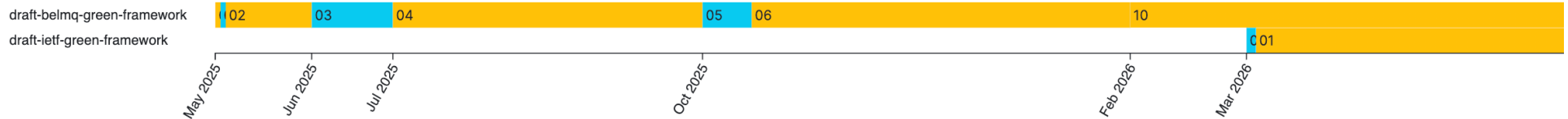


Framework for Energy Efficiency Management

draft-ietf-green-framework-00



Benoit Claise (Everything OPS)
L.M. Contreras (Telefonica)
Jan Lindblad (All For Eco)
Marisol Palmero (Independent)
Emile Stephan (Orange)
Q. Wu (Huawei)

Document History and Recap

- IETF 124 KEY Decisions
 - Establish GREEN design team and organize bi-weekly GREEN design team meetings to accelerate work on device monitoring firstly.
 - Synchronize GREEN framework with the progress of the GREEN YANG data model.
- Framework draft has been adopted

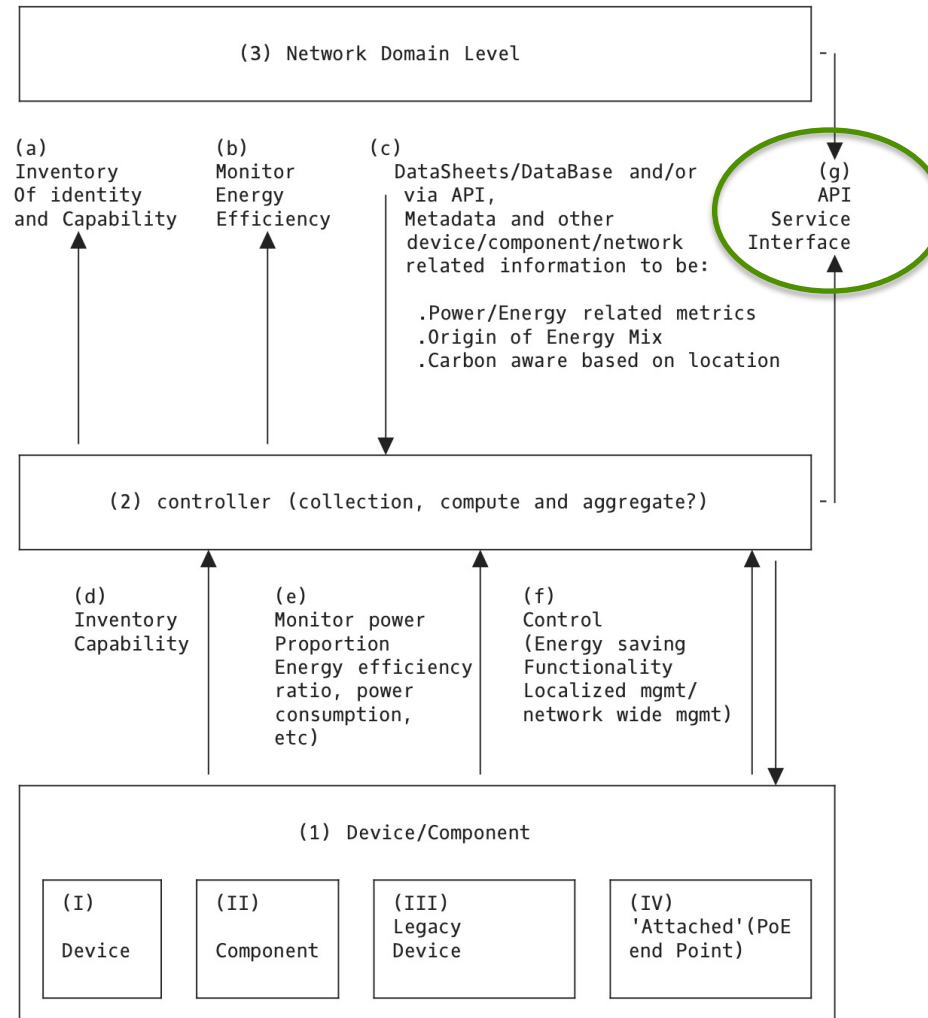
GREEN Framework Reference Model

YANG Data Model
(Controller level)

Starting...

