

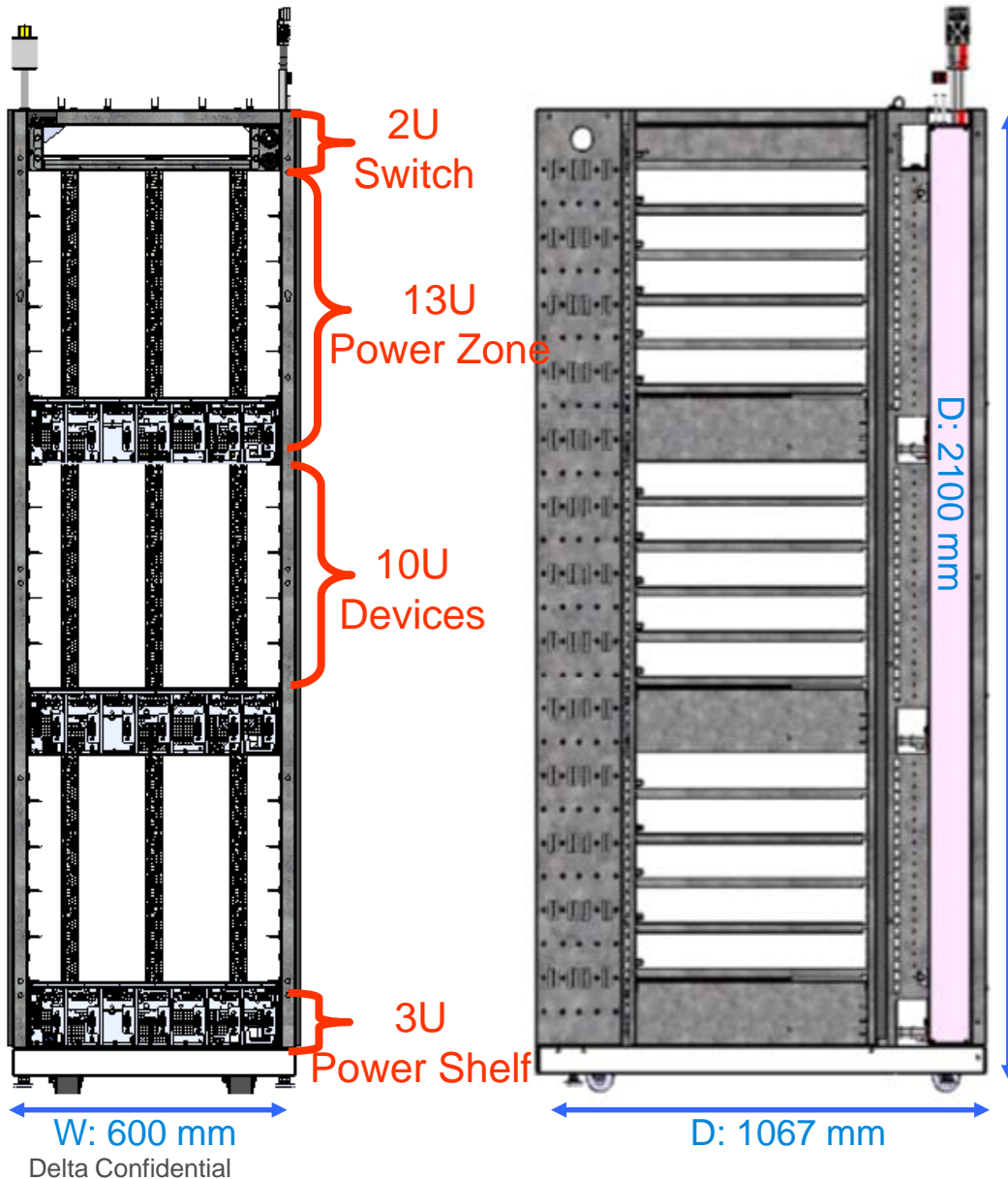
# Delta Open Rack & Power Solution

Delta PSBG, IDC LOB  
2014 Jan, Richard. Chan



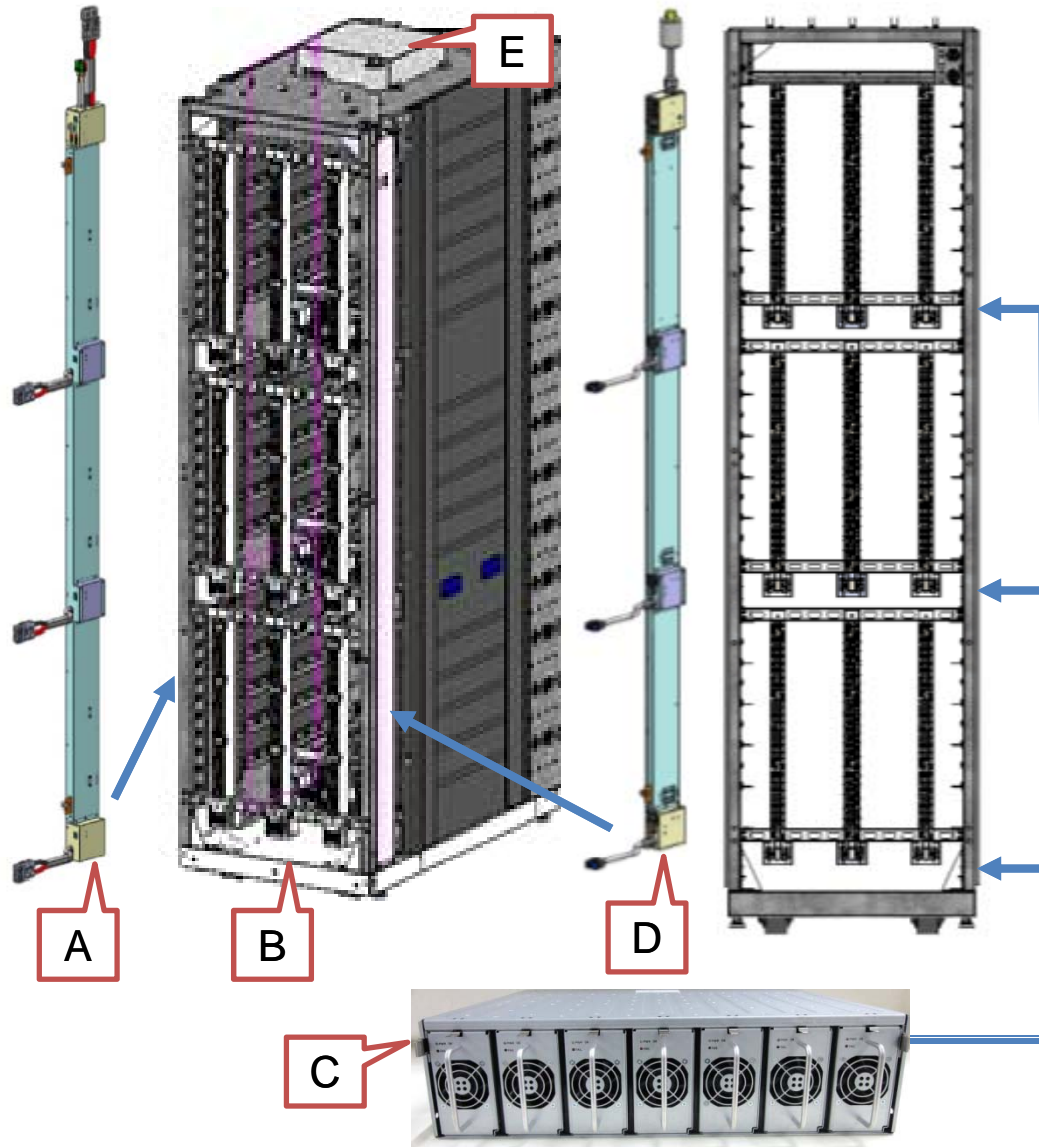


# V1 Open Rack General Specification



- Dual Inputs  $-277\text{Vac} + 48\text{Vdc}$
- Two Different types of PDU (AC + DC)
- 3 Power Zones; 3 pairs Bus for each Zone
- Each Power Zone = 4.2KW
- Use 21 pcs 700W PSU for total power
- Total Power = 12KW
- 15U space for server/ storage devices
- 9U space for PSU
- Bus Bar Max. continuous current = 408A
- Max. current for the Clip is 80A.  
(20% derating)

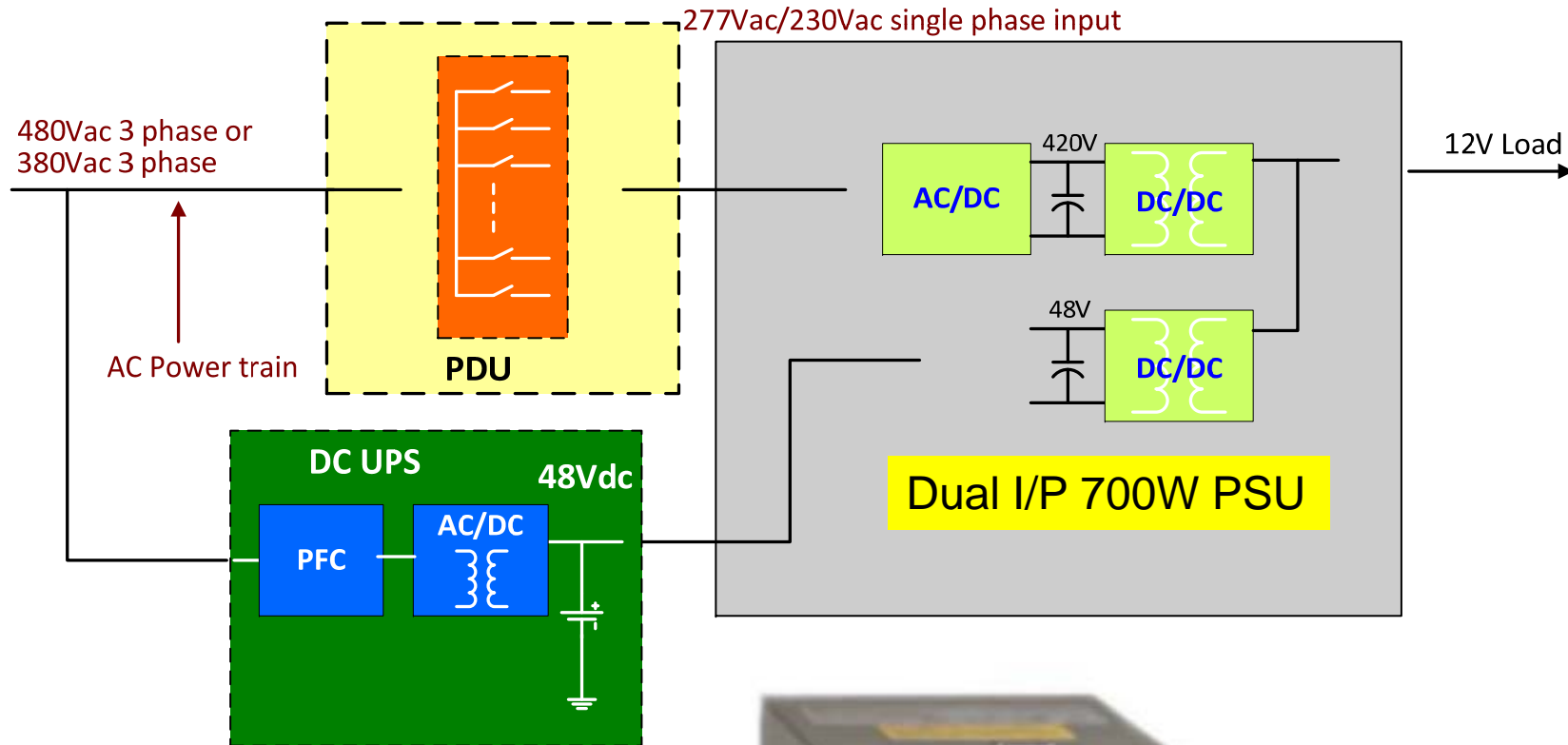
# V1 Open Rack



- A. DC G-PDU:** 3 main 48Vdc outputs + extra aux DC outputs
- B. Dual input server rack:** contain 1 AC and 1DC PDUs and 3 Power Zones (4.2KW each zone) ; 3 pairs Bus bar for each Zone;
- C. Power shelf:** Total 3 shelves; 7 PSU (6+1; 700W each PSU) per shelf, 4.2KW per zone, total 21 power supply to provide 12KW power
- D. AC G-PDU:** 277Vac input; 3 main AC outputs with single phase 277Vac to power shelf
- E. Monitoring device (Bloodhound):** collecting power status to central control



# Dual input (277Vac +48Vdc) dual Input PSU

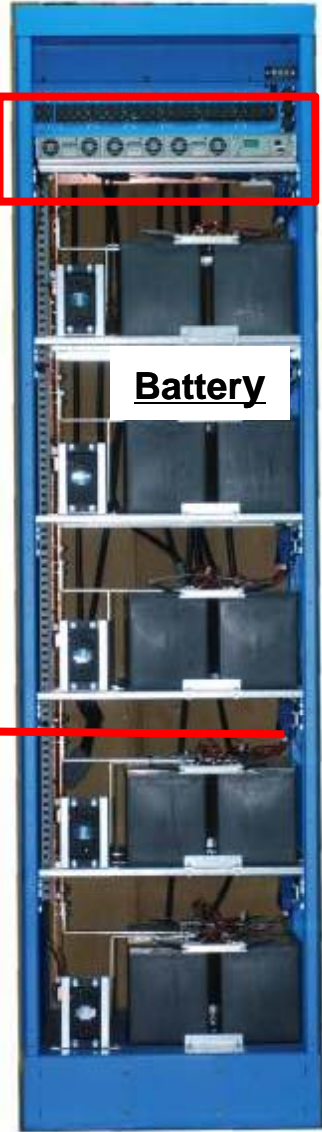
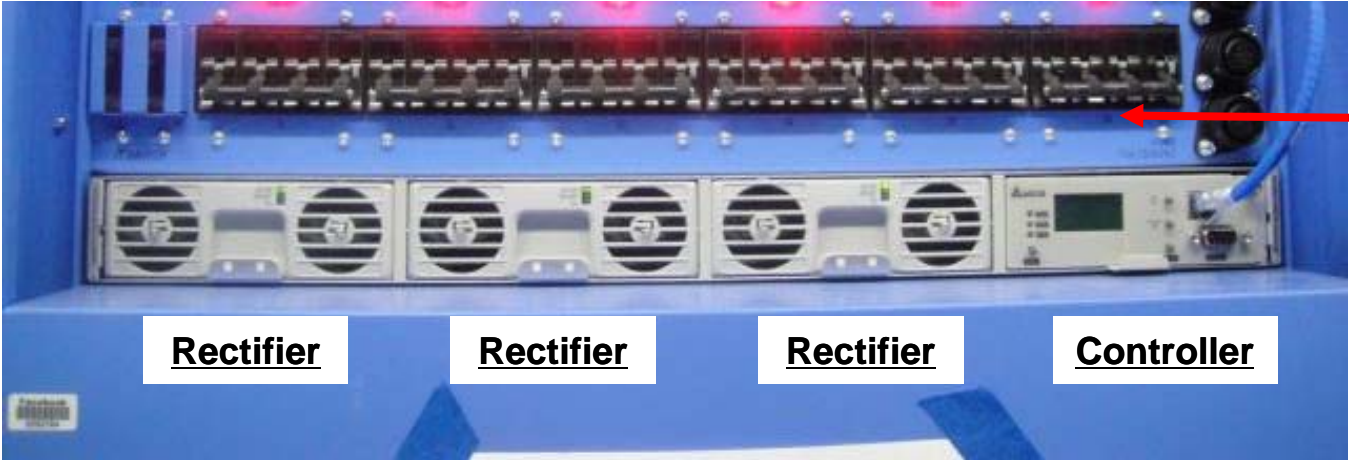


