

# Reference Model for Energy Management

draft-quittek-eman-reference-model-01

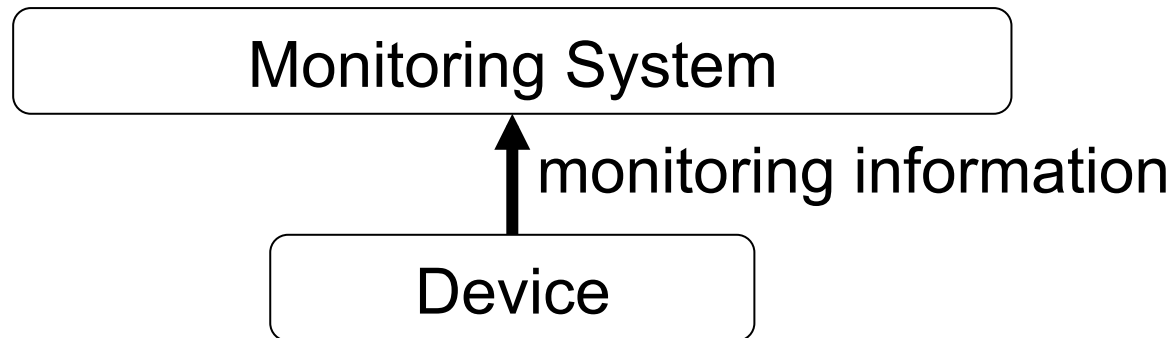
J. Quittek, B. Nordman

# Motivation

- Some scenarios differ significantly from common network management scenarios
- Main reason: reporting on remote devices
- In order to understand what we are doing it is helpful to model these scenarios
  - ◆ One approach is the parent/child concept
  - ◆ This reference model is an alternative view on the same scenarios

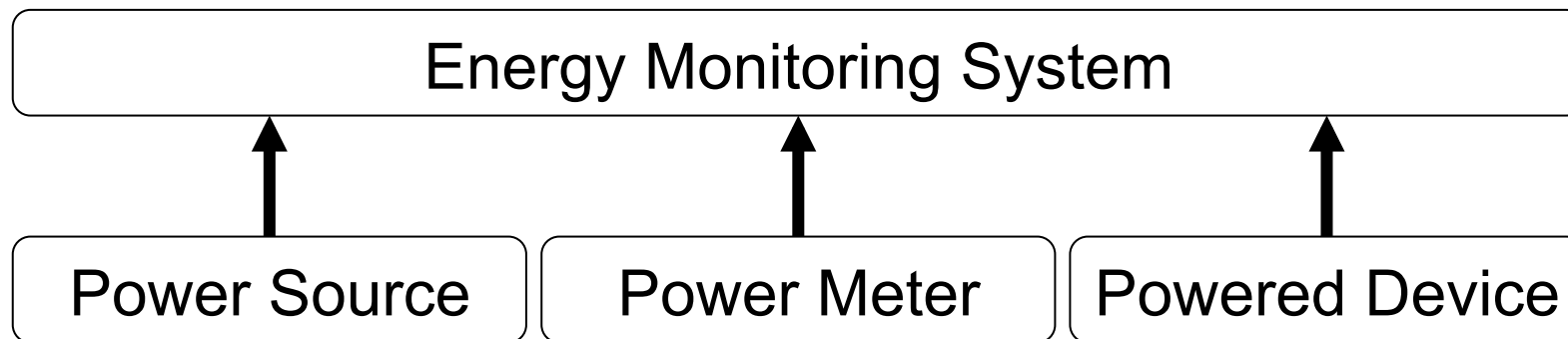
# What 's different in energy management?

