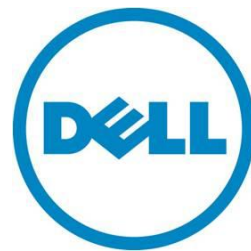# iDRAC and Lifecycle Controller – A Recommended Workflow for Performing Firmware Updates on PowerEdge Servers

This Dell Technical White Paper discusses the best practices and workflow for performing firmware updates on PowerEdge servers.

Author(s)

Raja Tamilarasan

Contents

A recommended workflow for performing firmware updates on PowerEdge servers

Summary

Dell recommends that the firmware running on your PowerEdge servers be kept up to date to make sure that the servers deliver peak performance. The firmware update feature supported by iDRAC and Lifecycle Controller (LC) makes it easy to keep the various firmware running on the PowerEdge server up to date.

iDRAC and Lifecycle Controller support the following interfaces that perform firmware updates:

RACADM → Dell PowerEdge Server ← iDRAC GUI

WSMAN → Dell PowerEdge Server ← CMC GUI

OMSA / OS DUP → Dell PowerEdge Server ← Lifecycle Controller GUI
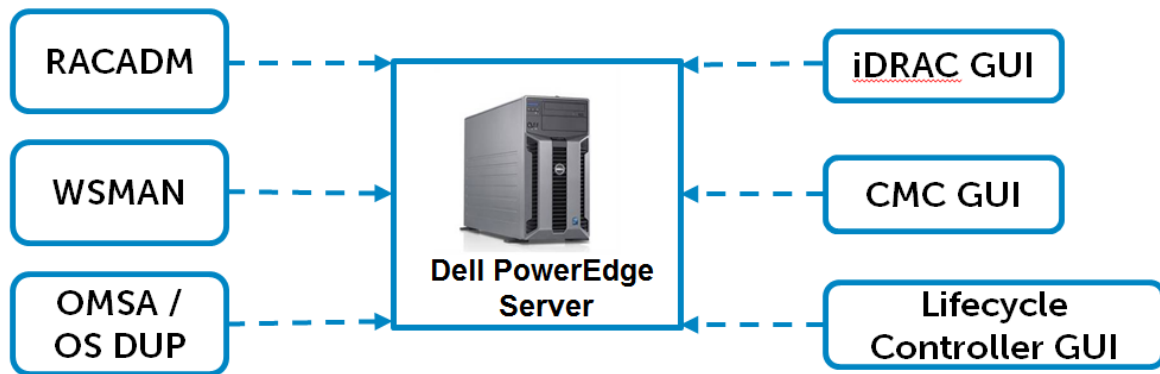
1. RACADM
   - See "RACADM reference" at http://www.delltechcenter.com/idrac
2. Industry-standard Web Services Management (WSMAN) command line interface (CLI)
3. OMSA and Operating System (OS)–based Dell Update Packages (DUP)
   - http://en.community.dell.com/techcenter/extras/m/white_papers/20097364.aspx
4. iDRAC GUI
5. Chassis Management Controller (CMC) GUI.
6. Lifecycle Controller GUI (press <F10> during system start).
   - http://en.community.dell.com/techcenter/extras/m/white_papers/20097364.aspx

Before You Begin

Before you start updating a firmware, review all the supported user interfaces and select the one that suits your environment.

1. The Dell RACADM (Remote Access Controller Admin) utility is a CLI–based tool that allows for remote or local management of Dell Servers by using iDRAC or DRAC.

2. Web Services-Management (**WS-Management**) is a DMTF open standard defining a SOAP–based protocol for the management of servers, devices, applications, and various Web services. When accessing the iDRAC using the WSMAN interface, for Windows, make sure the WinRM CLI

tool is configured (for help, see Installation and Configuration of Windows Remote Management). For Linux, make sure the Openwsman CLI is built and installed (for help, see Openwsman Home). Make sure the target system is a PowerEdge server with iDRAC enabled, configured, and network accessible, so that you can communicate by using WS-MAN.

