DELLEMC

PowerEdge MX7000 Chassis Power Sequence

Dell EMC Server & Infrastructure
Jitendra Jagasia
Michael Brown

July 2018

A Dell EMC Technical White Paper

Revisions

Date	Description
July 2018	Initial release

Contents

DELLEMC

Executive summary

This technical whitepaper covers the Dell EMC MX7000 chassis power sequencing. It will discuss the things that happen after AC power has been applied to the chassis, what happens during the power ON sequence, as well as what happens when powering OFF the chassis. It will cover the lights and front panel indications during these sequences, as well as what order each component in the chassis is powered ON and OFF. This information is important information to know for administrators when debugging issues or for general understanding of what to expect when you plug in a chassis.

1 Introduction

The Dell EMC MX7000 chassis is the latest chassis in the Dell EMC lineup, designed and constructed from the ground up as a brand new chassis. This new chassis has some important differences in how the system powers on from the older M1000e chassis, and this document will show the new power sequencing.

In this document, we will reference the Right Control Panel (RCP), the OpenManage Enterprise Modular UI (OME), and OpenManage Mobile. The OME GUI is accessed from a web browser, you can get the IP address of the OME GUI from the front panel LCD or from OpenManage Mobile. The OpenManage Mobile is an optional Bluetooth module that can be ordered which provides connectivity to manage the chassis from a mobile device. Apple IOS and Android apps are available for download. See the user's guide or the Quicksync whitepaper for more details.

1.1 Overview of Chassis power sequence

Diagram below shows chassis Power sequence
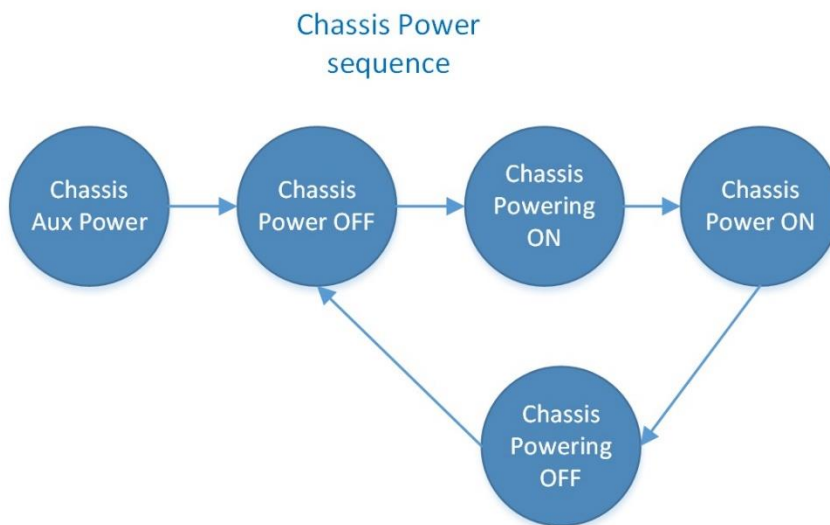
MX7000 has five different Power states

1. Chassis Aux Power state: This is the initial power state of the chassis after AC power is applied to the chassis. Once the management module boots up, the chassis transitions to chassis power OFF state. This state is not generally observable though most management interfaces because in this state,

most of the management interfaces are still initializing. If you look at the front panel LCD, you will see loading screen like below

2. Chassis OFF state: In the OFF state, the chassis management controller still runs to provide external user control and management. Chassis can be powered ON either by pressing the chassis power button on the RCP, or using OpenManage Mobile (OMM) or OpenManage Enterprise Modular (OME). Note that in the OFF state, some management functions may be limited, for example, if you remove chassis components and insert new ones, these may not be fully detected and inventoried until the chassis powers on.
3. Chassis Powering ON state: This states means chassis is powering ON its infrastructure components (See below for the sequencing of these components)
4. Chassis ON state: The chassis is ON and can be managed fully through the OME GUI, OMM, or LCD. All of the chassis infrastructure components are ON. Individual Sleds can be ON or OFF in this state.
5. Chassis Powering OFF state: This states means chassis is in the process of powering OFF all Sleds and infrastructure components. If the chassis takes too long to power down normally, long press on the power button can be used to do an immediate, force power down, with a risk of data loss.