- Common case of device monitoring



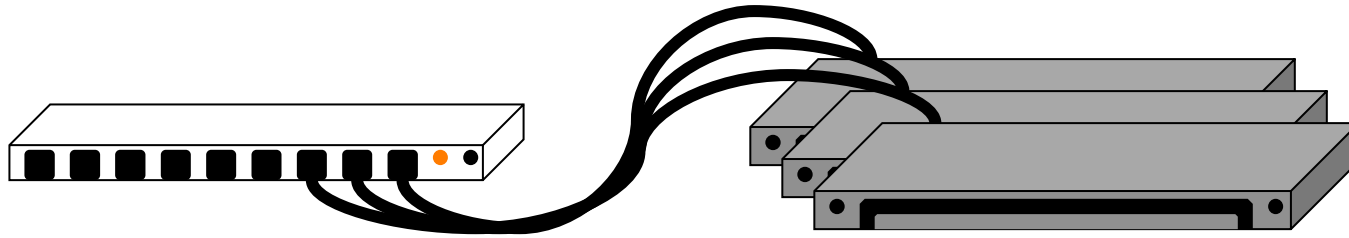
- **Complication #1:**

Up to three locations to monitor for a device

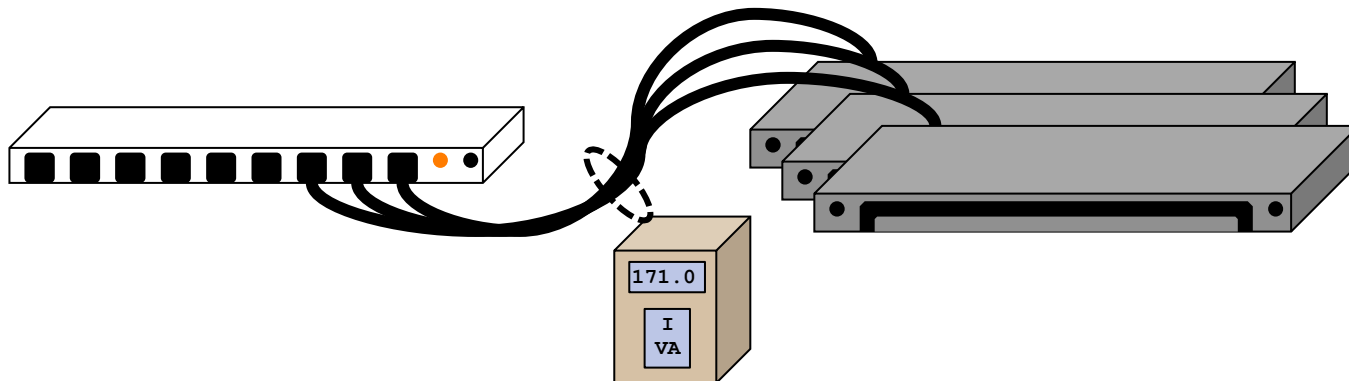


# Examples

- PDU and server in a rack
  - ◆ or, PoE switch and desktop phone



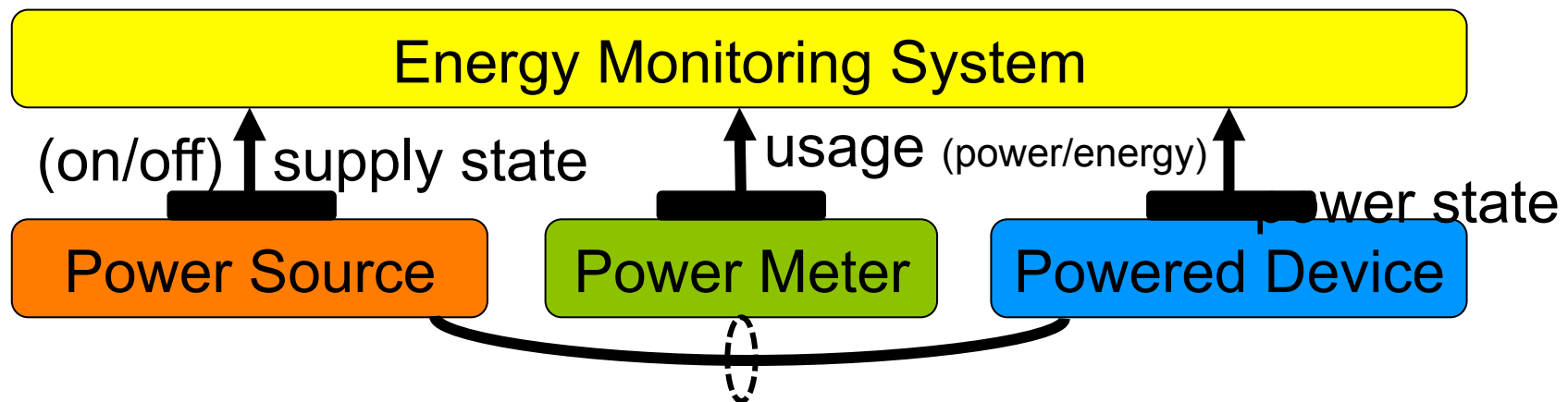
- External power meter



# Basic Energy Monitoring Model

Three sources of information on a powered device

- ◆ Power source (supply)
  - Is the device supplied with power (on/off)?
- ◆ Power meter (between source and device)
  - What is the current power the device is supplied with (W)?
  - How much energy has been consumed by the device (Wh)?
- ◆ Powered device
  - Which (power) state is the device in (on, sleep, off, etc.)?

