Distribution Automation / Self-Healing Competence Center

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Distribution Automation / Self Healing Competence Center
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Selfhealing Grid - HEP ODS Elektra Koprivnica

Challenges
• Reduce outages, 50 km of overhead line with plenty of faults
• Terrain configuration – communication solution
• First self-healing grid pilot project, based on decentralized system architecture and wireless communication – limited experience

Solution
• 4 reclosers with controllers
• Wireless communication
• Advanced automation system based on IEC 61850 protocol
• Advanced adaptive protection scheme

Benefits
• Increased system reliability
• Better SAIFI and SAIDI factor
• High-speed reconfiguration < 300ms
• Integration in existing system
Self-healing Grid Koprivnica Solution

- Siemens 3AD Recloser + 7SC80 controller
- Decentralized architecture
- 2 communication protocols in same time (7SC80):
  - IEC 61850 GOOSE - Fault detection, isolation and power restoration < 300ms
  - IEC60870-5-104 - vertical communication to control center
- Advanced protection functions (jDiff, adaptive protection)
- Local engineering and local partners
Self-healing grid Koprivnica - solution

- FLISR - Fault location, isolation and service restoration
- ATS - Automatic transfer source

<table>
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<tr>
<th>Location</th>
<th>Fault detection</th>
<th>Isolation</th>
<th>Reconfiguration</th>
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IEC 61850-GOOSE

Recloser

<300ms
Adaptive protection 1

- Jump differential (jDiff)
- Selectivity and protection coordination – predefined scenarios

Figure 5 - Jump Differential detector

Figure 1 - OHL with communication
Adaptive protection 2

- Jump differential (jDiff)
- Selectivity and protection coordination – pre-defined scenarios
Communication solution

- Preliminary planning was needed due to difficult terrain
- Telecommunication pole 70m height – to achieve direct optical visibility
- Microwave radio equipment, frequency range 5.4 GHz
- Point-to-point and point-to-multipoint links
- Testing on all locations to ensure that links have enough:
  - Throughput 25 Mbit/s
  - High reliability (≥99.99%)
  - Low latency
- Antennas are located at 8m height on poles
Pre-commissioning period

Factory visit, Berlin
Vacuum recloser cut-out

Simulation in test lab, Nurnberg and Zagreb

Factory test of complete solution, Zagreb
Commissioning period

Instalation period of 3AD recloser RC2

3AD Recloser and Communication antena

Signal testing and energizing of 3AD recloser 1 (Master)
Secondary Distribution Automation
Intelligent Ring Main Unit

Motor Control Unit, electronic control for switching devices in 8DJH

Low-power voltage transformer for SICAM FCM acc. to IEC 61869-7, 3.25V/√3 @ Ur max. 24kV

Low-power current transformer for SICAM FCM acc. to IEC 61869-8, 225mV @ 300A

Monitor for supervision of the distribution grid SICAM FCM (Feeder Condition Monitor)

Smart Grid RTU SICAM A8000 for automation of distribution grids
RC-HR Siemens d.d.
Center of Competence
Self Optimizing Grid
Sales and engineering competencies

• Siemens RC-HR regional competence center for consulting on delivering SDA projects, namely the decentralized solution
• Local engineering know-how and SDA expertise
  o We know the tools
  o We can test the solution – with IEC61850 and GOOSE communication
  o We can test the application
• Training and engineering support for the opportunities from Siemens local organization and their VAR partners
• Fully equipped lab/test facilities
• And proven experience (SDA project references) from the bidding phase to the delivery
Self Optimizing Grid - CoC
Regional and customer support

- SDA RC-HR Lab for testing and engineering
- Training on SW tools (e.g. FASE, DIGSI, DM, etc.)
- Pre-engineering and FAT support
- Simulation tools / demos
Thank you for attention!

Contact information

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