DELLEMC

2 Chassis Power ON sequence.

Diagram below shows chassis power ON sequence
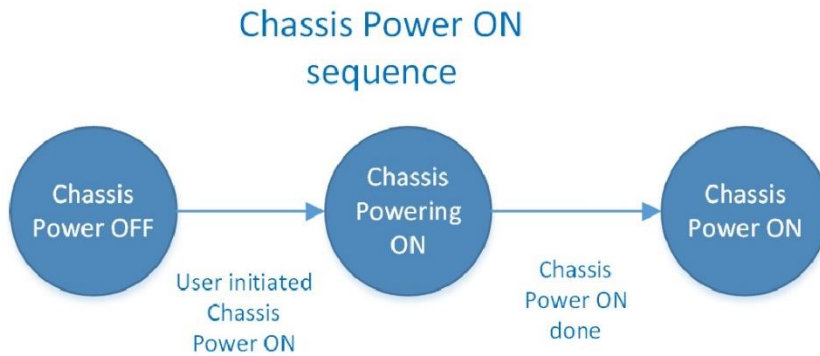
Chassis power ON occurs:

1. When requested by the user, either with a front panel power button or the various user interfaces
2. When AC power is restored, if chassis was ON when AC power was lost

2.1 User initiated Chassis Power ON request

To power ON the chassis, press the power button on Right Control Panel (RCP) or initiate power ON command from OME GUI

2.2 Auto Chassis Power ON

If AC power is lost and later restored, the chassis will recover to the ON or OFF state that it was in prior to AC power loss. For example, if the chassis was ON prior to AC loss, after AC recovery, the chassis will automatically power back on. If the chassis was powering ON prior to AC loss (but had not completed power on), the chassis will power ON after recovery. If the chassis was powering OFF prior to AC loss, then the chassis will remain OFF when AC is recovered. And, finally, if the chassis was OFF prior to AC loss, the chassis will remain OFF when AC power is restored.

Individual sleds in the chassis will follow their individual AC loss policy and can be configured individually, usually through BIOS options on the sled.

DELLEMC

3 Chassis Powering ON sequence in detail.

This section explains the order in which components are powered on.

Chassis Powering ON
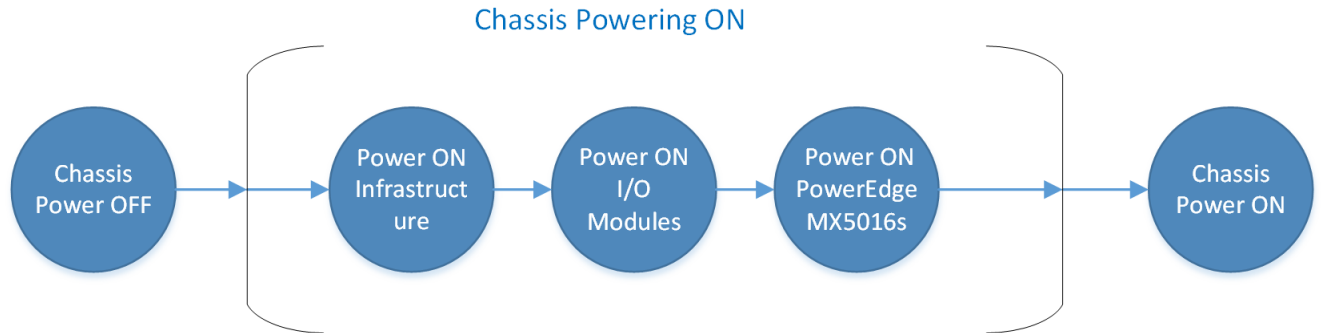
- The first components which power ON are chassis infrastructure items: the power supplies, followed by fans and other critical internal components such as temperature sensors and the I/O Module microcontrollers.
- Once the infrastructure is up & running then all I/O Modules (IOMs) present in chassis are powered ON.
- After IOMs, any PowerEdge MX5016s present in chassis are powered ON.
- Once PowerEdge MX5016s are powered ON, **the chassis is considered ON.**
- Once the chassis reaches power ON state, individual compute sleds follow their individual BIOS settings for power-on.