- 277Vac +48Vdc Input
- 12.5V/ 700W;450W
- Efficiency>94%

**99%**                      **x 94%**                      **= 93%**



# 85KW DC UPS & Venus AC/DC PDU



AC & DC PDU

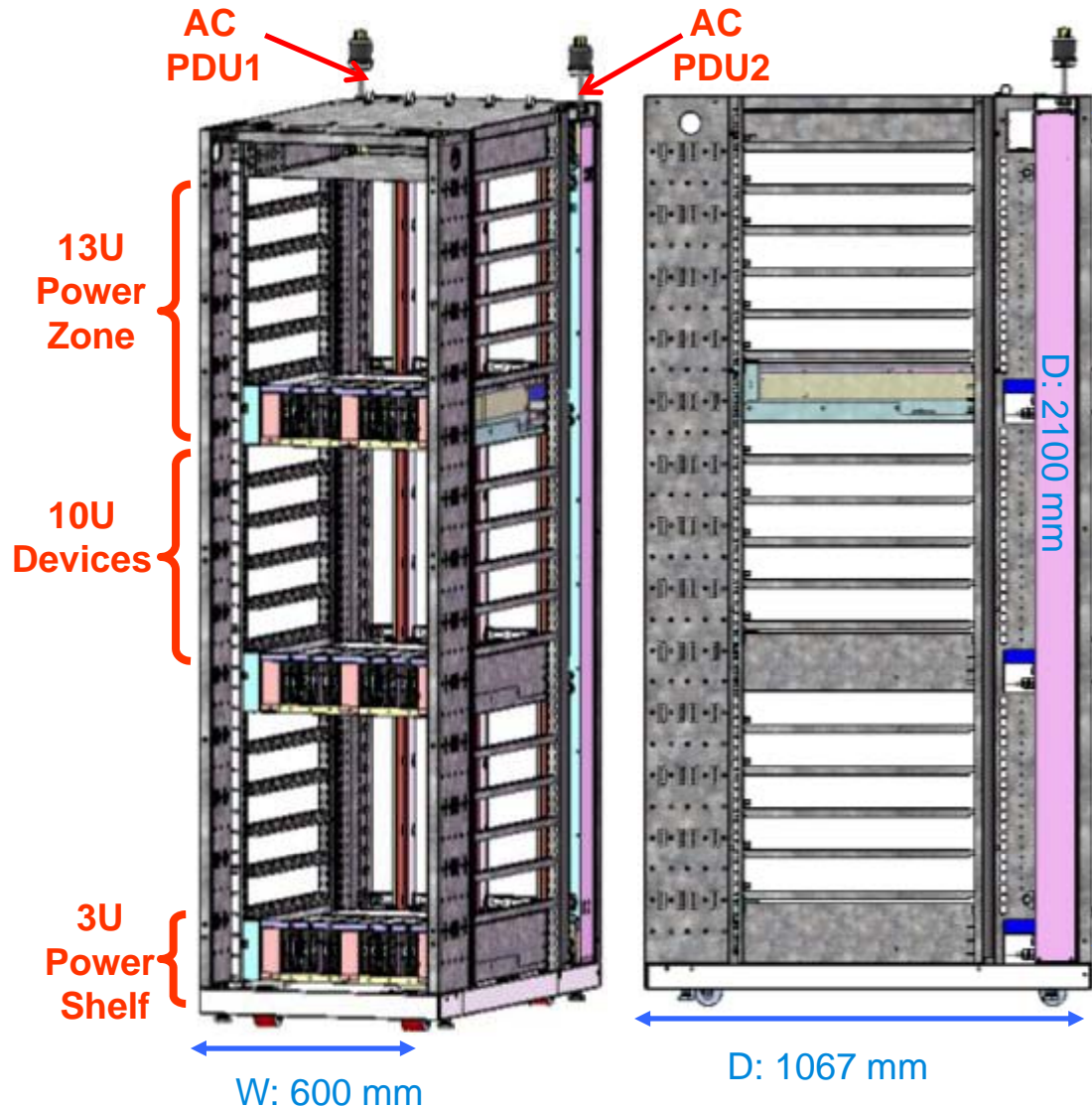


BHM

Provide the Power to IT switch and Server node @ AC outage

DC Backup System

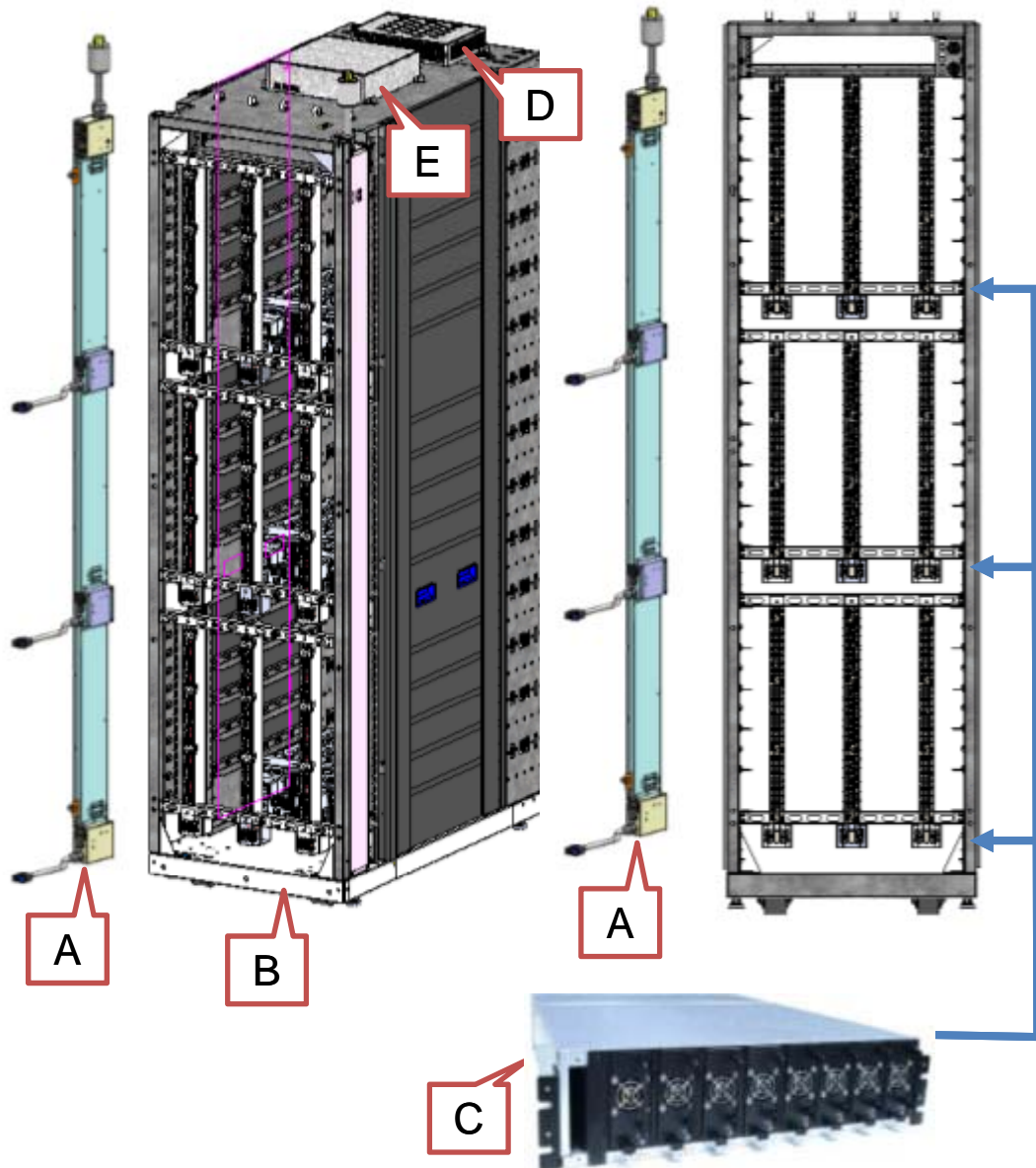
# DELTA 208/230Vac Stingray OpenRack Specification



- Dual Inputs –208/230Vac + 208/ 230Vac
- Dual AC PDU
- 3 Power Zones; 3 pairs Bus for each Zone
- Each Power Zone = 4.2KW
- Use 18pcs 2.1W PSU for total power
- Total Power = 12KW
- 15U space for server/ storage devices
- 9U space for PSU
- Bus Bar Max. continuous current = 408A
- Max. current for the Clip is 80A.  
(20% derating)



## 208V/230V Stingray Rack



**A. AC M- PDU:** 208Vac input; 3 main AC outputs; total 2 per rack

**B. Dual AC input server rack:** contain 2 AC PDUs and 3 power zones; 3 pairs of bus bars

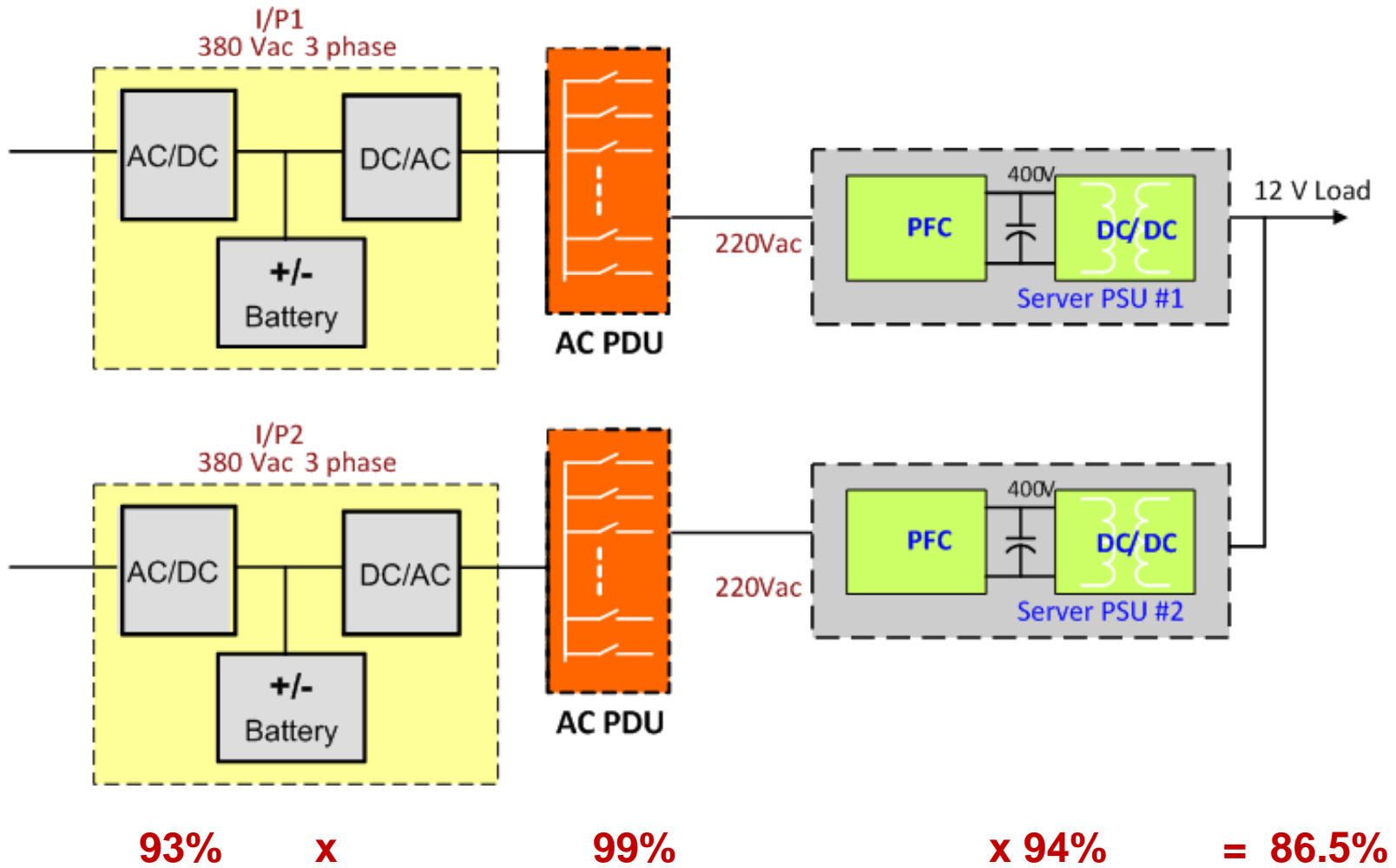
**C. Power shelf:** Total 3 shelves per rack, max with 6 pcs 2.1KW PSU (3+3); max power is 6.3KW per zone, 15KW per rack total

**D. Power adapter box:** 50W power adapter to provide DC power to monitoring device

**E. Monitoring device(Bloodhound):** collecting power status to central control

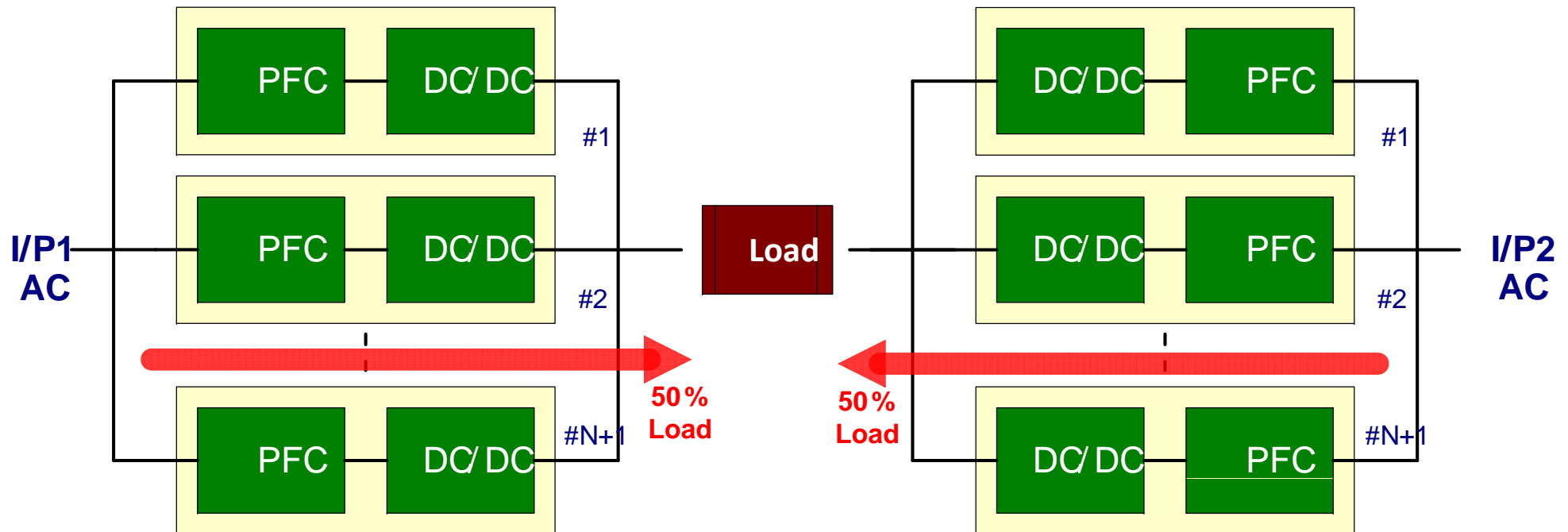


# Dual AC Feed Power Architecture





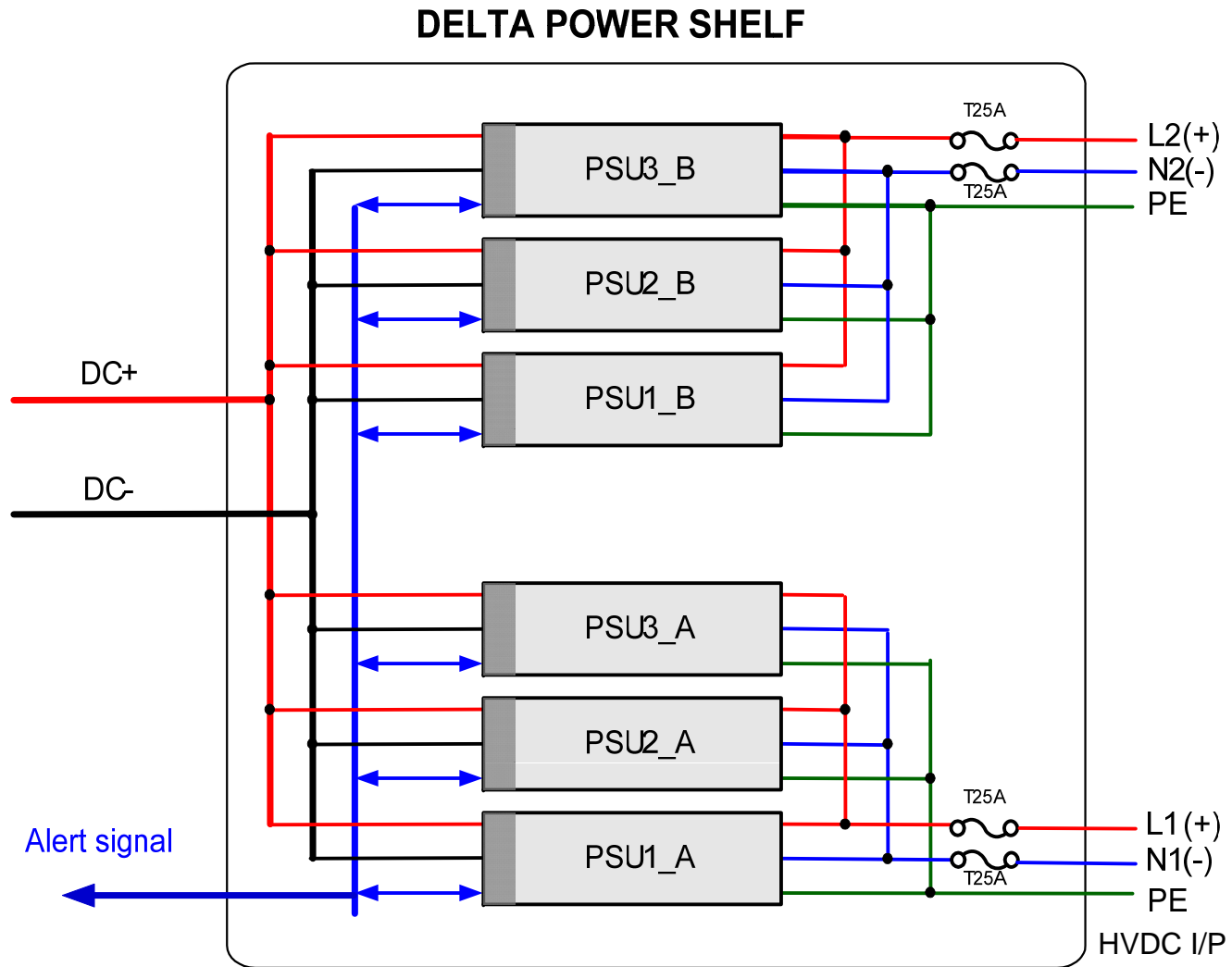
# Dual AC Feed Power



- ❖ Main AC-DC PSU work on redundant status at normal condition.
- ❖ Standard design
- ❖ AC backup system may be needed



