# DISTRIBUTION MANAGEMENT SYSTEM (DMS)
# v2.5.0.1

## 5.4.3.4a Optimize Network (Real-Time Mode)

Creation Date: May 5th, 2021

Last Updated: October 29, 2021

ORACLE

**Copyright © 2021, Oracle. All rights reserved.**

**This document is provided for information purposes only and the contents hereof are subject to change without notice. This document is not warranted to be error-free, nor subject to any other warranties or conditions, whether expressed orally or implied in law, including implied warranties and conditions of merchantability or fitness for a particular purpose. We specifically disclaim any liability with respect to this document and no contractual obligations are formed either directly or indirectly by this document. This document may not be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose, without our prior written permission. Oracle, JD Edwards, PeopleSoft, and Siebel are registered trademarks of Oracle Corporation and/or its affiliates. Other names may be trademarks of their respective owners.**

# Contents

BRIEF DESCRIPTION ..... 4
BUSINESS PROCESS MODEL PAGE 1 ..... 5
BUSINESS PROCESS MODEL PAGE 2 ..... 6
BUSINESS PROCESS MODEL PAGE 3 ..... 7
BUSINESS PROCESS MODEL PAGE 4 ..... 8
DETAIL BUSINESS PROCESS MODEL DESCRIPTION ..... 9
DOCUMENT CONTROL ..... 20
ATTACHMENTS ..... 21
*Optimization Report* ..... *21*

# Brief Description

**Business Process:** **5.4.3.5 NMS(DMS) Optimize Network (Real-Time Mode)**
**Process Type:** **Sub Process**
**Parent Process:** **5.4.3 NMS(DMS).Monitor and Identify Areas for Improvement**
**Sibling Processes:** **5.4.4.1 NMS(OMS).Manage Planned Switching**

The Network Optimization Tool (Optimization) generates a set of optimal substation power transformer tap positions, voltage regulator tap positions, capacitor bank statuses, and DER/DR power dispatch controls for a defined optimization objective. The following optimization objectives are currently supported:

- **Loss Minimization**
- **Power Factor Correction**
- **Conservation Voltage Reduction**
- **Relieve Violations**
- **Maximize Voltage**
- **Maximize VAr**
- **Return to Nominal**

In real-time mode, Optimization runs cyclically to generate optimal plans for configured areas of the network. Areas can be configured for either manual mode, which will force the user to review the plan before execution, or automatic mode, which will allow the system to execute the plan without user interaction to constantly keep areas optimized based on changing conditions.

The primary actors for the Optimization application process are as follows:

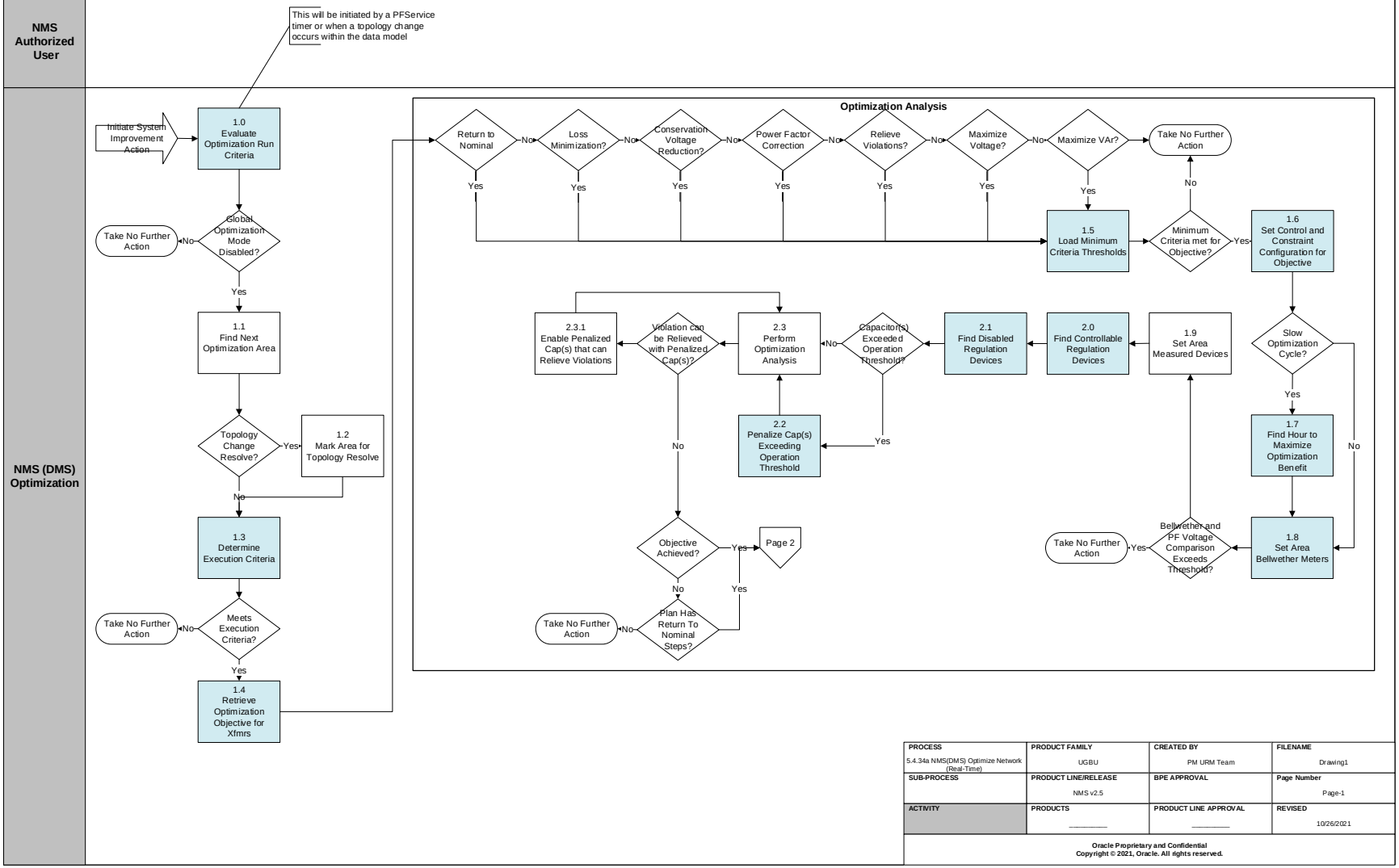
1. NMS Authorized User: Monitors status of the optimization plans and if configured for manual mode will invoke the execution of the plan.
2. Optimization: The Optimization application runs cyclically and creates switch plans for optimized system configuration for the pre-defined objective.
3. SCADA: Is a 3rd party application which is often integrated with NMS. SCADA takes in the control commands sent from NMS, executes them and sends feedback to NMS.

