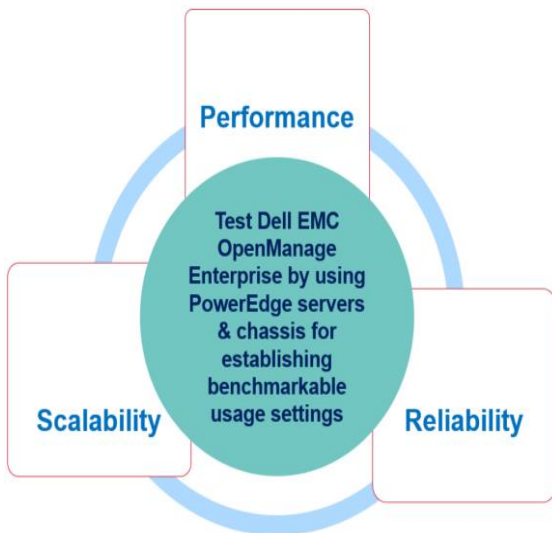


Benchmark the Performance, Reliability, and Scalability of Dell EMC OpenManage Enterprise 3.2 in your data center environment

This technical white paper provides information about best practices that you can use as the benchmark for using Dell EMC OpenManage Enterprise 3.2 to optimize the usage of servers and chassis.



Abstract

This technical white paper provides information about the best practices you can adopt while using the following features of Dell EMC OpenManage Enterprise 3.2—discovery, inventory, health monitoring, firmware upgrade, and configuration and deployment.

To minimize your efforts to read, where possible, information is provided in the form of infographics.

Where available, direct links to the micro-video URLs are provided to demonstrate the tasks of using OpenManage Enterprise.

August 2019

Revisions

Date	Description
Feb 2019	Initial release
August 2019	Revision 1

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Contents

- Revisions.....2
- Acknowledgements.....2
- Acronyms5
- Executive summary.....6
- 1 Impact of hardware on the performance of OpenManage Enterprise 3.2 in PowerEdge servers and MX7000 chassis
7
- 2 OpenManage Enterprise 3.2 features tested8
 - 2.1 Configurations used for testing the Scalability and Performance of OpenManage Enterprise 3.28
 - 2.2 Load parameters defined in various tables9
 - 2.3 General recommendations for testing scalability and performance of OpenManage Enterprise 3.2.....9
 - 2.4 Test results for deployment of OpenManage Enterprise 3.2.....10
- 3 Scalability and performance test results of OpenManage Enterprise 3.2 (on multiple PowerEdge servers)11
 - 3.1 Test setup and results of the Discovery and Inventory feature in OpenManage Enterprise 3.2.....11
 - 3.1.1 Recommendations for setting an environment to test the Discovery and Inventory feature in OpenManage Enterprise 3.211
 - 3.1.2 Test environment and results of the Discovery and Inventory feature in OpenManage Enterprise 3.2.....11
 - 3.2 Test setup and results of the Firmware Upgrade feature in OpenManage Enterprise 3.2.....14
 - 3.2.1 Recommendations for setting an environment to test the Firmware Upgrade feature in OpenManage Enterprise 3.214
 - 3.2.2 Test environment and results of the Firmware Upgrade feature in OpenManage Enterprise 3.214
 - 3.3 Test setup and results of the Configuration Inventory feature in OpenManage Enterprise 3.216
 - 3.3.1 Recommendations for setting an environment to test the Configuration Inventory feature in OpenManage Enterprise 3.216
 - 3.3.2 Test environment and results of the Configuration Inventory feature in OpenManage Enterprise 3.216
 - 3.4 Test setup and results of the Alert and Task Management feature in OpenManage Enterprise 3.217
- 4 Scalability and performance test results of OpenManage Enterprise 3.2 (tested on a single PowerEdge server) ...19
 - 4.1 Test setup and results of the Discovery, Inventory, and Status Poll feature in OpenManage Enterprise 3.2 (tested on a single server).....19
 - 4.2 Test setup and results of the Firmware Upgrade feature in OpenManage Enterprise 3.2 (tested on a single server)20
 - 4.3 Test setup and results of the Configuration Inventory and Deployment feature in OpenManage Enterprise 3.2
21
- 5 Scalability and performance test results of OpenManage Enterprise 3.2 (tested on 20 MX7000 chassis)22
 - 5.1 Test setup and results of the Discovery, Inventory, and Status Poll feature in OpenManage Enterprise 3.2 (tested on 20 MX7000 chassis).....22
 - 5.2 Test setup and results of the Firmware Upgrade feature in OpenManage Enterprise 3.2 (tested on a single MX7000 chassis)23

