

**การไฟฟ้าส่วนภูมิภาค**

**PROVINCIAL ELECTRICITY AUTHORITY**

โครงการจัดหา พัฒนา ติดตั้ง และบำรุงรักษา

ระบบริหารไฟฟ้าขัดข้อง Outage Management System (OMS)

* 1. (2) ขอบเขตรายละเอียดของงาน (TOR)

(Book 3: System Integration)

**ภาคผนวก A6 : โปรไฟล์เพื่อการเชื่อมโยงข้อมูล MobileApp\_OMS**

**ภาคผนวก A6  
โปรไฟล์เพื่อการเชื่อมโยงข้อมูล MobileApp\_OMS**

การพัฒนาเชื่อมโยงข้อมูลระหว่างซอฟต์แวร์จำเป็นต้องมีข้อกำหนดกลางเพื่อการเชื่อมโยงข้อมูล มาตรฐาน ไออีซี ซิม หรือ IEC CIM (Common Information Model) เป็นมาตรฐานสากลเพื่อการเชื่อมโยงข้อมูลเกี่ยวกับ การจำหน่ายกระแสไฟฟ้าและการบริหารไฟฟ้าขัดข้อง ที่สำคัญได้แก่ IEC-61970 และ IEC-61968 มาตรฐานสากลดังกล่าวจัดทำขึ้นเพื่อใช้เป็นข้อกำหนดกลางในการรับส่งข้อมูลระหว่างซอฟต์แวร์ที่แตกต่างกัน เพื่อลดเวลา ลดค่าใช้จ่าย และเพิ่มประสิทธิภาพในการพัฒนาเชื่อมโยงข้อมูลระหว่างกัน ปัจจุบันผลิตภัณฑ์ซอฟต์แวร์ที่พัฒนาขึ้นเพื่อสนับสนุนการปฏิบัติระบบไฟฟ้าและบริหารไฟฟ้าขัดข้อง มักมีความสามารถในการเชื่อมโยงข้อมูลตามมาตรฐานนี้

โปรไฟล์เพื่อการเชื่อมโยงข้อมูล (CIM Profile) คือ ข้อกำหนดขอบเขตและคุณลักษณะเฉพาะของข้อมูลภายใต้บริบทหนึ่ง ประกอบด้วย ชื่อข้อมูล ความหมายและรูปแบบข้อมูล เพื่อใช้ในการพัฒนาระบบเชื่อมโยงข้อมูลภายใต้วัตถุประสงค์หนึ่ง ตัวอย่างโปรไฟล์มาตรฐาน ได้แก่ IEC-61970-452, IEC-61970-453, IEC-61970-456 องค์กรสามารถกำหนดโปรไฟล์ที่เหมาะสมกับบริบทของตนได้ โดยการกำหนดรายการข้อมูลเฉพาะส่วนที่จำเป็นสำหรับการเชื่อมโยงข้อมูลภายใต้บริบทนั้น มักมีขนาดเล็กและง่ายต่อการพัฒนา โปรไฟล์การเชื่อมโยงข้อมูลนี้จัดทำขึ้นตามมาตรฐานสากล IEC-61970-501 จัดทำขึ้นโดยใช้ซอฟต์แวร์เครื่องมือเพื่อใช้สร้างโปรไฟล์ อาทิ เช่น CIMtool เป็นต้น

เอกสารนี้อธิบายโปรไฟล์เพื่อการเชื่อมโยง ระบบ MobileApp ชื่อว่า MobileApp\_OMS

CIM profile: [http://pea.co.th/cim/profile/MobileApp\_OMS#](http://pea.co.th/cim/profile/MobileApp_OMS)

ประกอบด้วย เอกสารดังนี้

1. เอกสารอธิบายโปรไฟล์ : MobileApp\_OMS.rtf, MobileApp\_OMS.html
2. แฟ้มเอกสารอิเล็กทรอนิกส์ ข้อกำหนดโปรไฟล์ : MobileApp\_OMS.owl
3. แฟ้มเอกสารอิเล็กทรอนิกส์ IEC-61970-501 : MobileApp\_OMS.legacy-rdfs
4. แฟ้มเอกสารอิเล็กทรอนิกส์ IEC-61968-100 : MobileApp\_OMS.part100-ed2.xsd

ผู้รับจ้างต้องดำเนินการศึกษา ทบทวนและสอบทาน ข้อกำหนดโปรไฟล์นี้ กับผู้ที่เกี่ยวข้องกับซอฟต์แวร์ที่จะเชื่อมโยงนั้น ปรับข้อกำหนดโปรไฟล์ให้สอดคล้องกับความต้องการของผู้เกี่ยวข้องและเสนอขอรับความเห็นชอบก่อนการดำเนินการ

**MobileApp\_OMS\_Profile Profile**

Profile namespace: http://pea.co.th/cim/profile/MobileApp\_OMS#

**Concrete Classes**

**Crew**

Group of people with specific skills, tools, and vehicles.

**Native Members**

|  |  |  |  |
| --- | --- | --- | --- |
| **name** | **mult** | **type** | **description** |
| mRID | 1..1 | string | Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended.For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements. |
| aliasName | 1..1 | string | The aliasName is free text human readable name of the object alternative to IdentifiedObject.name. It may be non unique and may not correlate to a naming hierarchy.The attribute aliasName is retained because of backwards compatibility between CIM relases. It is however recommended to replace aliasName with the Name class as aliasName is planned for retirement at a future time. |
| description | 1..1 | string | The description is a free human readable text describing or naming the object. It may be non unique and may not correlate to a naming hierarchy. |
| name | 1..1 | string | The name is any free human readable and possibly non unique text naming the object. |
| CrewMembers | 1..\* | [CrewMember](#CrewMember) | All members of this crew. |
| CrewType | 1..1 | [CrewType](#CrewType) | Type of this crew. |
| status | 1..1 | [Status](#Status) | Status of this crew. |
| SwitchingAction | 1..1 | [SwitchingAction](#SwitchingAction) | The switching action that is assigned to this crew. |
| WorkTasks | 1..\* | [WorkTask](#WorkTask) | All work tasks this crew participates in. |

**Outage**

Document describing details of an active or planned outage in a part of the electrical network.