The general business process for VVO:

1. Trigger Mechanism: The real-time optimization will be invoked cyclically on a either a fast or slow cycle. The fast cycle runs every 15 minutes and will attempt to perform any steps possible to optimize the network. The slow cycle runs every hour and the VVO application will attempt to optimize the network for a window of time to avoid frequent device operations.
2. Optimization Recommendation: Based on the defined objective and the loading conditions, the Optimization application recommends capacitor, transformer, and DER/DR power dispatch devices for optimized operation.
3. Switching Sheet Creation: Based on the Optimization recommendation, the system or user creates and executes switching sheet for the intended optimization objective.

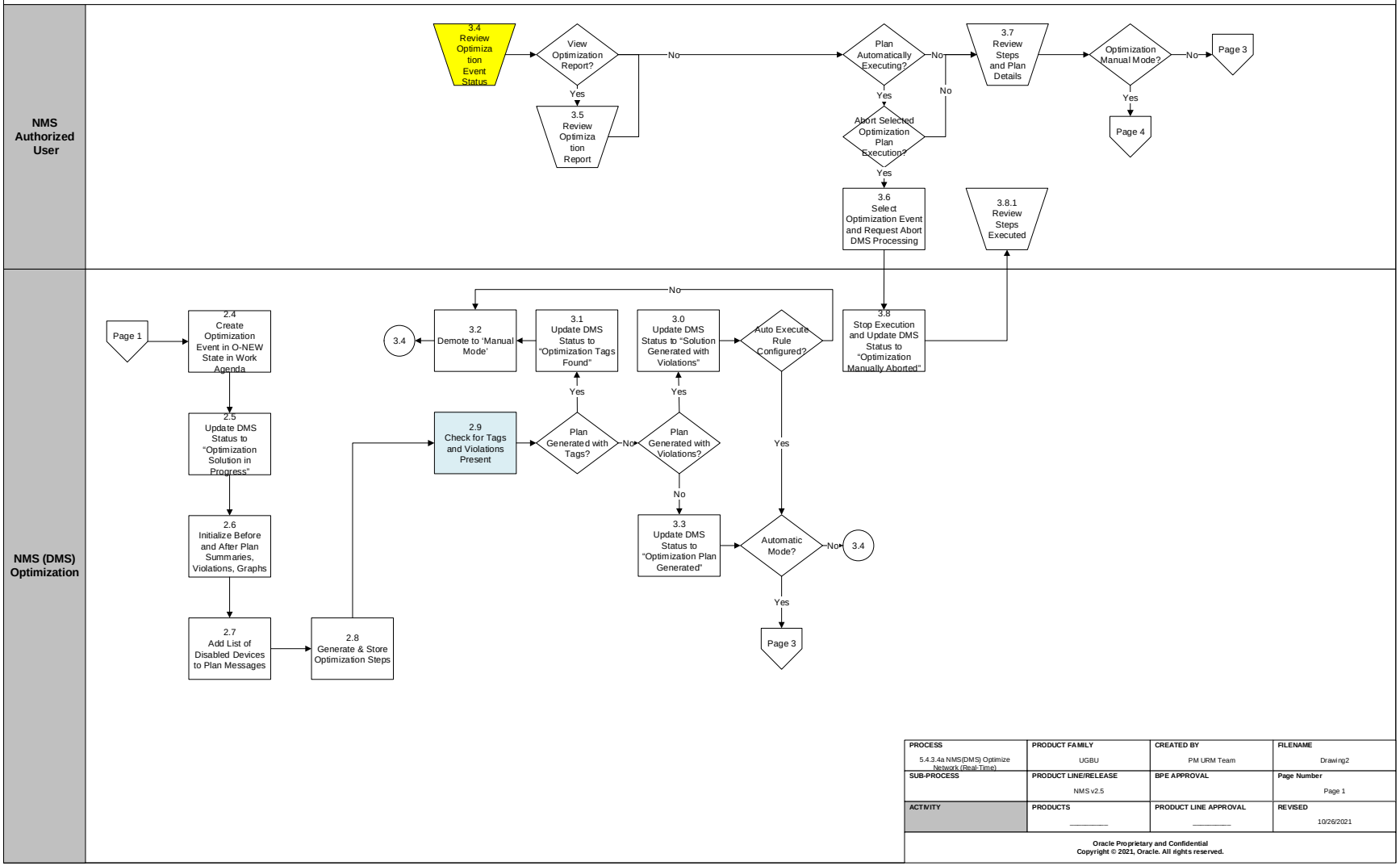
# Business Process Model Page 1

5.4.3.4a NMS(DMS) V2.5 *Optimize Network (Real-Time Mode)*



# Business Process Model Page 2

5.4.3.4a NMS(DMS).V2.5.0.1 *Optimize Network (Real-Time Mode)*

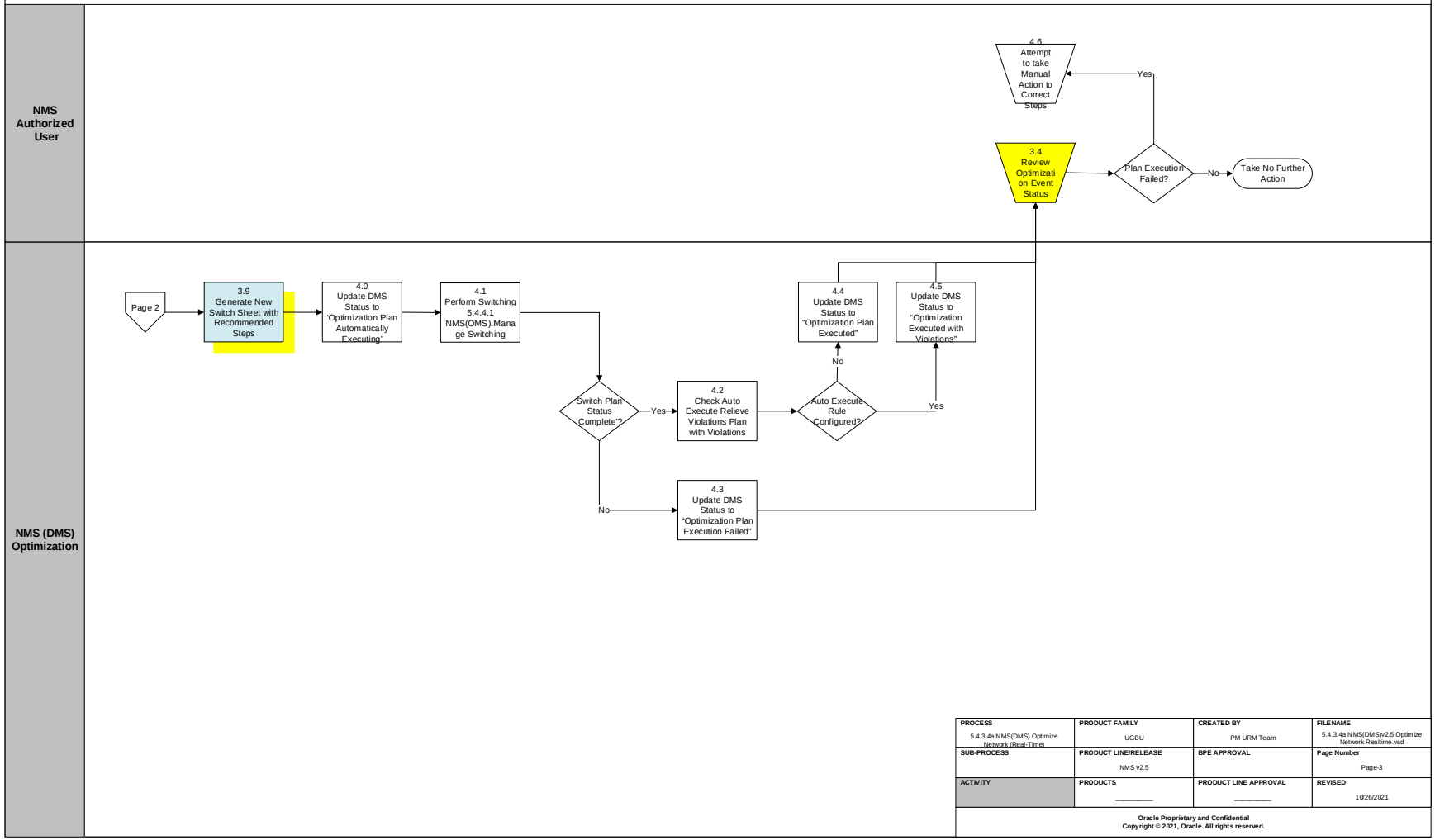



| | | | |
|---|---|---|---|
| **PROCESS** 5.4.3.4a NMS(DMS) Optimize Network (Real-Time) | **PRODUCT FAMILY** UGBU | **CREATED BY** PM URM Team | **FILENAME** Drawing2 |
| **SUB-PROCESS** | **PRODUCT LINE/RELEASE** NMS v2.5 | **BPE APPROVAL** | **Page Number** Page 1 |
| **ACTIVITY** | **PRODUCTS** _____ | **PRODUCT LINE APPROVAL** _____ | **REVISED** 10/26/2021 |

