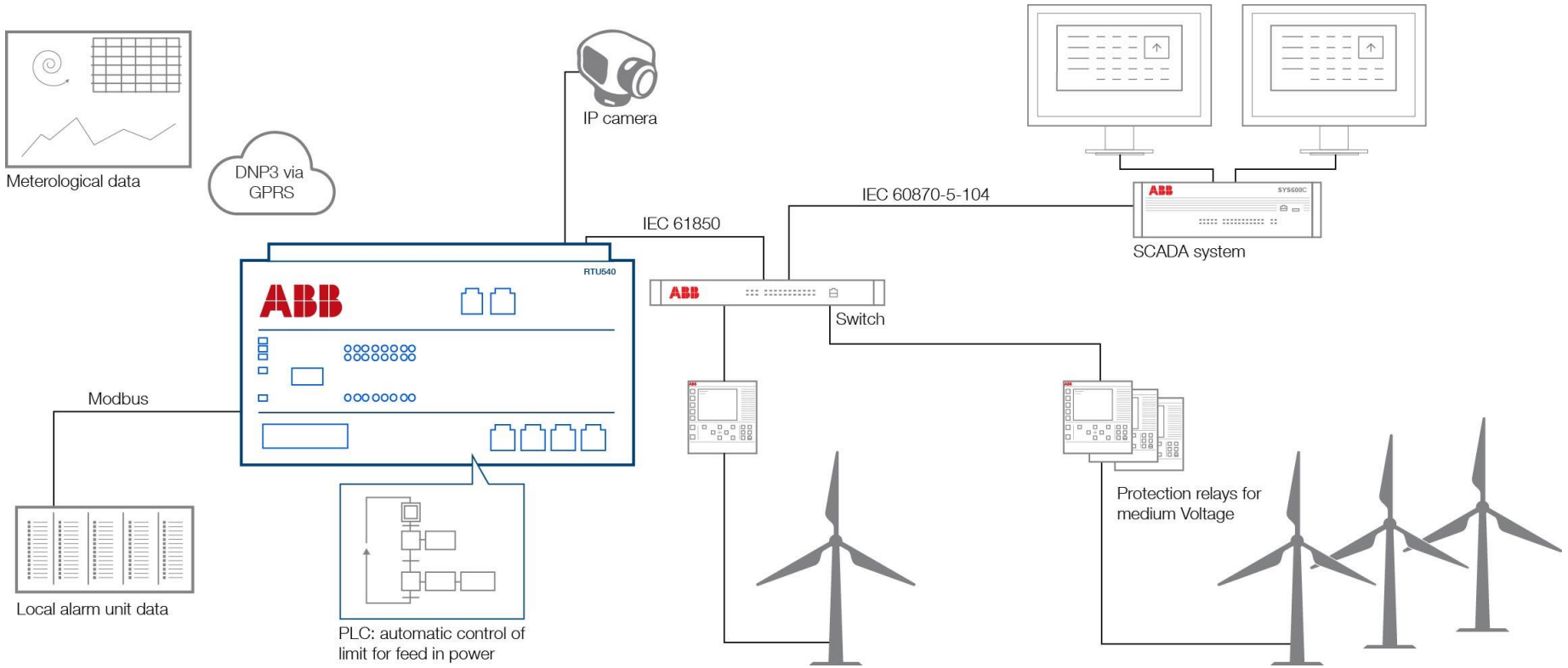
Hydro power plants

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

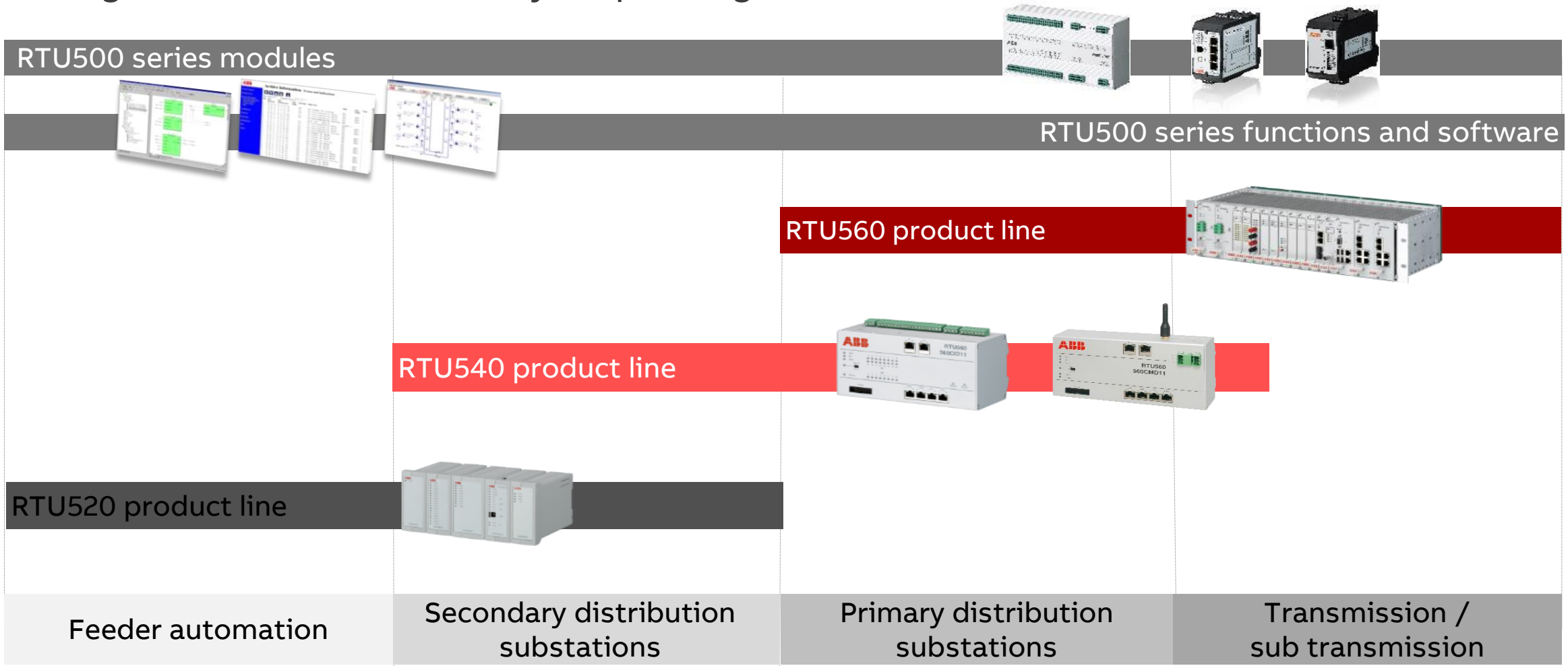
Energy from sun, delivered by ABB

Customer challenge	Amongst the largest installation using thin-film photovoltaic panels
ABB solution	RTU (Remote Terminal Units) MicroSCADA Pro Meteorological sensors