A non-planned outage may be created upon:

- a breaker trip,

- a fault indicator status change,

- a meter event indicating customer outage,

- a reception of one or more customer trouble calls, or

- an operator command, reflecting information obtained from the field crew.

Outage restoration may be performed using a switching plan which complements the outage information with detailed switching activities, including the relationship to the crew and work.

A planned outage may be created upon:

- a request for service, maintenance or construction work in the field, or

- an operator-defined outage for what-if/contingency network analysis.

**Native Members**

| **name** | **mult** | **type** | **description** |
| --- | --- | --- | --- |
| mRID | 1..1 | string | Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended.For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements. |
| communityDescriptor | 1..1 | string | a name to denote the community - this could be a name or a code of some kind. |
| createdDateTime | 1..1 | dateTime | Date and time that this document was created. |
| customersRestored | 1..1 | integer | number of customers that have been restored in the area. |
| description | 1..1 | string | The description is a free human readable text describing or naming the object. It may be non unique and may not correlate to a naming hierarchy. |
| lastModifiedDateTime | 1..1 | dateTime | Date and time this document was last modified. Documents may potentially be modified many times during their lifetime. |
| metersAffected | 1..1 | integer | The updated number of meters affected by the outage as reported by the OMS within the utility. It is assumed this number will be updated repeatedly until the full outage is resolved. |
| name | 1..1 | string | The name is any free human readable and possibly non unique text naming the object. |
| originalCustomersServed | 1..1 | integer | the total number of customers that are served in the area (both outaged and not outaged). |
| originalMetersAffected | 1..1 | integer | The original number of meters that were affected as reported by the OMS within the utility. That is, this is the total number of meters that were out at the beginning of the outage. |
| outageKind | 1..1 | [OutageStatusKind](#OutageStatusKind) | Defines if the outage has been verified or is only estimated |
| revisionNumber | 1..1 | string | Revision number for this document. |
| statusKind | 1..1 | [CrewStatusKind](#CrewStatusKind) | defines the status of the crew as in dispatched or arrived, etc. |
| subject | 1..1 | string | Document subject. |
| title | 1..1 | string | Document title. |
| type | 1..1 | string | Utility-specific classification of this document, according to its corporate standards, practices, and existing IT systems (e.g., for management of assets, maintenance, work, outage, customers, etc.). |
| utilityDisclaimer | 1..1 | string | This contains an disclaimers the utility would like to place on the data provided to any stakeholder. This may be different for different stakeholders. This should possibly be an attribute under the Organization class but it is placed here for now. |
| actualPeriod | 1..1 | [DateTimeInterval](#DateTimeInterval) | Actual outage period; end of the period corresponds to the actual restoration time. |
| Crew | 1..\* | [Crew](#Crew) | The crew that is assigned to the outage. |
| DeEnergizedUsagePoint | 1..\* | [UsagePoint](#UsagePoint) | all deenergized useage points associated with the outage. |
| EnergizedUsagePoint | 1..\* | [UsagePoint](#UsagePoint) | All energized usage points associated with this outage. |
| Equipments | 1..\* | [Equipment](#Equipment) | All equipments associated with this outage. |
| estimatedPeriod | 1..1 | [DateTimeInterval](#DateTimeInterval) | Estimated outage period for a planned outage. The start of the period is the start of the planned outage and the end of the period corresponds to the end of the planned outage. |
| EstimatedRestorationTime | 1..1 | [EstimatedRestorationTime](#EstimatedRestorationTime) | The estimated time that the power will be restored after an outage |
| Faults | 1..\* | [Fault](#Fault) | All faults involved in this outage. |
| OutageArea | 1..\* | [OutageArea](#OutageArea) | The outage area where the outage occured. |
| OutageIsolationEquipment | 1..\* | [ConductingEquipment](#ConductingEquipment) | The equipment that isolates this outage |
| summary | 1..1 | [ServicePointOutageSummary](#ServicePointOutageSummary) | Summary counts of service points (customers) affected by this outage. |

**OutageOrder**

Transmits an outage plan to a crew in order for the planned outage to be executed.

**Native Members**

|  |  |  |  |
| --- | --- | --- | --- |
| **name** | **mult** | **type** | **description** |
| comment | 1..1 | string | Free text comment. |
| comment | 1..1 | string | Free-form comment associated with the outage order |
| createdDateTime | 1..1 | dateTime | Date and time that this document was created. |
| subject | 1..1 | string | Document subject. |
| title | 1..1 | string | Document title. |
| type | 1..1 | string | Utility-specific classification of this document, according to its corporate standards, practices, and existing IT systems (e.g., for management of assets, maintenance, work, outage, customers, etc.). |
| Location | 1..\* | [Location](#Location) | Location of this outage order. |
| OutagePlan | 1..1 | [OutagePlan](#OutagePlan) | The outage plan that is defined to address the outage order. |

**OutagePlan**

Document containing the definition of planned outages of equipment and/or usage points. It will reference switching plans that are used to execute the planned outage.

**Native Members**

|  |  |  |  |
| --- | --- | --- | --- |
| **name** | **mult** | **type** | **description** |
| approvedDateTime | 1..1 | dateTime | The date and time the outage plan was approved |
| cancelledDateTime | 1..1 | dateTime | Date and Time the planned outage was canceled. |
| purpose | 1..1 | string | Purpose of this outage plan, such as whether it is to replace equipment or perform maintenance or repairs or to reconfigure network topology. |

**Person**

General purpose information for name and other information to contact people.