- 5.3 Test setup and results of the Configuration Inventory and Deployment feature in OpenManage Enterprise 3.2 (tested on a single MX7000 chassis)24
- 5.4 Test results of the Configuration Inventory and Deployment feature in OpenManage Enterprise 3.2 (tested on a single MX7000 chassis)25
- 6 Longevity Test results for OpenManage Enterprise 3.2.....26
 - 6.1 Longevity test configuration for OpenManage Enterprise 3.226
 - 6.2 Longevity test results for OpenManage Enterprise 3.227
 - 6.3 Test results of REST API in a longevity setup in OpenManage Enterprise 3.228
 - 7.1 Role-based user privileges in Dell EMC OpenManage Enterprise 3.231
 - 7.2 Dell EMC OpenManage Enterprise Firmware Update Support Matrix32
 - 7.3 Troubleshooting issues in Dell EMC OpenManage Enterprise when performing firmware update on target devices33
- A Technical support and resources38
 - A.1 Related resources.....38
 - A.1.1 Contacting Dell EMC38
 - A.1.2 About Dell EMC OpenManage Enterprise.....38

Acronyms

Acronym	Expansion
AD	Active Directory
CLI	Command Line Interface
DNS	Domain Name System
DIMM	Dual In-line Memory Module
DRM	Dell EMC Repository Manager
DUP	Dell Update Package
FC	Fibre Channel
FCoE	Fibre Channel over Ethernet
FIPS	Federal Information Processing Standards
FQDD	Fully Qualified Device Descriptor
FTP	File Transfer Protocol
GUI	Graphical User Interface
HDD	Hard Disk Drive
iDRAC	Dell EMC Integrated Dell Remote Access Controller
IOM	Input-Output Module
iQN	iSCSI Qualified Name
iSM	iDRAC Service Module
LSB	Large Scale Business
MAC	Media Access Control
OMEM	OpenManage Enterprise Modular
PERC	Dell PowerEdge RAID Controller
SNMP	Simple Network Management Protocol
SSB	Small Scale Business
VLAN	Virtual Area Network
WAN	Wide Area Network
WWNN	World Wide Node Name
WWPN	World Wide Port Name

Executive summary

Dell EMC OpenManage Enterprise is a web-based hardware monitoring and management console that provides a comprehensive view of Dell EMC servers, chassis, network switches, other third-party devices, and components on the enterprise network. It is designed for the next generation IT professionals with a focus on simplicity, automation, and unification of data center management.

This technical white paper provides an overview of scalability, reliability, and performance of Dell EMC OpenManage Enterprise 3.2. It contains reports of test results that were used to assess the product quality, stability, and scalability of various features that include discovery, inventory, monitoring, firmware update, configuration, and deployment. This technical white paper also offers recommendations to achieve optimal performance as demonstrated by the test results.



You can also view the following videos to get more information about using the unmatched features of Dell EMC OpenManage Enterprise Graphical User Interface (GUI):

- [Creating a firmware baseline in Dell EMC OpenManage Enterprise](#) (01:22 m)
- [Dell EMC OpenManage Enterprise Systems Management Console](#) (02:02 m)
- [Dell EMC OpenManage Enterprise](#) (01:44 m)

Note—For more information about the field definitions involved in the tasks performed that are discussed in this technical white paper, see the Online Help documentation by clicking the ? symbol in the upper-right corner of that respective page. Else, you can also see the *Dell EMC OpenManage Enterprise User's Guide* available on the support site.

1 Impact of hardware on the performance of OpenManage Enterprise 3.2 in PowerEdge servers and MX7000 chassis

To optimize the setup and task schedule of your appliance, it is first necessary to understand how the hardware may affect performance. The appliance does most of the processing and stores all the data, so both the underlying hardware and the hardware allocated to the VM will be a limiting factor in the overall performance. Hardware must be prioritized by using the following guidelines:

- **Memory**—This will be a gating factor to the number and size (in devices) of tasks which can be run simultaneously. It is recommended to manually increase the RAM from the default—up to 32 GB—when running a max scale configuration to allow more concurrent processes.
- **CPU**—The appliance has multiple services that are responsible for running distinctive tasks by using different threads concurrently. Also, OpenManage Enterprise database activities are CPU-intensive. Therefore, it is also recommended to add more cores for better performance.
- **Network**—Majority of functionality in OpenManage Enterprise is based on network interactions from the appliance to devices. This information is then transmitted from the appliance to a client which is accessing it over the network.
 - **Network speed**—The speed of a network defines the responsiveness of appliance and its performance. The time taken to execute a job depends on the available bandwidth and delay that exists in a network.
 - **Timeout**—There are many different cases where network communication to the device may fail. Depending on the nature of the failure, this may be noticeable in the task performance. Especially, if this happens for many devices in the task (for example, for a discovery task). For a slower network or device, it is recommended to increase the timeout and number of 'retries' for a discovery job. Possible scenarios are listed here:
 - **Sparsely populated IP range in a discovery job**—Define the discovery range more granularly to avoid this. If it is possible, define a single discovery task with a list of IPs or ranges.
 - **Discovery uses incorrect credentials**—If the devices on your network must use different credentials, it is required to split these into separate ranges with the appropriate credentials.
 - **Device malfunctions or the protocol is disabled**—The task execution history may provide some details about a failure. This may require actions on the device to resolve.
 - **Device actions**—The time taken running different tasks—such as firmware update and configuration inventory—depends on the server generation, hardware inventory, and selected components.
- **Hard drive**—The default drive space requirements are mentioned for specific tests covered for the purpose of this technical white paper.