collect and combine information with the power being generated Live updates to the national grid
Customer benefit	Improve the reliability of the operation and it's efficiency Disturbances to be quickly identified

Lopburi solar plant in Thailand

RTU500 series applications

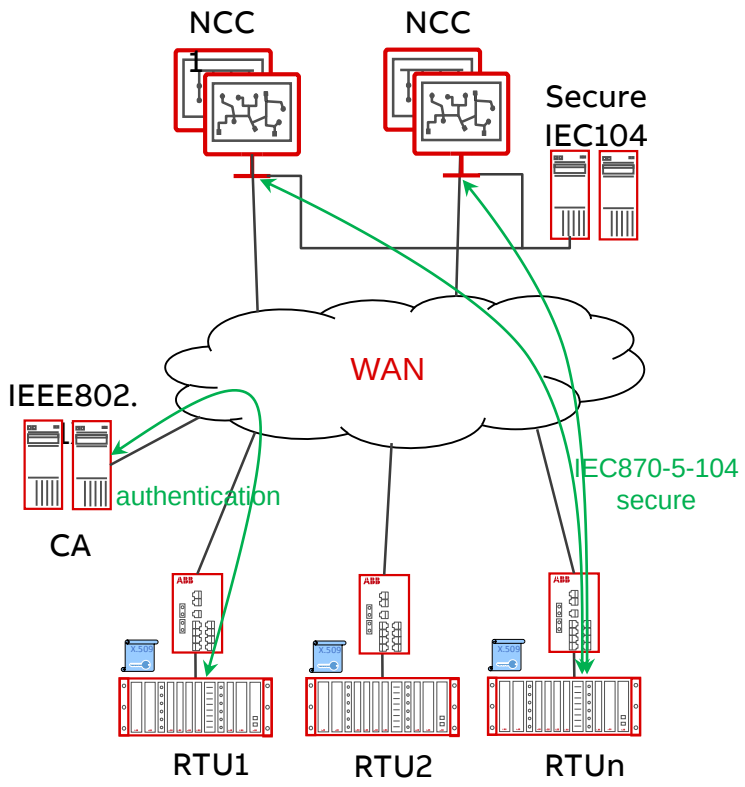
Intelligence distributed across your power grid



