



Feeder automation based on IEC61850





Feeder Automation based on IEC61850

- Design of a **decentralized** solution based on the coordination among different IEDs distributed along MV lines and the use of **IEC 61850 GOOSE** communication services to accelerate the decision taken





Background

- **28% of the malfunctions** of protection functions are already caused **by wrong configurations** according to the North America Electric Reliability Corporation last report
- Changes in topology for fault restoration and congestion management
- Impact of high rate of DG connection on protection systems operation: Blinding effect, unnecessary operations, Failing autoreclosing, unintended islanding...





Inflection point

- Application of IEC 61850 standard for feeder automation
- Current trend of replacing **switches by breakers** along distribution feeders
- Frequent changes in network configurations to fulfil optimization functions
- Protection system reliable operations in networks with DER and DG connection





IEC 61850 Protection Function Parameters Update

- Objective

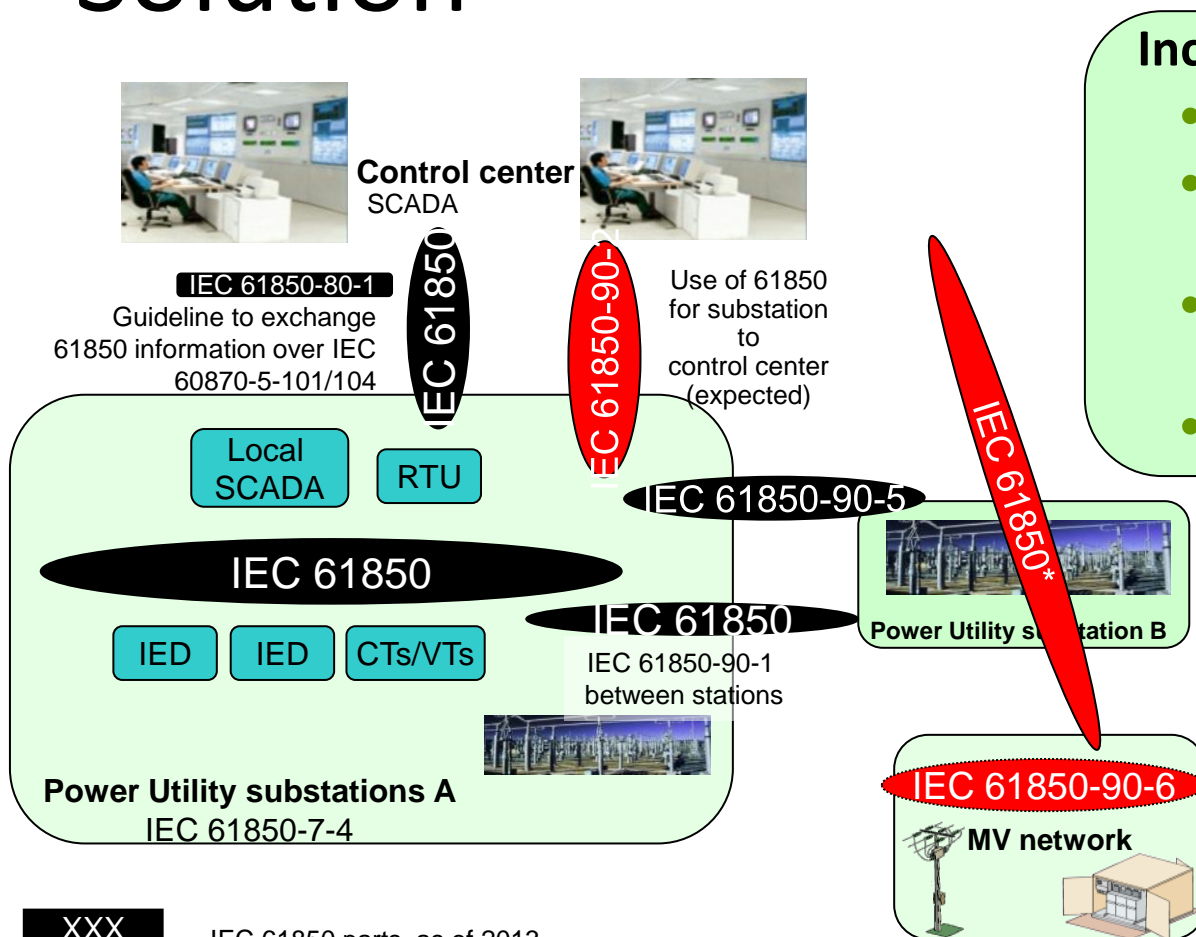
Process to change remotely functional parameters and data subscriptions in peer to peer communications without interrupting operation

- Schema

- Protection, monitoring and control functions modelled with standardized Logical Nodes
- Embedded Logic at IED level for dynamic reconfiguration
- Use of MMS messages to update:
 - LN setting values
 - GOOSE ID subscriptions



Decentralized IEC 61850 FLISR Solution



- ### Included Use Cases
- FLISR using auto re-closers
 - FLISR based on distributed control
 - Islanding protection using communication command
 - Configuration of IEDs

XXX

IEC 61850 parts, as of 2013

XXX

IEC 61850 future parts (already engaged)

