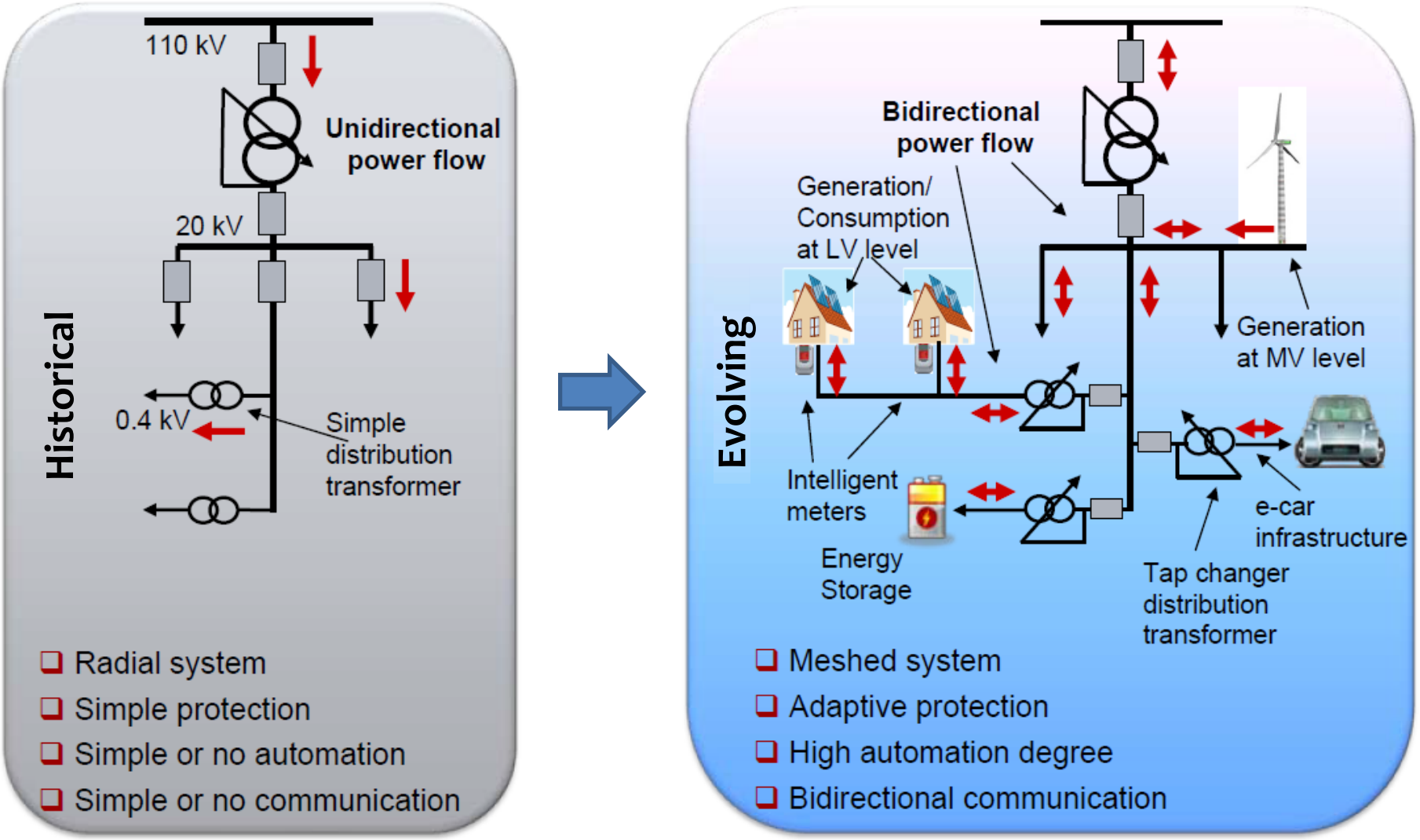
Smart Grid RTU

APEX Summit 2014

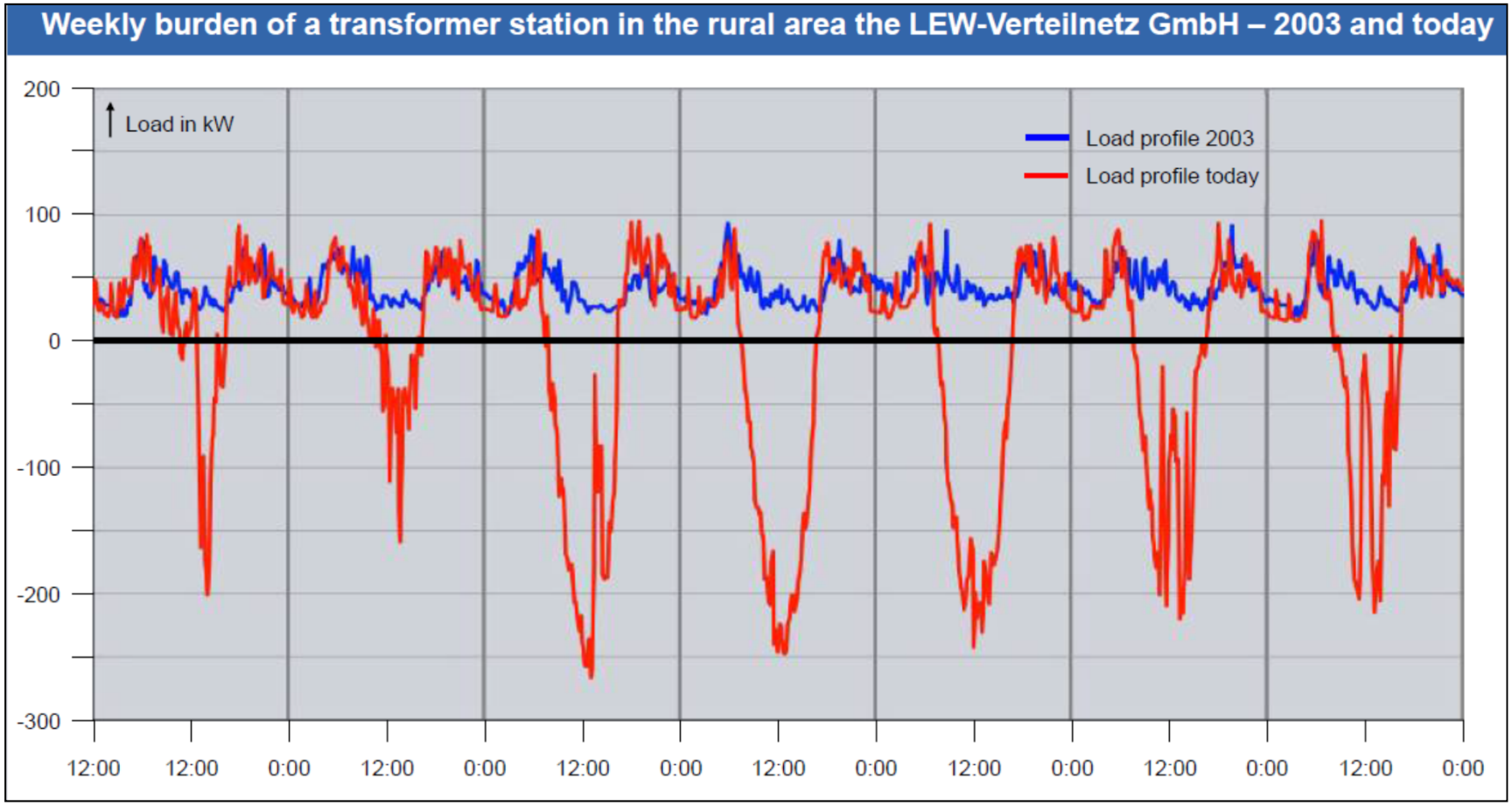
Mohit Phadnis

Changes in Distribution Networks

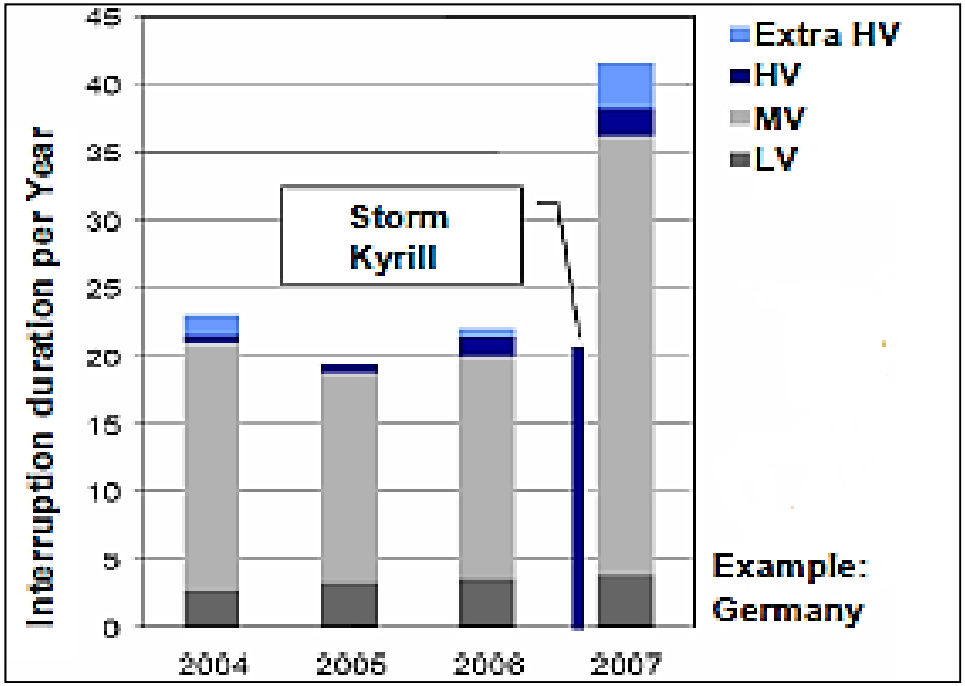


Increasing Need for Automation in Ring Main Units!

Changing infeed patterns challenge existing grid infrastructure



MV Interruption Duration per year



- 80% of Germany's interruptions are caused by the MV faults (20kV)