3. Dell OpenManage Server Administrator (OMSA) is a software agent that provides a comprehensive, one-to-one systems management solution in two ways—from an integrated, Web browser–based GUI and from a CLI by using the operating system.

4. The iDRAC GUI is a Web browser–based management application that you can use to interactively manage the iDRAC and monitor the managed server. It is the primary interface for day-to-day tasks, such as monitoring system health, viewing the system event log, managing local iDRAC users, and launching the CMC Web interface and console redirection sessions.

5. The CMC GUI is a Web browser–based management application that can be used to view the status and manage all the servers in that chassis.

6. Lifecycle controller supports local one-one system management tasks by using a GUI on the server's KVM for operating system installation, update, configuration, and for performing diagnostics on single- and local servers.

Direct versus Staged Updates

The updates supported on Dell PowerEdge servers can be classified into Direct and Staged Updates.

- Direct Updates are those that do not require a server restart for the update to take effect.

- Staged updates are the ones where the updates are staged and are applied only when the server is restarted. Lifecycle Controller will be invoked during the server startup.

Direct Updates	Staged Updates
1. Lifecycle Controller	1. BIOS
2. iDRAC7 Firmware	2. NIC Firmware
3. Diagnostics	3. RAID Firmware
4. OS Driver Pack	4. Backplane Firmware
5. Identity Module	5. PSU Firmware
	6. CPLD

Note: iDRAC and driver pack updates for 11G PowerEdge systems are staged updates. For 12G and future generations, the iDRAC and OS Driver Pack updates are direct updates.

Server Reboot Requirement for performing iDRAC updates

The need to reboot the server to apply an iDRAC update varies based on the current version of the iDRAC firmware and the interface used to update the iDRAC. Refer to Table 1 below for more information.

iDRAC6 Firmware Version / Update Interface	RACADM		WSMAN	iDRAC GUI		CMC GUI	OME	
	fwupdate command (using .d6 (or) .imc image)	update command (using windows DUP)		(using .imc image)	(using windows DUP)	(using windows DUP)	In-Band	Out-Of-Band
All iDRAC6 Versions	No Reboot	**Not Supported**	**Reboot**	No Reboot	**Not Supported**	**Reboot**	No Reboot	**Reboot**

iDRAC7 Firmware Version / Update Interface	RACADM		WSMAN	iDRAC GUI	
	fwupdate command (using .d7 image)	update command (using windows DUP)		(using .d7 image)	(using windows DUP)
1.00.00 / 1.20.20/ 1.23.23	No Reboot	**Not Supported**	**Reboot**	No Reboot	**Not Supported**
1.30.30 and above	No Reboot	No Reboot	No Reboot	No Reboot	No Reboot

iDRAC7 Firmware Version / Update Interface	CMC GUI	OME	
	(using windows DUP)	In-Band	Out-Of-Band
1.00.00 / 1.20.20/ 1.23.23	**Reboot**	No Reboot	**Reboot**
1.30.30 and above	No Reboot	No Reboot	No Reboot

Table 1: iDRAC Update and Server Reboot

Recommended Firmware Update workflow

iDRAC and Lifecycle Controller provide the infrastructure for updating most component firmware on PowerEdge servers. The iDRAC and Lifecycle Controller (LC) are released as two individual firmware components, but are dependent on one another for various change management features and hardware that they support. It is recommended that these components are updated together. Regardless of the methodology used to perform firmware updates, iDRAC and LC firmware should always be upgraded first before upgrading the other components on the server.

It is recommended to use the following sequence when updating firmware on the Dell PowerEdge servers.

1. iDRAC
2. Lifecycle Controller
3. BIOS
4. Diagnostics
5. OS Driver Pack
6. RAID
7. NIC
8. PSU
9. CPLD
10. Other update

Staged updates can be combined together to apply on a single-host restart. That is, BIOS, RAID, NIC, PSU, CPLD, and so on can all be staged together and applied with a single-host restart.

Note : If multiple updates are staged together from consoles such as iDRAC GUI, CMC GUI, Lifecycle Controller GUI, and any other Dell-supported consoles such as Open Manage Essentials, the updates might be reordered automatically on the basis of time to install optimizations built in for those management tools.

