

facebook

OCP Open Rack Engr Summit

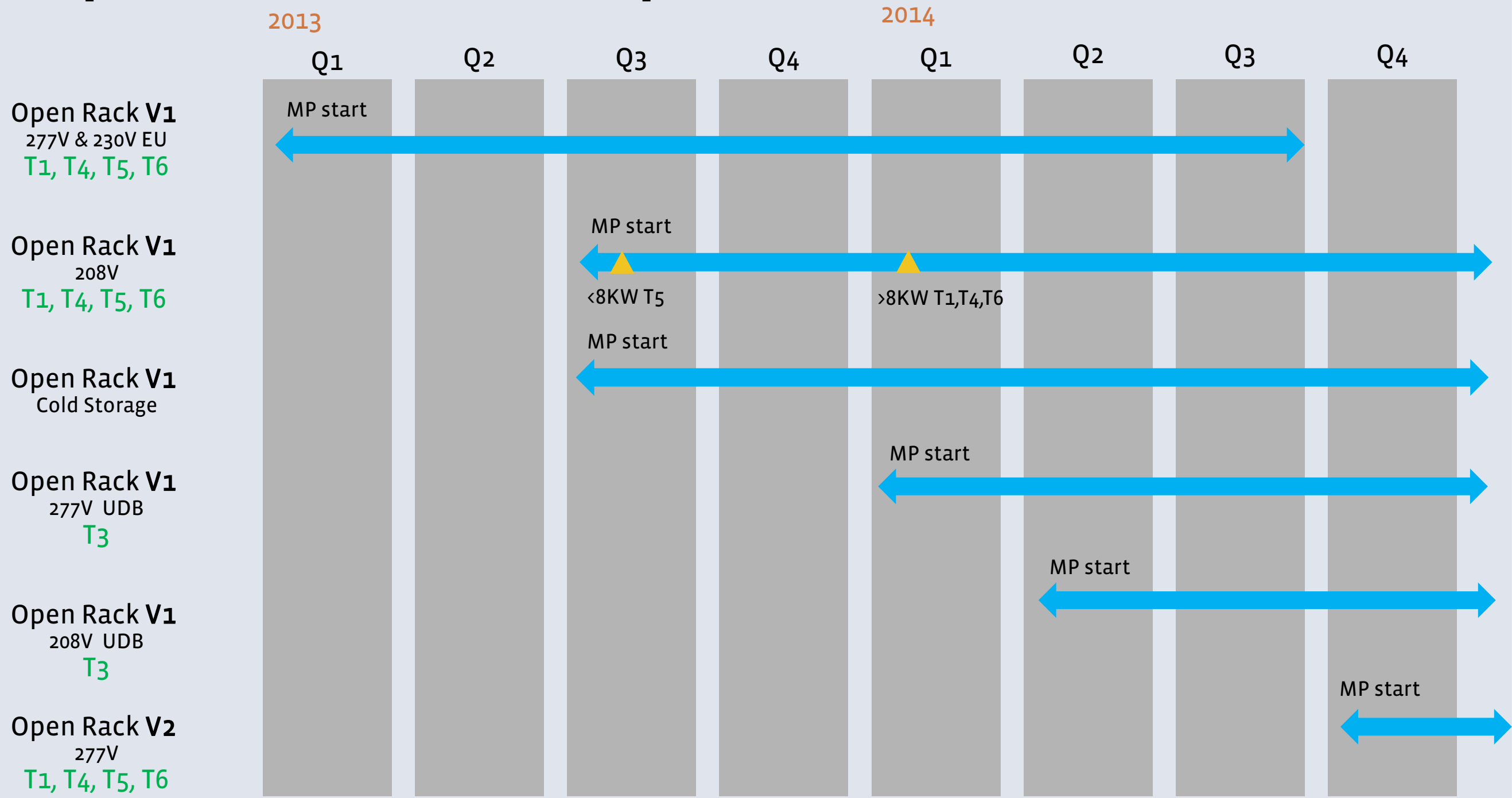
Facebook Update

SteveMills, Samir Kala, Gloria Lau
5/16/13

facebook

Facebook Derivatives Update

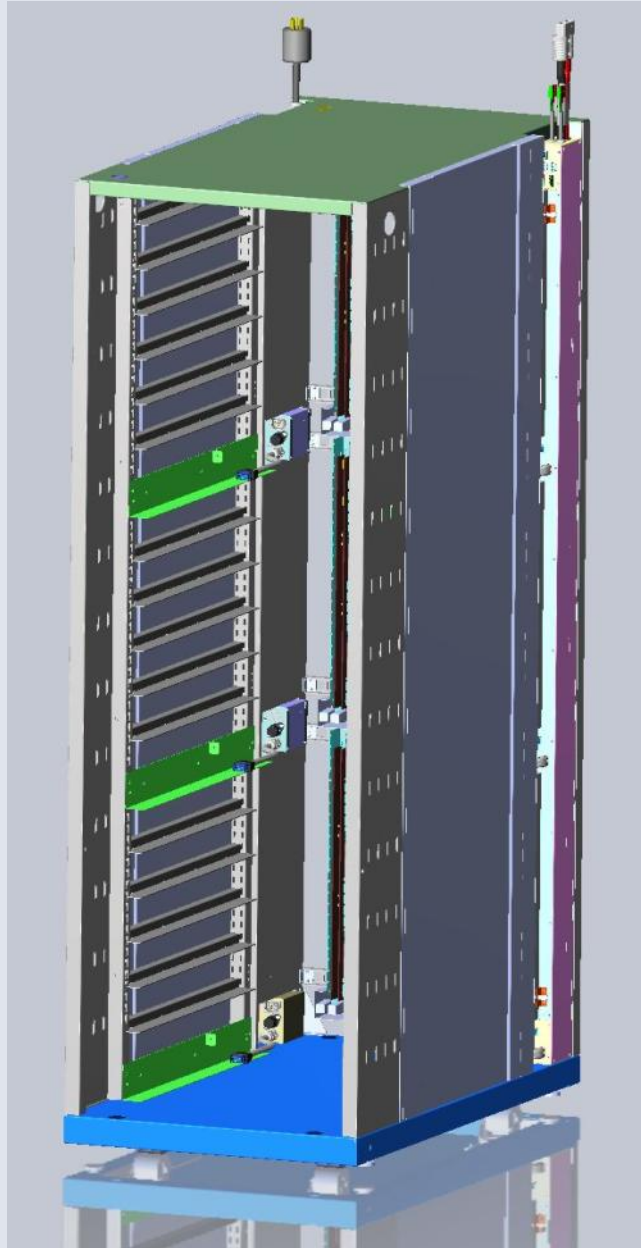
Open Rack Roadmap



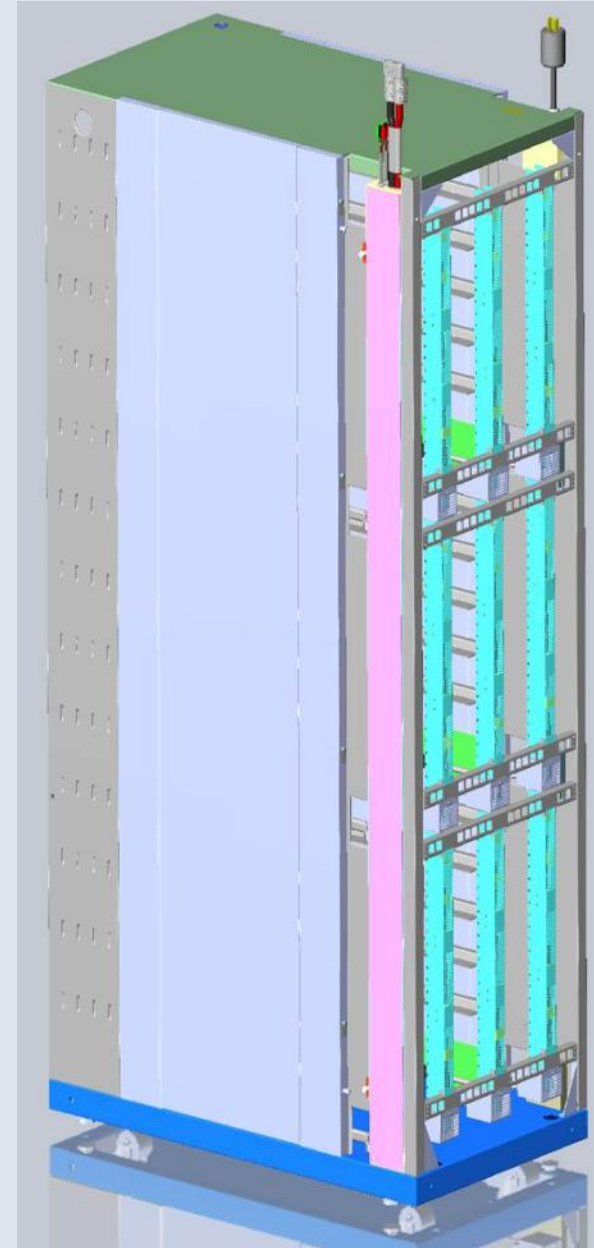
Open Rack V1

- What it is:
- **First Industry 21” Standardized Rack Infrastructure**
- **Key Component of Open Compute Project (OCP)**
- **Modular Mounting**
- **Component Disaggregation - Next Major Step Forward for Datacenter Efficiency**
 - **Utilize Full Component Lifetime**
 - **Power Supplies is First**
- **Innovative Cable-less Power Delivery**