**Native Members**

|  |  |  |  |
| --- | --- | --- | --- |
| **name** | **mult** | **type** | **description** |
| mName | 1..1 | string | Middle name(s) or initial(s). |

**PlannedOutage**

**Native Members**

| **name** | **mult** | **type** | **description** |
| --- | --- | --- | --- |
| mRID | 1..1 | string | Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended.For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements. |
| communityDescriptor | 1..1 | string | a name to denote the community - this could be a name or a code of some kind. |
| createdDateTime | 1..1 | dateTime | Date and time that this document was created. |
| customersRestored | 1..1 | integer | number of customers that have been restored in the area. |
| description | 1..1 | string | The description is a free human readable text describing or naming the object. It may be non unique and may not correlate to a naming hierarchy. |
| lastModifiedDateTime | 1..1 | dateTime | Date and time this document was last modified. Documents may potentially be modified many times during their lifetime. |
| metersAffected | 1..1 | integer | The updated number of meters affected by the outage as reported by the OMS within the utility. It is assumed this number will be updated repeatedly until the full outage is resolved. |
| name | 1..1 | string | The name is any free human readable and possibly non unique text naming the object. |
| originalCustomersServed | 1..1 | integer | the total number of customers that are served in the area (both outaged and not outaged). |
| originalMetersAffected | 1..1 | integer | The original number of meters that were affected as reported by the OMS within the utility. That is, this is the total number of meters that were out at the beginning of the outage. |
| outageKind | 1..1 | [OutageStatusKind](#OutageStatusKind) | Defines if the outage has been verified or is only estimated |
| reason | 1..1 | string | The reason for the planned outage. |
| revisionNumber | 1..1 | string | Revision number for this document. |
| statusKind | 1..1 | [CrewStatusKind](#CrewStatusKind) | defines the status of the crew as in dispatched or arrived, etc. |
| subject | 1..1 | string | Document subject. |
| title | 1..1 | string | Document title. |
| type | 1..1 | string | Utility-specific classification of this document, according to its corporate standards, practices, and existing IT systems (e.g., for management of assets, maintenance, work, outage, customers, etc.). |
| utilityDisclaimer | 1..1 | string | This contains an disclaimers the utility would like to place on the data provided to any stakeholder. This may be different for different stakeholders. This should possibly be an attribute under the Organization class but it is placed here for now. |
| ActivityRecord | 1..\* | [ActivityRecord](#ActivityRecord) | The activity record for a document |
| Approver | 1..1 | [Approver](#Approver) | Approver of this document. |
| Author | 1..1 | [Author](#Author) | Author of this document. |
| Crew | 1..\* | [Crew](#Crew) | The crew that is assigned to the outage. |
| DeEnergizedUsagePoint | 1..\* | [UsagePoint](#UsagePoint) | all deenergized useage points associated with the outage. |
| EnergizedUsagePoint | 1..\* | [UsagePoint](#UsagePoint) | All energized usage points associated with this outage. |
| Faults | 1..\* | [Fault](#Fault) | All faults involved in this outage. |
| FieldDispatchHistory | 1..1 | [FieldDispatchHistory](#FieldDispatchHistory) | The dispatch history associated with the planned outage |
| Incident | 1..\* | [Incident](#Incident) | Incident reported in trouble call that results in this outage. |
| Issuer | 1..1 | [Issuer](#Issuer) | Issuer of this document. |
| OutageArea | 1..\* | [OutageArea](#OutageArea) | The outage area where the outage occured. |
| OutagePlan | 1..1 | [OutagePlan](#OutagePlan) | Outage plan for executing a planned outage. |
| SwitchingPlans | 1..\* | [SwitchingPlan](#SwitchingPlan) | All switching plans that lead to supply restoration due to this outage. Only one will be retained for execution. |

**Inherited Members**

| **name** | **mult** | **type** | **description** |
| --- | --- | --- | --- |
| mRID | 1..1 | string | see [Outage](#Outage) |
| communityDescriptor | 1..1 | string | see [Outage](#Outage) |
| createdDateTime | 1..1 | dateTime | see [Outage](#Outage) |
| customersRestored | 1..1 | integer | see [Outage](#Outage) |
| description | 1..1 | string | see [Outage](#Outage) |
| lastModifiedDateTime | 1..1 | dateTime | see [Outage](#Outage) |
| metersAffected | 1..1 | integer | see [Outage](#Outage) |
| name | 1..1 | string | see [Outage](#Outage) |
| originalCustomersServed | 1..1 | integer | see [Outage](#Outage) |
| originalMetersAffected | 1..1 | integer | see [Outage](#Outage) |
| outageKind | 1..1 | [OutageStatusKind](#OutageStatusKind) | see [Outage](#Outage) |
| revisionNumber | 1..1 | string | see [Outage](#Outage) |
| statusKind | 1..1 | [CrewStatusKind](#CrewStatusKind) | see [Outage](#Outage) |
| subject | 1..1 | string | see [Outage](#Outage) |
| title | 1..1 | string | see [Outage](#Outage) |
| type | 1..1 | string | see [Outage](#Outage) |
| utilityDisclaimer | 1..1 | string | see [Outage](#Outage) |
| actualPeriod | 1..1 | [DateTimeInterval](#DateTimeInterval) | see [Outage](#Outage) |
| Crew | 1..unbounded | [Crew](#Crew) | see [Outage](#Outage) |
| DeEnergizedUsagePoint | 1..unbounded | [UsagePoint](#UsagePoint) | see [Outage](#Outage) |
| EnergizedUsagePoint | 1..unbounded | [UsagePoint](#UsagePoint) | see [Outage](#Outage) |
| Equipments | 1..unbounded | [Equipment](#Equipment) | see [Outage](#Outage) |
| estimatedPeriod | 1..1 | [DateTimeInterval](#DateTimeInterval) | see [Outage](#Outage) |
| EstimatedRestorationTime | 1..1 | [EstimatedRestorationTime](#EstimatedRestorationTime) | see [Outage](#Outage) |
| Faults | 1..unbounded | [Fault](#Fault) | see [Outage](#Outage) |
| OutageArea | 1..unbounded | [OutageArea](#OutageArea) | see [Outage](#Outage) |
| OutageIsolationEquipment | 1..unbounded | [ConductingEquipment](#ConductingEquipment) | see [Outage](#Outage) |
| summary | 1..1 | [ServicePointOutageSummary](#ServicePointOutageSummary) | see [Outage](#Outage) |

**SwitchingEvent**

Event indicating the completion (success or fail) of any switching action (jumper action, cut action, tag action, etc). The switching action may or may not be a consequential event in response to a request to complete the action.