How to View the Current Firmware Inventory

Dell PowerEdge servers support gathering Firmware Inventory data using both in-band (using the servers' operating system drivers) and out-band (using the dedicated systems management channel. running on the iDRAC service process or pre-OS UEFI environment) tools. Listed here are some examples on how to view the current firmware inventory on any PowerEdge Server.

A recommended workflow for performing firmware updates on PowerEdge servers

Firmware Inventory from iDRAC GUI

1. Log in to the IDRAC Web interface.
2. Go to **Server** → **System Inventory** → **Firmware Inventory**.

Component	Firmware Version
Power Supply.Slot.1	07.00.00
Power Supply.Slot.2	07.09.40
Integrated Dell Remote Access Controller	1.50.50
Lifecycle Controller, 1.3.0.568, X18	1.3.0.568
Enterprise UEFI Diagnostics, 4225A2, 4225.4	4225A2
OS Drivers Pack, 7.2.1.4, A00	7.2.1.4
System CPLD	1.0.3
Intel(R) Gigabit 4P I350-t rNDC - BC:30:5B:ED:F5:20	14.0.12
Intel(R) Gigabit 4P I350-t rNDC - BC:30:5B:ED:F5:21	14.0.12
Intel(R) Gigabit 4P I350-t rNDC - BC:30:5B:ED:F5:22	14.0.12
Intel(R) Gigabit 4P I350-t rNDC - BC:30:5B:ED:F5:23	14.0.12
Broadcom NetXtreme II 10 Gb Ethernet BCM57810 - 00:10:18:B9:08:E0	7.4.8
Broadcom NetXtreme II 10 Gb Ethernet BCM57810 - 00:10:18:B9:08:E2	7.4.8
Broadcom NetXtreme II 10 Gb Ethernet BCM57810 - 00:10:18:99:AC:C0	7.4.8
Broadcom NetXtreme II 10 Gb Ethernet BCM57810 - 00:10:18:99:AC:C2	7.4.8
BIOS	1.6.0
PERC H710 Mini	21.0.1-0132

A recommended workflow for performing firmware updates on PowerEdge servers

Viewing Firmware Inventory from CMC GUI

1. Launch the CMC Web interface.
2. Go to **Server Overview → Update → Server Component Update.**

| Properties | Setup | Power | Troubleshooting | **Update** |

Server Component Update

Server Component Update

Instructions

- Lifecycle Controller Operations - Update, Rollback and Reinstall including Job Deletion are supported. Only one type of operation at a time is allowed.
- For Rollback and Reinstall an image file is not required. These operations can be applied when available on the server.
- For Update an image file is required. Update of a set of components/devices that can be filtered can be specified and applied to one or more servers.
- Ensure that the correct file for the component or device is selected. The file is available as a Windows Dell Update Package (DUP).
- To select/deselect a component/device for Update across all servers, press and hold the CTRL key and then make the selection.
- Lifecycle Controller operations will fail if System Services is not available. Ensure Pre-OS consoles such as BIOS Setup, Unified Server Configurator (USC) or iDRAC Configuration are not active. If these consoles are active, System Services will not be available.
- The Lifecycle Controller Jobs page lists all existing jobs on a server and enables you to clear the job queue before starting an update (recommended). For more information see the following link Lifecycle Controller Jobs page