DELLEMC

4 Chassis Power OFF sequence.

Diagram below shows chassis Power OFF sequence. The sequence that we power off components in the chassis is exactly reverse order of the power on sequence in the previous section. One important detail is that normal power off requests are "graceful". A graceful shutdown request means that IDRAC on individual sleds will perform and ACPI request to the OS to initiate a graceful shutdown. If any OS on any blade fails to complete a graceful shutdown, then the chassis power off will abort and the chassis will remain on.

Chassis Power OFF sequence

Chassis Power ON → Chassis Powering OFF → Chassis Power OFF

User initiated Chassis Power OFF

Chassis Power OFF done
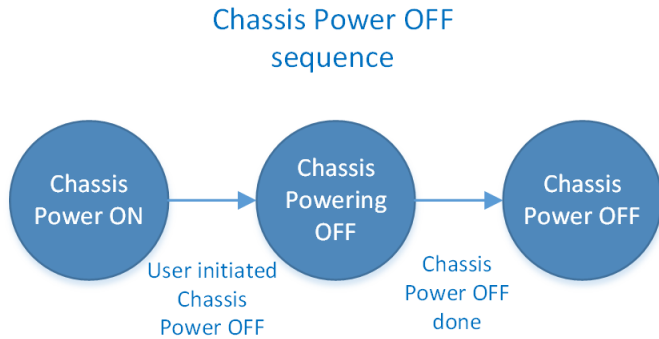
4.1 User initiated Chassis Power OFF request

To power OFF the chassis press the power button on Right control Panel or initiate Power OFF command from the OpenManage Enterprise Modular (OME) GUI, or OpenManage Mobile (OMM).
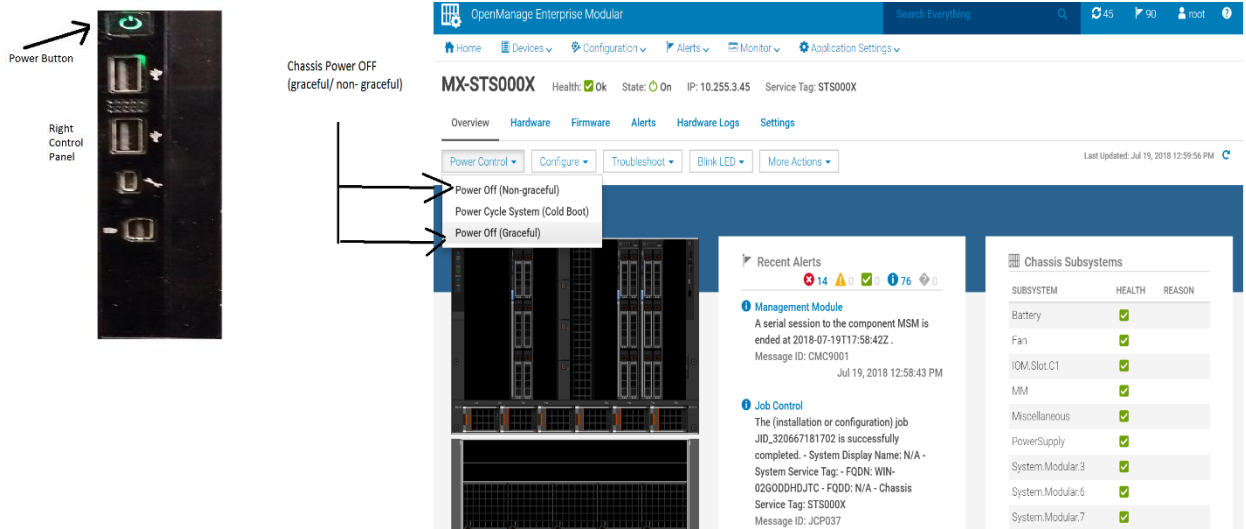
There are two different modes to Power OFF chassis.