3 Steps to Intelligent Ring Main Unit

Monitoring

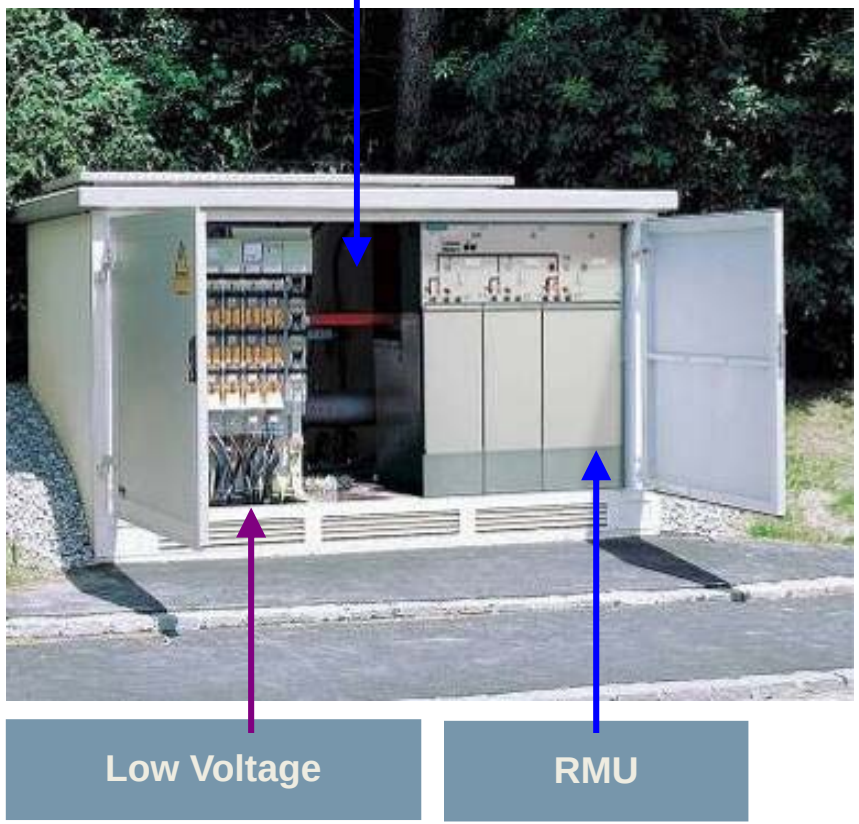
- Availability
- Fault Location

Telecontrol

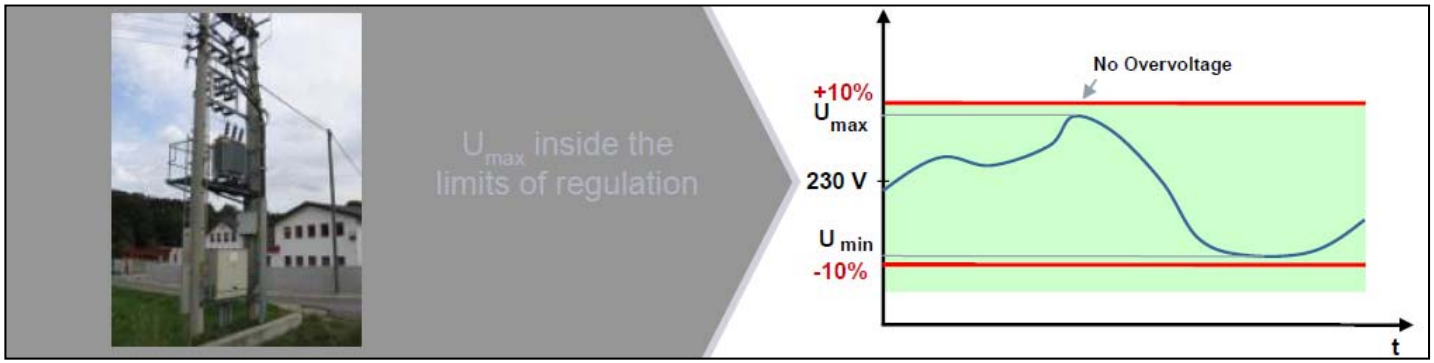
- Minimizing of Downtimes ("h" ➔ "min")

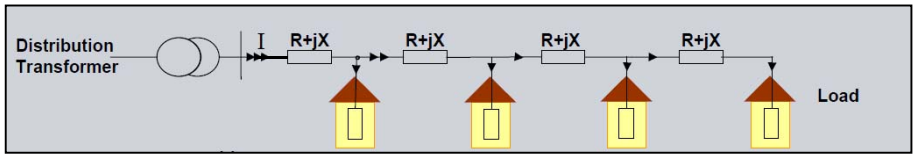
Load Flow Control

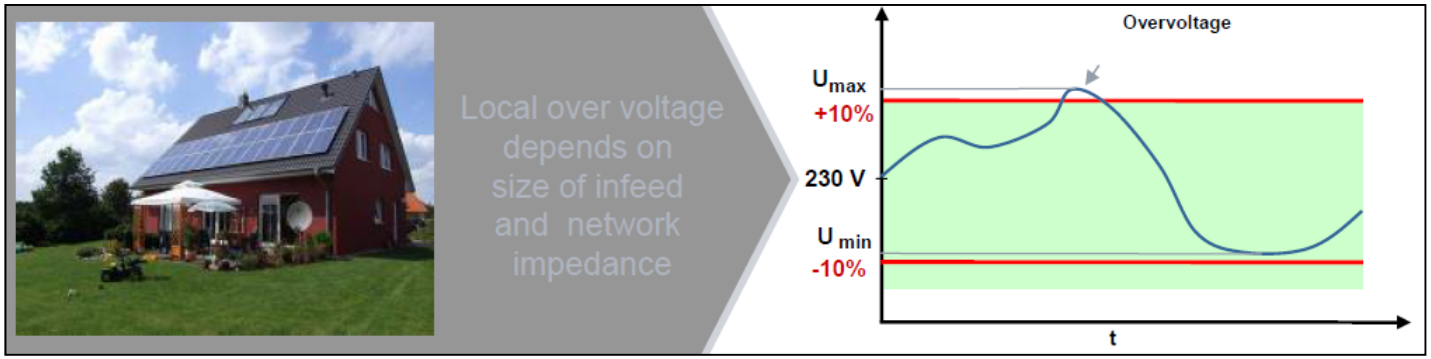
- Management of Decentralized In-feed
- Minimizing of Losses