Component/Device Update Filter

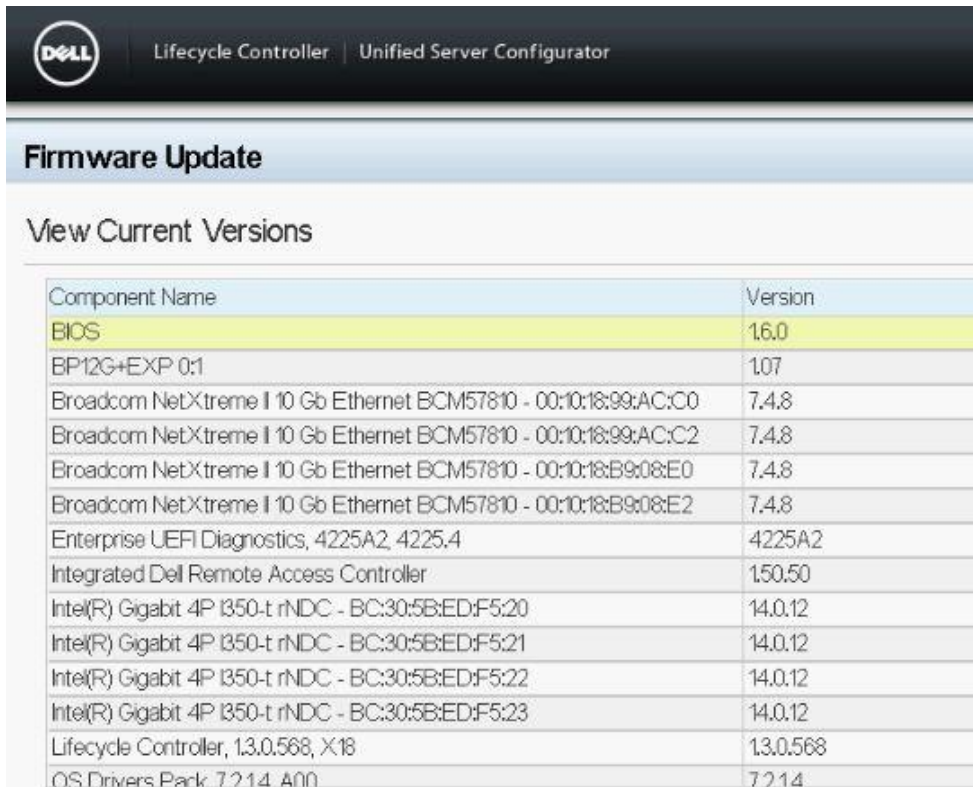| ☐ BIOS | ☐ iDRAC | ☐ Lifecycle Controller | ☐ 32-Bit Diagnostics | ☐ OS Driver Pack | ☐ Network I/F Controller | ☐ RAID Controller |

Component/Device Firmware Inventory

Slot	Name	Model	Component/Device	Current Version		Rollback Version		Job Status	Update
3	SLOT-03	PowerEdge M620	BIOS	1.3.6	☐	1.6.0	☐		☐
			Integrated Dell Remote Access Controller	1.50.50		1.50.03.50	☐		☐
			Lifecycle Controller	1.1.1.18					☐
			Diagnostics	0					☐
			OS Drivers Pack	7.1.1.3					☐
			System CPLD	1.0.4					
			Broadcom NetXtreme II 10 Gb Ethernet BCM57810 - 24:B6:FD:F5:FF:24	7.4.8	☐				☐
			Broadcom NetXtreme II 10 Gb Ethernet BCM57810 - 24:B6:FD:F5:FF:26	7.4.8	☐				☐
			PERC S110 Controller	3.0.0-0139					☐
			PERC H310 Mini	20.10.1-0084					☐
			Physical Disk 0:1:0	HT65					
			Physical Disk 0:1:1	HT65					
			BP12G+ 0:1	1.00					
4	SLOT-04	PowerEdgeM610	BIOS	6.0.7		2.3.8	☐		☐
			iDRAC6	3.35		3.30	☐		☐
			Dell Lifecycle Controller	1.5.1.57					☐
			Dell 32 Bit Diagnostics	5148A0					☐
			Dell OS Drivers Pack	6.5.1.2					☐
			Broadcom NetXtreme II Gigabit Ethernet - (Embedded 1-1)	6.2.10	☐	5.2.7	☐		☐
			Broadcom NetXtreme II Gigabit Ethernet - (Embedded 2-1)	6.2.10	☐	5.2.7	☐		☐
			CERC 6/i Integrated (Embedded)	6.2.0-0013	☐				☐

Viewing Firmware Inventory from Lifecycle Controller GUI

1. Launch the Lifecycle Controller GUI by pressing F10 during Power On Self-Test (POST).

2. Go to **Firmware Update → View Current Versions**.

Viewing Firmware Inventory using WS-MAN

Firmware inventory can be viewed using WSMAN by enumerating the *DCIM_SoftwareIdentity* class.