Open Rack Singlet



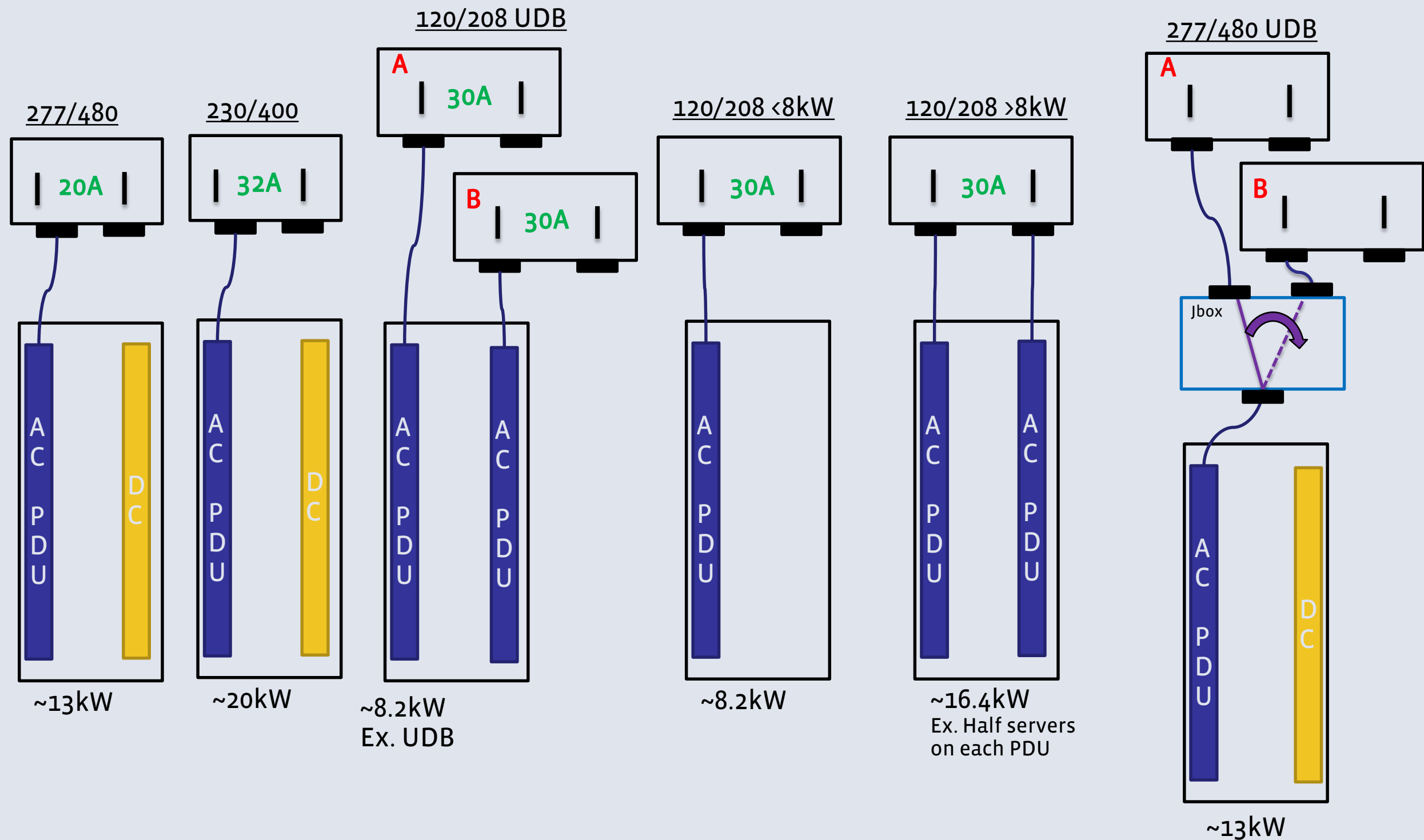
Front View



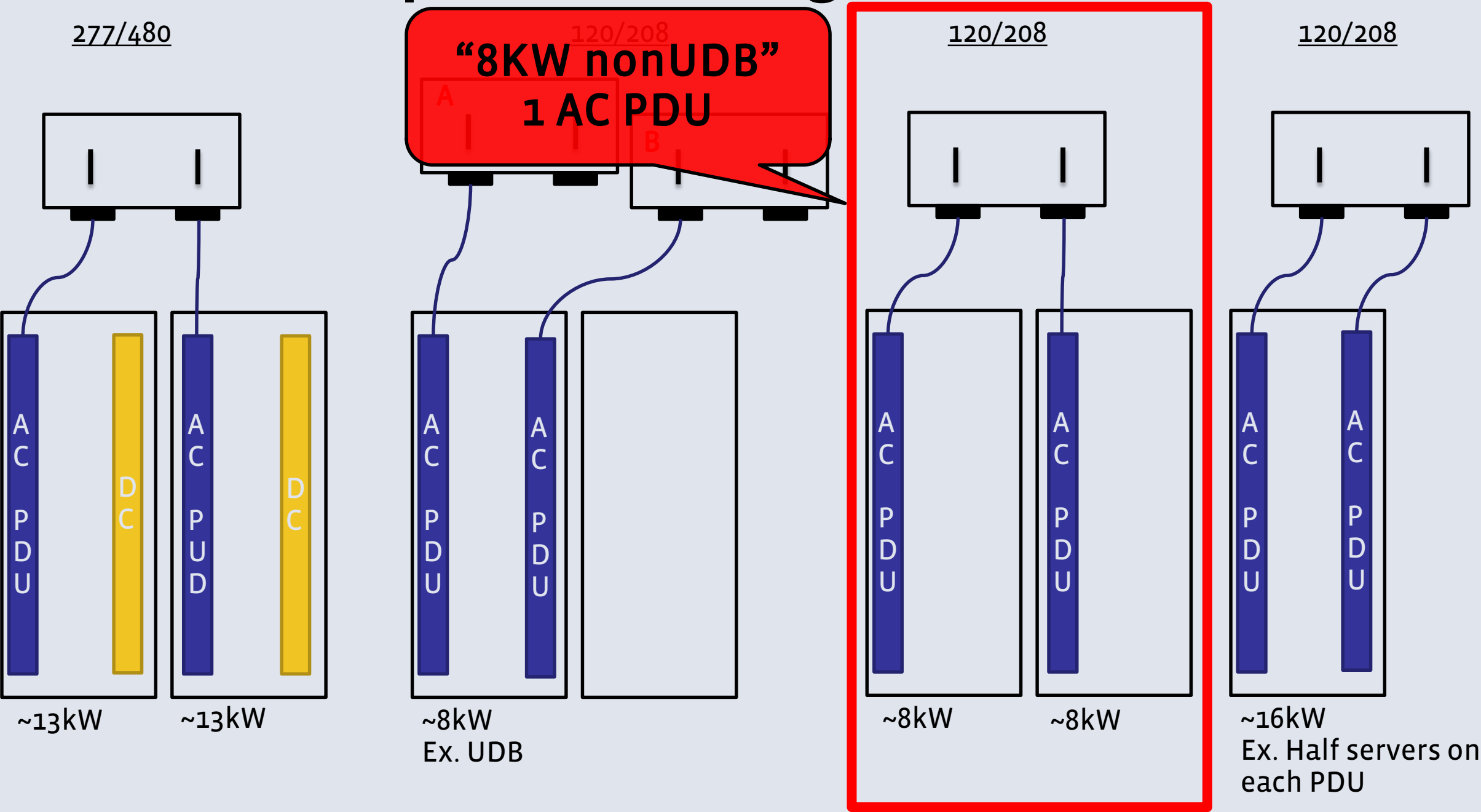
Back View

Note: 120/208Vac doesn't need a DC PDU since the AC voltage is in-line UPS

FB owned Data Center power configurations



Data Center power configurations

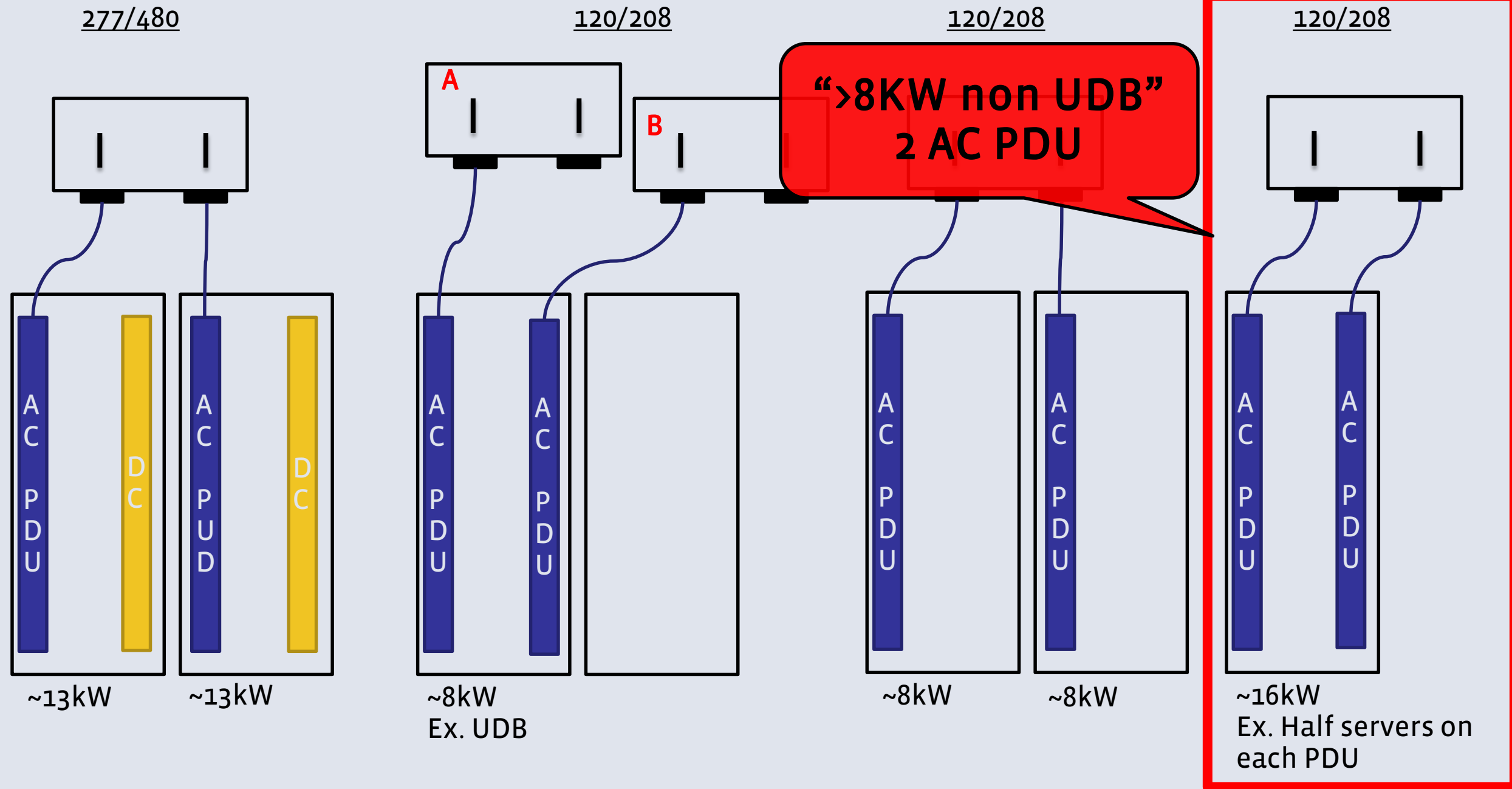


Note: 120/208Vac doesn't need a DC PDU since the AC voltage is in-line UPS

Open Rack 208V – “8kW non UDB”

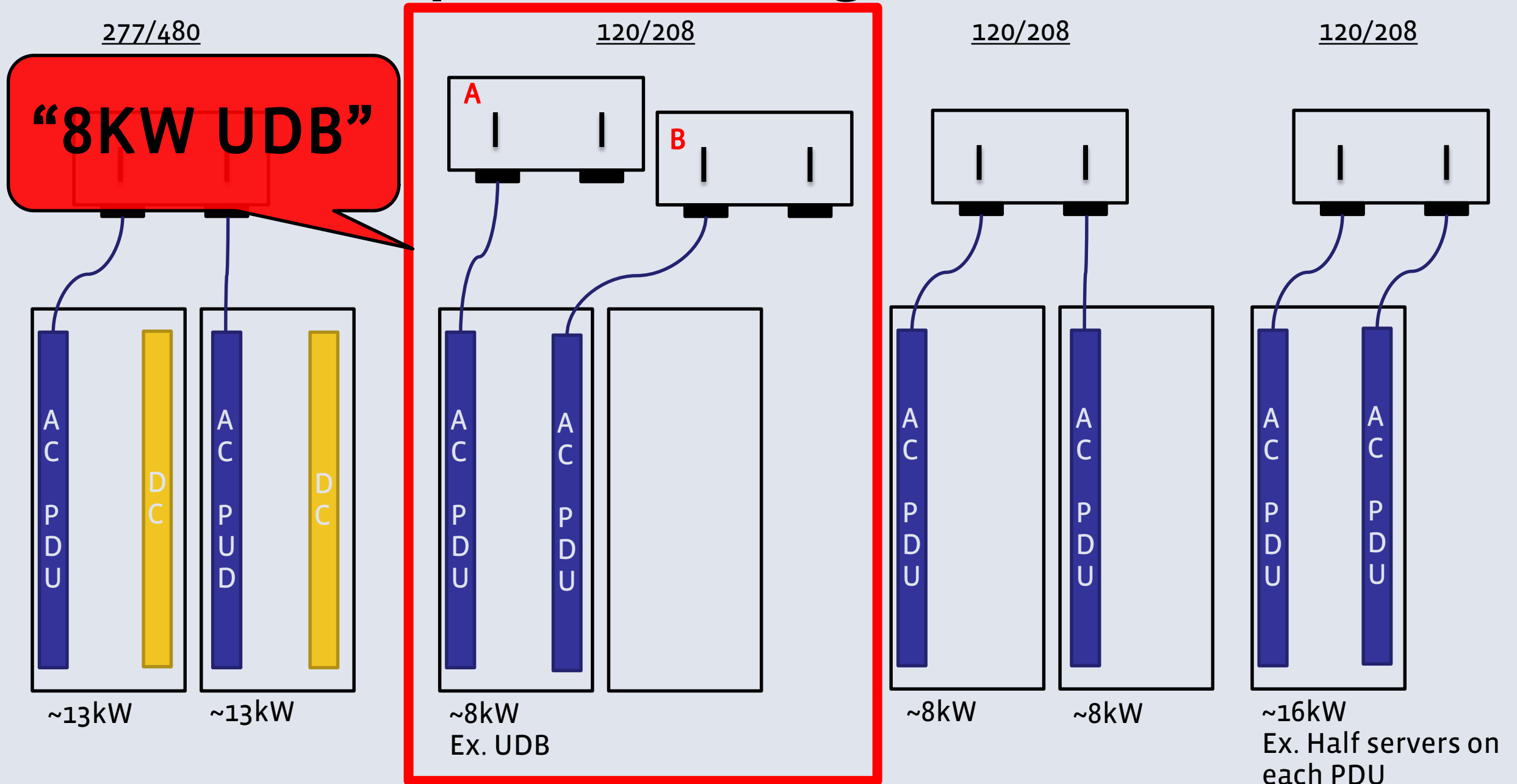
- What it is
- Using the current V1 PowerShelf we can only use **1 AC PDU** and therefore we are limited by the 30A breaker tapbox
- **Max of 8.2kW per rack:**
 - Winterfell – 12.4kW – **NO**
 - Knox Type IV – 9.6kW – **NO**
 - Knox Type V – 6.9kW – **YES**

Data Center power configurations



Note: 120/208Vac doesn't need a DC PDU since the AC voltage is in-line UPS

Data Center power configurations

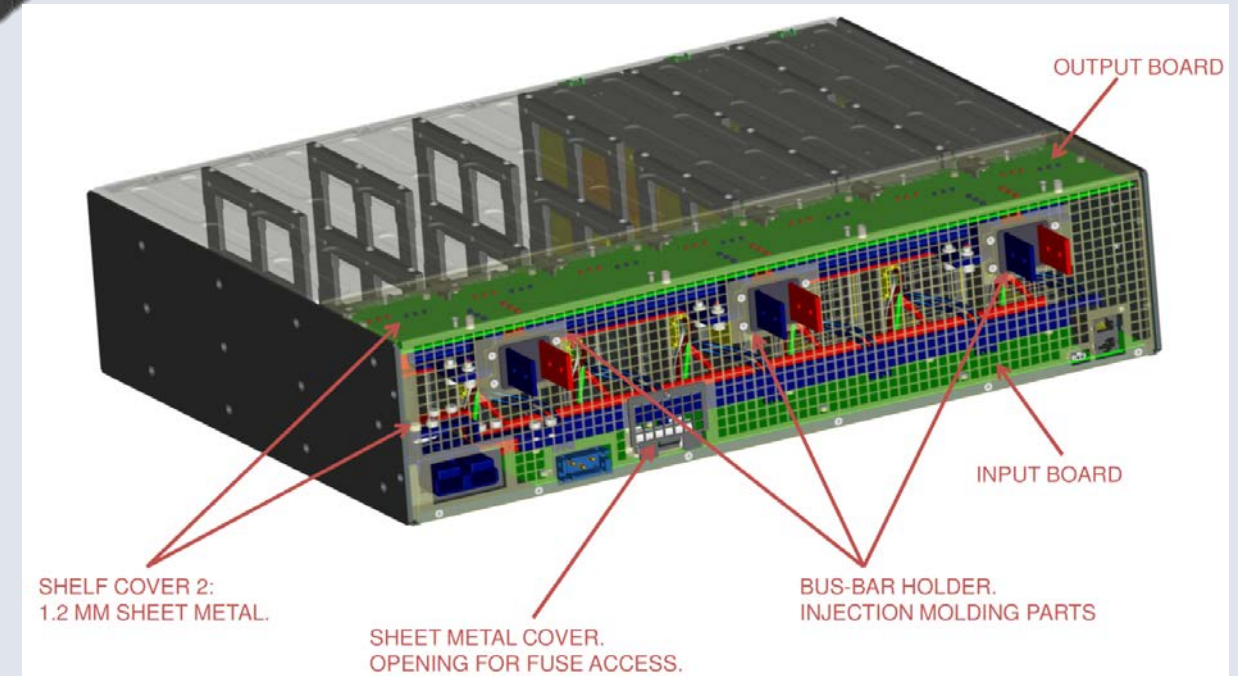
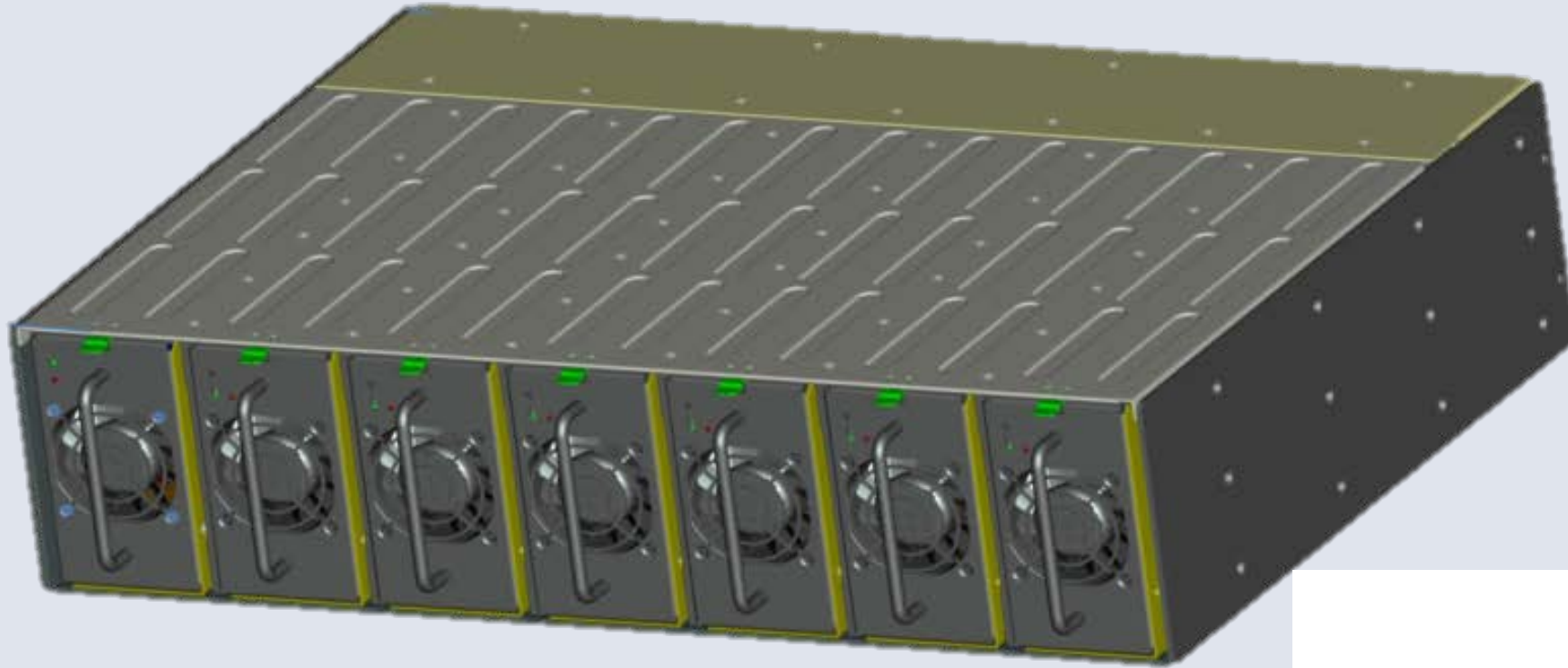


