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USE CASE 6 – SYSTEM OPERATOR SWITCHES FEEDERS BASED ON CONTINGENCY ANALYSIS

Use Case Title

System Operator switches feeders based on contingency analysis

Use Case Summary

Key applications are needed that apply to system operations, both at the substation and feeder level are vital to the optimized operation of the utility...these include remote feeder switching between feeders and substations, VAr dispatch, and Voltage dispatch. Though not rocket science, the development of applications that address these traditional operations have the potential to add significant economic value and operating improvements to the systems under discussion. It may be that data sets can be identified, that when implemented will help streamline these operations, enabling economic, system stability and safety benefits.

- Application monitors system for connectivity and IED placement on the utility grid using CIM and for system loads using IEC61850.
- When switching is required, calculations are run to project loading on each switchable utility grid segment for the period of time the switch action will be in place.
- The application then analyzes operating contingency options and advises the System Operator on which switching operations are viable from and operating viewpoint.
- System Operator then selects the switch sequence and initiates an automated switching process.

Use Case Detailed Narrative

Key applications that apply to system operations, both at the substation and feeder level are vital to the optimized operation of the utility...these include remote feeder switching between feeders and substations, VAr dispatch, and Voltage dispatch. Though not rocket science, these traditional operating applications add economic value to the systems under discussion.

Step 1: Application monitors system for connectivity and IED placement on the utility grid using CIM.

Step 2: Application monitors system for system loads using IEC61850.

Step 3: When switching is required, calculations are run to project loading on each switchable utility grid segment for the period of time the switch action will be in place

Step 4: The application then analyzes operating contingency options and advises the System Operator on which switching operations are viable from and operating viewpoint.

Step 5: System Operator then selects the switch sequence and initiates an automated switching process.

Business Rules and Assumptions

Switching Application uses CIM for the network topology.

Field switches are assumed to be automated.

ACTORS

Actor Name	*Actor Type (person, device, system etc.)*	*Actor Description*
Field Device Communication Interface	System	Generic architectural component that communicates with substation and field devices using IEC 61850. This system can translate IEC 61850 services to GID services.
Switching Application	System	Switching application uses CIM to represent network topology. IEC 61850 data might also be used directly for device status and communication.
System Operator	Person	Monitors network and identifies the need for and performs required switching using the Switching Application.
CIM Model Server	System	

STEP BY STEP ANALYSIS OF EACH SCENARIO

Scenario Description

Triggering Event	*Primary Actor*	*Pre-Condition*	*Post-Condition*
(Identify the name of the event that start the scenario)	*(Identify the actor whose point-of-view is primarily used to describe the steps)*	*(Identify any pre-conditions or actor states necessary for the scenario to start)*	*(Identify the post-conditions or significant results required to consider the scenario complete)*
Switching operation must be performed	System Operator	The network topology has been captured in the CIM. IEDs are deployed on the network	Switches on power network have been successfully operated

Steps for this scenario

Step #	Actor	Description of the Step	Additional Notes
#	*What actor, either primary or secondary is responsible for the activity in this step?*	*Describe the actions that take place in this step including the information to be exchanged. The step should be described in active, present tense.*	*Elaborate on any additional description or value of the step to help support the descriptions. Short notes on architecture challenges, etc. may also be noted in this column.*
1	Switching Application	Switching Application continuously polls field devices to retrieve device data using IEC 61850	Example data types – load, VArs, volts, device status (open/close), etc. This step is repeated continuously.
2	Field Device Communication Interface	Field Device Communication Interface provides 61850 to CIM services translation of remote device data.	
3	CIM Model Server	CIM Model Server updates network topology model as needed to reflect system changes	Harmonization – 61850 to CIM This step is repeated continuously.
4	System Operator	System operator determines needs to perform switching operations.	
5	System Operator	System Operator uses Switching Application to model the desired grid segment switching.	
6	Switching Application	Switching Application analyzes operating contingency options and advises the System Operator on which switching operations are viable from an operating viewpoint.	
7	System Operator	System Operator selects the desired switch sequence and initiates an automated switching process	
8	Switching Application	Switching Application transmits switching commands to field devices using IEC 61850	
9	Field Devices	Field Devices receive commands and perform switching operations	

REQUIREMENTS

Functional Requirements

Functional Requirements	*Associated Scenario # (if applicable)*	*Associated Step # (if applicable)*

Non-functional Requirements

Non-Functional Requirements	*Associated Scenario # (if applicable)*	*Associated Step # (if applicable)*