

OPEN POSSIBILITIES.

Rack Monitoring, Redfish, and OpenBMC



OCP
GLOBAL
SUMMIT

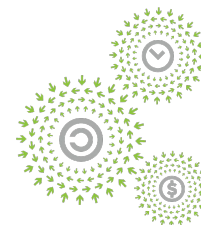
NOVEMBER 9-10, 2021



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Rack Monitoring, Redfish, openBMC

Sudhindra Barve, Engineering Manager, Google



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OCP - ORV3 Power Monitoring



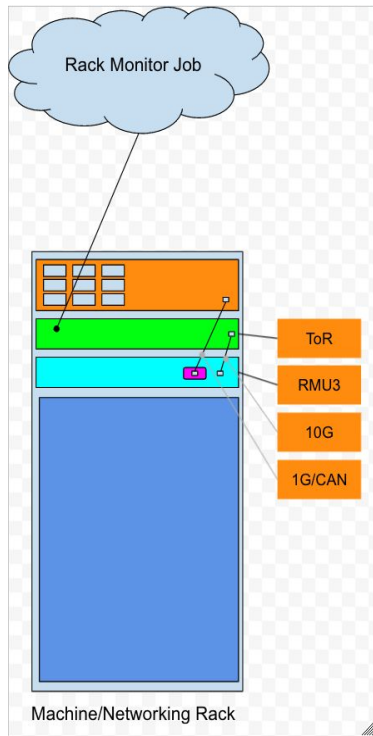
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- OCP [Rack and Power](#)
 - PMC and PMI based design
 - ORV3 Rev 65 is latest spec for PMC and PMI
 - PMI Spec is finalised, ref design available
 - Refocus PMC to RMD
- PMC (Power Management controller)
 - Sits on power and battery shelves
 - Has 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.

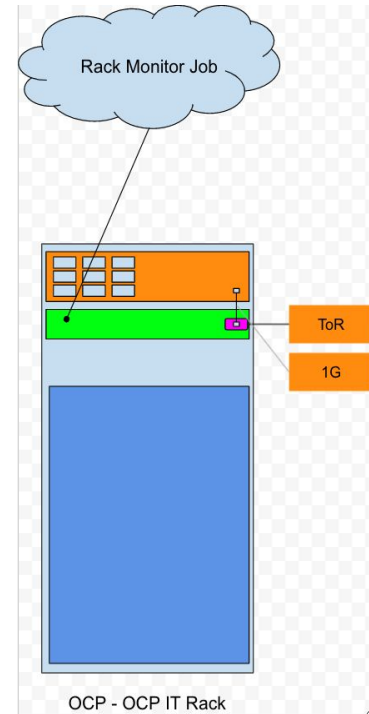
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OCP - OCP RMD