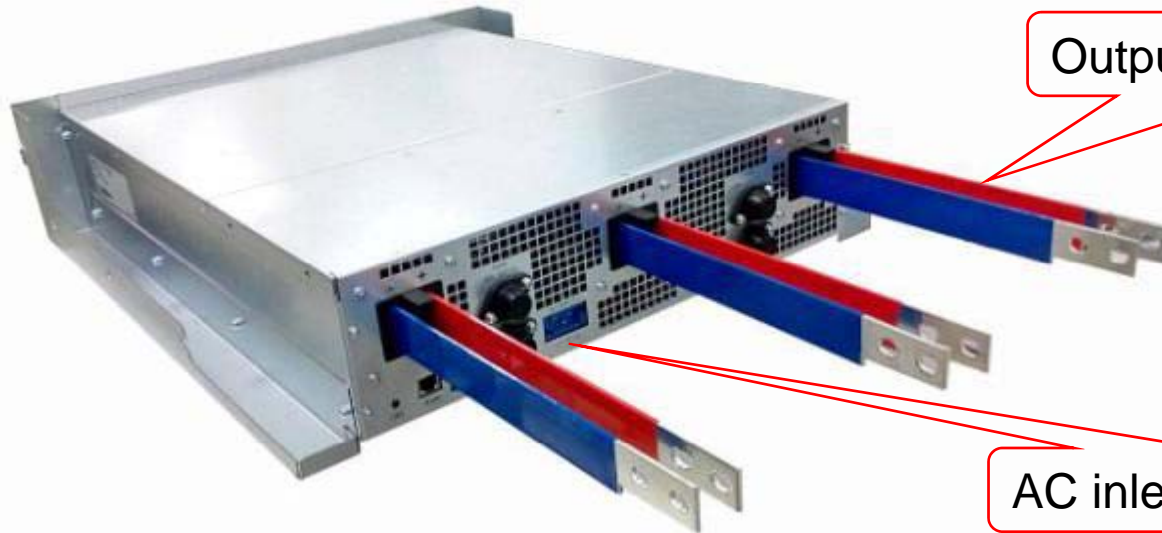
# Power shelf block diagram



# Outside Drawing



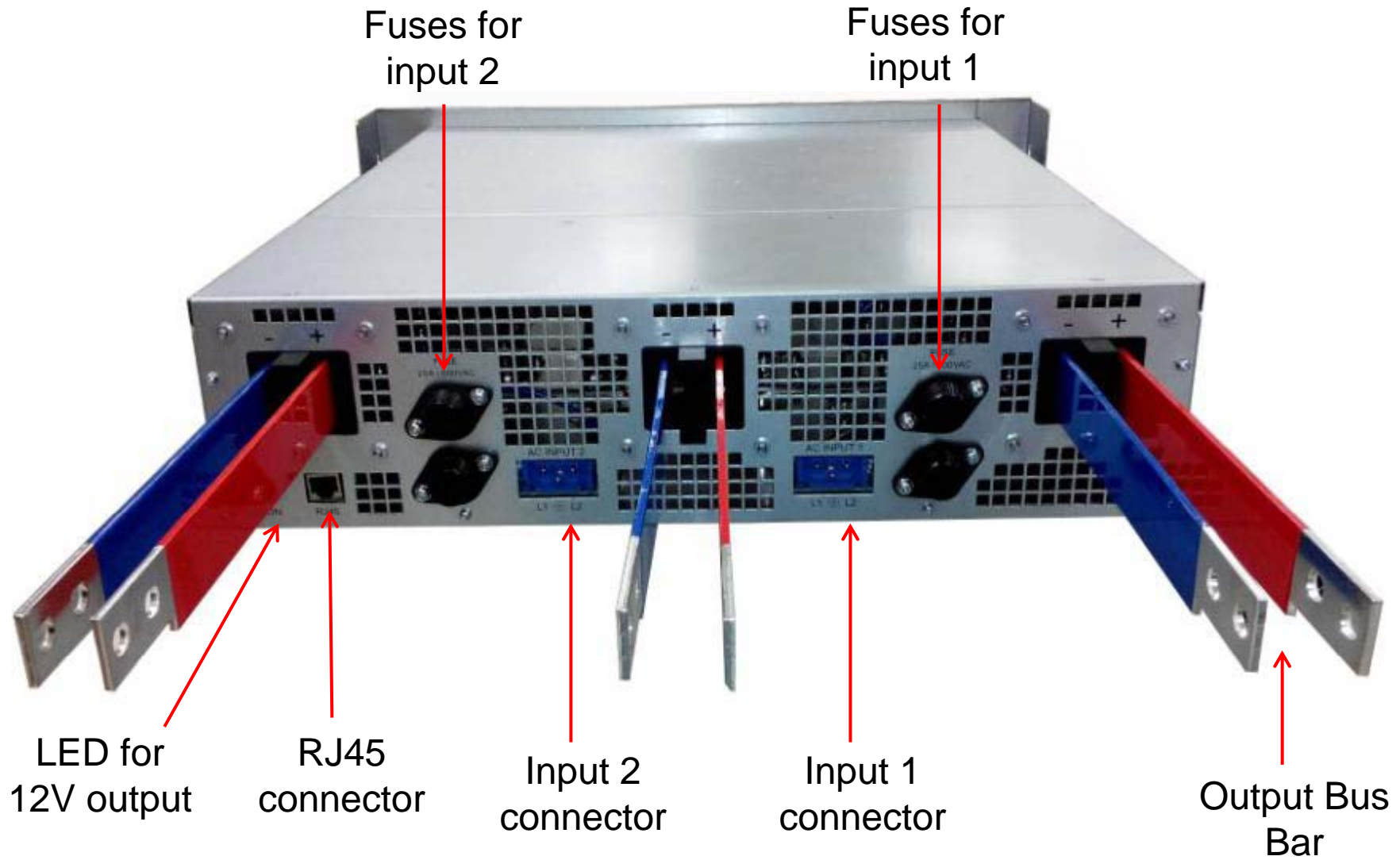
PSU Slots



Output Bus Bar

AC inlet

# Rear View of Power Shelf





# Dual AC input & 2 Power Zone Openrack

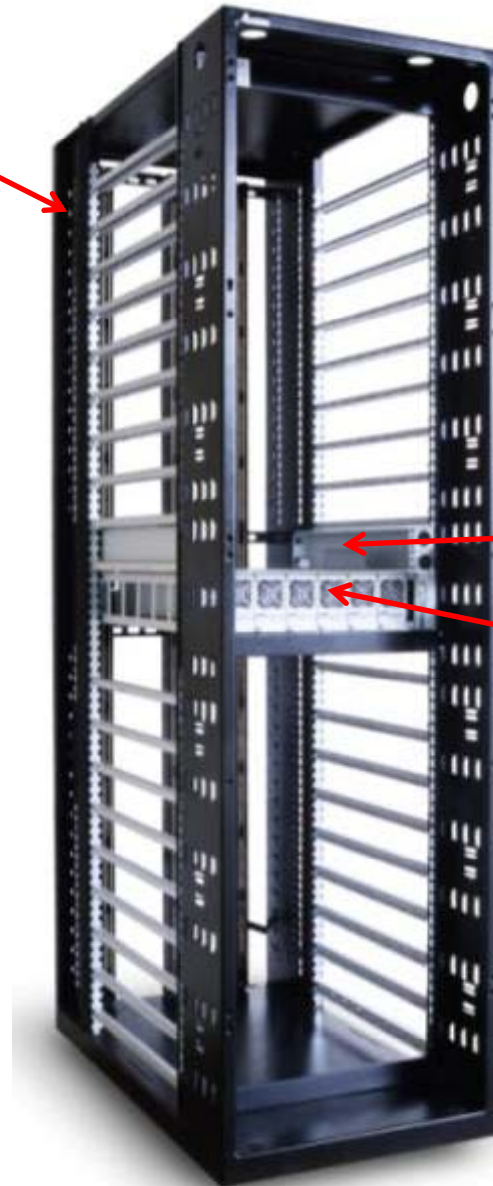
3 Pair Bus Bar for each Power Zone

■ All systems shall be electrically and mechanically compatible with the Open Compute Open Rack Standard.

■ Highest economical physical density scalable to 12KW per rack.

■ Diverse parallel AC power inputs per cabinet

- United States 208Vac three phase input power solution.
- UK / International 415/240Vac three phase power solution



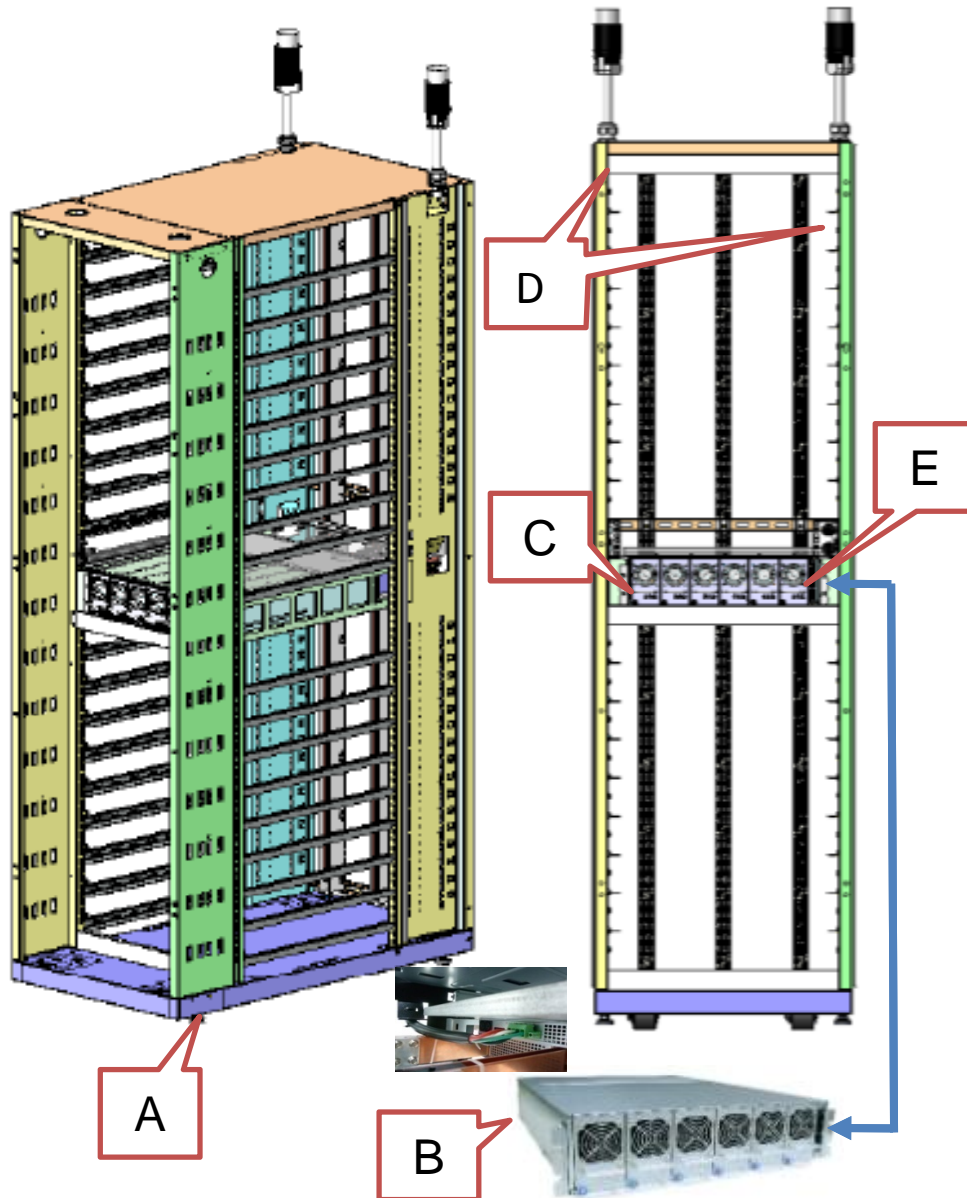
180U space for server & storage devices

20U space for Switch

Dual AC Inputs 12KW Power shelf

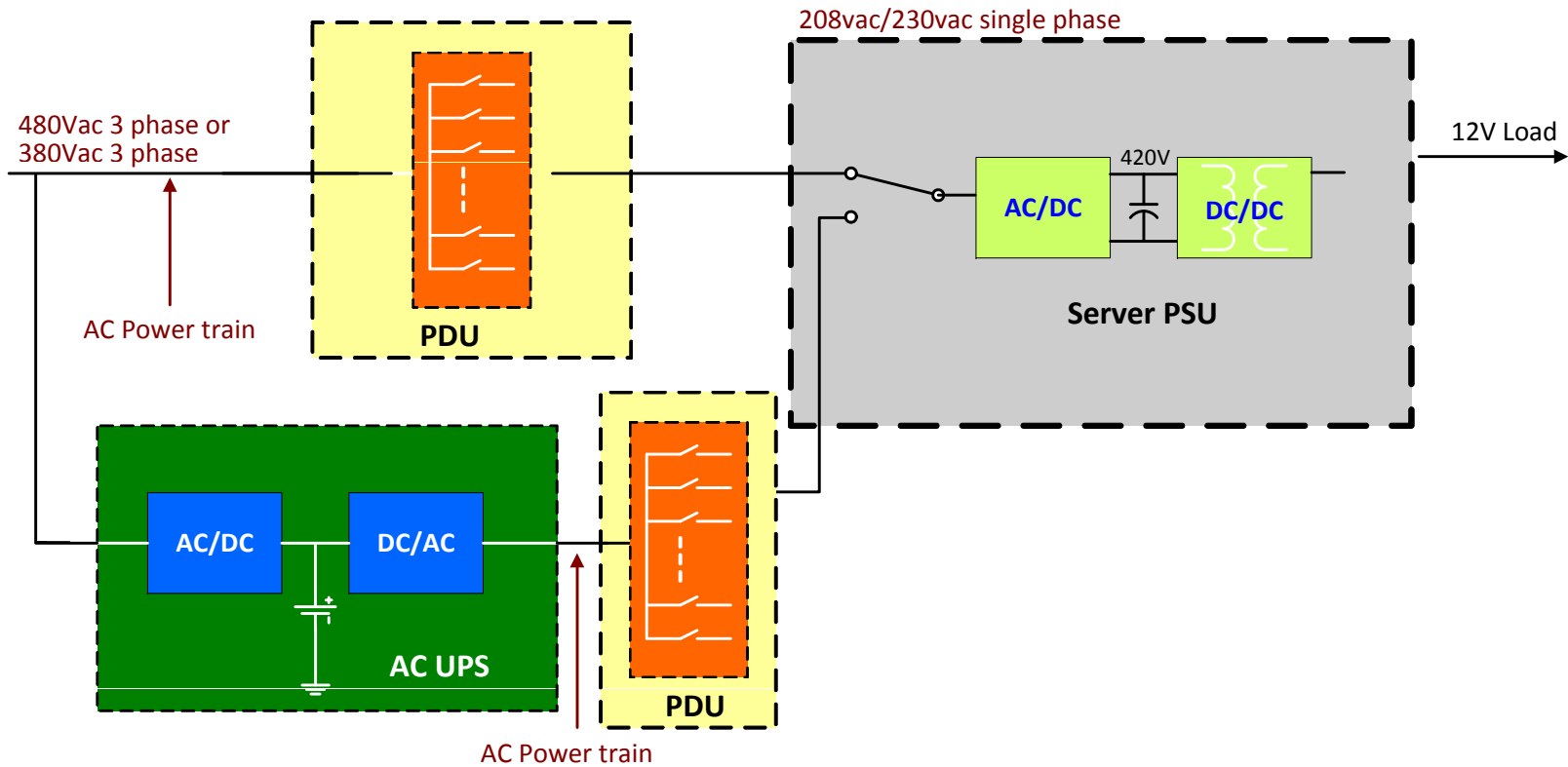
180U space for server & storage devices

# Rackspace Open Rack



- A. 208Vac/230Vac dual AC input server rack:** Contain 1 power shelf with dual AC input cables; 42U total height.
- B. Power Shelf:** 1 shelf per rack, containing 6 pcs 2.4KW PSU (N+1); can support total 12KW power; additional aux AC connectors are available
- C. Switch Tray:** Assembly in the middle of the rack, right on top of the power shelf. RMC feature also available
- D. AC input cables:** 2 cables connected directly to the power shelf, supporting either 208Vac/230Vac input voltages.
- E. RMC:** Rack Power Shelf Remote monitor / Control device.