Note: 120/208Vac doesn't need a DC PDU since the AC voltage is in-line UPS

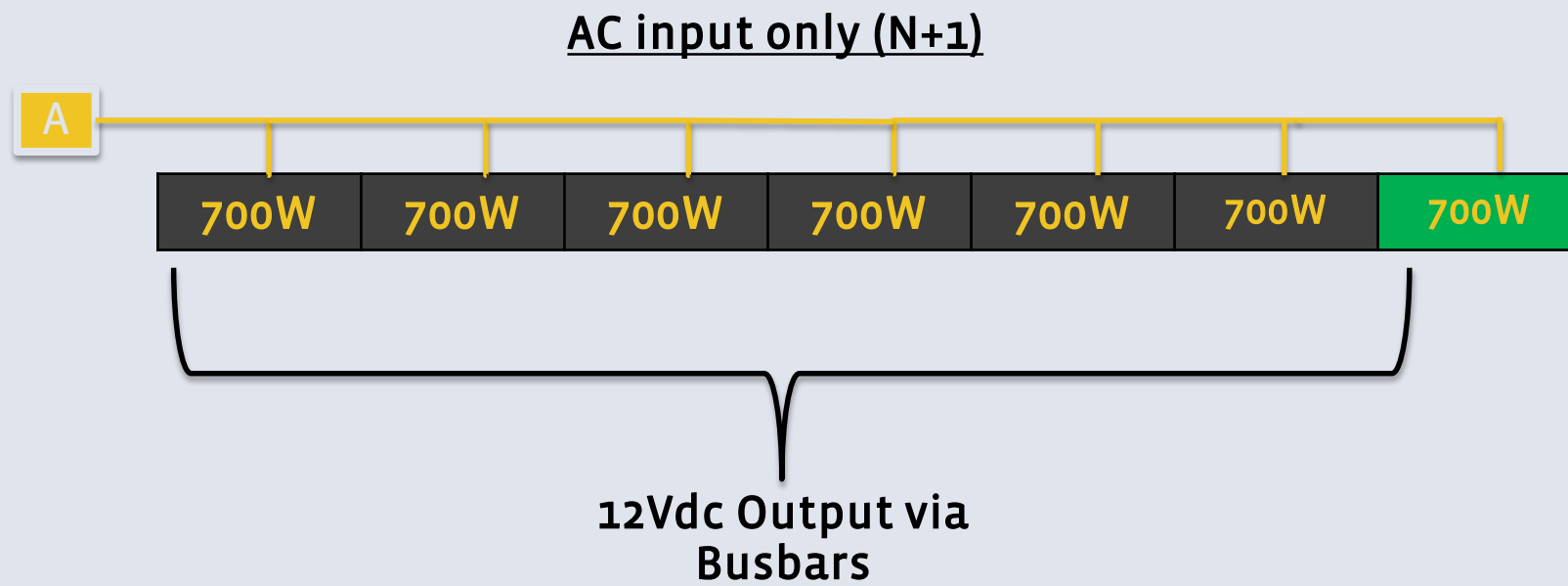
Open Rack 208V – “>8kW nonUDB” or “8KW UDB”

- Option 1: upgrade DC breaker and plug-in tapbox to 50A
 - Can support
- Option 2: Modify an OCP compliant PowerShelf created by Delta
 - Up to 16.4kW per rack
 - Each PowerShelf has dual AC input therefore can be used for UDB system <8.2kW per rack
 - Winterfell – 12.4kW – YES
 - Knox Type IV – 9.6kW – YES
 - Knox Type V – 6.9kW – YES
 - UDB – dual 208Vac PDU - YES

V1 Power Shelf

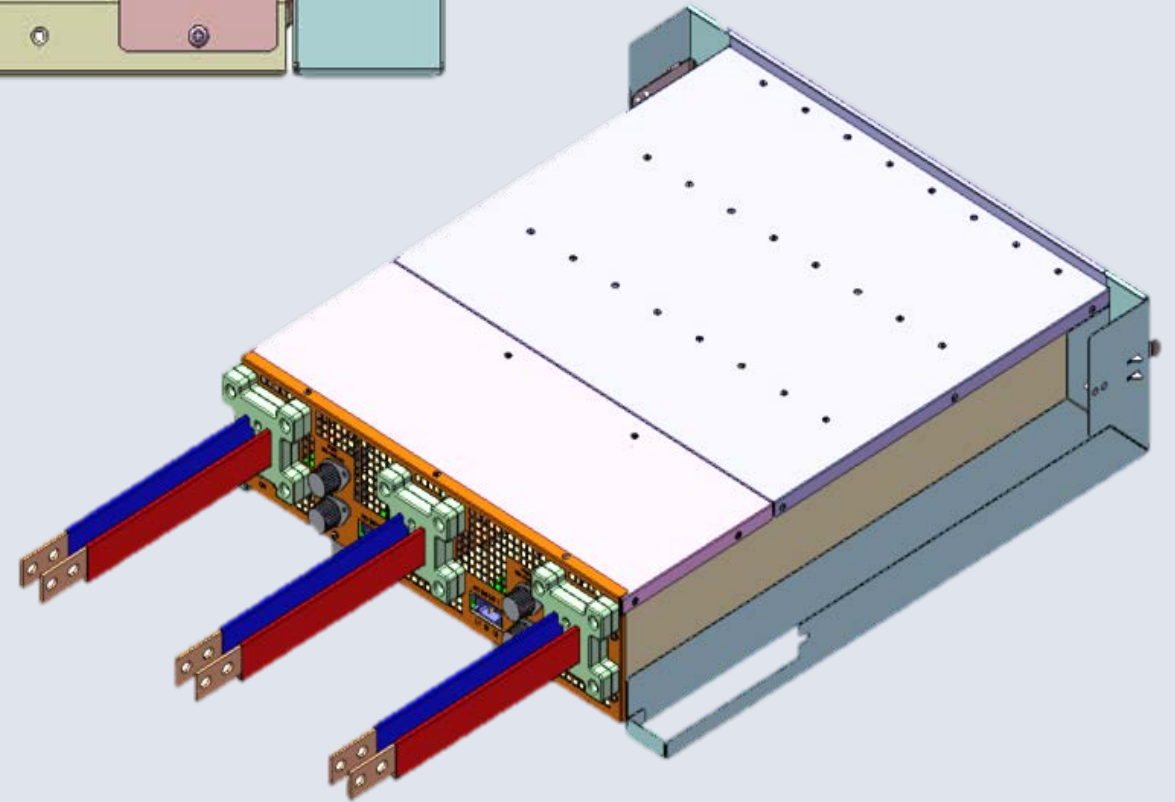
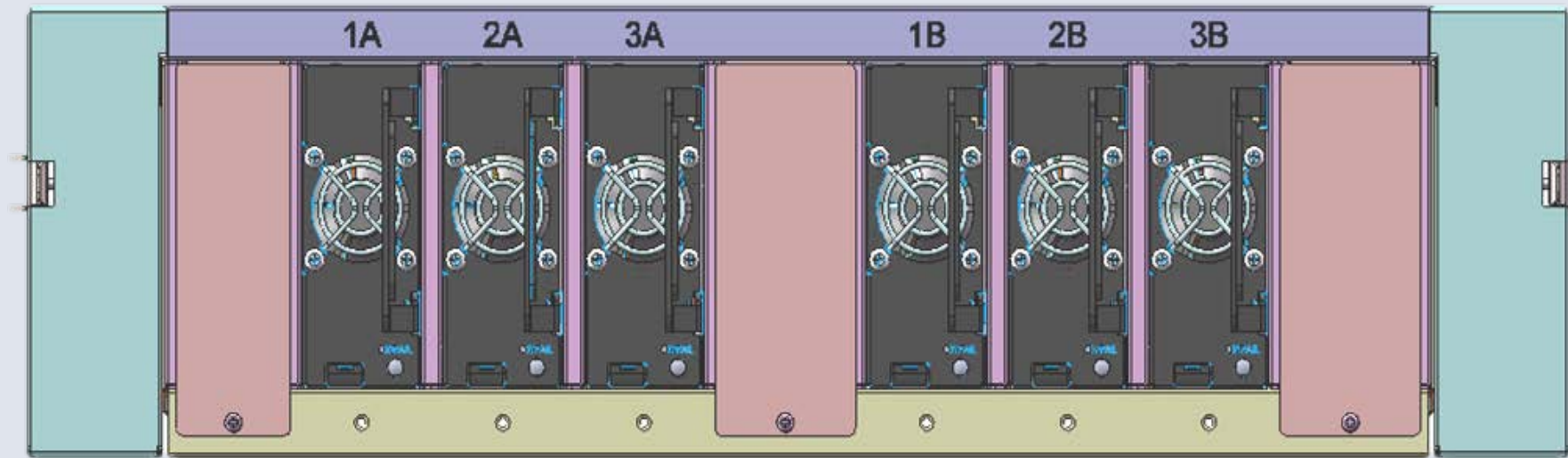


V1 OpenRack



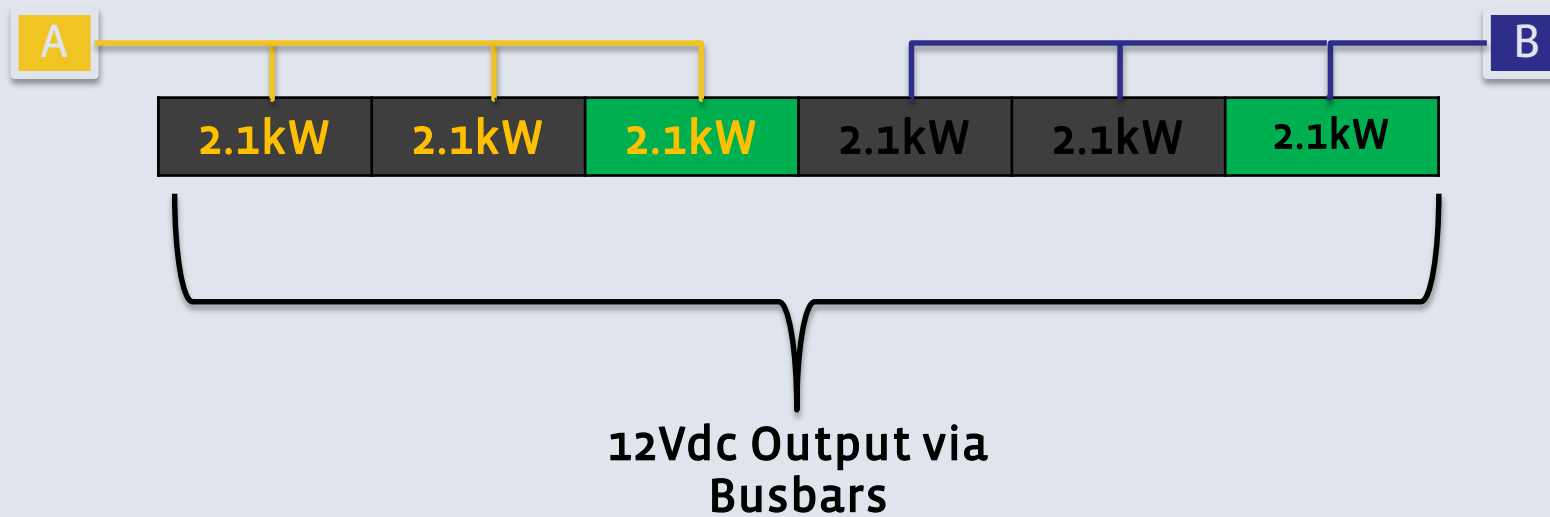
$$700W \times 6 = 4.2kW \times 3 = 12.6kW \text{ per Rack}$$

Dual input AC Powershelf



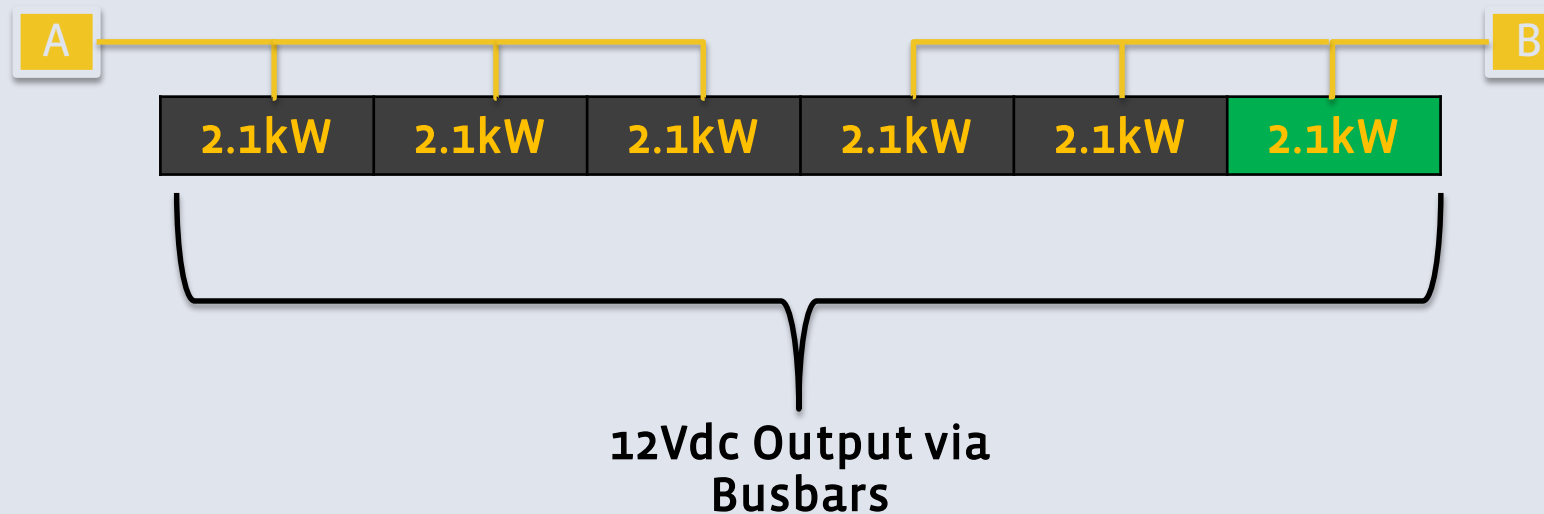
208V PowerShelf

UDB Configuration N(N+1)