RTU500 series

Cyber security

New features



Overview and Benefits

- 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 [1)]
  - Centralized cyber security logging

[1)] Requires RTU500 Release 12 and SDM600 1.2

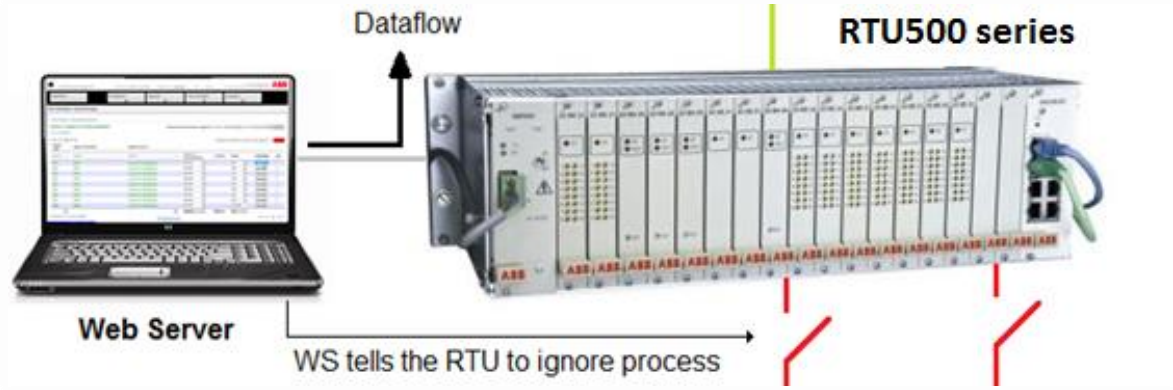
RTU500 series

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

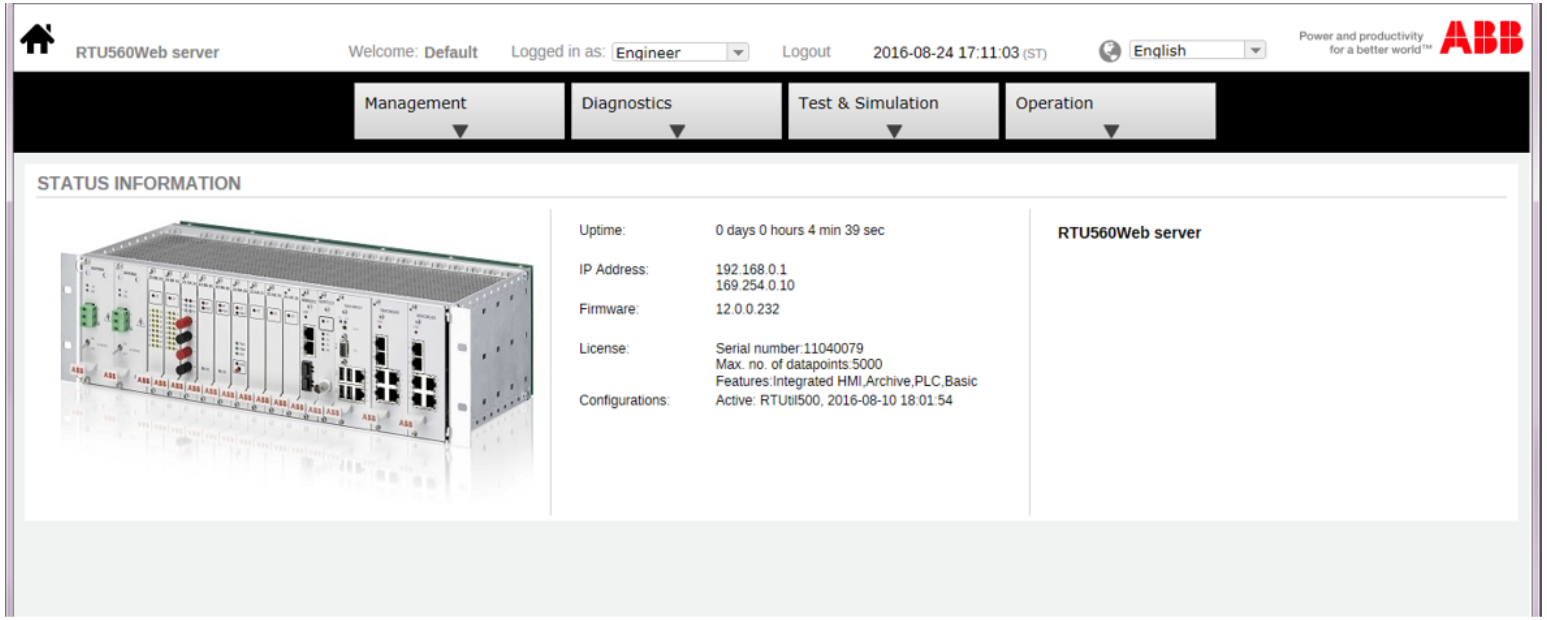
User centric approach to improve usability for untrained users