- Graceful shutdown.
- Ungraceful shutdown.

DELLEMC

4.2　Chassis Power OFF: Graceful shutdown.

A graceful chassis power off sequence will cause chassis internal components to be powered OFF gracefully. In this mode if sled host cannot be shutdown gracefully then chassis will not power OFF, it will go back to chassis power ON state. Now user has option to either trigger graceful shutdown again or if user wants to shutdown chassis immediately then ungraceful shutdown can be triggered.

User can initiate graceful shutdown from power button or from OME GUI.

- Initiating graceful shutdown from OME GUI is straightforward, section 4.1 shows the screenshot.
- Initiate graceful shutdown using the RCP power button by pressing and holding the button for 1 second.
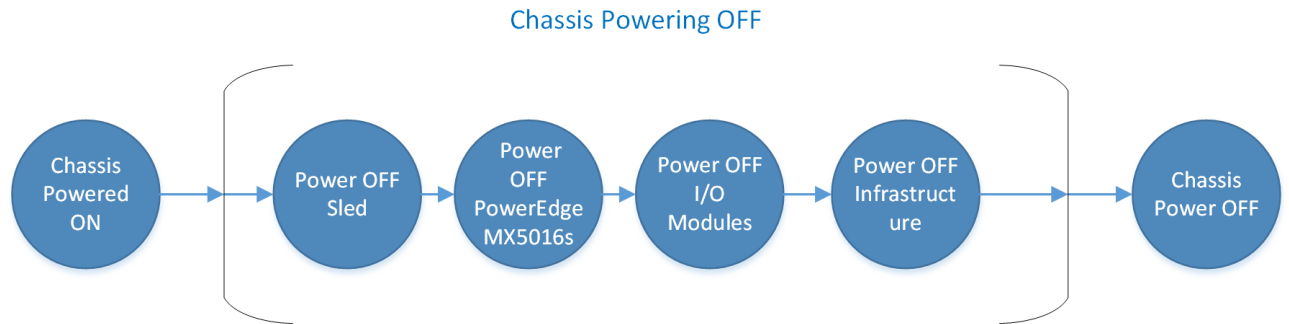
4.3　Chassis Power OFF: Un-Graceful shutdown.

An un-graceful chassis power off sequence will cause chassis internal components to be powered OFF forcefully. In this mode sled hosts will be forcefully shutdown with a risk of data loss.

Initiate un-graceful shutdown from Power button or from OME GUI.

- Press and hold the chassis power button for >6 seconds to initiate un-graceful shutdown.
- To use OME GUI, select the "Power Off (non-graceful)" option from the GUI, see 4.1 for screenshot.

DELLEMC

5 Chassis Powering OFF sequence in detail.

Diagram below shows chassis Powering OFF sequence in detail

Chassis Powering OFF

```
Chassis        Power OFF    Power OFF      Power OFF    Power OFF        Chassis
Powered   →    Sled      →  PowerEdge   →  I/O       →  Infrastruct  →   Power OFF
ON                          MX5016s        Modules      ure
```

- First we power OFF the all compute sleds present in the chassis.
  - If graceful shutdown power OFF sequence was initiated then sled will be gracefully turned OFF. If any sled fails to gracefully power off through the OS, the chassis will remain in the ON state. From this state, user has the option to go to the individual sled and initiate either an OS shutdown, or go to the IDRAC for that sled to initiate either graceful or force shutdown for that sled, or, finally, the user can perform a non-graceful chassis shutdown.
- Once the sleds present in the chassis are powered OFF, now it is safe to power OFF PowerEdge MX5016s present in the chassis.
- After PowerEdge MX5016s are off, I/O Modules (IOMs) present in the chassis are powered OFF.
- After IOMs, remaining infrastructure components (Fans, IOM microcontrollers, temperature sensors, etc) in the chassis are powered OFF.
- At this point, the chassis is considered OFF.