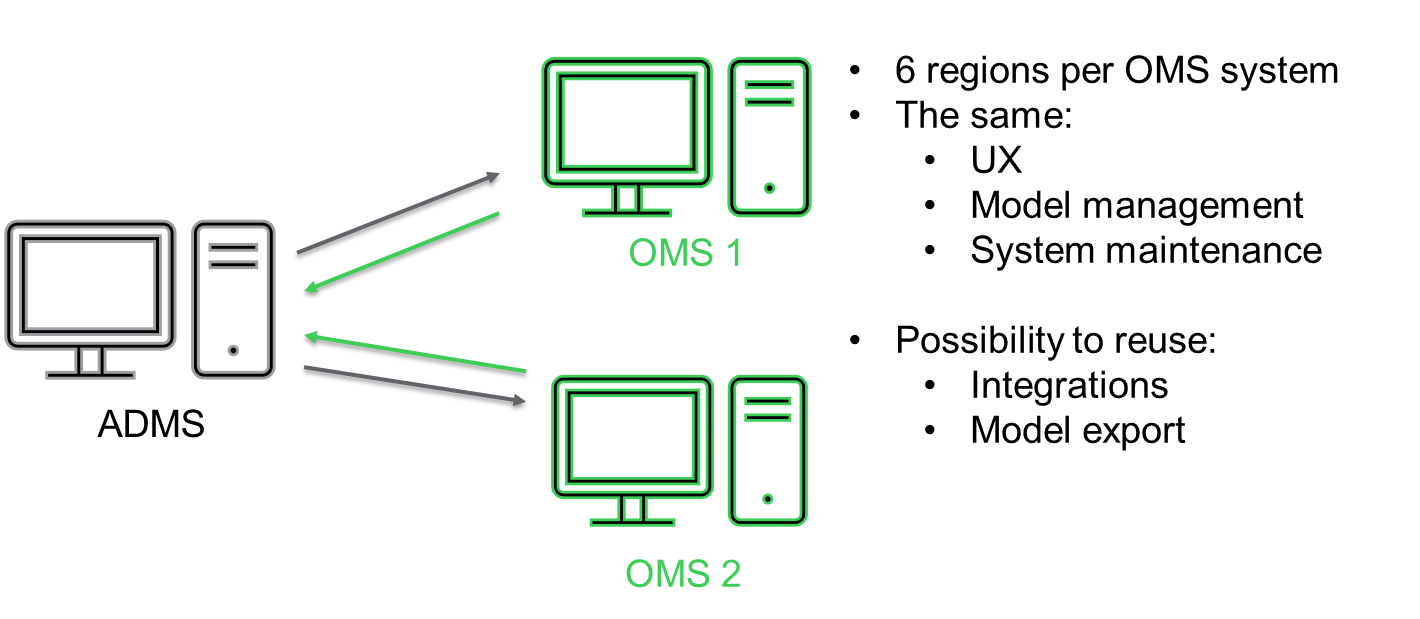
**Recommendations SE for PEA OMS**

## Architecture

Two OMS system, each with approximately ½ of the PEA service territory.



## Network Model Maintenance

Starting point should be existing model from ADMS system that includes substations, MV feeders and schematics to speed up project execution.

Our proposal is to leverage automatic synchronization of the network model between the two SE systems, that is developed for the cases when we have two separate systems (ADMS and EMS or ADMS and DERMS) both provided by SE. With small modification, this process can be used in this situation when ADMS and OMS systems are separated. It enables that changes to the network model are done in one place, on the source system (in this case ADMS), and upon completion of model promotion, for configured set of network containers, same changes are transferred as CIM xml file to the destination system(s), in this case OMS, where they are promoted by the user.

So, it should be expected that OMS system should be able to process CIM files in format provided by existing ADMS, containing changes for both MV feeders and substation internals. That will significantly reduce effort for PEA personnel in maintenance of network model in OMS system, as whole process of import and validation would be done only once (in ADMS side), and OMS system would just reuse it. It will also provide better alignment in models of both systems as they would be updated at the same time.

It will also be beneficial if single line diagrams from ADMS can be imported to OMS system to avoid unnecessary manual work in drawing SLD again in OMS system.