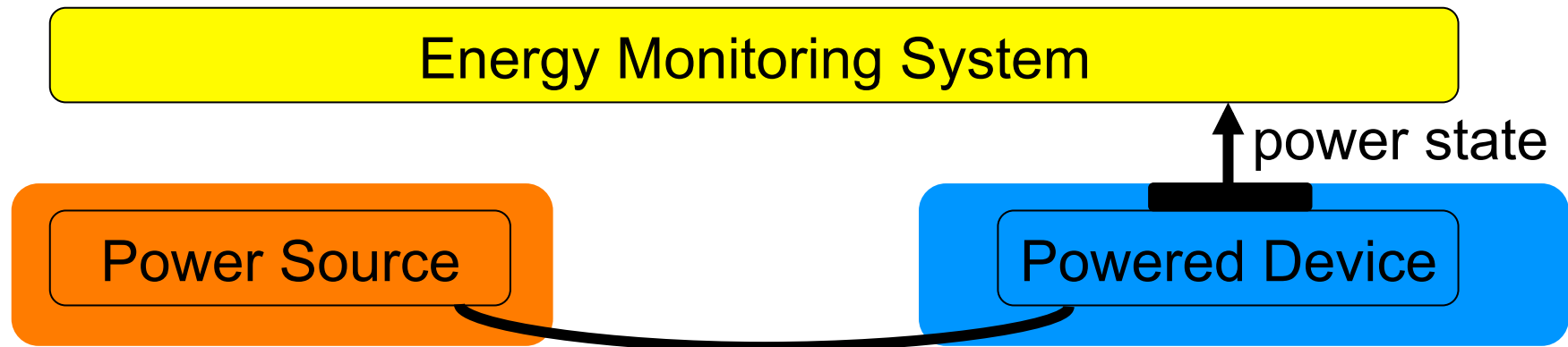


# Key concepts for Reference Model

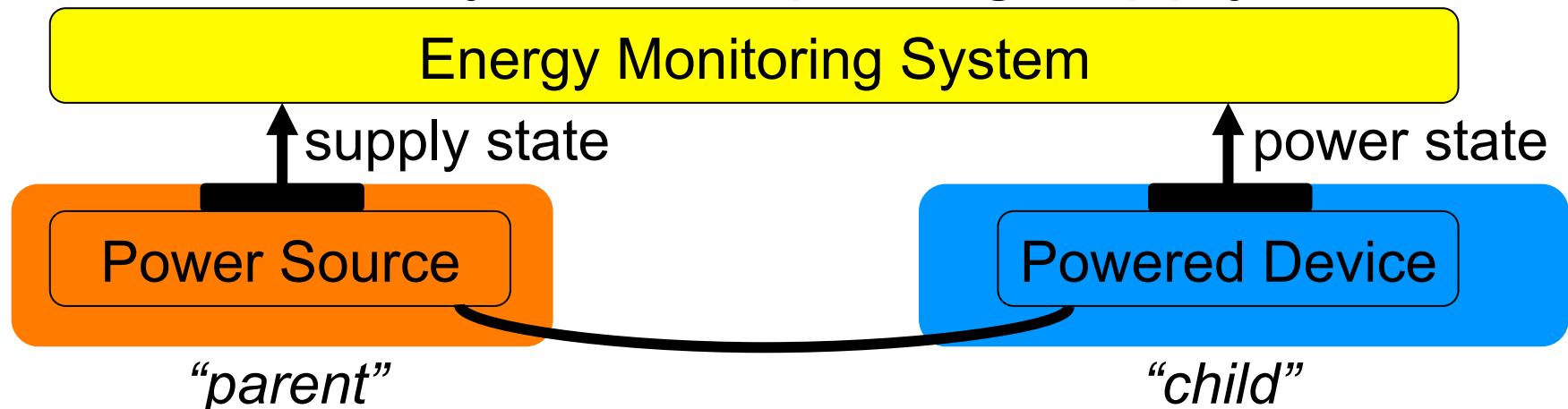
- Device being reported on is always the “powered device” regardless of the reporting topology
- Each of the three power monitors is a “function” whose location varies
- Monitor may report to more than one management system
- Does not require parent/child concept

