



PowerEdge MX Power Redundancy

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SUMMARY

Within this 4 page whitepaper you will find core details associated with the PowerEdge MX redundant power features. Specifically called out are the grid power options and associated redundancy features.

Power considerations are key to a successful kinetic infrastructure deployment and planning for sufficient power and redundancy

Discussed are the AC & DC options associated with the chassis deployment options.

Shared Power Infrastructure

MX7000 continues Dell EMC's commitment to maximize performance-per-watt through the consolidation of servers and network switchgear into a single high-density chassis using 14th generation ultra-efficient power supplies and dynamic power-efficient fans.

A shared power infrastructure takes advantage of the aggregation of multiple servers by distributing power across the system without the wasted power margin seen with individual monolithic servers and switchgear. Shared resources allow for a common power policy across all servers in chassis.

The power distribution inside the PowerEdge MX7000 Modular Server System consists of a 3+3 redundant power supply system, located in the rear bottom of the chassis. Each power supply is rated at 3000W bringing total system redundant power is approximately 9000W in a 3+3 power supply configuration. Each power supply unit (PSU) is hot-swappable and are accessed from the front of the chassis with power cables that can stay permanently attached to the rear.



Figure 1 – PSUs Removable from the front of the chassis

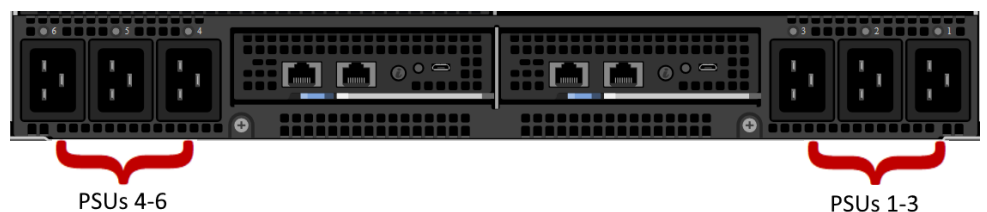
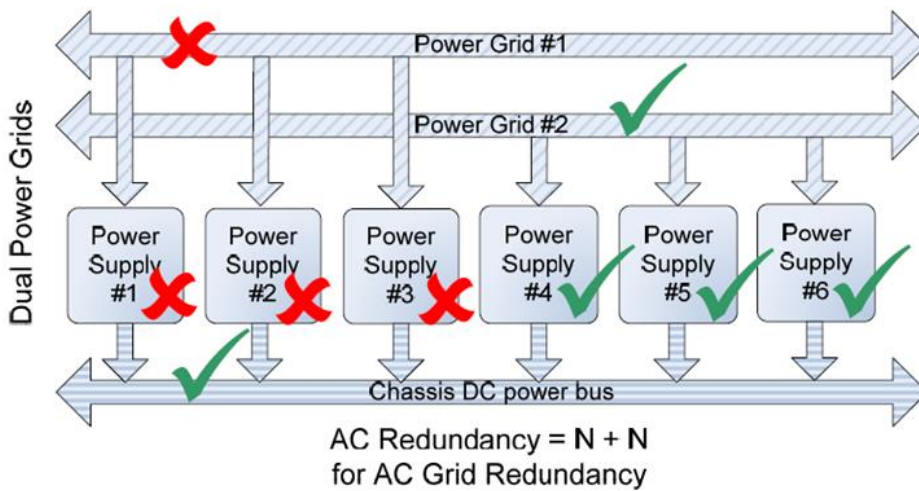


Figure 2 – AC power connected in the rear of the chassis

The chassis power supplies are on a common output bus so that, if any PSU fails, neighbor PSUs can pick up the load. Because of this, there are multiple PSU redundancy modes supported for the MX7000

If there are two power grids feeding the data center racks, AC Grid Redundancy policy can provide the greatest protection against both AC loss or PSU failure:



- If Power Grid #1 fails, PSUs 4-6 will continue to operate from Power Grid #2
- If Power Grids #1 and #2 are operational, the system can suffer the failure of up to 3 PSUs in a 6-PSU configurations without affecting the operation of the chassis.

Figure 3 – AC Grid Redundancy – Loss of a power grid allows for uninterrupted operation.

Should either of these failure scenarios occur, the MX7000 will set a fault and can be configured to send notification of the issue.

Whether a single or dual AC Grid is employed, the MX7000 can be configured to support DC Redundancy. This configuration allows for 1 or more PSUs to fail yet keep the chassis fully operational.

As shown in Figure 4, the failure of one PSU will not cause failure of the chassis DC power bus. The likelihood of multiple power supplies failing at the same time is remote. If additional PSU capacity is installed (i.e. installing a fourth PSU in the bottom example of Figure 4), the chassis can suffer multiple PSU failures without affecting system operation.

By default, the MX7000 is configured with no redundancy policy selected. If there is sufficient PSU capacity (i.e. extra PSUs above the capacity needed to operate the chassis), the system will continue to operate if there are any PSU failures. However, no fault will be raised.