The most important fields in the *DCIM_SoftwareIdentity* enumeration output are:

- ComponentType
  - Denotes the type of the firmware
- FQDD
  - Fully Qualified Device Descriptor (FQDD) uniquely identifies the device on the server.
- Status
  - Installed: This instance is already installed on the device
  - Available: An instance of the device firmware that is available with Lifecycle controller and can be used to perform an upgrade / downgrade.
- Updateable
  - True: Firmware update supported by Lifecycle Controller.
  - False: Firmware update not supported by Lifecycle Controller.

Input
```
winrm e cimv2/root/dcim/DCIM_SoftwareIdentity -u:root -p:****** -r:https://10.0.0.1/wsman:443 -
SkipCNCheck -SkipCACheck -auth:basic -encoding:utf-8
```

Partial Output

```
DCIM_SoftwareIdentity
    BuildNumber = 0
    Classifications = 11
    ComponentID = 159
    ComponentType = BIOS
    DeviceID = null
    ElementName = BIOS
    FQDD = BIOS.Setup.1-1
    IdentityInfoType = OrgID:ComponentType:ComponentID
    IdentityInfoValue = DCIM:BIOS:159
    InstallationDate = NA
    InstanceID = DCIM:PREVIOUS#741__BIOS.Setup.1-1
    IsEntity = true
    MajorVersion = 1
    MinorVersion = 4
    RevisionNumber = 5
    RevisionString = null
    Status = Available
    SubDeviceID = null
    SubVendorID = null
    Updateable = true
    VendorID = null
    VersionString = 1.4.5
    impactsTPMmeasurements = true

DCIM_SoftwareIdentity
    BuildNumber = 0
    Classifications = 11
    ComponentID = 159
    ComponentType = BIOS
    DeviceID = null
    ElementName = BIOS
    FQDD = BIOS.Setup.1-1
    IdentityInfoType = OrgID:ComponentType:ComponentID
    IdentityInfoValue = DCIM:BIOS:159
    InstallationDate = NA
    InstanceID = DCIM:CURRENT#741__BIOS.Setup.1-1
    IsEntity = true
    MajorVersion = 1
    MinorVersion = 4
    RevisionNumber = 4
    RevisionString = null
    Status = Available
    SubDeviceID = null
    SubVendorID = null
    Updateable = true
    VendorID = null
    VersionString = 1.4.4
    impactsTPMmeasurements = true

DCIM_SoftwareIdentity
    BuildNumber = 0
    Classifications = 11
    ComponentID = 159
    ComponentType = BIOS
    DeviceID = null
    ElementName = BIOS
    FQDD = BIOS.Setup.1-1
    IdentityInfoType = OrgID:ComponentType:ComponentID
    IdentityInfoValue = DCIM:BIOS:159
    InstallationDate = 2012-11-27T13:14:46Z
    InstanceID = DCIM:INSTALLED#741__BIOS.Setup.1-1
    IsEntity = true
    MajorVersion = 1
    MinorVersion = 4
```

```
RevisionNumber = 4
RevisionString = null
Status = Installed
SubDeviceID = null
SubVendorID = null
Updateable = true
VendorID = null
VersionString = 1.4.4
impactsTPMmeasurements = true
```

Firmware Inventory using RACADM

Firmware inventory can be viewed using RACADM by running the `swinventory` command.