*: use of IEC 61850 over WAN can/will take advantage of IEC 61850-80-1, IEC 61850-90-2 and IEC 61850-8-2 (web based), and IEC 61850-90-12 (WAN)





Decentralized IEC 61850 FLISR Solution

- Objective

Decentralized FLISR Schema based on IEC61850 GOOSE messages that contemplates different interruption technologies at distribution level, islanding mode protection and new IEC 61850 guidelines

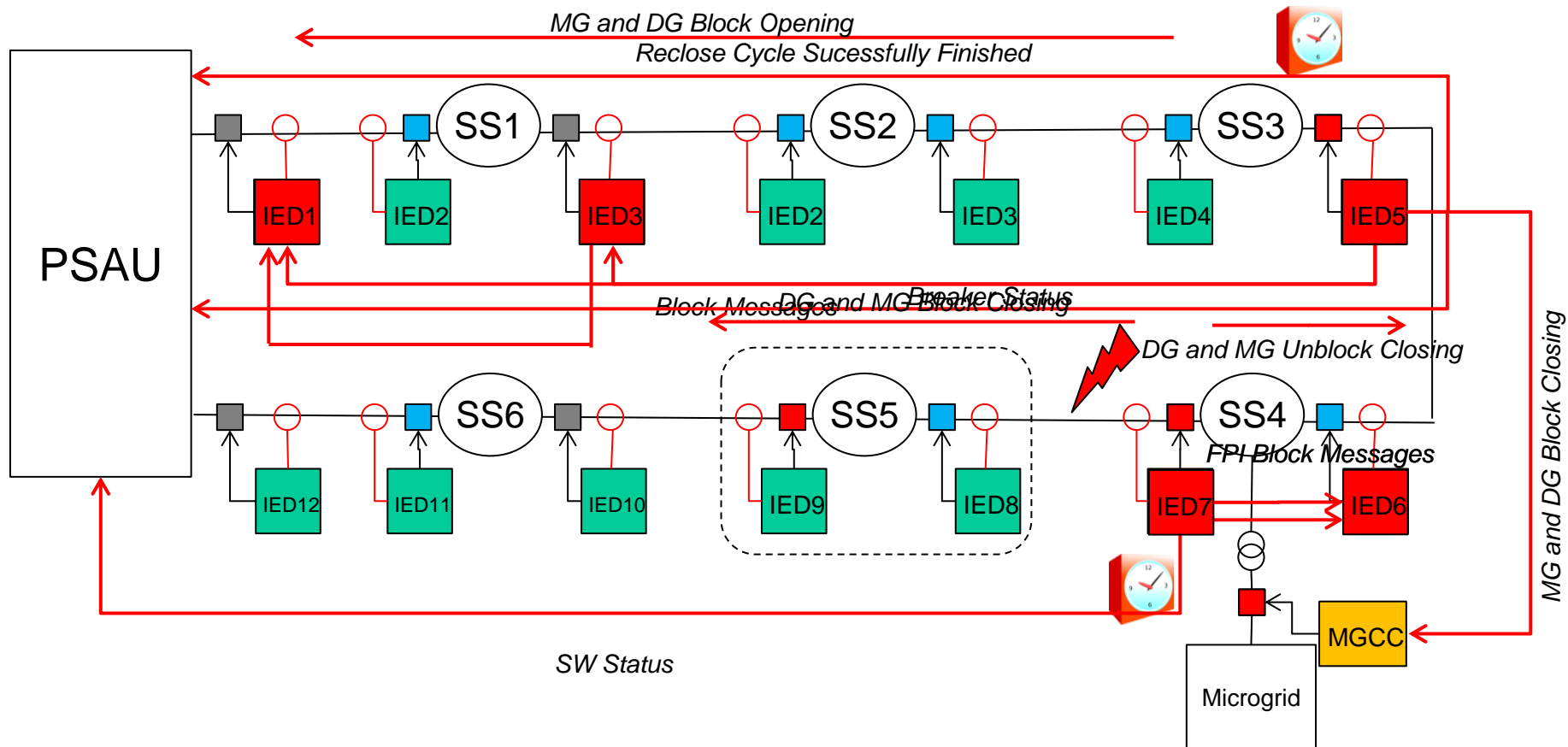
- Schema

- Decentralized logic selectivity using GOOSE messages
 - **1st Isolation Step** – Performed by **IEDs controlling circuit breakers**.
 - **2nd Isolation Step** – Performed by **IEDs controlling switches**.
- **Loss of Mains** Protection by means of IEC 61850 messages controlled by MV IEDs
- MMS messages to report status and interact with SAU algorithms

