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RACK & POWER

Open Rack Battery Back up Roadmap

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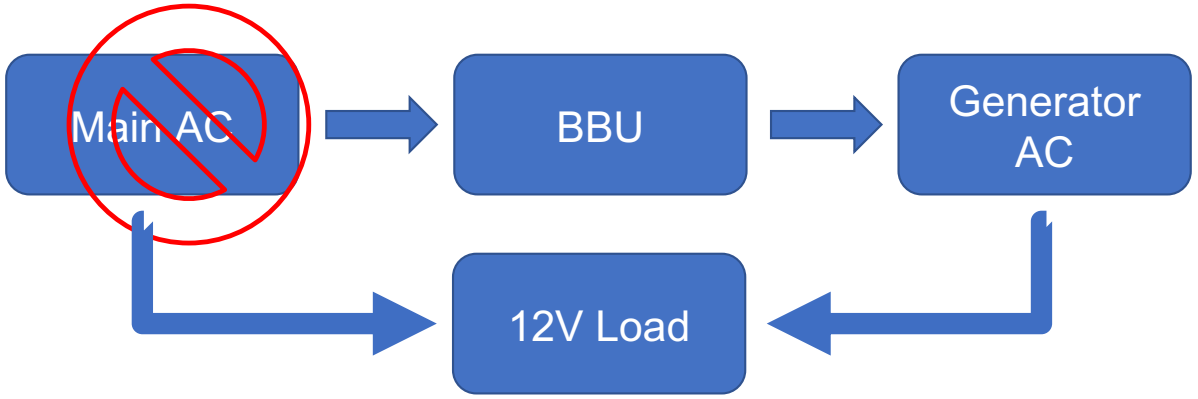
Current ORv2 BBU

RACK & POWER

Purpose:

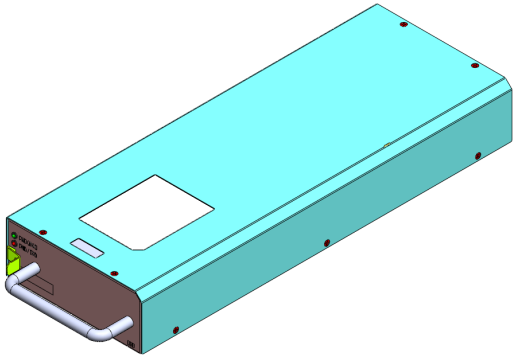
Accommodating transitions for AC outages to generator and back.

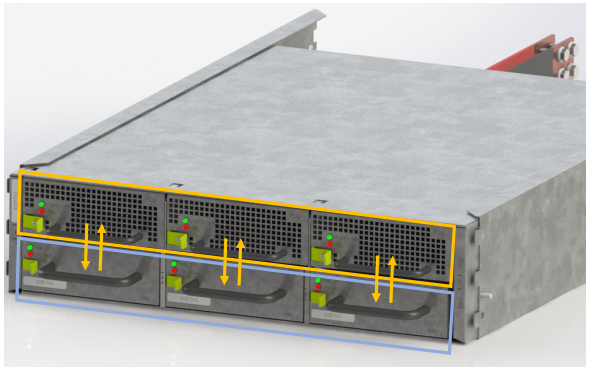


Specifications

Current ORv2 BBU

- 52 x 18650 Power Type Li-Ion Cells – 13S4P
- 90s discharge @ 3600W Max
- 5A CC-CV charge
- 52 - 33.6 VDC voltage range
- 444 x 62x 160mm (LxWxH)





Current ORv2 BBU - Limitations

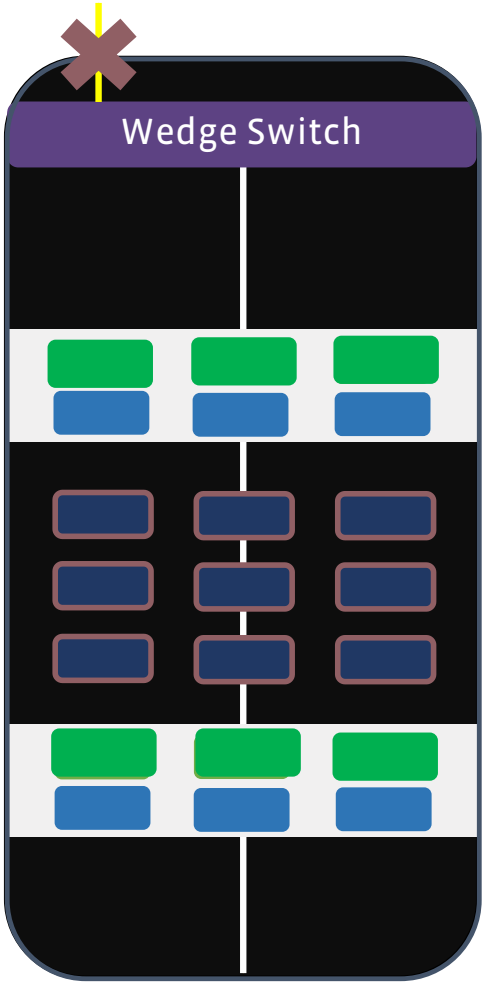
- Discharge time is fixed and too short for other use cases
- Lack of control over charge after an outage
- Charge as a result of self-discharge is too frequent
- Elevated Battery temperature in the Data Center

