draft-ietf-eman-framework-08

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Summary: Changes in draft

- Major Editorial Revisions
  - Sections
  - Information model introductions
  - Reviewed / Addressed 27 Feedback TIckets
- Finally achieved consensus on organization and issues
  - Removed Proxy
  - Removed Parent /child and just describe Relationships
- Completed IANA Section
  - PWG Feedback and Resolution
- Information Model Expressed as pseudo code for review.
- Format of Model is Item for discussion today

Summary: Feedback Issues Addressed

milestone1	37	Determine how best to include PWG power states
milestone1	30	Power State and Power State Sets introduction
milestone1	4	Reorganise sections
milestone1	29	IANA Considerations section needs more detail
milestone1	21	h. Clarify the intended application of the Domain concept?
milestone1	17	d. Is aggregation a relationship, or just a function?
milestone1	12	how summation occurs
milestone1	5	Review UML with latest draft from Monitoring MIB/Aware.
milestone1	22	i. Are there any power source or metering relationships not covered by data about the wiring topology?
milestone1	18	e. Clarify relation among aggregation, proxying, and IP/non-IP devices (section 5)
milestone1	20	g. Add a reference to some external definition
milestone1	23	Figure 6. Clarify that Parent/Child communication can be accomplished via EMAN
milestone1	24	no need for a separate concept of a meter
milestone1	26	ASHRAE 201P Power Quality
milestone1	8	List EMAN curtailment levels
milestone1	6	States and ASHRAE Curtailment levels
milestone1	25	l. Figure 7 seems unnecessary to include?
milestone1	19	f. Possibility to merge some keyword variables?
milestone1	16	c. What does parent/child mean when the direction of power flow between two devices can reverse?
milestone1	7	Clarify power interfaces
milestone1	10	6.5.2 - DMTF states
milestone1	14	Metering and Power Source both seem to be derivative of wiring topology
milestone1	9	Delete incorrect IEEE 1621 definitions
milestone1	3	Nameplate should mention Manufacturer Rating. (ASHRAE)
milestone1	15	Metering relationship duplicative of power source relationship?
milestone1	13	Correct use of term 'odometer.'

History: Draft Evolution

- IETF 77, 78 3/2010
  - OPSAG Monitor MIB
  - Introduction, MIB, Use Cases

- IETF 79 11/2010
  - EMAN WG Start
  - Introduction, UML become draft along with UML from MIB

- IETF 80 3/2011 –
  - UML and MIB Revised
  - feedback from PDU vendors
  - Requirements and use cases added

- IETF 81 7/2011
  - -Single Power State Series set detailed

- IETF 82 11/2011
  - Single Power State discussed
  - Definitions discussed in separate draft
  - Use Cases and Requirements modev to drafts

- IETF 83 3/2012
  - Multiple Power State Series Adopted
  - Power Interfaces Adopted

- IETF 84 7/2012
  - Definitions reviewed and incorporate
  - Relationships detailed and Topology examples put in

- IETF 85 11/2012
  - Editorial changes from tracker

- IETF 86 3/2013
  - Examples removed form Terminology
  - Editorial changes form tracker and reorganization

- IETF 87
  - Now

History: What's Stable

		REQ	USE CASES	Intro	Info Model	States	Relationships	Topologies	Interfaces	Defiinitions
IETF	78			ADD						
IETF	79			EDIT	ADD					
IETF	80	ADD	ADD	EDIT	CHG		ADD			
IETF	81	EDIT	EDIT	EDIT	EDIT	ADD	=			
IETF	82	DEL	DEL	EDIT	=	EDIT	=			ADD
IETF	83			EDIT	=	CHG	=		ADD	EDIT
IETF	84			=	=	=	=	ADD	=	EDIT
IETF	85			=	=	=	=	=	=	=
IETF	86			=	=	=	=	=	=	=
IETF	87			EDIT	= *	=	EDIT**	=	=	=