- **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

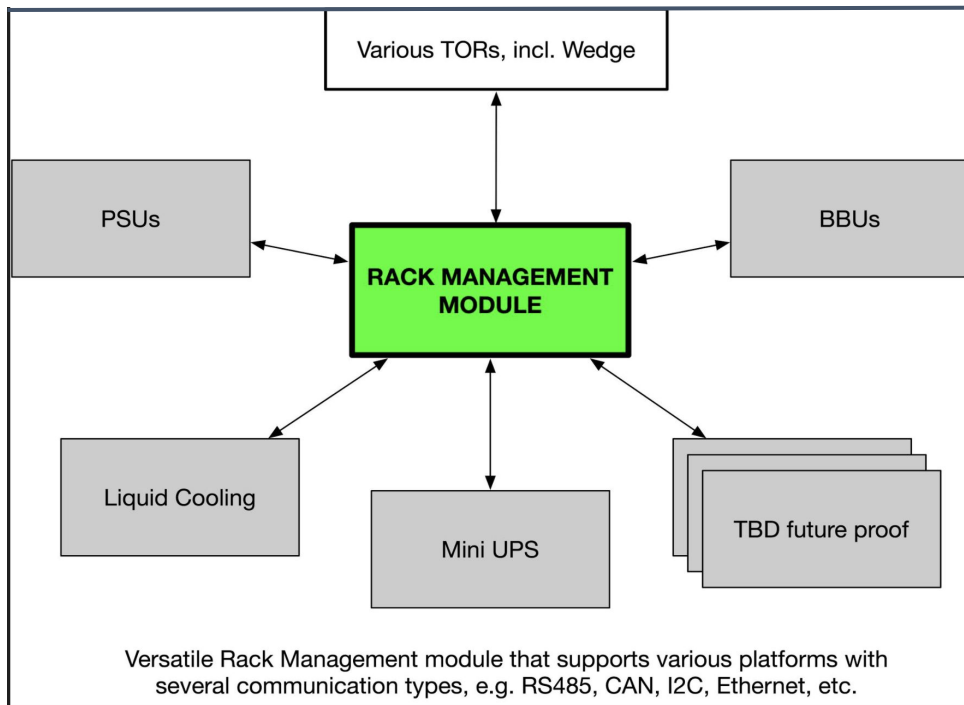


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RMM Concept from Facebook



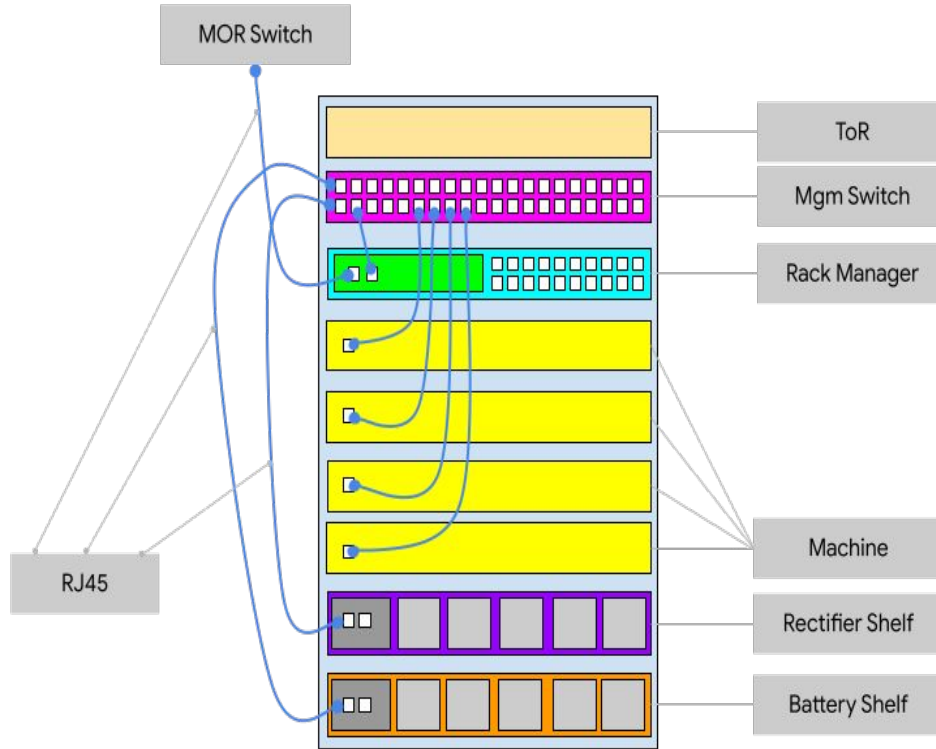
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- Versatile Rack Management Module
- Supports RS485, CAN, I2C, Ethernet etc
- Possible alignment with OCP RMD
 - 48 port OOB switch with BMC
 - Security RoT
 - Uplink to ToR (Data port)
 - Redfish for Telemetry and control
 - Can be used for OOB management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