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

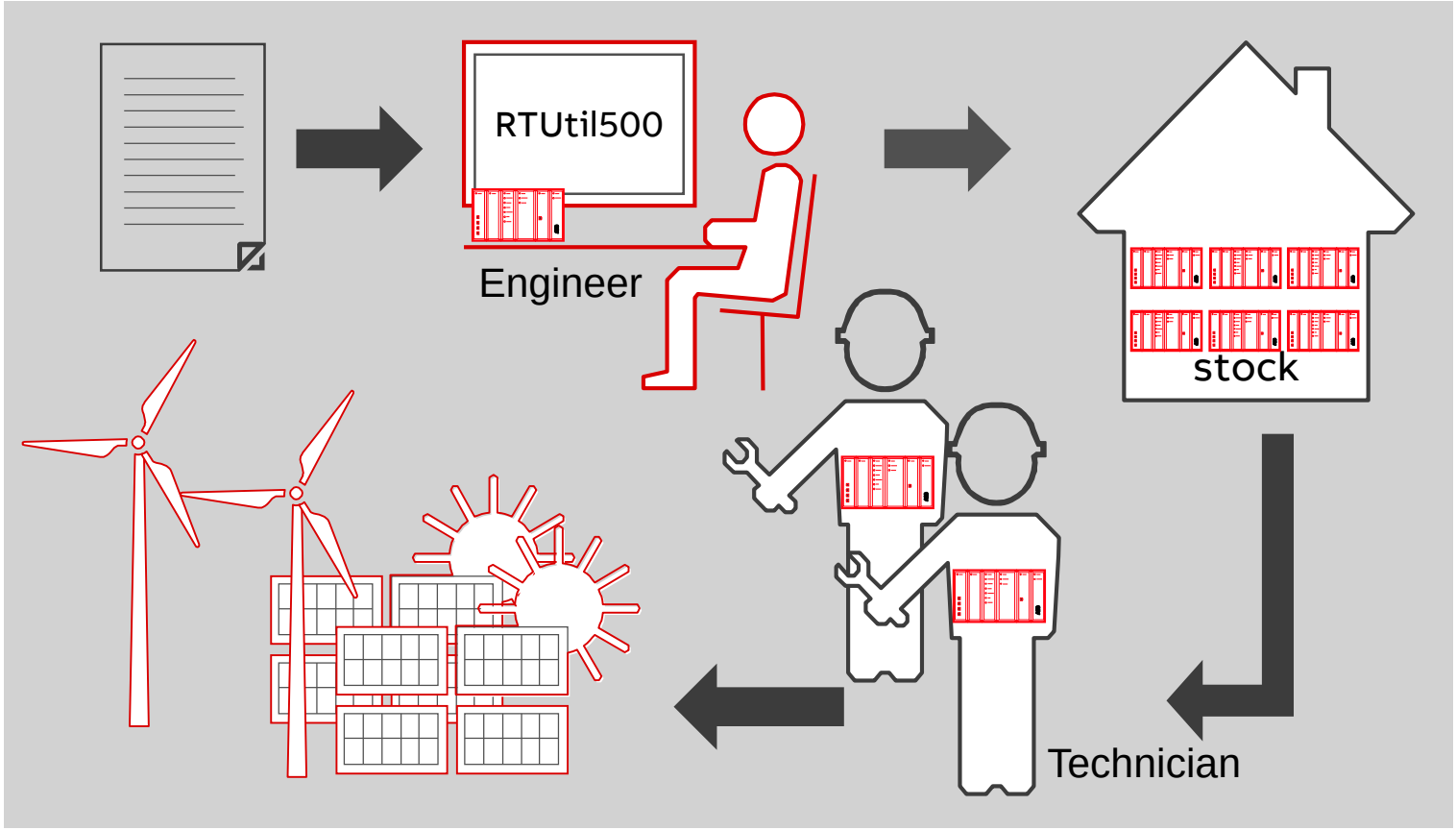
New engineering approach

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



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

Trunkey Systems

Complete and coherent solution from automation, electrical distribution to grid connection

Service team to support planning, engineering, project, commissioning and maintenance

Distribution Automation Solutions with RTU500 Series

Questions

