# Use Case Task 1-2: Transport Contingency Specifications

## 1   Summary:

Export Contingency Specifications from the EMS or another application for use by the planning application(s).  This would allow coordination between the contingencies used by operations and transmission planning as well as generation planning.

## 2   Actor(s):

*Describe the primary and secondary actors involved in the use case. This might include all the people (their job), systems, databases, organizations, and devices involved in or affected by the role performed (e.g. operators, system administrators, customer, end users, service personnel, executives, meter, real-time database, ISO, power system). Actors listed for this use case should be copied from the global actors list to ensure consistency across all use cases.*

| Actor Name | Actor Type (person, system, device, etc.) | Role description for this use case |
|---|---|---|
| Network Planning Engineer | Person | Develop a base planning model to examine an operations event or to establish a new planning base case for future planning. |
| EMS Operator | Person | Attends the EMS and is familiar with its capabilities to export network models |
| EMS System | System | System for monitoring/controlling the real-time system and includes a bus-breaker network operations model for real-time network calculations and includes switches/breakers in the model (bus-breaker model).  Includes a State Estimator and usually a load flow solution package as well as a contingency analysis engine that uses either automatic or user-specified contingencies to check system security |
| External System | System | System or database that contains information on contingency conditions studied in the operations, generation planning, and/or transmission planning activities. |
| Planning Software | System | Software for detailed study of network performance, usually representing a larger geographical territory than the network model in the EMS.  Generally based on a bus-branch model (no switches/breakers).  Planning software includes power flow, short-circuit, dynamics, etc. |
| CIM XML | Method | A protocol defined by a NERC profile that establishes the content, naming, relationships, etc. of network data and the file format for a file exchange from one EMS to another such that sufficient data is exchanged to perform a similar load flow solution on the receiving EMS system |
| Topology Processor | Analysis | A software analysis used to remove switches/breakers from an operations model (bus-breaker model) to a planning model (bus-branch model).  Uses the switch positions (open/closed) in the operations model to connect/disconnect equipment terminals together in the planning model.  The bus-breaker model can be developed from base EMS data or from an actual operations mode. |
| Base Case | Network planning model from which network alternatives are studied | A data set that represents the network at a specific point in time either as a past point in time or a significant point in time in the future (e.g. 2008 Summer heavy case).  The Network Planning Engineer builds alternatives on this case for transmission expansion scenarios or "what-ifs" if the case is a case representing a historical operating point |
| | | |

## 3    Assumptions / Design Considerations:

Contingency specifications identify system conditions for which the system is to be subjected to determine the capability of the system to withstand the occurance of the contingency. Contingencies may represent a single change or multiple changes to the system operating conditions.

Contingencies are generally specified in terms of a specific model (i.e. operations model, planning model, etc.) and therefore are expressed differently.  For instance a contingency might be expressed in an operations model as two breakers opening to isolate a line or component, where in the planning model, without breaker representations, the contingency would be expressed as a line out of service.  Contingencies could be considered to be a subset of a broader class of activities that would be considered service outages.

## 4    Pre-conditions:

Contingency specifications exist in the EMS or external system and can be considered to be a list of suddenly-occuring changes in the state of the system.  A single contingency could consist of any one or combination of the following:

1.  component(s) switched in/out of service (breakers, lines, transformers, shunt devices, etc.)

2.  loss of/rescheduling generation

3.  loss/switching on of load

Contingencies must be related to a model.  That is, if a contingency is specified for a future line addition made to the model, that contingency would have no relationship to the model prior to the time that represents the line being installed in the model.

## 5    Normal Sequence:

| Use Case Step | Event/ Input to this step | Actor activity and tools used | Description Of Processing | Information Producer | Information Receiver | Output Information to be Exchanged | Notes or Comments |
|---|---|---|---|---|---|---|---|
| # | *Event that triggers this step and/or inputs* | *Name of actor(s), activity description, and tools/ applications used* | *Describe the processing that takes place in this step.* | *Actors/tools responsible for producing information.* | *Actors responsible for receiving information* | *Description of information produced in this step to be exchanged with Information Receiver* | |
| 1 | Request from planning for one or more contingency definitions | Network Planning Engineer notifies target EMS system or External System of the need for a contingency list. | Network Planning Engineer specifies what model is being used and/or what contingency data is needed – base data, future planning model, past model, etc. | EMS system or External System | A file | The file is a CIM XML file | File consists of some relationship to the model to which the contingencies apply and a list of contingencies |

| Use Case Step | Event/ Input to this step | Actor activity and tools used | Description Of Processing | Information Producer | Information Receiver | Output Information to be Exchanged | Notes or Comments |
|---|---|---|---|---|---|---|---|
| # | *Event that triggers this step and/or inputs* | *Name of actor(s), activity description, and tools/ applications used* | *Describe the processing that takes place in this step.* | *Actors/tools responsible for producing information.* | *Actors responsible for receiving information* | *Description of information produced in this step to be exchanged with Information Receiver* | |
| | | | | | | | |
| 2 | CIM XML file | Network Planning Engineer - Data model translator | Contingencies may be specified in reference to a different type of model (eg. Bus-breaker operations model) versus the bus-branch planning model.  This processing would convert the contingencies to terms of the bus-branch model | Manually by the Network Planning Engineer or automatic using a software application related to a topology processor | Network Planning Engineer | A list of contingencies suitable for use in the target planning model | |
| 3 | List of contingencies matching the planning model | Network Planning Engineer | Enter contingency specifications into the planning application | Network Planning Engineer | Planning Application | Network Study under contingency conditions | **Process Complete** |
| | | | | | | | |

## 6   Exceptions / Alternate Sequences:

*Describe any alternative actions that may be required that deviate from the normal course of activities. Should the alternate sequence require detailed descriptions, consider creating a new Use Case.*

None

## 7   Post Conditions

*Describe conditions that must exist at the conclusion of the use case.*

List of contingencies for use in planning studies.

## 8   Activity Diagrams

*Typically an activity diagram with swim lanes for each participating system or actor to graphically describe the step-by-step interactions between actors/systems and the messages exchanged between them. Additionally, sequence diagrams may be developed to help describe complex event flows.*

## 9 References:

*Use Cases referenced by this use case, or other documentation that clarifies the requirements or activities described. Also any prior work (intellectual property of companies or individuals) used in the preparation of this use case.*

## 10 Issues:

*List of outstanding issues that must be addressed to complete the use case.*

| ID | Description | Status |
|----|-------------|--------|
| 1 | List of data required in the contingency specification | Not started |
| | | |

## 11 Revision History:

| No | Date | Author | Description |
|----|------|--------|-------------|
| 0 | 01/27/07 | S F Mauser | Initial version |
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## 12  Use Case Diagram

**Step 1 – Request
File from EMS or
Other Application**

**System
Planner**

**Step 2 –
Export Contingencies
with Reference Model
Relationships**

**EMS or Other
External System
Export**

CIM XML

**Step 3 – Translate
Contingencies into
terms of target model**

**Data Model
Translator**

Contingency Specification
List Suitable for Target
Planning Application

**Applications Software
Package**