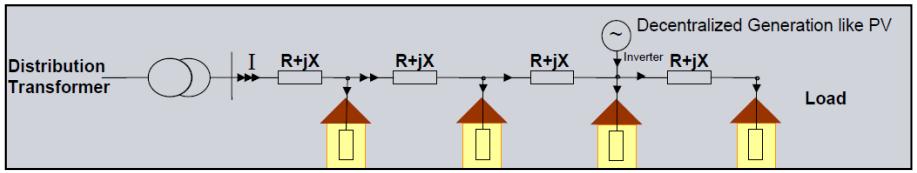


Power Quality

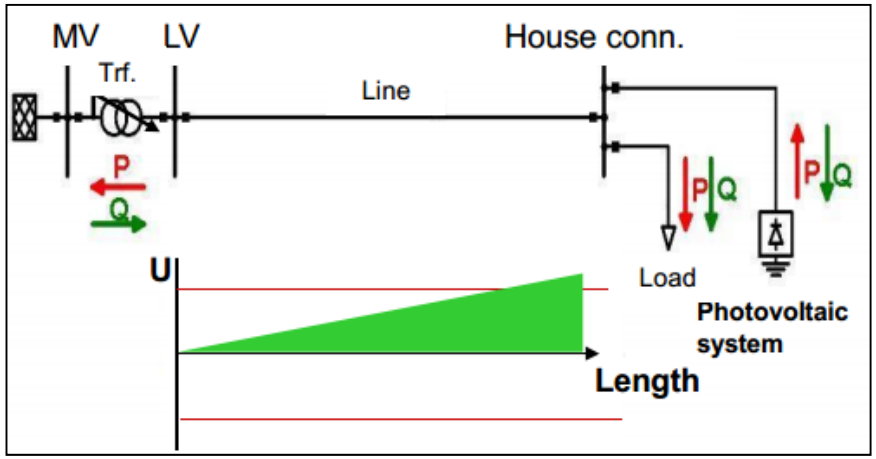


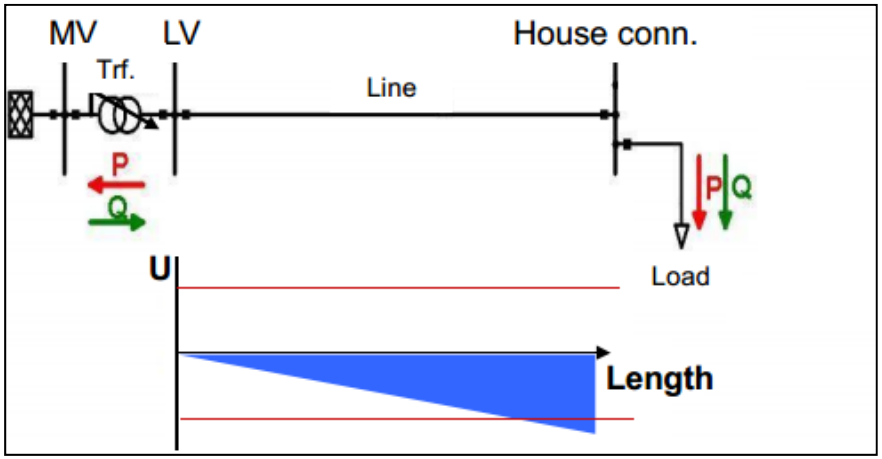






Voltage profile in LV Network





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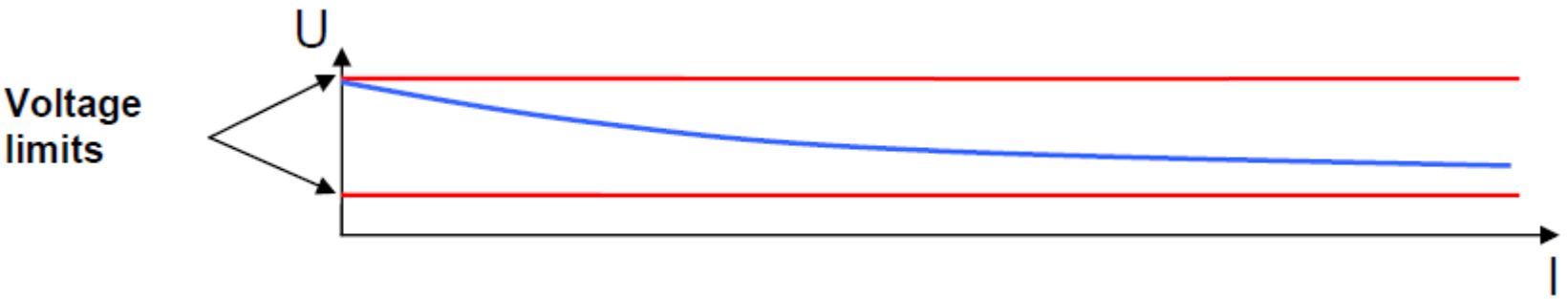
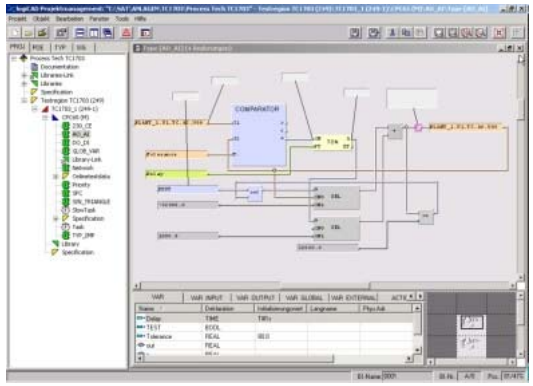


