



Energy Management Framework draft-ietf-eman-framework-01

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Abstract

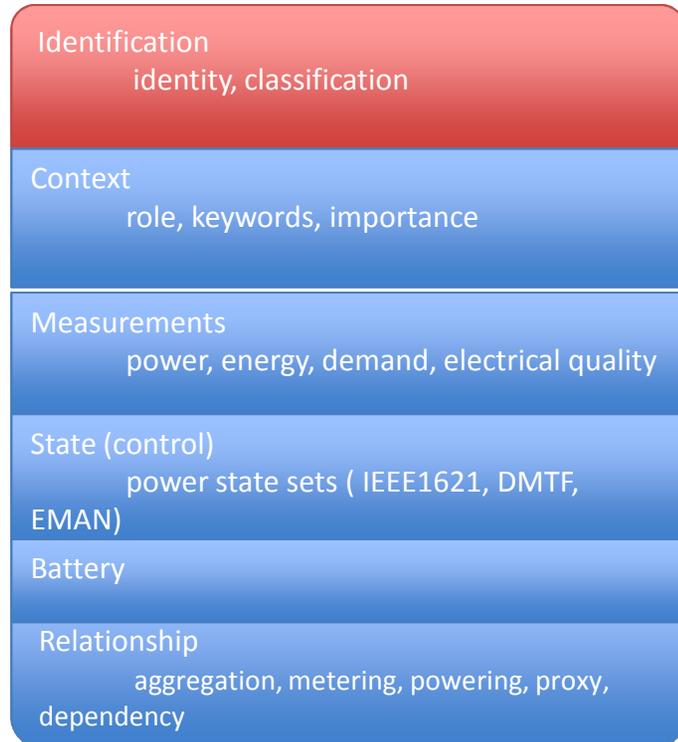
- This document defines a **framework** for providing Energy Management for devices within or connected to communication networks.
- The framework defines a **domain** of Energy Management devices that is a logical unit of Energy Management.
- Within a domain each device is **identified, classified** and given **context**.
- Devices can be monitored and/or controlled with respect to **power, power state, energy, demand, electrical quality, and battery**.
- Additionally the framework models **relationships** and capabilities between devices in a domain.

Summary of Approach

Define an Information Model

Identification	identity, classification
Context	role, keywords, importance
Measurements	power, energy, demand, electrical quality
State (control)	power state sets (IEEE1621, DMTF, EMAN)
Battery	
Relationship	aggregation, metering, powering, proxy, dependency

Identification



- Considerable discussion on Entity MIB linkage for identity
- Converging on a UUID versus SNMP context as required for a managed object with a link to Entity MIB – Do we agree?
- OPEN ISSUE – What to do with device type from requirements.
 - Received feedback that object type/manufacturer) should have more guidance (D Prantl et al)

Context

Identification identity, classification
Context role, keywords, importance
Measurements power, energy, demand, electrical quality
State (control) power state sets (IEEE1621, DMTF, EMAN)
Battery
Relationship aggregation, metering, powering, proxy, dependency

- Generally accepted
- OPEN ISSUE: potentially something that can be added to the Entity MIB
- Keywords and Importance are generally accepted
- TO DO: Role received feedback on establishing guidance on how to set this value (D Prantl et al)

Measurements



Power, Energy and Demand are the most critical values

Energy - the capacity of a system to produce external activity or perform work

Power - a rate of energy conversion.
As the unit of time approaches zero a power measurement is called an instantaneous power reading.