$2.1\text{kW} \times 2 = 4.2\text{kW} \times 3 = 12.6\text{kW}$ per Rack
Limited to 8.2kW due to breaker limit

Up to 16.4kW Configuration (N+1)



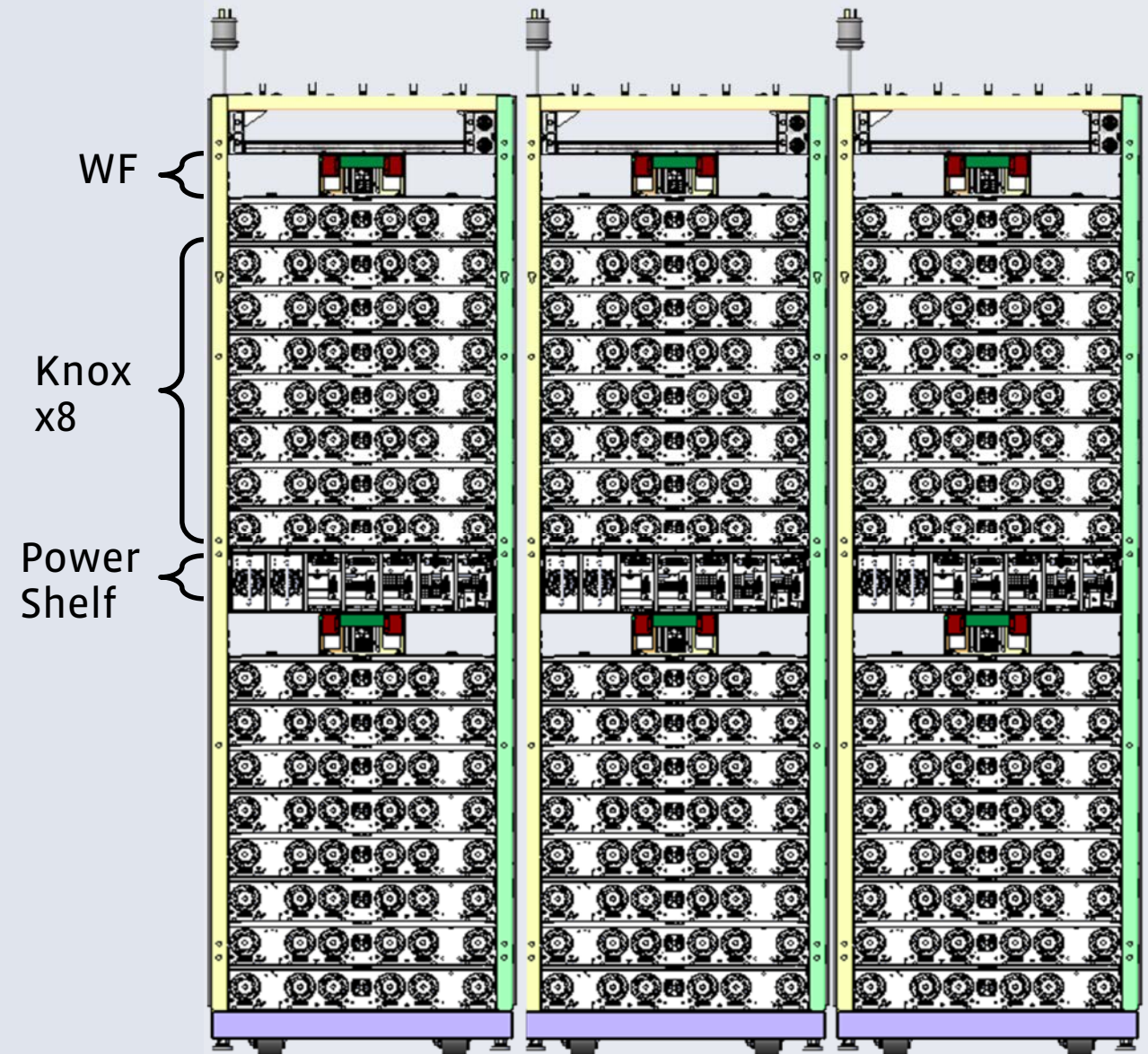
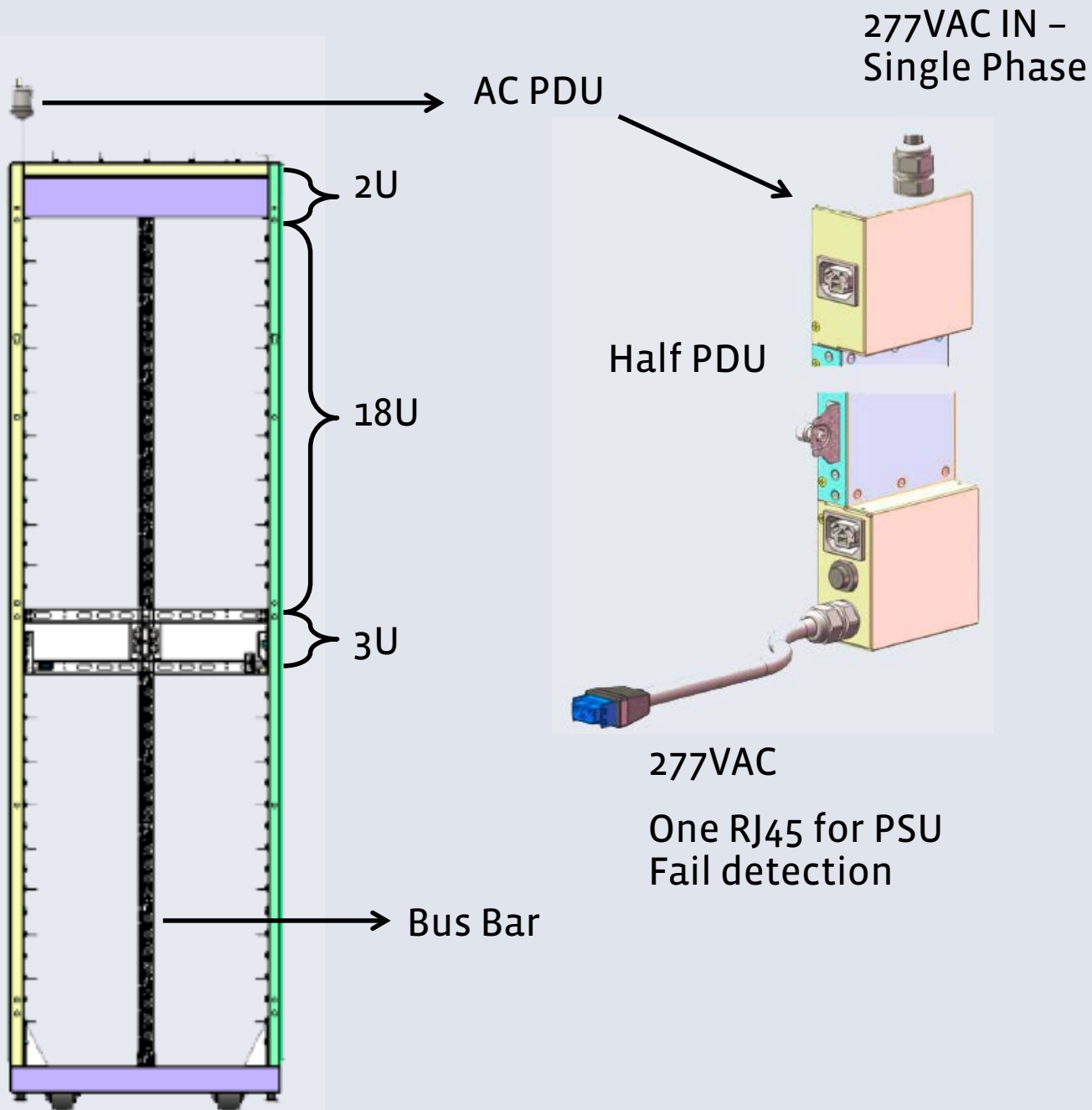
$2.1\text{kW} \times 5 = 10.5\text{kW} \times 3 = 31.5\text{kW}$ per Rack
Limited to 16.4kW due to breaker limit

Open Rack - Cold Storage - Design

- Low cost, efficient storage rack for rarely accessed data:
 - Two Power Zones
 - One Power Shelf w/ 5 PSUs (4+1)
 - AC input only – No DC backup
 - 16 Knox trays and 2 Winter Fell
 - One 10G and 1G switch per 3 racks

[illegible]

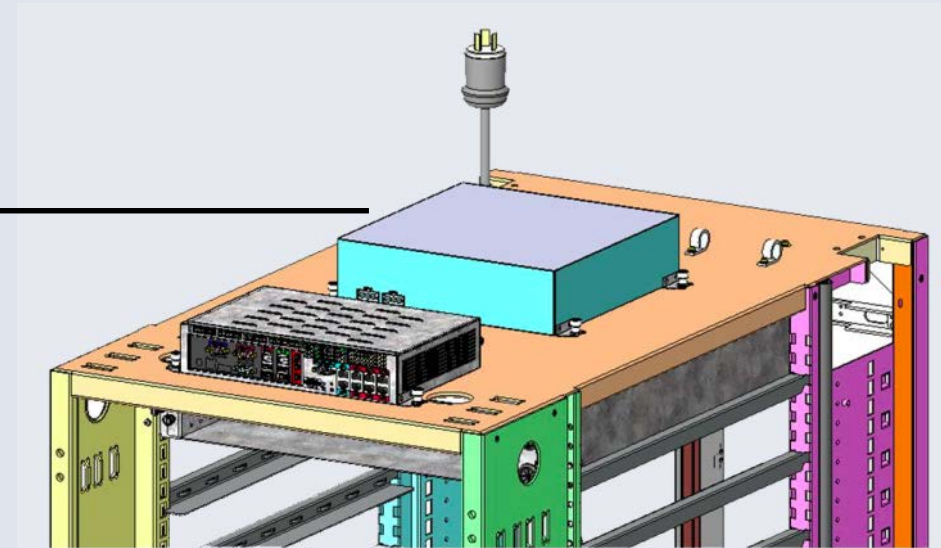
Open Rack - Cold Storage - Design



Open Rack - Cold Storage - Design

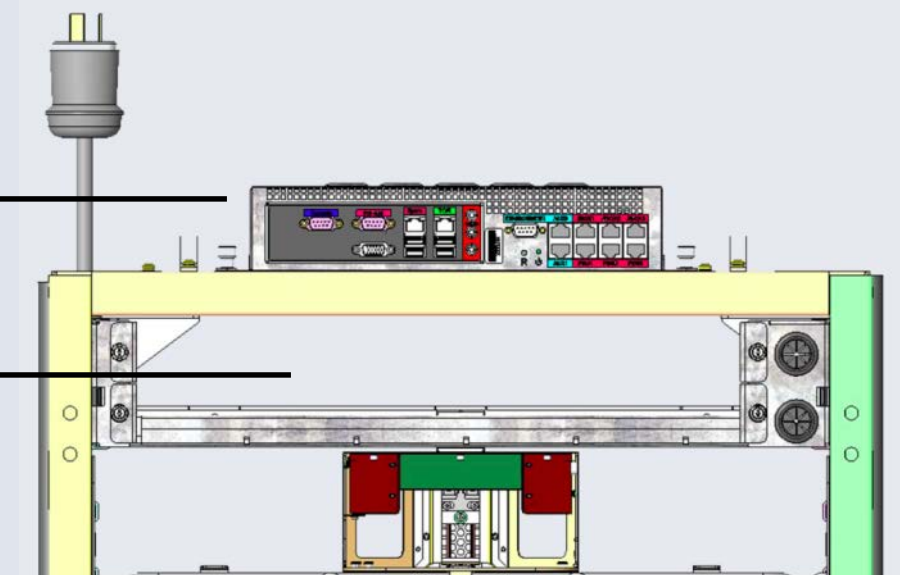
- Power Box to power Switches and BloodHound
- 1 BloodHound per 3 racks
- Middle Rack houses BloodHound, Switches and Power Box

Power Box



BloodHound

Switch Tray



facebook

Lessons Learned

Facebook Open Rack V1

Thin Data Cables for Thin Cable Volume

Cable Tray only 1 inch wide



10 Gig with
small cross-
section



1Gig Cat6
With Rectangular
Cross section



Why Does the DC Power Clip Float?