**Native Members**

|  |  |  |  |
| --- | --- | --- | --- |
| **name** | **mult** | **type** | **description** |
| mRID | 1..1 | string | Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended.For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements. |
| createdDateTime | 1..1 | dateTime | Date and time this activity record has been created (different from the 'status.dateTime', which is the time of a status change of the associated object, if applicable). |
| description | 1..1 | string | The description is a free human readable text describing or naming the object. It may be non unique and may not correlate to a naming hierarchy. |
| name | 1..1 | string | The name is any free human readable and possibly non unique text naming the object. |
| reason | 1..1 | string | Reason for event resulting in this activity record, typically supplied when user initiated. |
| severity | 1..1 | string | Severity level of event resulting in this activity record. |
| type | 1..1 | string | Type of event resulting in this activity record. |

**TroubleOrder**

Trouble order sends an incident to a crew to initiate a response to an unplanned outage.

**Native Members**

|  |  |  |  |
| --- | --- | --- | --- |
| **name** | **mult** | **type** | **description** |
| mRID | 1..1 | string | Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended.For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements. |
| comment | 1..1 | string | Free-form comment associated with the trouble order. |
| createdDateTime | 1..1 | dateTime | Date and time that this document was created. |
| description | 1..1 | string | The description is a free human readable text describing or naming the object. It may be non unique and may not correlate to a naming hierarchy. |
| lastModifiedDateTime | 1..1 | dateTime | Date and time this document was last modified. Documents may potentially be modified many times during their lifetime. |
| name | 1..1 | string | The name is any free human readable and possibly non unique text naming the object. |
| subject | 1..1 | string | Document subject. |
| title | 1..1 | string | Document title. |
| type | 1..1 | string | Utility-specific classification of this document, according to its corporate standards, practices, and existing IT systems (e.g., for management of assets, maintenance, work, outage, customers, etc.). |
| electronicAddress | 1..1 | [ElectronicAddress](#ElectronicAddress) | Electronic address. |
| TroubleTicket | 1..\* | [TroubleTicket](#TroubleTicket) | The ticket called in by the customer that describes the trouble |
| WorkTask | 1..\* | [WorkTask](#WorkTask) | The work tasks that are associated with this trouble order. |

**TroubleTicket**

**Native Members**

|  |  |  |  |
| --- | --- | --- | --- |
| **name** | **mult** | **type** | **description** |
| comment | 1..1 | string | Free-form comment associated with the trouble call for example, "customer reported a large flash", etc. |
| dateTimeOfReport | 1..1 | dateTime | Date and time the trouble has been reported. |
| firstResponderStatus | 1..1 | string | Indicates whether the first responder such as police, fire department etc.has been notified and whether they are on site or en route. |
| multiplePremises | 1..1 | boolean | Set to true if the outage report indicated that other neighbors are also out of power. |
| reportingKind | 1..1 | [TroubleReportingKind](#TroubleReportingKind) | Indicates how the customer reported trouble. |
| resolvedDateTime | 1..1 | dateTime | Date and time this trouble ticket has been resolved. |
| troubleCode | 1..1 | string | Trouble code (e.g., power down, flickering lights, partial power, etc). |
| Incident | 1..1 | [Incident](#Incident) | Incident reported in this trouble ticket |
| Location | 1..1 | [Location](#Location) |  |

**UnplannedOutage**

Document describing the consequence of an unplanned outage in a part of the electrical network. For the purposes of this model, an unplanned outage refers to a state where energy is not delivered; such as, customers out of service, a street light is not served, etc.

A unplanned outage may be created upon:

- impacts the SAIDI calculation

- a breaker trip,

- a fault indicator status change,

- a meter event indicating customer outage,

- a reception of one or more customer trouble calls, or

- an operator command, reflecting information obtained from the field crew.

Outage restoration may be performed using a switching plan which complements the outage information with detailed switching activities, including the relationship to the crew and work.

