Energy Management Framework
draft-parello-eman-definitions-00

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Abstract

This document contains definitions and terms used in the Energy Management Working Group. Each term contains a definition(s), example, and reference to a normative, informative or well know source. Terms originating in this draft must be either composed of or derived from other terms in the draft with a source. The defined terms will then be used in other drafts as defined here.
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TODO:
- Compile all references
- Add examples where needed
- Review all drafts and collect any dangling terms and include here
1. Introduction

Within Energy Management there are terms that may seem obvious to a casual reader but in fact require a rigorous and sourced definition. To avoid any confusion in terms among the working group drafts, one glossary / lexicon of terms should exist that all drafts can refer to. This will allow avoid a review of terms multiplied across drafts.

This draft will contain a glossary of definitions of terms that can be agreed upon by the working group outside of the context of the drafts and then included in or sourced to this draft. Each term will contain a definition(s), an example and a normative or informative reference. All terms should be rooted with a well-known reference.

If a definition is take verbatim from a reference then the source is listed in square brackets. If a definition is derived from a well-known reference then the source is listed as "derived from" with the reference listed in square brackets. If a defined term is newly defined here the reference will indicated the composing terms from this document.

2. Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [RFC2119].

3. Definitions

Energy Management System (EnMS)

An EnMS is a set of systems or procedures upon which organizations can develop and implement an energy policy, set targets, action plans and take into account legal requirements related to energy use. An EnMS allows organizations to improve energy performance and demonstrate conformity to requirements, standards and/or legal requirements.

Example:
A set of workflow procedures setup by an organization to track and archive utility billing records to ensure an auditable history of targets.

Reference:
[ISO50001]
Energy Management

Energy Management is a set of functions for measuring, modeling, planning, and optimizing networks to ensure that the network elements and attached devices use energy efficiently and is appropriate for the nature of the application and the cost constraints of the organization. In that light, Energy Management is a system congruent to any of FCAPS area of management in the ISO/OSI Network Management Model [TMN]. Energy Management for communication networks and attached devices is a subset or part of an organization’s greater EnMS.

Example:
A set of computer systems that will poll electrical meters and store the readings

Reference:
Derived from [ITU-T-M-3400]

Energy Management Systems

An Energy Management System (EMS) is congruent to a Network Management System (NMS) and is a combination of hardware and software used to administer a network with the primarily purpose being Energy Management.

Example:
Reference:
Derived from [1037C]

Energy Monitoring

Energy Monitoring is a part of Energy Management that deals with collecting or reading measurements from devices to aid in Energy Management. This could include Energy, Power, Demand, Quality, Context and/or Battery information.

Example:
Reference:

Energy

Energy is the capacity of a system to produce external activity or perform work and can be electricity, fuels, steam, heat,
compressed air, and other like media. Energy is typically expressed in watt hours or joules.
Example:
Reference: [ISO50001]

Power

Power is a rate of energy conversion. As the unit of time approaches zero a power measurement is called an instantaneous power reading. Typically when implementing Power monitoring in hardware, a measuring device may have to compute an average value per some unit of time to express a reading to approximate an instantaneous power measurement.
Example:
Reference: Derived from [ISO50001]

Demand

Demand is an average of Power measurements over an interval(s) of time and typically expressed in kilowatt hours. This measurement is significant because some utilities or energy providers bill by Demand measurements as well as for maximum Demand per billing periods. Power values may spike during short-terms by devices, but Demand measurements recognize that maximum Demand does not equal maximum Power during an interval.
Example:
Reference:

Power Quality

Power Quality is defined as a set of values to describe the electrical characteristics of Power as provided by an electrical source as seen by the Energy Managed Object. For example: AC phase, apparent and reactive power, etc.
Example:
Reference:
Energy Control

Energy Control is a part of Energy Management that deals with modifying or setting the state of an Energy Managed Object in order to optimize or ensure its efficiency.

Example:
Reference:

Energy Managed Object

An Energy Managed Object (EMO) is a device that is part of or attached to a communications network that is monitored, controlled, or aids in the management of another device for Energy Management.

Example:
Reference:

Energy Aware Object

An Energy Managed Object may not have the capability to provide information necessary for Energy Management itself. If an Energy Managed Object can provide Energy Management Context, Energy Monitor and optionally Energy Control values for itself then the Energy Managed Object is said to be an Energy Aware Object.

Example:
For example: as the most simplistic example, a set of light bulbs where all values are provided by an EMS through estimation and or catalogue information are not Energy Aware. In contrast a set of network switches that can report the same information based upon hardware sensing is said to be Energy Aware.