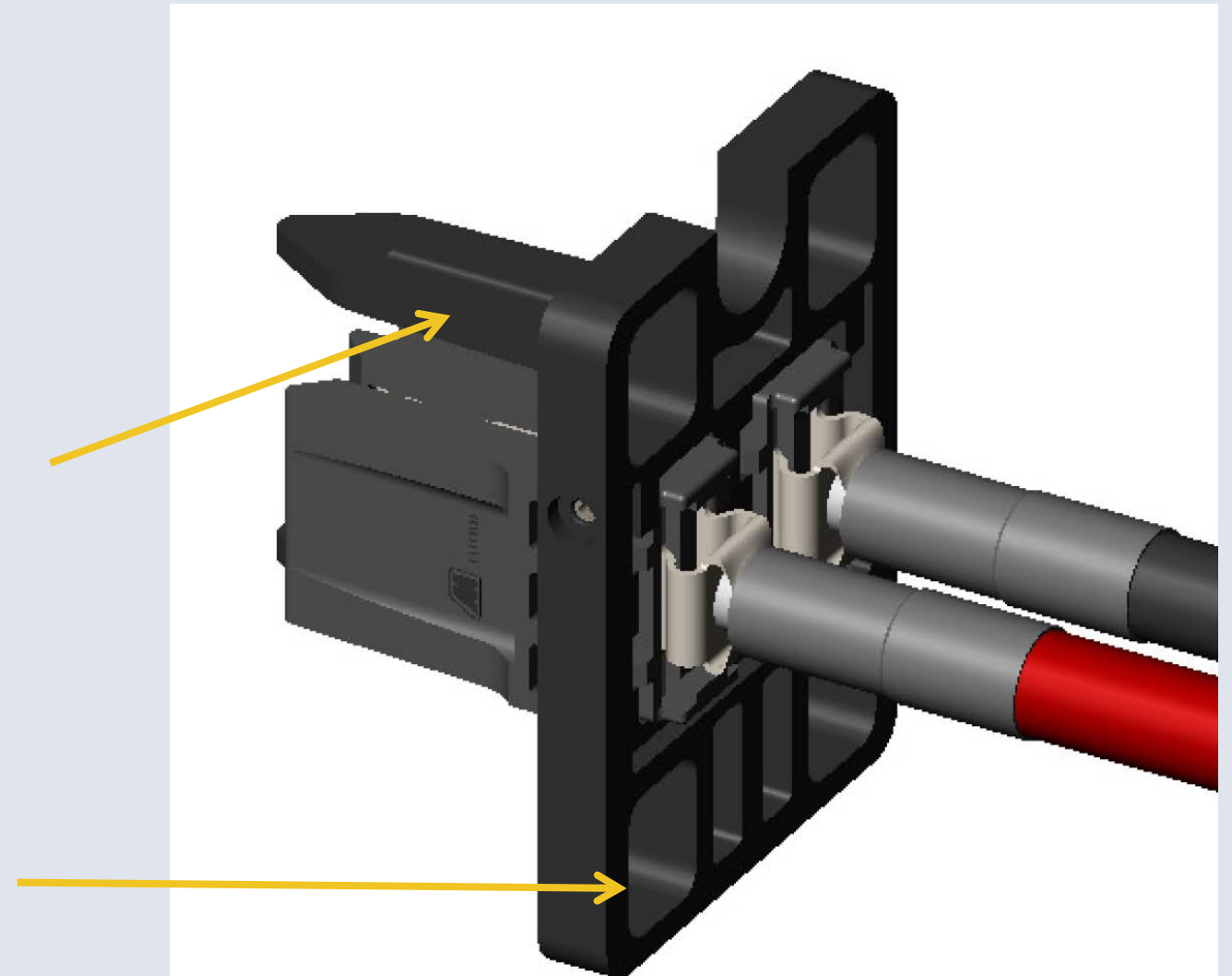
Motion from shipping IT Gear in the rack causes damage to the busbar

Adding the +/- 4mm vertical float eliminates the relative motion between busbar and clip

Guide pins align clip to busbar

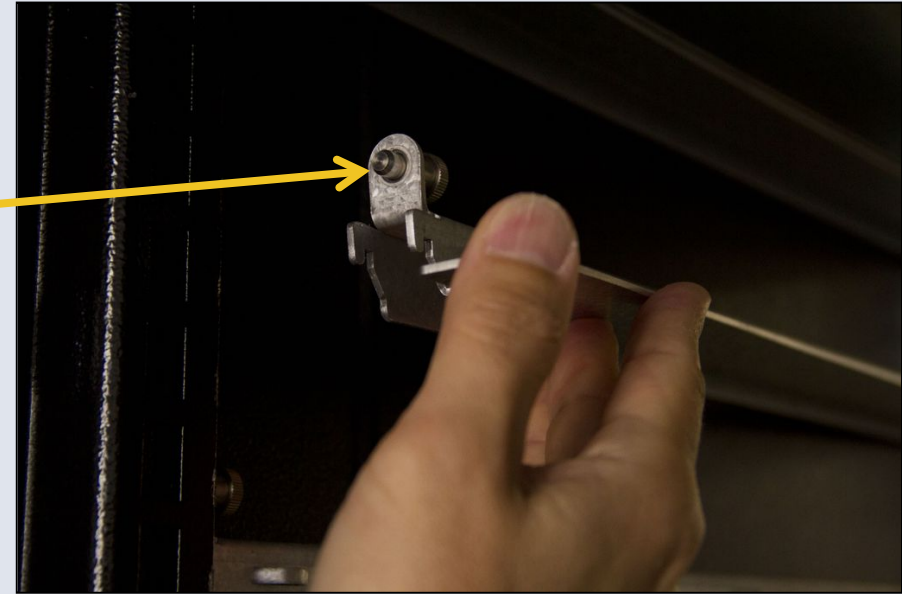
+/- 4mm vertical float
+/- 3mm horizontal float

12V 100A Clip



Lower Cost Design IT Gear Support Bracket

Current design uses a spring plunger to retain the support bracket into the rack.

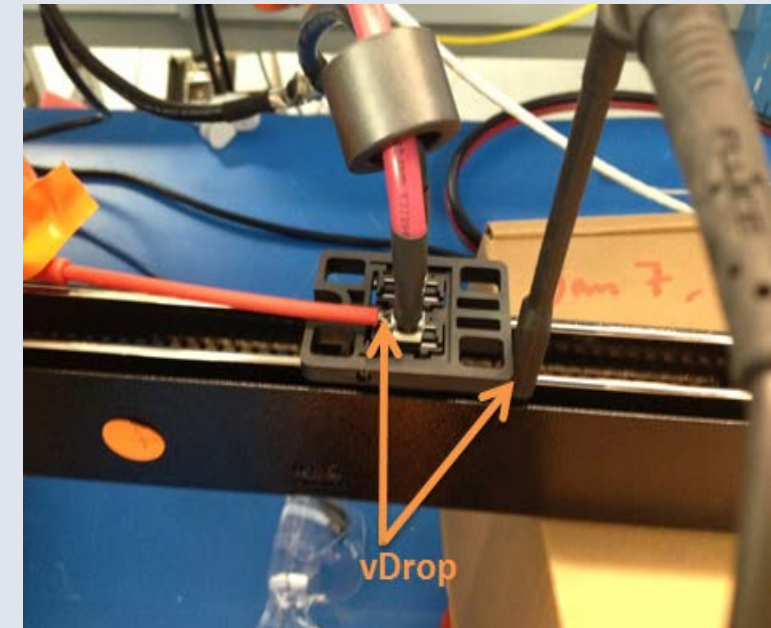
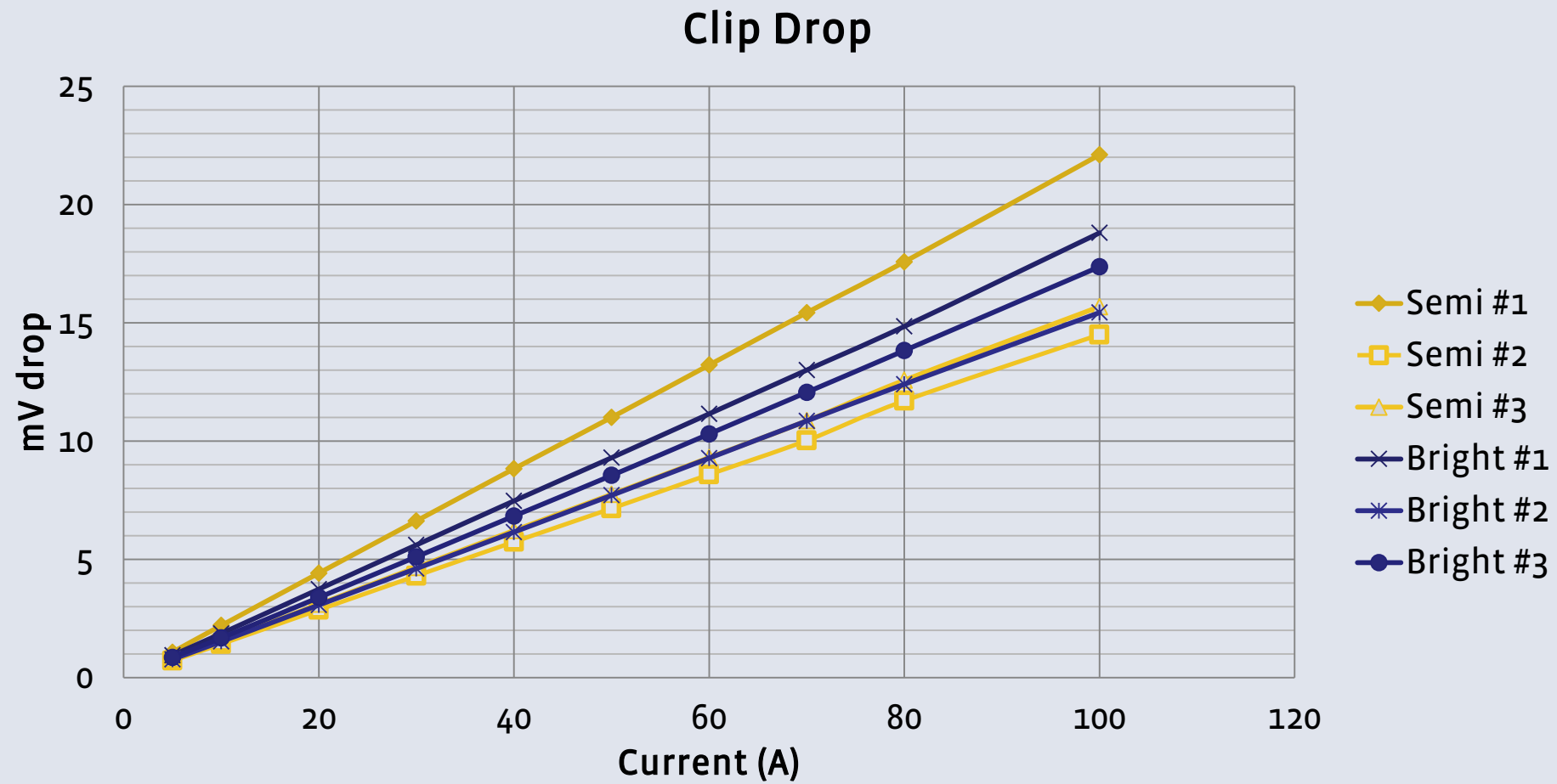


New design will replace the spring plunger with thread forming screw

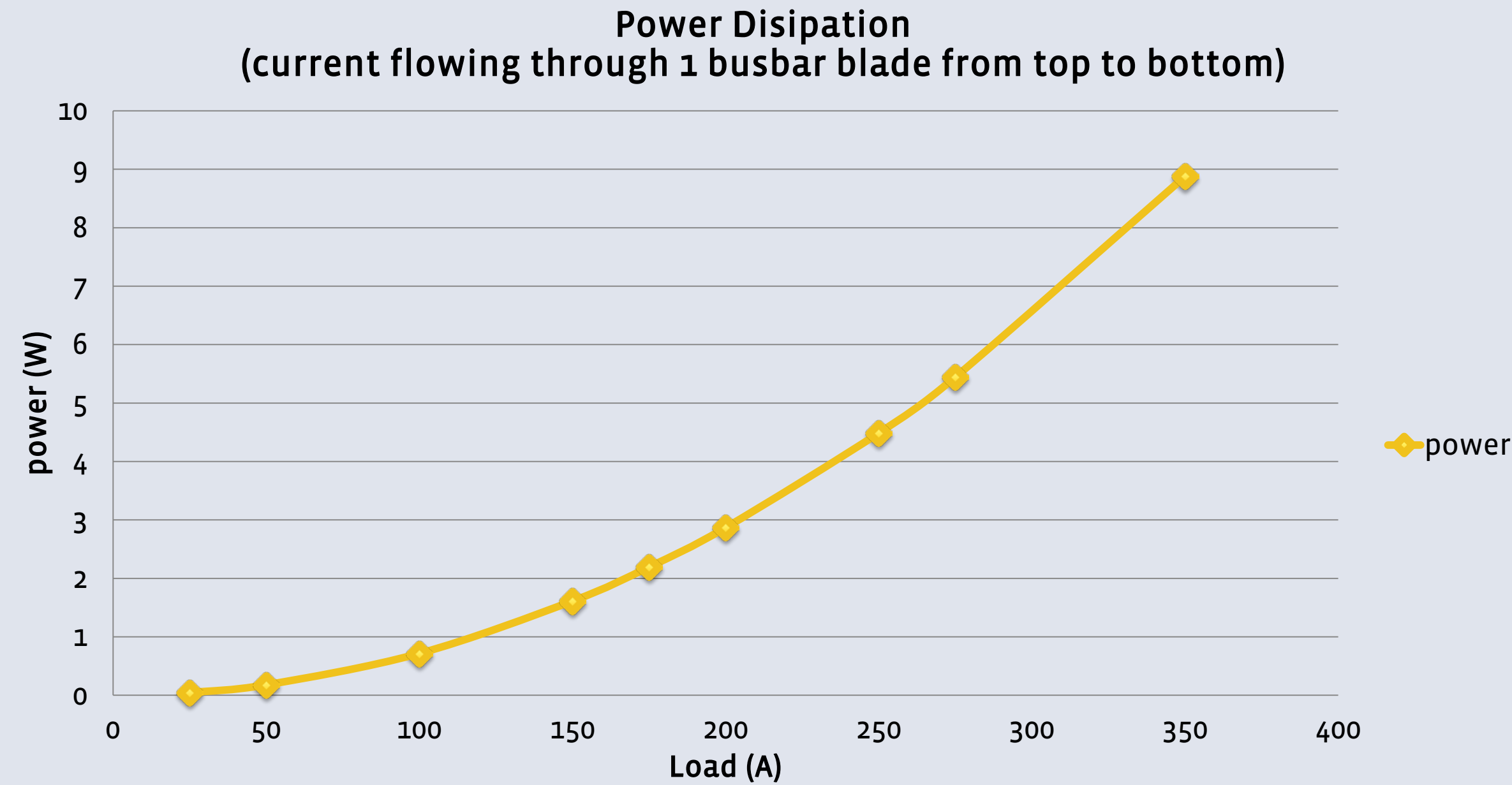
Both Designs will be available on OCP website