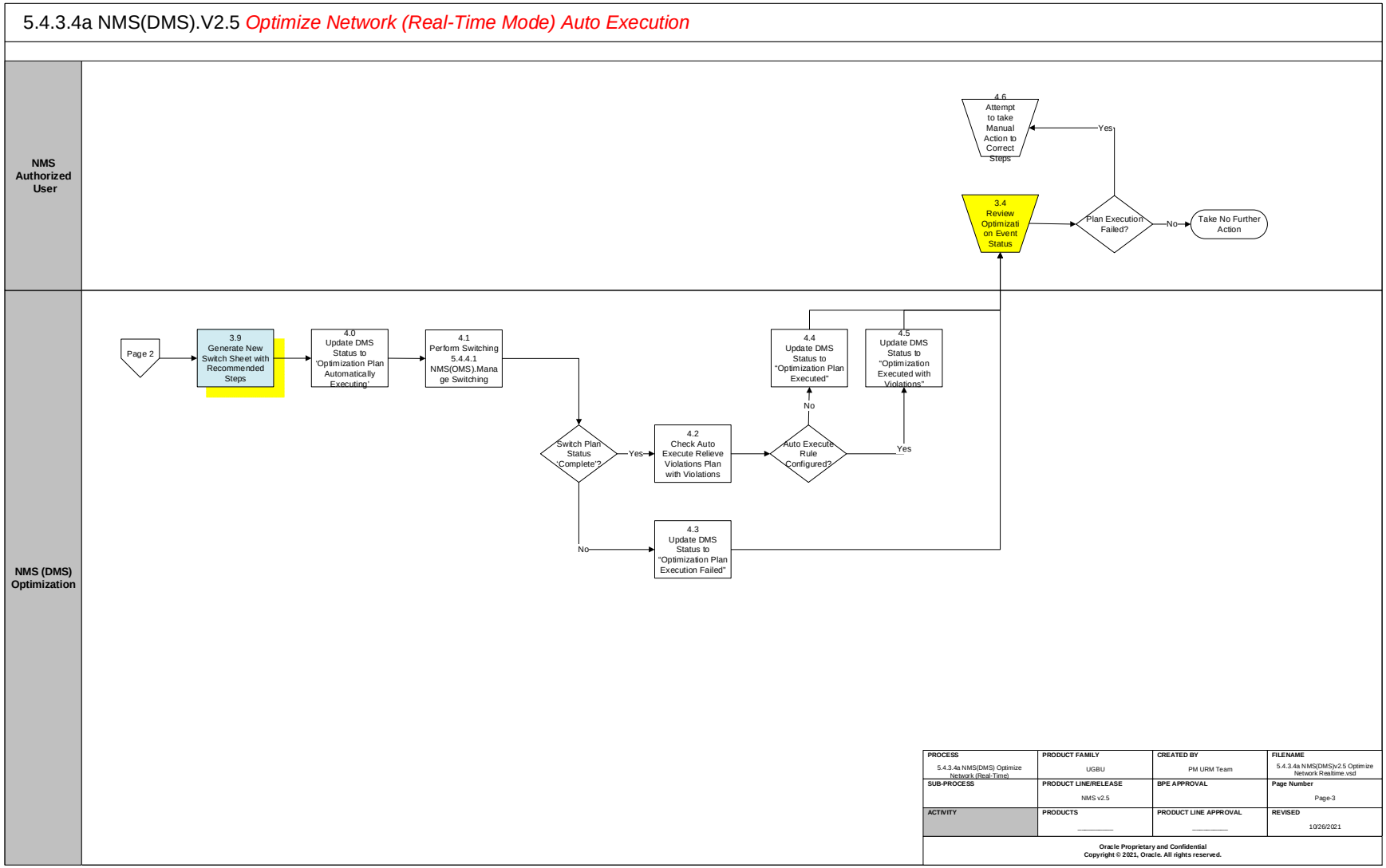
Oracle Proprietary and Confidential
Copyright © 2021, Oracle. All rights reserved.

# Business Process Model Page 3

5.4.3.4a NMS(DMS).V2.5 *Optimize Network (Real-Time Mode) Auto Execution*



# Business Process Model Page 4



# Detail Business Process Model Description

**1.0 Evaluate Optimization Run Criteria**
**Actor/Role: NMS (DMS) Optimization**
**Description:**
This will be the basis of starting a run of Optimization and will be triggered by a cyclical timer or topology change within the model. The cyclical timer fires at the feeder of a real-time Feeder Load Management (FLM) cycle and after the end of each FLM forecast done at the top of the hour. If a topology change occurs a run of Optimization will be forced for the areas affected after the power flow solve has completed. The cycle speed of the real-time FLM cycle is configurable via an SRS rule and is defaulted to 15 minutes. If a project changes this value, it would also change the frequency at which the optimization areas configured for the slow cycle would operate.

**Task Customizable (Y)** **Available Rule(s):**

| Mechanism | Rule |
|---|---|
| SRS Rules | CYCLE_TIME |

**Configuration required (N)** **Entities to Configure:**

| |
|---|
| SRS Rules |

**1.1 Find Next Optimization Area**
**Actor/Role: NMS (DMS) Optimization**
**Description:**
The application checks to see if there are any remaining areas that still need to be solved for the current cycle. If so, it will continue to process the areas that have yet to be optimized. If not, this is where the current cycle of optimization will end until the next cycle is triggered by the cyclical timer or topology change.

**1.2 Mark Area for Topology Resolve**
**Actor/Role: NMS (DMS) Optimization**
**Description:**
Determine if the resolve is due to a topology change, if so determine the new power transformers that are part of the optimization area.

**1.3 Determine Execution Criteria**
**Actor/Role: NMS (DMS) Optimization**
**Description:**
Determine if the area should be optimized for the current conditions. Optimization areas can be set to run fast cycle, which occurs at the end of each Feeder Load Management (FLM) cycle, or slow cycle, which occurs at the end of each FLM forecast. If the current cycle of the Optimization run meets the cycle speed configured for the optimization area, then continue processing the area. Also as a part of this check ensure that all feeder within the optimization area have been enabled.

From a configuration standpoint, the analysis optimizes the area at and below a Low Voltage (LV) bus within a substation. The optimization objective and frequency at which the analysis runs is configured for the feeder that defines the LV bus within the network model. For example if a substation had two transformer banks with a normally open bus tie breaker the substation would contain two optimization areas that could be configured with

different objectives and run-times. The feeders that are serviced by the LV bus will also need to be set as enabled in the model configuration. Various elements will need to be setup properly within the FEEDERS table and also the inheritance that identifies substation power transformers.

**Task Customizable (Y)** **Available Rule(s):**

| Mechanism | Rule |
|---|---|
| FEEDERS Database Table | VVO_ENABLED |
| FEEDERS Database Table | FEEDER_TYPE |
| Inheritance | pf_sub_xfmr |

**Configuration required (Y)** **Entities to Configure:** Model Configuration, Inheritance

**1.4 Retrieve Optimization Objective for Xfmrs**
**Actor/Role: NMS (DMS) Optimization**
**Description:**
Determine the optimization objective that is configured for the transformer banks within the optimization area. Note: The optimization objective is set at the transformer bank and applied to all downstream feeders.