# Example scenarios

## 1. Plain device just reporting it 's power state

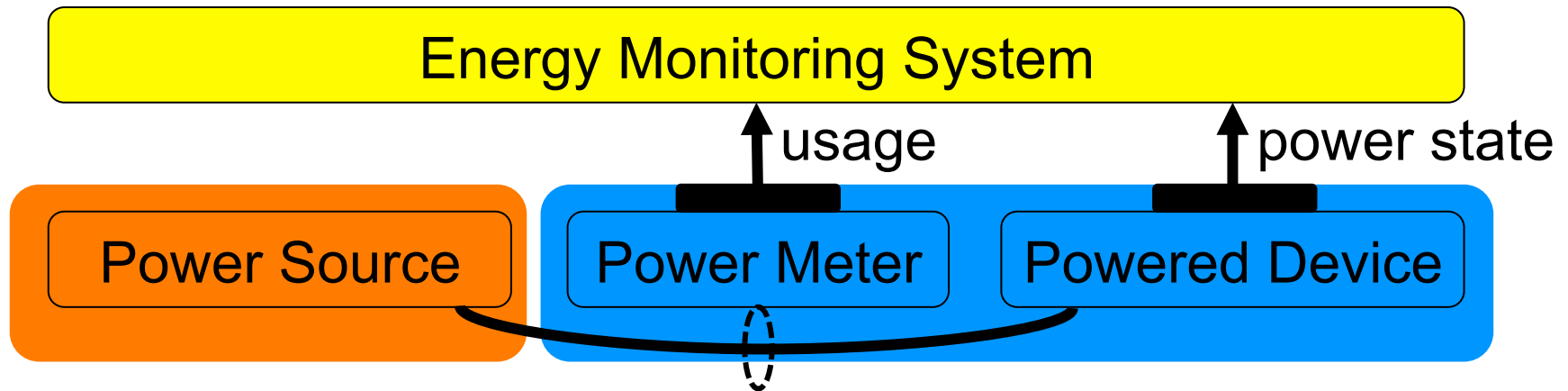


## 2. Additionally, PDU reporting supply state

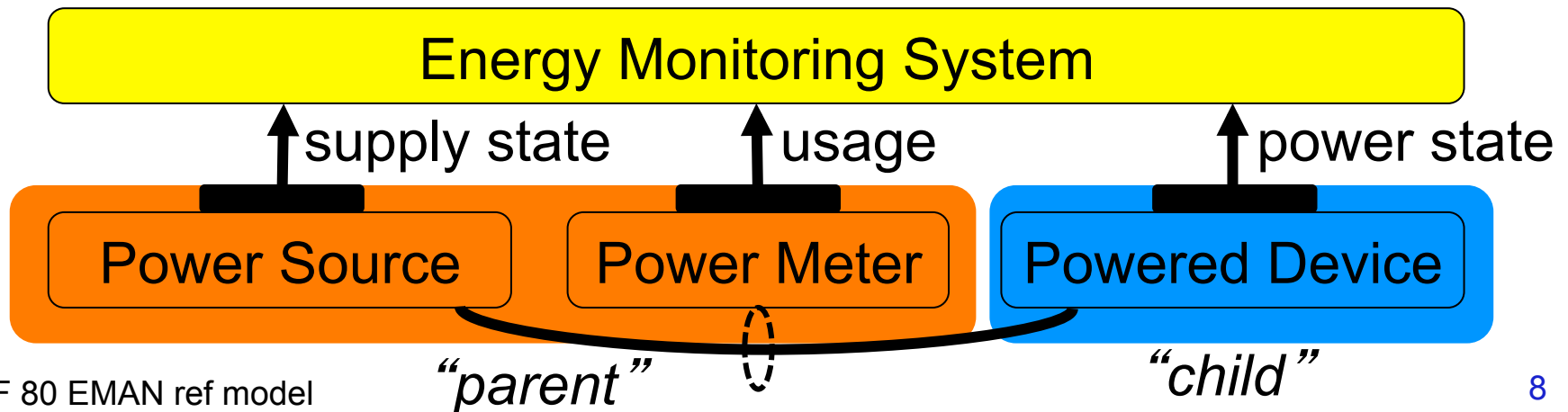


# Example scenarios

## 3. Device with a meter (or an estimator)



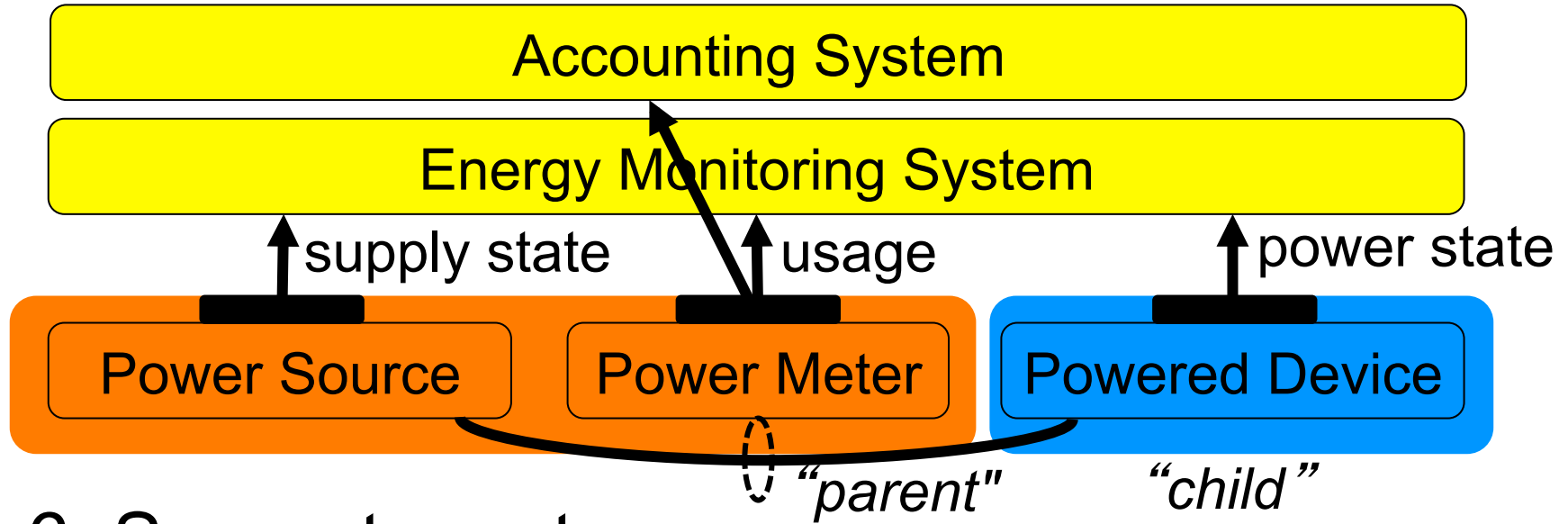
## 4. PDU with meter / PoE Switch



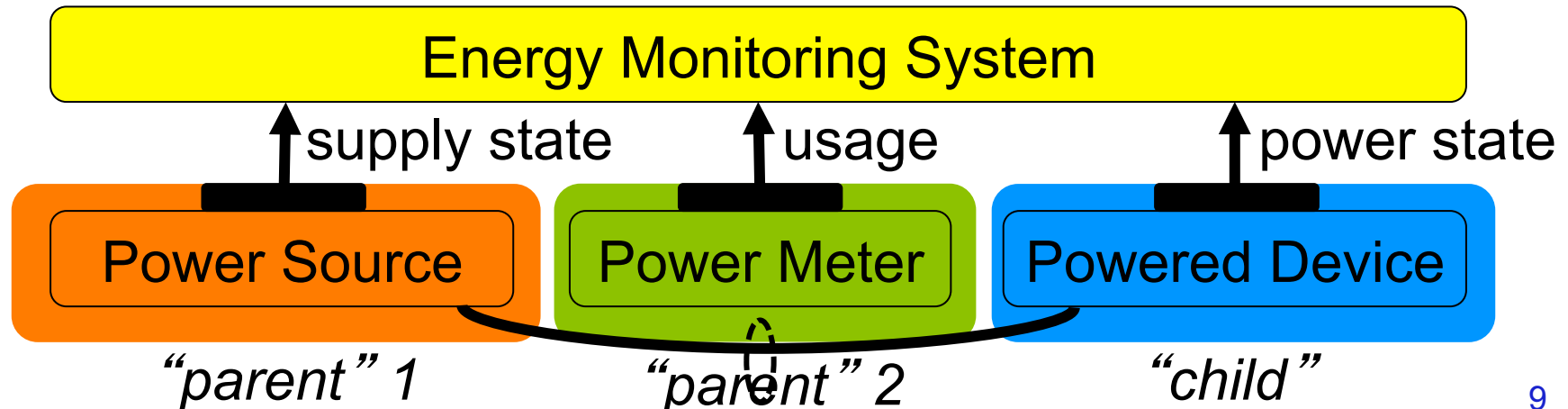