YANG Data Model
(Device/Component level)

70% of the work already DONE



Use Cases
mapping

(In progress...)

Figure 1: GREEN Framework Reference Model

Changes from v.06 to v.10

Table of Contents

- 1. TO DO and Open Issues
 - 1.1. Discovering Capabilities
 - 1.2. Understanding Device Capabilities
 - 1.3. Mapping Intents to Device Settings
 - 1.4. Handling Transitions and Ensuring Safety
 - 1.5. East-West Traffic/Energy Metrics
- 2. Introduction
 - 2.1. Terminology
- 3. Motivation
 - 3.1. Impact on Energy Metrics
 - 3.2. Current Device Readiness
 - 3.3. Why Now?
- 4. Reference Model
 - 4.1. Typical Power Topologies
 - 4.1.1. Basic Power Supply
 - 4.1.2. Physical Meter with Legacy Device
 - 4.1.3. Physical Meter with New Device
 - 4.1.4. Power over Ethernet
 - 4.1.5. Single Power Supply with Multiple Devices
 - 4.1.6. Multiple Power Supplies with Single Device
 - 4.2. Relationships
 - 4.3. Power State Set
 - 4.4. Power State Set Mapping and Intent
 - 4.4.1. Capability Discovery
 - 4.4.2. Intent Mapping
 - 4.4.3. SLA Considerations
- 5. Interfaces Usage Of the Framework
 - 5.1. Mapping of Use Cases to Framework Interfaces
 - 5.2. Observations and Next Steps
- 6. Conventions and Definitions
- 7. Security Considerations
- 8. IANA Considerations
- 9. Acknowledgments
- 10. References
 - 10.1. Normative References
 - 10.2. Informative References
- Authors' Addresses

Table of Contents

- 1. TO DO and Open Issues 4
 - 1.1. Discovering Capabilities 4
 - 1.2. Understanding Device Capabilities 4
 - 1.3. Mapping Intents to Device Settings 4
 - 1.4. Handling Transitions and Ensuring Safety 4
 - 1.5. East-West Traffic/Energy Metrics 4
- 2. Introduction 5
 - 2.1. Terminology 6
- 3. Motivation 8
 - 3.1. Impact on Energy Metrics 8
 - 3.2. Current Device Readiness 9
 - 3.3. Why Now? 9
- 4. Reference Model 10
 - 4.1. Data Collection Architecture 12
 - 4.1.1. Telemetry Push Pattern 13
 - 4.1.2. Controller vs. Device Initiated 13
 - 4.1.3. UUID-Based Component Identification 14
 - 4.1.4. Measurement Accuracy and Data Source Classification 14
 - 4.1.5. Industry-Standard Certifications 15
 - 4.1.6. Extensibility Through YANG Identities 15
 - 4.1.7. Hierarchical Data Model and Default Value Inheritance 15
 - 4.1.8. Unit Multiplier Consistency 16
 - 4.1.9. Power Factor 17
 - 4.2. Typical Power Topologies 17
 - 4.2.1. Basic Power Supply 17
 - 4.2.2. Physical Meter with Legacy Device 18
 - 4.2.3. Physical Meter with New Device 20
 - 4.2.4. Power over Ethernet 22
 - 4.2.5. Single Power Supply with Multiple Devices 23
 - 4.2.6. Multiple Power Supplies with Single Device 25
 - 4.3. Relationships 26
 - 4.4. Power State Set 27
 - 4.5. Power State Set Mapping and Intent 28
 - 4.5.1. Capability Discovery 28
 - 4.5.2. Intent Mapping 29
 - 4.5.3. SLA Considerations 29
- 5. Interfaces Usage Of the Framework 29
 - 5.1. Mapping of Use Cases to Framework Interfaces 29
- 6. Use Case Implementation Requirements: Device vs. Controller Centric 32
 - 6.1. Implementation Focus: Where Intelligence Resides 32
 - 6.2. Key Findings 35
 - 6.2.1. Device Capabilities Required across Use Cases 35
 - 6.2.2. Controller Capabilities Required across Use Cases 35
 - 6.3. Implementation Priorities 35
 - 6.4. Next Steps 35
- 7. Conventions and Definitions 35
- 8. Security Considerations 35
- 9. IANA Considerations 36
- 10. Acknowledgments 36
- 11. References 36
 - 11.1. Normative References 36
 - 11.2. Informative References 36
- Authors' Addresses 37