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RMD - Microsoft

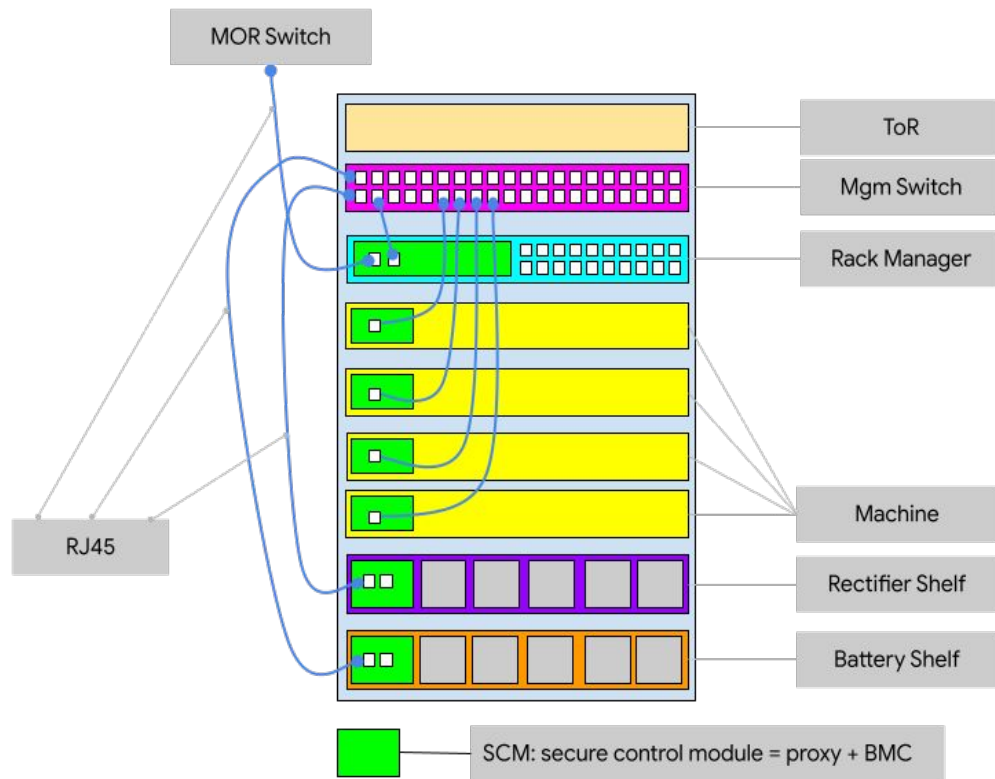


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- Rack manager is used for power cycling control and reset functions and it is not related to RMD function.
- Rack power telemetry data is aggregated through the mgm switch. The aggregated data is sent to PROD through rack manager and MOR (mid of row) switch.

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Microsoft - SCM Module



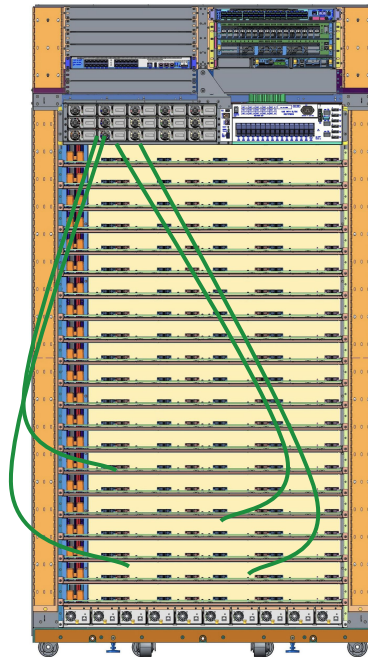
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- A SCM module is used in each rectifier/battery/machine shelf.
- Security is implemented in the SCM module.
- An open-BMC module is used in the SCM module so that the output data from the SCM module is in Redfish format.