OMS system should be able to reuse of ICCP configuration from ADMS system to OMS system. ADMS system can provide export of ICCP configuration, and it should significantly reduce manual effort if this export can be imported to OMS systems.

## LV network

OMS system should be capable to support PEA LV network. Pattaya City LV network should be included in OMS system to enable visibility of LV outages and as a proof of concept for the rest of the system. Inclusion of LV outages in the long run will help PEA to more precisely measure customer outage minutes (count only affected LV feeders). This will ultimately help PEA to improve SAIDI/SAIFI key KPI.

LV network model should be imported from GIS and preparation of LV network export should be in scope of OMS vendor.

LV network model will be gradually imported in OMS according to the maturity of the LV data in GIS. Selected OMS vendor should:

* + - * + Build and test Pattaya city LV network model as part of OMS project
        + Train PEA staff to be able to continue building the LV network over the years

OMS vendor needs to size the OMS system (License and HW) to integrate the full PEA Low-Voltage network that will be available in the future (throughout the lifetime of the system).

## Outage Management

Outages will be created and maintained in the OMS system. During outage handling operation on manual and remote switching devices will be executed. Due to various business processes and ownership over locally controlled switches on MV, there should be allowed flexibility to update switch statuses in any of the systems (ADMS and OMS). Integration interfaces should ensure that both systems have updated topology based on locally controlled switches status changes.

For remote points, ICCP integration will be used to transfer switching statuses from ADMS system to OMS system, and outages will be automatically created. It would be also possible to configure ICCP in that way that operators in OMS system can operate remote points via ICCP (for switching points that are relevant for outage handling), in case this use case becomes of interest.

OMS should support exchange of tags on remote points using ICCP block 4 implementations that is supported by existing ADMS system.

For manual points, adapter will be used to transfer manual point status changes between OMS and ADMS system.

Temporary elements should also be aligned between the OMS and the ADMS systems using integration adapter.

Tags on manual points should also be aligned between the OMS and the ADMS systems using integration adapter.

## Clearance – Live line work request

OMS operator may request permit (Safety Document or Clearance is commonly used terminology) for the crew to work in network area controlled by ADMS user. That permit would be transferred to ADMS system by the integration adapter. ADMS user will approve that Safety Document to guarantee safety of the working crew. When the work is done, OMS operator will return Safety Document (Clearance – Live line work) and ADMS operator can return all to regular state.

## Switching Order Management

To provide flexibility for different use cases and process in different regions, switching planning process and execution can be done in either ADMS or OMS system. Work Requests and Switching Plans, if created in ADMS system, could be transferred to OMS.

Integration adapter should be used to transfer Switching Plans and Work requests between ADMS and OMS systems.

OMS should have capability to automatically generate Switching Plan for isolating requested equipment defined in Work Request. OMS should be able to validate prepared Switching Plans in Simulation based on Load Flow calculations.

OMS system should be able to provide the list of customers that will be affected by the planned work.

## FLISR

Automatic FLISR has full value on ADMS system, where it can quickly react and isolate the fault and restore power using remote switches. But manual FLISR can provide some benefits on the OMS system as well, as a supporting tool that can be used by the operators in cases of some larger outages in the depth of the feeder, where suggesting for isolation and restoration variants based on Load Flow results can speed up operator work and help him make better and faster decisions. This benefit can be achieved if manual FLISR module is fully integrated into OMS system.

One addition to this process that can bring extra value is the integration that can transfer detected fault location by FLISR that is run on ADMS system to the OMS side so that OMS operators are aware in which area to organize reparation work. There, fault locations will be recognized by the FLISR if it is manually run on the OMS system.

## Alignment of ad-hock switching operations

In case there are use cases where some ad-hock switching operations are executed in the ADMS or OMS system in the network (not part of any outage or planned work), alignment of switch statuses can be done using ICCP integration for remote points and integration adapter for manual points.

In case of a need of ad-hock operation on remote devices, it can be done in ADMS system and via ICCP aligned on OMS system. Ad-hock switching on the manual points should be performed only by the field crews (in the field) and updated in either ADMS or OMS system, where those updates will be transferred to the other system using integration adapter.