Clip Efficiency



Busbar Efficiency



Backup

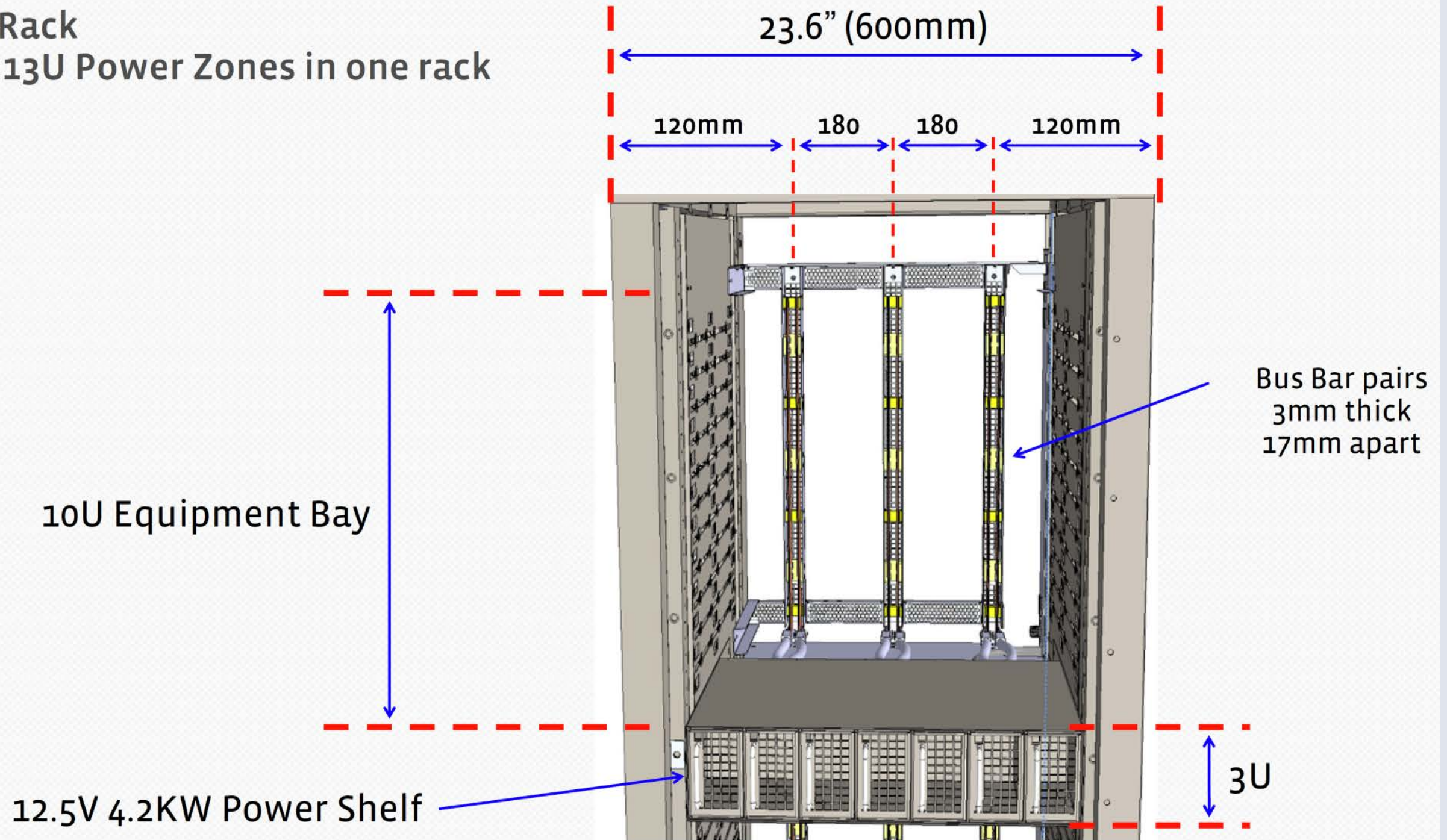
Modular Mounting

- OU = 48mm
- Tool-less Knife Shelving
- Power Shelf Adjustable in
 - 0.5 OU increments
 - IT equipment can have various heights – 1 OU, 1.5 OU, 2 OU, etc.