**Native Members**

| **name** | **mult** | **type** | **description** |
| --- | --- | --- | --- |
| cause | 1..1 | string | The cause of this outage. This is the cause that is used to present to external entities. That is, the cause is weather, equipment failure, etc.Note: At present, this is a free string text; it could be replaced with an enumeration in the future. |
| causeKind | 1..1 | [OutageCauseKind](#OutageCauseKind) | The possible cause that could be associated with this unplanned outage. |
| communityDescriptor | 1..1 | string | a name to denote the community - this could be a name or a code of some kind. |
| createdDateTime | 1..1 | dateTime | Date and time that this document was created. |
| customersRestored | 1..1 | integer | number of customers that have been restored in the area. |
| lastModifiedDateTime | 1..1 | dateTime | Date and time this document was last modified. Documents may potentially be modified many times during their lifetime. |
| metersAffected | 1..1 | integer | The updated number of meters affected by the outage as reported by the OMS within the utility. It is assumed this number will be updated repeatedly until the full outage is resolved. |
| originalCustomersServed | 1..1 | integer | the total number of customers that are served in the area (both outaged and not outaged). |
| originalMetersAffected | 1..1 | integer | The original number of meters that were affected as reported by the OMS within the utility. That is, this is the total number of meters that were out at the beginning of the outage. |
| outageKind | 1..1 | [OutageStatusKind](#OutageStatusKind) | Defines if the outage has been verified or is only estimated |
| reportedStartTime | 1..1 | dateTime | The earliest start time of the Outage - as reported by some system or individual |
| statusKind | 1..1 | [CrewStatusKind](#CrewStatusKind) | defines the status of the crew as in dispatched or arrived, etc. |
| subject | 1..1 | string | Document subject. |
| title | 1..1 | string | Document title. |
| type | 1..1 | string | Utility-specific classification of this document, according to its corporate standards, practices, and existing IT systems (e.g., for management of assets, maintenance, work, outage, customers, etc.). |
| utilityDisclaimer | 1..1 | string | This contains an disclaimers the utility would like to place on the data provided to any stakeholder. This may be different for different stakeholders. This should possibly be an attribute under the Organization class but it is placed here for now. |
| actualPeriod | 1..1 | [DateTimeInterval](#DateTimeInterval) | Actual outage period; end of the period corresponds to the actual restoration time. |
| Crew | 1..\* | [Crew](#Crew) | The crew that is assigned to the outage. |
| DeEnergizedUsagePoint | 1..\* | [UsagePoint](#UsagePoint) | all deenergized useage points associated with the outage. |
| EnergizedUsagePoint | 1..\* | [UsagePoint](#UsagePoint) | All energized usage points associated with this outage. |
| Equipments | 1..\* | [Equipment](#Equipment) | All equipments associated with this outage. |
| estimatedPeriod | 1..1 | [DateTimeInterval](#DateTimeInterval) | Estimated outage period for a planned outage. The start of the period is the start of the planned outage and the end of the period corresponds to the end of the planned outage. |
| EstimatedRestorationTime | 1..1 | [EstimatedRestorationTime](#EstimatedRestorationTime) | The estimated time that the power will be restored after an outage |
| Faults | 1..\* | [Fault](#Fault) | All faults involved in this outage. |
| FieldDispatchHistory | 1..1 | [FieldDispatchHistory](#FieldDispatchHistory) | The dispatch history associated with the unplanned outage |
| Incident | 1..\* | [Incident](#Incident) | Incident reported in trouble call that results in this outage. |
| Incident | 1..\* | [Incident](#Incident) | The incidents that are associated with the unplanned outage |
| OutageArea | 1..\* | [OutageArea](#OutageArea) | The outage area where the outage occured. |
| OutageIsolationEquipment | 1..\* | [ConductingEquipment](#ConductingEquipment) | The equipment that isolates this outage |
| summary | 1..1 | [ServicePointOutageSummary](#ServicePointOutageSummary) | Summary counts of service points (customers) affected by this outage. |
| TroubleOrder | 1..\* | [TroubleOrder](#TroubleOrder) | The trouble order that is associated to the unplanned outage. |
| TroubleTicket | 1..\* | [TroubleTicket](#TroubleTicket) | The ticket called in by the customer that describes the trouble |

**Inherited Members**

| **name** | **mult** | **type** | **description** |
| --- | --- | --- | --- |
| mRID | 1..1 | string | see [Outage](#Outage) |
| communityDescriptor | 1..1 | string | see [Outage](#Outage) |
| createdDateTime | 1..1 | dateTime | see [Outage](#Outage) |
| customersRestored | 1..1 | integer | see [Outage](#Outage) |
| description | 1..1 | string | see [Outage](#Outage) |
| lastModifiedDateTime | 1..1 | dateTime | see [Outage](#Outage) |
| metersAffected | 1..1 | integer | see [Outage](#Outage) |
| name | 1..1 | string | see [Outage](#Outage) |
| originalCustomersServed | 1..1 | integer | see [Outage](#Outage) |
| originalMetersAffected | 1..1 | integer | see [Outage](#Outage) |
| outageKind | 1..1 | [OutageStatusKind](#OutageStatusKind) | see [Outage](#Outage) |
| revisionNumber | 1..1 | string | see [Outage](#Outage) |
| statusKind | 1..1 | [CrewStatusKind](#CrewStatusKind) | see [Outage](#Outage) |
| subject | 1..1 | string | see [Outage](#Outage) |
| title | 1..1 | string | see [Outage](#Outage) |
| type | 1..1 | string | see [Outage](#Outage) |
| utilityDisclaimer | 1..1 | string | see [Outage](#Outage) |
| actualPeriod | 1..1 | [DateTimeInterval](#DateTimeInterval) | see [Outage](#Outage) |
| Crew | 1..unbounded | [Crew](#Crew) | see [Outage](#Outage) |
| DeEnergizedUsagePoint | 1..unbounded | [UsagePoint](#UsagePoint) | see [Outage](#Outage) |
| EnergizedUsagePoint | 1..unbounded | [UsagePoint](#UsagePoint) | see [Outage](#Outage) |
| Equipments | 1..unbounded | [Equipment](#Equipment) | see [Outage](#Outage) |
| estimatedPeriod | 1..1 | [DateTimeInterval](#DateTimeInterval) | see [Outage](#Outage) |
| EstimatedRestorationTime | 1..1 | [EstimatedRestorationTime](#EstimatedRestorationTime) | see [Outage](#Outage) |
| Faults | 1..unbounded | [Fault](#Fault) | see [Outage](#Outage) |
| OutageArea | 1..unbounded | [OutageArea](#OutageArea) | see [Outage](#Outage) |
| OutageIsolationEquipment | 1..unbounded | [ConductingEquipment](#ConductingEquipment) | see [Outage](#Outage) |
| summary | 1..1 | [ServicePointOutageSummary](#ServicePointOutageSummary) | see [Outage](#Outage) |

**Abstract Classes**

**CoordinateSystem**

Coordinate reference system.

**Native Members**

|  |  |  |  |
| --- | --- | --- | --- |
| **name** | **mult** | **type** | **description** |
| crsUrn | 1..1 | string | A Uniform Resource Name (URN) for the coordinate reference system (crs) used to define 'Location.PositionPoints'.An example would be the European Petroleum Survey Group (EPSG) code for a coordinate reference system, defined in URN under the Open Geospatial Consortium (OGC) namespace as: urn:ogc:def:crs:EPSG::XXXX, where XXXX is an EPSG code (a full list of codes can be found at the EPSG Registry web site http://www.epsg-registry.org/). To define the coordinate system as being WGS84 (latitude, longitude) using an EPSG OGC, this attribute would be urn:ogc:def:crs:EPSG::4.3.2.6A profile should limit this code to a set of allowed URNs agreed to by all sending and receiving parties. |

**CrewMember**

Member of a crew.