- `racadm swinventory (local racadm)`
- `racadm -r <iDRACIP>  -u <iDRAC UserName>  -p <iDRAC Password> swinventory`

```
-----------------------SOFTWARE INVENTORY-----------------------

ComponentType = FIRMWARE
ElementName = Power Supply.Slot.1
FQDD = PSU.Slot.1
InstallationDate = NA
VersionString = 07.2B.7D
------------------------------------------------------------------

ComponentType = FIRMWARE
ElementName = Power Supply.Slot.1
FQDD = PSU.Slot.1
InstallationDate = 2013-04-22T11:39:10Z
VersionString = 07.00.00
------------------------------------------------------------------

ComponentType = FIRMWARE
ElementName = Power Supply.Slot.2
FQDD = PSU.Slot.2
InstallationDate = 2013-04-22T11:39:10Z
VersionString = 07.09.40
------------------------------------------------------------------

ComponentType = FIRMWARE
ElementName = Integrated Dell Remote Access Controller
FQDD = iDRAC.Embedded.1-1
InstallationDate = NA
Rollback Status = Available
VersionString = 1.50.03.50
------------------------------------------------------------------

ComponentType = FIRMWARE
ElementName = Integrated Dell Remote Access Controller
FQDD = iDRAC.Embedded.1-1
InstallationDate = 2013-05-11T13:23:12Z
VersionString = 1.50.50
------------------------------------------------------------------

ComponentType = APPLICATION
ElementName = Lifecycle Controller, 1.3.0.568, X18
FQDD = USC.Embedded.1:LC.Embedded.1
InstallationDate = 2013-05-29T14:24:45Z
VersionString = 1.3.0.568
------------------------------------------------------------------

ComponentType = APPLICATION
ElementName = Enterprise UEFI Diagnostics, 4225A2, 4225.4
```

A recommended workflow for performing firmware updates on PowerEdge servers

```
FQDD = Diagnostics.Embedded.1:LC.Embedded.1
InstallationDate = 2013-05-09T00:31:26Z
VersionString = 4225A2
----------------------------------------------------------------------

ComponentType = APPLICATION
ElementName = OS Drivers Pack, 7.2.1.4, A00
FQDD = DriverPack.Embedded.1:LC.Embedded.1
InstallationDate = 2013-05-09T00:38:08Z
VersionString = 7.2.1.4
----------------------------------------------------------------------

ComponentType = FIRMWARE
ElementName = System CPLD
FQDD = CPLD.Embedded.1
InstallationDate = 2013-06-11T15:43:55Z
VersionString = 1.0.3
----------------------------------------------------------------------

ComponentType = FIRMWARE
ElementName = Intel(R) Gigabit 4P I350-t rNDC - BC:30:5B:ED:F5:20
FQDD = NIC.Integrated.1-1-1
InstallationDate = NA
Rollback Status = Available
VersionString = 13.5.6
----------------------------------------------------------------------

--More--
```
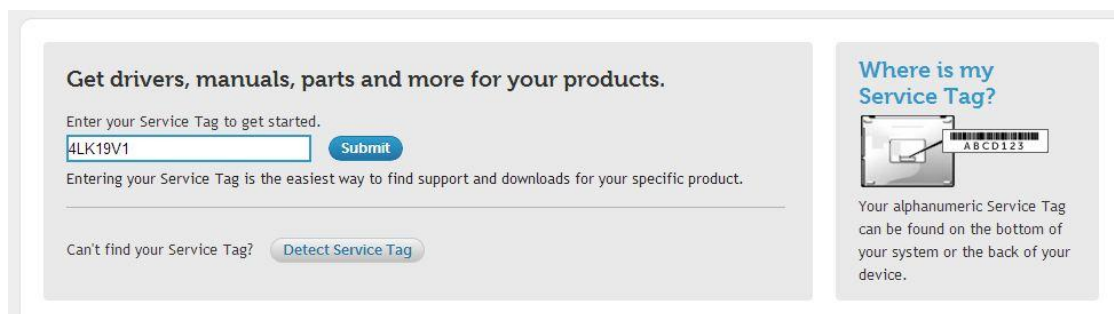
How to Get the Latest Updates Available for Servers

After you know about the current versions of the firmware installed on a PowerEdge server, check for any available updates.

