Rack Monitoring, Redfish, and OpenBMC
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OCP - ORV3 Power Monitoring

- OCP **Rack and Power**
  - PMC and PMI based design
  - ORV3 Rev 65 is latest spec for PMC and PMI
  - PMI Spec is finalised, ref design available
  - Refocus PMC to RMD
- PMC (Power Management controller)
  - Sits on power and battery shelves
  - Has BMC (ASPEED 2620)
  - Downstream through sliver straddle connector
  - Upstream is RJ45 to mgmt port of ToR
- PMI (Power Management Interface)
  - PMI is an extension module
  - Brings MODBUS directly out for upstream communication.
Current OCP Rack Monitoring
- There is no dedicated RMD box in the OCP rack while the RMD functionalities are offloaded to the ToR and rack power systems (power shelves/BBUs).
- Data aggregation is implemented in the power systems while proxy function is executed in the ToR.
- A ToR is needed for RMD functions even for a machine-less rack.

New RMD:
- RMD integrates data aggregation and proxy functions in one.
- RMD can function as a standalone switch and has the flexibilities to be used in different configurations.
- RMD is independent of ToR and has the flexibilities to extend/upgrade functionalities without affecting ToR.
- New RMD superset of current RMD (features.
- RMD can be used as OOB mgmt switch
RMM Concept from Facebook

- Versatile Rack Management Module
- Supports RS485, CAN, I2C, Ethernet etc
- Possible alignment with OCP RMD
  - 48 port OOB switch with BMC
  - Security RoT
  - Uplink to ToR (Data port)
  - Redfish for Telemetry and control
  - Can be used for OOB management network
  - Can be used for low latency paths

Versatile Rack Management module that supports various platforms with several communication types, e.g. RS485, CAN, I2C, Ethernet, etc.
- Rack manager is used for power cycling control and reset functions and it is not related to RMD function.
- Rack power telemetry data is aggregated through the mgm switch. The aggregated data is sent to PROD through rack manager and MOR (mid of row) switch.
A SCM module is used in each rectifier/battery/machine shelf.
- Security is implemented in the SCM module.
- An open-BMC module is used in the SCM module so that the output data from the SCM module is in Redfish format.
RMD - Goals

- **Security**
  - RMD should have a HW RoT (Root of Trust)
  - Enforce Secure Boot
  - Provide Attestation
  - RMD has Security Proxy to separate rack level network
- **ToR Independent Design**
  - No rack management code in ToR
  - Step towards ToR OTS
- **Enables OTS devices, servers securely**
  - Redfish based telemetry
  - Redfish Aggregation
- **Rack Level Management Network**
  - Connects to Machine BMC’s
- **Low cost device**
RMD: Next Gen Rack Management Device

- Overview: 1RU, 48x1G, 2x10G uplink, CPU, BMC, Switch, power connector, RS485, CAN, BMC and CPU console
- Low end 1G switch with CPU and BMC
- Cost of the HW should be very low as one RMD is needed per Rack (< $500)
RMD: Software Stack

- **CPU - Linux**
  - Switch management on CPU
  - Vendor sdk on CPU
  - Security Proxy on CPU
- **BMC**
  - Firmware for telemetry and control of BBUs and PSUs
  - Redfish Aggregator
  - Redfish Translator (if needed)
  - RoT (root of trust) using platform security chip
Rack Level Mgmt Network, Enables OTS Devices

- BMC based Redfish Telemetry
- Machine BMCs To RMD
- Rectifiers
- Batteries
- Redfish Telemetry

RACK & POWER

Top of the Rack Box

External 54VDC Feed
Ethernet or MoBus
Uplink

OPEN POSSIBILITIES.
RMD Redfish

PSUs

BBUs

UPS

Chillers
Generators
Cooling

Redfish (http)

RMD

Proxy

Redfish Client

Data Port

ToR

Rack side

Prod side

OPEN POSSIBILITIES.
OpenBMC, Redfish

- Redfish based telemetry and control.
- Redfish aggregation on BMC
  - openBMC based implementation
- RMD will have Redfish Client
- All endpoints (BBUs and PSUs) to RMD communication can be per Redfish standard
- RMD can translate Redfish messages to other formats (vendor specific) as needed
- Benefits of Redfish
  - Single messaging interface b/w RMD and endpoints
  - Easy and faster onboarding of OTS Endpoints
  - Industry/Open standards.
Rack Level Management Network

- Out Of Band management network for Machine BMCs
  - Used for Installation of software
  - Used for firmware updates
  - Used for all OOB management
- RMD can be used as OOB switch in addition to being RMD
  - RMD has 48 port 1G RJ45 interfaces.
  - CPU of RMD should be able to handle all the OOB traffic (proxy)
- Rack Private network
  - OOB Management ports can be on private network
  - RMD can securely proxy for those
OCP RMD Convergence - Goal (WIP)

- RMU from Google
- RMM from Facebook
- SCM Module from Microsoft?

2021
2022
2023
2024

OPEN POSSIBILITIES.
Call to Action

- Define common requirements for RMD
- Collaborate with different vendors to finalize minimum requirements
  - Google, Facebook and Microsoft have started collaborating
- Define high level HW design which meets these requirement
Thank you!