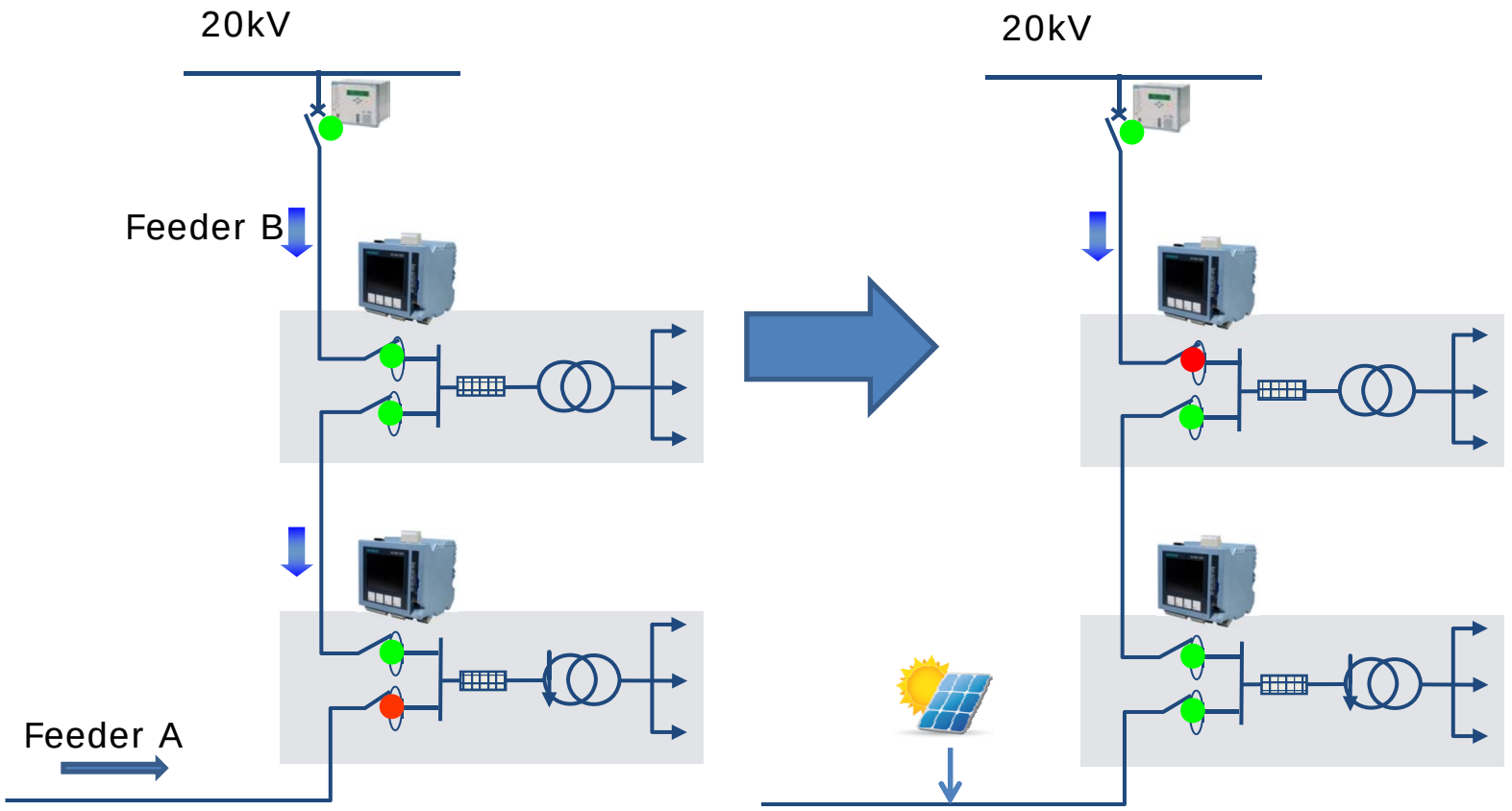
Control of Distribution transformer

- Sensors to monitor the voltage level and the voltage level is fed to the Smart RTU.
- Smart voltage control of the distribution transformer
- The Smart RTU is automated by Programmable Logic Control software via web browser interface or by the graphical user interface

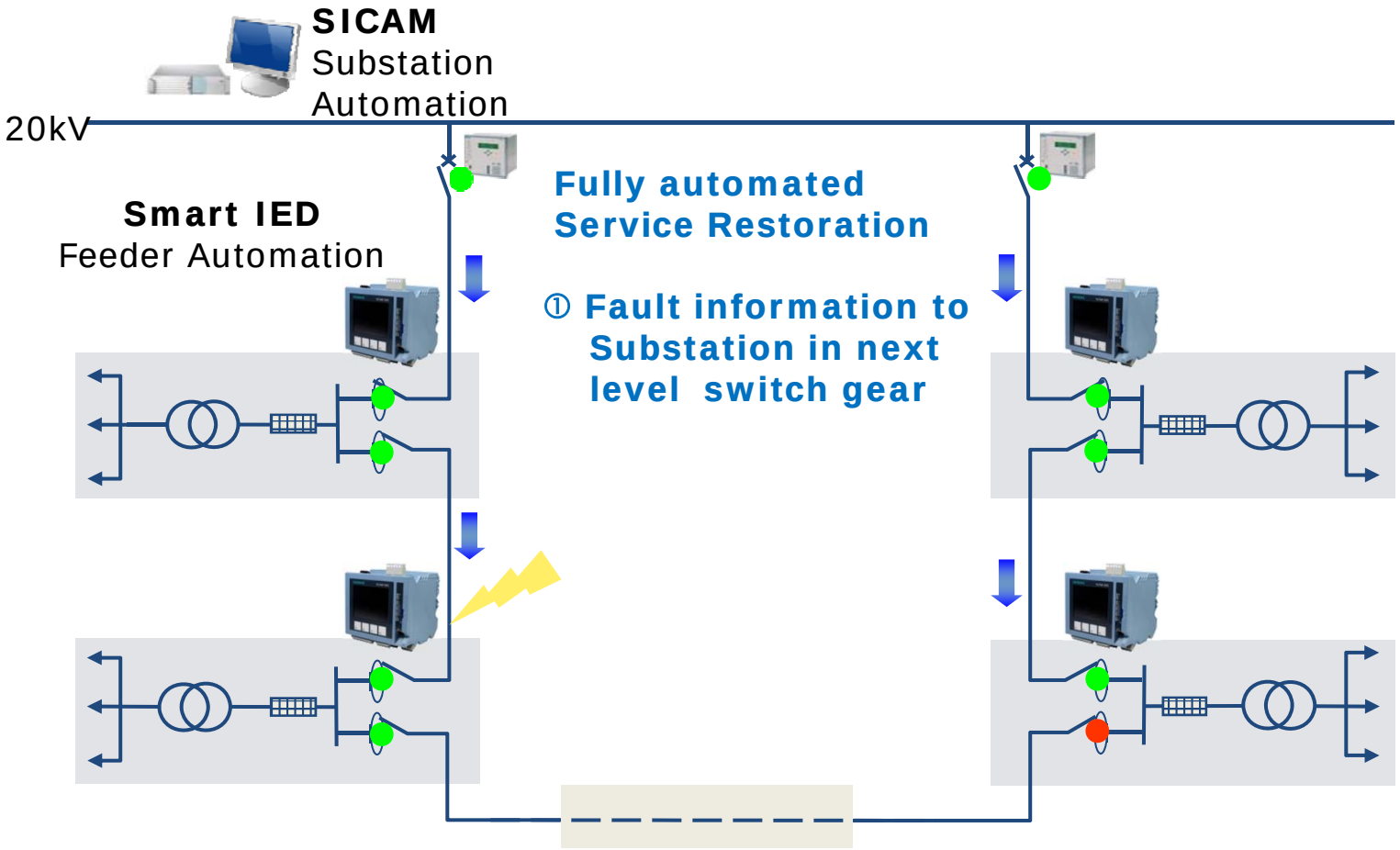


Load Management

- Moving the normal open point if Distributed generation(DG) is added to grid (due to high voltage profile near DG)
- Switching of feeders is performed by RTU