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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**



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RMD: Next Gen Rack Management Device



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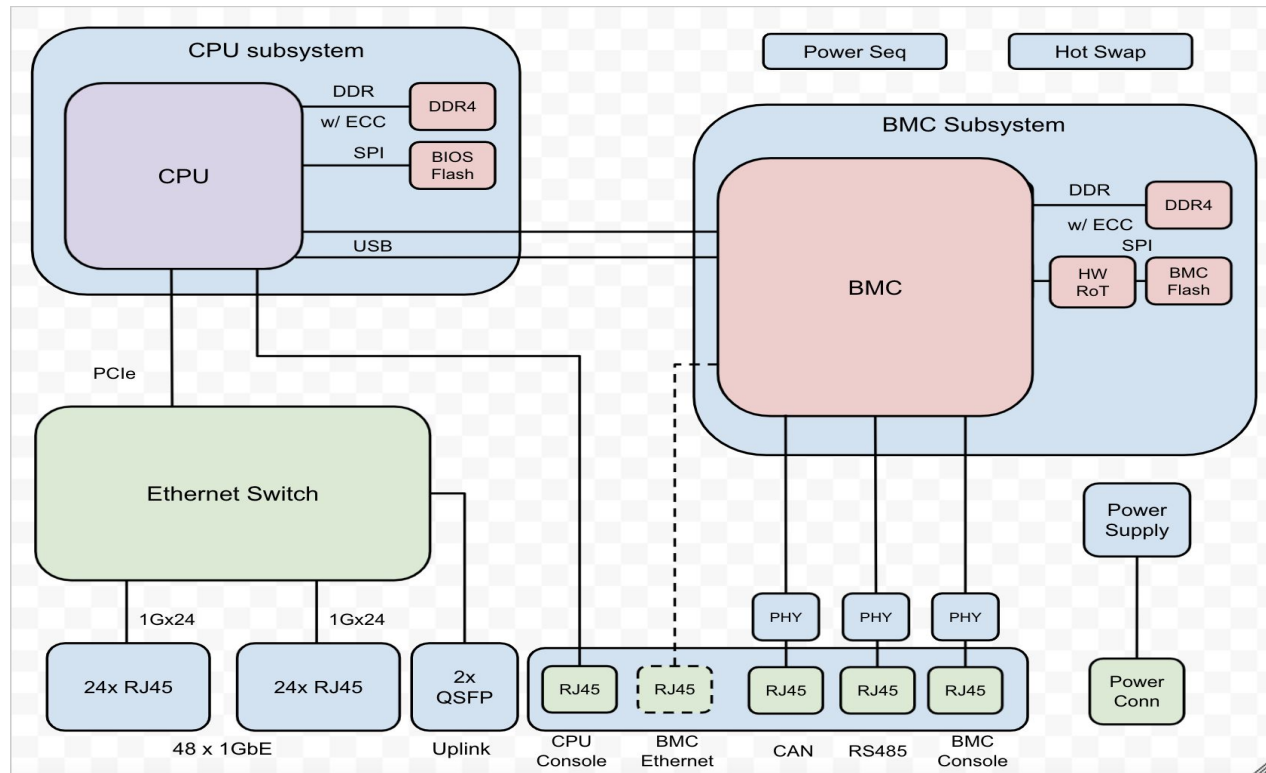
- Overview: 1RU, 48x1G, 2x10G uplink, CPU, BMC, Switch, power connector, RS485, CAN, BMC and CPU console
- Low end 1G switch with CPU and BMC
- Cost of the HW should be very low as one RMD is needed per Rack (< \$500)

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RMD: HW Block Diagram



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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



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Rack Level Mgmt Network, Enables OTS Devices