Even though it took and average to obtain it

Demand - is an average of Power measurements over an interval(s) of time

Billable value for most utilities

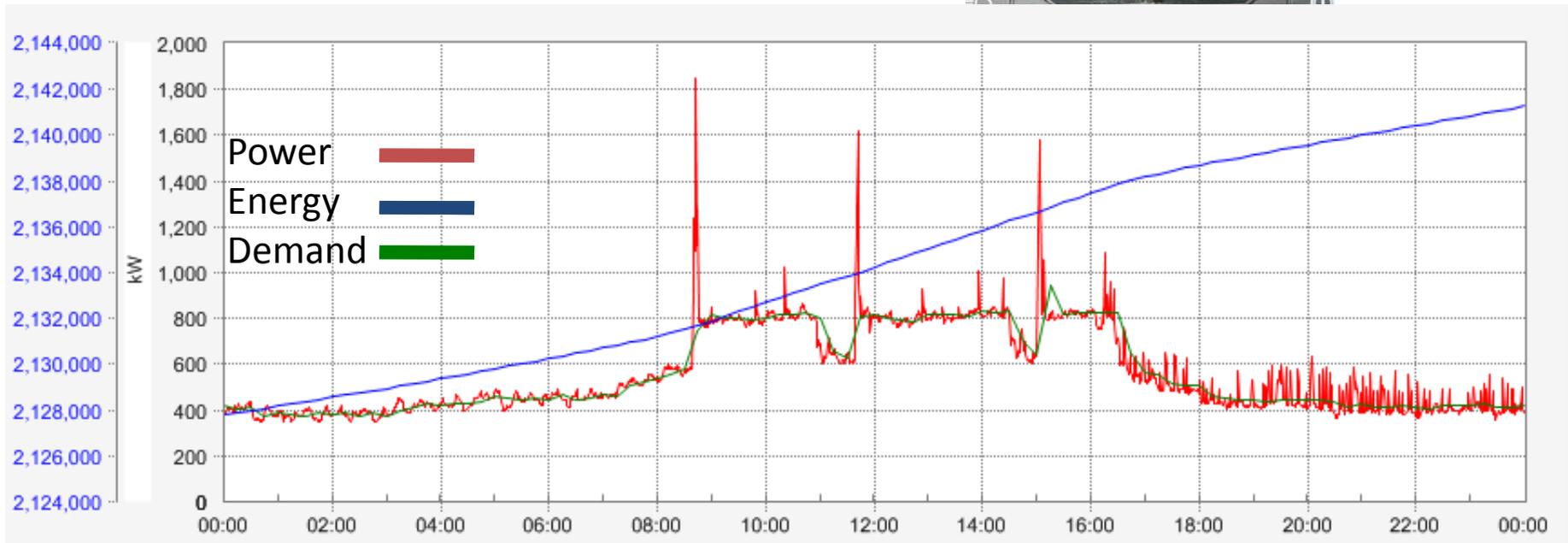
Created **draft-parelo-eman-definitions-00** to help consolidate terms and aid in other drafts.

Please review, thank you for the fast reviews so far.