POWER LOSS SIREN

A mechanism to broadcast AC power outage to affected servers within a rack

Power Loss Siren Flow

1. AC Outage
2. PSU Sensor Triggered
3. GPIO Signal Sent to RSW
4. TOR notifies all hosts within the rack



AC Power

Power Supply

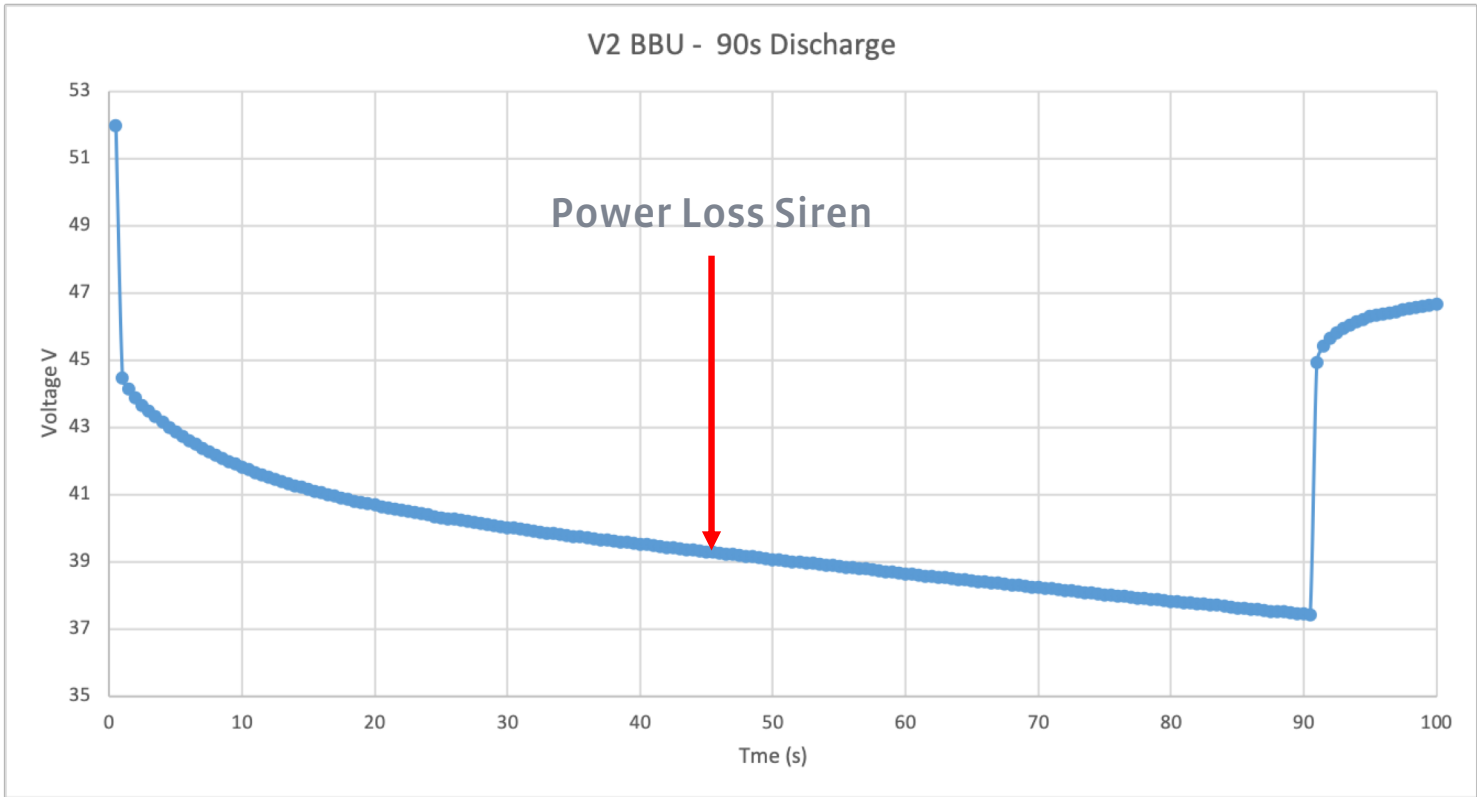
Battery Back up unit

Power Shelf

Bus Bar

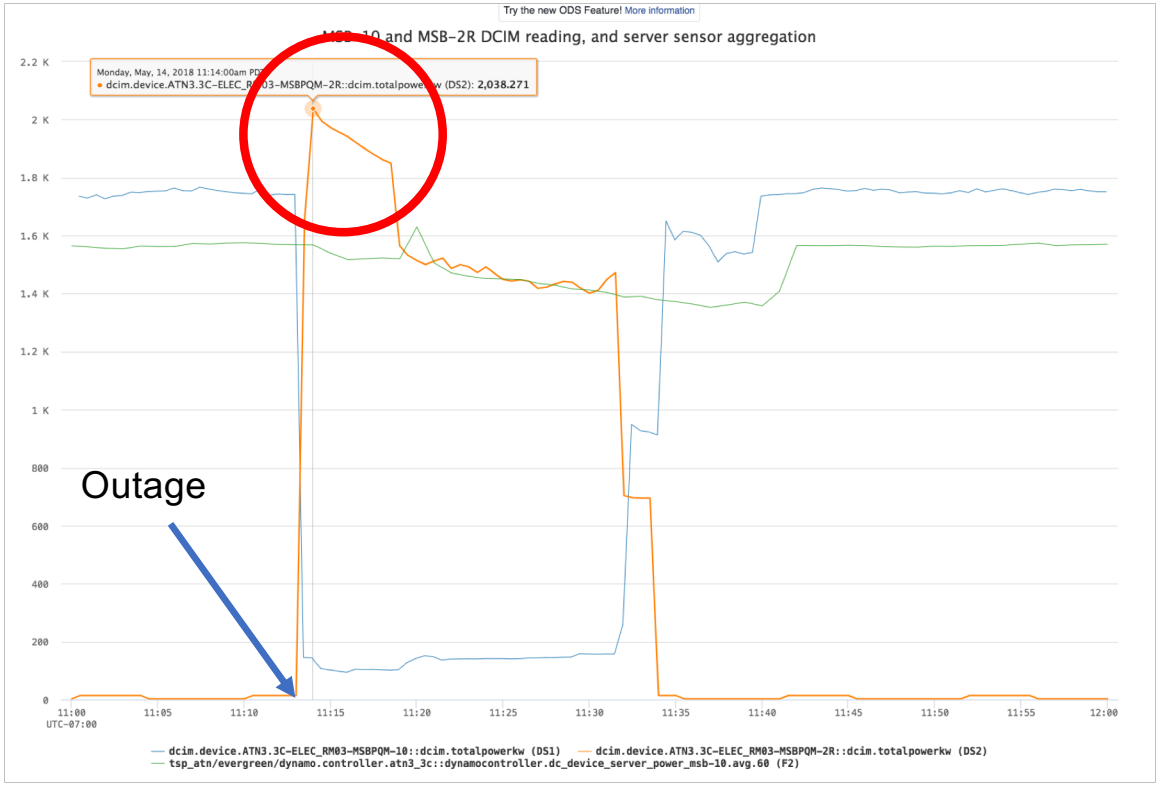
Servers