# Power Architecture



$$99\% \quad \times 94\% \quad = 93\%$$



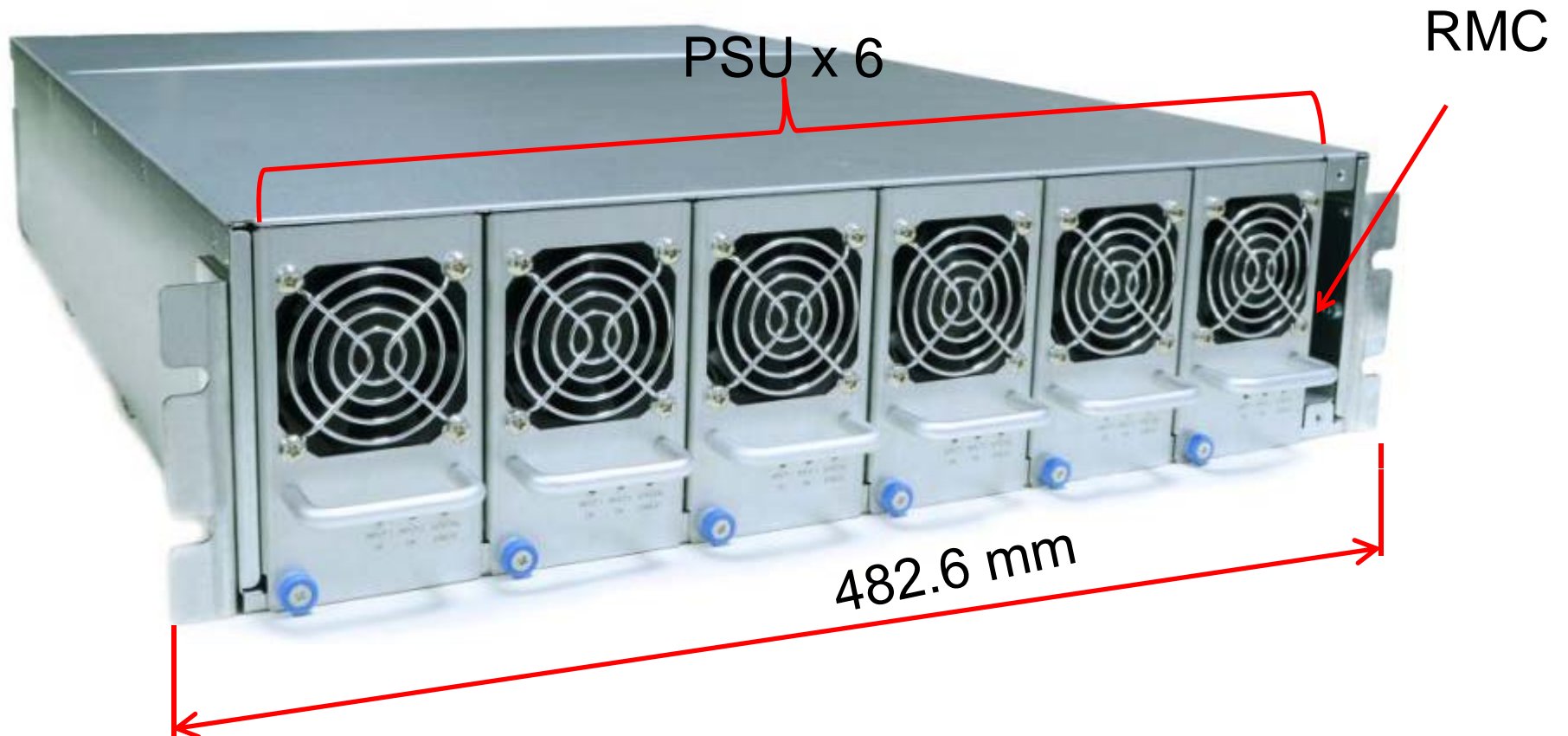
# Power Shelf Outlook & Dimension

Power Shelf Size:

W: 482.6 mm

H: 117 mm

D: 600 mm







# Power Shelf I/P & O/P Device

DC 12V O/P  
Bus Bar Set  
(3 sets)



AC O/P 1  
For SW

Breaker for  
AC O/P 1

AC I/P 1  
Terminal

AC I/P 2  
Terminal

Breaker for  
AC O/P 2

AC O/P 2  
For ATS I/P 2





# Power Shelf Block Diagram

INPUT A

△: 208Vac

Y: 415Vac/240Vac

INPUT B

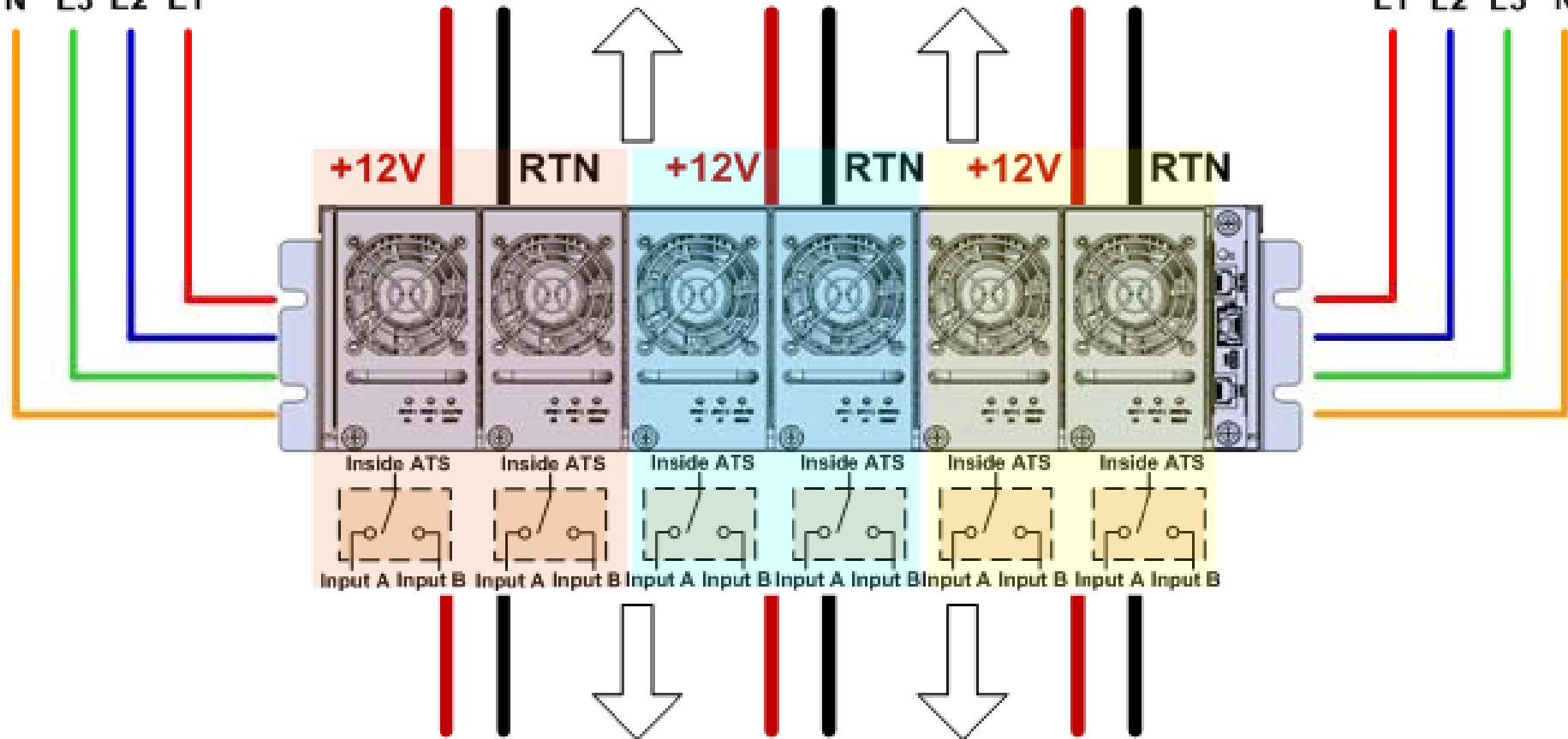
△: 208Vac

Y: 415Vac/240Vac

O/P: 12.5V/1000A, 12.5KW

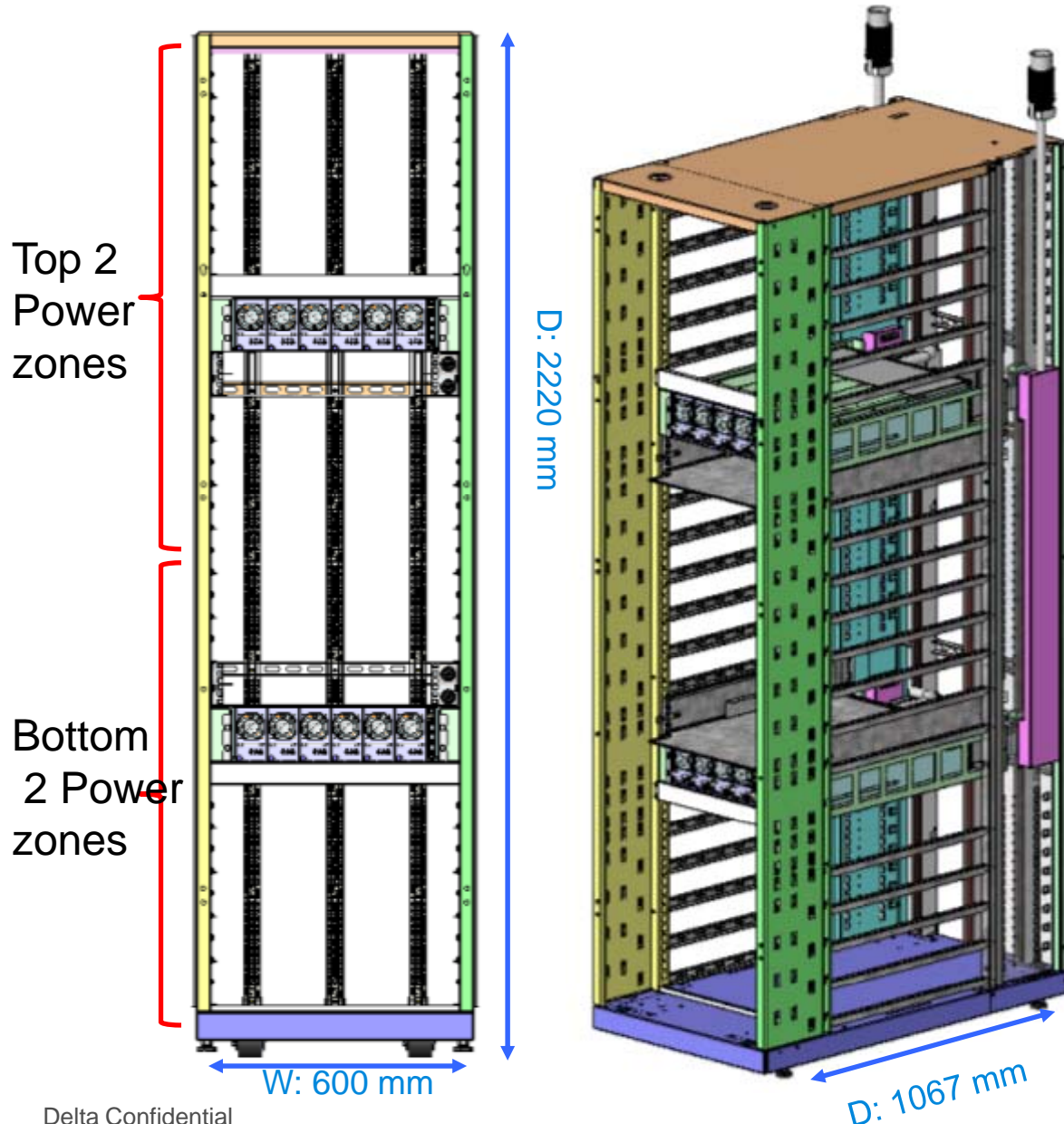
N L3 L2 L1

L1 L2 L3 N





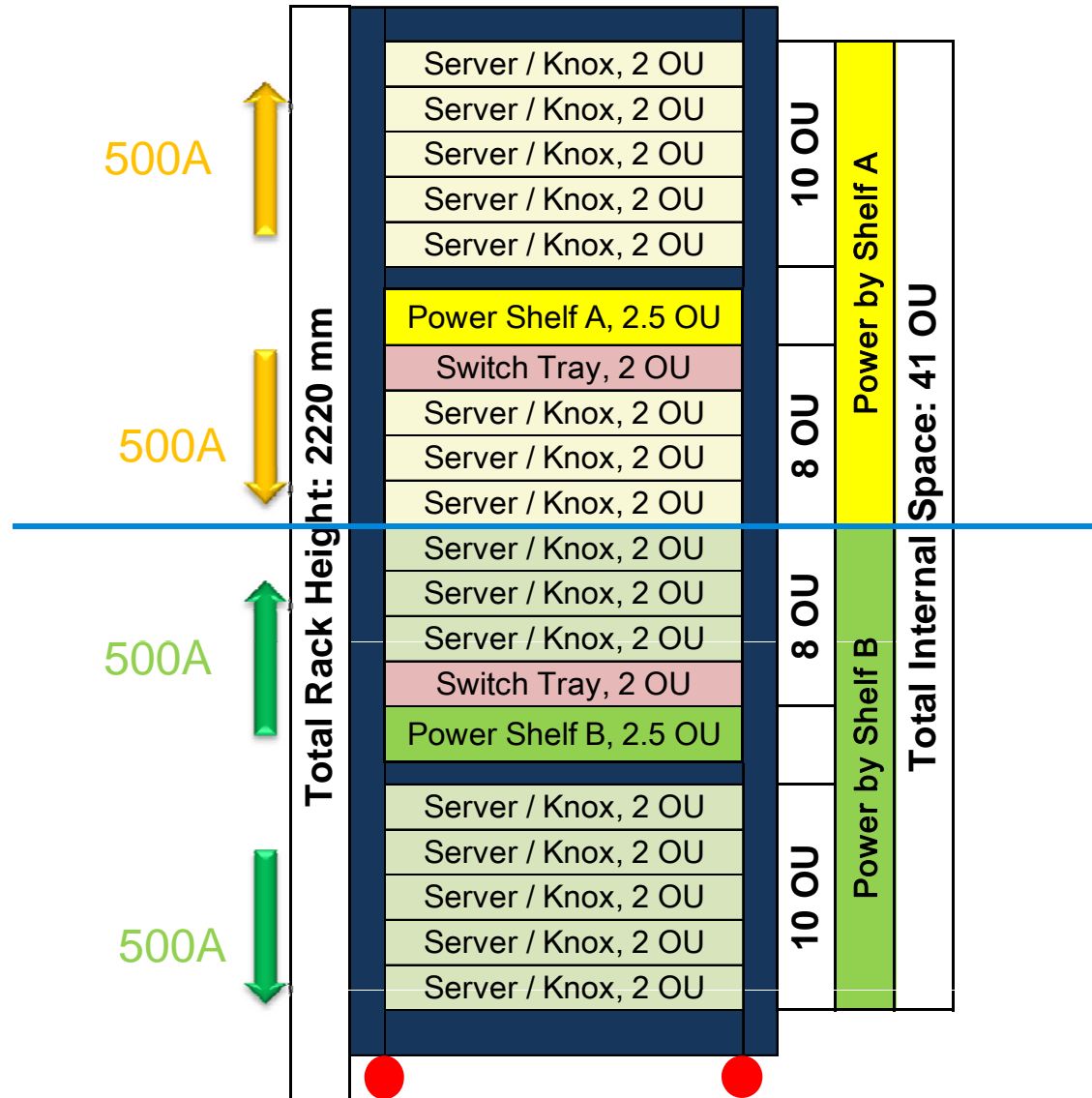
# General Specification (Higher Power Demand Rack)



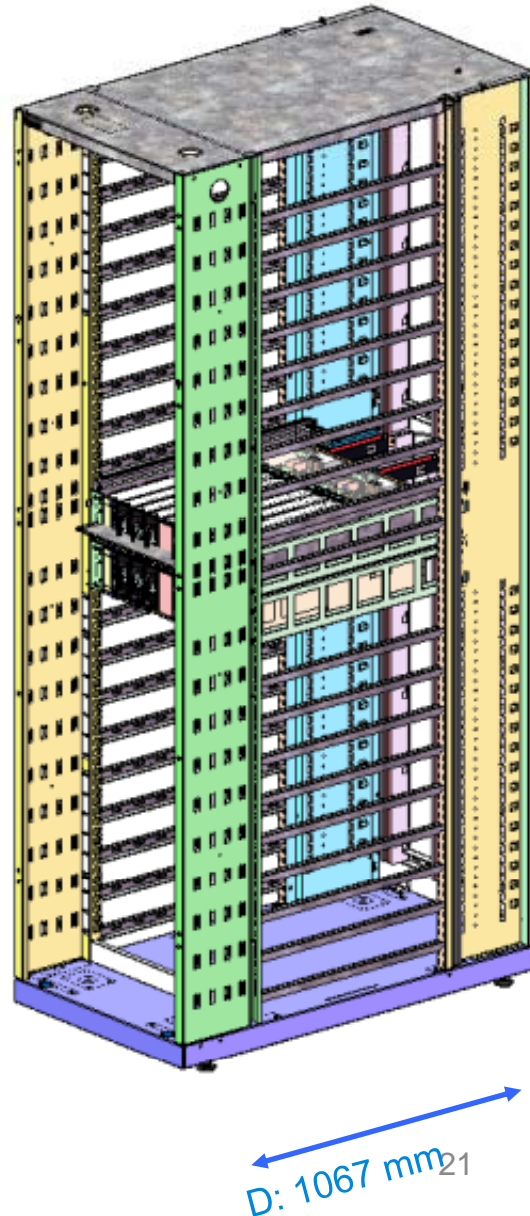
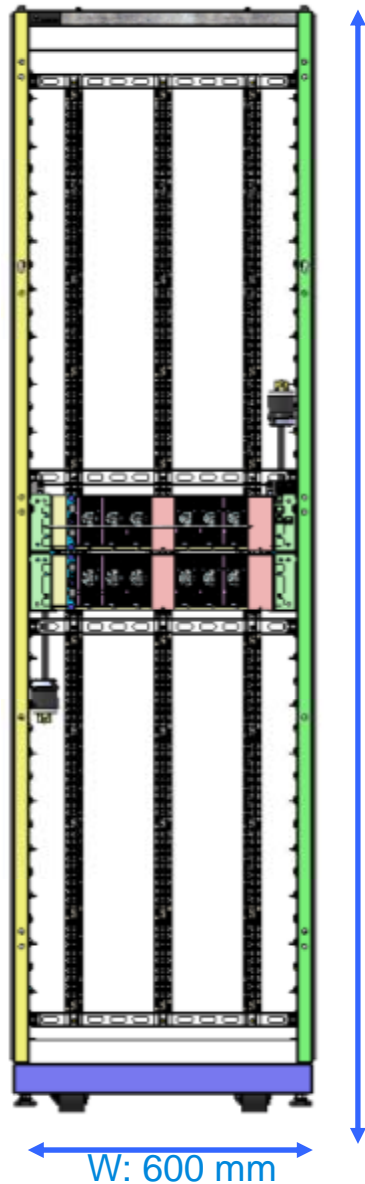
- Dual AC Inputs –208/230Vac
- Two AC PDU
- 4 Power Zones; 3 pairs Bus for each Zone
- Each Power Zone = 6KW
- Use 12 pcs 2.4W PSU for total power
- Total Power = 24KW
- 36U space for server/ storage/ switch devices
- Bus Bar Max. continuous current = 408A
- Max. current for the Clip is 80A. (20% derating)