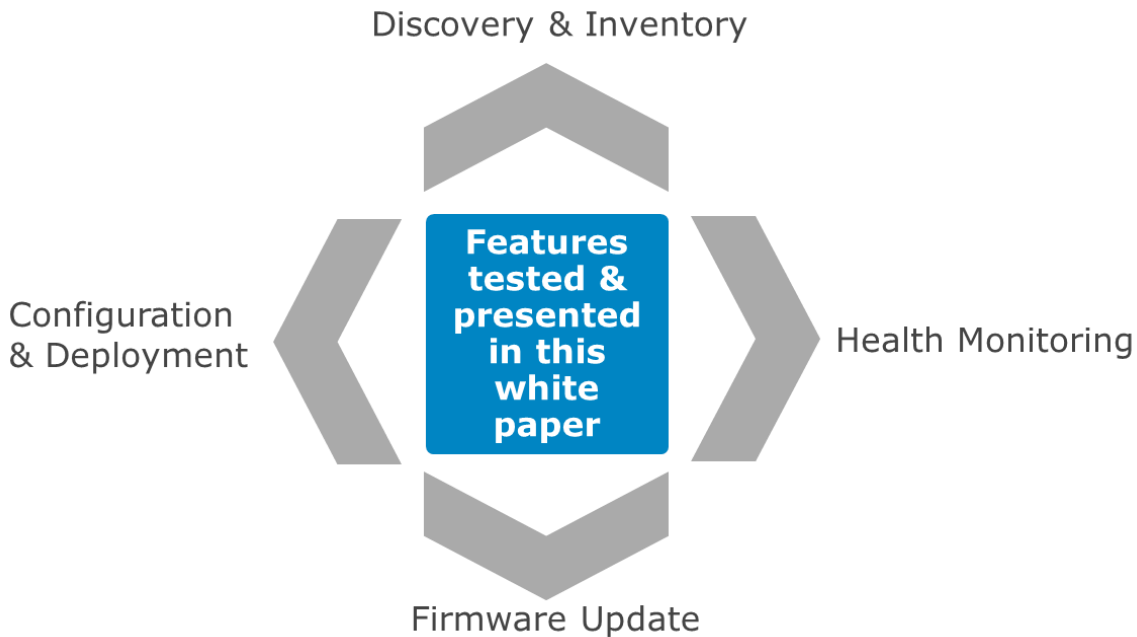
Overall, smaller scale configurations will have better performance, because they manage less data and will generally have fewer scheduled tasks running at the same time.

Multiple tasks running together have additional constraints, complexity, or dependencies which may not be immediately obvious but will impact performance numbers. The performance of OME for monitoring and managing FIPS-enabled iDRAC configuration (that have TLS 1.2 installed) is similar to the iDRACs that do not have FIPS enabled.

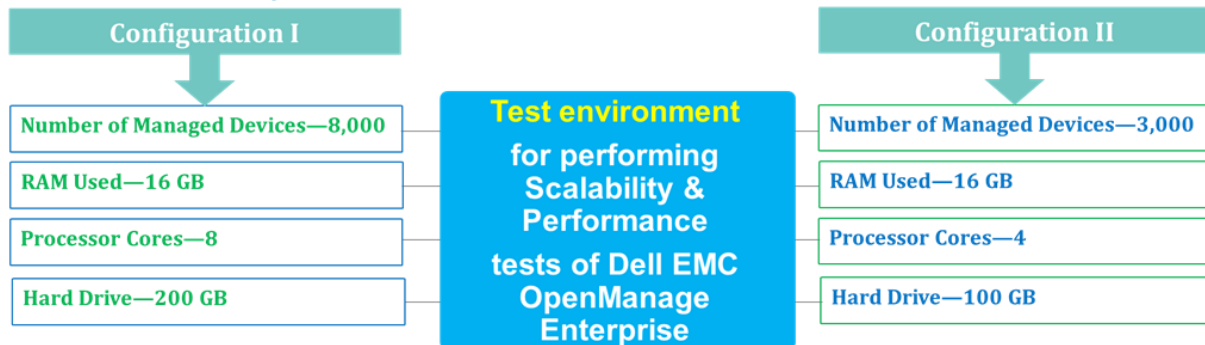
2 OpenManage Enterprise 3.2 features tested

Longevity and reliability tests were performed for a duration of three weeks where specific features were used at regular intervals. The main focus of scalability and performance test was to collect and analyze various performance parameters of OpenManage Enterprise 3.2 for the following features:

- Discovery and Inventory
- Health Monitoring
- Firmware Update
- Configuration and Deployment