Discharge limitation



Lack of charge control

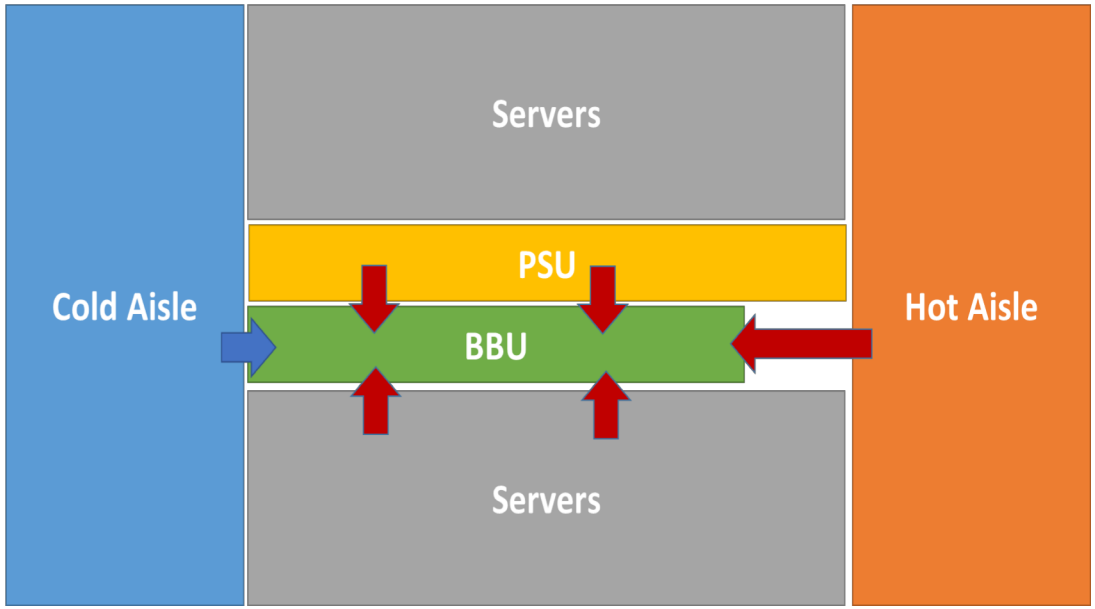
- Breaker trip at DC
- Generator overload
- Power Capping → Capping services



Thermal limitations

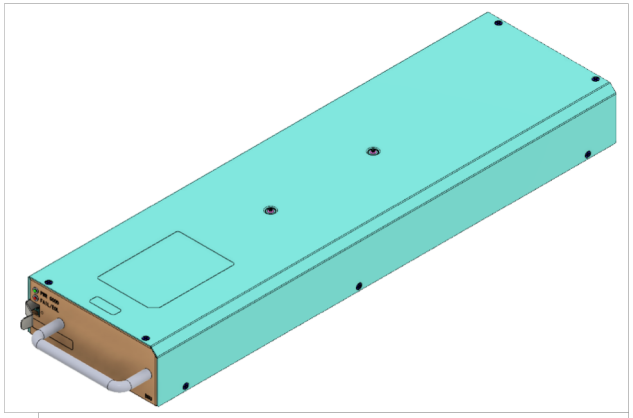
- Cold aisle temp 18-35C
- Hot aisle temp > 45C

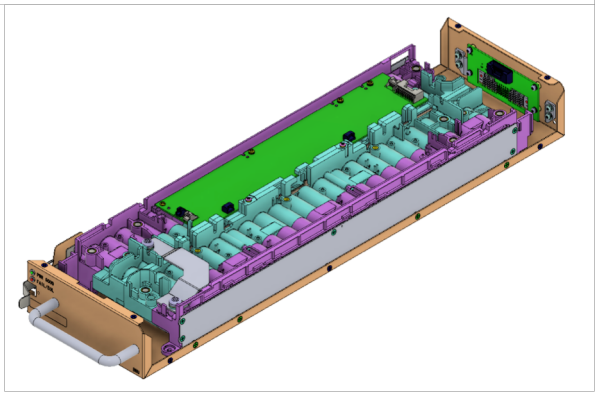
Elevated BBU temp in the Summer and for high power racks.