# Rack Layout

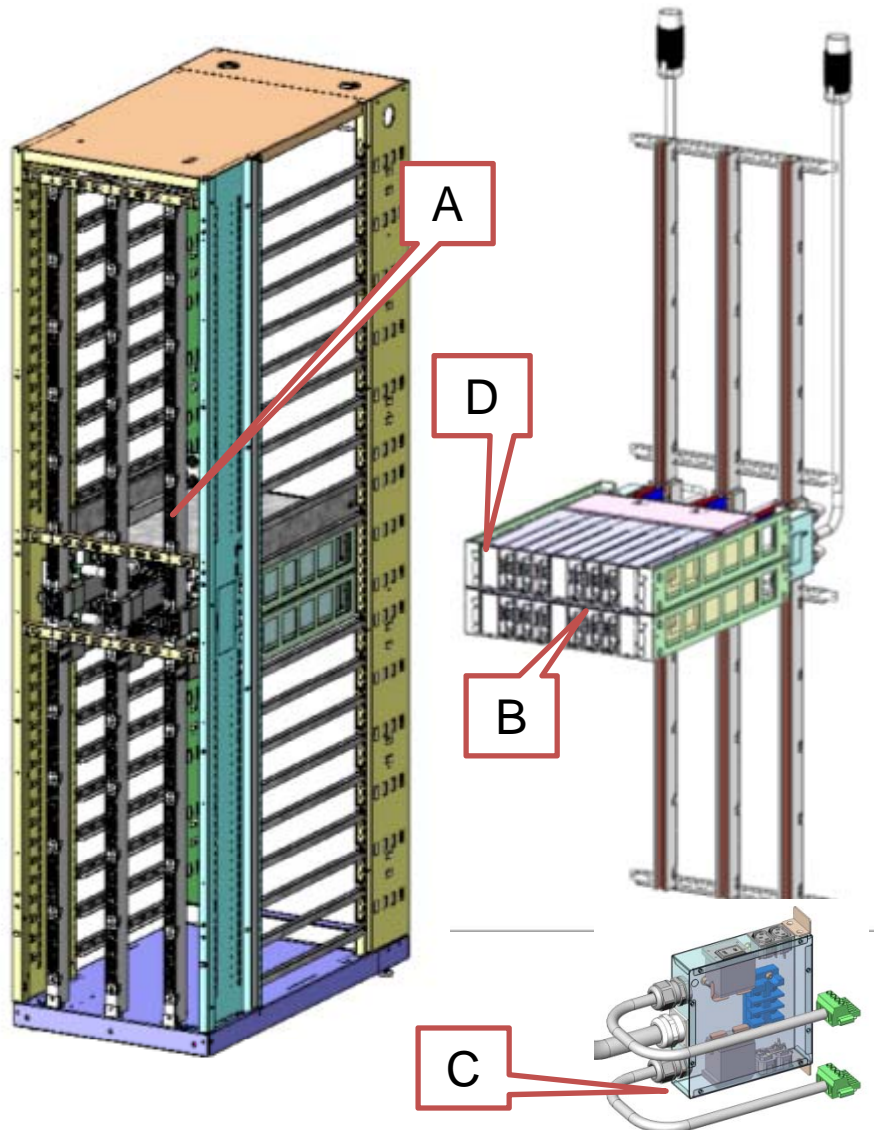


# DELTA Fidelity Open Rack General Specification



- Dual AC Inputs –3 phase 208/230Vac
- Two AC PDU
- 2 Power Zones; 3 pairs Bus for each Zone
- Each Power Zone = 7.5KW
- Use 12 pcs 2.5KW PSU for total power
- Total Power = 15KW maximum
- 36U space for server/ storage/ switch devices
- Bus Bar Max. continuous current = 408A
- Redundancy Power Shelf

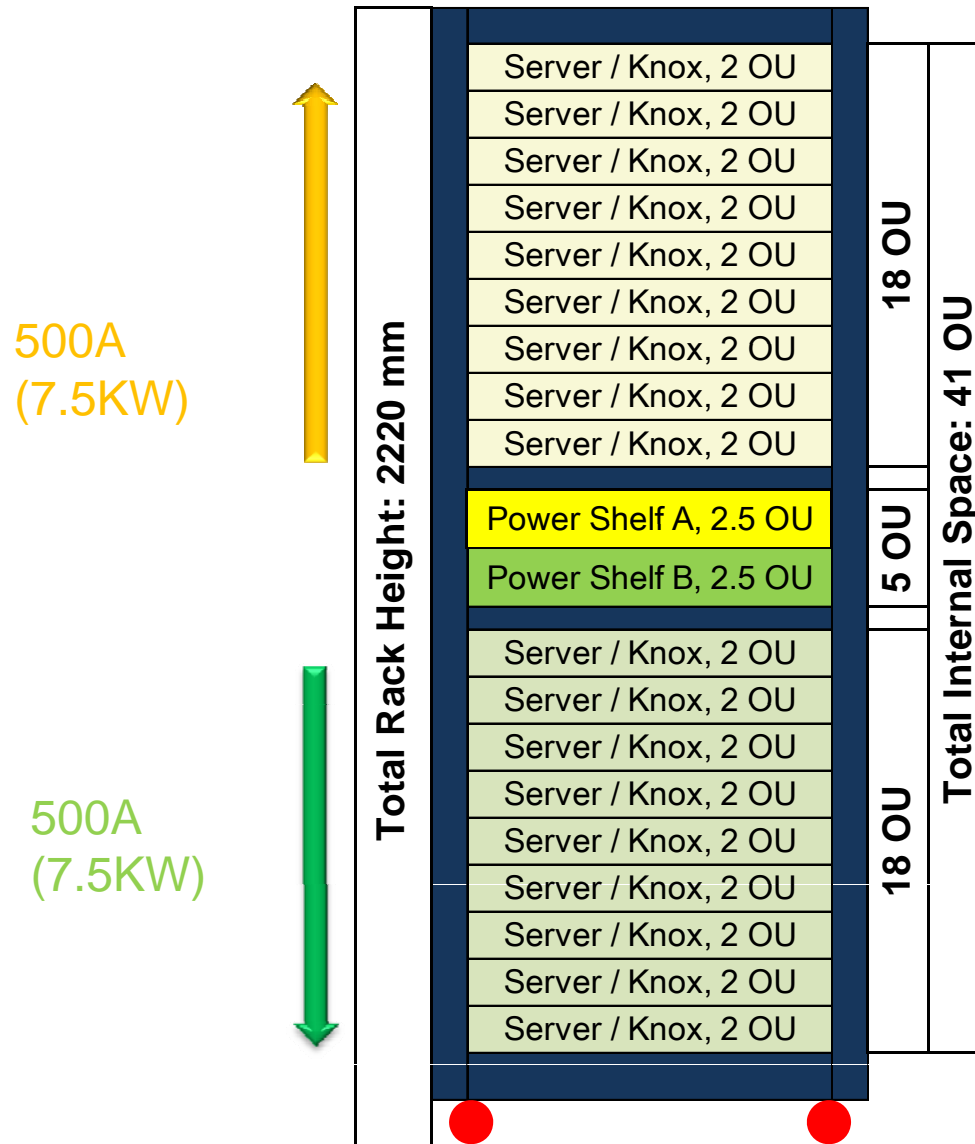
# Fidelity Open Rack



- A. Open Rack Bus Bar Assemble Set:** Contain 6 pairs Bus Bar connect the power between power shelves and server nodes.
- B. Power Shelf:** 2 shelves per rack, containing 6 pcs 2.4KW PSU (N+N); can support total 7.2KW power per shelf; total 14.4W for whole rack
- C. AC PDU:** Installing at the back of the power shelf. Each PDU has 2 AC output to top/bottom power shelf
- D. RMC:** Rack Power Shelf Remote monitor / Control device.