YANG Data Model
(Device/Component level)

Use Cases mapping

Complementary to GREEN YANG Data Model

Focus on the architectural collection requirements:

- Leverage RFC 8348: energy metrics are anchored to hardware UUIDs (chassis, PSU, line cards...); controllers maintain a dual-identifier mapping between their own onboarding IDs and device UUIDs to enable cross-system correlation.
- Framework supports both initiation models: controller-initiated and device-initiated; dual-identifier UUID mapping is a defined requirement for onboarding. ¶
- Data source classification and accuracy: measured, estimated, unknown
- Industry certifications (e.g., for PSUs), so operators can trust the data they act on. Done through IANA: YANG module maintained by IANA and IANA registry
- Unit multiplier consistency for the YANG data models
- Introduce Power Factor

Topics for Further Discussion

(later by Benoit C.)

- **Power State Set Mapping&Intent**

Defining how controllers map high-level operational intents to device-specific power states requires further alignment.

- **Controller vs Device Initiated**

Both models are complementary; coordination rules and edge cases need further definition.

- **UUID-based Component Identification**

Dual-identifier mapping between controller-assigned IDs and RFC 8348 device UUIDs requires further discussion.

Use Cases Focus

UC#	Use Case	Critical Capabilities
Device-Centric		
14	Power Shortage Management	Backup power awareness, autonomous operation
1	Incremental Deployment	Baseline metrics, certification reporting, capability discovery
Device + Controller		
4	Virtualized NF Metering	HW-layer metering, VM correlation, real-time telemetry push
9	WLAN Energy Saving	PoE power modes, double counting, coordinated state transitions

Controller-Centric		
2	Selective Energy Reduction	Traffic pattern analysis, coordinated sleep modes, global optimization
3	Lifecycle Reporting	External database integration, carbon factor correlation, metadata aggregation
5	Indirect Monitoring	PDU/meter integration, topology-aware aggregation, proxy measurement
6	Cross-Domain Metrics	Multi-domain API integration, double-accounting prevention, metric mapping
7	Wireless Transport Optimization	*Traffic-aware power adjustment, dynamic link control, pattern recognition
8	Video Streaming	Multicast optimization, cache placement, traffic engineering
10	Fixed Network Saving	pattern prediction, coordinated reconfiguration, AI/ML integration
11	Network-Wide Management	Centralized visibility, topology mapping, vendor-neutral aggregation
12	ISAC Smart City	Context-aware activation, city-wide coordination, sensing prioritization
13	Double Accounting Prevention	Metering topology awareness, relationship modeling, intelligent aggregation
15	AI Training Workloads	Energy-aware scheduling, data placement, East-West traffic optimization
16	Cross-Layer Saving	Multi-layer coordination (L0-L3), cross-layer state synchronization

Table 2: Use Case Implementation Focus

Next Steps

Continue working on mapping the GREEN framework to:

- GREEN YANG data model (focus on Controller)
- Prioritize Use Cases
- Review the GREEN terminology and keep aligning the terms
- Keep updating based of the open "Issues" under git repo:

<https://github.com/ietf-wg-green/draft-ietf-green-framework>

Thank You

- Datatracker :
<https://datatracker.ietf.org/doc/draft-belmq-green-framework/>
- Github :
<https://github.com/ietf-wg-green/...>
- Mailing List :
green@ietf.org