# Example scenarios

## 5. Multiple Management Systems



## 6. Separate meter

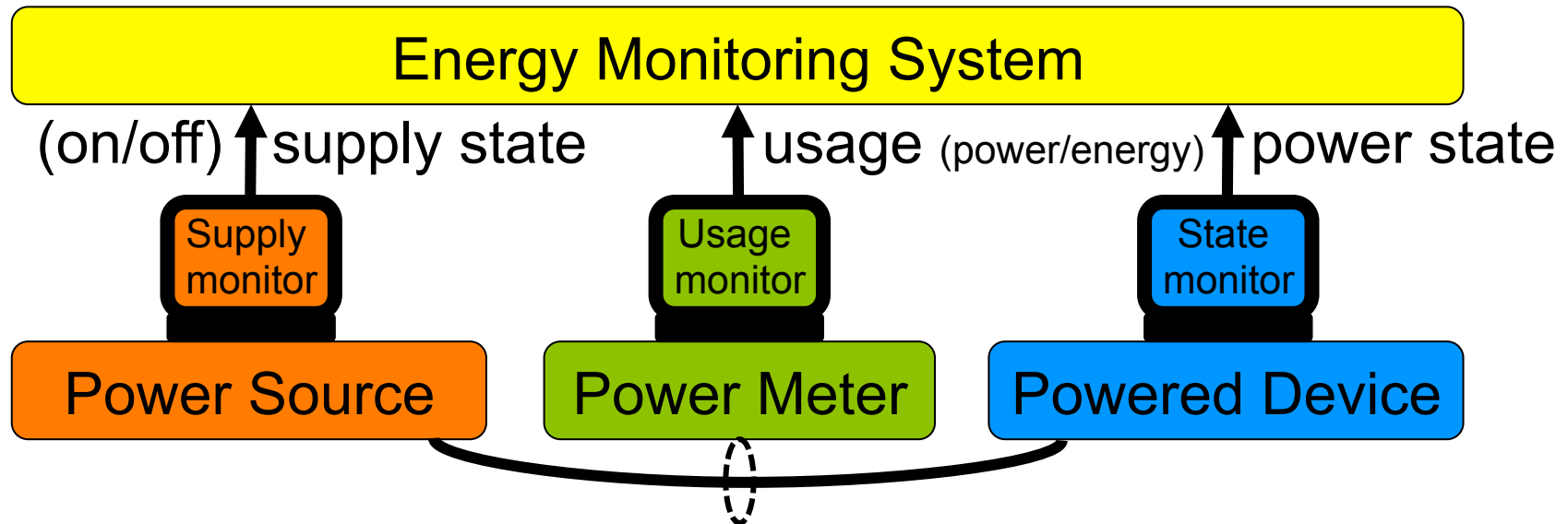


# What's different?, part 2

- **Complication #2:**  
Relaying of monitoring information for
  - ◆ reporting all information about a device together
  - ◆ providing a gateway to non-IP devices
  - ◆ aggregating information from several devices
  - ◆ etc.