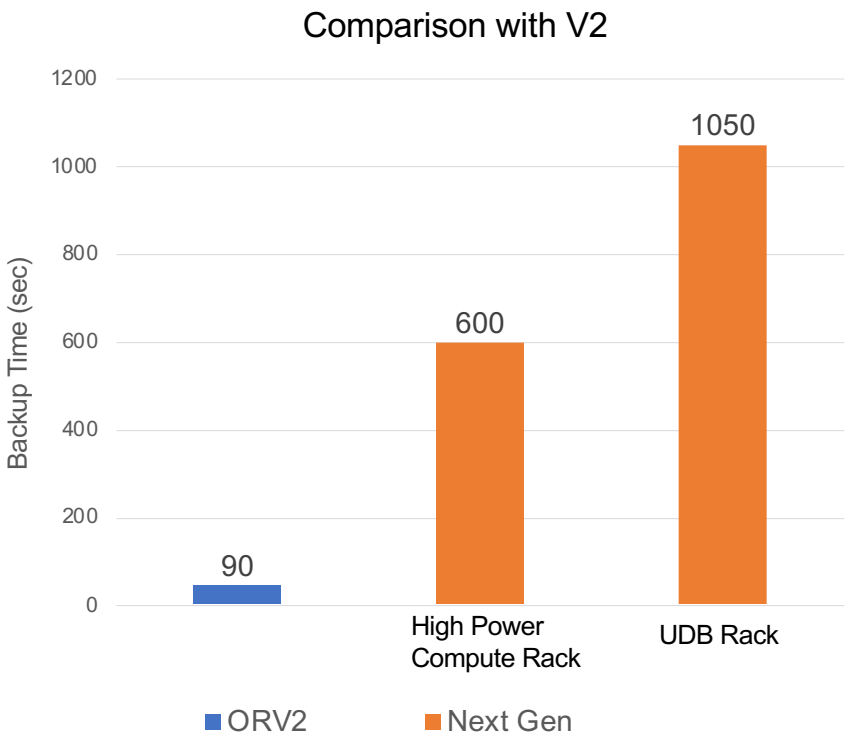
New BBU Design

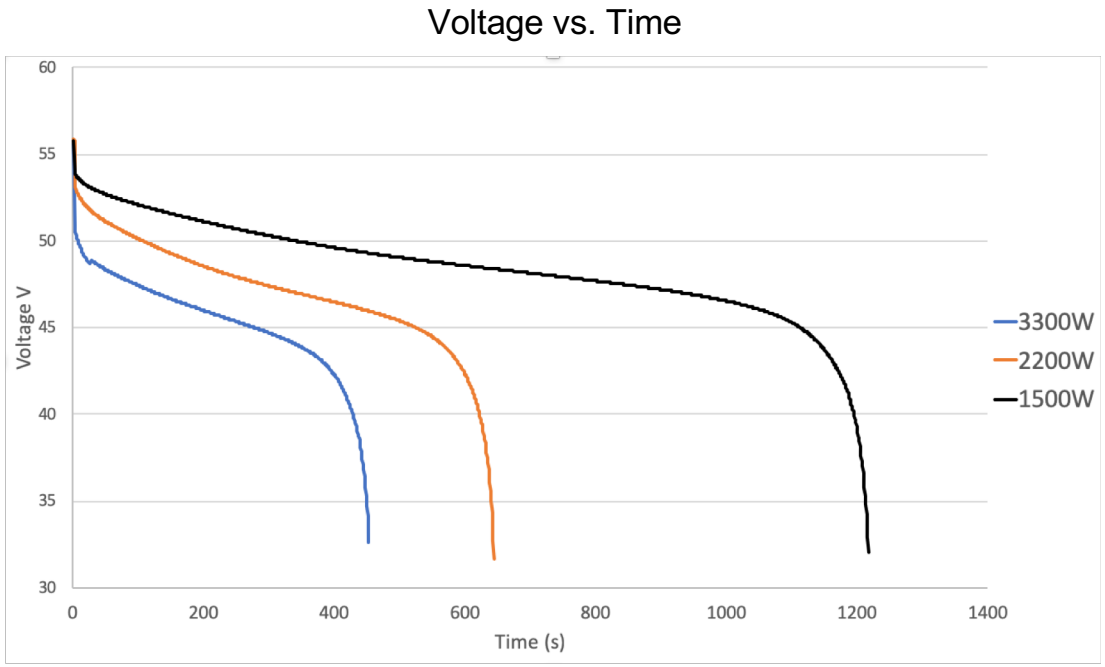
- 84 x 18650 Cells – 14S6P
- 450s discharge @ 3300W Max
- 1A - 5A CC-CV charge
- 57.4 - 36.4 VDC voltage range
- 568 x 62x 160mm (LxWxH)
- Improved cell chemistry