**Native Members**

|  |  |  |  |
| --- | --- | --- | --- |
| **name** | **mult** | **type** | **description** |
| mRID | 1..1 | string | Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended.For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements. |
| aliasName | 1..1 | string | The aliasName is free text human readable name of the object alternative to IdentifiedObject.name. It may be non unique and may not correlate to a naming hierarchy.The attribute aliasName is retained because of backwards compatibility between CIM relases. It is however recommended to replace aliasName with the Name class as aliasName is planned for retirement at a future time. |
| description | 1..1 | string | The description is a free human readable text describing or naming the object. It may be non unique and may not correlate to a naming hierarchy. |
| name | 1..1 | string | The name is any free human readable and possibly non unique text naming the object. |
| IssuedSafetyDocuments | 0..\* | [SafetyDocument](#SafetyDocument) | All safety documents issued to this supervisor. |
| Person | 1..1 | [Person](#Person) | Person having this role. |
| ReleasedSafetyDocuments | 0..\* | [SafetyDocument](#SafetyDocument) | All safety documents released by this supervisor. |

**CrewType**

Custom description of the type of crew. This may be used to determine the type of work the crew can be assigned to. Examples include repair, tree trimming, switching, etc.

**Native Members**

|  |  |  |  |
| --- | --- | --- | --- |
| **name** | **mult** | **type** | **description** |
| mRID | 1..1 | string | Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended.For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements. |
| aliasName | 1..1 | string | The aliasName is free text human readable name of the object alternative to IdentifiedObject.name. It may be non unique and may not correlate to a naming hierarchy.The attribute aliasName is retained because of backwards compatibility between CIM relases. It is however recommended to replace aliasName with the Name class as aliasName is planned for retirement at a future time. |
| description | 1..1 | string | The description is a free human readable text describing or naming the object. It may be non unique and may not correlate to a naming hierarchy. |
| name | 1..1 | string | The name is any free human readable and possibly non unique text naming the object. |

**DesignLocation**

A logical part of the design (e.g., pole and all equipment on a pole). This includes points and spans.

**Incident**

Description of a problem in the field that may be reported in a trouble ticket or come from another source. It may have to do with an outage.

**Native Members**

|  |  |  |  |
| --- | --- | --- | --- |
| **name** | **mult** | **type** | **description** |
| mRID | 1..1 | string | Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended.For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements. |
| aliasName | 1..1 | string | The aliasName is free text human readable name of the object alternative to IdentifiedObject.name. It may be non unique and may not correlate to a naming hierarchy.The attribute aliasName is retained because of backwards compatibility between CIM relases. It is however recommended to replace aliasName with the Name class as aliasName is planned for retirement at a future time. |
| cause | 1..1 | string | Cause of this incident. |
| comment | 1..1 | string | Free text comment. |
| description | 1..1 | string | The description is a free human readable text describing or naming the object. It may be non unique and may not correlate to a naming hierarchy. |
| name | 1..1 | string | The name is any free human readable and possibly non unique text naming the object. |
| subject | 1..1 | string | Document subject. |
| title | 1..1 | string | Document title. |
| type | 1..1 | string | Utility-specific classification of this document, according to its corporate standards, practices, and existing IT systems (e.g., for management of assets, maintenance, work, outage, customers, etc.). |

**Location**

The place, scene, or point of something where someone or something has been, is, and/or will be at a given moment in time. It can be defined with one or more position points (coordinates) in a given coordinate system.

**Native Members**

|  |  |  |  |
| --- | --- | --- | --- |
| **name** | **mult** | **type** | **description** |
| direction | 1..1 | string | (if applicable) Direction that allows field crews to quickly find a given asset. For a given location, such as a street address, this is the relative direction in which to find the asset. For example, a streetlight may be located at the 'NW' (northwest) corner of the customer's site, or a usage point may be located on the second floor of an apartment building. |
| geoInfoReference | 1..1 | string | (if applicable) Reference to geographical information source, often external to the utility. |
| type | 1..1 | string | Classification by utility's corporate standards and practices, relative to the location itself (e.g., geographical, functional accounting, etc., not a given property that happens to exist at that location). |
| CoordinateSystem | 1..1 | [CoordinateSystem](#CoordinateSystem) | Coordinate system used to describe position points of this location. |
| PositionPoints | 1..\* | [PositionPoint](#PositionPoint) | Sequence of position points describing this location, expressed in coordinate system 'Location.CoordinateSystem'. |

**PositionPoint**

Set of spatial coordinates that determine a point, defined in the coordinate system specified in 'Location.CoordinateSystem'. Use a single position point instance to describe a point-oriented location. Use a sequence of position points to describe a line-oriented object (physical location of non-point oriented objects like cables or lines), or area of an object (like a substation or a geographical zone - in this case, have first and last position point with the same values).

**Native Members**

|  |  |  |  |
| --- | --- | --- | --- |
| **name** | **mult** | **type** | **description** |
| sequenceNumber | 1..1 | integer | Zero-relative sequence number of this point within a series of points. |
| xPosition | 1..1 | string | X axis position. |
| yPosition | 1..1 | string | Y axis position. |

**SafetyDocument**

Document restricting or authorising works on electrical equipment (for example a permit to work, sanction for test, limitation of access, or certificate of isolation), defined based upon organisational practices.