## Crew Management

OMS system should enable full model of crews, with members, vehicle, skills, shifts, in order to support dispatching of a best crew for the job. Visualization of the crews on work location and current location (based on GPS coordinates provided by the crew vehicle or mobile device) are very valuable for the safety reasons.

Crew data (crew members, vehicles, skills, shifts, association of members to a crew) shall be synchronized from 3rd party system to OMS.

## Field crew application

Best approach from total cost of ownership perspective is to have mobile application for crews that is fully integrated with OMS system, to avoid complex integration development and maintenance. Application for the field crew should provide all data related to outage or planed work, access to the network view with online and up-to date state of the network and visibility of other work and crews in the area. Field crew should have ability to record all actions and findings in the application that would minimize necessity for voice communication between control room and field crews and increase safety and efficiency of the field crews. Field crew application should support offline work in the area without network coverage and automatic synchronization of data when connected.

## PoC scenarios

Proof of Concept should be performed on the network model that is built based on model data provided by the PEA (e.g., export from GIS). PEA should provide before PoC representative part of the network that includes both medium voltage and low voltage network.

Duration should be 2 to 2.5 days, including one day for preparation.

Pattaya City LV network should be used during Proof-Of-Concept to test network with Low-Voltage (Pattaya city being the only city for PEA equipped with smart-meters).

Tendering process (proof of concept) should include following scenarios:

User interface

1. Demonstrate desktop layout configuration/ management
2. Demonstrate areas of responsibility functionality
3. Demonstrate tabular displays filtering, sorting and user configurable capabilities
4. Demonstrate capability to autogenerate one-line circuit schematic diagrams based on geographic data
5. Demonstrate the circuit tracing capabilities including upstream, downstream, to source, to next switching device, to open points, etc.
6. Demonstrate search / find capabilities (transformers, switches, customers, addresses, intersections, etc.)
7. Demonstrate dynamic topological coloring and abnormal topology coloring and indication
8. Demonstrate web application layout configuration/management
9. Demonstrate web application tabular displays filtering, sorting and user configurable capabilities
10. Demonstrate web application circuit tracing capabilities including upstream, downstream, to source, to next switching device, to open points, etc.
11. Demonstrate web application search / find capabilities (transformers, switches, customers, addresses, intersections, etc.)
12. Demonstrate web application dynamic topological coloring and abnormal topology coloring and indication
13. Demonstrate mobile application user interface, including access to network displays, tracing capabilities, search capability, etc.

Outage management

1. Demonstrate trouble call management capabilities (receiving of trouble calls from different sources: Call Center, operator input, customer portal, customer calls, location based calls, etc.)
2. Demonstrate outage management in LV network, including single customer outage, LV feeder outage, and secondary transformer outage
3. Demonstrate incident management capabilities including incident lifecycle, creation of incident based on trouble call/AMI data, prediction engine, optimal crew assignment, receiving of assignments in crew mobile application, multimedia attachments, resolution of incident, callbacks
4. Demonstrate creation of incident based on SCADA event, determining fault location
5. Demonstrate restoration of an outage in multiple restoration steps, including locally controlled switches, temporary elements and remote switches. Emphasize how customer interruption times are recorded in each restoration step.
6. Demonstrate capability to correct recorded incident data (number of affected customers, misplaced calls, executed switching steps, customer interruption times) for both active and closed incident
7. Demonstrate crew management capabilities
8. Demonstrate management of incidents by field crew on mobile application, including offline work mode
9. Demonstrate storm mode management (from OMS point of view)
10. Demonstrate process for creation of follow up work, and a consequence of unplanned outage
11. Demonstrate OMS reporting (live dashboards, historical reports)
12. Demonstrate configurability of OMS (user configuration, processing configuration, visualization)

Switching management

1. Demonstrate creation of work request for planned works on electrical asset
2. Demonstrate automatic creation of switching plan based on information from work request
3. Demonstrate visualization of switching management documents and switching steps in the network view
4. Demonstrate scheduling capabilities (automatic clash checking, Gantt chart, etc.)
5. Demonstrate approval of switching plan (multiple levels of approval, switching validations, outage report)
6. Demonstrate process for modifying switching plan after approval
7. Demonstrate execution of switching plan including execution of remote and manual steps
8. Demonstrate execution of switching by field crew on mobile application
9. Demonstrate issuing and returning of safety document
10. Demonstrate various capabilities for manual creation of switching plan and speeding up process for switching plan writing
11. Demonstrate validation of switching plan in Study mode
12. Demonstrate how commissioning of new network parts (e.g., commissioning of new distribution transformer) shall be performed as part of switching plan process
13. Demonstrate live line work (e.g., tree trimming) process in switching management
14. Demonstrate configurability of Switching Management