# Extended Energy Monitoring Model

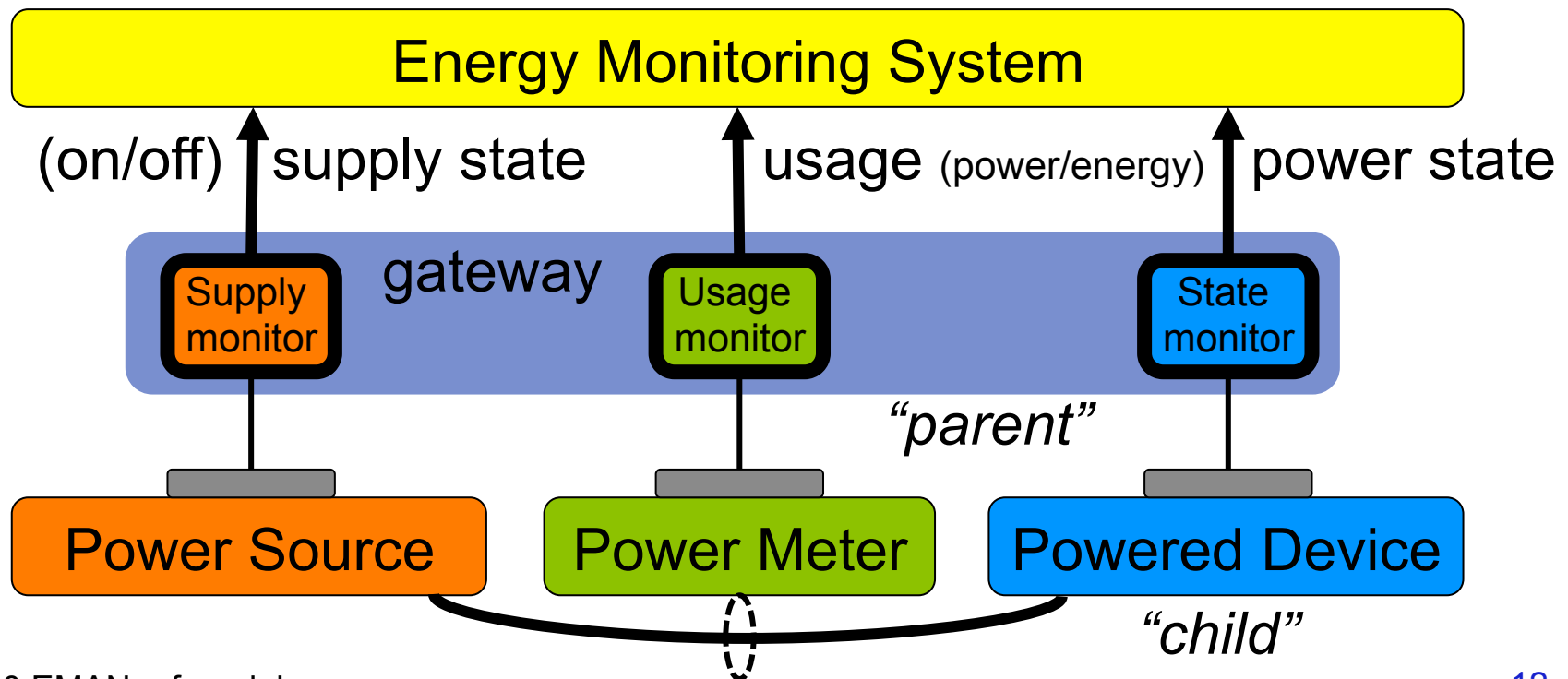
- For reporting on non-local data, reporter (monitor) and source of data need to be separated



- Monitors can be located remotely if they still have a connection to the source of information
- Communication from source of information to monitor can be proprietary

