Automating Networks - Improving Grid Reliability

MicroSCADA Pro
Topics to cover

- **Product portfolio and applications**
  - Substations Automation
  - Network Automation
- Historian reporting
- Cyber security
- References and case installations
MicroSCADA Pro – Product Portfolio

- **Control System - SYS 600**
  - The software product for demanding applications
  - Gateways and Interfaces
  - Control of power systems
  - HMI for complete process overview

- **Compact System - SYS 600C**
  - SYS 600 software preinstalled into a solid state computer
  - Perfect fit for harsh environment
  - Low maintenance needs

- **Distribution Management System - DMS 600**
  - Geographical distribution network presented with background maps
  - Enables efficient network management
MicroSCADA Pro
Control System - SYS 600

- The Control System is used in and as
  - Substation Automation and Communication Gateway
    - Interface to Process IEDs and upper level systems
  - Network Automation (SCADA)
    - Network Control system, managing up to hundreds of stations
    - Data collector and Interface to DMS and other systems
  - System and Communication Server in large systems

[Image of control system interface]
[Image of control system hardware]
MicroSCADA Pro
Control System - SYS 600

- Communication is in it …
  - IEC 61850, 60870-5-101/104, Modbus, …
  - Master and slave prot.

- Interfaces for integration to other systems
  - ODBC, OPC Server and Client interfaces, API, …

- Historical data
  - Flexible in data storing and displaying
MicroSCADA Pro
PRP and HSR redundancy protocols

- Parallel redundancy protocol (PRP) is based on parallel redundant networks without any interlinks

- High availability seamless redundancy (HSR) protocol is based on ring topology
- Overcomes failure of a link or switch with zero-switchover time
- Secures critical communication between devices
MicroSCADA Pro
SYS 600 - Historian

- Storing of all process data for long periods (years)
- Measurement reports and statistics are easily produced
  - Fault and load analysis
  - Refine data into meaningful information
  - Visualized in form of various graphs, trends and numerical reports
- Full flexibility in system design
  - One Historian server can handle several system servers
  - Data can be transferred from one System server to several Historian servers
MicroSCADA Pro
Compact System SYS 600C

- Solid state hardware
  - Robust design for harsh environments (IP40)
  - No moving parts
  - Rack mounted with option for redundant power supplies
  - Large number of communication ports
  - Support for redundant servers

- Benefits
  - Optimized and hardened at the factory
  - System sizes ranging from tens to thousands of data points
  - Flexible system configurations
  - Reduces maintenance needs
MicroSCADA Pro
Compact System SYS 600C

- SSD disk, 32 or 64 GB with significantly read/write speed
- Application whitelisting option for enhanced cyber security and robustness
- Preconfigured Windows users with role based access rights
- Alarm contact for power supply supervision
MicroSCADA Pro
Leading Distribution Management System - DMS 600

- Enables efficient distribution network management
- Outages and their durations minimized (SAIDI, SAIFI)
- Geographical network presented with background maps
- Monitoring and controlling based on real-time process information
  - Event analysis and fault location
  - FLIR (location, isolation, restoration)
  - Maintenance outage planning
  - Field crew management
  - Outage reporting
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Applications in the power network

○ Substation Automation  ○ Infrastructure  ○ Power Plants  ○ Smart Grid
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Distribution Management System – DMS 600
MicroSCADA Pro
…in Network Automation and its components
MicroSCADA Pro

DMS Interfaces to other systems

CIS
Customer Information System

NIS
Network Information System

OMS
Operation Management System

AMM
Automatic Mater Management

DMS
Distribution Management System

AM
Asset Management

Authority
Police, Fire Service Regulators

Customer Info
Web pages, SMS

DMS Interfaces to other systems:
- CIM XML
- .csv-file
- KML
- Database replication

DMS

IEC 61968-9 WebService

IEC101/104

Call Center

Customer

SCADA
ABB SCADA or 3rd party SCADA

History

Work Management

Database replication

OPC DA
MicroSCADA Pro
Network Automation savings - Case

- Reduced outage times
  - Reduced amount of undelivered energy (money)
- Improved power quality
- Lower maintenance costs
  - Scheduled and planned maintenance outages
- Satisfied customers

![Graph showing restoration times with and without Network Automation]
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MicroSCADA Pro
SYS 600 Historian application opportunities

- High capacity data logging
  - Event based logging – don’t miss fast transients
  - Consolidation of data from several systems
- Flexible Reporting and Trending
  - Customizable templates and displays
  - Operator controlled reports and trends
    - Drag & drop of variables to displays for easy data analysis
Historian Displays can be launched from SCADA HMI.

The Display can be opened to display only one specific trend or with full workplace.

ABB
Historian Architecture

- The Historian is typically deployed in a dedicated server
- Communication over LAN with dedicated protocol
- Integration with System Server is possible for light usage
MicroSCADA Pro

Topics to cover

- Product portfolio and applications
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- Historian reporting
- **Cyber security**
- References and case installations
Cyber Security

What is cyber security?

*Measures taken to protect an automation system against unauthorized access or attack*
Cyber security
Why is cyber security an issue?

- Cyber security has become an issue by introducing Ethernet (TCP/IP) based communication protocols to industrial automation and control systems.
- Connections to and from external networks to industrial automation and control systems have opened systems and can be misused for cyber attacks.
- Cyber attacks on industrial automation and control systems are real and increasing, leading to large financial losses.
- Utilities need to avoid liability due to non-compliance with regulatory directives or industry best practices.
Cyber security
What are the threats?

Targets
- Personal computer
- Control Systems

Threats
- Hacking
- Malicious software
- Mistakes
ABB’s cyber security initiatives
Security organization and involvement

- Customer needs
  - High level of security for all products & solutions
  - Fast response time and reliable partner in case of a cyber security alert

- ABB’s solution
  - ABB established a global, cross-functional cyber security organization many years ago
  - Security is fully integrated to all process areas
    - Security assessment and robustness testing
    - Patch management
    - Vulnerability Handling
    - Actively participation in security standard committees
We have a Cyber Security Patch verification process in place

- Patch compatibility report published every month
- List of allowed IP addresses (IEC 104)
- Cyber security has been further enhanced by introducing DNP secure authentication (v2)
- Windows security policy script and updated cyber security deployment guideline including application whitelisting
- Configuration guides for McAfee and Symantec EndPoint Protection are available.
- We can provide Cyber Security services for customers
MicroSCADA Pro
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## MicroSCADA Pro Installations worldwide

<table>
<thead>
<tr>
<th>Country</th>
<th>ABB solution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Colombia</strong>:</td>
<td>• Redundant SYS 600C computers, double workplaces, integrated gateway functionality</td>
</tr>
<tr>
<td>Substation Automation project</td>
<td>• IEDs connected over a redundant IEC 61850 network and DNP 3.0. The remote connection to the upper level dispatch center is using IEC 60870-5-104.</td>
</tr>
<tr>
<td>(8000nd MicroSCADA Pro license)</td>
<td></td>
</tr>
<tr>
<td><strong>Abu Dhabi</strong>:</td>
<td>• Etihad Towers is a complex of 5 towers (apartments, commercial center, offices, hotel).</td>
</tr>
<tr>
<td>Etihad Towers</td>
<td>• MicroSCADA Pro offers an optimal solution for such complex projects. Features of both MicroSCADA Pro and RTU560 are stretched to significant limits, programming the 125 load shedding sequences.</td>
</tr>
<tr>
<td><strong>India</strong>:</td>
<td>• Delhi’s metro system has 213 km of track and 148 stations along elevated and underground sections.</td>
</tr>
<tr>
<td>Delhi metro, traction, power distribution SCADA</td>
<td>• The SCADA system based on MicroSCADA Pro monitors and controls the metro network, connecting the stations - as well as the receiving and traction substations – to a central and backup control center.</td>
</tr>
</tbody>
</table>
Customer need

- Reliable Centralized/Distributed DMS
- Open system, easy connections for various SCADAs, good horizontal integration to Graphical Information System (GIS)/Customer Information System (CIS)

ABB response

- Distribution Management System (DMS 600) with wide functionality
- Distributed/Centralized structure
- Interfaces to NIS and 3rd party SCADA

Customer benefits

- Flexible operation from several locations
- Excellent overall view for network management
- Increased power supply reliability
- Smart Grid
Customer need

- Improved distribution network reliability in the four cities (Danang, Hue, Qui Nhon and BuonMa Thout)
- Project financing