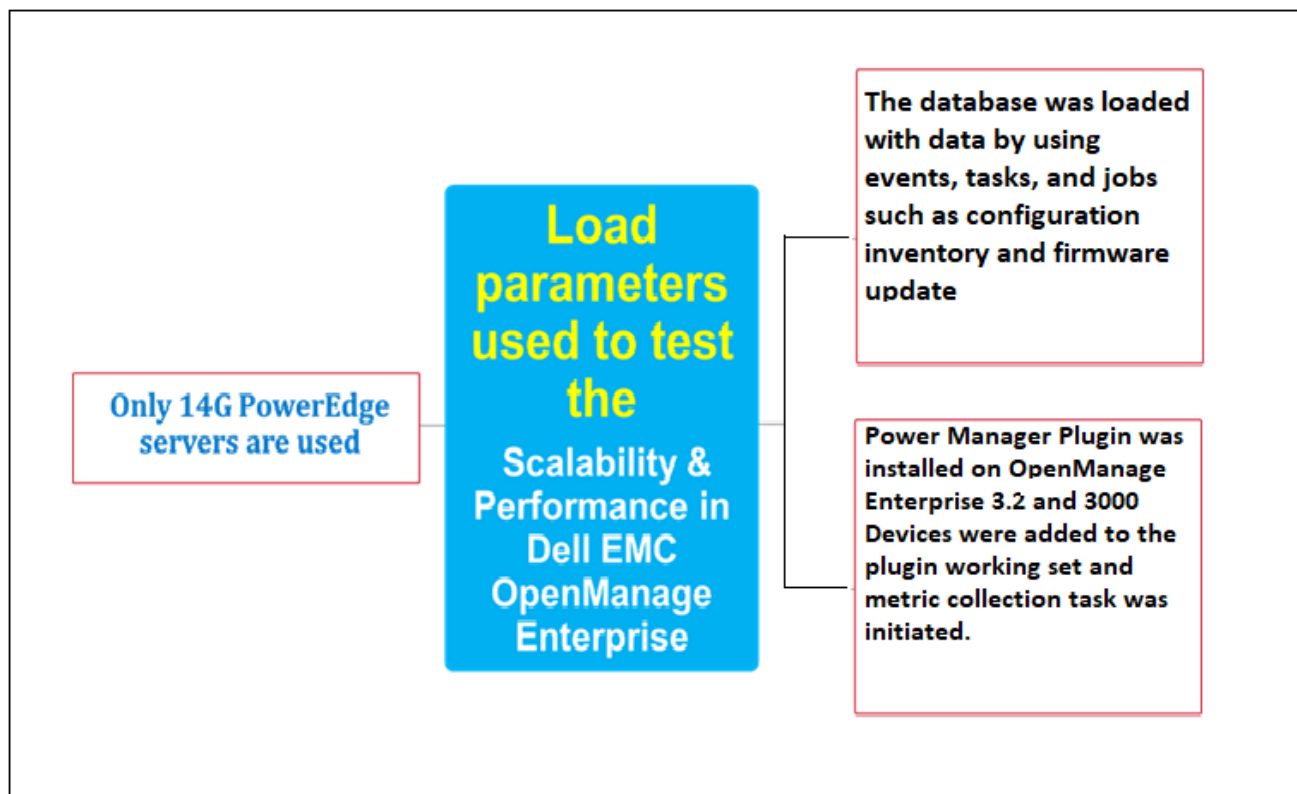
2.1 Configurations used for testing the Scalability and Performance of OpenManage Enterprise 3.2



2.2 Load parameters defined in various tables

The load parameters used for the test were to distinguish the performance of OpenManage Enterprise 3.2 under those parameters.

- 14th Generation servers—All the servers used for the feature test were 14G servers.
- Fully loaded appliance—The database was loaded with data by using events, tasks, and jobs such as configuration inventory and firmware update. After that, tests were performed for the specific features.
- Power Manager Plugin was installed on OpenManage Enterprise 3.2.
- 3,000 Devices were added to the plugin working set and metric collection task was initiated.



2.3 General recommendations for testing scalability and performance of OpenManage Enterprise 3.2

Based on the analysis of various tests performed, it is recommended to have the following minimal configurations for optimal performance:

- Minimum hardware configuration shown in section 2.1 must be used. Enhanced hardware specifications—such as increasing the processor core or RAM—will result in a better performance than described in this technical white paper.
- A DNS must be configured so that OpenManage Enterprise 3.2 is able to resolve the hostname of all the managed devices.

2.4 Test results for deployment of OpenManage Enterprise 3.2

Objective of this test is to verify the time taken to deploy Open Manage Enterprise 3.2 virtual appliance on an ESXi. OpenManage Enterprise 3.2 virtual appliance file size:

- OVF Size: 920 MB
- VHD Size: 877 MB
- KVM Size: 877 MB

ESXi setup information

- ESXi version–6.5.0 U1
- Server–PowerEdge R940
- Sockets–4
- Cores per socket–24

Table 1: Time breakup during deployment of Open Manage Enterprise appliance on ESXI

Sl. No.	Parameters	Time Taken	Comments
1	Virtual appliance (OVF) deployment	50 sec	OVF upload from local HDD to ESXI data store (dependent on network speed)
2	Installation till TUI screen to appear	3 min 30 sec	OS Image load and OM Enterprise packages installation
3	Basic IPV4 DHCP configuration & save changes (restart of services)	50 sec	Configure IP as DHCP/Static and Service restart time taken
4	Restart the Appliance till TUI screen appears	47 sec	N/A

3 Scalability and performance test results of OpenManage Enterprise 3.2 (on multiple PowerEdge servers)

3.1 Test setup and results of the Discovery and Inventory feature in OpenManage Enterprise 3.2

3.1.1 Recommendations for setting an environment to test the Discovery and Inventory feature in OpenManage Enterprise 3.2

Protocols	Select only the protocols necessary for a specific discovery and inventory task because selecting all the protocols causes the discovery and inventory task to run slowly.
Small range	For a faster discovery and inventory, it is recommended that the discovery jobs be split into smaller ranges of 1000 IP addresses.