Visualizing Power & Energy

Power measurement is likened to speedometer

Energy measurement is likened to an odometer

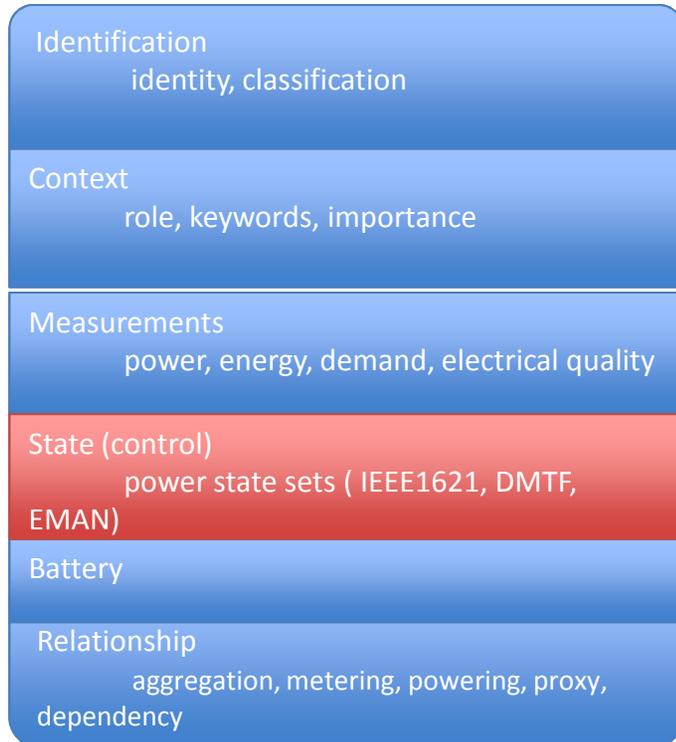


Measurements



- Receive Feedback (R. Morgan et al) that energy odometers are a good solution for energy. EMAN requirements should call this out.
- OPEN ISSUE: Feedback (M. Suchoff) should be using IEC 61000-4-30 as quality reference. Looking at that now.
- Time series values for demand is called out in this framework. OPEN ISSUE for requirements, more time series are being discussed in the requirements and this must be decided.

State



Considerable discussion on power state sets from many on the list.

- We agreed on multiple power state sets. Within each set there are multiple power states each with a name and value and a power setting for that state.

- From IETF 80 incorporated agreement on multiple power state sets and the first three (IEEE1621, DMTF, and EMAN)

- OPEN ISSUE: Receive feedback (D Prantl et al) on possibly having a variable range of states (i.e. dimmer)

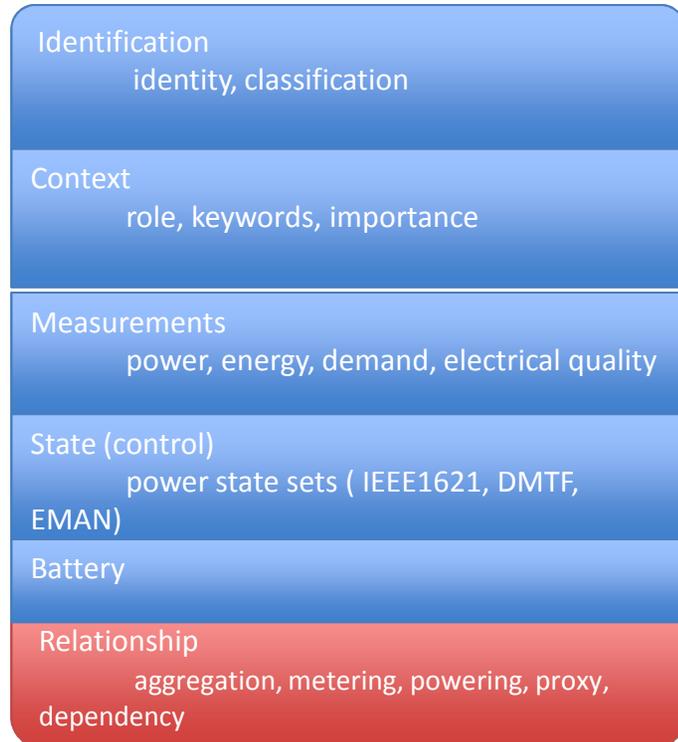
- OPEN ISSUE: whether time in state and transition times are required. Will incorporate final decision from requirements.

Battery

Identification identity, classification
Context role, keywords, importance
Measurements power, energy, demand, electrical quality
State (control) power state sets (IEEE1621, DMTF, EMAN)
Battery
Relationship aggregation, metering, powering, proxy, dependency

- Defined the need for a specific set of battery information
- Attributes are covered in draft-ietf-eman-battery-mib-02
- OPEN ISSUE: How to model batteries?
 - Is this a relationship or a component?
 - Internal? Entity physical index
 - External? relationship

