

Use Case 20: Telemetry Definition

Author: Pat Brown

Date: July 22, 1997

Use Case Overview:

This Telemetry Definition use case covers the maintenance of telemetry definitions in the CIM database and the use of that information for the creation of tab sheets and EMS .ND files. Telemetry definitions include all information (from the RTG interface to the point address) that is needed by the EMS to scan RTUs.

also events for maintaining DFMS db
equipment updates DFMS gets immediately

point (Measurement.OfRecord) updates DFMS gets at .ND file creation (or DBSwitch? time), and at ICCP bilateral table create (or new link association) time? logic: points aren't supported until EMS DBSwitch or new link association

User Summary:

Initial Definition

Telemetered points and their addresses, cards, RTUs, etc. are initially defined in the CIM database, in a planned state, by the Substation Engineer. When the corresponding power system equipment has been defined in the CIM database (also in a planned state), the Substation Engineer can then associate the telemetered points with the equipment location being monitored by connecting the point and the location graphically in PowerVisuals. As points are checked out or cards or RTUs put into service, the EMS Support person will make the necessary changes, online, in the EMS database and will change the state of the points (and their associations to equipment locations) or cards or RTUs in the CIM database to active.

Ongoing Maintenance

When a spare point is going to be used, the Substation Engineer will associate the telemetered point with the equipment location being monitored by connecting the point and the location graphically in PowerVisuals, creating a out-of-service-planned-active association in the CIM database. When the new point is checked out, the state of the association will be changed to active by the EMS Support person.

When a scanned, wired point is planned to be spared out (to have its wiring removed), the state of the association between the point and the monitored location will be changed to active-planned-out-of-service in the CIM database by the Substation Engineer. When the wiring is actually removed in the field, the Substation Engineer will change the state of the association to out-of-service.

When a point is going to be moved (the equipment location being monitored by a particular telemetry point is going to change), the Substation Engineer will create a new planned association by connecting the telemetry point and the new equipment location in PowerVisuals. The Substation Engineer will also change the existing association to

active-planned-out-of-service in the CIM database. As the telemetry points are rewired in the field, the EMS Support person will modify, online, the point information in the EMS database, and will make the new association active and the old association out-of-service in the CIM database.

Taking Telemetry Out of Service

When telemetered points or cards or RTUs are planned to be taken out of service (to not be scanned), the Substation Engineer will change the state of the point or card or RTU to active-planned-out-of-service in the CIM database. When the point, card, or RTU is taken out of scan, the EMS Support person will modify the EMS database online and then change the state of the point (or card or RTU) in the CIM database to out-of-service.

Tab Sheets

Tab sheets can be generated, upon request, for any RTU, from the telemetry information in the CIM database. The sheets can include points in the any variety of states (active (scanned), planned, out-of-service).

ND File Creation

Selected information to populate attributes in the RTU, ADDRESS, and DI, DO, AI, AO and PA entities in the DAC .ND files will come from the telemetry information in the CIM database. The state of the point, card or RTU will determine whether it is included in the .ND file. Point name information will be derived from the associated equipment location being monitored for active points and from telemetry point address information for spare points.

All objects required to define the telemetry path (from RTG to digital input, for example) of a Telemetry object are manually created and maintained in the CIM in one of several states using PowerVisuals dialogs. Objects are created from the top down.. parent objects before child objects (RTGs before RTUs, before Cards, etc.) A change to the state of any of the objects defining the telemetry path will cause an event to be issued. Using PowerVisuals, a Telemetry object can be associated with a Measurement. When this is done, a MeasurementValue (TelemeteredMeasurement) object is created, which also has a state. New NDFiles are created upon manual request and are populated based on telemetry path objects that exist in certain states.

In-Process Notes:

- be sure attributes for Telemetry, TelemeteredMeasurement and Measurement are in the right place.... Telemetry should just be address related stuff (that doesn't change if location being monitored changes).... TelemeteredMeasurement should be values specific to the association or specific to that kind of measuring (tele as opposed to calc or EMS vs ICCP).... Measurement should have generically applicable info (rating? or units)... limits should probably be at the MeasurementValue level, if needed (good idea for OfRecordMeasurement)
- Tab Sheet name belongs in MeasurementValue class
-