ABB response

- MicroSCADA Pro SYS 600 based SCADA system with DMS 600
- RTUs in primary and secondary substations
- Arrangement of concessional credit financing

Customer benefits

- Less and shorter power distribution interruptions through enhanced supervision and control
- Project financing cost reduction
- Smart Grid
Customer need

- Electrical Network Monitoring and Control (ENMC) System for the mall (Small SCADA system)
- Bahrain City Centre Mall is a large scale retail and leisure complex in Manama

ABB response

- Redundant MSPro System Servers with LAN and fiber connections to substation RTU’s
- RTU’s in the substations, communicating with energy meters and protection relays
- Automated control sequences for Load Shedding

Customer benefits

- Fault tolerant system (redundancy)
- Scalability, easy to expand
- Smart Grid
Power Management Control System for a building
Burj Khalifa Tower Project

Customer need
- Power Monitoring and Control System for world’s tallest building
- Monitoring of Loads, Indicating Faults, Events and Alarms

ABB response
- MicroSCADA with RTU560
- OPC Link to other Systems
- Presentation of Single line diagrams, alarm and event list, Measurement Reports in MicroSCADA

Customer benefits
- Fault tolerant system (redundancy)
- Possibilities to collect data from a wide range of third party equipments
- Scalability, easy to expand
Energy Management System (EMS)
Etihad Towers, Abu Dhabi, United Arab Emirates

Customer need
- Etihad Towers is a complex of 5 towers (apartments, commercial center, offices, hotel).

ABB Response
- ABB’s MicroSCADA Pro products are an optimal solution for such complex project. Features of both MicroSCADA and RTU 560 are stretched to significant limits, programming the 125 shedding sequences.

Customer Benefits
- Reliable and secured power supply
Power SCADA for Bangkok Skytrain

Customer: BTS
Bangkok Mass Transit System Thailand
Year of commissioning: 2009

Customer need
- Power SCADA replacement and extension of existing equipment
- Scalability, hierarchical architecture and openness at all level

ABB response
- MicroSCADA Pro HSB System servers, workstations and peripherals
- RTU560 multi processor architecture and redundancy for IEC60870-5-104.
- Gateway to Siemens RTUs and signaling System via ELCOM 90

Customer benefits
- Future proof and flexible expandability
- Guaranteed system lifetime support
- Secure investment
Customer need
- Higher-than-average reliability demands for power distribution
- Centralized supervision and control, including eight (8) 400-900kVA Emergency Power Generators

ABB response
- MicroSCADA Pro HSB System, SPACOM protection relays
- IEC 61850 implementation
- Supervision and control for 40 primary-and secondary substations

Customer benefits
- Less and shorter interruptions
- High functionality through a maximum level of IED integration
- Secured power supply

Customer: Finavia
Year of commissioning: Upgraded in 2007 and 2008

SCADA for airport application

Helsinki-Vantaa Airport 110/20kV
Optimization of harbour lighting
Vuosaari Harbor

Customer’s need
- Need for optimal and efficient lighting in the harbor area
- All lights not needed all the time
  - 3 light groups
  - Fog sensors
  - Time based control
- The foggy harbor need the optimal lighting in different times of the day

ABB response
- MicroSCADA Pro based control and monitoring system
- Fog sensors, removing diverse light groups
- Time based control

Customer benefits
- Optimal lighting in the harbor
- Energy consumption monitored and reported in the MicroSCADA Pro system
- Smart Harbor
Lopburi Solar Plant Project
Distributed power generation

Customer’s need
- Substation Automation System to protect and monitor the overall solar power plant
- Communication to the grid

ABB’s response
- MicroSCADA Pro based monitoring and control system for the complete electrical installation in the solar power plant
- Provide data to connect with utilities regulation, EGAT

Customer’s benefits
- Substation reliability improvement
- Information available both local and remote
- Reduced maintenance cost via supervision function of secondary and primary equipment
- Shorten shutdown times
MicroSCADA Pro

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MicroSCADA Pro
Summary

- Scalable from Substation Automation system to SCADA/DMS level

- Secure and open communication and integration possibilities

- Secure system with superior overview and manageability of whole power distribution network

- Brings you Improved quality of the power network
  - Advanced and instant fault location and isolation
  - Safe and quick network restoration
Power and productivity for a better world™