The optimization objective for the area is configured for the feeder that defines the LV bus within the network model.

**Task Customizable (Y)** **Available Rule(s):**

| Mechanism | Rule |
|---|---|
| FEEDERS Database Table | VVO_OBJECTIVE |

**Configuration required (Y)** **Entities to Configure:** Model Configuration

**1.5 Load Minimum Criteria Thresholds**
**Actor/Role: NMS (DMS) Optimization**
**Description:**
The optimization considers certain minimum criteria thresholds before an objective is performed, these rules will be loaded and evaluated at this stage. For example it wouldn't be prudent to run loss minimization if total losses on the feeder were only 1kW.

**Task Customizable (Y)** **Available Rule(s):**

| Mechanism | Rule |
|---|---|
| SRS Rules | VOLTVAR_DEMAND_THRESHOLD |
| SRS Rules | VOLTVAR_LM_LOSS_THRESHOLD |
| SRS Rules | VOLTVAR_PFCORRECTION_PF_THRESHOLD |
| SRS Rules | VOLTVAR_MAX_LEADING_PF |

**Configuration required (Y)** **Entities to Configure:** SRS Rules

## 1.6 Set Control and Constraint Configuration for Objective

**Actor/Role: NMS (DMS) Optimization Description:**

Determine the control and constraint weighting for the selected objective. The optimization has configuration which allows projects to specify which constraints and controls should be considered within each of the available objective functions. In addition, the weight at which each control/constraint can also be configured. For example, a project could specify they would not like to use DER controls for the CVR objective, so they can adjust the weight of …. .

**Task Customizable (Y)** **Available Rule(s):**

| Mechanism | Rule |
|---|---|
| SRS Rules | opfConstraintLine |
| SRS Rules | opfConstraintSwitch |
| SRS Rules | opfConstraintVolt |
| SRS Rules | opfConstraintXfmr |
| SRS Rules | opfControlCapPos |
| SRS Rules | opfControlDistGen |
| SRS Rules | opfControlTapPos |

**Configuration required (Y)** **Entities to Configure:**

| |
|---|
| SRS Rules |

## 1.7 Find Hour to Maximize Optimization Benefit

**Actor/Role: NMS (DMS) Optimization**

**Description:**

If the area being evaluated is configured for slow cycle analysis, the optimization will look at a window of time configured by rule VV_FORECAST_WINDOW to find the optimal solution for. As an example, if the rule was set to 4, the analysis would find an optimal plan for the next 4 hours to minimize the number of device operations needed.

**Task Customizable (Y)** **Available Rule(s):**

| Mechanism | Rule |
|---|---|
| SRS Rules | VV_FORECAST_WINDOW |

**Configuration required (N)** **Entities to Configure:**

| |
|---|
| SRS Rules |

## 1.8 Set Area Bellwether Meters

**Actor/Role: NMS (DMS) Optimization**

**Description:**

The Optimization locates all bellwether meters within the area as candidate devices to be used for polling voltages to be used in the analysis. These devices will be used to compare telemetered voltages against solved voltages, if the difference exceeds a certain threshold the analysis will be terminated since there is too great a discrepancy in the real world vs. the model.

If bellwether voltages are to be used at the meter level they will need to be configured to use measurement type "Volts" in the product configuration. This is a special reserve attribute type to indicate the voltage measurement at a meter and not at the distribution voltage level.

**Task Customizable (Y)** **Available Rule(s):**

| Mechanism | Rule |
|---|---|
| SCADA Attributes | Volts |
| SRS Rule | VOLTVAR_BELLWETHER_MAX_VOLT_DIFF |
| SRS Rule | VOLTVAR_BELLWETHER_TIME_THRESHOLD |

**Configuration required (Y)** **Entities to Configure:** SCADA Measurements, SRS rules

**1.9 Set Area Measured Devices**
**Actor/Role: NMS (DMS) Optimization**
**Description:**
The Optimization locates all measured devices within the area as candidate devices that can be used for telemetry for load and voltage.

**2.0 Find Controllable Regulation Devices**
**Actor/Role: NMS (DMS) Optimization**
**Description:**
The Optimization will locate all controllable devices within the area and determine which, based on available telemetry and configuration, will be controllable in the analysis.

For devices to be utilized by the real-time Optimization they must have the required controllable attributes.
**Transformers:** Tap Position, Voltage Set Point
**Capacitors:** Position, On Threshold, Off Threshold
**Distributed Energy Resources:** Real Power Output, Reactive Power Output

**Task Customizable (Y)** **Available Rule(s):**

| Mechanism | Rule |
|---|---|
| SRS Rule | _PF_MEAS_CAP_OFFTHRESHOLD |
| SRS Rule | _PF_MEAS_CAP_ONTHRESHOLD |
| SRS Rule | _PF_MEAS_CAP_POSITION |
| SRS Rule | _PF_MEAS_TAP_POSITION |
| SRS Rule | _PF_MEAS_TAP_POSITION_A |
| SRS Rule | _PF_MEAS_TAP_POSITION_B |
| SRS Rule | _PF_MEAS_TAP_POSITION_C |
| SRS Rule | _PF_MEAS_SETPOINT |
| SRS Rule | _PF_MEAS_KW |
| SRS Rule | _PF_MEAS_KVAR |

**Configuration required (Y)** **Entities to Configure:** SCADA Measurements, SRS rules

**2.1 Find Disabled Regulation Devices**
**Actor/Role: NMS (DMS) Optimization**
**Description:**
From the available controllable devices, the Optimization now decides if any should be excluded due to quality codes, conditions present on the device, or a specific measurement that if set excludes the device as a candidate.