ADD : concept is new to the draft

CHG : Concept is not new approach is changes

=   : Concept and text is the same, editrial or language edits may have been made

EDIT : Concept and approach(class) is the same attributes may have been modified, added or deleted

DEL : Concept was removed from the draft

* NOTE: Pseudo code used to express UML

** NOTE: Removed Proxy and Parent/Child discussion

Changes: Definitions

- Clarification of what is Information Model vs Physical

- Removed Parent / Child & Proxy

- Decided to go with term **CONTEXT** even if clashes with data model languages

Changes: IANA Proposal

- Closes Issue #29
- Register IEEE1621 state
- Register DMTF
- Will Not Register PWG
- Register EMAN
- Defer Battery Registration is at all
- Modifications according to RFC5226

Changes: Information Model Representation

- Issue #5
- Put in pseudo code for class definitions
- Just UML without boxes
- Discuss UML as XML, UML Diagram, psuedo-ccode

Information Model

IM: Simple Information Model

- Organization stable since IETF 81
  - Introduced IETF 80
- Model
  - Identification
  - Context
  - Relationships for topology
  - Measurements Power, Energy, Demand
  - Power Control

```
class EnergyObject {

// identification
    index       : int
    identifier  : uuid  // RFC 4133
    alternatekey : string

// context
    domainName      : string
    role            : string
    keywords [0..n] : string
    importance      : int

// relationship
    relationships [0..n] : Relationship

// measurements
    nameplate    : Nameplate

// power and energy
    power    : PowerMeasurement
    energy   : EnergyMeasurment
    demand   : DemandMeasurement

// power states
    powerControl [0..n] : PowerStateSet
}
```

```
class Device extends EnergyObject {
    eocategory   : enum { producer, consumer
                          , meter, distributor
    }
}
```

```
class Component extends EnergyObject
    eocategory   : enum { producer, consumer
                           , meter, distributor
    }
}
```

```
class Interface extends EnergyObject{
    eoIfType : enum ( inlet, outlet, both}
}
```

```
class Relationship {
    relationshipType    : enum {
         meters, meteredby
        ,powers, poweredby
        ,aggregates, aggregatedby
    }
    relationshipObject  : uuid
}
```

Power States

```
class PowerStateSet {
      powerSetIdentifier : int  //IANA
      name               : string
      powerStates [0..n] : PowerState
      operState          : int
      adminState         : int
      reason             : string
      configuredTime     : timestamp
}


class PowerState {
      powerStateIdentifier  : int // IANA
      name               : string
      cardinality        : int
      maximumPower       : PowerMeasurement
      totalTimeInState : time
      entryCount         : long
}
```

IM: Measurements Model
(IEC 61850 windowing)

```
class Nameplate {
     nominalPower : PowerMeasurement
     details      : URI
}


class Measurement {
     multiplier: enum { -24..24}
     caliber   : enum { actual, estimated,
trusted, assumed }
     accuracy  : enum { 0..10000} // hundreds
of percent
}


class PowerMeasurement extends Measurement {
     value          : long
     units          : "W"
     rate           : enum { 0, milliseconds,
seconds, minutes, hours}
          // Brad find out what the rate was
not in mib delete this.
     powerAttribute : PowerAttribute
}
```

```
class EnergyMeasurement extends Measurement {
     startTime : time
     units      : "Wh"
     provided  : long
     used      : long
     produced  : long
}


class TimedMeasurement extends Measurement {
     startTime  : timestamp
     value      : Measurement
     maximum    : Measurement
}


class TimeInterval {
     value     : long
     units     : enum { seconds, miliseconds,...}
}


class DemandMeasurement extends Measurement {
     intervalLength : TimeInterval
     interval       : long
     intervalMode   : enum { periodic, sliding, total }
     intervalWindow : TimeInterval
     sampleRate     : TimeInterval
     status         : enum { active, inactive }
     measurements[0..n] : TimedMeasurements
}
```
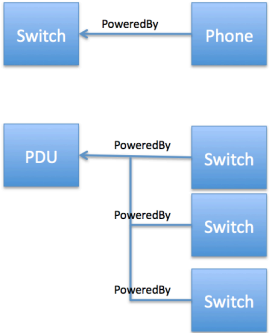
UML From MIB Data Model