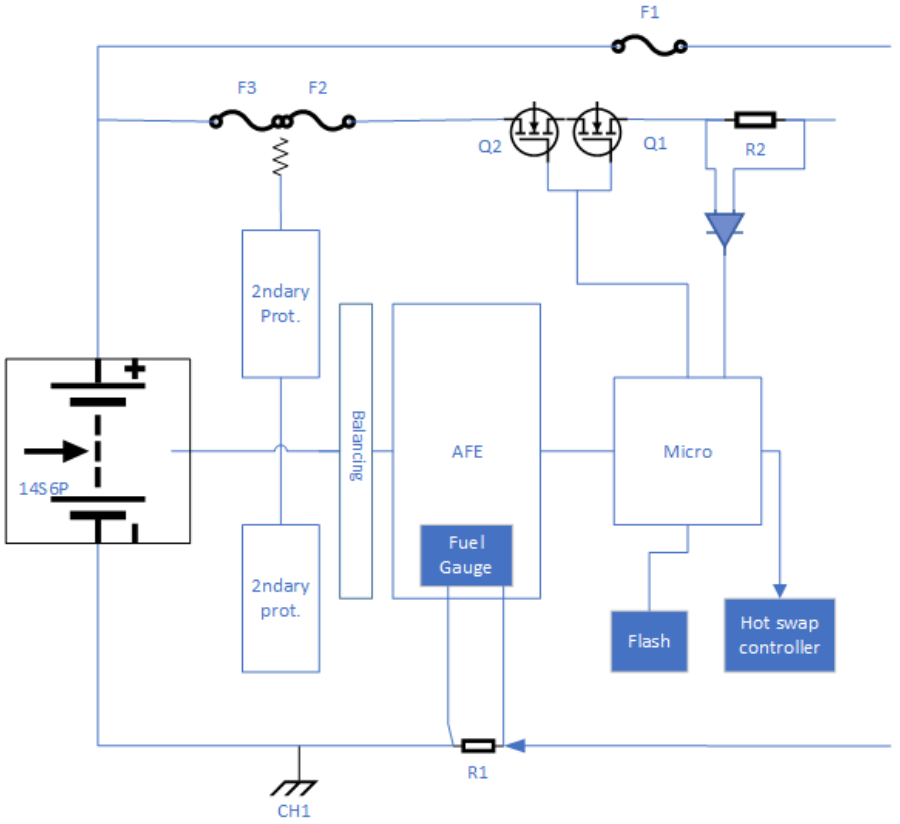
New BBU discharge times





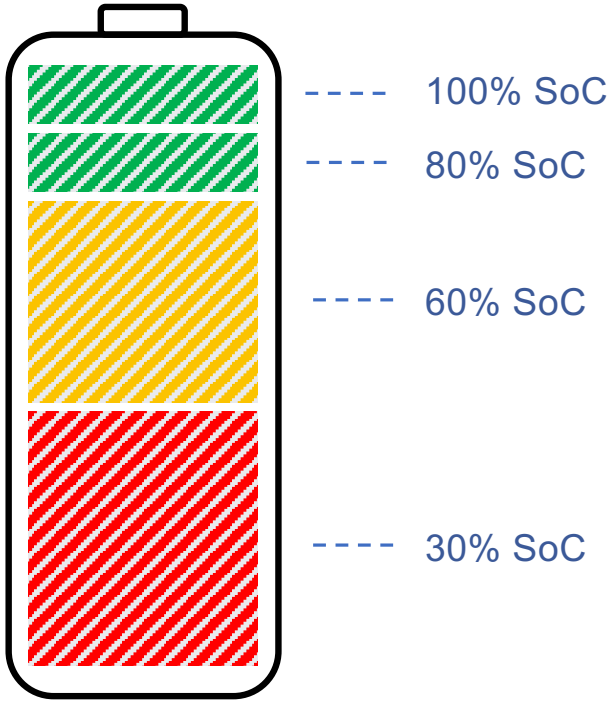
New BBU Design

- Reduced BMS Components
- High side I sensing for Charge
- Blackbox functionality
- Adaptive charger



Variable Charger

- Reduced charge voltage for new batteries
- Reduced charge current based on discharged energy
  - Energy counting by the PSU or BBU
- Charge Delay
  - Staggering charge sequence across DC for all BBUs