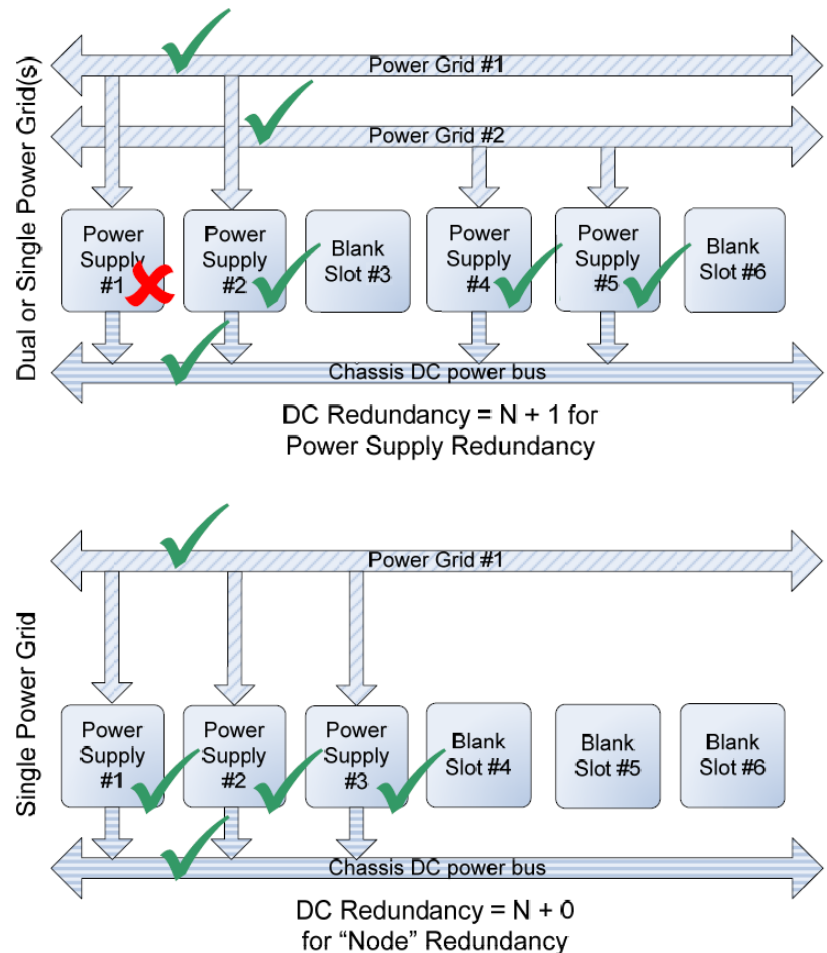


Figure 4 – DC Redundancy, 2 AC Grid or Single Grid

Power Redundancy Policy Selection

Power Redundancy Policy selection can be changed via the MX7000 GUI. In the MX7000 web interface, click the Settings page. Then select the Redundancy Policy from the Redundancy Configuration section:

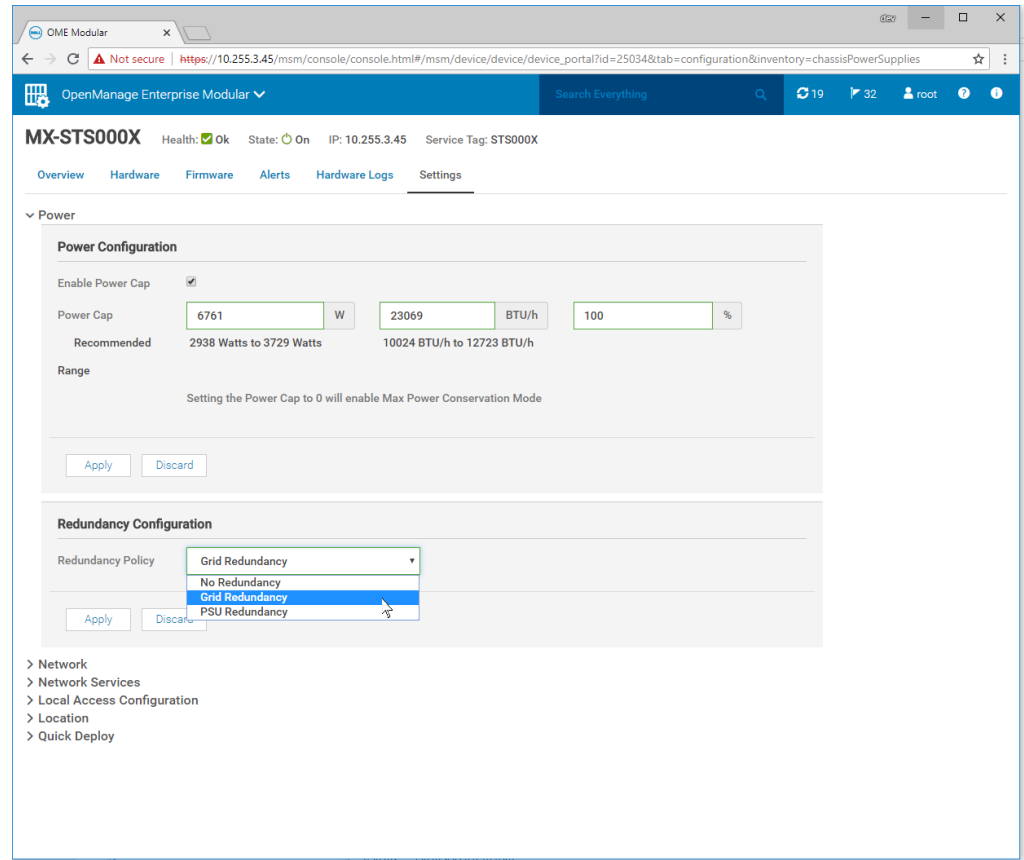


Figure 5 – Redundancy Configuration in the MX7000 Web Interface

Power Management

Shared power in modular systems take advantage of the power pool by distributing power without the waste seen in dedicated rack-mount servers and switchgear. The MX7000's advanced power budget Inventory allows it to provide priority to powering infrastructure while guaranteeing computing resources can be used.

The Management Module and each server's iDRAC management controller negotiates its required power, whether that be for simple power-on, AC recovery, or Wake-On-Lan. This inventory considers CPU, memory, storage, and other server I/O to provide additional margin should any power shortage occur.

Budgeting is transparent to the system administrator. The MX7000 automatically protects against using more power than is available by limiting which components can be powered on, as well as by dynamically limiting server power.

The MX7000 management module and the servers' iDRAC modules work in concert to constantly monitor power conditions in the chassis. In the event of a power shortage, they will instantaneously limit power to servers, decreasing performance, but keeping the chassis online. Once the power shortage is corrected, servers will be allowed to return to their full performance.

Power Supply Fault Detection

The PowerEdge MX7000 logs failures of PSUs. Notifications will be sent per the configuration in the OpenManage Enterprise Modular web interface. The PSU utilizes four LEDs to help with issue identification: 3 on the front the PSU, one on the back:

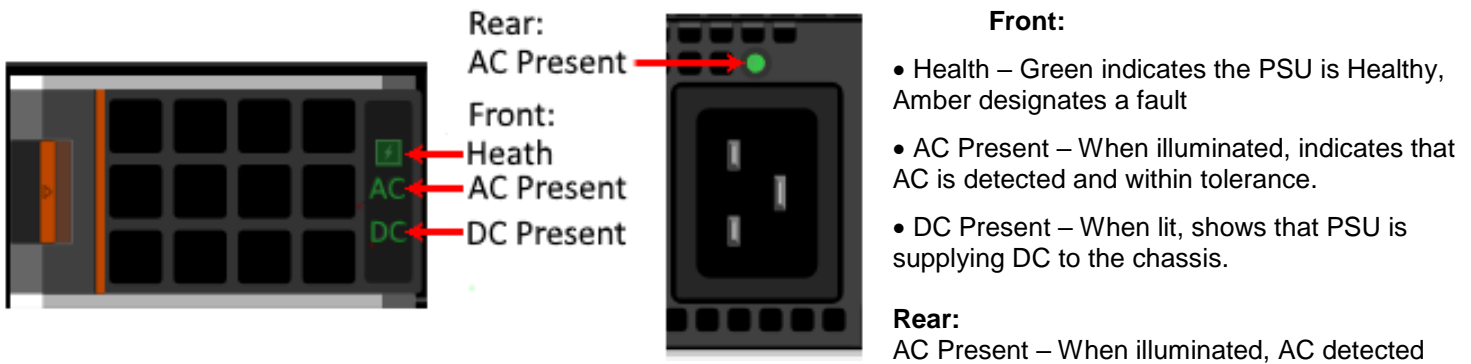


Figure 6 – PSU Fault LEDs in green

Troubleshooting Tips:

- If the Rear AC Present LED fails to illuminate:
 - Check to make sure the PSU in the front of the chassis is installed in the correct slot and is fully seated.
 - Verify that the power cable is installed in an operating AC outlet/PDU
- If the Rear AC Present LED is illuminated but the Front AC Present LED is not:
 - Verify that the AC power being provided by the utility is within tolerances.
- If the Health LED is Amber the PSU has a fault and needs to be cleared.
 - Remove the PSU for a minimum of 30 seconds.
 - Verify that nothing is obstructing the front outlet and the rear PSU pins are not damaged.
 - Re-insert the PSU and verify that it is fully seated.
 - If the Health LED blinks Amber multiple times and then turns off, PSU is indicating a capacity mismatch. Likely reasons for this are:
 - PSU is connected to a different input voltage than the other PSUs (ex. 110 VAC instead of 208VAC).
 - Input power provided by the utility is not consistent or within tolerances.

Tolerances: 220VAC (single PSU runs 180V – 264VAC) or 110VAC input.