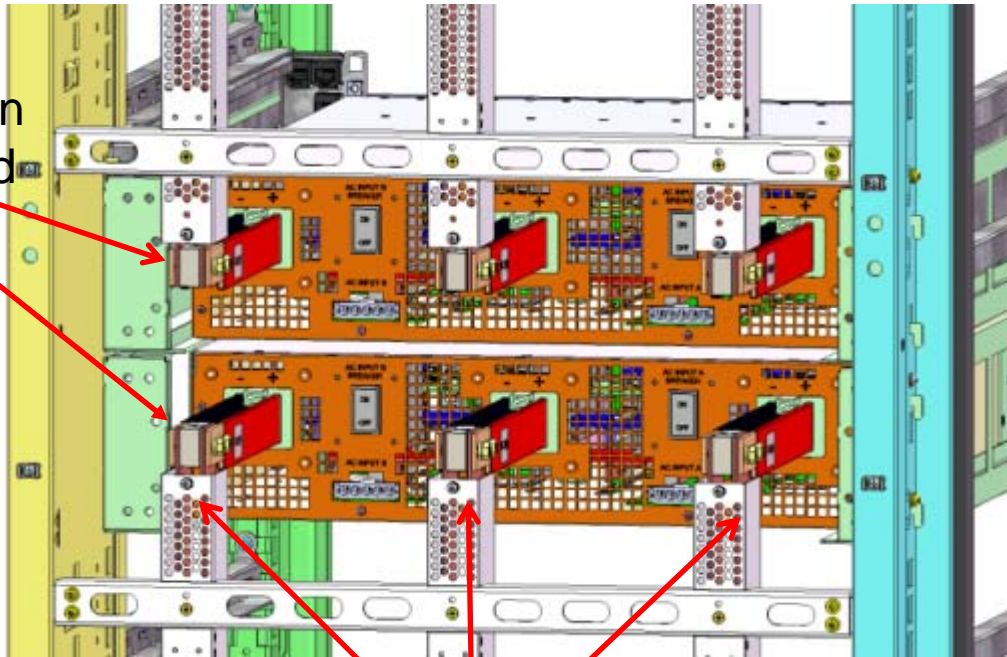
# Rack Layout





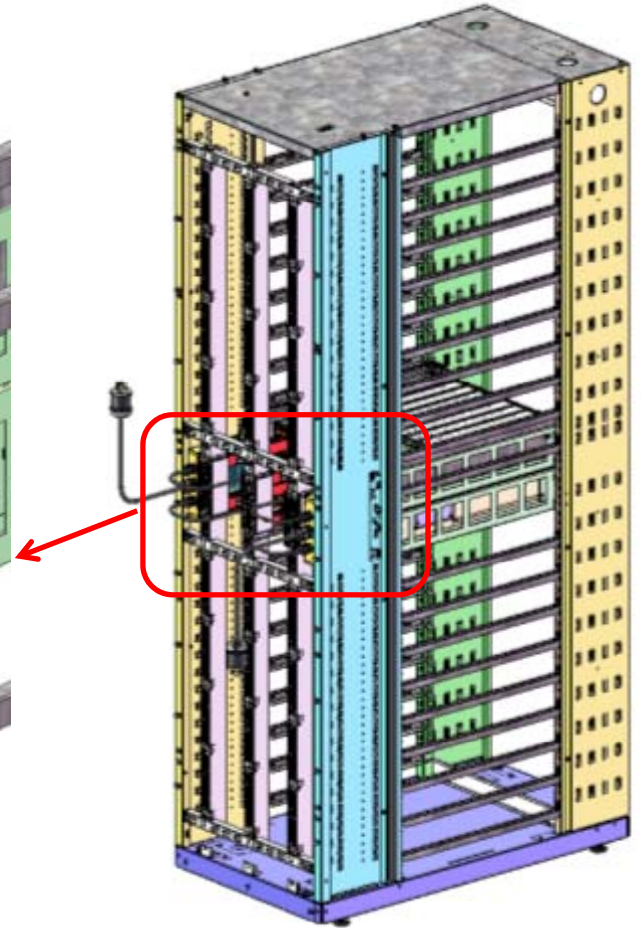
# Output Bus Bar Connection

Upper side vertical Bus Bar



Busbar connection between shelf and Rack

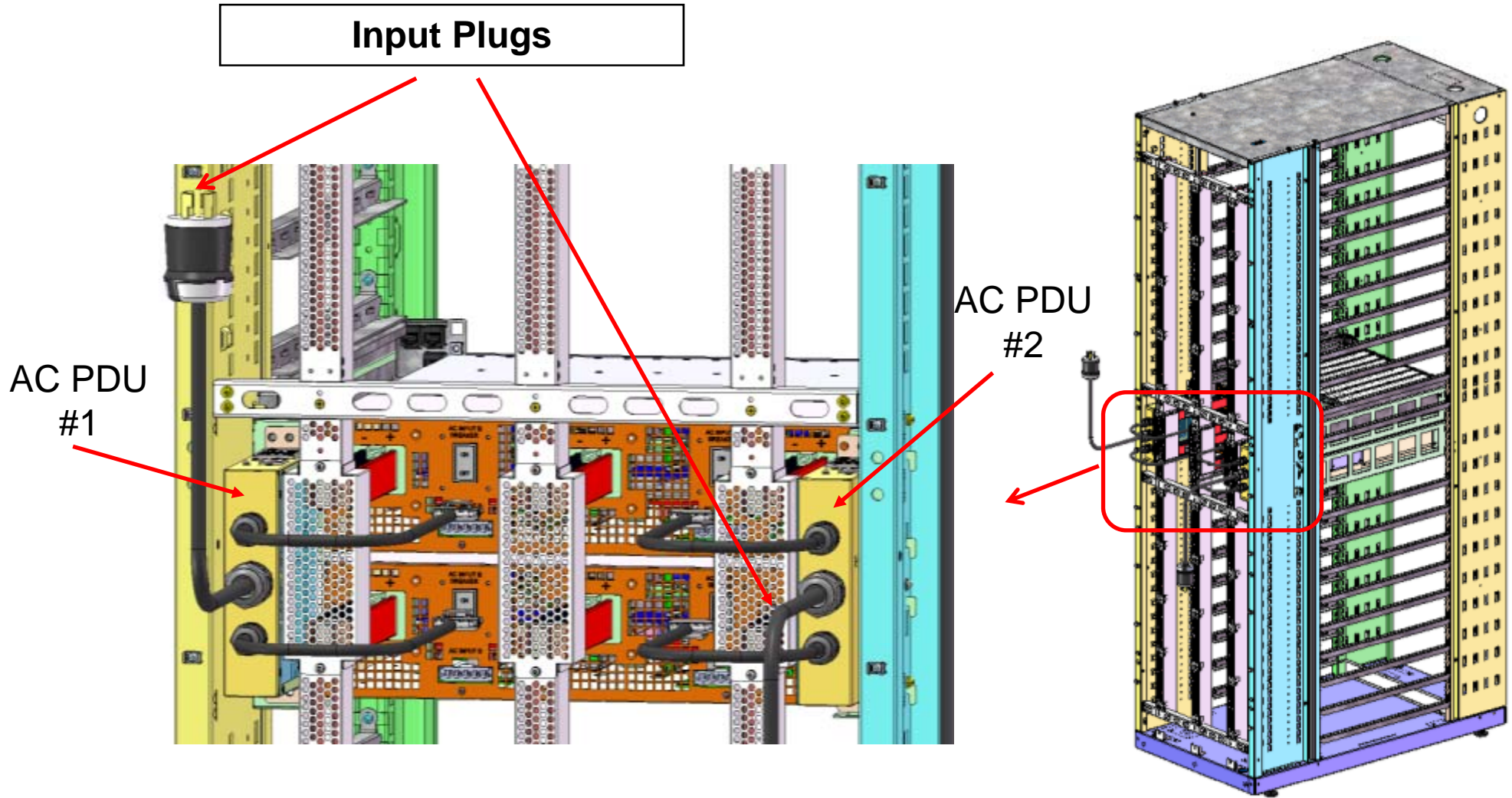
Down side vertical Bus Bar





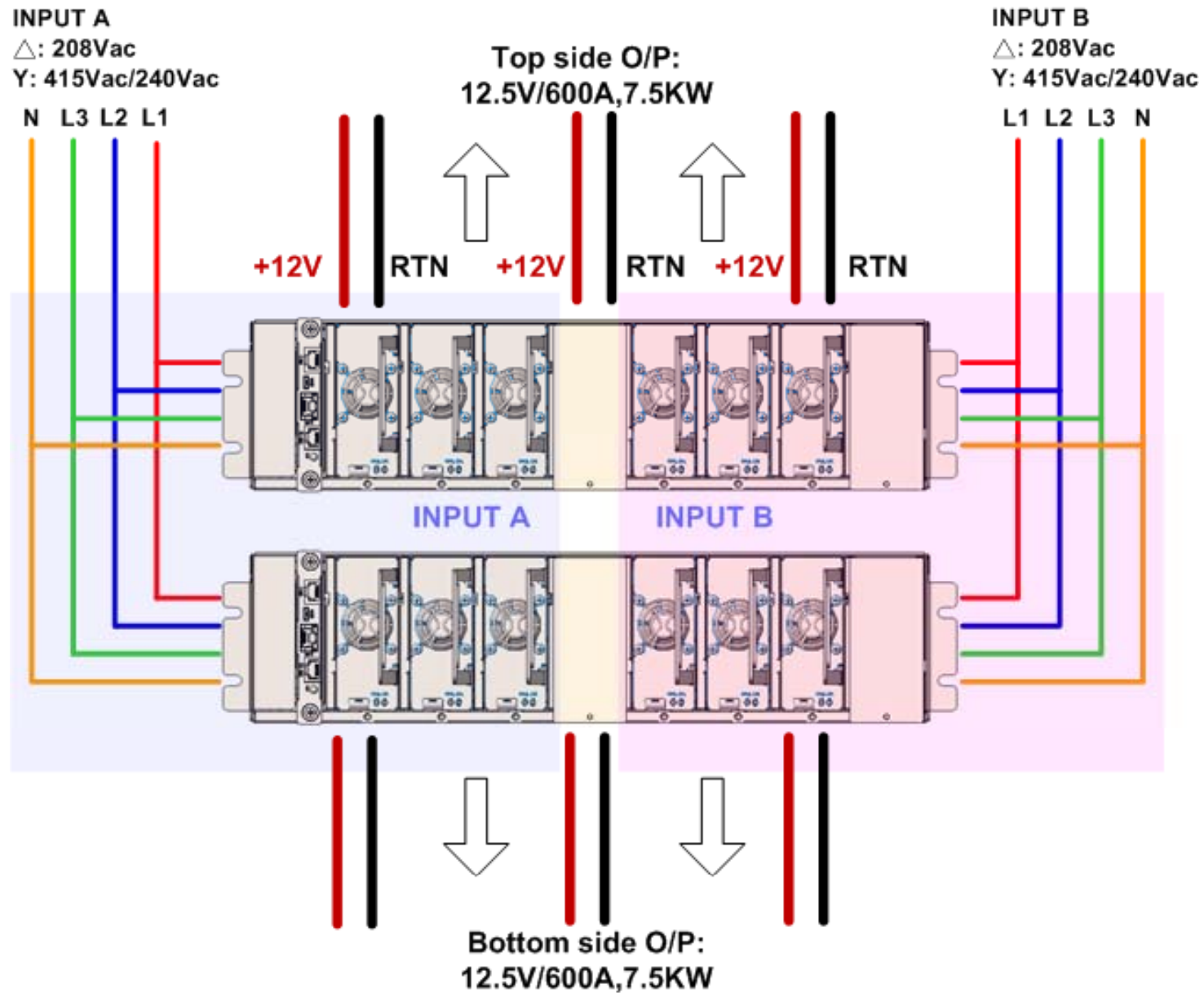


# Output Bus Bar Connection



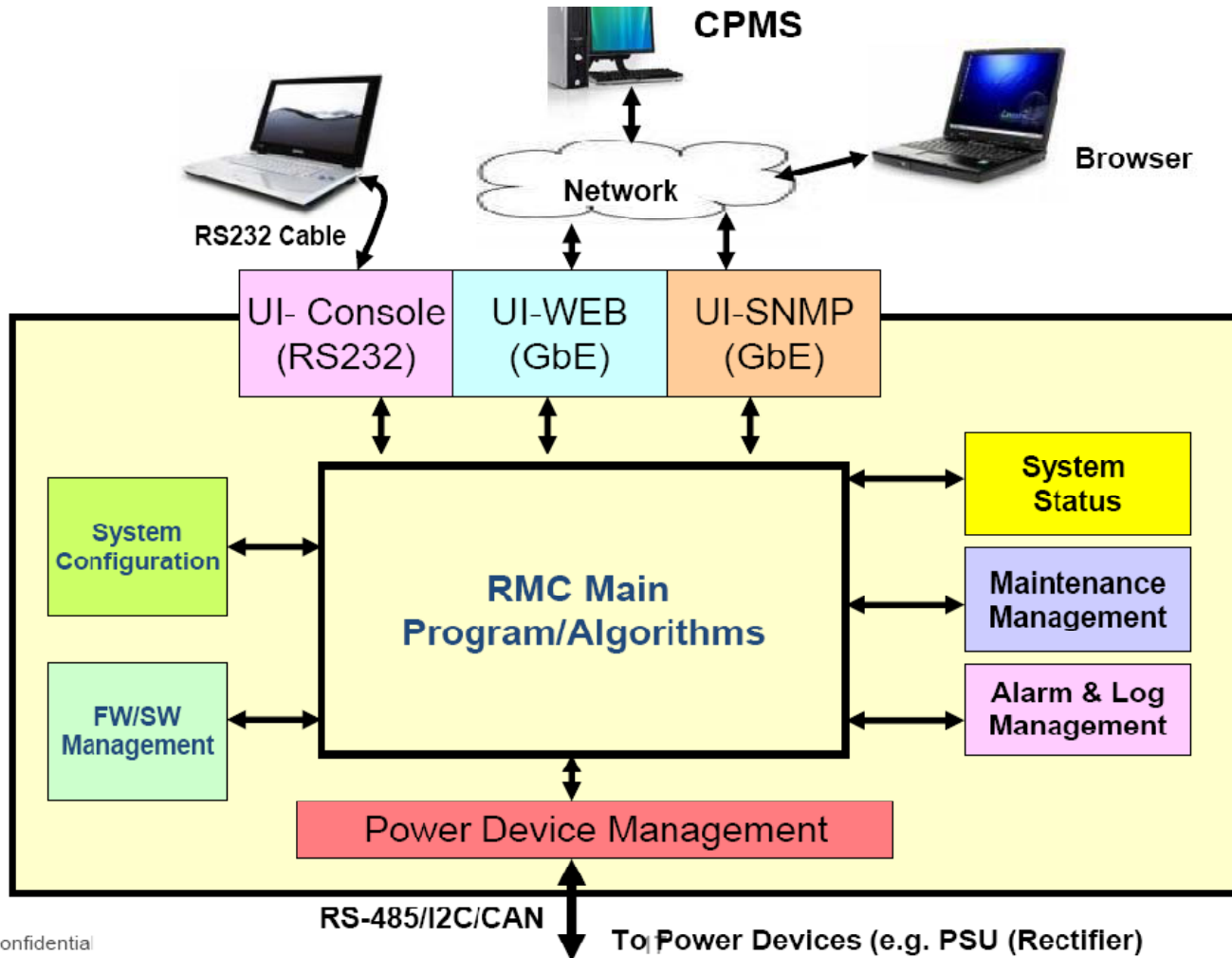


# Power shelf's block diagram





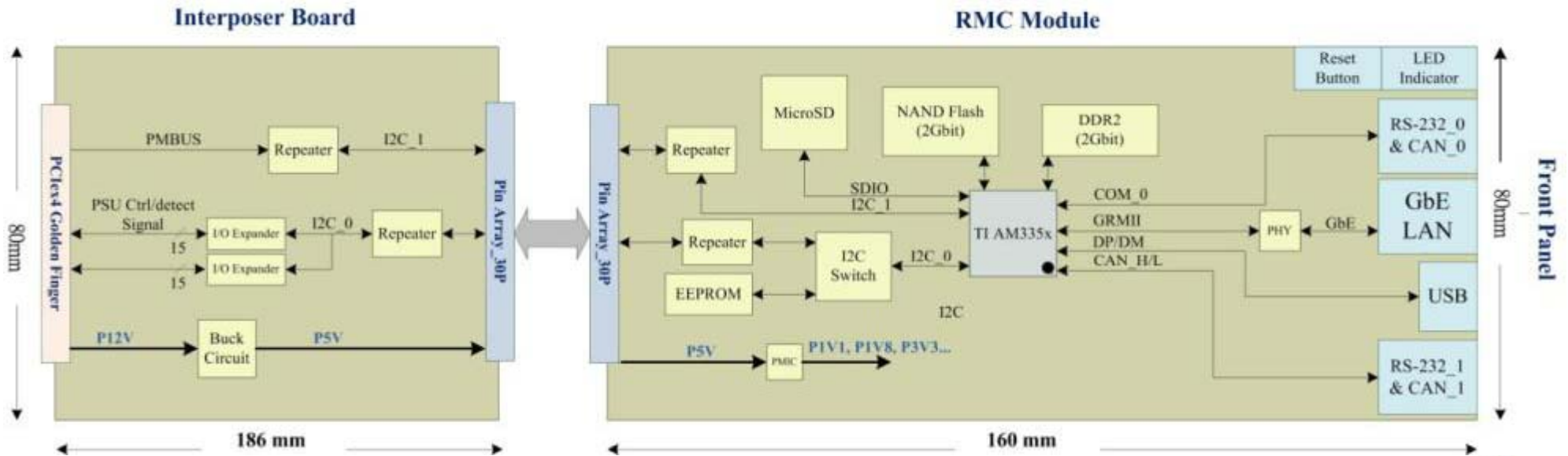
# Rack Configuration and Monitoring – RMC (Remote Monitoring Controller)



Delta Confidential

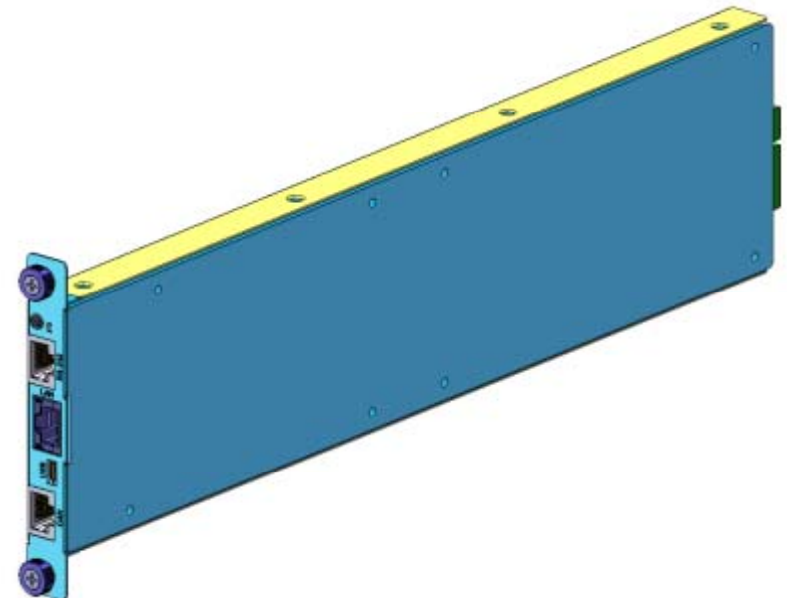
Delta Confidential

# RMC Block Diagram and Interface



## Interface:

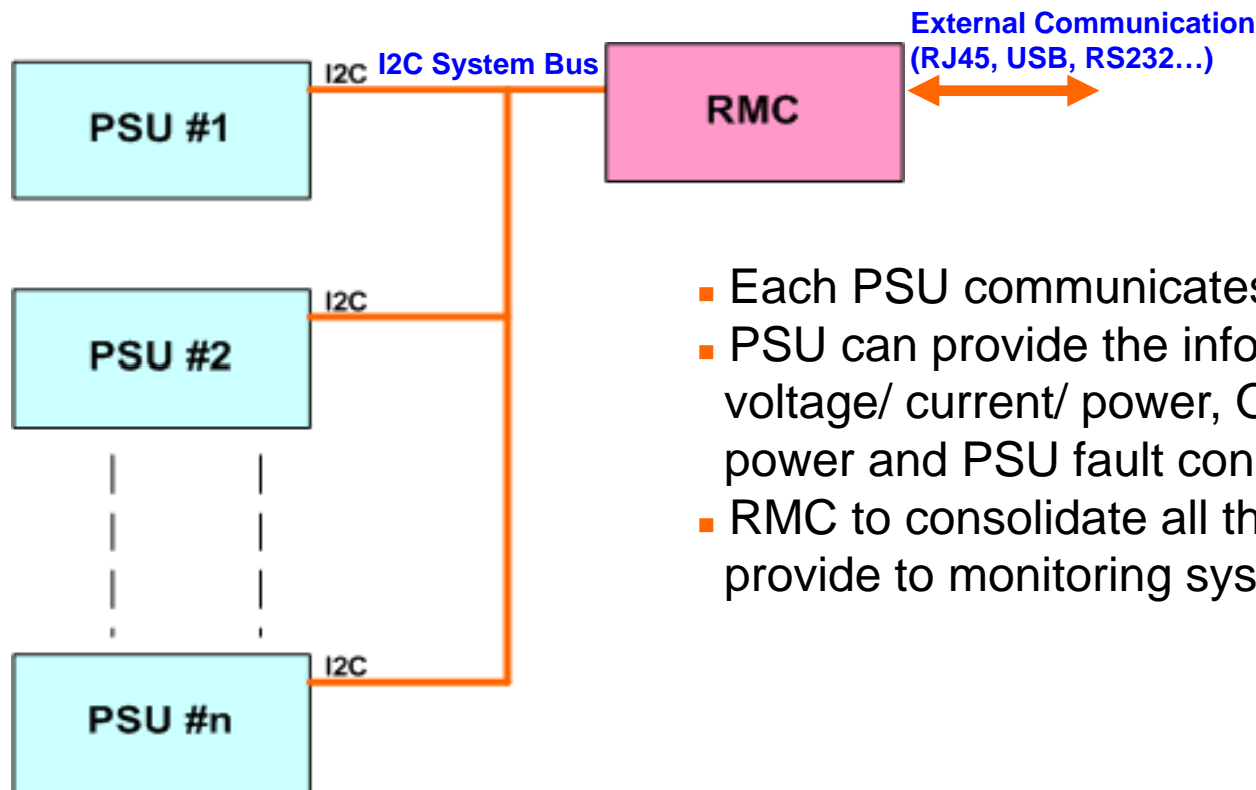
- Gigabit Ethernet (RJ45)
- USB , support OTG function (Micro-USB)
- RS-232\_COM0 + CAN\_0 (RJ45)
- RS-232\_COM1 + CAN\_1 (RJ45)
- Reset Button
- LED indicator (Red and Green light)





# Power Shelf Communication Architecture

Main Function - Monitor/ report each PSU I/P & O/P Voltage, current, Power  
- Monitor/ report overall Power shelf I/P & O/P Power  
- PSU failure alerting mechanism  
- PSU Remote ON/ OFF control, available max. Power ...etc.



- Each PSU communicates with RMC through I2C .
- PSU can provide the information such as Input voltage/ current/ power, Output voltage/ current/ power and PSU fault condition.
- RMC to consolidate all the PSU information then provide to monitoring system by SNMP.