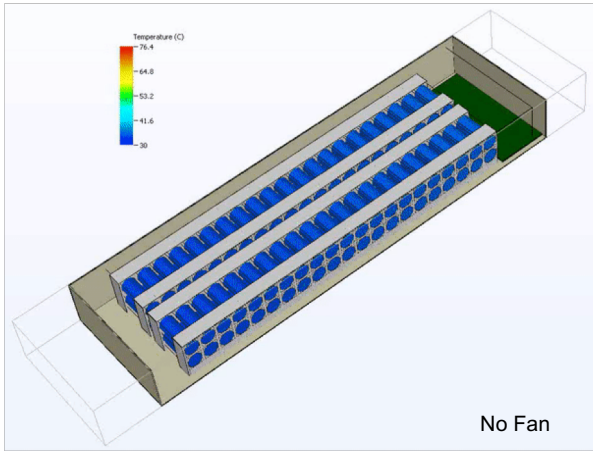


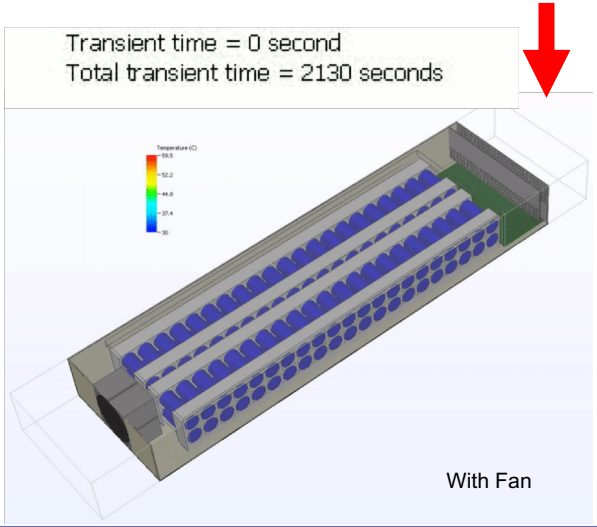
Thermal improvements

Addition of Fan power by PSU and controlled by the BBU

Airflow Consumption

- 3.5 CFM per unit -> 21 CFM per rack
- Typical airflow -> 900~1100 CFM per rack





System Improvements

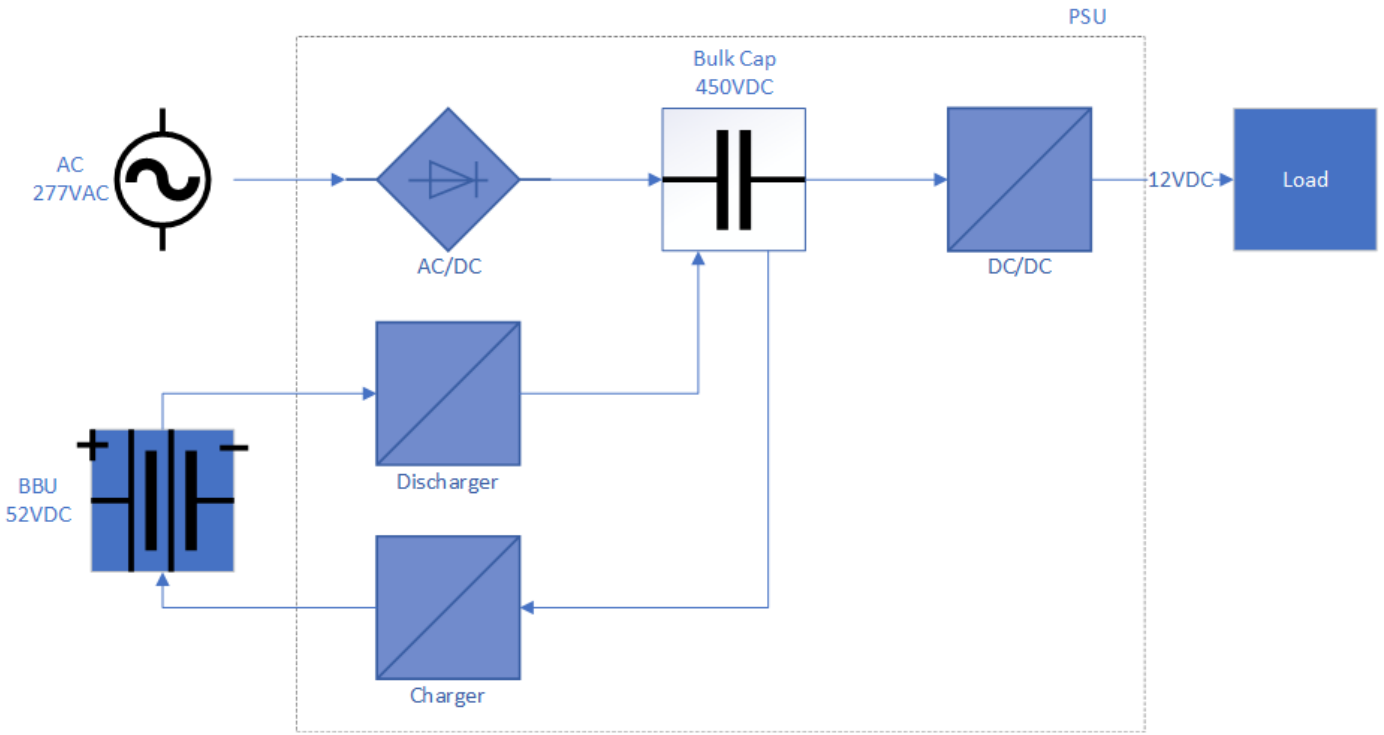
Extend emergency runtime

- Reduce diesel power generation