**Task Customizable (Y)** **Available Rule(s):**

| Mechanism | Rule |
|---|---|
| SRS Rule | _PF_MEAS_OPT_DISABLE |
| Inheritance | voltvar_disable |

**Configuration required (N)** **Entities to Configure:**

| |
|---|
| SRS Rules, Inheritance |

**2.2 Penalize Cap(s) Exceeding Operation Threshold**
**Actor/Role: NMS (DMS) Optimization**
**Description:**
The Optimization analysis determines if any capacitor has exceeded the operation count threshold for a configurable time period. If the operation count for the device has been exceeded the capacitor will not be included in the analysis. This functionality tries to limit the amount of wear and tear, certain devices receive, if they are more optimal for certain scenarios.

**Task Customizable (Y)** **Available Rule(s):**

| Mechanism | Rule |
|---|---|
| SRS Rule | capacitorOperationsCountPenaltyThreshold |
| SRS Rule | capacitorOperationsHistoryPeriod |
| SRS Rule | useRollingPeriodCapacitorOperationsCount |

**Configuration required (N)** **Entities to Configure:**

| |
|---|
| SRS Rules |

**2.3 Perform Optimization Analysis**
**Actor/Role: NMS (DMS) Optimization**
**Description:**
Perform the actual optimization analysis to determine how to optimize the controllable devices given the constraints and control objective. The results of this analysis should be the optimal device positions/outputs for the objective that was configured for the optimization area.

**2.3.1 Enable Penalized Cap(s) that can Relieve Violations**
**Actor/Role: NMS (DMS) Optimization Description:**
After performing the optimization analysis if it is determined a penalized cap can be used to relieve or improve a violation the device will be enabled and the optimization analysis re-conducted.

**2.4 Create Optimization Event in O-NEW State in Work Agenda**
**Actor/Role: NMS (DMS) Optimization**
**Description:**

The Optimization analysis has completed its analysis and generated a set of steps. An "O-New" event will be created in the Work Agenda to allow a user to track the details and progress of the optimization event. This event will allow a user to view the plan steps and graphs related to the results.

**2.5 Update DMS Status to "Optimization Solution in Progress"**
**Actor/Role: NMS (DMS) Optimization**
**Description:**
The DMS status of the "O-New" event will be transitioned to "Optimization Solution in Progress" to indicate to users the analysis is in the process of finalizing and writing the results of the optimization to the database.

**2.6 Initialize Before and After Plan Summaries, Violations, and Graphs**
**Actor/Role: NMS (DMS) Optimization**
**Description:**
The Optimization will determine what the before and after results look like as a part of executing the plan. This involves calculating power flow results, voltage profile graphs, and violation counts for before and after plan execution. This will help operators determine the benefit of the particular plan that was generated. For example, in a CVR plan they will see the savings in real-power, the new minimum feeder voltage, and the shift in the voltage profile for each feeder.

**2.7 Add List of Disabled Devices to Plan Messages**
**Actor/Role: NMS (DMS) Optimization**
**Description:**
If any devices were found to be disabled during the analysis due to conditions or quality codes the list of devices will be written to the database and made available in the Optimization Report Messages pane for user review.

**2.8 Generate and Store Optimization Steps**
**Actor/Role: NMS (DMS) Optimization**
**Description:**
The analysis will determine the before/after positions of the devices and calculate any regulation set points that need to be applied. The steps found for the optimization analysis will be written to the database and associated to the event.

**2.9 Check for Tags and Violations Present**
**Actor/Role: NMS (DMS) Optimization**
**Description:**
The analysis will next check to see if the plan resulted in violations still be present in the optimization area or if tags were found. Both of these items are safety concerns and the DMS status of the event will be updated accordingly.

**Task Customizable (Y)** **Available Rule(s):**

| Mechanism | Rule |
|---|---|
| Inheritance | tags |
| SRS Rule | VVO_RV_AUTO_EXECUTE_WITH_VIO |

**Configuration required (N)** **Entities to Configure:** SRS Rules, Inheritance

**3.0 Update DMS Status to "Solution Generated with Violations"**
**Actor/Role: NMS (DMS) Optimization**
**Description:**
The analysis found violations present in the optimization area after a simulation of step execution in the power flow analysis. At this point the DMS status of the event will be marked as "Solution Generated with Violations" to let the user know the end state resulted in violations present.

**3.1 Update DMS Status to "Optimization Tags Found"**
**Actor/Role: NMS (DMS) Optimization**
**Description:**
The analysis found Safety Tags to be present in the optimization area which could indicate crews working in the area. To err on the side of caution the plan will now be demoted to manual mode execution, a user will need to first review the plan before execution to ensure safety of area crews. The DMS status of the event will be transitioned to "Optimization Tags Found".

**3.2 Demote to "Manual Mode"**
**Actor/Role: NMS (DMS) Optimization**
**Description:**
The analysis found Safety Tags present in the optimization area which could indicate crews working in the area. The plan execution will now be demoted to manual mode regardless of whether automatic mode was enabled or not.

**3.3 Update DMS Status to "Optimization Plan Generated"**
**Actor/Role: NMS (DMS) Optimization**
**Description:**
The safety checks that look for violations being present after plan execution and tags being present in the area both passed. At this point the DMS status of the event will be transitioned to "Optimization Plan Generated". Depending on whether the global mode of Optimization is set to manual mode or automatic mode will determine how this plan now gets executed.

**3.4 Review Optimization Event Status**
**Actor/Role: NMS Authorized User**
**Description:**
Once the event has been created as a part of process 2.4 the event will show up in the Work Agenda for user review. While the plan is being generated the user will see "Solution in Progress" in the DMS Status column of the Work Agenda.

**3.5 Review Optimization Report**
**Actor/Role: NMS Authorized User**
**Description:**
Once the Work Agenda event has transitioned from "Solution in Progress" to a terminal state such as "Optimization Plan Generated" or "Optimization Tags Found" a user can then right click the event and bring up the Optimization Report. This report will show pertinent information related to the plan such as the controllable device settings, violation counts, power flow results, and voltage profile graphs before and after plan execution.