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BMC based Redfish Telemetry

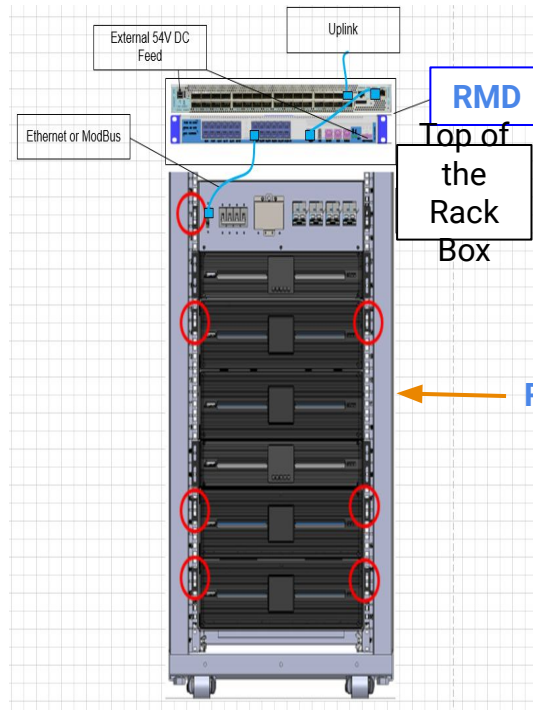
RMD

Machine BMCs To RMD

Rectifiers

Batteries

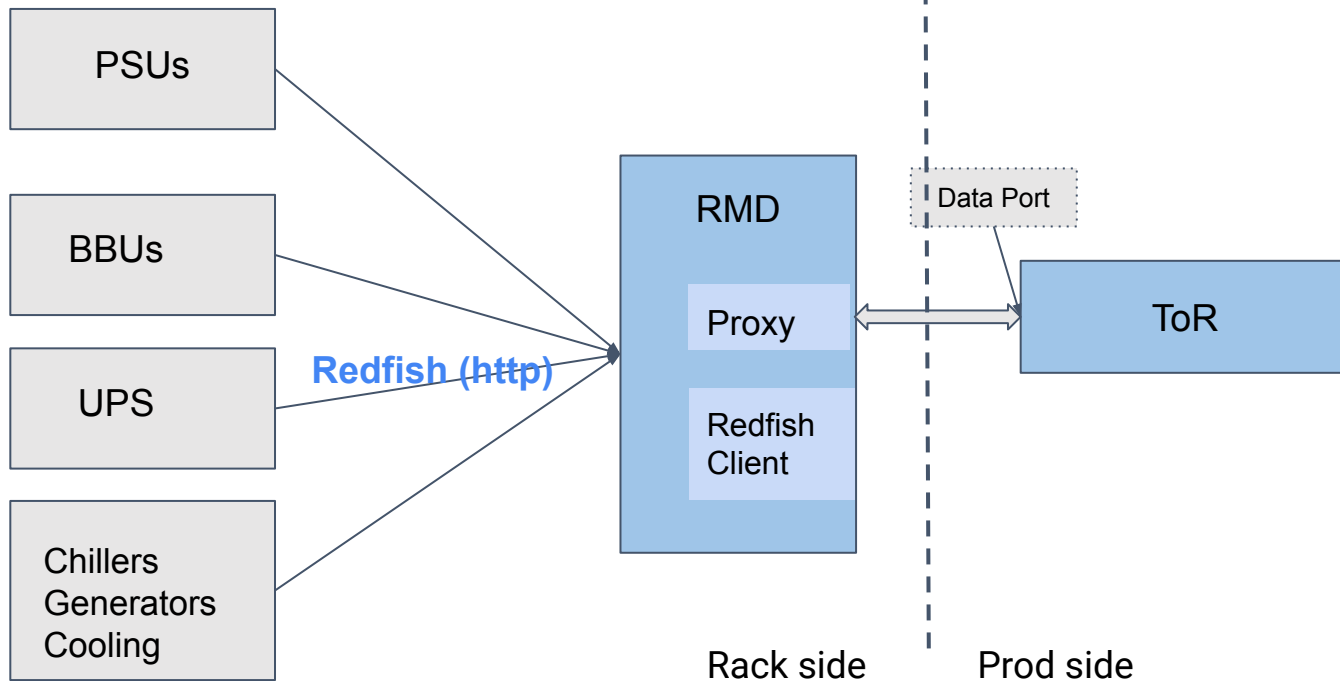
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RMD Redfish



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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.