- Graceful shut down in DR scenarios

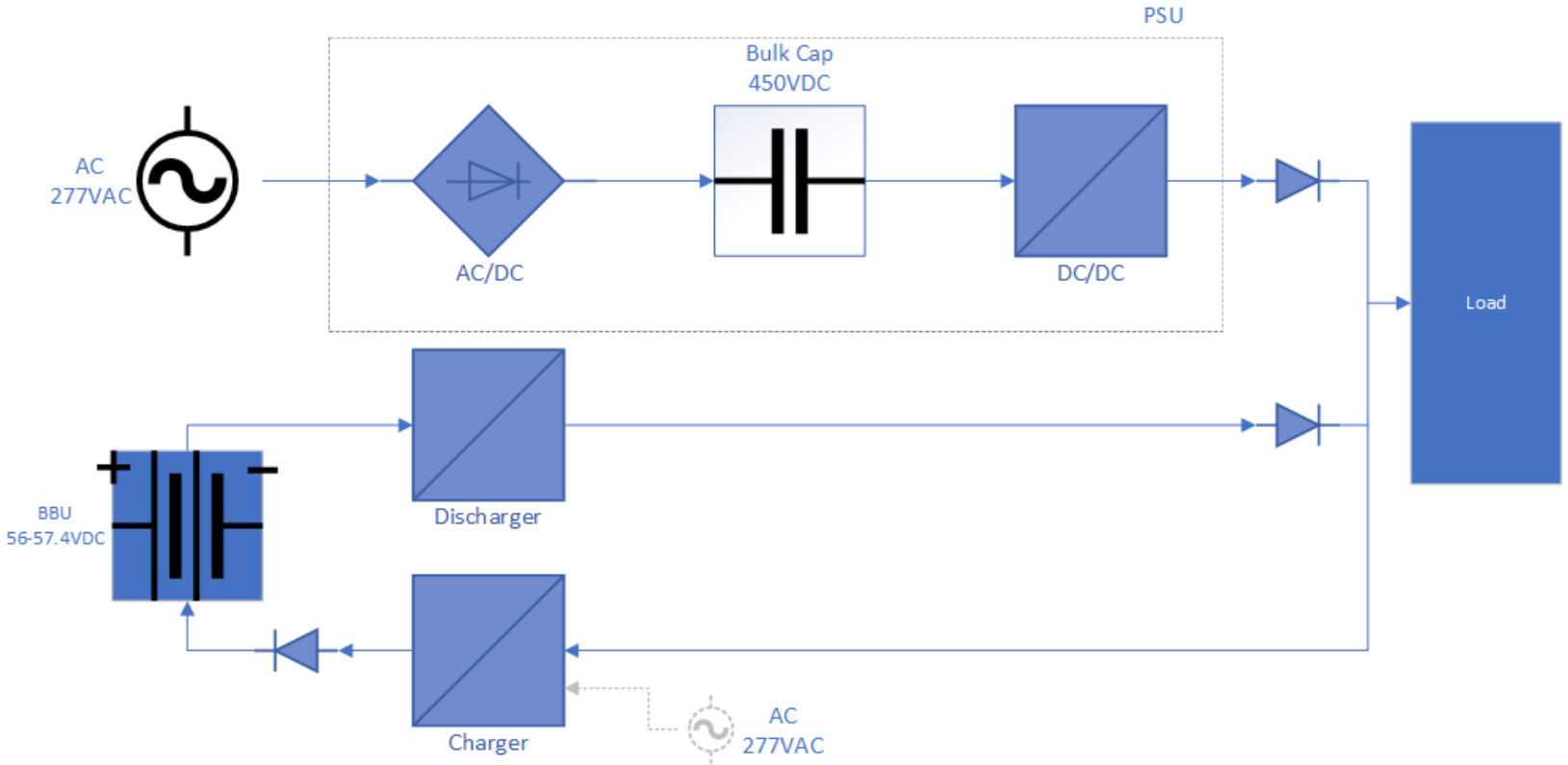
Enable peak shaving

- Increase rack power max limit

V2 Battery Backup

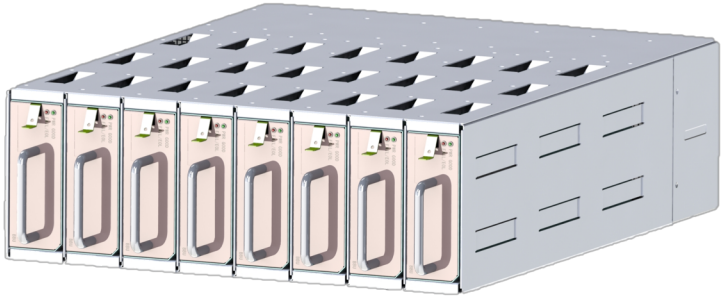


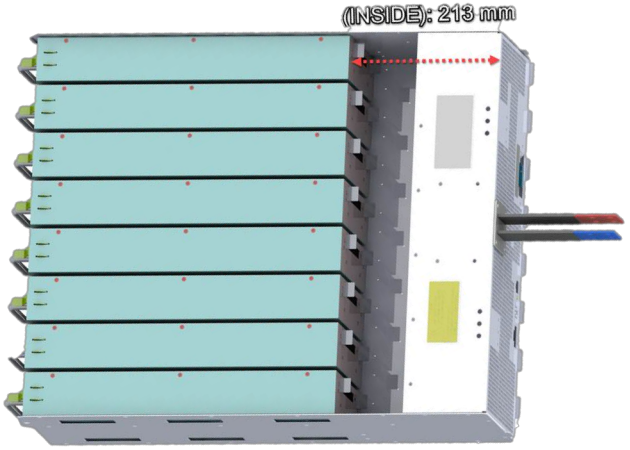
Next gen Battery Backup



New BBU Shelf

- Standalone BBU Shelf
- 4OU Height
- 8 x V2 BBU or Vx BBU
- OpenBMC com-controller