Application of a cable network
Self Healing- Service restoration in 4 steps



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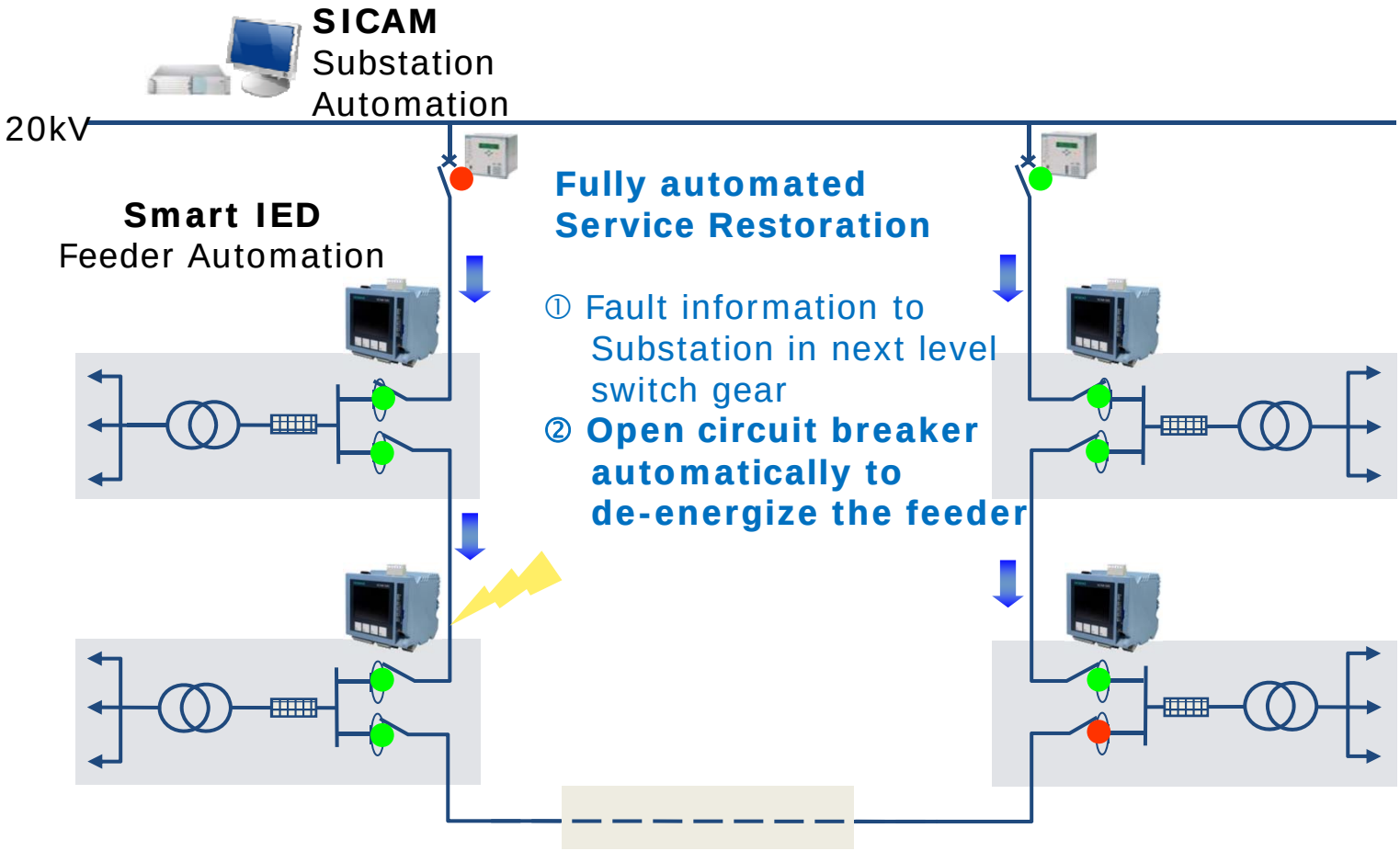

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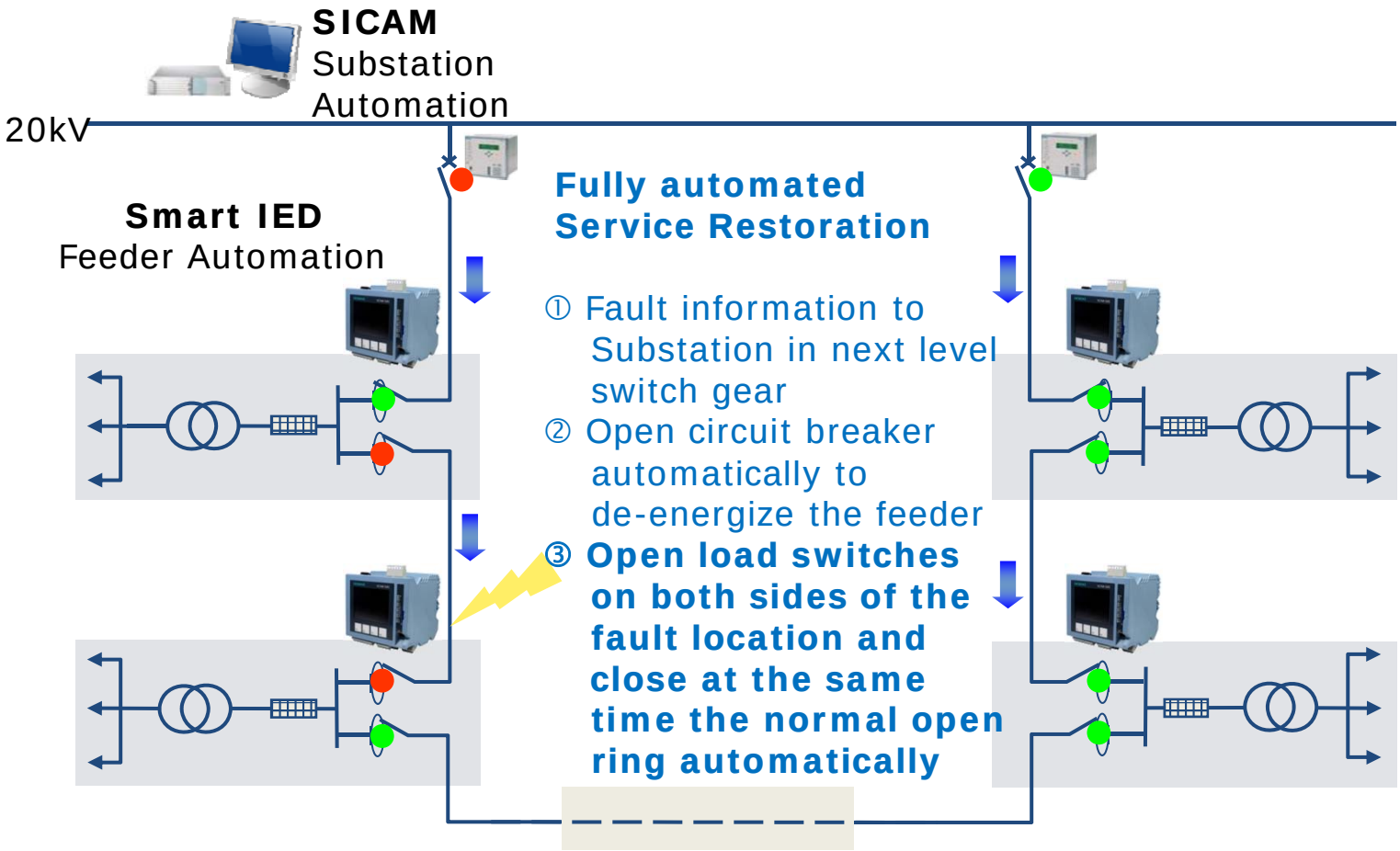