# RMC → Module - Module Status

Delta Power Monito x

192.168.0.1/html/index.htm

Remote Monitor Controller

Site Name : DELTA  
Site Location : -----

Temperature : 26.33  
System Status : ON

System

Modules

- Module Status
- Module Identify
- Module Alarm
- Module Control

Configurations

Event Log

Hardware Rev. : HW 1.0 B  
Software Rev. : RMC\_x1.01B07

Date Time : 2014-01-24 13:28:30

**Module Information**

**Information**

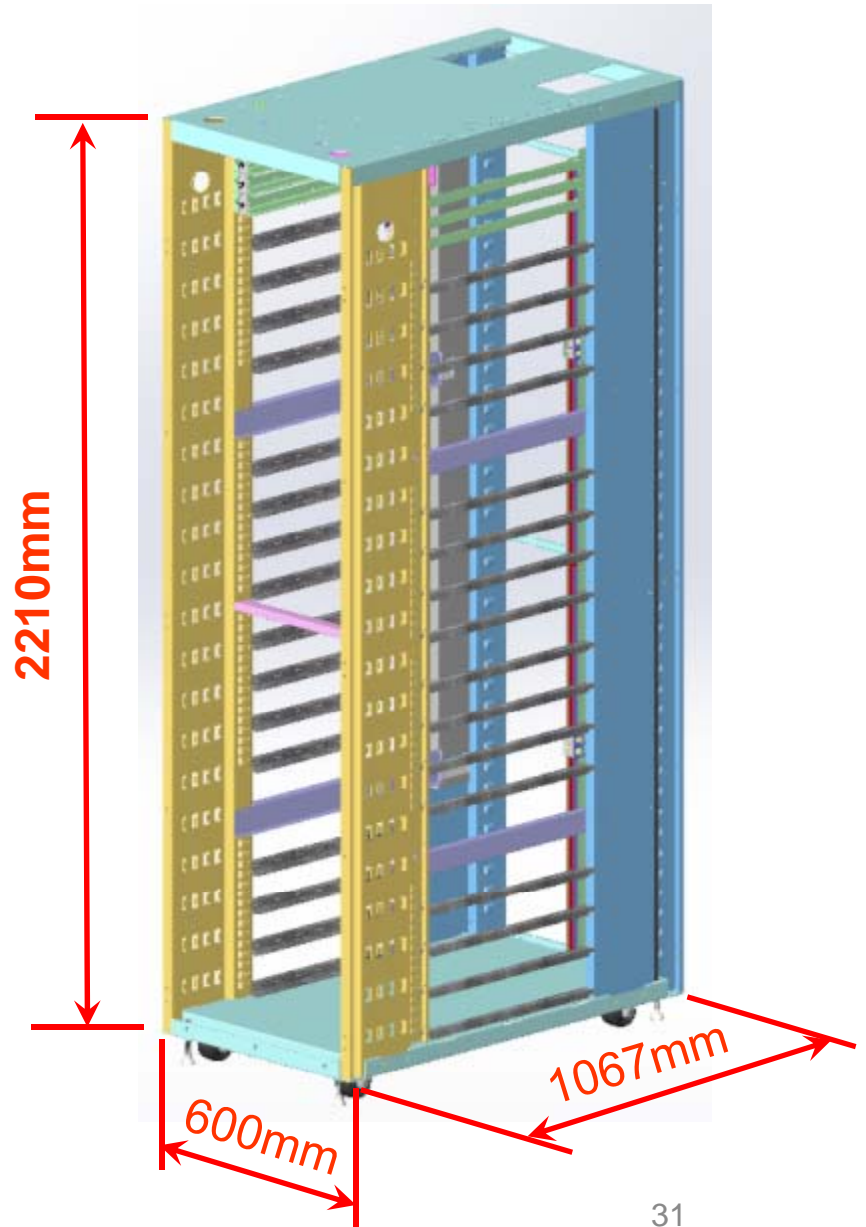
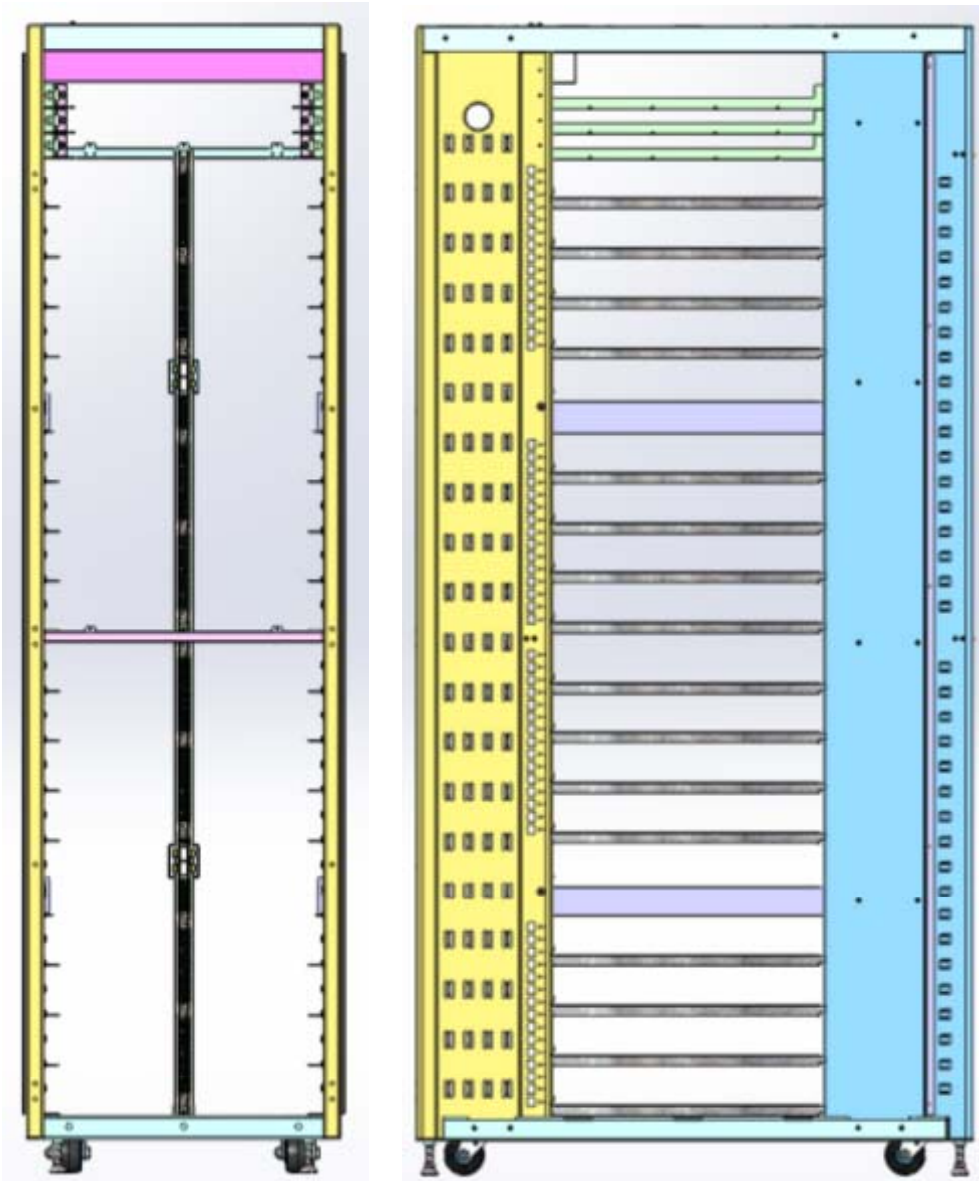
Total	Normal	Error
6	6	0

**PSU Monitor Data**

NO.	Status	AC Volt. Input (Vrms)	Volt. Output (Vrms)	Curr. Output (Irms)	Power Output (W)	Temp. (°C)
1	ON	220.97	12.49	52.21	652.00	25.00
2	ON	221.19	12.50	52.55	657.00	27.00
3	ON	219.09	12.50	52.86	660.00	27.00
4	ON	219.09	12.51	52.50	657.00	27.00
5	ON	221.69	12.50	52.33	654.00	25.00
6	ON	218.69	12.51	52.66	658.00	27.00



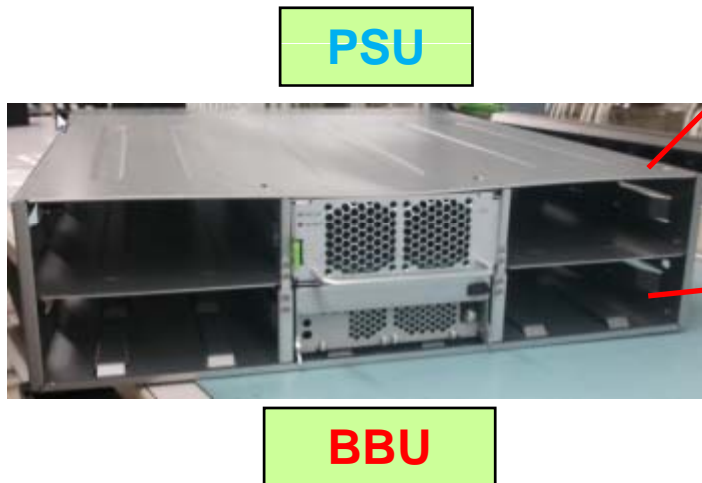
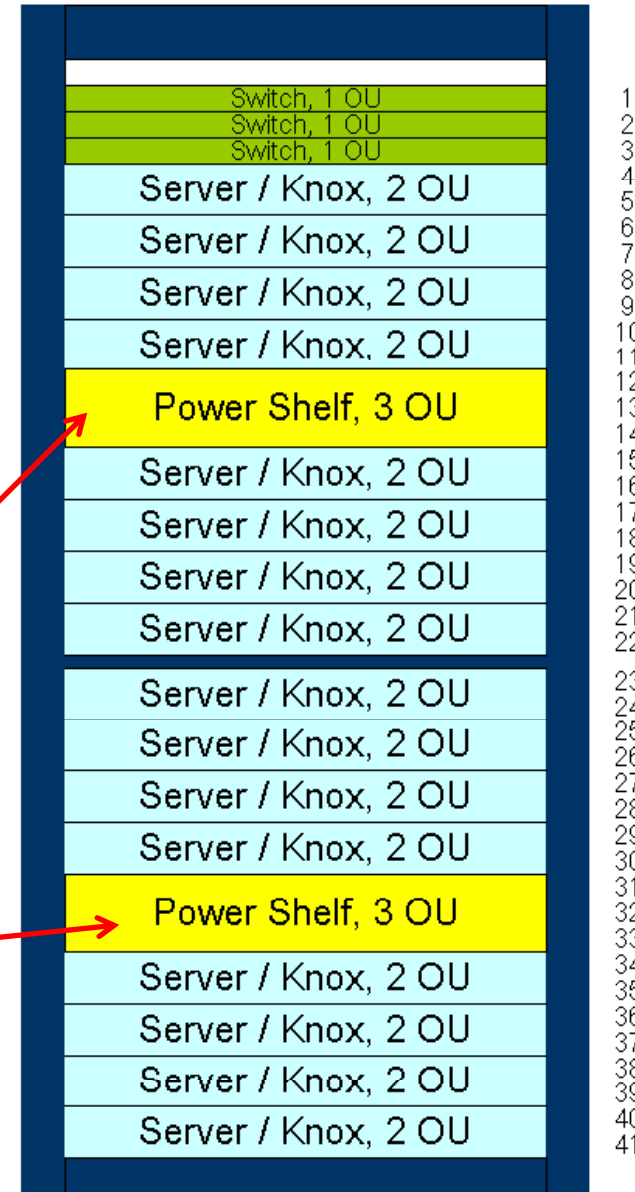
# V2 Open Rack External Physical Size





# V2 Open Rack Internal Space Configuration

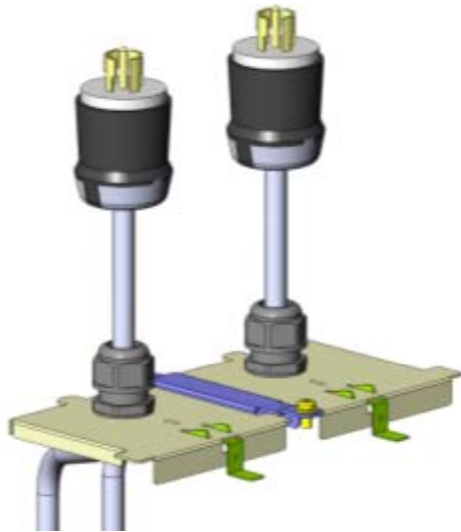
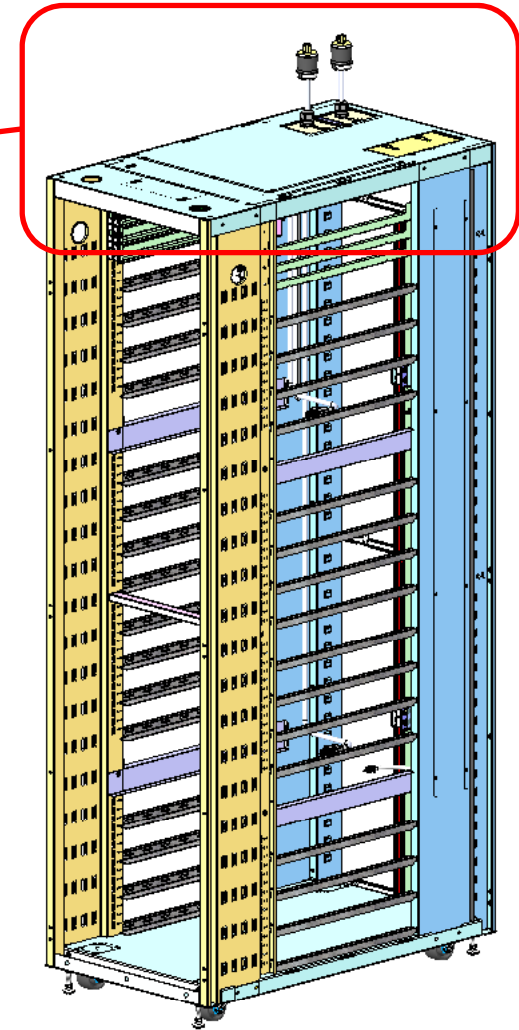
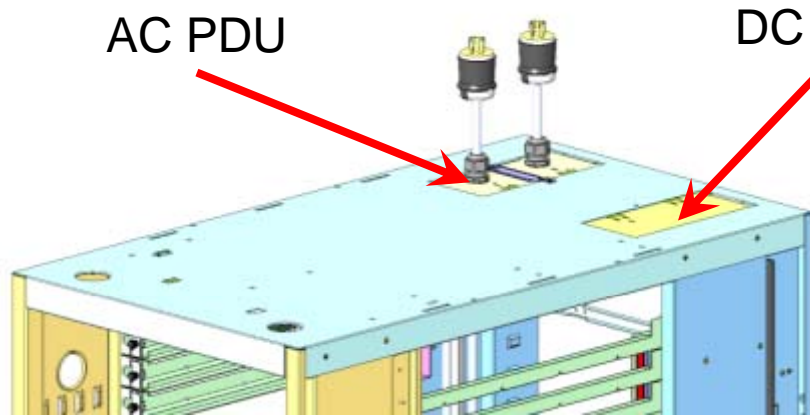
Type	Size	Q'ty	Total
Switch	1 OU	3	3 OU
Server / Knox	2 OU	16	32 OU
Power Shelf	3 OU	2	6 OU
<b>Total Internal Space</b>			<b>41 OU</b>







# AC & DC PDU in Rack



AC PDU



DC PDU



## Major Differences on Open Rack V1 VS. V2

Items	Open Rack V1	Open Rack V2
Rack External Height	2100 mm	<b>2210 mm</b>
Internal Total Space	41 OU	41 OU
Server / Knox Space	30 OU	<b>32 OU</b>
Switch Space	2 OU	<b>3 OU</b>
Power Zone Q'ty	3 zones	<b>2 zones</b>
Power Shelf Q'ty	3 Sets / 9 OU	<b>2 Sets / 6 OU</b>
DC Bus Bar Q'ty	3 sets	<b>1 or 3 sets</b>
PDU Location	Side of rack	<b>Top of rack</b>