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Rack Level Management Network



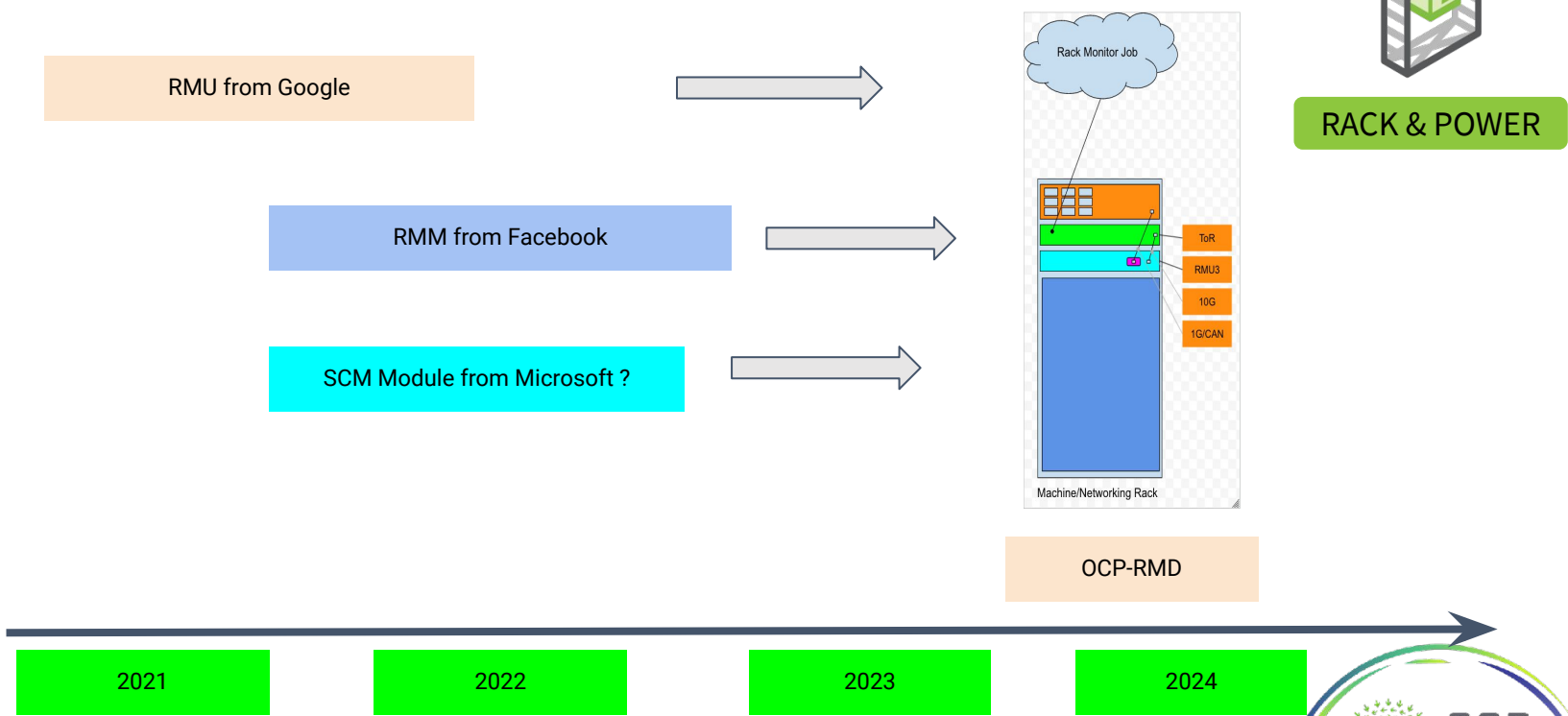
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- Out Of Band management network for Machine BMCs
 - Used for Installation of software
 - Used for firmware updates
 - Used for all OOB management
 -
- RMD can be used as OOB switch in addition to being RMD
 - RMD has 48 port 1G RJ45 interfaces.
 - 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

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OCP RMD Convergence - Goal (WIP)



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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



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Thank you!



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