3.1.2 Test environment and results of the Discovery and Inventory feature in OpenManage Enterprise 3.2

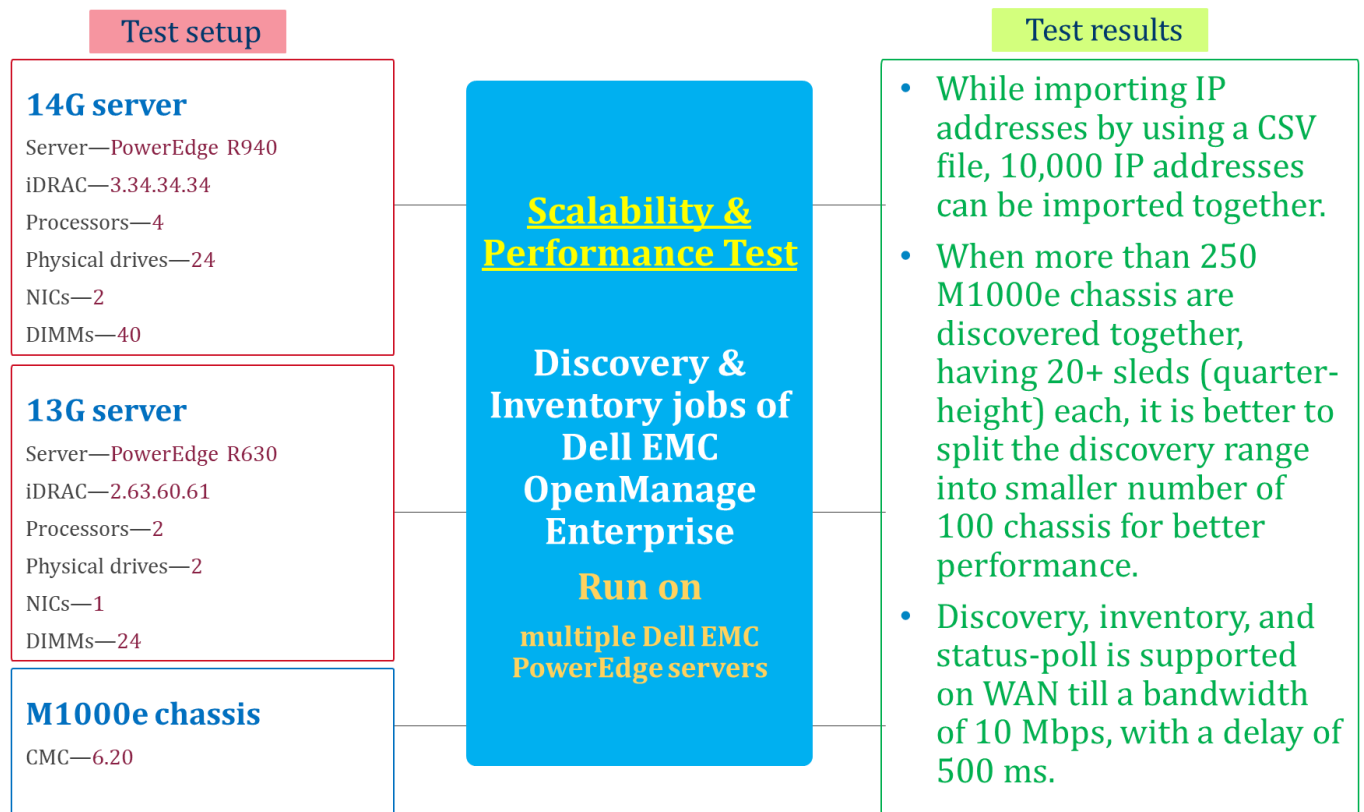
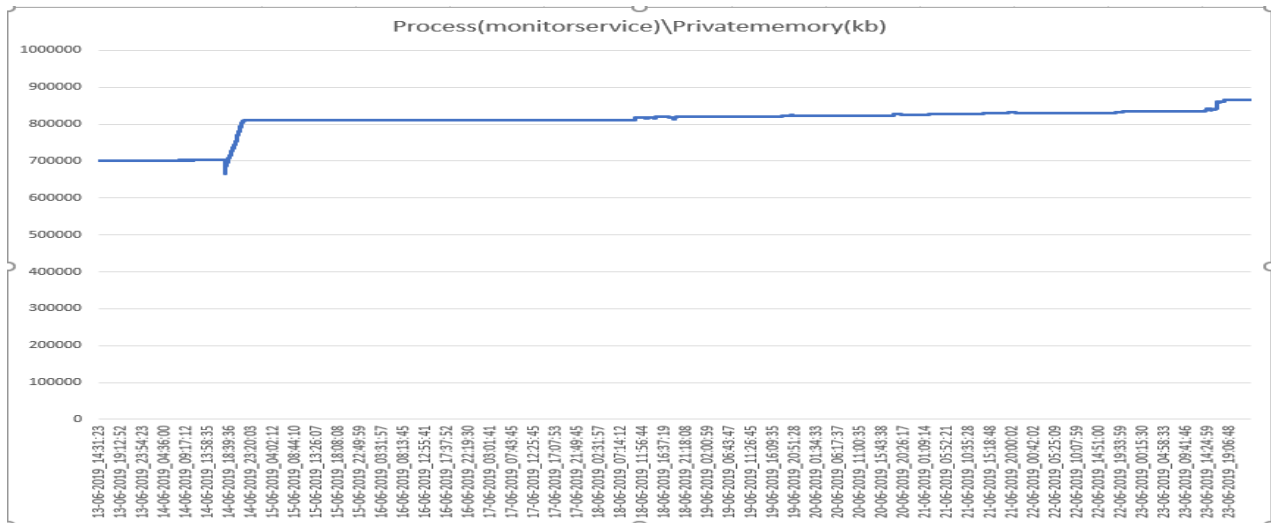


Table 1 Discovery and inventory of 8,000 servers by using WS-Man (Config I)

Protocol used for discovery	WS-Man	
Load Parameters	Without Power Manger Plugin	With Power Manger Plugin
Number of Servers Discovered	8,000 devices	8,000 devices
Time taken for the first discovery, inventory and onboarding	3 h 43 m	3 h 48 m
Time taken for rediscovery and onboarding	4 h	4 h 2m
Time taken for re-inventory	3 h 5 m	3 h 10 m
Time taken for status-poll	10 m	10 m

Table 2 Discovery and inventory of 3,000 servers by using WS-Man(Config II)

Protocol used for discovery	WS-Man	
Load Parameters	Without Power Manger Plugin	With Power Manger Plugin
Number of Servers Discovered	3,000 Devices	3,000 Devices
Time taken for the first discovery, inventory and onboarding	1 h 30 m	1 h 31m
Time taken for rediscovery and onboarding	1 h 32 m	1 h 33 m
Time taken for re-inventory	1 h 5 m	1 h 10m
Time taken for status-poll	4 m 30 s	4 m 30 s



Memory utilization while testing the Discovery, Inventory, and Status-poll features of Dell EMC OpenManage Enterprise 3.2 on multiple PowerEdge servers.

Note—The above tests were carried out with OpenManage Power Manager installed and 3,000 devices added to working set. No major deviation in performance were observed.

Table 2 Discovery and inventory of M1000e chassis

Protocol used for discovery	WS-Man
Number of chassis discovered	250
Time taken for first discovery, inventory, and onboarding	19 m 02s
Time taken for re-discovery	26 m 15s
Time taken for re-inventory	10 m
Time taken for status-poll	17 sec
Time Taken for Complete Chassis Sub-Discovery	5 h 51 m

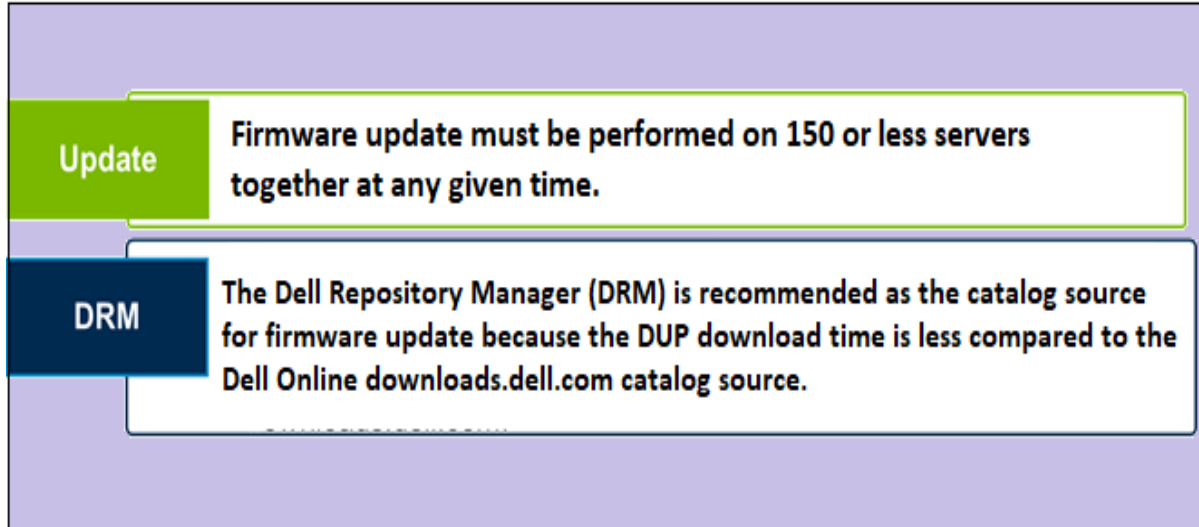
Note—This technical white paper does not cover test results for SNMP-based discovery and inventory of supported devices.