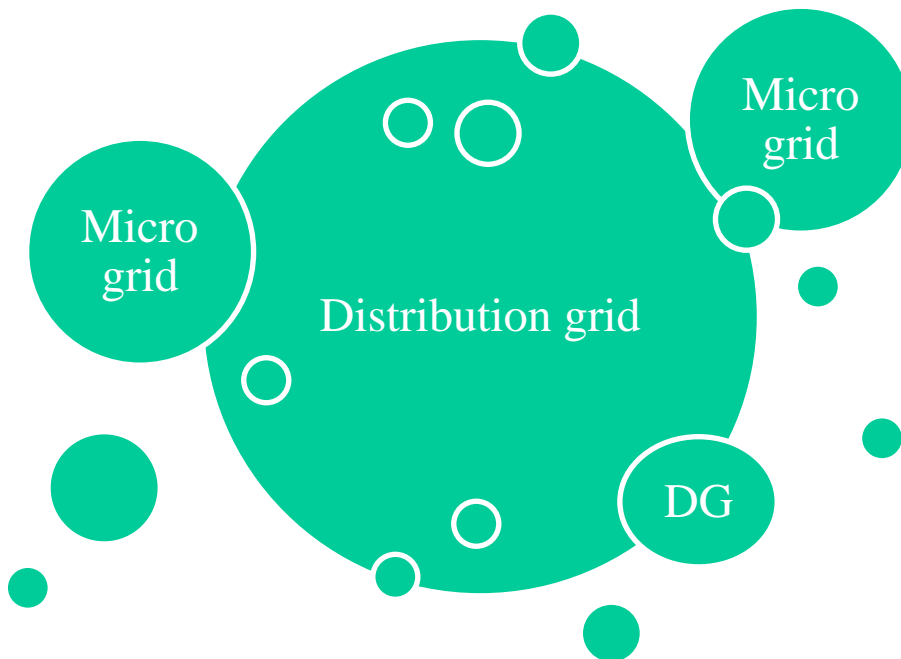




Decentralized IEC 61850 FLISR Solution



Islanding of microgrids



Background

Microgrids may operate either **connected to the distribution grid** or as a **standalone power system**.

Interaction with the distribution system must be taken into account.

The **breakthrough** is the **proposal of a protection device** that coordinates with distribution grid **based on ICT**



Islanding of microgrids

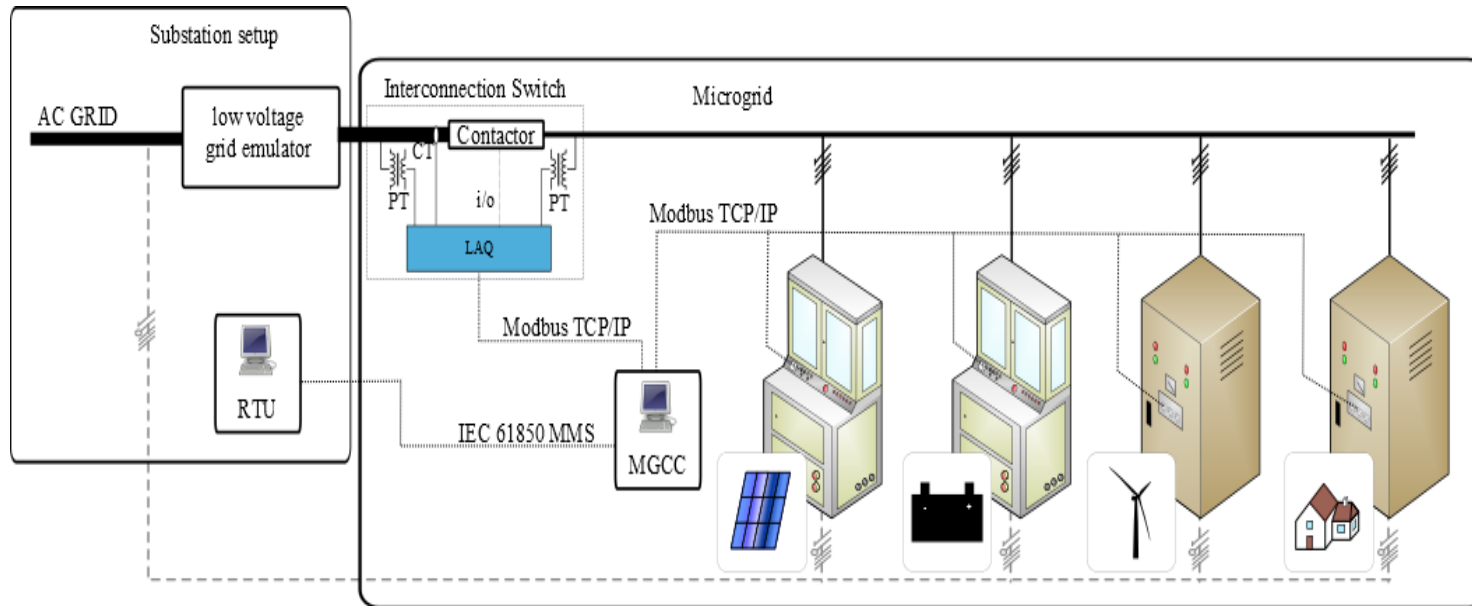
Features of Interconnection Switch

Coordination with MV FLISR protection system.

The microgrid protection system uses IEC 61850.

Communication-Failsafe autonomous operation of the interconnection switch.

Automatic reclosing upon distribution grid restoration.





Breakthroughs Expected Results

- Reducing the number of customers affected by the supply interruption
- Reducing restoration times
- Improve reliability and safety of protection systems