**Native Members**

|  |  |  |  |
| --- | --- | --- | --- |
| **name** | **mult** | **type** | **description** |
| mRID | 1..1 | string | Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended.For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements. |
| comment | 1..1 | string | Free text comment. |
| description | 1..1 | string | The description is a free human readable text describing or naming the object. It may be non unique and may not correlate to a naming hierarchy. |
| issuedDateTime | 1..1 | dateTime | Date and time this safety document has been issued. |
| name | 1..1 | string | The name is any free human readable and possibly non unique text naming the object. |
| releasedDateTime | 1..1 | dateTime | Date and time this safety document has been released. |

**Switch**

A generic device designed to close, or open, or both, one or more electric circuits. All switches are two terminal devices including grounding switches. The ACDCTerminal.connected at the two sides of the switch shall not be considered for assessing switch connectivity, i.e. only Switch.open, .normalOpen and .locked are relevant.

**Native Members**

|  |  |  |  |
| --- | --- | --- | --- |
| **name** | **mult** | **type** | **description** |
| mRID | 1..1 | string | Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended.For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements. |
| aliasName | 1..1 | string | The aliasName is free text human readable name of the object alternative to IdentifiedObject.name. It may be non unique and may not correlate to a naming hierarchy.The attribute aliasName is retained because of backwards compatibility between CIM relases. It is however recommended to replace aliasName with the Name class as aliasName is planned for retirement at a future time. |
| description | 1..1 | string | The description is a free human readable text describing or naming the object. It may be non unique and may not correlate to a naming hierarchy. |
| name | 1..1 | string | The name is any free human readable and possibly non unique text naming the object. |
| normalOpen | 1..1 | boolean | The attribute is used in cases when no Measurement for the status value is present. If the Switch has a status measurement the Discrete.normalValue is expected to match with the Switch.normalOpen. |
| open | 1..1 | boolean | The attribute tells if the switch is considered open when used as input to topology processing. |
| ratedCurrent | 1..1 | [CurrentFlow](#CurrentFlow) | The maximum continuous current carrying capacity in amps governed by the device material and construction.The attribute shall be a positive value. |

**SwitchingAction**

Atomic switching action.

**Native Members**

|  |  |  |  |
| --- | --- | --- | --- |
| **name** | **mult** | **type** | **description** |
| executedDateTime | 1..1 | dateTime | Actual date and time of this switching step. |
| issuedDateTime | 1..1 | dateTime | Date and time when the crew was given the instruction to execute the action; not applicable if the action is performed by operator remote control. |
| kind | 0..1 | [SwitchActionKind](#SwitchActionKind) | Switching action to perform. |
| phases | 1..1 | [PhaseCode](#PhaseCode) | Phases of the Switching Action |
| plannedDateTime | 1..1 | dateTime | Planned date and time of this switching step. |
| OperatedSwitch | 0..1 | [Switch](#Switch) | Switch that is the object of this switch action. |
| PlannedOutage | 0..1 | [Outage](#Outage) | Planned outage for whose scope this switch action applies. |

**WorkActivityRecord**

Records information about the status of work or work task at a point in time.

**Native Members**

|  |  |  |  |
| --- | --- | --- | --- |
| **name** | **mult** | **type** | **description** |
| percentComplete | 1..1 | [PerCent](#PerCent) | Estimated percentage of completion of this individual work task or overall work order. |

**WorkAsset**

Asset used to perform work.

**Native Members**

|  |  |  |  |
| --- | --- | --- | --- |
| **name** | **mult** | **type** | **description** |
| mRID | 1..1 | string | Master resource identifier issued by a model authority. The mRID is unique within an exchange context. Global uniqueness is easily achieved by using a UUID, as specified in RFC 4122, for the mRID. The use of UUID is strongly recommended.For CIMXML data files in RDF syntax conforming to IEC 61970-552, the mRID is mapped to rdf:ID or rdf:about attributes that identify CIM object elements. |
| aliasName | 1..1 | string | The aliasName is free text human readable name of the object alternative to IdentifiedObject.name. It may be non unique and may not correlate to a naming hierarchy.The attribute aliasName is retained because of backwards compatibility between CIM relases. It is however recommended to replace aliasName with the Name class as aliasName is planned for retirement at a future time. |
| description | 1..1 | string | The description is a free human readable text describing or naming the object. It may be non unique and may not correlate to a naming hierarchy. |
| name | 1..1 | string | The name is any free human readable and possibly non unique text naming the object. |

**WorkLocation**

Information about a particular location for various forms of work.

**Native Members**

|  |  |  |  |
| --- | --- | --- | --- |
| **name** | **mult** | **type** | **description** |
| direction | 1..1 | string | (if applicable) Direction that allows field crews to quickly find a given asset. For a given location, such as a street address, this is the relative direction in which to find the asset. For example, a streetlight may be located at the 'NW' (northwest) corner of the customer's site, or a usage point may be located on the second floor of an apartment building. |
| geoInfoReference | 1..1 | string | (if applicable) Reference to geographical information source, often external to the utility. |
| type | 1..1 | string | Classification by utility's corporate standards and practices, relative to the location itself (e.g., geographical, functional accounting, etc., not a given property that happens to exist at that location). |
| CoordinateSystem | 1..1 | [CoordinateSystem](#CoordinateSystem) | Coordinate system used to describe position points of this location. |
| PositionPoints | 1..\* | [PositionPoint](#PositionPoint) | Sequence of position points describing this location, expressed in coordinate system 'Location.CoordinateSystem'. |

**Inherited Members**

|  |  |  |  |
| --- | --- | --- | --- |
| **name** | **mult** | **type** | **description** |
| direction | 1..1 | string | see [Location](#Location) |
| geoInfoReference | 1..1 | string | see [Location](#Location) |
| type | 1..1 | string | see [Location](#Location) |
| CoordinateSystem | 1..1 | [CoordinateSystem](#CoordinateSystem) | see [Location](#Location) |
| PositionPoints | 1..unbounded | [PositionPoint](#PositionPoint) | see [Location](#Location) |

**WorkTask**

A task within a set of work.