- possible states for Telemetry objects: out-of-service, out-of-service-planned-active, active, active-planned-out-of-service, archived(?) or deleted(?) [do we mix standard object “aging” states with actual operational states?]
- TelemeteredMeasurement should reflect if wiring is in place in the field, so initially, when Measurement is planned (presumably this means the equipment is planned) and Telemetry is planned, so is TelemeteredMeasurement
- potentially the TelemeteredMeasurement object would allow modeling of wired but not scanned points (Telemetry in out-of-service state, TelemeteredMeasurement in active state)
- planned point changes will be represented by a new out-of-service-planned-active association (TelemeteredMeasurement) in conjunction with a active-planned-out-of-service association (TelemeteredMeasurement)...both referring to the same telemetry point (Telemetry)
-
- DAC .ND file creation will create a point for each active* Telemetry.... the DACMeasurementValueName from the TelemeteredMeasurement association will be used as the DAC point name... concept: until an association is made between Measurement and an EMS telemetry point (Telemetry), DAC point name is inconsequential, when association created, DAC point name will be created
- the value of TelemeteredMeasurement.MeasurementValueName is the concatenation of source and Measurement.MeasurementName
- Measurement.MeasurementName is derived from the type of ConductingEquipment it's associated with???
- no DAC point will be created for out-of-service Telemetry objects; active Telemetry objects with no active TelemeteredMeasurement will have their name created based on the address (AISPARE01 08)info in the Telemetry
- a ManuallyEntered object will be created for Measurements related to certain equipment at certain voltage levels to allow for overwriting by the DFMS (the DFMS is a serverComponent for these objects)... this seems like it should be based on the authorization model
- the DFMS alias will be an attribute of the OfRecordMeasurement class [note.... this implies (probably correctly) that we should create a new class called OfRecordMeasurement, a child of MeasurementValue], since the DFMS will be getting change of value events from OfRecordMeasurement... the DFMS alias will be enterable only for certain types of ConductingEquipment at certain voltage levels?... when DFMS alias is entered an event is generated, so the DFMS knows there's a Measurement available to it... question: can DFMS alias also be mostly automatically generated from equipment name info?
- a Measurement should exist when there is or ever has been:
 - ⇒ an EMS DAC point associated with this equipment location
 - ⇒ an ICCP source data value existing for this equipment location
 - ⇒ a manually entered value that could come from the DFMS for this equipment location
- thoughts (Measurements exist in the CIM only in association w/equipment inside substations.... bounded by “CIM definition limits” rules) (think about what should create what... ICCP always create DAC point? ICCP data values created by high level, voltage & device type rules (modified manually?).... DFMS ManuallyEntered objects created by same sorts of rules
- concept: for comprehensiveness of thought: view CIM equipment definition as first step, EMS telemetry definition as second step, ICCP datavalue creation as 3rd step,

DFMS alias linkage as 4th step.... think about how these “work” if they actually happen out of sequence from this?

- only spare EMS points exist without a corresponding TelemeteredMeasurement... this implies that some form of ConductingEquipment(?) always exists so the ConductingEquipment.Measurement.TelemeteredMeasurement access mechanism works (and you have an OfRecordMeasurement object to request info from).... is an affiliation with a “substation” ConductingEquipment object the best way to handle the obscure points?
- Measurements in out-of-service state can have no MeasurementValue associations, but once the Measurement tries to go active, then, if no MeasurementValues exists, the Measurement should not exist
- maybe “commit” is time that some processing (creation, clean up) should be done
- need ability to do cut and paste of existing xfmr or feeder circuit (for example) to create a new one... would come along clear through Measurement (not TelemeteredMeasurement (MeasurementValue))
- question... are Measurements for MVA and Bus Amps manually created and the calcs for them automatically created?
- question: how are floating measurements handled? or more to the point, maybe it's floating equipment? breaker states or flows from places we don't do connectivity for?
- do a scenario with states for Measurement, TelemeteredMeasurement and Telemetry
-
- in what Use Case do calculated points show up? functionality should at least cover what we do now programmatically.... create MVA from MW, Mvar; bus amps, PF, etc.. A use case to play:
 - ⇒ SG or XF icon (or copied object).... brings only through Measurement (not MeasurementValue association), so no Calculation objects would come with
 - ⇒ since calcs at this time are EMS-related, do batch job in preparation for .ND file creation (later, with IEDs and CIM-based Calculations will need a different approach...) so need to do processing at ConductingEquipment level.... that knows what kind of equipment it's related to (what kind of inherited classes does this imply?....do we need different kinds of Xfs? is there a SG class? or feeder? or disc-breaker-disc?)... at that time, method at that level would perform “investigation” across entire object to determine appropriate calcs based on existence of appropriate TelemeteredMeasurement objects in active* state... if present would create new Calculation object, or keep old one, in state that matches that of TelemeteredMeasurement objects
- need to expand CIM to define EMS calcs? have Calculation.CalculationType point to a CalculationType class that supports EMS CALC entities?
-

Measurement

- out-of-service-planned-active - associated with equipment (terminal) in out-of-service-planned-active state
- active - associated with equipment (terminal) in active state
- active-planned-out-of-service - associated with equipment (terminal) in active-planned-out-of-service state
- out-of-service - associated with equipment (terminal) in the out-of-service state

Note: equipment does not have to have Measurement, but once it has one, it always will (?).. it goes in to out-of-service or archive(?) state

TelemeteredMeasurement

- out-of-service-planned-active - not wired, but planned to be
- active - wired to equipment
- active-planned-out-of-service - wired to equipment, but planned to be “unwired”
- out-of-service - not wired

At a future time, might want to include “active-not-tested” as a state

Telemetry

- out-of-service-planned-active - not scanned, but planned to be
- active - scanned
- active-planned-out-of-service - scanned, but not going to be in future
- out-of-service - not scanned

Actors:

Assumptions: (e.g., frequency of use, design considerations)

Preconditions: {constraints for initiation of use case}

Description: (1-4 pages)

This use case starts when Actor n ...

The system responds by

....[Sequence of Interactions]

....data is retrieved, manipulated, stored

....description of all choices, all looping behavior, any resets

....rules of making choices

....stimulus to actors

This use case ends when

Exceptions:

Postconditions:

