

Dell Lifecycle Controller 2 Remote Services Release 1.1 Quick Start Guide



Notes, Cautions, and Warnings



NOTE: A NOTE indicates important information that helps you make better use of your computer.



CAUTION: A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.



WARNING: A WARNING indicates a potential for property damage, personal injury, or death.

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2012 - 12

Rev. A00

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Introduction

The Dell Lifecycle Controller provides advanced embedded systems management. It includes a 1GB-managed and persistent storage that embeds systems management features in addition to the iDRAC features.

The Dell Lifecycle Controller Remote Services further enables remote systems management in a one-to-many method. Remote Services is accessible over the network using the secure Web services interface and can be programmatically utilized by applications and scripts. Remote services enable management consoles to perform one-to-many bare-metal server provisioning. The combination of the Auto-discovery feature to identify and authenticate the attached Dell system to the network and integration with one-to-many management consoles reduces the manual steps required for server. The interface is aimed at simplifying many tasks, some of which include remotely deploying an operating system, remote update and inventory, and remotely automating the setup and configuration of new and already-deployed Dell systems.

Lifecycle Controller reduces the time and number of steps taken to accomplish tasks, reduces potential for error, enhances server and application uptime and security, and results in more efficient IT management. Developed on the industry standard Unified Extensible Firmware Interface (UEFI) platform and Web Services for Management (WSMAN) interfaces, Lifecycle Controller provides an open environment for console integration that also allows custom scripting for Lifecycle Controller. Leading systems management consoles. For example, Microsoft System Center Configuration Manager, BMC Software BladeLogic Operations Manager, Symantec Deployment Solution, Dell Management Console) have integrated Dell Lifecycle Controller, thus offering its features and capabilities to existing infrastructure, where the respective consoles are installed.

Benefits of using iDRAC7 with Lifecycle Controller

At the heart of 12th generation server's embedded management is iDRAC7 with Lifecycle Controller technology, that allows you to perform useful tasks such as configure BIOS and hardware settings, deploy operating systems, update drivers, change RAID settings, and save hardware profiles. Together, they provide a robust set of management functions that can be leveraged throughout the entire server lifecycle.

Dell Lifecycle Controller simplifies server lifecycle management— from provisioning, deployment, patching and updating to servicing and user customization—for servers located both locally and remotely. It was delivered as a part of the Dell Remote Access Controller or iDRAC (Express, Enterprise and vFlash) starting with Dell PowerEdge 11G servers. On 12G servers, the vFlash feature is included with the iDRAC7 Enterprise License, so you no longer have to separately license vFlash starting with Lifecycle Controller 2. Dell's 12G servers only use Express or Enterprise licensing. Lifecycle Controller includes managed and persistent storage that embeds systems management features and Operating System device drivers directly on the server, thus eliminating the media-based system management tools and utilities, traditionally needed for systems management.

The benefits include:

- **Increased Availability** — Early notification of potential or actual failures that help prevent a server failure or reduce recovery time after failure.
- **Improved Productivity and Lower Total Cost of Ownership (TCO)** — Extending the reach of administrators to larger numbers of distant servers can make IT staff more productive while driving down operational costs such as travel.
- **Secure Environment** — By providing secure access to remote servers, administrators can perform critical management functions while maintaining server and network security.
- **Enhanced Embedded Management through Lifecycle Controller** – Lifecycle Controller provides deployment and simplified serviceability through Lifecycle Controller GUI for local deployment and Remote Services (WS-

Management) interfaces for remote deployment integrated with Dell OpenManage Essentials and partner consoles.

For more information about iDRAC7, see *Integrated Dell Remote Access Controller User's Guide* available at dell.com/support/manuals

Key Features

You can perform the following systems management tasks using Lifecycle Controller-Remote services:

- Install operating systems and drivers
- Manage Licensing
- Perform BIOS firmware updates
- Part Replacement
- Perform component firmware updates
- Get hardware inventory information
- Get and set NIC/CNA and RAID configuration
- Get and set BIOS configuration and BIOS passwords
- Export lifecycle log and add work notes
- Export current and factory shipped hardware inventory log
- Manage, attach, and boot to vFlash SD card partitions
- Lock the controllers using the local key
- Export and import the server profile
- Export and import System Configuration XML
- Schedule and track the status of the update and configuration

What's New in this Release?

The highlights of this release of Lifecycle Controller-Remote Services are:

- Import and export System Configuration XML file that contains information about a component configuration
- Backplane and enclosure firmware update
- Faster iDRAC firmware update
- New Shutdown job type
- Added support for Fibre Channel (FC) HBA cards

Why Use Lifecycle Controller Remote Services?

When Dell examined the most common management tasks and the inefficiencies associated with them, it discovered that the additional time taken for performing the management tasks was not because of the tools, but it was because of how they were delivered. The most common tasks such as provisioning, deploying, and updating required multiple tools, multiple forms of media, and searching the Web for the latest enablement tools, including drivers and firmware. This traditional delivery model resulted in inefficient usage of time, a potential for error, and exposure to security risks. Lifecycle Controller-Remote Services addresses all these system management issues.

Licensable Features in Lifecycle Controller

The Web Services for Management (WSMAN) License and Privilege Specification encompasses all the license and privilege information that is required to utilize the WSMAN API provided by the integrated Dell Remote Access Controller (iDRAC7) with Lifecycle Controller 2.0.

The Lifecycle Controller manageability capabilities are partitioned into distinct areas and represented by the Dell Common Information Model (DCIM) profile specifications that provide comprehensive details about each manageability feature or capability. These features may be free, partially licensed, or fully licensed. Furthermore, the accessibility of a feature is defined by the credentials provided with the WSMAN request and maps to the user-assigned privilege credential, such as administrator or read-only access.

What is the Web Service API?

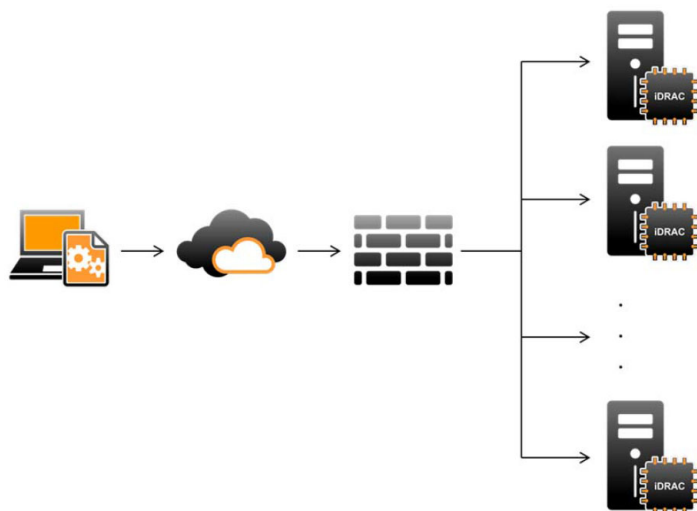
Web Services-Management (WSMAN) is a Distributed Management Task Force (DMTF) open standard, defining a Simple Object Access Protocol (SOAP)—based protocol for managing servers, devices, applications, and various Web services. WSMAN provides a common way for systems to access and exchange management information across the IT infrastructure.

DMTF is an industry organization that develops, maintains, and promotes standards for systems management in enterprise IT environments.

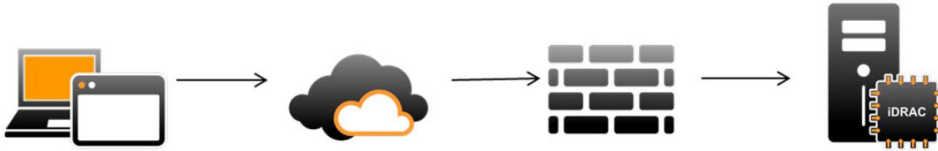
The DMTF data model is complex and typically requires multiple transactions to accomplish simple operations such as specifying a user name and password, or giving administrator privileges to a user account. Therefore, Lifecycle Controller also offers a Dell data model for management that is based on an attribute model.

Where can the Lifecycle Controller API be used from?

Lifecycle Controller-Remote Services is a standards-based interface that enables consoles to integrate, for example, bare-metal provisioning and one-to-many operating system deployments, for remotely-located servers. Dell's Lifecycle Controller takes advantage of the capabilities of both Lifecycle Controller and Lifecycle Controller-Remote Services to deliver significant advancement and simplification of server deployment.



Lifecycle controller also supports local one-to-one system management tasks through a graphical user interface (GUI) using the server's KVM or the **Virtual Console** in iDRAC for operating system installation, updates, configuration, and for running diagnostics, on single and local servers. This eliminates the need for multiple option ROMs for hardware configuration. For more information, see *Lifecycle Controller User's Guide*.

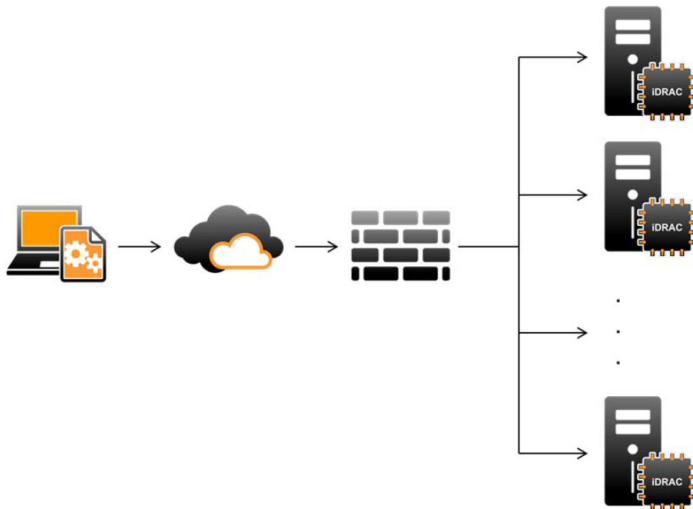


Who can use the API?

Lifecycle Controller-Remote Services features are available based on the type of license (Basic Management, iDRAC7 Express, iDRAC7 Express for Blades, or iDRAC7 Enterprise) you purchase. Only licensed features are available in the iDRAC7 Web interface and Lifecycle Controller-Remote Services. For more information about managing licenses, see *iDRAC7 User's Guide*. For more information about Lifecycle Controller-Remote Services licensing, see [Licensing](#)

How is One-to-many Management Achieved?

A management station sends WSMAN commands over a network and the WSMAN commands can traverse the network safely from outside the firewall and still be secure.



Contacting Dell

To obtain the most up-to-date information regarding Lifecycle Controller and WSMAN, see the [Social Media Reference](#) section in this document.

Lifecycle Controller-Remote Services Features

Using Lifecycle Controller-Remote Services, you can perform the following operations:

- Deploy and Configuration
- Monitor
- Maintain
- Jobs

Deployment and Configuration

Using various Lifecycle Controller-Remote Services' capabilities, you can perform different configurations on a system throughout its lifecycle. You can perform operations such as Operating System Deployment and BIOS, iDRAC, RAID, and NIC configurations on the system.

BIOS Configuration

The BIOS and boot configuration feature is used to get and set any of the configurable BIOS attributes that are exposed in BIOS UEFI HII. You can perform the following operations:

- Retrieve current configuration of BIOS inventory
- Retrieve current boot configuration settings
- Manage the boot order configuration
- Change the BIOS boot mode or UEFI boot mode
- Manage BIOS Passwords
- Change the boot order
- Enable or disable boot sources

iDRAC Configuration

The iDRAC configuration feature is used to manage the properties and interfaces for running system management tasks related to the management of basic properties of iDRAC. The remote access controller properties and attributes are divided into views to provide a simple methodology for the clients to query the iDRAC views and set the iDRAC attributes.

You can perform the following operations:

- Retrieve current card configuration and iDRAC inventory
- Get and set any configurable attribute
- Manage iDRAC local user accounts

RAID Configuration

The RAID configuration feature is used to manage the properties and capabilities of the RAID storage. The RAID storage is modeled as a collection of attributes, where there are collections for the storage adaptors, physical disks, logical

disks, enclosures, and parent-child relationships between the collections. Additionally, there is a configuration service that contains all the methods used to configure the RAID storage.

You can perform the following operations:

- Retrieve current configuration of RAID inventory
- Delete all virtual disks and unassign all the hot spare physical disk drives
- Prepare any foreign physical disks for inclusion in the local configuration
- Manage hot spares
- Manage Keys for self-encrypting drives
- Manage virtual disks
- Set controller attributes
- Change RAID-ready states of the physical disk drives

NIC Configuration

Network Interface Controller (NIC) configuration feature is used to set up or modify configuration settings for supported NIC cards (for example, Intel, Qlogic, and Broadcom). These configuration settings can be set or updated both locally and remotely using Lifecycle Controller-Remote Services.

The NICs supported by Lifecycle Controller provide an array of networking features converged into a single controller:

- Traditional NIC capabilities
- Internet Small Computer System Interface over Ethernet (iSCSI) capabilities
- Fibre Channel over Ethernet (FCoE) capabilities

You can configure various device capabilities such as:

- Personalities (FCoE, ISOE, Layer 2 NIC)
- NIC partition bandwidth allocation
- Boot versus Offload
- I/O Identity

Operating System Deployment

The operating system deployment feature is used to remotely deploy and manage an operating system using WSMAN Web services protocols that use CIFS and NFS network file sharing protocols. Remote activation of local exposure of embedded drivers as a USB drive eliminates the need for physical media.

You can perform the following operations:

- Get installed Driver Pack version and list of supported operating systems.
- Remote activation of local exposure of embedded drivers for the selected operating system as an emulated USB device to the server that is automatically installed during installation.
- Remote acquisition for embedded drivers for the selected operating system to a CIFS or NFS network share that can be used later for operating system deployment.
- Boot to an ISO image located on a CIFS or and NFS network share to initiate an operating system installation.
- Download ISO to vFlash SD card and boot from the card to initiate an operating system installation.
- Connecting an ISO from CIFS or NFS network share, attaching it as virtual USB CD-ROM device to the server, and booting the server to the ISO, every time the server restarts.
- One time boot to PXE.
- One time boot to hard disk.

- Get the list of MAC Addresses of all the NICs present on the server.

System Configuration XML

System configuration XML file contains the component configuration information, and this file is used to apply the configuration for BIOS, iDRAC, RAID, and NIC by importing the file into a target system. For more information, see *XML Configuration Workflow* white paper.

Monitor

Using various Lifecycle Controller-Remote Services capabilities, you can monitor a system throughout its lifecycle. Current and factory-shipped hardware inventory, Lifecycle Log, System Event Log, Firmware Inventory are some of the features that help you monitor the system.

Hardware Inventory

The hardware inventory information is cached on the Lifecycle Controller—persistent storage and is available to iDRAC and UEFI applications. It is used to export the hardware inventory from Lifecycle Controller to a text file on a remote share.

You can remotely query the inventory of hardware components. Each hardware inventory classes contains important attributes about the hardware itself.

For example, the `LastSystemInventoryTime` attribute identifies when the last time a Collect System Inventory on Restart (CSIOR) was run. It is an important attribute as it indicates how recently the inventory was updated.

Hardware inventory and configuration information is available for the following components:

- Power Supply
- Fan
- Memory
- CPU
- iDRAC
- PCI Device
- Video Card
- vFlash SD Card
- NIC
- RAID
- BIOS
- System
- Sensor

Lifecycle Log

Lifecycle logs contain entries for configuration and firmware updates of BIOS, Storage Controllers, LOMs, and add-in NIC cards, if supported. The Lifecycle Log can be exported to a network share or saved to a USB drive. The lifecycle log is accessible through the iDRAC7 Web interface, RACADM, and WSMAN interface.

Lifecycle log provides the following information:

- iDRAC configuration changes

- Logs of all the remote operations
- Firmware update history based on device, version, and date.
- BIOS and NIC configuration changes.
- RAID configuration changes.
- Error message IDs. For more information, see *Dell Event Message Reference Guide* at dell.com/support/manuals.

System Event Log

The Lifecycle log contains events related to system, storage devices, network devices, firmware updates, configuration changes, license messages, and so on. However, the system events are also available as a separate log called System Event Log (SEL).

When a system event occurs on a managed system, it is recorded in the SEL. The same SEL entry is also available in the Lifecycle Log.

Firmware Inventory

Lifecycle Controller-Remote Services provides information about each of the component firmware installed on the target system and the available firmware images cached in Lifecycle Controller.

Additional information contained in the available properties are:

- Firmware type
- Firmware version
- Installation Date
- Vendor IDs
- Revision Number

Event Alerts

Alerts and actions can be set for certain events that occur on a managed system. An event occurs when the status of a system component has changed with respect to the pre-defined condition. If an event matches an event filter and this filter is configured to generate an alert (e-mail, SNMP trap, or IPMI alert), an alert is sent to one or more configured destinations. If the same event filter is also configured to perform an action (such as reboot, power cycle, or power off the system), the action is performed. You can set only one action for an event.

Maintain

Using various Lifecycle Controller-Remote Services capabilities, you can maintain the health of a system throughout its lifecycle. You can use features such as remote firmware management, part replacement, server profile import or export, and auto-discovery to maintain a system using Lifecycle Controller-Remote Services.

Firmware Update

You can perform firmware updates from a network source to either update or rollback component firmware. A rollback operation is used to install the previous version of a component firmware.



NOTE: There are some components for which the updates are immediately applied after the firmware is downloaded, after which the system automatically restarts.

The firmware update operations or firmware rollback operations are performed in the following order:

1. Initiate and download the image.
2. Create a reboot job.
3. Schedule the update job.
4. Monitor the job until finished.

Part Replacement

The Part Replacement feature is used to automatically update a firmware, configuration, or both for a newly-replaced component, such as a RAID controller, NIC, or power supply, to match with the original part. It is a licensed feature that is disabled by default, and can be enabled if required.

When a component is replaced and the part replacement feature is enabled, the actions performed by Lifecycle Controller-Remote Services is locally displayed on the system monitor. You can remotely configure part replacement-related properties through the Web services interface using the WSMAN protocol.

System Configuration XML - Export or Import

Lifecycle Controller-Remote Services can export or import a System Configuration XML file. The export operation collects the configuration information for BIOS, iDRAC, RAID, NIC and Lifecycle Controller and stores it in a single file that is copied to a network share. The import operation imports the file from a network share, and applies the previously-saved or updated configurations to a system. For more information, see *XML Configuration Workflow* white paper.

Server Profile - Export or Import

Lifecycle Controller-Remote Services can export (backup) or import (restore) the server profile of the host system. These operations are commonly used during motherboard replacement.

The export feature gathers system information, firmware images, hardware configuration, Lifecycle Controller configuration, iDRAC firmware and configuration, and stores the information to a single file located on the local vFlash SD card or a remote network share. The import feature applies the saved configurations to a system from the local vFlash SD card, or from a network share.

Auto-Discovery

The Auto-Discovery feature in iDRAC allows newly-installed servers to automatically discover the remote management console that hosts the Provisioning Server. The Provisioning Server provides custom administrative user credentials to iDRAC so that the management console can discover and manage the newly-installed managed system.

If you ordered a Dell system with the Auto-Discovery feature Enabled (factory default setting is Disabled), then iDRAC is delivered with DHCP enabled and user accounts disabled. If the auto-discovery feature is disabled, you can manually enable this feature and disable the default administrative account using the **iDRAC7 Settings** utility. For more information about the iDRAC Settings utility, see *iDRAC7 User's Guide*.

For more information on auto-discovery, see the *Lifecycle Controller Management* profile.

Job Management

The Lifecycle controller has the capability to create, schedule, track, and manage system management tasks that are referred to as "jobs".

A single job or array of jobs can be run immediately or scheduled to run at a later time. Multiple jobs are listed in the order of job execution sequence. If a system must reboot at the scheduled start time, a reboot job needs to be added to the list.

Remote Services provides the following functions to manage Lifecycle Controller jobs:

- **Creating Jobs** — Create specific types of jobs to apply configurations.
- **Scheduling Jobs and Job Queues** — Run multiple jobs in a single restart of the system using the `SetupJobQueue()` method. If a job is created without setting the start time, use the `SetupJobQueue()` method to set the schedule and order of execution. The job is setup for execution at the time that was specified.
- **Deleting Jobs** — Delete a specified existing job or all jobs at once.
- **Reporting all Jobs** — All jobs are reported using a single command.
- **Reporting scheduled Jobs** — A selection filter of “`JobStatus=Scheduled`” can be used to generate a report of all the scheduled jobs.

Job Types

There are two types of jobs, system-created jobs (implicit) and user-created jobs (explicit):

- **System-created jobs** are created when you run specific Remote Services tasks. For example, Remote Services features such as export hardware inventory, export license, create persistent storage partition, and so on create a job and return the job ID. Polling the job status determines the completion status of the task.
- **User-created jobs** such as `CreateTargetedConfigJob`, `CreateRebootJob`, and `InstallFromURI` are used to apply user configurations for RAID, NIC, BIOS, and so on. They can be scheduled to run immediately or at a scheduled time.

Table 1. System and User Created Jobs

System-created Jobs	User-created Jobs
<ul style="list-style-type: none"> • Export Factory Configuration • Export Hardware Inventory • Export Lifecycle log • vFlash (Initialize) • vFlash (Create Partition) • vFlash (Format Partition) • vFlash (Attach Partition) • vFlash (Detach Partition) • vFlash (Export Data from Partition) • vFlash (Create Partition using Image) 	<ul style="list-style-type: none"> • RAID configuration • BIOS configuration • NIC configuration • iDRAC configuration • System configuration • Software update (BIOS, NIC, RAID, and so on) • Reboot

System Status

The feature is used to remotely obtain the overall Remote Services API status that includes both the host system status and as well as the remote services (Data Manager) status. The overall status is displayed in the Status output parameter.

After the job is complete in Automated Task Application (previously SSM), the job status is immediately updated in the job store. The job is immediately moved to the Completed state after it is complete in the Automated Task Application. After the job is completed, synchronization occurs in the configDB and refreshes all the required populators. When this operation is successful, the system is in the *Ready* state.

Getting Started with API Collateral and Links

Getting started with any feature of Lifecycle Controller begins at the Dell Tech Center Lifecycle Controller home page — delltechcenter.com/LC.

The home page contains various sections that reference URLs, and these referenced URLs are direct links to the corresponding sections.

You can follow these steps to get started using the Lifecycle Controller API:

1. Identify the feature or the required management operation.
2. Determine how the API is constructed for the desired management activity.
3. Utilize a client to access the API.
4. Use the best practices work flows for the client to interact with the API to accomplish the activity.

Profiles

Profiles describe the behavior of each feature and necessary classes, properties, methods, and configurable management attributes that represent the feature. They explain “what” is supported by Lifecycle Controller-Remote Services provided within the context of the CIM architecture.

Profile specifications are organized around different management areas or domains.

 **NOTE:** To access the profiles, from the Dell TechCenter (delltechcenter.com/LC) page, under the **Reference Specifications**, click **Profiles**. Alternatively, go to en.community.dell.com/techcenter/systems-management/w/wiki/1906.aspx

Table 2. Profiles

Profile Name	Description
Active Directory	The Active Directory Client Profile extends the management capabilities of referencing profiles by adding the capability to represent the configuration of Active Directory client service and the groups managed by the service.
Base Metrics	The DCIM Base Metrics Profile extends the DMTF Base Metrics Profile to add Dell-specific implementation requirements for power-related metrics. The profile standardizes the units and description for the metrics, and provides static methodology for the clients to query the metrics without substantial traversal of the model.
Base Server and Physical Asset	The Base Server Profile is the autonomous profile that defines the classes used to describe basic server hardware and its related software.
BIOS and Boot Management	The BIOS and Boot Management Profile extends the management capabilities of referencing profiles by adding the capability to represent the configuration of the system BIOS setup and to manage the boot of the system.
CPU	The DCIM CPU Profile describes the properties and interfaces for executing system management tasks related to the management of processors within a system.

Profile Name	Description
Ethernet Port	The Ethernet Port Profile extends the management capability of referencing profiles by adding the ability to represent an Ethernet port, its associated controller, and Ethernet interfaces.
Event Filter	The Dell Event Filter Profile provides the management capabilities to view the event filters and set actions and notifications for the events.
Fan	The DCIM Fan Profile describes the properties and interfaces for executing system management tasks related to the management of fans within a system.
iDRAC Card	The DCIM iDRAC Card Profile describes the properties and interfaces for executing system management tasks related to the management of basic properties of iDRAC card.
Job Control	The Job Control Profile extends the management capabilities of referencing profiles by adding the capability to create, schedule, track, and manage jobs that represent platform management operations.
LC Management	The Lifecycle Controller (LC) Management Profile describes the management of the Dell Lifecycle Controller and its configuration attributes.
License Management	The License Management Profile is an autonomous profile for modeling the Dell Product License Manager (License Manager). It extends the management capabilities of referencing profiles by adding the capability to represent the devices and Licenses managed by the Dell Product Licensing Manager.
Memory	The DCIM Memory Profile describes the properties and interfaces for executing system management tasks related to the management of memories (DIMMs) within a system.
OS Deployment	OS deployment profile describes how to remotely download, setup, and monitor an operating system on a bare metal machine.
PCI	The DCIM PCI Device Profile describes the properties and interfaces for executing system management tasks related to the management of PCI devices within a system.
Persistent Storage	The Persistent Storage Profile extends the management capabilities of referencing profiles by adding the capability to represent and manage the partitions on the Virtual flash media on Dell platforms.
Power State Management	The Power State Management Profile describes the classes, associations, properties, and methods used to manage the power of a system.
Power Supply	The DCIM Power Supply Profile describes the properties and interfaces for executing system management tasks related to the management of power supplies within a system.
Profile Registration	The DCIM Profile Registration Profile defines the classes used to describe the DCIM and DMTF profile registration and the version information of the profiles advertised as implemented for a managed system and components of the system.
Profile Registration	The DCIM Profile Registration Profile defines the classes used to describe the DCIM and DMTF profile registration and the version information of the profiles advertised as implemented for a managed system and components of the system.
RAID	The RAID Profile extends the management capabilities of referencing profiles by adding the capability to represent the configuration of RAID storage.
Record Log	The DCIM Record Log Profile provides the management capabilities to represent logs of a managed system element.