Table 3 Discovery and inventory by using WAN

Protocol used for discovery	WS-Man			
	Config I		Config II	
Load parameter	100 Mbps, 200 ms delay	10 Mbps, 500 ms delay	100 Mbps, 200 ms delay	10 Mbps, 500 ms delay
Number of servers discovered using WS-Man	8,000	8,000	3,000	3,000
Time taken for first discovery, inventory, and onboarding	5 h 55 m	9 h 8 m	2 h 46 m	4 h 4 m
Time taken for rediscovery	6 h 20 m	9 h 28 m	2 h 44 m	4 h
Time taken for re-inventory	3 h 19 s	7 h 43 m	2 h 8 m	3 h 16 m
Time taken for status-poll	22 m 49 s	36 m 32 s	10 m 9 s	17 m

3.2 Test setup and results of the Firmware Upgrade feature in OpenManage Enterprise 3.2

3.2.1 Recommendations for setting an environment to test the Firmware Upgrade feature in OpenManage Enterprise 3.2



3.2.2 Test environment and results of the Firmware Upgrade feature in OpenManage Enterprise 3.2

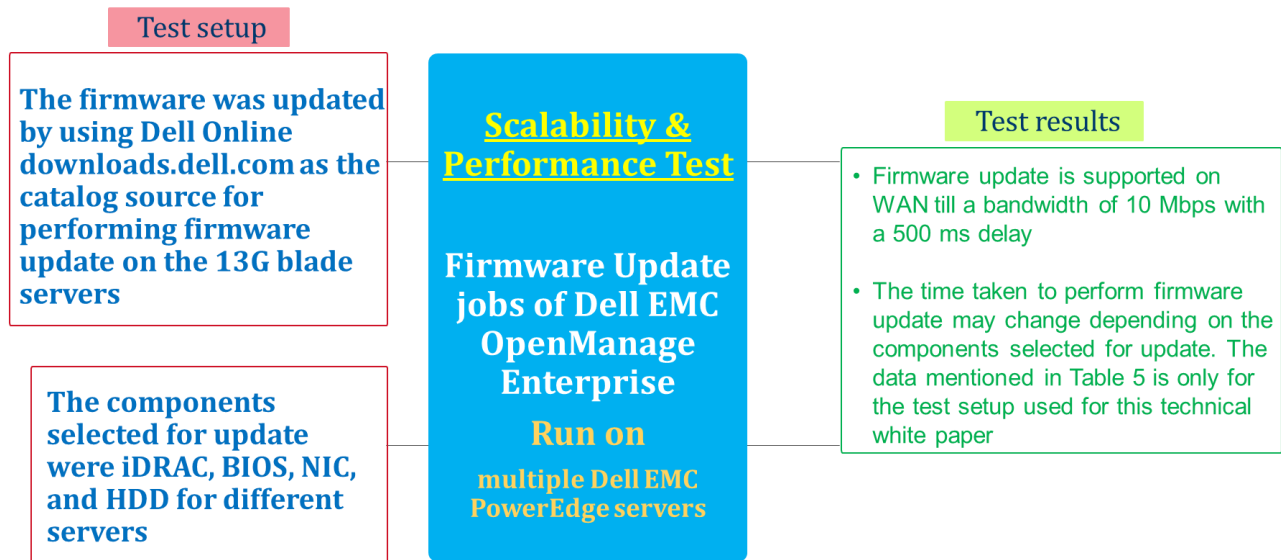
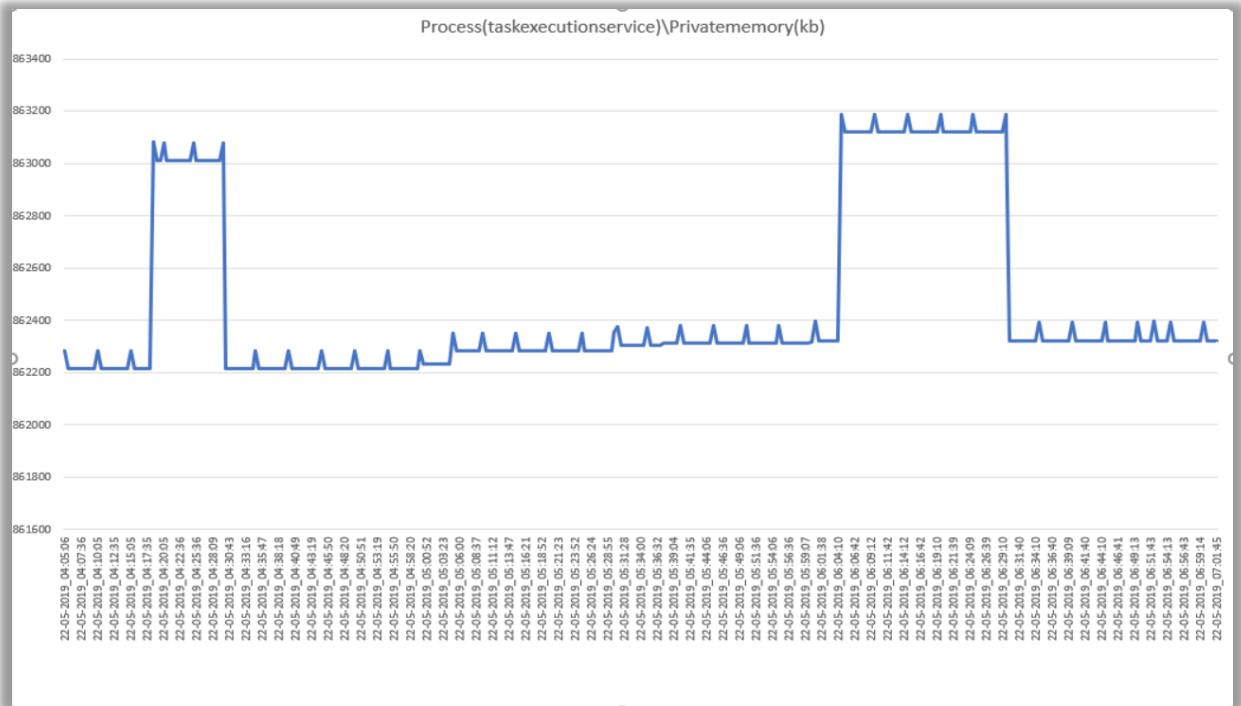