- Generated UML from MIB Implementation to validate and confirm design (Brian Hedstrom)
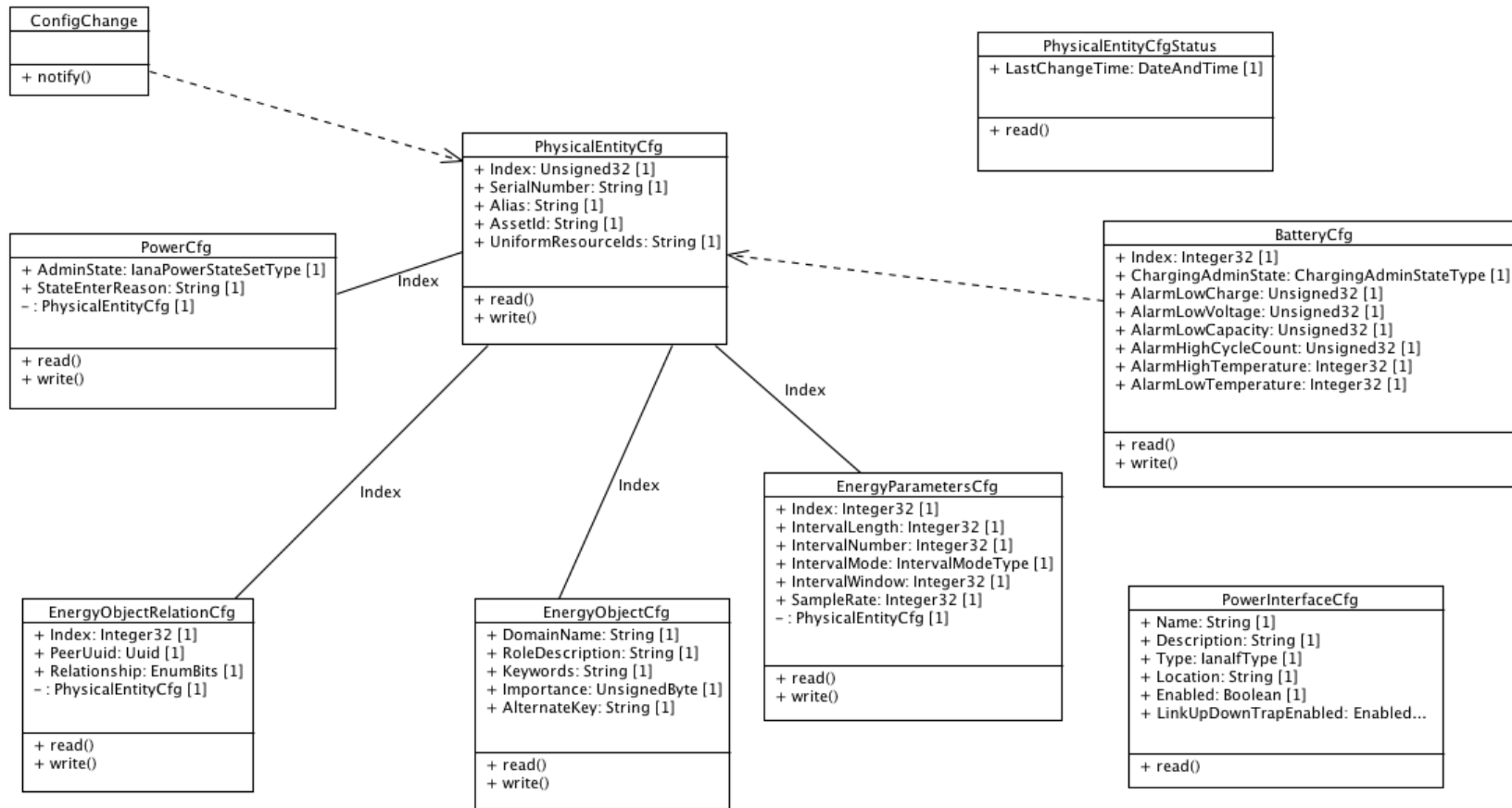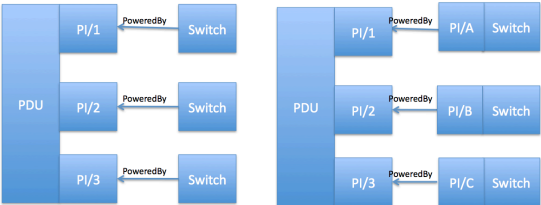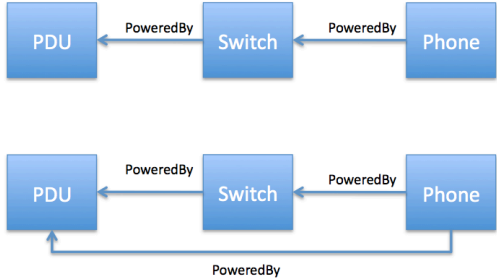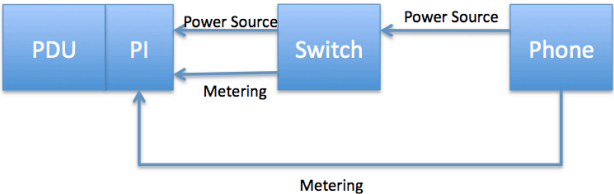
Power Source Topology
(Simple / Multiple)