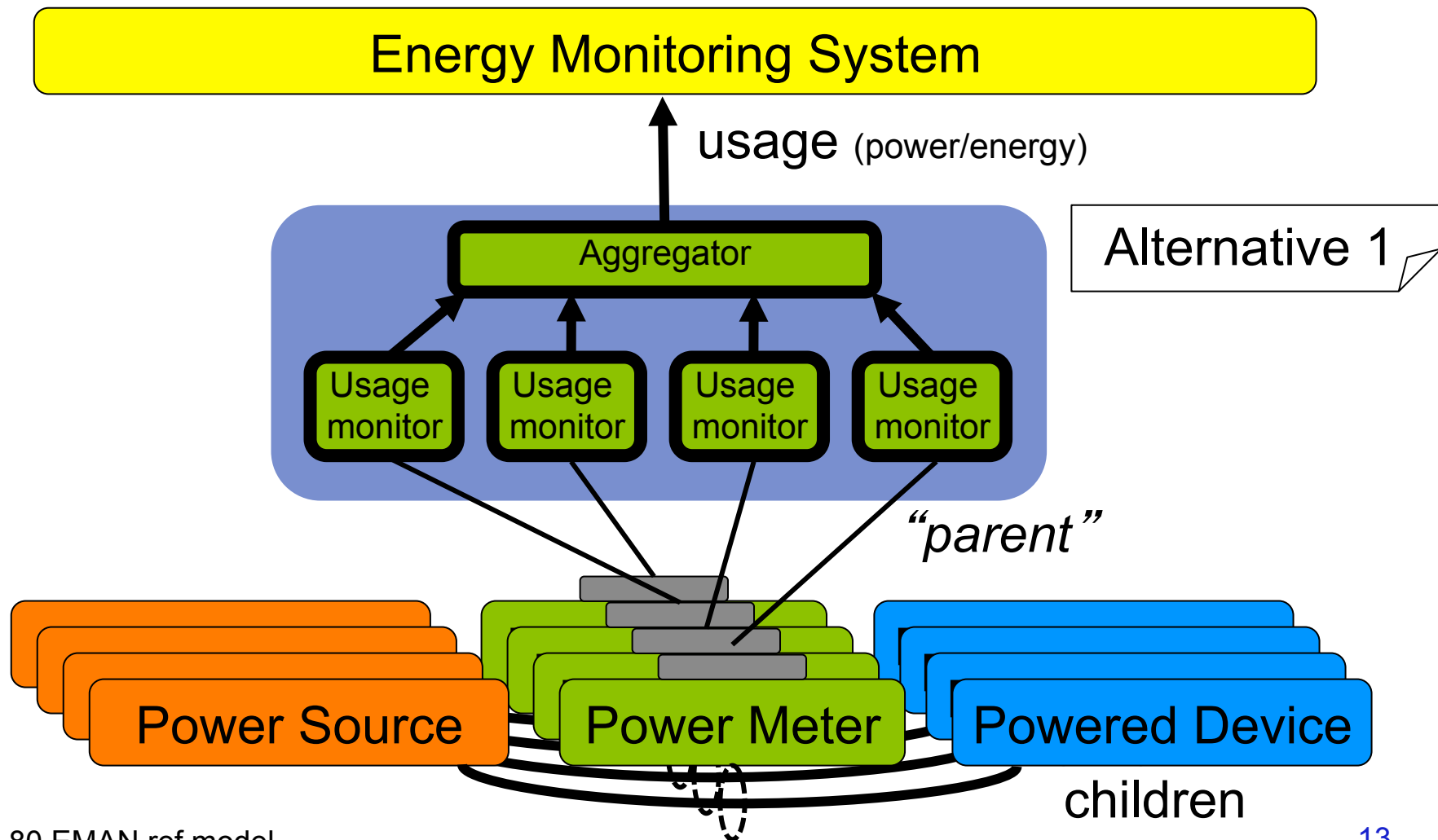
# Example Scenario: Gateway

- Gateway connecting private or non-IP network to monitoring system
- Communication between source, meter, powered device, and gateway may be proprietary