**Native Members**

|  |  |  |  |
| --- | --- | --- | --- |
| **name** | **mult** | **type** | **description** |
| completedDateTime | 1..1 | dateTime | Date and time work task was completed. |
| contractorCost | 1..1 | [Money](#Money) | Total contractor costs associated with the work task. |
| crewETA | 1..1 | dateTime | Estimated time of arrival, so that customer or police/fire department can be informed when the crew will arrive. |
| estimatedCompletionTime | 1..1 | dateTime | Time and Date when the work task will be completed. |
| instruction | 1..1 | string | Instructions for performing this task. |
| kind | 1..1 | [ServiceRequestKind](#ServiceRequestKind) | Kind of work. |
| laborCost | 1..1 | [Money](#Money) | Total labor costs associated with the work task. |
| laborHours | 1..1 | [Hours](#Hours) | Hours of labor expended under work task. |
| materiallCost | 1..1 | [Money](#Money) | Total material costs associated with the work task. |
| schedOverride | 1..1 | string | If specified, override schedule and perform this task in accordance with instructions specified here. |
| startedDateTime | 1..1 | dateTime | Date and time work task was started. |
| statusKind | 1..1 | [WorkStatusKind](#WorkStatusKind) | Kind of work status. |
| taskKind | 1..1 | [WorkTaskKind](#WorkTaskKind) | Kind of work. |
| toolCost | 1..1 | [Money](#Money) | Total tool costs associated with the work task. |
| WorkActivityRecords | 1..\* | [WorkActivityRecord](#WorkActivityRecord) | All activity records for this work or work task. |
| WorkLocation | 1..1 | [WorkLocation](#WorkLocation) | Location for this work/task. |

**Enumerations**

**CrewStatusKind**

Defines the current status of the Crew - assigned, arrived, etc.

|  |  |
| --- | --- |
| **name** | **description** |
| arrived | the crew is on site at the outage location |
| assigned | the crew has been assigned to work on a task |
| awaitingCrewAssignment | Indicates that the work is awaiting one or more crews to be assigned |
| enroute | the crew has been dispatched to work on an outage |
| fieldComplete | the crew has corrected the outage in the field. The equipment or other devices may not be energized at this time. |

**OutageStatusKind**

This defines if the outage have been predicted or confirmed

|  |  |
| --- | --- |
| **name** | **description** |
| closed | The outage has been fully restored, the crews have been released and the outage is shown as closed |
| confirmed | the outage has been verified |
| partiallyRestored | Some of the usage points affected by the outage have been restored but other usage points are still out of power. |
| predicted | the outage may not be real since it has not been verified - it is only thought to be an outage. |
| restored | All usage points associated with the outage have been restored |

**ServiceRequestKind**

Kinds of service requests

|  |  |
| --- | --- |
| **name** | **description** |
| connect | Physically connect the service. |
| construction | The construction work requested. |
| disconnect | Physically disconnect the service. |
| inspection | Inspection work. |
| newservice | A new service is requested by the customer |
| other | Other kind of work. |
| reconnect | Physically reconnect the service. |
| repair | Repair work. |
| replace | replace an asset |
| test | Test work. |
| turn-off | Temporarily turn off the service but leave the connection in place. |
| turn-on | Turn on the service. |

**TroubleReportingKind**

Kind of trouble reporting.

|  |  |
| --- | --- |
| **name** | **description** |
| app |  |
| call | Trouble call received by customer service representative. |
| email | Trouble reported by email. |
| ivr | Trouble reported through interactive voice response system. |
| letter | Trouble reported by letter. |
| other | Trouble reported by other means. |
| sms |  |
| web |  |

**WorkStatusKind**

Kind of status, specific to work.

|  |  |
| --- | --- |
| **name** | **description** |
| approved | Work has been approved. |
| cancelled | Work has been canceled. |
| closed | Work has been closed (typically by a person responsible for work management) and is ready for billing. |
| completed | Work has been completed, i.e., crew can leave the work location and is available for another work. |
| dispatched | Crew has been dispatched. |
| enroute | Crew is 'en route'. |
| inProgress | Work is in progress. |
| onSite | Crew is on the site. |
| scheduled | Work has been scheduled. |
| waitingOnApproval | Work approval is pending. |
| waitingOnMaterial | Work has been waiting on material. |
| waitingToBeScheduled | Work needs to be scheduled. |

**WorkTaskKind**

Kinds of work tasks.

|  |  |
| --- | --- |
| **name** | **description** |
| exchange | Work task deals with exchange of assets. |
| install | Work task deals with installation of assets. |
| investigate | Work task deals with investigation about assets. |
| remove | Work task deals with removal of assets. |

**Compound Types**

**DateTimeInterval**

Interval between two date and time points, where the interval includes the start time but excludes end time.

**Members**

|  |  |  |  |
| --- | --- | --- | --- |
| **name** | **mult** | **type** | **description** |
| end | 1..1 | dateTime | End date and time of this interval. The end date and time where the interval is defined up to, but excluded. |
| start | 1..1 | dateTime | Start date and time of this interval. The start date and time is included in the defined interval. |

**Status**

Current status information relevant to an entity.

**Members**

|  |  |  |  |
| --- | --- | --- | --- |
| **name** | **mult** | **type** | **description** |
| dateTime | 1..1 | dateTime | Date and time for which status 'value' applies. |
| reason | 1..1 | string | Reason code or explanation for why an object went to the current status 'value'. |
| remark | 1..1 | string | Pertinent information regarding the current 'value', as free form text. |
| value | 1..1 | string | Status value at 'dateTime'; prior status changes may have been kept in instances of activity records associated with the object to which this status applies. |

**Datatypes**

**CurrentFlow**

Electrical current with sign convention: positive flow is out of the conducting equipment into the connectivity node. Can be both AC and DC.

XSD type: float

**Hours**

Time specified in hours.

XSD type: float

**Money**

Amount of money.

XSD type: decimal

**PerCent**

Percentage on a defined base. For example, specify as 100 to indicate at the defined base.

XSD type: float