Suggestion for Priority Use Cases for PAP 14

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Criteria for Prioritization

• Select a small number of transmission operations functions which have:
  a. Significant cross-cutting needs
  b. Are architecturally significant, i.e.
     • Involve most of the actors
     • Require critical performance characteristics
Background Information


- Smart Grid Focused Use Cases for Transmission and Distribution Operations, presented to TnD DEWG at the Connectivity Week

- Use Cases Driving the Need for Harmonization, [Available: http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/PAP14Objective2#Use_Cases_Driving_the_Need_for_H](http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/PAP14Objective2#Use_Cases_Driving_the_Need_for_H)
Transmission-Distribution-Customer Domains
Bus Load Model for Transmission Operations

Transmission

LTC

Bus Load Model for Transmission Operations

Active Distribution Network

Transmission

LTC

Bus Load Model for Transmission Operations

Transmission

LTC

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Transmission

LTC
Aggregated Bus Load Model

- With DER and ES
- External Signals

Total Load
- After VVWC
- Demand Response
  - Under-frequency load shedding
  - Under-voltage load shedding
- Curtailment

• This information should be generated by DMS and should be made available to EMS
Suggested Transmission Use Cases with Significant Cross-Cutting over T-D-C domains
Bus load forecast (modeling)

Relation to Distribution Domain:

- Depends on DER operations, schedules, reserves, reactive power capabilities and control modes
- Depends on Demand Response status and capabilities
- Depends on aggregated load-to-voltage dependences (including reactions of DER, capacitors, and VR)
- Depends on actual setups of DER protection, and RAS in distribution
Relation to Distribution Domain:

- Uses the bus load forecasts (models)
- Includes state of controlling devices in distribution (aggregated)
- Uses the results of DOMA for dynamic voltage limits required by distribution operations
- Includes Network Sensitivity Analysis for use by DMS applications
- Includes contingency analyses with the reactions and controls of load management and DER in distribution
Optimal Power Flow and Security Constraint Dispatch

Relation to Distribution Domain:

- Takes into account the dynamic limits imposed by distribution
- Includes real and reactive load management in distribution
- Includes dispatchable DER
Prevention and mitigation of Wide-Area Contingencies

Relation to Distribution Domain:

- Uses bus load models
- Includes requirements for distribution support of secure operating conditions, e.g., load relief, voltage support
- Includes pre-arming and re-coordination of RAS, taking into account distribution operations
Restoration after contingencies

• Relation to Distribution Domain:
  ➢ Includes return of DMS functions to normal operations, based on near-real-time situation in transmission and generation
  ➢ Includes restoration of load reduced by Demand Response, based on near-real-time situation in transmission and generation
  ➢ Includes restoration of loads shed by load-shedding schemes, based on near-real-time situation in transmission and generation
Further Actions

- Develop use cases for these functions, defining
  - the narratives
  - the actors
  - the information interchanges and their requirements
  - the sequence of actions
- Define the object/data models
- Define corresponding standards and gaps
Thank you!