Reliability and Smart Grids: Cause and Effect?

Vijay Venu Vadlamudi
Post Doctoral Research Fellow, NTNU
Reliability & SGs

• Almost every working definition on SG emphasises on the term ‘Reliability’.

• All the various SG visions stake claim to an improvement in reliability.

  – More often than not qualitative.
Reliability Perspective

• How can there be an improvement in the adequacy status of a power system?
Reliability Contributions

Nomenclature:
- DER: Distributed Energy Resources
- DR: Demand Response
- DA: Distribution Automation
- APE: Advanced Power Electronics Devices

SG core ring corresponding to strategic adoption of power system technology improvisations
SG inner core ring (which runs through all the SG core ring) creating a feedback control system of ICT deployment, i.e. ICT provides feedback to every technological constituent

ICT
(Leading to Distributed Computational Intelligence)

Instrumentation
- PMUs
- Sensors
- WAMS
- Smart Metering (AMI)

Outage Management & Condition Monitoring
(Monitoring outages, faults, power quality)

Data Management

Cause? Effect?
Research Goals

– Identify the resource adequacy contributors upon the deployment of ICT from among the various technological constituents of SG.

– Develop suitable metrics to gauge the improved reliability.
  
  • For both ICT infrastructure + power system infrastructure