Relationship



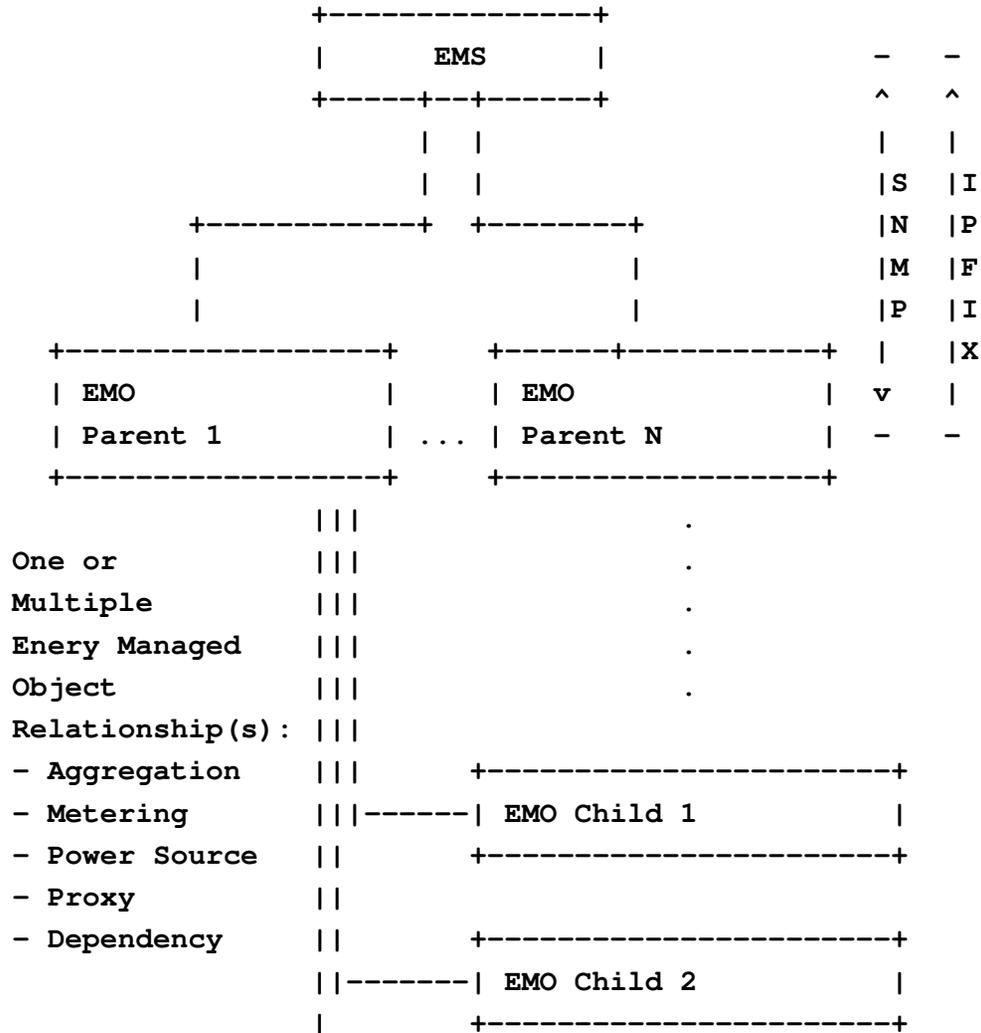
- Having a unique identifier and simple relationships allows complex topologies to be simplified in a model
- Identified metering, powering, proxy, aggregation

Relationship

Identification identity, classification
Context role, keywords, importance
Measurements power, energy, demand, electrical quality
State (control) power state sets (IEEE1621, DMTF, EMAN)
Battery
Relationship aggregation, metering, powering, proxy, dependency

- Clarified parent/child relationship is a generic pattern of relationship between managed objects in a domain
- Merged the relationships from other models (Quittek et al) and added dependency for sub components
- Incorporated relationships as many to many from feedback.
- Open issue (Nordman) as to whether components are needed. We agree but previous added due to feedback. Is this for Battery?
- Open Issue modeling outlet gangs (Verges et al). Propose a ganged relationship

