Disclaimer

• The information in this presentation represents a snapshot of work in progress within the DMTF.

• This information is subject to change without notice. The standard specifications remain the normative reference for all information.

• For additional information, see the Distributed Management Task Force (DMTF) website.
Control Loops

- Models exist for metrics, sensors and controls
- A control loop can be constructed between sensors/metrics and controls
  - Sense input(s)
  - Analyzed the input(s)
  - Decide on action(s), if any
  - Perform action(s) via control(s)
- The control loop can be viewed as a policy construct
  - Analyze inputs and decide which controls to manipulate
Polices can be Delegated (e.g. Power Capping)

- The policy construct can be delegated down a hierarchy
- A delegated policy authorizes a node to enforce a policy, locally
Survey of Policy Management Models (details in backup)

- DEN/COPS Policy Statements
  - COPS = Common Open Policy Servic (1996)
- DMTF/IETF Policy Framework (circa 2001)
  - PDP = Power Decision Points
  - PEP = Power Enforcement Points
- TM Forum - GB922 R18.0.2 "Shared Information/Data Model" (2018)
- DSP1048 - Network Policy Management Profile (2021)
  - [https://www.dmtf.org/sites/default/files/standards/documents/DSP1048_1.0.0.pdf](https://www.dmtf.org/sites/default/files/standards/documents/DSP1048_1.0.0.pdf)
- ETSI - Draft - DGR/NFV-IFA042 v0.3.0 "Policy Model" (2021)
DMTF Policy Mgmt Model

DMTF/IETF RFC 3060
Policy Core Information Model (2001)

DSP1048 - Network Policy Management Profile (2021)
TM Forum & ETSI References

- **TM Forum - GB922 R18.0.2 "Shared Information/Data Model"
  - Policy - [https://www.tmforum.org/resources/standard/gb922-policy-r18-0-0](https://www.tmforum.org/resources/standard/gb922-policy-r18-0-0)
  - R18.0.2 approved by TM Forum on 18-Jun-2018

  - [https://www.etsi.org/deliver/etsi_gr/ENI/001_099/003/01.01.01_60/gr_ENI003v010101p.pdf](https://www.etsi.org/deliver/etsi_gr/ENI/001_099/003/01.01.01_60/gr_ENI003v010101p.pdf)
  - IETF's SUPA model - (Simplified Use of Policy Abstractions)
  - Draft DGR/NFV-IFA042 v0.3.0 Policy Model

Supa drafts
- "Applicability of SUPA", March 2017, draft-cheng-supa-applicability-01
Redfish Policy model

- **Delegated Power Limit Policy example**
  - If power usage exceeds X, use delegated controls to reduce power usage below X within 50 ms (achieve goal within a timeframe)
  - If unable to achieve, notify the delegator

- **Some Variations**
  - Multiple conditions
    - Need to indicate AnyOf, AllOf, etc
  - Multiple reactions
    - Policy prioritize of reaction?
    - Simultaneous
Proposed Policy Model

Use the CertificateService modeling pattern

Note - There is thought that Certificate model should have reversed the direction of the references

Multiple policies per resource

Policy references sensors and controls
New resource schema

- PolicyService
- PolicyCollection
- PolicyLocations
- Policy

```
{  
"@odata.type": ">#Policy.v1_0_0.Policy",
"Name": "Policy0",
"PolicyType": "PowerLimit",
"PolicyEnabled": true,
"PolicyTriggered": true,
"State": { ... },
"PolicySuspendPeriod": { ... },
"Conditions": [  
  {  
    "Sensor": "/redfish/v1/Chassis/1/Sensors/TotalPower",
    "TriggerThreshold": 100
  }
],
"Reactions": [  
  {  
    "Control": "/redfish/v1/Chassis/1/Controls/PowerUsage",
    "Setpoint": 120
  },  
  {  
    "Reaction": "SendEvent"
  }
],
"PolicyExceptionActions": [  
  {  
    "Reaction": "SendEvent"
  }
]  
}
```
Questions

• Questions for the industry
  • What are use cases the model should comprehend

• Modeling questions:
  • Whether to model centralized policies (ref from PolicyLocations to Policies) vs a distributed policy model (inverse reference)?
  • Replace Reactions property with a Jobs construct for ordered and concurrent reactions
  • Disposition of existing "Triggers" resource and power controls
  • How to model a system with N processors, each with the same Policy (model scalability) - use wildcard mechanism?
Backup
Policy Management Models
DMTF/IETF models (circa 2001)

https://datatracker.ietf.org/wg/policy/documents
http://www.watersprings.org/pub/id/draft-wang-netmod-yang-policy-dm-01.html
2004 John Strasser, Morgan Kaufmann
https://books.google.com/books?id=lid7plhl1PQC

COPS = Common Open Policy Service (1996)
DMTF/IETF (1999)
  PDP = Power Decision Points
  PEP = Power Enforcement Points
ETSI NFV - RESTful protocols spec for the Policy Manager I/F

Policy Resource
- Policy Version - Versions of the policy
- Selected Version - Selected version of the policy
- Activation Status - activated or deactivated
- Transfer Status - whether content of policy has been transferred
- Associations - identifiers of the entities to which the policy is associated

Policy Actions
- CreatePolicy
- TransferPolicy
- DeletePolicy
- ModifyPolicy

https://www.etsi.org/deliver/etsi_gs/NFV-SOL/001_099/012/03.04.01_60/gs_nfv-sol012v030401p.pdf
ETSI NFV - RESTful protocols spec for the Policy Manager I/F
ONF Reference Implementation

• The Policy Framework for ONOS (Feb 2019)
  • ONOS = Open Network OS
  • The control plane for a software-defined network (SDN) - v1.0.0 (2014) to v2.5.1 (2021)

https://wiki.onosproject.org/display/ONOS/POLICY+FRAMEWORK+FOR+ONOS
https://opennetworking.org/onos
Examples
Power Management Policies of Platform, Subsystem and Components
Power Limiting Policies - nomenclature

Threshold Triggered Action policy (reactive)

- Platform protection
- Hard cap
- Time to achieve
- Power limit
- Dwell time
- Policy exception (unable to achieve)

Pre-emptive Action policy (predictive)

- Platform protection
- Damages hw/system
- Hard cap
- Blows fuse
- Power limit
- Policy exception (unable to achieve)
Example - Platform Power Policies

- **Power Limit Policy (read/write)**
  - Platform does not exceed the power limit (on average). The platform uses its power limiting capabilities and sends exception if unable.

- **Hardcap Policy (read/write)**
  - Platform should not exceed the power limit (else breaker is tripped). The platform uses its power limiting capabilities prior to cap and sends exception.

- **Hardcap Shutoff Policy (read/write)**
  - When platform exceeds a threshold, then power off the platform
  - (Could be the exception action for Hardcap Policy)

- **Platform Protection Policy (read-only)**
  - Configured by OEM/System Integrator
Example - Processor Domain Power Policies

- **Power Limit Policy (read/write)**
  - The power consumption of the processors does not exceed a power limit.
  - The power consumption of process of specific processor-type does not exceed a power limit.
Example - Processor Power Policies

- **LossOfSensor Policy**
  - When readings cannot be obtained from the processor, throttle to a percentage of CPU power usages (e.g. 100%)