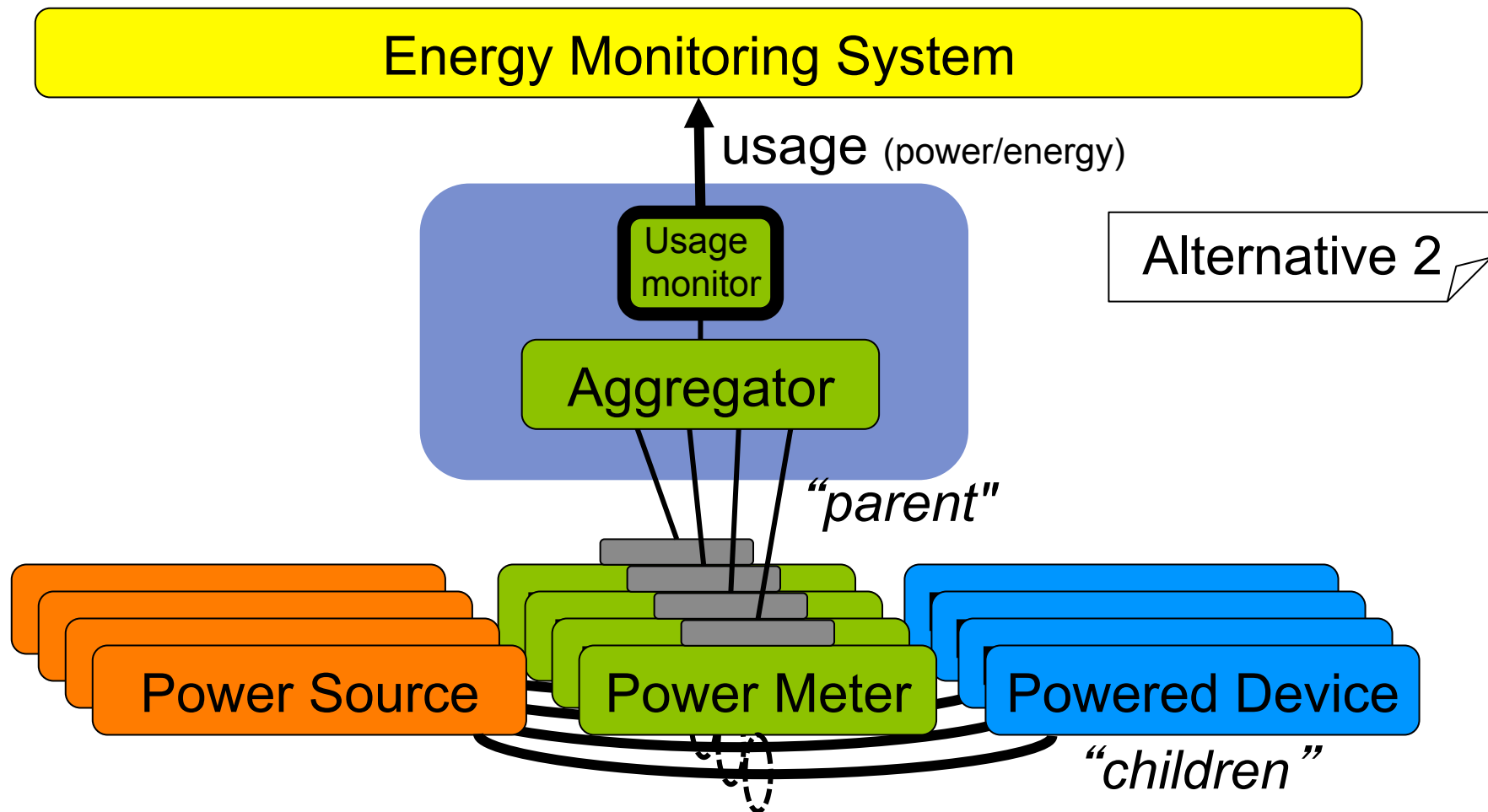
# Example Scenario: Aggregator 1

- Open issue: how to model aggregators?



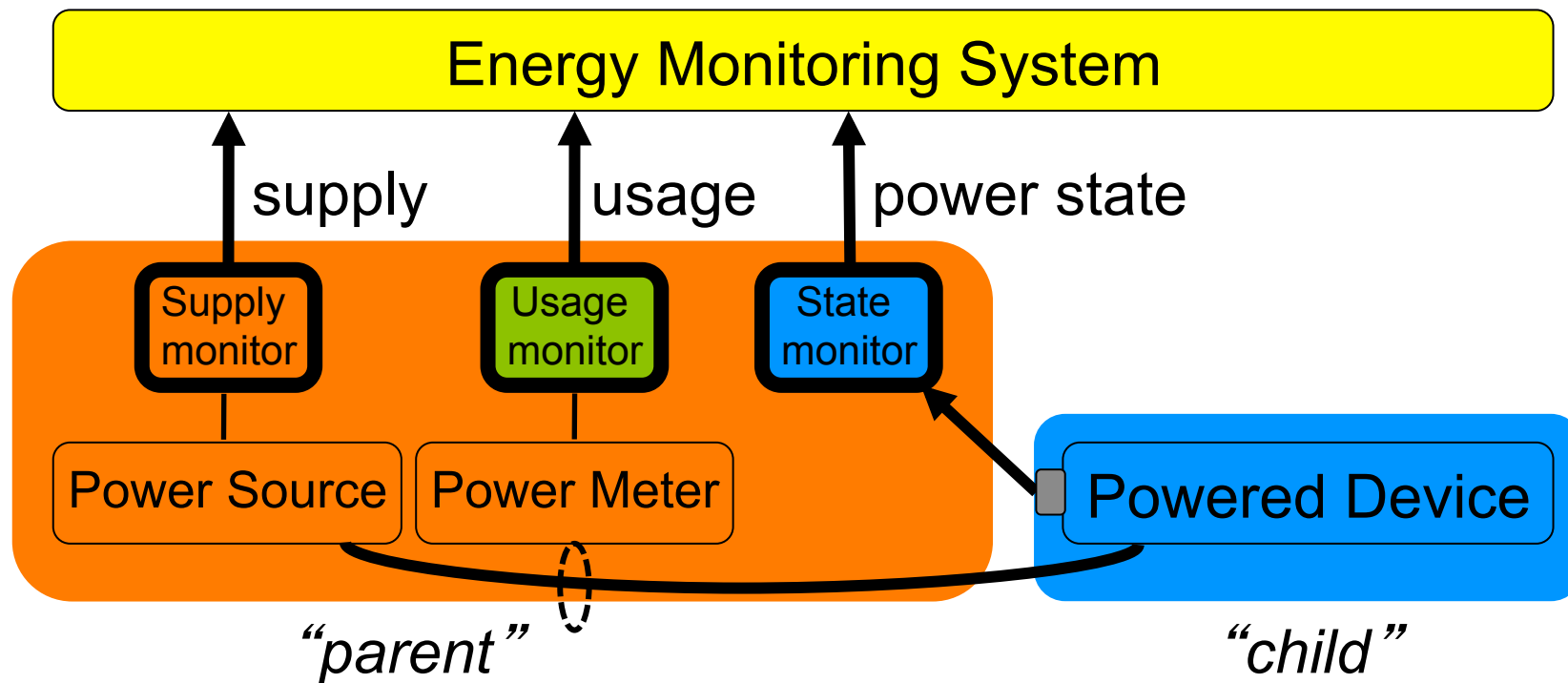
# Example Scenario: Aggregator 2

- Open issue: how to model aggregators?



# Example Scenarios: PoE Switch

- PoE switch with power state monitor



# Conclusion

- Reference model
  - ◆ identifies functions performed in energy management
  - ◆ independent of location of functions
    - locating functions is step 2 after identifying them
    - parent/child appears to be about location only ???
  - ◆ models large set of application scenarios
  - ◆ clarifies that power supply is a distinct monitoring function
- Adding control is easy
  - ◆ we get power controllers in addition to power monitors
  - ◆ controllers would be adjacent to monitors
  - ◆ as with monitors, power supply controller and power state controller can be in different locations