**3.6 Select Optimization Event and Request Abort DMS Processing**
**Actor/Role: NMS Authorized User**
**Description:**

If a user needs to abort the auto execution of an Optimization Plan for emergency purposes they can right click the event and select the option to "Abort DMS Processing". When selected this option will send a request to the NMS to abort executing any more steps in the Optimization Plan.

### 3.7 Review Steps and Plan Details

**Actor/Role: NMS Authorized User**
**Description:**
After opening the Optimization Report for the event the user can review the steps that were generated for each of the controllable devices and review the before and after power flow results. If needed the user can drill into the plan details to see more detailed power flow results on each feeder and a voltage profile graph.

### 3.8 Stop Execution and Update DMS Status to "Optimization Manually Aborted"

**Actor/Role: NMS (DMS) Optimization**
**Description:**
The NMS receives the request from the user to abort the current auto execution of an Optimization plan. The NMS will abort processing any additional steps in the plan and mark the DMS status of the event as "Optimization Manually Aborted".

### 3.8.1 Review Steps Executed

**Actor/Role: NMS (DMS) Optimization**
**Description:**
The NMS has aborted executing any more optimization steps for the selected event, the user can now review the steps that were executed to see if any system changes need to be made.

### 3.9 Generate New Switch Sheet with Recommended Steps

**Actor/Role: NMS (DMS) Optimization**
**Description:**
The optimization analysis steps will be placed into an actual Switching Management Sheet that can then be executed in real-time to send the control operations to the SCADA system.

The following SRS rules define the configuration for which control actions will be placed in the Switching Sheet for the various steps. The rules should be setup properly such that the rules are mapped to the proper SCADA control actions for controlling the regulation device.

**Task Customizable (Y)** **Available Rule(s):**

| Mechanism | Rule |
|---|---|
| SRS Rule | voltVarSwitchPlanType |
| SRS Rule | voltVarTemplateBase |
| SRS Rule | voltVarTemplateCapAuto |
| SRS Rule | voltVarTemplateCapPosition |
| SRS Rule | voltVarTemplateCapOnThreshold |
| SRS Rule | voltVarTemplateCapOffThreshold |
| SRS Rule | voltVarTemplateXfmrAuto |
| SRS Rule | voltVarTemplateXfmrPosition |
| SRS Rule | voltVarTemplateXfmrPositionA |
| SRS Rule | voltVarTemplateXfmrPositionB |
| SRS Rule | voltVarTemplateXfmrPositionC |
| SRS Rule | voltVarTemplateXfmrTarget |
| SRS Rule | voltVarTemplateDistGenKw |
| SRS Rule | voltVarTemplateDistGenKvar |

**Configuration required (Y)** **Entities to Configure:** SRS Rules

**4.0 Update DMS Status to "Optimization Plan Automatically Executing"**
**Actor/Role: NMS (DMS) Optimization**
**Description:**
The DMS status of the event will be changed to "Optimization Plan Automatically Executing" to let users know the execution has started. The responsibility of the plan execution will now be transferred over to Switching Management.

**4.1 Perform Switching 5.5.3.2 NMS(OMS).Placeholder for Switching URM**
**Actor/Role: NMS (DMS) Optimization**
**Description:**
The plan execution will be handled by Switching Management which is covered by a separate URM. This process will be responsible for sending the control actions to the connected SCADA system and tracking plan execution and step failures.

**4.1 Perform Switching 5.5.3.2 NMS(OMS).Placeholder for Switching URM**
**Actor/Role: NMS (DMS) Optimization**
**Description:**
The DMS status of the event will be changed to "Optimization Plan Automatically Executing" to let users know the execution has started. The responsibility of the plan execution will now be transferred over to Switching Management.

**4.2 Check Auto Execute Relieve Violations Plan with Violations**
**Actor/Role: NMS (DMS) Optimization**
**Description:**
If automatic plan execution was successful check to see whether SRS rule VVO_RV_AUTO_EXECUTE_WITH_VIO is set to "yes" and violations were predicted to be present in the "After" execution results.

**Task Customizable (Y)** **Available Rule(s):**

| Mechanism | Rule |
|---|---|
| Inheritance | tags |
| SRS Rule | VVO_RV_AUTO_EXECUTE_WITH_VIO |

**Configuration required (N)** **Entities to Configure:**

| |
|---|
| SRS Rules, Inheritance |

**4.3 Update DMS Status to "Optimization Plan Execution Failed"**
**Actor/Role: NMS (DMS) Optimization**
**Description:**
If automatic plan execution was unsuccessful set the DMS status of the event to "Optimization Plan Execution Failed".

**4.4 Update DMS Status to "Optimization Plan Executed"**
**Actor/Role: NMS (DMS) Optimization**
**Description:**
If automatic plan execution was successful and no violations were present in the predicted "After" results, set the DMS status of the event to "Optimization Plan Executed".

**4.5 Update DMS Status to "Optimization Executed with Violations"**
**Actor/Role: NMS (DMS) Optimization**
**Description:**
The DMS status will be set to "Optimization Executed with Violations if the following were true items were true, automatic plan execution was successful, violations were present in the "After" execution results, and the SRS rule to auto execute plans with violations was set to "Yes".

**4.6 Attempt to take Manual Action to Correct Steps**
**Actor/Role: NMS Authorized User**
**Description:**
If the automatic plan execution failed a user can now evaluate whether additional steps need to be taken. If only certain steps were executed the operator may need to determine if the steps should be rolled back if it will cause unwanted effects on the network. A user at this point may choose to manually operate the devices to finish the plan, undue the changes done by the plan, or do nothing at all.