Model maintenance

1. Explain how the demo model was built, discuss main issues detected and quality of data provided.
2. Discuss how model maintenance process will be implemented, including process for data sourced from GIS, and well as for maintenance of substation models and single line diagrams
3. Demonstrate process for incremental feeder import from GIS, including automatic validations and reporting detected errors.
4. Demonstrate process for applying imported GIS data to production environment
5. Demonstrate graphical editor capabilities for maintaining substation displays
6. Demonstrate process for ICCP configuration maintenance

## Background and Recommendations for User and Licenses

* + - * Background:
        + PEA will insist to keep at least the same 350 number of concurrent licenses as existing Trimble Licenses
        + Overall user:

1000 users (200 in important/big offices categorized #1 to #3, and 800 in smaller offices categorized #4 and #5). Expected offices #4 and #5 will rely on offices #1 to #3 to manage outages in their area

3000 field crews members, expected roughly 1000 per shift, per team if 3 members (1 crew)

* + - * + PEA will insist on keeping 3 screens for the 200 operators of the important office
      * Recommendations:
        + Consider Concurrent Licenses as follow:

350 Users

200 Desktop application (DMD)

150 Web application (DMD)

350 Mobile Application for field Crew (native OMS application)

* + - * + Consider the following HW:

New workstations with 3 screens for all Desktop application (200 units)

Leverage existing for Web application

No tablet for crew

## Recommendation for tender commercial evaluation

* + - * Promote Technical over Price, recommended soring split 80% technical and 20% Price
      * For Technical, promote the weight of the PoC, recommended
        + Table of Compliance score 20%
        + Integration Compliance 20%
        + PoC 60%
      * Recommend minimal technical score to pass to increase from 70 to 80% to ensure PEA is selecting the strongest vendor to deliver state-of-the-art compliant OMS with limited execution risks (costs, delay, …)
      * Suggest increasing the scoring difference between “C” and “A”, for example if “C” gives 5 points, “A” should be half or less.
      * Suggest considering “bonus” point allocation
        + For example, for Project Resources, if involved in deploying the product in Thailand
      * Recommend scoring for the number of active utilities using the product platform
        + Number of utilities running the product is more than 50. have 5 score
        + Number of active utilities, products 40-49 have 3 score
        + Number of active utilities 30 to 39 products have 1 score
        + Number of active utilities less than 30 products have 0 score
      * Recommended scoring for the maximum number of utility meters for the platform
        + Maximum number of electricity users is more than 7 million meters. Get 5 points
        + Maximum number of electricity users 5-7 million meters Get 3 points
        + Maximum number of electricity users 1-5 million meters Get 1 point
        + Maximum number of electricity users below 1 million meters Get 0 point
      * Suggest for PoC use-cases to consider Pass or Fail scoring, not granting point if the use-cases is half successful. This is in the interest of PEA to ensure selection of the best OMS vendor for their project

## Recommendation for FAT and Training location

* + - * Recommend PEA to allow FAT in Thailand
      * Recommend PEA to have training in the same location as FAT to be more efficient
      * Suggest the possibility for vendor to include a “management training seminar” for PEA management at software factory of origin, to be exposed to the latest market trends, technologies, roadmap, meeting executive, visit of software factory, introduction with development chain …

## Recommendations for Price Schedule (project milestones and Payment terms)

* + - * PEA to consider adjusting the requirements to Software industry standard, some suggestions as follow:
        + Advanced Payment
        + Design completion/acceptance
        + Development completion/acceptance
        + FAT completion/acceptance
        + HW delivery at PEA
        + SAT completion/acceptance
        + TOAC

## Recommendations for support during warranty and maintenance

* + - * PEA to considersimilar requirement for restauration and resolution time as ADMS project**:**