Profile Name	Description
Role Based Authorization	The DCIM Role Based Authorization Profile describes the properties and interfaces for executing system management tasks related to the authorization.
Sensors	The DCIM Sensors Profile describes the properties and interfaces for executing system management tasks related to the management of sensors within a system.
Simple ID Management	The DCIM Simple Identity Management Profile describes the properties and interfaces for executing system management tasks related to the management of accounts and identities.
Service Processor	The DCIM Service Processor Profile describes the properties and interfaces for executing system management tasks related to the management of the service processor and iDRAC.
Simple NIC	The Simple NIC Profile extends the management capabilities of referencing profiles by adding the capability to represent the configuration of NIC network controllers.
Software Inventory	The Dell Software Inventory Profile extends the management capabilities of referencing profiles by adding the capability to represent the software inventory of system.
Software Update	The Software Update Profile extends the management capabilities of referencing profiles by adding the capability to update platform firmware or software.
System Info	The DCIM System Info Profile describes the properties and interfaces for executing system management tasks related to the management of the host system.
Video	The DCIM Video Profile describes the properties and interfaces for executing system management tasks related to the management of video controllers within a system.
Virtual Media	The DCIM Virtual Media Profile describes the properties for executing system management tasks related to managing the Virtual Media functionality.

MOF WSDL and XSD API Definitions

A complement to the profile documentation is the MOF files that document the class implementation of the Dell-specific CIM classes. WSDL and XSD files describe the resulting functionality.

Managed Object File

The Common Information Model (CIM) is an open standard that defines how managed elements in an IT environment are represented as a common set of objects and relationships between them. This is intended to allow consistent management of these managed elements, independent of their manufacturer or provider.

Files that contain the normative description for classes, properties, and methods are contained within the Managed Object File (MOF).



NOTE: To access the MOFs, on the Dell TechCenter (delltechcenter.com/LC) page, under **Reference Specifications**, click **MOFs**.

Web Service Description Language (WSDL)

The Web Services Description Language is an XML-based language that is used for describing the functionality offered by a Web service. A WSDL description of a web service (also referred to as a WSDL file) provides a machine-readable description of how the service can be called, what parameters it expects, and what data structures it returns.

XML Schema Description

An XML schema (also known as XSD) is a description of a type of XML document, typically expressed in terms of constraints on the structure and content of documents of that type, above and beyond the basic syntactical constraints imposed by XML itself. These constraints are generally expressed using some combination of grammatical rules governing the order of elements.

 **NOTE:** To access the XSD, use the link en.community.dell.com/dell-groups/dtcmedia/m/mediagallery/20074445.aspx

Web Services Interface Guide

The Web Services Interface Guide (WSIG) serves as a guideline for utilizing the functionality available from embedded Lifecycle Controller Remote Services Web Services interfaces. It provides information and examples for utilizing the Web services for WSMAN protocol using Windows WinRM and open source WSMANCLI command line utilities.

- Windows Version — en.community.dell.com/techcenter/extras/m/white_papers/20066174.aspx
- Windows batch file examples — en.community.dell.com/techcenter/extras/m/white_papers/20066179.aspx
- Linux Version — en.community.dell.com/techcenter/extras/m/white_papers/20066176.aspx
- Linux WSMAN shell script examples — en.community.dell.com/techcenter/extras/m/white_papers/20066181.aspx

Best Practices Guide

The *Best Practices Guide* provides the work flows that group smaller WSMAN operations to achieve a particular task. To access the *Best Practices Guide*, from the Dell TechCenter (delltechcenter.com/LC) page, under the **Web Services Integration Tools**, click **Best Practices Guide**. Alternatively, go to en.community.dell.com/techcenter/extras/m/white_papers/20066173.aspx

Sample scripts corresponding to all sections in the document are also provided, using WinRM on Windows and wsmancli on Linux.

The *Best Practice Guide* contains the detailed instructions of common work flows to perform various tasks utilizing WinRM or WSMAN. The PYTHON scripting language is used to provide a software development kit (SDK) for the Lifecycle Controller API methods. The following primary objectives are addressed through the SDK:

- Work flows documented in the *Best Practices Guide* provide guidance to established, known, and working API methodologies.
- The corresponding PYTHON sample scripts are separately provided. After invoking these scripts, the output log can be used to provide approximate timing on a particular system configuration, as well as raw WinRM or WSMAN input and output.

