Lucy Switchgear

Distribution Automation – Sets up Network Standards and Smart Grid Roll Out

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Content

• Automation improves network reliability
• Stages of automation
• Migrating to the Smart Grid
• Incremental development of the Smart Grid
• Automation Building Blocks
• Automation Ready Switchgear
• Benefits
• Conclusion
Automation improves network reliability

- Enabler for outage reduction
- What to automate
- How to automate
- Tipping point
- Network design has an impact
- Dynamic reconfiguration
Stages of automation

- Smart Grid Functionality
- Switch Control
- Remote monitoring
Migrating to the Smart Grid

- Disproportionate
- Towards self-healing

Improved reliability

Level of investment
Incremental development of the Smart Grid

- Tipping point
- Investment decisions
  - Full
  - Defer
  - Incremental investment
- Shorter development
  - Automation intensity
  - Network complexity
- Key indicators
  - Automation ready switchgear
  - Modular automation solution
Incremental development of the Smart Grid

- No automation in place
Incremental development of the Smart Grid

Source Breaker
Sub A
Sub B
Sub C
Sub E
Sub F

200 Customers
200 Customers
200 Customers
200 Customers
200 Customers
200 Customers
Incremental development of the Smart Grid
Incremental development of the Smart Grid
Incremental development of the Smart Grid

200 Customers

200 Customers

200 Customers

200 Customers

200 Customers

Source Breaker

Sub A

Sub B

Sub C

Sub E

Sub F

NOP
Incremental development of the Smart Grid

Source Breaker  Sub A  Sub B  Sub C  Sub E  Sub F

200 Customers  200 Customers  200 Customers  200 Customers  200 Customers

Control Source Breaker

NOP
Incremental development of the Smart Grid
Incremental development of the Smart Grid
Incremental development of the Smart Grid
Incremental development of the Smart Grid

Source Breaker

Sub A

Sub B

Sub C

Sub E

Sub F

200 Customers

200 Customers

200 Customers

200 Customers

200 Customers
Incremental development of the Smart Grid

- Control room operator
- Centralised self-healing algorithm
Incremental development of the Smart Grid

- What and how to automate?

SAIDI = \( \frac{\text{sum of all customer interruption durations}}{\text{total number of customers served}} \)
Incremental development of the Smart Grid
Incremental development of the Smart Grid

- Sub A
- Sub B
- Sub C
- Sub D
- Sub E
- Sub F

Control Source Breaker

200 Customers

NOP
Incremental development of the Smart Grid
Incremental development of the Smart Grid

Source Breaker

Sub A

Sub B

Sub C

Sub D

Sub E

Sub F

200 Customers

200 Customers

200 Customers

200 Customers

200 Customers

200 Customers

G

NOP
Incremental development of the Smart Grid

200 Customers
200 Customers
200 Customers
200 Customers
200 Customers
200 Customers

Sub A
Sub B
Sub C
Sub D
Sub E
Sub F

Source Breaker

 NOP

engineering brilliant solutions
Incremental development of the Smart Grid

200 Customers
Sub A

200 Customers
Sub B

200 Customers
Sub C

200 Customers
Sub D

200 Customers
Sub E

200 Customers
Sub F

Source Breaker

G
NOP
Modular Approach to Smart Grid

- Remote monitoring
- [Selective] Switch Control
Automation Building Blocks

- Low initial investment
- Secure and reliable
- Flexible and upgradeable
- Incremental approach
- Automation ready
Automating Old Switchgear

Actuator

Control Box
Automation Ready Switchgear

Connector to pre-wired looms

Actuator
Flexibility and upgradeability

Cost savings in planning & implementation of networks

- Remote monitoring
- Single switch control
- Additional I/O capacity
- Measurement functionality for Smart Grids
Flexibility and upgradeability

Improves Quality of Service

SAIDI

Automation intensity

Source Breaker

Sub 1
200 Customers

Sub 2
200 Customers

Sub 3
200 Customers

Sub N-1
200 Customers

Sub N
200 Customers

NOP
Benefits

• Robust solution
• Minimal investment
• Avoiding sunk costs and relationship specific assets
• Distribution Automation Setting Standards
• Integral part in migrating to Smart Grid
• Incremental approach provides a reinforcement
• Smart Grid roll-out
• Greater insight into networks
• Maximise within constraints of bounded information
Conclusions

• Network Complexity needs to increase
  • Bounded information – max. contingency / max. load
  • Manage electrical headroom through Dynamic Reconfiguration

• Fault Location, Detection and Isolation and Restoration
  • Centralised approach may avoid lock-in (open standards)
  • Modular approach
    • Differing system conditions & configurations
    • Integration of existing equipment
Smart Grid Ready Already

- Incremental investment
- "Automation ready" switchgear
- Retrofit solutions
- Modular automation solutions