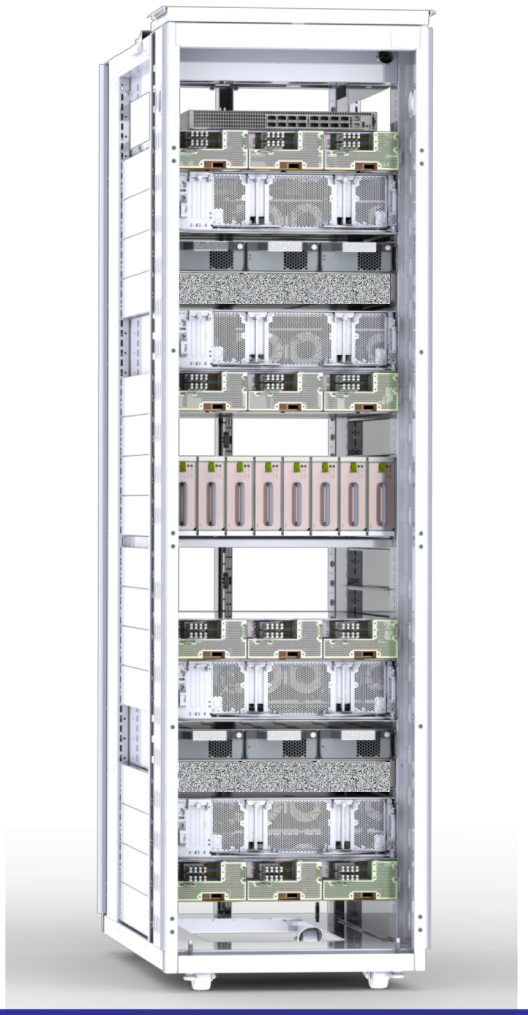
New BBU Shelf

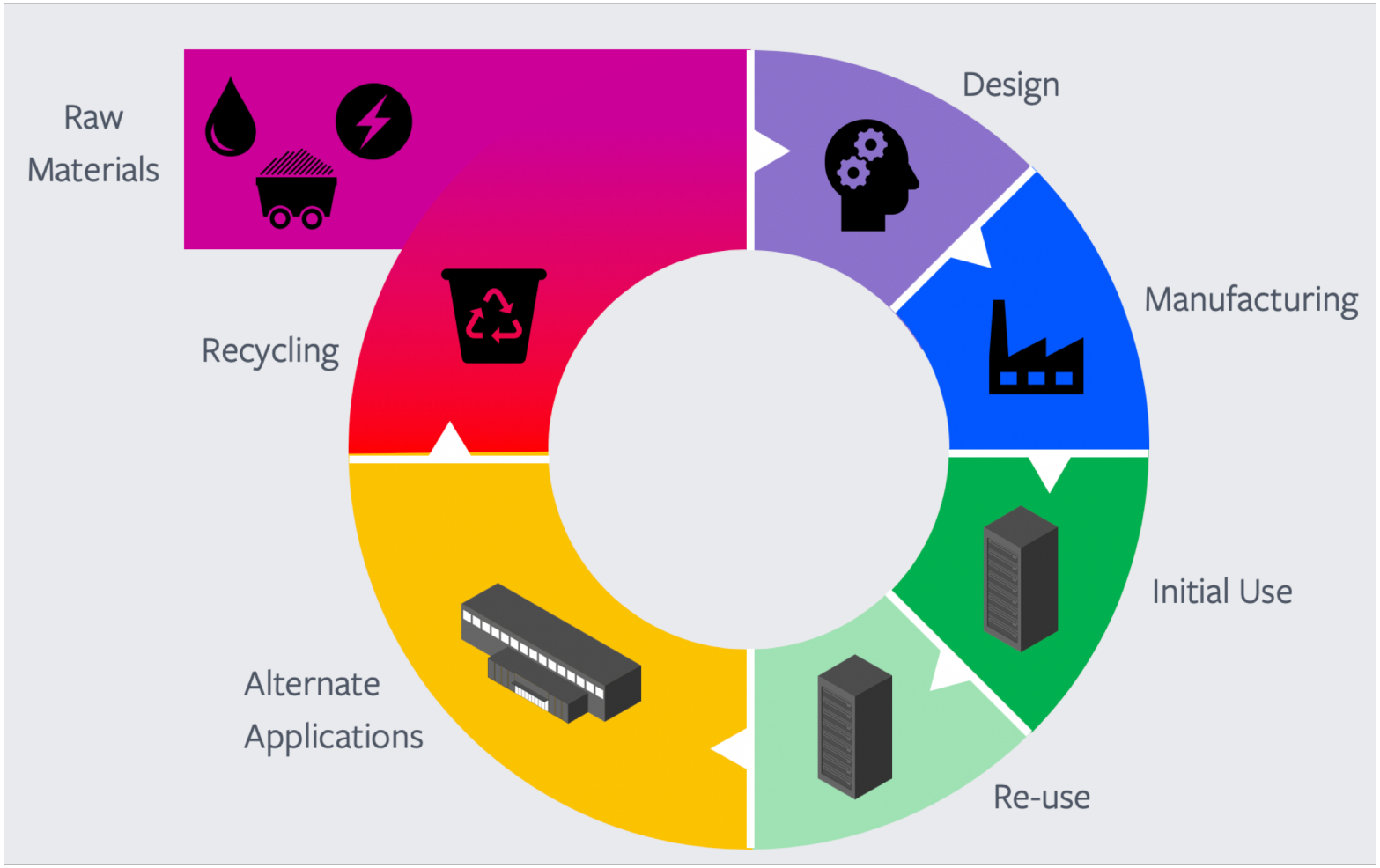
Energy Available:

- W/ V2 module: 2.9 KWh
- W/ new module: 4.8 KWh

GPU Rack Example:

> 20 minutes of discharge for a GPU rack




Raw
Materials
Design
Manufacturing
Initial Use
Re-use
Alternate
Applications
Recycling

Call to Action

Specification submission to OCP, Q3 2019

Project Wiki with latest specification :
https://www.opencompute.org/wiki/Open_Rack/SpecsAndDesigns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