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Flexible and ready to use solution

Stadtwerke Lindau, Kraftwerke Mainz – Wiesbaden, RWW and MVV, Germany

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 and protection of cable networks from faults in overhead lines

Customer benefit

Less outages
Shorter duration
Boosted customers satisfaction
Less penalties

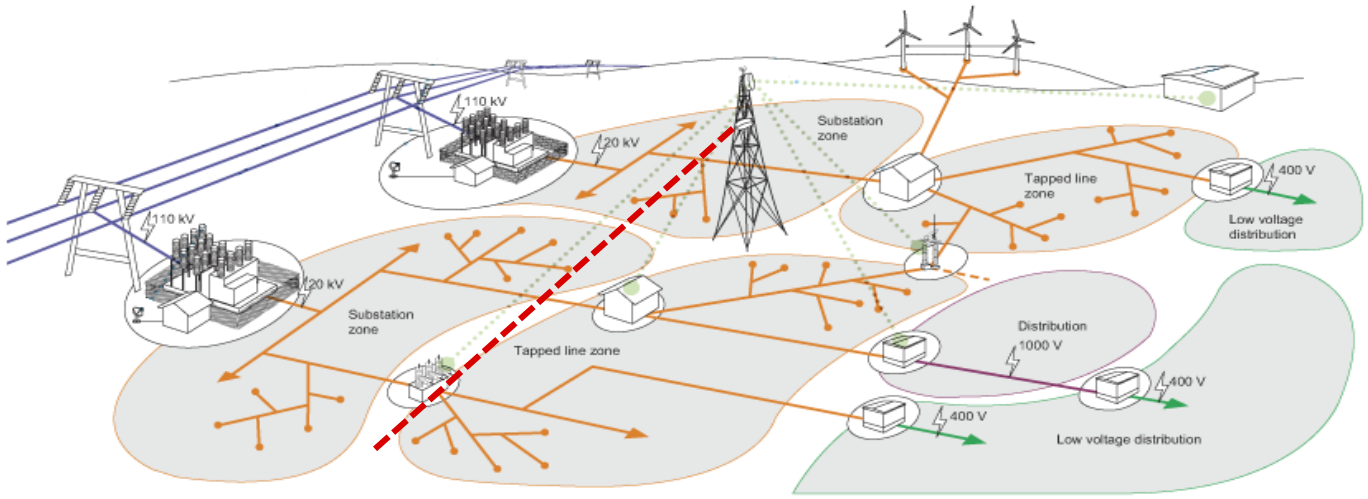
Distribution Automation

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