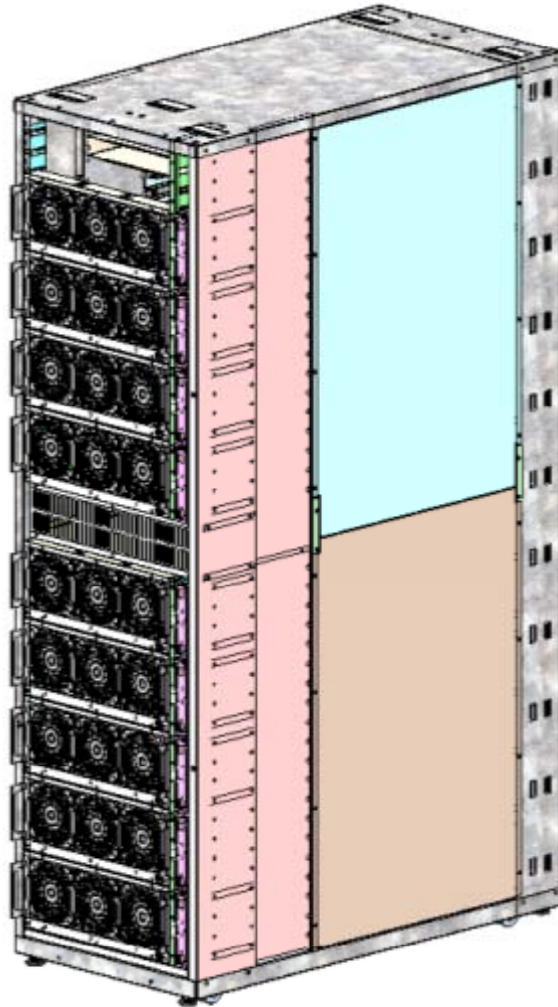
# Facebook V2 Open Rack Features



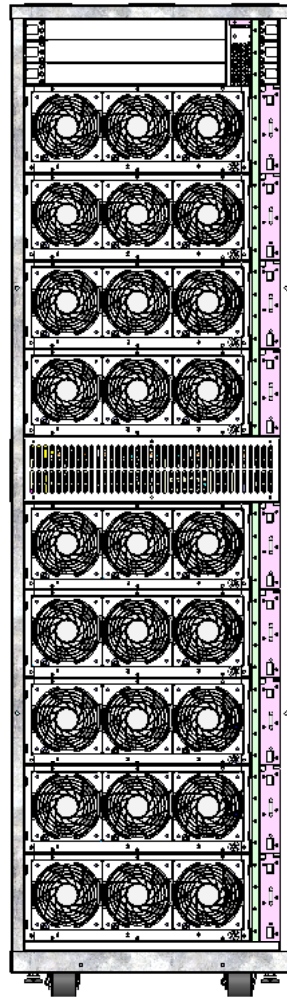


# China Scorpio Open rack 2.0 Outlook

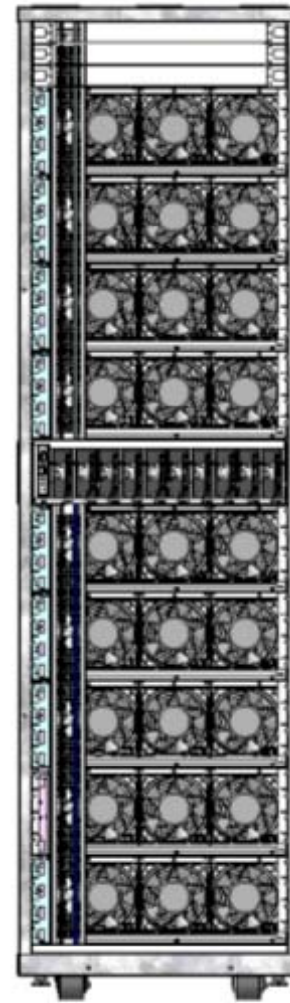
Rear & Left



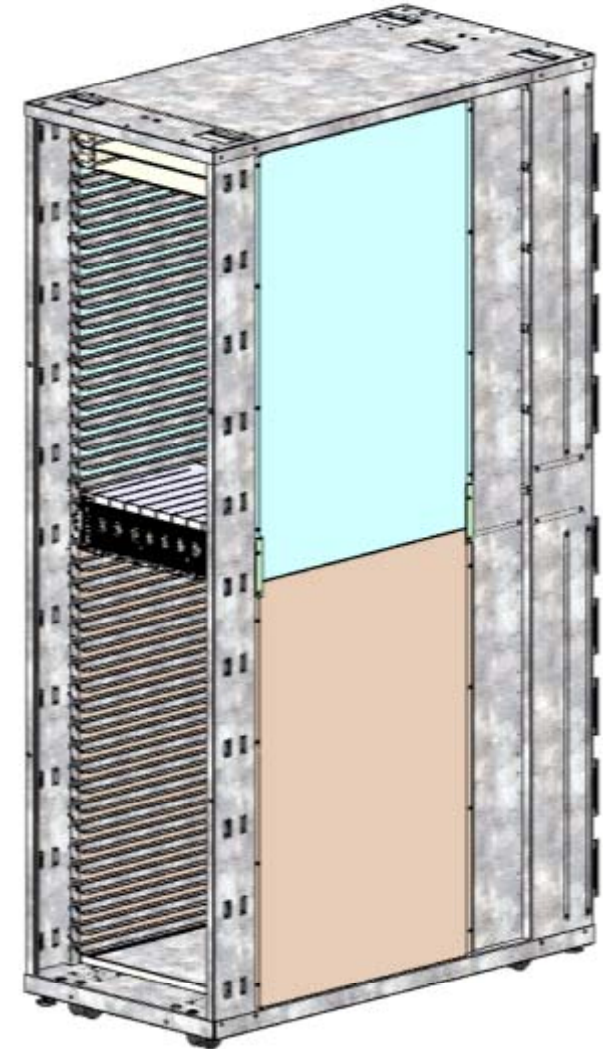
Rear



Front



Front & Right



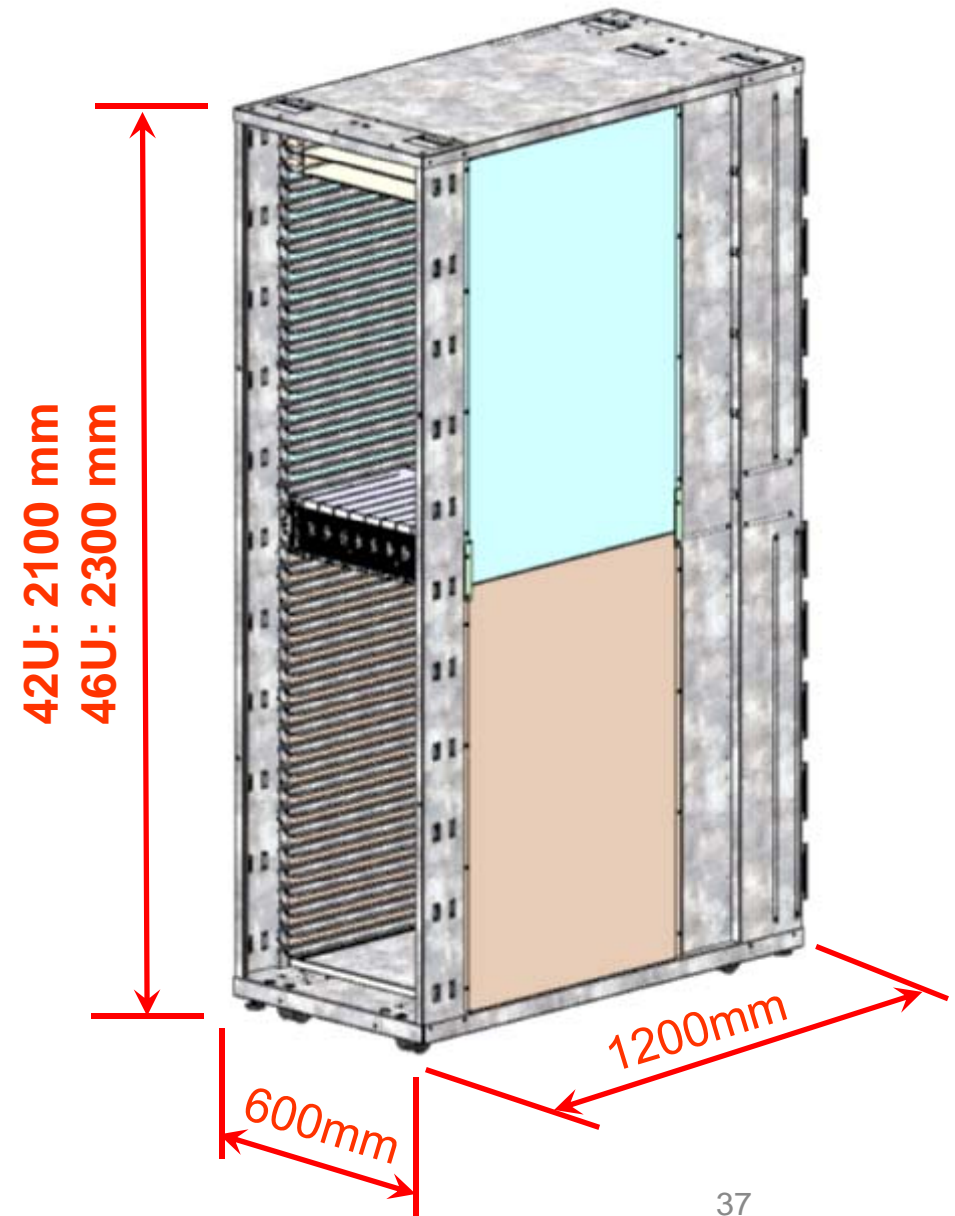


## External Physical Size

Based on China Scorpio standard, there are 2 type racks “42U” & “46U” below:

Item	42U	46U
Total Height	2100 mm	2300 mm
Switch Tray	3 U	3 U
Server space	36 U	40 U
Power Shelf	3 U	3 U
Fay Tray Q'ty	9 sets	10 sets

Special Note:  
For China scorpion, 1U = 46.5 mm.





# Internal Space Configuration

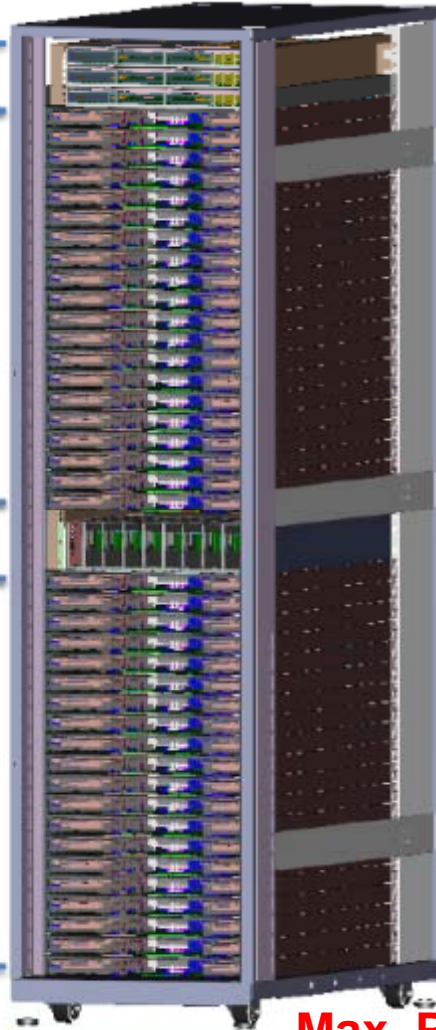
3U Switch Zone  
3U x 46.5mm=139.5mm

20U Server Zone  
20U x 46.5mm=930mm

3U Power Zone  
3U x 46.5mm=139.5mm

20U Server Zone  
20U x 46.5mm=930mm

Total: 46 U



2300mm Rack

3U Switch Zone  
3U x 46.5mm=139.5mm

16U Server Zone  
16U x 46.5mm=744mm

3U Power Zone  
3U x 46.5mm=139.5mm

20U Server Zone  
20U x 46.5mm=930mm

Total: 42 U

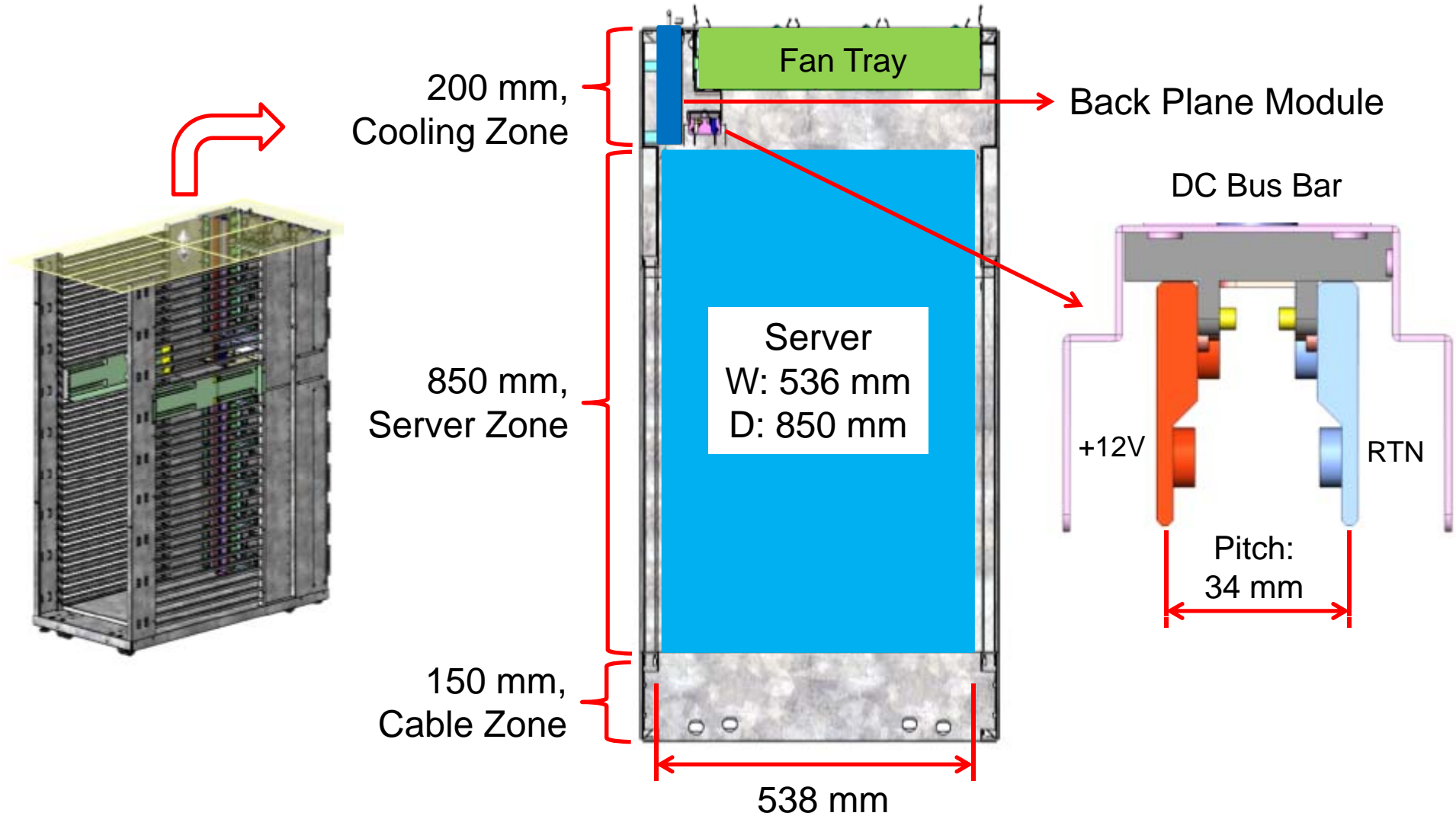


2100mm Rack

**Max. Power Demand = 12KW**



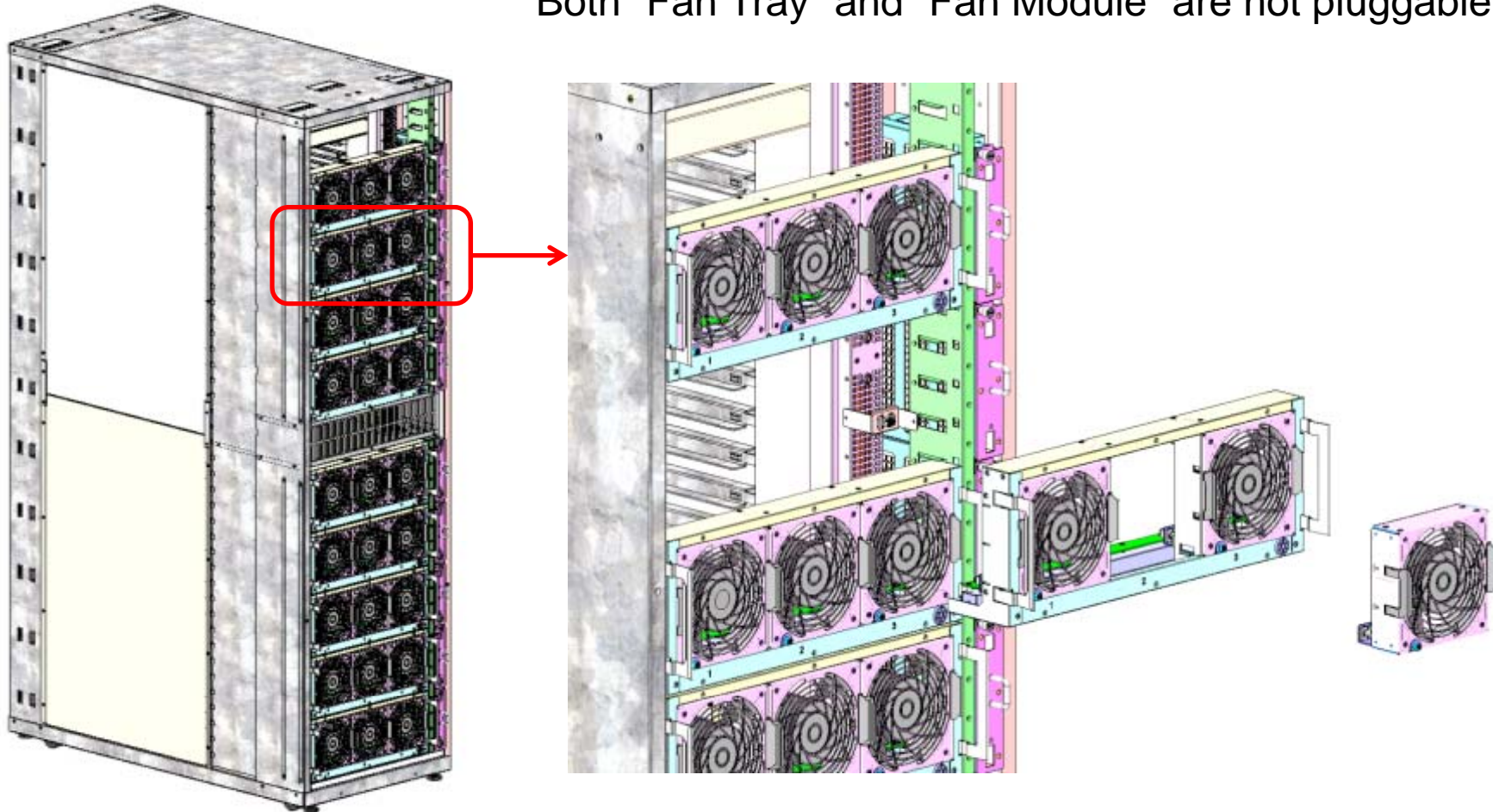
# Rack Internal Space Placement





# Hot Pluggable Fan Tray

Each “Fan Tray” with 3 sets “Fan Module” (14 cm size fan)  
Both “Fan Tray” and “Fan Module” are hot pluggable.







# Scorpio V2 Open Rack Features





## Major Differences on Scorpio 2.0 VS Open Rack V2

Items	Scorpio 2.0	Open Rack V2
Rack External Height	<b>2100 / 2300 mm</b>	2210 mm
Rack External Depth	<b>1200 mm</b>	1067 mm
Rack External/Internal Width	<b>600/ 540mm</b>	<b>600/ 540mm</b>
1 U size	<b>46.5 mm</b>	48.0 mm
Internal Total Space	<b>42 / 46 U</b>	41 OU
Switch Tray size / Q'ty	<b>1 U / 3 sets</b>	1U / 3 sets
Server Size / Q'ty	<b>1 U / 36 or 40 sets</b>	2 OU / 16 sets
Cooling	<b>System Fan Tray</b>	Fan in Server
Power Zone Q'ty	<b>1 zones</b>	2 zones
Power Shelf Q'ty	<b>1 Sets / 3 U</b>	2 Sets / 6 OU
Bus Bar Q'ty / Location	<b>1 sets / Left Size</b>	1 set / Center
AC / DC PDU	<b>Without any PDU</b>	With AC / DC PDU

**Smarter. Greener. Together.**

**Thank you**

To learn more about Delta, please visit [www.deltaww.com](http://www.deltaww.com).