**4.7 Is Plan Execution Required**
**Actor/Role: NMS Authorized User**
**Description:**
If Optimization is in manual mode a user will need to make a decision on whether the plan should be executed or not. There are multiple situations that could lead a plan to this point so the user will need to decide if plan execution should occur. For example there may have been "Safety Tags" found during the analysis which is an indicator that crews may be in the area. The user should review whether the steps would have an impact on crew safety and determine to either proceed forward with plan generator or not. Another example would be the global optimization mode is set to manual which means every optimization even would need to be first review by a user before proceeding with plan generator and execution.

**4.8 Request Switch Plan for Selected Optimization Event**

**Actor/Role: NMS Authorized User**
**Description:**
If the user decides the plan optimization plan should be executed they can request the generation of a Switch Sheet from the user interface. This will create a Switching Management Sheet that contains the steps to optimize the network.

**4.9 Modify Optimization Switch Plan**
**Actor/Role: NMS Authorized User**
**Description:**
After Switch Plan generation a user can now add whatever additional steps they need to be meet required business processes or safety.

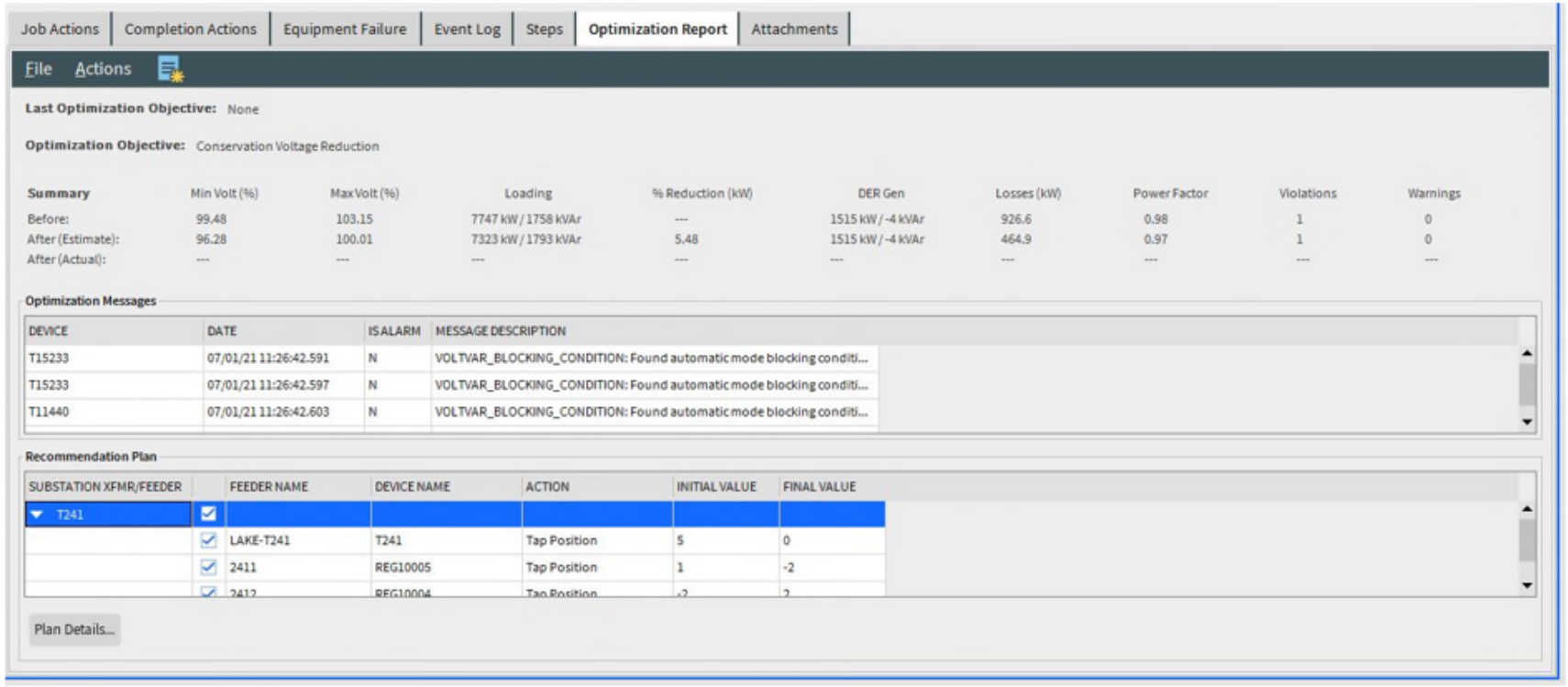
**4.10 Update Optimization Switch Plan**
**Actor/Role: NMS Authorized User**
**Description:**
If the user modified the Switch Plan the relevant changes will be saved into the database and associated to the optimization event.

**4.11 Initiate Execution**
**Actor/Role: NMS Authorized User**
**Description:**
Once the user is satisfied with the contents of the Switch Plan they can then request execution of the plan. The entire contents of the Switching Plan will then be executed by Switching Management and the relevant devices operations sent to the SCADA system.

# Document Control

## Change Record

| Date | Author | Version | Change Reference |
|---|---|---|---|
| 05/05/2021 | Andrew Neddermeyer | 1.0 | Initial Version for NMS v2.5.0.1 |
| 07/01/2021 | Andrew Neddermeyer | 1.1 | Finalized Changes for NMS v2.5.0.1 |
| 07/08/2021 | Saurabh Gupta | 1.1 | Reviewed |
| 7/8/2021 | Ian Hoogendam | 1.1 | Reviewed |
| 7/15/2021 | Mike Langford | 1.1 | Reviewed |
| 8/17/2021 | Palak Jain | 1.1 | Reviewed |
| 8/19/2021 | Galina Polonsky | | Reviewed, Approved |

# Attachments

## Optimization Report