 **NOTE:** The scripts are located here — en.community.dell.com/techcenter/extras/m/white_papers/20066173.aspx

Attribute Registry XML

The attribute registry lists all the attributes and properties for the particular component in XML format. The attribute registries are located in the following locations:

- RAID Attribute Registry — en.community.dell.com/techcenter/extras/m/white_papers/20066218.aspx
- NIC Attribute Registry — en.community.dell.com/techcenter/extras/m/white_papers/20066216.aspx
- iDRAC Attribute Registry — en.community.dell.com/techcenter/extras/m/white_papers/20066215.aspx

- BIOS Attribute Registry — en.community.dell.com/techcenter/extras/m/white_papers/20066214.aspx

Event Message Registry XML


The message registry XML describes all messages, message IDs, and message arguments from all profiles.

This zipped file contains the iDRAC and Lifecycle Controller event and error message data in XML, conforming to the DMTF DSP0228 message registry XML schema. The zipped file also includes an XSL file provided by Dell that enables content searching and reading easier.

- The link en.community.dell.com/dell-groups/dtcmmedia/m/mediagallery/20113623.aspx provides the *Dell Event Message Reference* document. The Event Message Reference document contains the error and event information generated by firmware and other agents that monitor system components. These events are logged and displayed to the user on one of the system management consoles, or both logged and displayed.
- The link support.dell.com/support/edocs/software/smsom/7.2/en/eventmsg provides the overall messages and related details for the events generated by most of Dell's systems management tools in the PDF format.

XML Schemas


The *Lifecycle Controller XML Schema Guide* provides interpretation of XML used by the Lifecycle Controller to describe various Lifecycle Controller output XML content such as:

 **NOTE:** To access the *Lifecycle Controller XML Schema Guide*, use the link en.community.dell.com/dell-groups/dtcmmedia/m/mediagallery/20074445.aspx

- Logs
- Configuration results
- Hardware Inventory
- Attributes

Authorization and Licensing Requirements for API Access

There are four levels of iDRAC licensing:

 **NOTE:** Use the link en.community.dell.com/techcenter/extras/m/white_papers/20067632.aspx to download the *WSMAN License and Privilege Specification* white paper.

- Basic
- Express (Monolithic)
- Express for blades (Modular)
- Enterprise

Table 3. Licensing

Feature	Base Management with IPMI	iDRAC7 Express	iDRAC7 Express for Blades	iDRAC7 Enterprise
Firmware Update	Yes	Yes	Yes	Yes
Operating System Deployment	Yes	Yes	Yes	Yes
Device Configuration	Yes	Yes	Yes	Yes

Feature	Base Management with IPMI	iDRAC7 Express	iDRAC7 Express for Blades	iDRAC7 Enterprise
Diagnostics	Yes	Yes	Yes	Yes
Server Profile Export and Import	-	-	-	Yes
Part Replacement	-	-	-	Yes
Local Updates	Yes	Yes	Yes	Yes
Driver Packs	Yes	Yes	Yes	Yes
Remote Services (through WSMAN)	Yes	Yes	Yes	Yes

White Papers

To access the following white papers, go to delltechcenter.com/LC:

- Converged Network Adapters with NIC, iSCSI and FCoE Support
- iDRAC Cloning Script
- FCoE Boot Configuration Setup on Intel Card
- Remote NIC Configuration Management
- How to Build Inventory Reports
- Programmatic Scripting with WSMAN
- Lifecycle Controller Platform Update in Dell PowerEdge 12th Generation Servers
- Scripting WSMAN to Deploy OS using Remote ISO Image to Stage and Boot
- Scripting WSMAN to Deploy OS Drivers
- Scripting WSMAN to Deploy OS using vFlash to Stage and Boot to ISO
- Updating BIOS on Dell 12G PowerEdge Servers
- Hardware Inventory Viewing Script
- Import and Export Server Profiles
- vFlash Overview
- Managing vFlash via USCGUI
- vFlash Partition Management
- Remote Firmware Update
- iDRAC7 Network and Virtual Media Performance
- Configuring iDRAC6 for Directory Services
- Public Key Infrastructure in iDRAC
- Using Dell vFlash
- Dell Systems Management for Server Deployment

Integrating the Lifecycle Controller API

This section outlines the resources required to integrate the Lifecycle Controller API into an application:

- [API Clients](#) – Lists the API clients that are available to support WinRM or WSMAN. The API clients enable a you to create an application in a variety of programming languages.
- [Best Practices Guide](#) — Provides information about the common work flows, where in ready-to-use Python scripts are provided for all the common work flows.
- [Sample Scripts and Tools](#) — Provides additional working examples and reference.
- [Applications Using Lifecycle Controller-Remote Services](#) — Lists several existing applications that are already integrated with the Lifecycle Controller API.
- [WinRM and OpenWSMAN Installation and Configuration](#) — Identifies resources for configuring WinRM and WSMAN.