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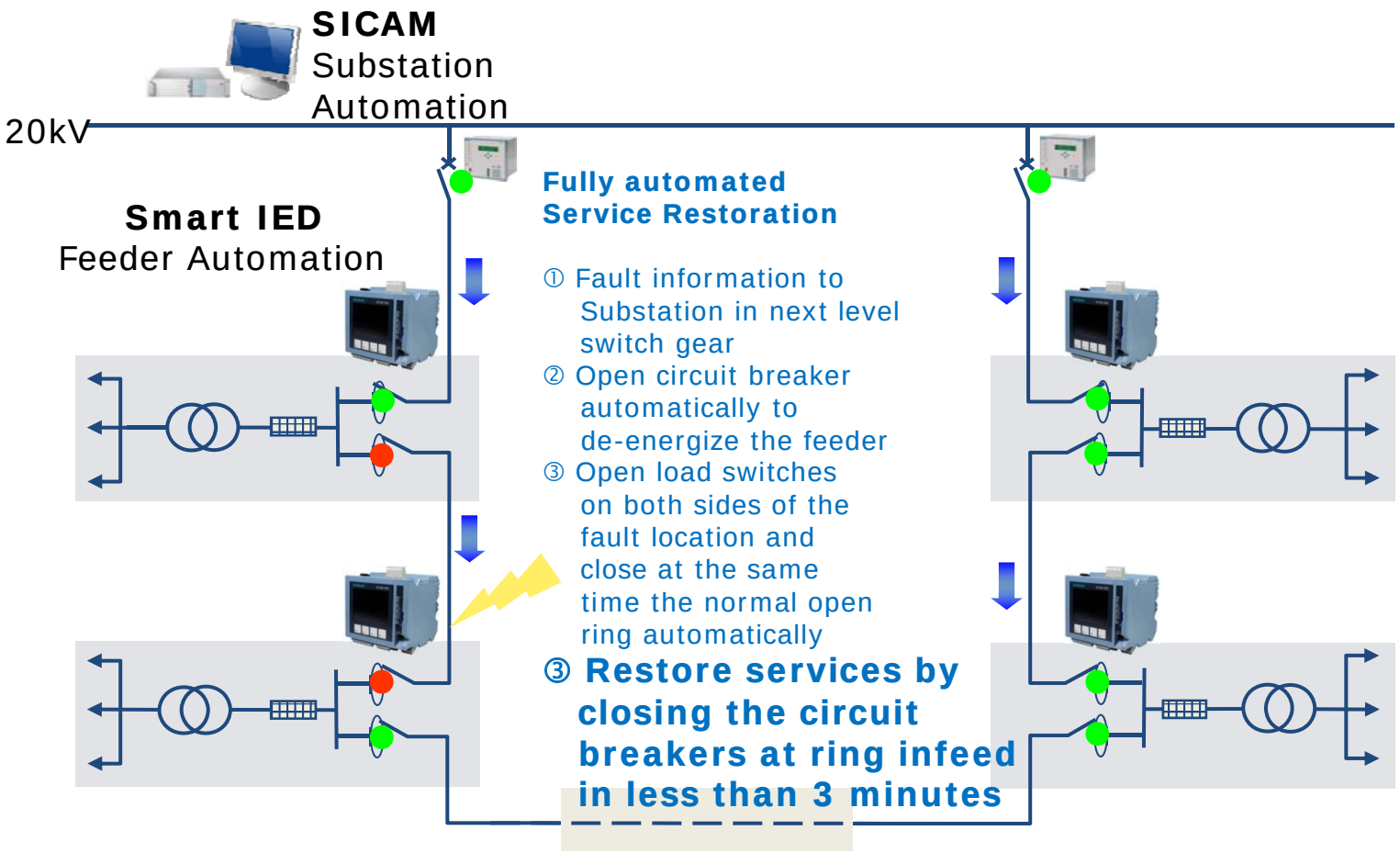
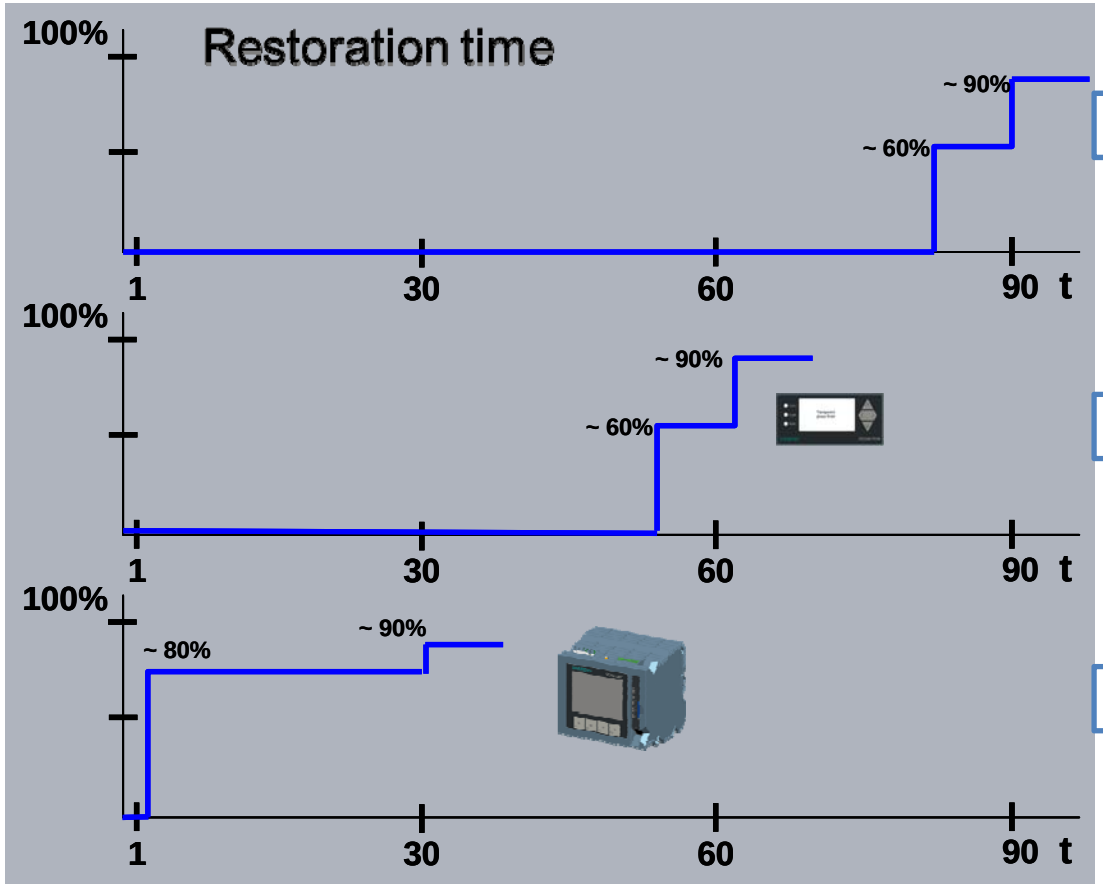