1. Go to the URL http://www.dell.com/support/.

2. Type the service tag of the server, and then click **Submit**.

3. Click **Drivers and Downloads**.

A recommended workflow for performing firmware updates on PowerEdge servers

Product Support for PowerEdge R720xd

PowerEdge R720xd
Service Tag: 4LK19V1

Select A Different Product >

Warranty Information
- Warranty information for this prod

Renew/Upgrade Warranty >

| Product Support | System Configuration | Drivers & Downloads | Parts & Upgrades | Manuals & Documentation | War |

Drivers & Downloads for PowerEdge R720xd
Visit Drivers Results Page

Refine your results: (165 files)

See More Filtering Options

| Operating System: | Category: | Release Date: | Importance: |
| MS Windows 2008 R2 | All | All | All |

Expand All Categories | Collapse All Categories

- BIOS (1)
- Chipset (1)
- Diagnostics (5)
- Drivers for OS Deployment (1)
- ESM (3)
- Fibre Channel (6)
- Firmware (2)
- Lifecycle Controller (3)
- Network (29)
- Removable Storage (5)
- SAS Drive (43)
- SAS Non-RAID (3)
- SAS RAID (4)

4. Download the firmware Dell Update Packages (DUPs) that are applicable to your server.

   Note: iDRAC GUI, CMC GUI, Lifecycle Controller GUI, RACADM and WSMAN Updates support only Windows-based DUPs.

Conclusion

The objective of this Whitepaper is to describe the recommended sequencing of updates, how to get current firmware version info, how to find firmware updates, and provide an overview of the various methodologies and tools available to perform a firmware update.

Firmware Update FAQ

1. What is the recommended order to stage firmware updates when updates are available for both the consoles (OMSA / OME) and the devices installed (BIOS, NIC, iDRAC)?

Fresh install or Updates to consoles should not be staged together with firmware updates. It is recommended that all device firmwares are updated prior to updating consoles such as OMSA / OME.

2. Can device firmware updates and configuration changes be performed at the same time or staged together to be applied on the same system reboot?

iDRAC and Lifecycle Controller does support scheduling a update and configuration job together to be applied on the same system reboot. Lifecycle Controller internally has logic to optimize the order in which all scheduled jobs are executed.

For example, a BIOS update and a BIOS configuration can be scheduled to be applied together on the same reboot and Lifecycle Controller will optimize the ordering based on the jobs scheduled.

For features or settings that are new and is available only with a newer release of the device firmware, it is recommend that you update the firmware and wait for the job to complete successfully before making any configuration changes.

A recommended workflow for performing firmware updates on PowerEdge servers

Learn more

Visit Dell.com/PowerEdge for more information on Dell's enterprise-class servers.

Reference Profiles
http://en.community.dell.com/techcenter/systems-management/w/wiki/1906.dcim-library-profile.aspx

Reference MOFs
http://en.community.dell.com/techcenter/systems-management/w/wiki/1840.dcim-library-mof.aspx

Best Practices Guide
http://en.community.dell.com/techcenter/extras/m/white_papers/20066173.aspx
Associated Scripts:
http://en.community.dell.com/techcenter/extras/m/white_papers/20066178.aspx

Web Services Interface Guide for Windows
http://en.community.dell.com/techcenter/extras/m/white_papers/20066174.aspx
Associated scripts
http://en.community.dell.com/techcenter/extras/m/white_papers/20066179.aspx

Web Services Interface Guide for Linux
http://en.community.dell.com/techcenter/extras/m/white_papers/20066176.aspx
Associated scripts
http://en.community.dell.com/techcenter/extras/m/white_papers/20066181.aspx

WS-MAN command line for Windows (Winrm)
http://msdn.microsoft.com/en-us/library/windows/desktop/aa384291(v=VS.85).aspx

WSMAN command line open source for Linux (Openwsman)
http://sourceforge.net/projects/openwsman/

Scripting the Dell Lifecycle Controller
http://en.community.dell.com/techcenter/systems-management/w/wiki/scripting-the-dell-lifecycle-controller.aspx

All about Lifecycle Controller in iDRAC
http://support.dell.com/support/edocs/software/smusc/smlc/lc_1_5/index.htm