API Clients

The links to various API clients:

- WinRM Scripting API, MSDN — [msdn.microsoft.com/en-us/library/aa384469\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/aa384469(VS.85).aspx)
- Openwsman CLI — openwsman.org/project/wsmancli
- Windows PowerShell blog — blogs.msdn.com/PowerShell
- Windows PowerShell ScriptCenter — microsoft.com/technet/scriptcenter/hubs/msh.mspix
- Ruby bindings for WSMAN — rwsman.rubyforge.org
- Recite - Interactive WSMAN Scripting Environment — en.community.dell.com/techcenter/systems-management/w/wiki/3757.recite-interactive-ws-man-scripting-environment.aspx
- Intel® WSMAN Java Client Library — software.intel.com/en-us/articles/download-the-latest-intel-ws-management-java-client-library

Best Practices Workflow References

For more information, see [Best Practices Guide](#)

Sample Scripts and Tools

A few sample scripts to use Lifecycle Controller API are available for use with **Recite**. Recite is a Python based tool that provides a simple and fast interface for using the Dell Lifecycle Controller API. It has an interactive mode that is useful to run a single command on a server or run batch commands to automate the sequence of operations.

- Interactive Recite environment — en.community.dell.com/techcenter/systems-management/w/wiki/3757.recite-interactive-ws-man-scripting-environment.aspx
- Other scripting examples — en.community.dell.com/techcenter/systems-management/w/wiki/1981.scripting-the-dell-lifecycle-controller.aspx

Applications Using Lifecycle Controller-Remote Services

The following applications use Lifecycle Controller-Remote Services

- Dell Compellent | Fluid Data Network Storage Solution — compellent.com
- Dell Lifecycle Controller Integration v2.0 for System Center Configuration Manager — dell.com/support/drivers/us/en/555/DriverDetails/DriverFileFormats?DriverId=Y6J43
- Virtual Integrated System (VIS) — dell.com/content/topics/topic.aspx/global/products/landing/en/virtual-integrated-system?c=us&l=en
- OpenManage Essentials - Systems Management — en.community.dell.com/techcenter/systems-management/w/wiki/1989.openmanage-essentials.aspx
- Chassis Management Controller (CMC) — en.community.dell.com/techcenter/systems-management/w/wiki/1987.dell-chassis-management-controller.aspx

WinRM and OpenWSMAN Installation and Configuration

It is recommended to use WinRM 2.0 on Windows Management Stations. WinRM 2.0 is installed by default as a part of Windows 7 and Windows Server 2008 R2. It can also be installed as a part of the Windows Management Framework Core package on the following operating systems:

- Windows Server 2008 SP1
- Windows Server 2008 SP2
- Windows Server 2003 SP2
- Windows Vista SP1
- Windows Vista SP2
- Windows XP SP3

For more information on how to install WinRM 2.0 as a part of the Windows Management Framework Core package, see article 968929 in the Microsoft Knowledge Base at go.microsoft.com/fwlink/?LinkId=186253.

To install and configure Windows Remote Management, see [msdn.microsoft.com/en-us/library/windows/desktop/aa384372\(v=vs.85\).aspx](http://msdn.microsoft.com/en-us/library/windows/desktop/aa384372(v=vs.85).aspx).

OpenWSMAN CLI is an open source Linux WS-MAN client. The OpenWSMAN CLI source code and installation information are available at sourceforge.net/projects/openwsman/files/wsmancli.

Social Media Reference

To obtain the most up-to-date information, go to the **Dell Tech Center** and search for the required information.

Lifecycle Controller Technical Learning Series

Dell's 12th generation PowerEdge servers (content.dell.com/us/en/corp/d/corp-comm/power-edge-servers) are shipped with the second generation of embedded server management, iDRAC7 with Lifecycle Controller (en.community.dell.com/techcenter/b/techcenter/archive/2012/08/02/idrac7-with-lifecycle-controller.aspx). This blog begins with a technical learning series about how Dell's embedded server management solution can help you manage PowerEdge servers in physical, virtual, local, and remote environments, operating in-band and out-of-band; with or without an agent.



NOTE: To navigate through the series, you can use the topics listed in the link provided above as an index, that you can refer to whenever the series is updated.

Terms and Definitions

The following table lists the terms used in this document and their definitions.

Term	Definition
LC	Lifecycle Controller
Enumerate	Refers to WSMAN ENUMERATE operation as described in Section 8.2 of DSP0226_V1.1 and Section 9.1 of DSP0227_V1.0
Get	Refers to WSMAN GET operation as defined in Section 7.3 of DSP00226_V1.1 and Section 7.1 of DSP0227_V1.0
iDRAC	Integrated Dell Remote Access Controller management controller for blades and monolithic servers.
USC	Unified Server Configurator
iSCSI	Internet Small Computer System Interface, an Internet Protocol (IP) based storage networking standard for linking data storage facilities.
SSM	System Services Manager
CSIOR	Collect System Inventory on Restart
SSIB	System Services Information Block
UEFI	Unified Extensible Firmware Interface
BIOS	Basic Input/Output System
NIC	Network Interface Controller
FQDD	Fully Qualified Device Description
LCL	Lifecycle Log
WSIG	Web Services Interface Guide