Reference:

Energy Managed Object Identification

Energy Managed Object Identification is a set of attributes that enable an Energy Managed Object to be: uniquely identified among all Energy Management Domains; linked to other systems; classified as to type model and or manufacturer.
Example:
Reference:
Energy Managed Object Context

Energy Managed Object Context is a set of attributes that allow an Energy Management system to classify the use of the Energy Managed Object within an organization. The classification contains use and/or ranking of the Energy Managed Object as compared to other Energy Managed Objects in the Energy Management Domain.

Example:

Reference:

Energy Management Domain

An Energy Management Domain is a name or name space that logically groups Energy Managed Objects into a zone of Energy Management. Typically, this zone will have as members all Energy Managed Objects that are powered from the same electrical panel(s) for which there is a meter or sub meter.

Example: All Energy Managed Objects drawing power from the same distribution panel with the same AC voltage within a building, or all Energy Managed Objects in a building for which there is one main meter, would comprise an Energy Management Domain.

Reference:

Energy Managed Object Relationships

Energy Managed Objects may have functional relationships to each other within an Energy Management Domain. The functional relationships include Aggregation, Metering, Power Source(s), Proxy, and Dependency. One device will provide a capability or functional value in the relationship and another will be the receiver of the capability. These capabilities include Aggregation, Metering, Power Source, Proxy and Dependency.

Example:

Reference:

Aggregation Relationship

An Energy Managed Object may aggregate the Energy Management information of one or more Energy Managed Objects and is
referred to as an Aggregation Relationship. An Energy Managed Object may be aggregated by another Energy Managed Object(s). Aggregate values are obtained by reading values from multiple Energy Managed Objects and producing a single value of more significant meaning such as average, count, maximum, median, minimum, mode and most commonly sum.
Example:
Reference: [SQL]

Metering Relationship

An Energy Managed Object may measure the Energy of another Energy Managed Object(s) and is referred to as a Metering Relationship. An Energy Managed Object may be metered by another Energy Managed Object(s). Example: a PoE port on a switch measure the Power it provides to the connected Energy Managed Object.

Example:
Reference:

Power Source Relationship

An Energy Managed Object may be the source of or distributor of power to another Energy Managed Object(s) and is referred to as a Power Source Relationship. An Energy Managed Object may be powered by another Energy Managed Object(s).

Example: a PDU provides power for a connected host.
Reference:

Proxy Relationship

An Energy Managed Object that provides Energy Management capabilities on behalf of another Energy Managed Object so that it appears to be Energy Aware is referred to as a Proxy Relationship. An Energy Managed Object may be proxied by another Energy Managed Object(s). Example: a protocol gateways device for Building Management Systems (BMS) with subtended devices.

Example:
Reference:
Dependency Relationship

An Energy Managed Object may be a component of or rely completely upon another Energy Managed Object to operate and is referred to as a Dependency Relationship. An Energy Managed Object may be dependent on another Energy Managed Object(s).

Example: A Switch chassis with multiple line cards

Energy Managed Object Parent

An Energy Managed Object Parent is an Energy Managed Object that provides one or more of the Energy Managed Object Relationships capabilities.

Energy Managed Object Child

An Energy Managed Object Child is an Energy Managed Object that has at least one Energy Managed Object Relationship capability provided by another Energy Managed Object.

Example:
Reference:

Power State

A Power State is a way to classify a Power setting on an Energy Managed Object (e.g., on, off, or sleep). A Power State can be viewed as a method for Energy Control

Example:
Reference:

Manufacturer Power State

A Manufacturer Power State is a device-specific way to classify a Power setting implemented on an Energy Managed Object.

Power State Set

A collection of Power States that comprise one named or logical grouping of control is a Power State Set. For example, the states (on, off, and sleep) as defined in [IEEE1621], or the 16 power states as defined by the [DMTF] can be considered two different Power State Sets.

Example:
Reference:
Nameplate Power

The Nameplate Power is the maximal (nominal) Power that a device can support. This is typically determined via load testing and is specified by the manufacturer as the maximum value required to operate the device. This is sometimes referred to as the worst-case Power. The actual or average Power may be lower. The Nameplate Power is typically used for provisioning and capacity planning.

Example:
Reference:

4. Security Considerations

None

5. IANA Considerations

None

6. Acknowledgments

The author would like to thank the authors of the current working group drafts for the discussions and definition clarifications

7. References

Normative References


Informative References


[TMN] "TMN Management Functions : Performance Management", ITU-T M.3400

[GAMMA] Eric Gamma et al. "Design Patterns: Element of Reusable Object-Oriented Software", 1994
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[ITU-T-M-3400] TMN recommendation on Management Functions (M.3400), 1997


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