Complex Energy Management Model & Relationship Types



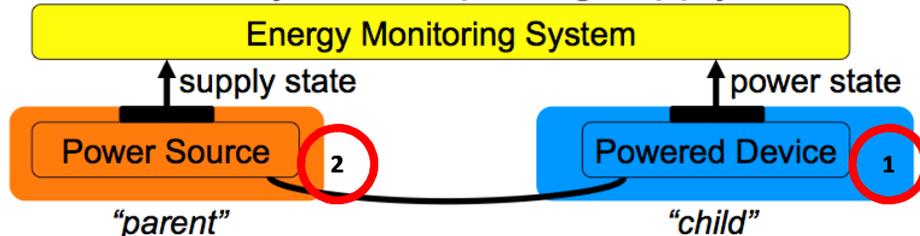
Relationships Can Model Scenarios

- Examples from Reference Model (IETF80)

1. Plain device just reporting it's power state



2. Additionally, PDU reporting supply state



IETF 80 EMAN ref model

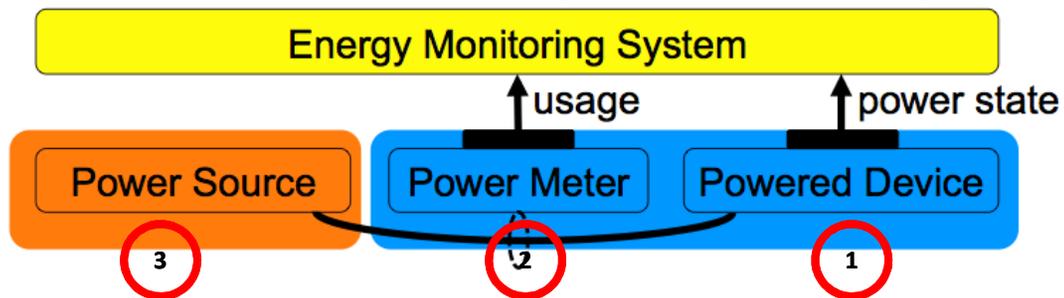
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1 Powered By 2

Relationships Can Model Scenarios

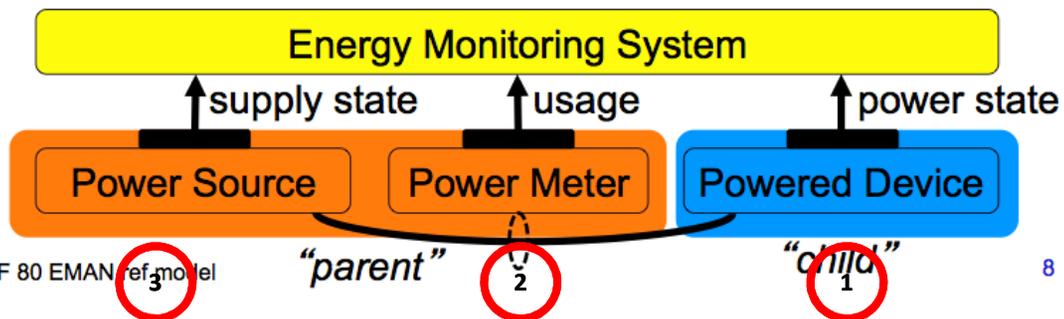
- Examples from Reference Model (IETF80)