Restoration in Distribution Networks



Typical distribution network

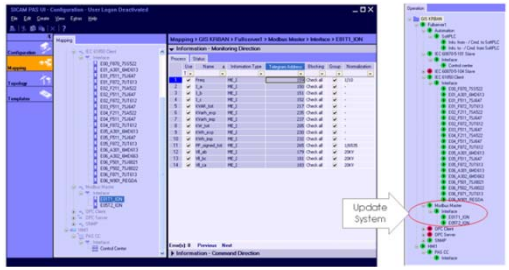
Typical distribution network + Sensors

Typical distribution network + Sensors + Distribution Automation

Service Restoration Process

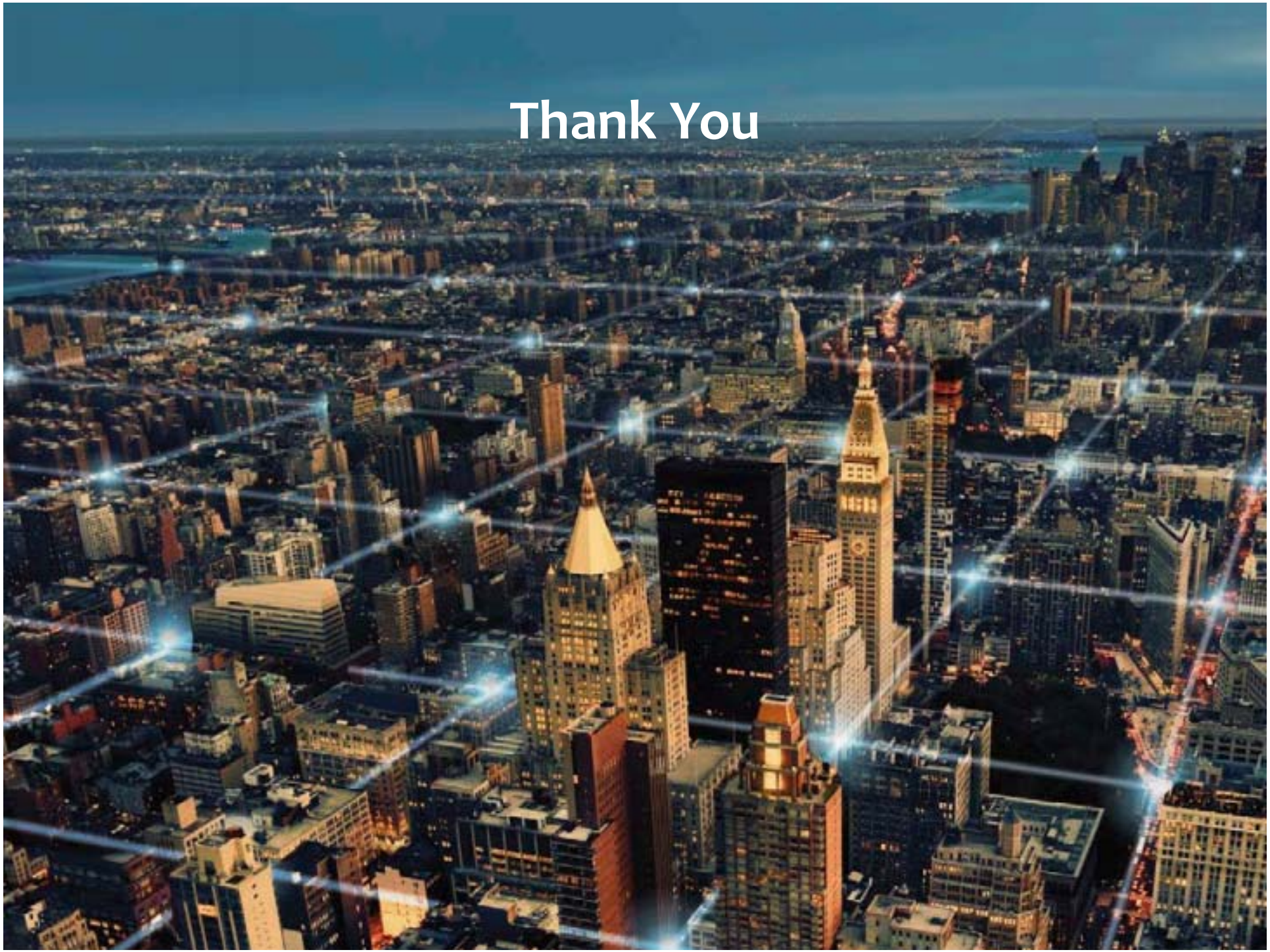
- Report status of CB Trip via RTU to control centre
- Evaluate information at control centre
- Send maintenance team to locate fault and restore service

- Report status of fault indicators via Smart RTU to control centre
- Smart RTU evaluates fault location and automatically starts restoration process via controlling RMU



Smart Grid RTU Benefits

- Increase distribution reliability (SAIDI)
- Monitor distribution power quality
- Smart control of distribution transformer
- Improved load management of the network
- Improve flexibility of distribution operations and maintenance process


Thank You

References

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