Rack

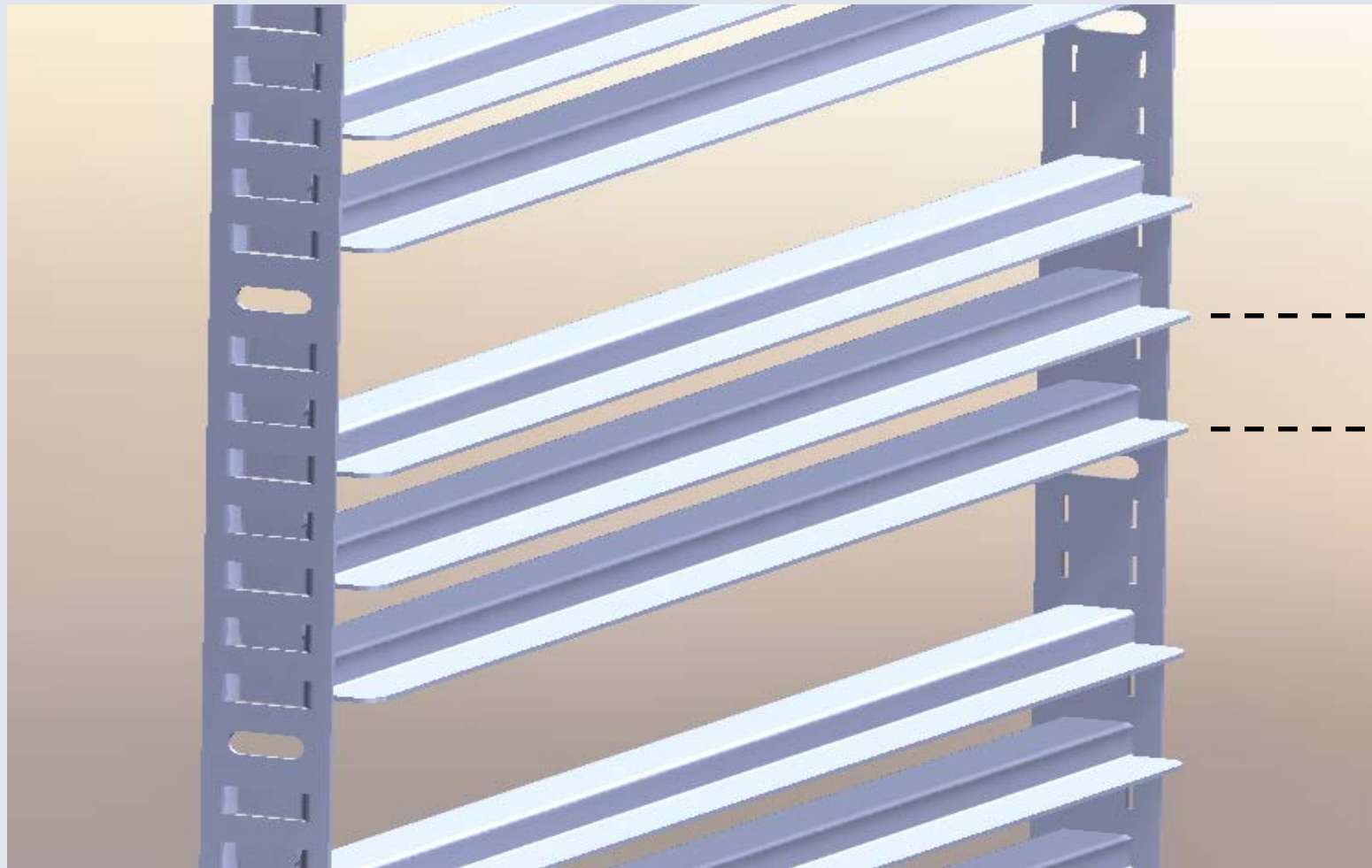
Open Rack

Three 13U Power Zones in one rack



Tool-less Knife Mounting

Rack - Chassis mounting scheme



0.5U vertical pitch

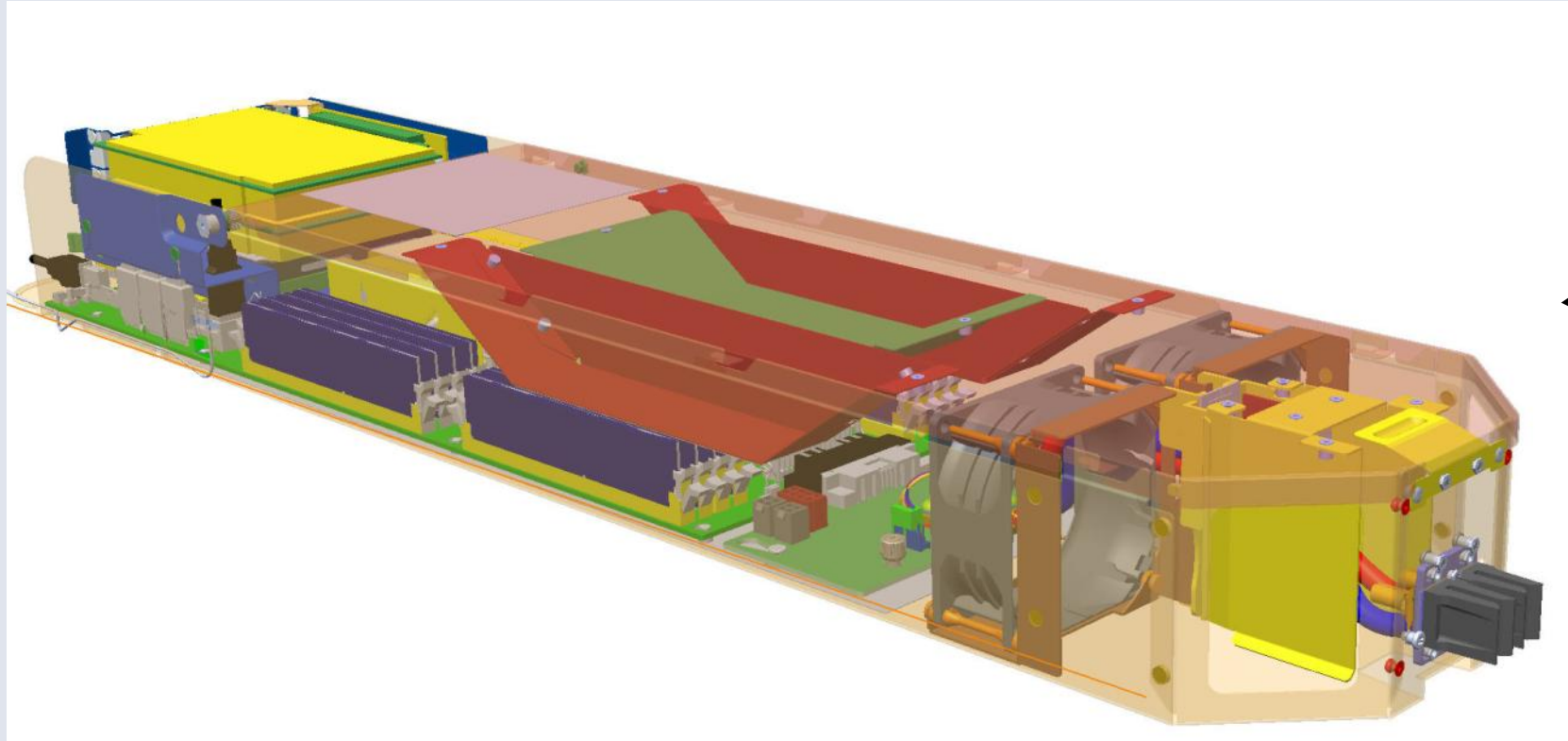
Innovation: Cable-less Power Delivery

- Clip
- Bus Bar
- PDU
- Power Shelf

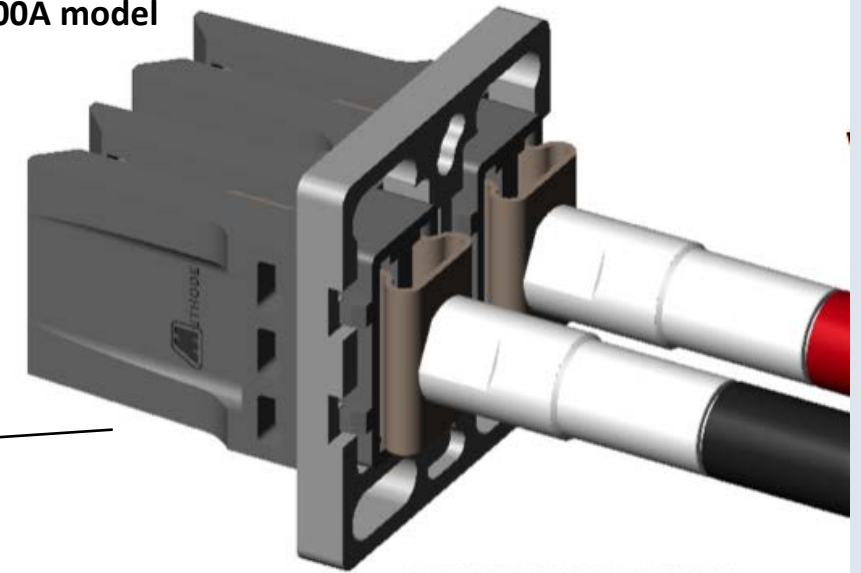
Clip

Winterfell Server

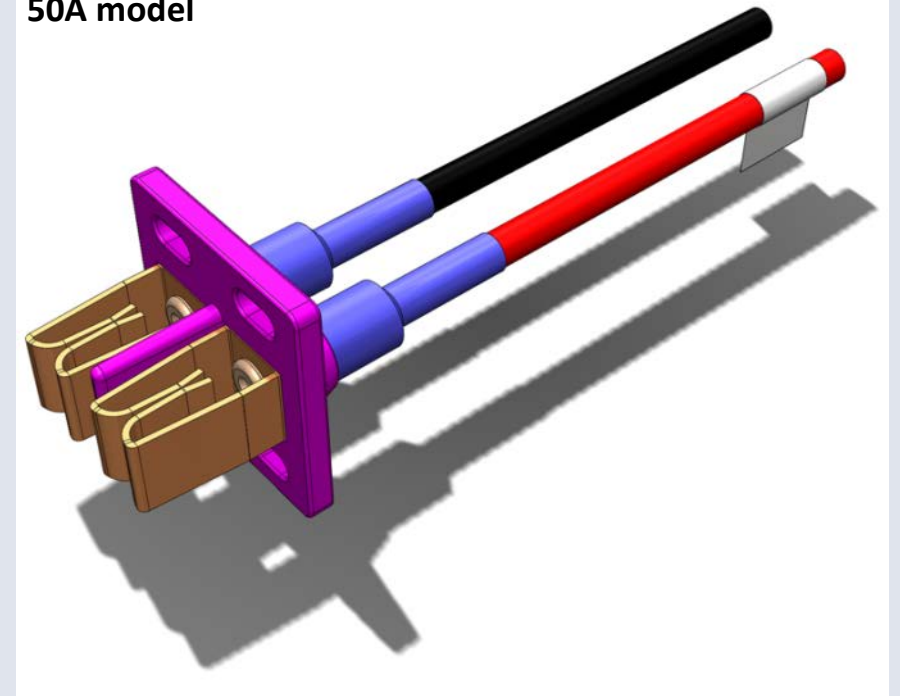
Bus Bar connector **CLIP**



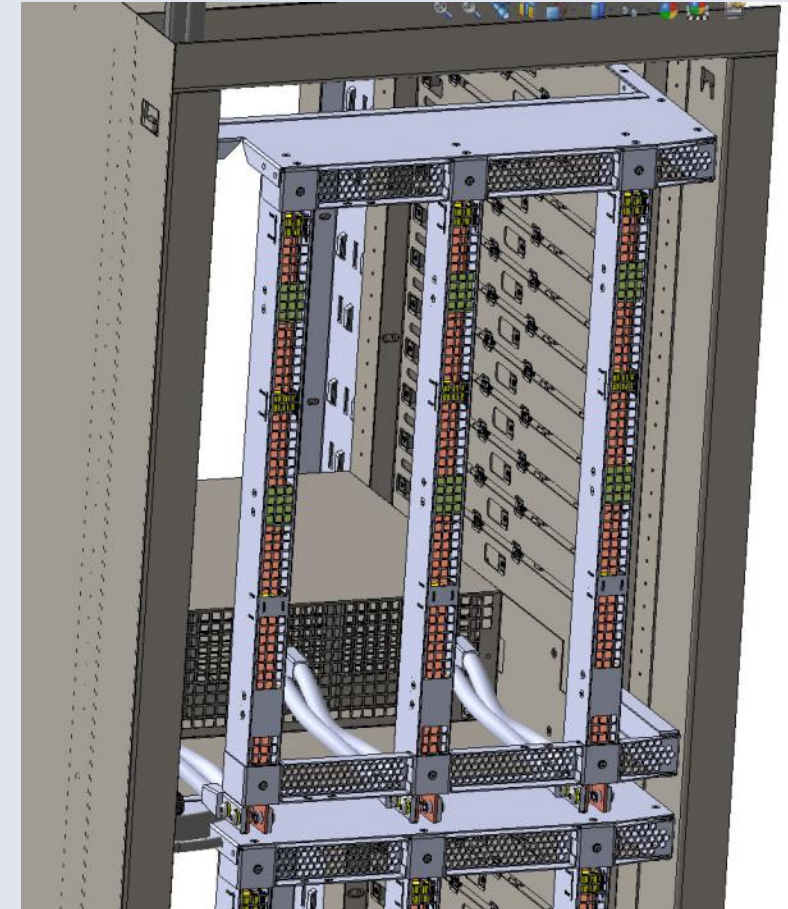
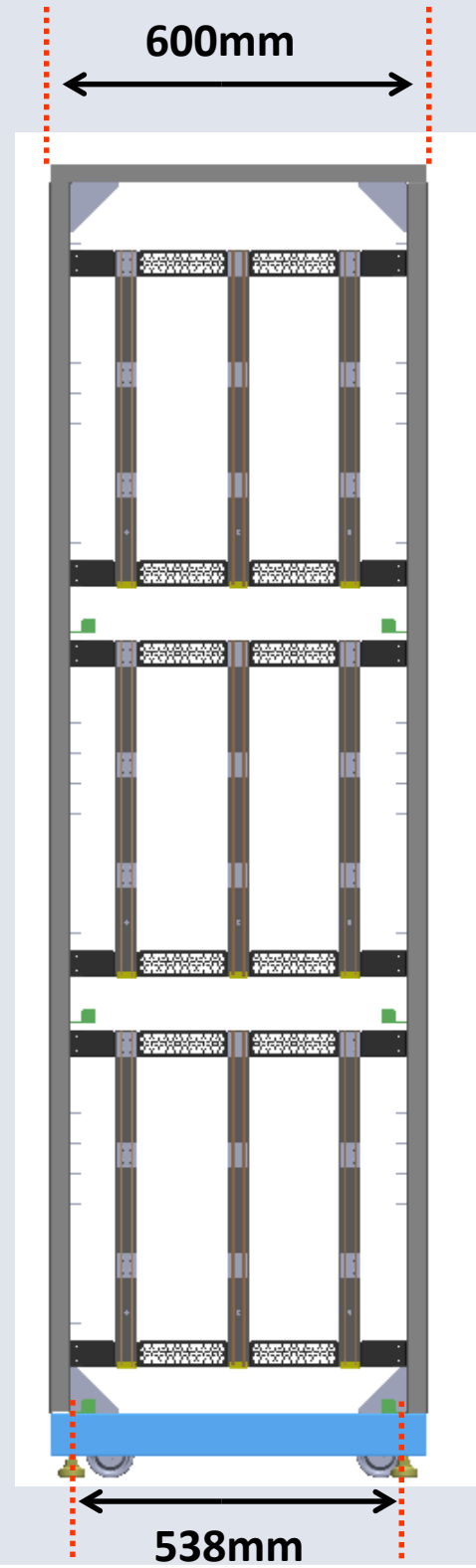
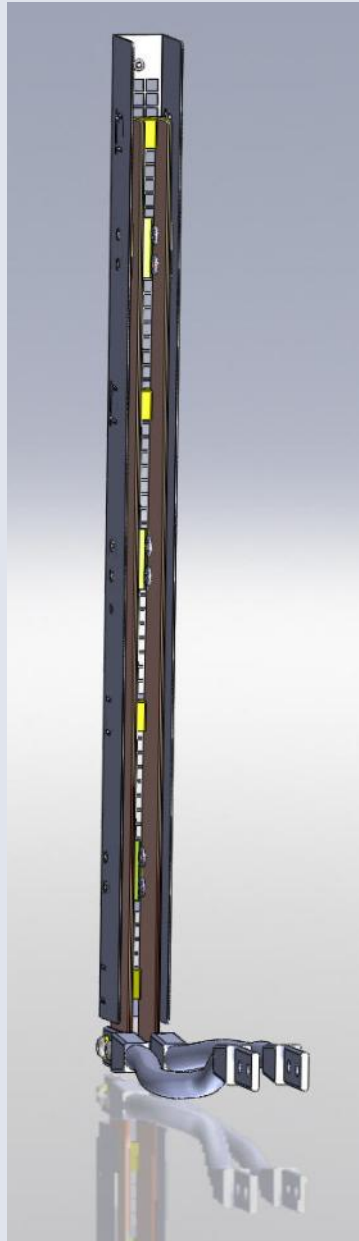
100A model



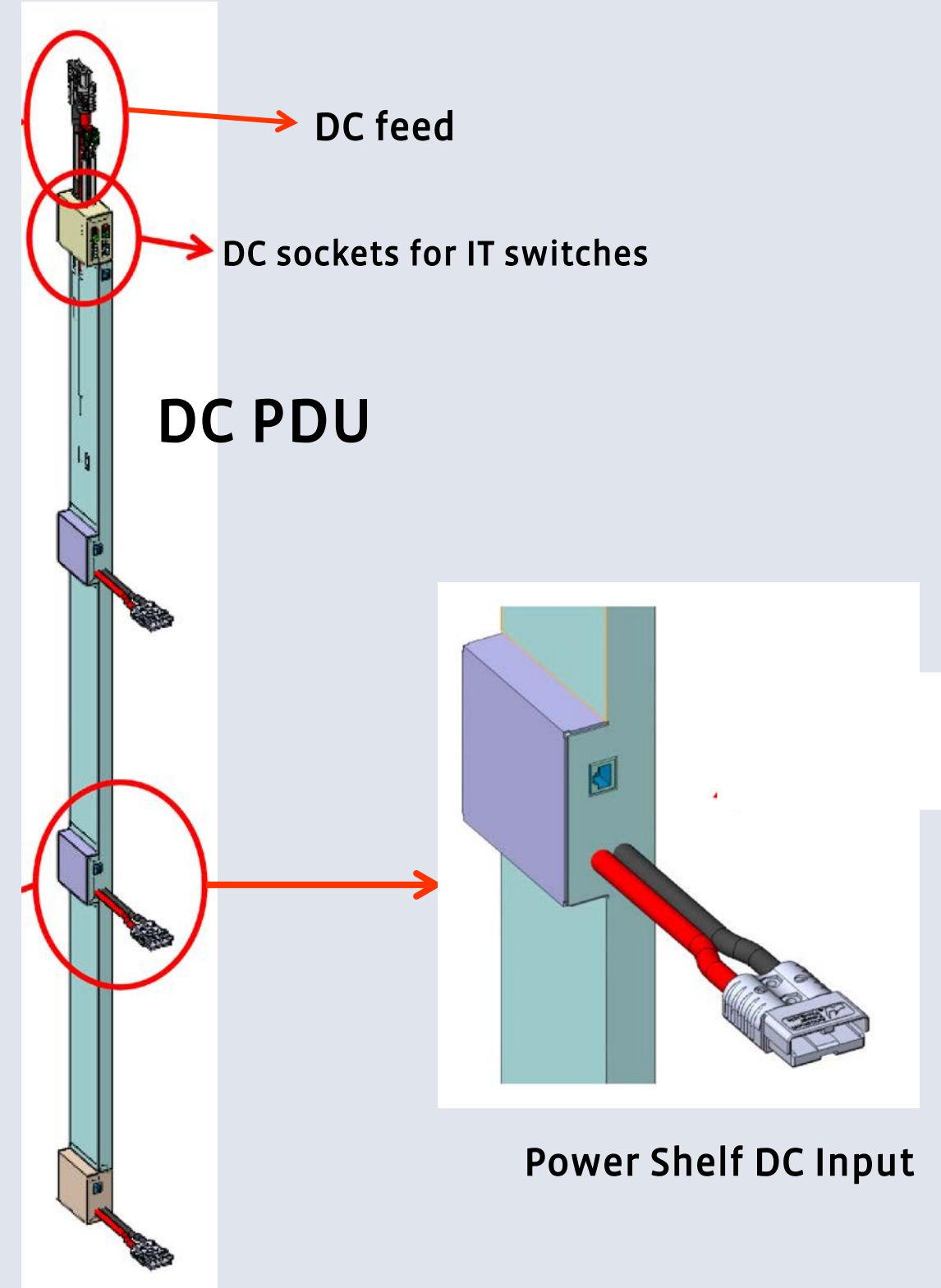
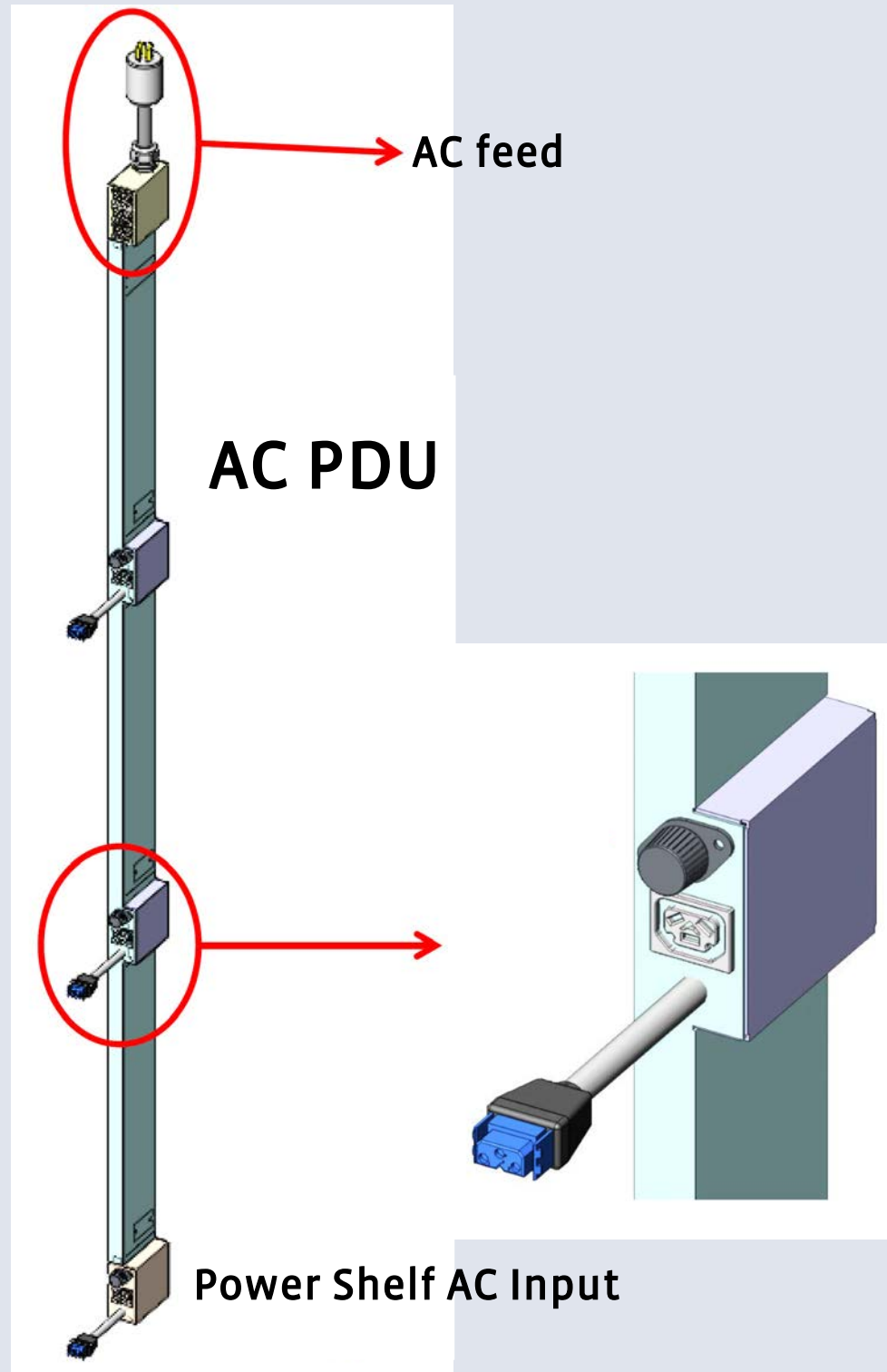
50A model