3. Device with a meter (or an estimator)



1 Metered By 2

4. PDU with meter / PoE Switch

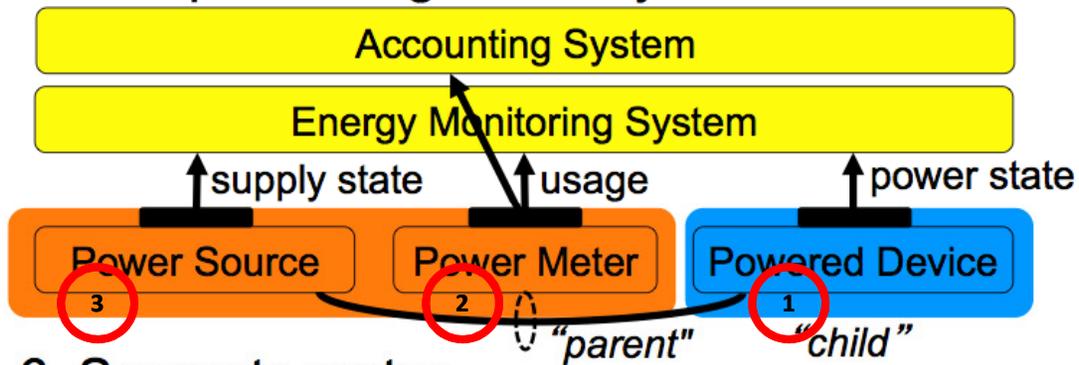


1 Powered By 3

Relationships Can Model Scenarios

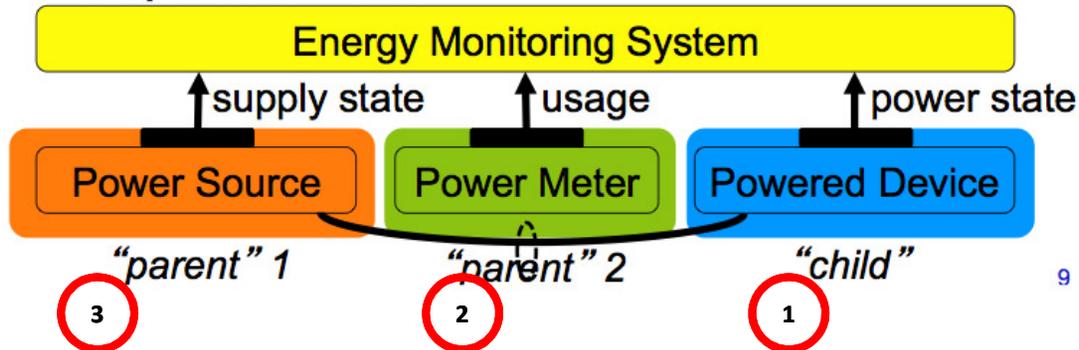
- Examples from Reference Model (IETF80)

5. Multiple Management Systems



1 Metered By 2

6. Separate meter



1 Powered By 3

Relationships Can Model Scenarios

- Examples from Reference Model (IETF80)