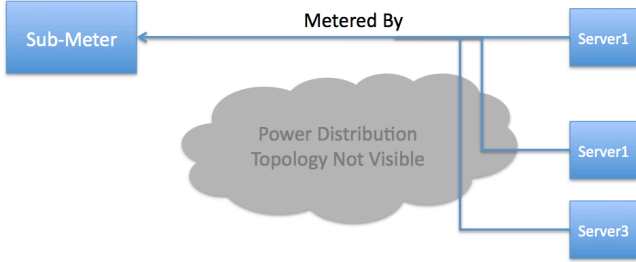Power Source Topology
(interfaces)

Power Source Topology
(Transitive)

Metering Topology
(Between Devices)

Metering Topology
(Power Distribution Point)

Code: Running Code

- Reference implementations
  - MIBS implemented
  - Python and DB model
- MIB drafts stable using this model
- Compatible Implementations
  - Cisco EnergyWise Partners
  - IM is a subset of Model in this program
    - Based on Cisco EnergyWise Partner Program
    - See ciscoEnergyWiseMib 1.3.6.1.4.1.9.9.683
      - Since 2009
    - Java, TLV, C, Python implementations of model
    - Devices:
      - PDU (APC, Schneider,Raritan,WTI,Cyberswitching)
      - Light (NuLeds)
      - Facilities translators (Field Server, Schneider)
      - Facility controllers (Schneider, JCI)
      - 102 Partner Companies...
  - EnMS' (Joulex now Cisco, Verdiem, CA Nimsoft, IBM Tivoli)

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- Major Editorial Revisions
- Finally achieved consensus on organization and issues
  - Removed Proxy
  - Removed Parent /child and just describe Relationships
- Completed IANA Section
  - PWG Feedback and Resolution
- Information Model Expressed as pseudo code for review.
- Need Consensus: Format of Information Model

Question

- ## Should UML...
  - – Be represented as psuedo code?
  - – UML TXT?
  - – XML format readable for IDE?
  - – Combinations?

- ## Given Stability of IM and lots of review...
  - – Steps for WG last call?

Thanks!