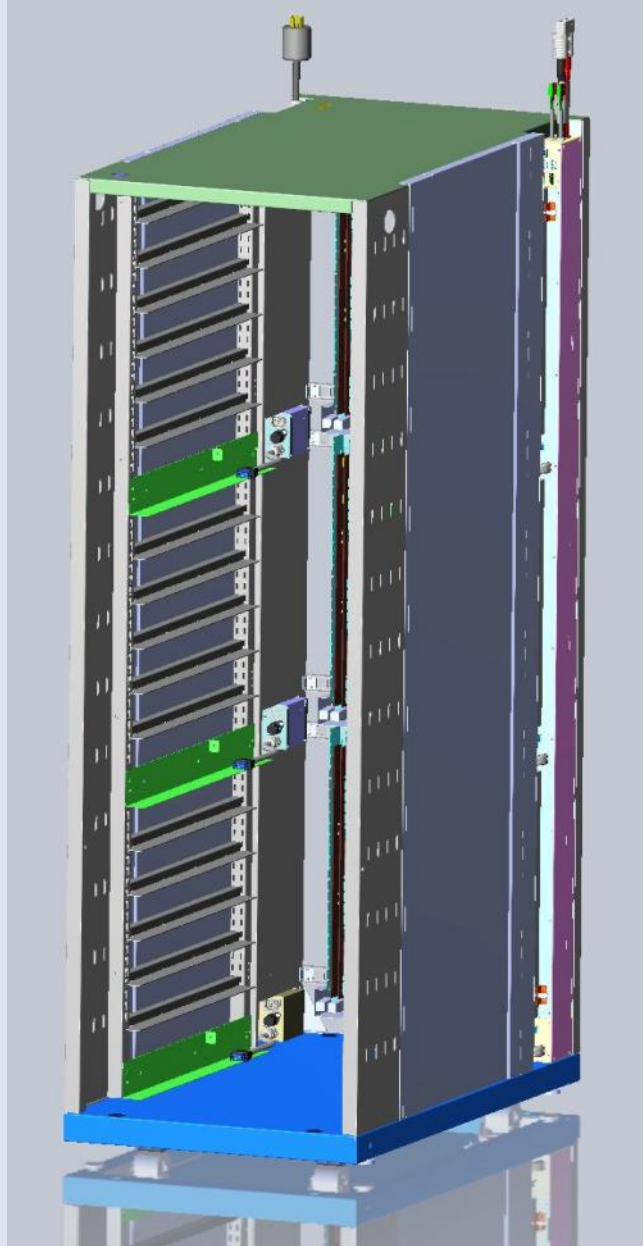
Bus Bar



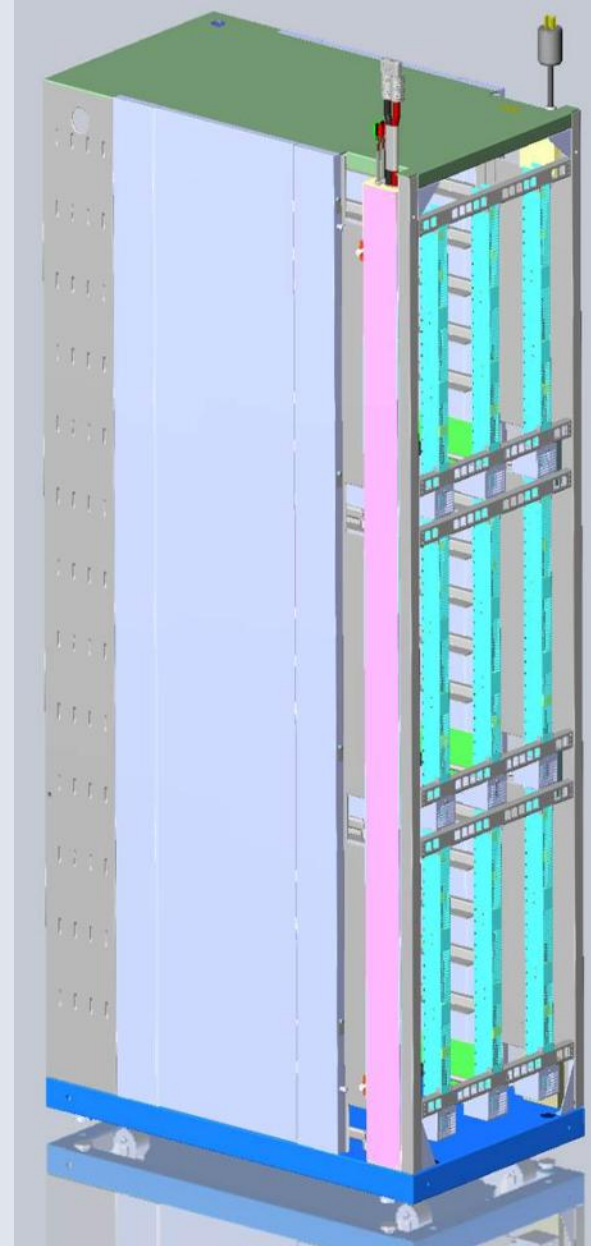
PDU



Open Rack Singlet

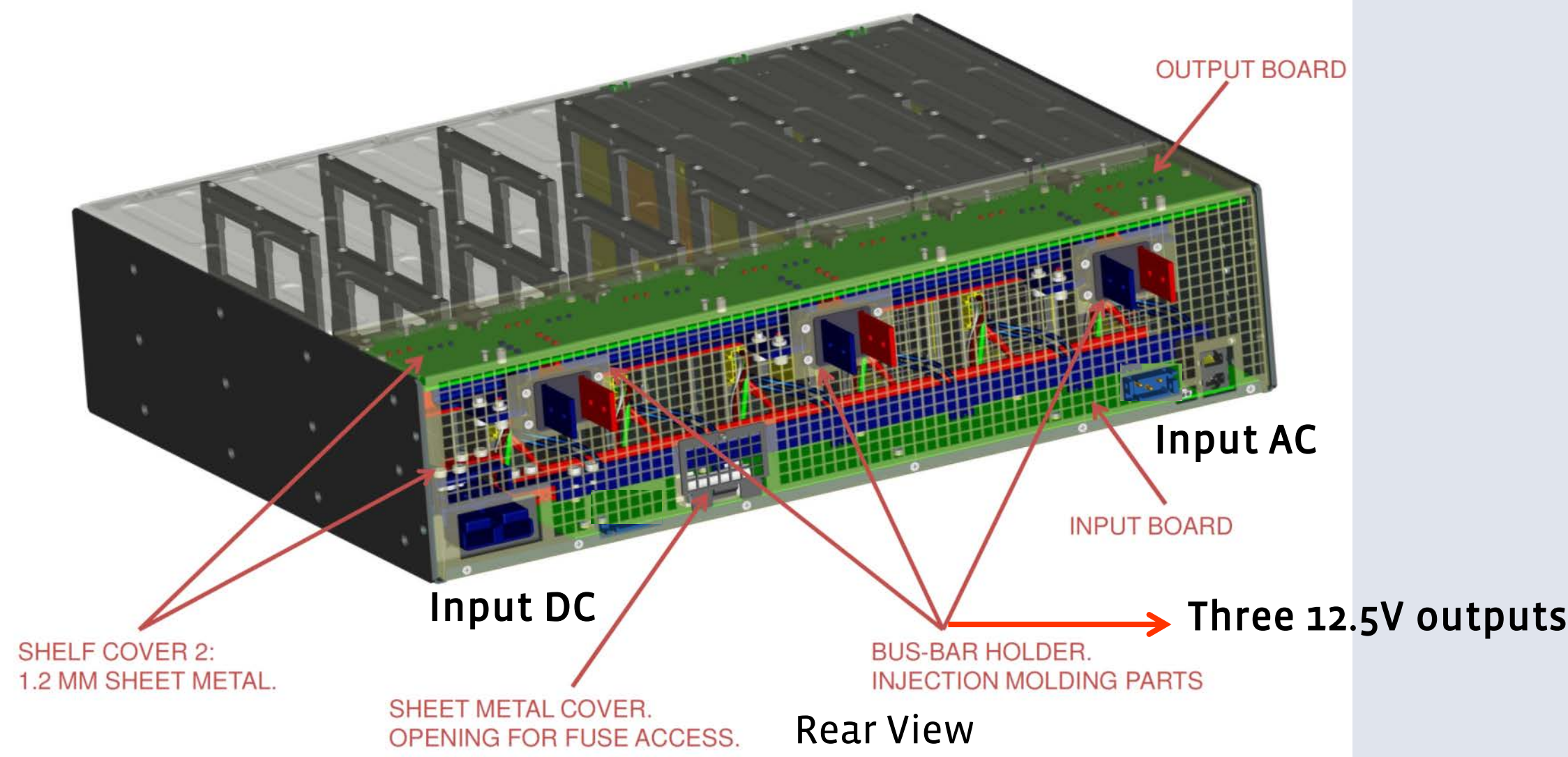
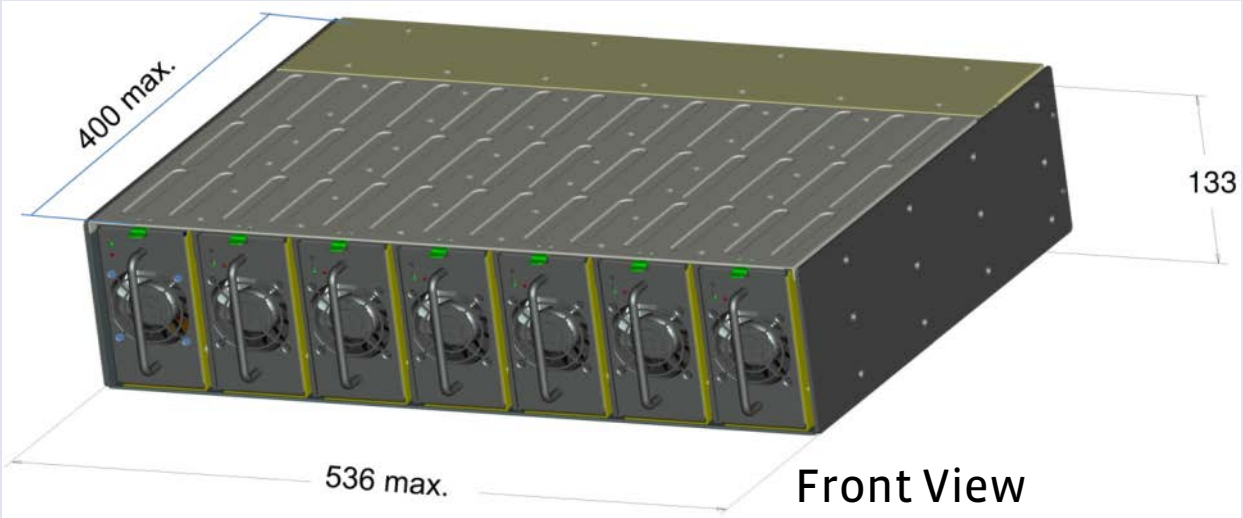


Front View



Back View

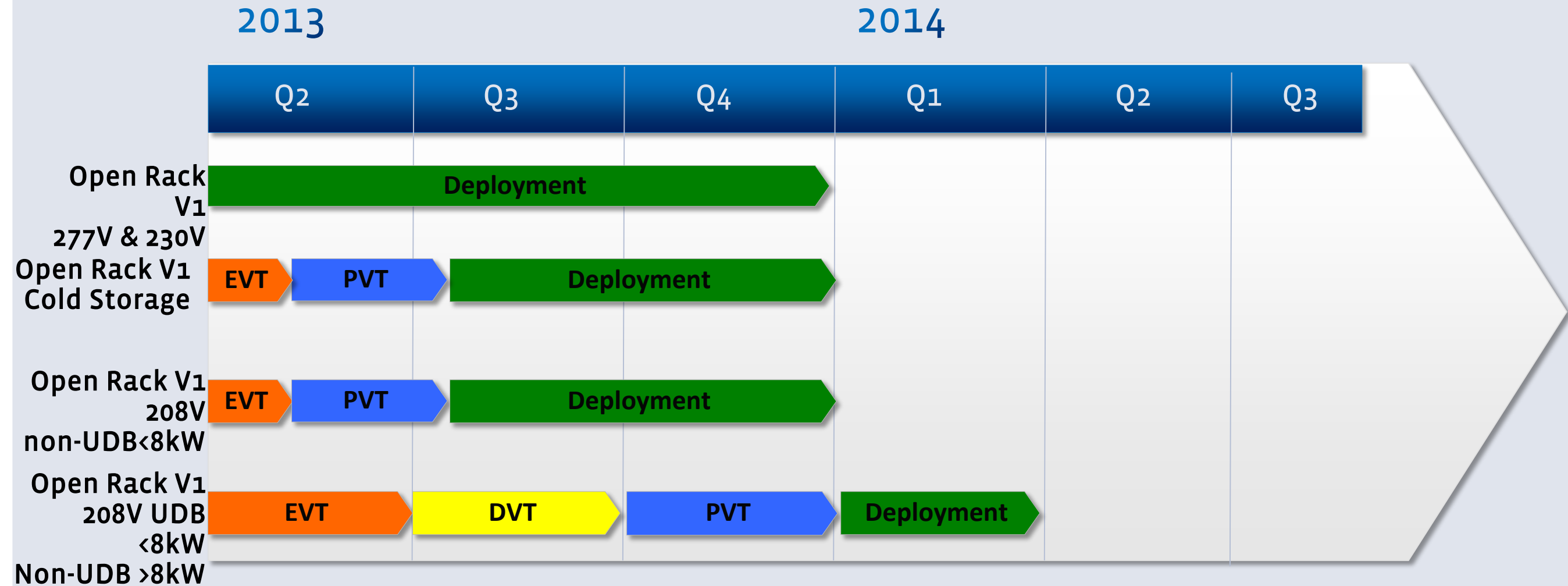
V1 Power Shelf



Open Rack - Cold Storage – Qualification

- Bus bar characterization
- Power Box characterization
- Holdup Time analysis
- BloodHound Fail detection
- Rack power monitoring
- Datacenter connection
- Mechanical check
- Cabling check

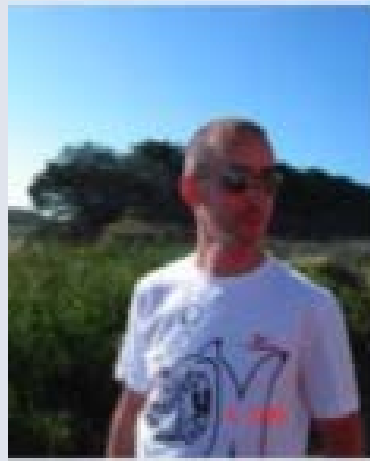
Open Rack Schedule Overview



Open Rack – Team



Gloria Lau-
Team Manager



Pierluigi Sarti –
Technical Lead
Rack and Power



Steve Mills –
Mechanical Engr



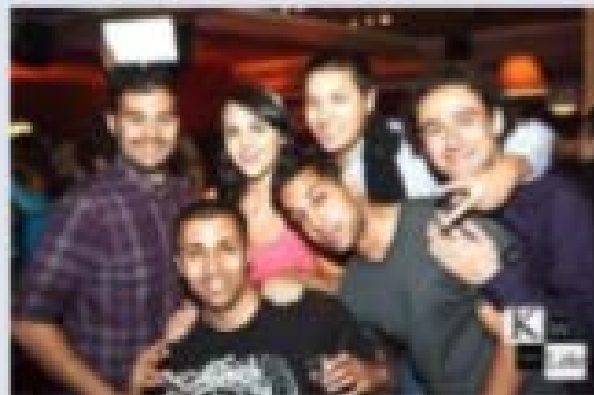
Veerendra Mulay –
Thermal Engr



Avery Nisbet-
Power Engr



Richard Feng –
SCO



Samir Kala -
Power Engr



Zoh Eb.-
Power Engr



Shafigh Shirinfar-
TPM