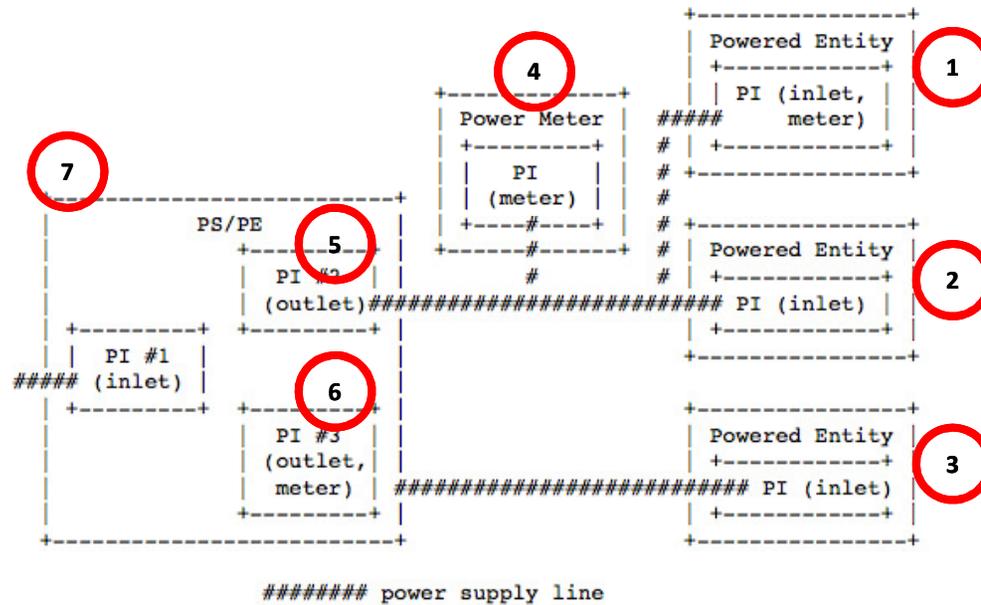
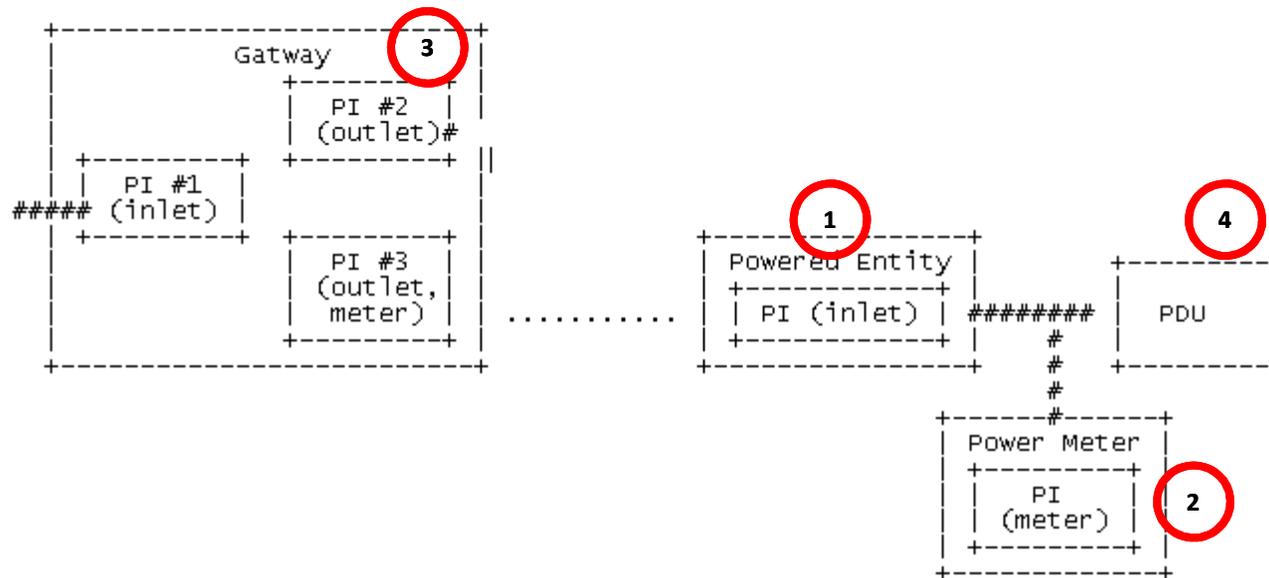


Figure 2: More complex power supply topology

- 1 Powered By 5
- 2 Powered By 5
- 1 Metered By 4
- 2 Metered By 4
- 3 Powered By 6
- 3 Metered By 6

Relationships Can Model Scenarios

- “Gateways to building networks” example



- 1 Powered By 4
- 1 Proxied By 3
- 1 Metered By 2

- Three different topologies: control, meter, and proxy
- Note: we could even have more relationships per topology (two “Powered by”)

Open Issues

- Do we agree? UUID Required for all managed object.
- Receive feedback (D Prantl et al) on possibly having a variable range of states (i.e. dimmer)
 - Is this really required?
- If the aggregation disappear from [EMAN-REQ], then we don't need the "Aggregation Relationship", and this is even simpler!
- How to model batteries?
 - As Component or Relationship?



Thank You

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