Table 4 Firmware update of 100 servers

Test Environment	Test result
Number of servers updated	133
Time taken for firmware update	2 h 22 m
Time taken for firmware update on WAN environment (100 Mbps, 200 ms delay)	2 h 35 m
Time taken for firmware update on WAN environment (10 Mbps, 500 ms delay)	19 h 54 m



Results for Memory utilization (in KB) while testing the firmware upgrade feature for 133 servers of Dell EMC OpenManage Enterprise 3.2 on PowerEdge servers

3.3 Test setup and results of the Configuration Inventory feature in OpenManage Enterprise 3.2

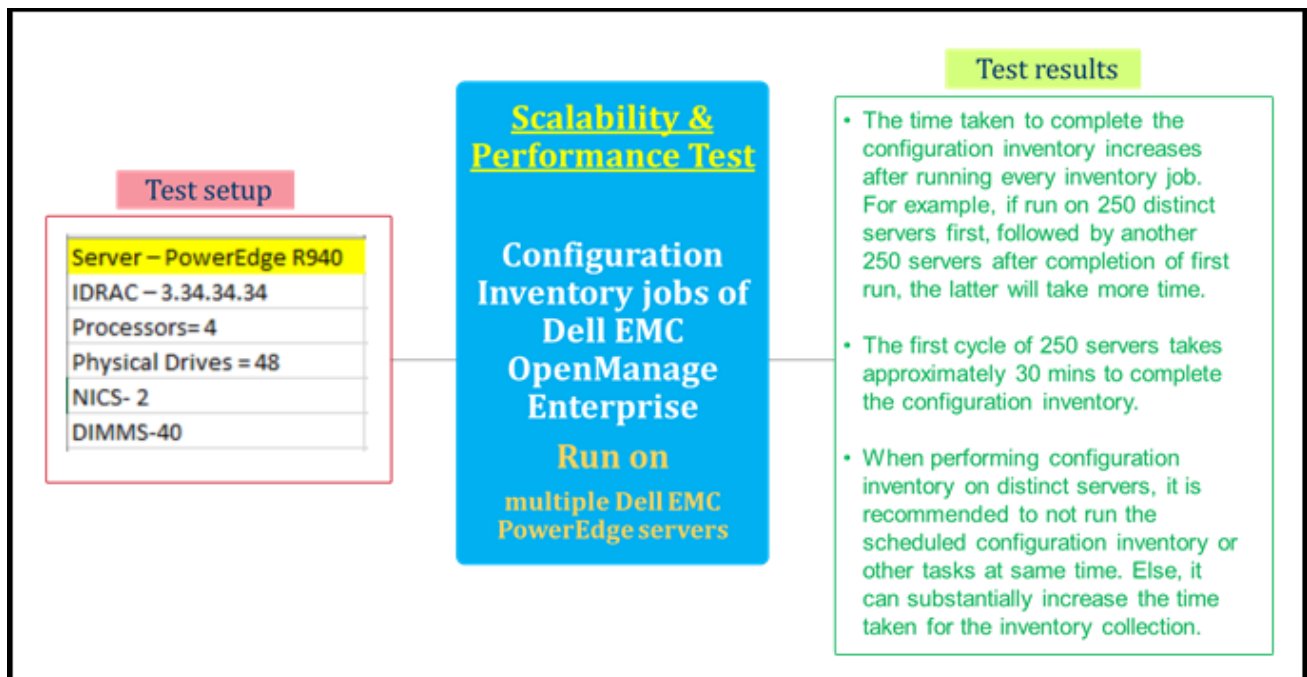
3.3.1 Recommendations for setting an environment to test the Configuration Inventory feature in OpenManage Enterprise 3.2

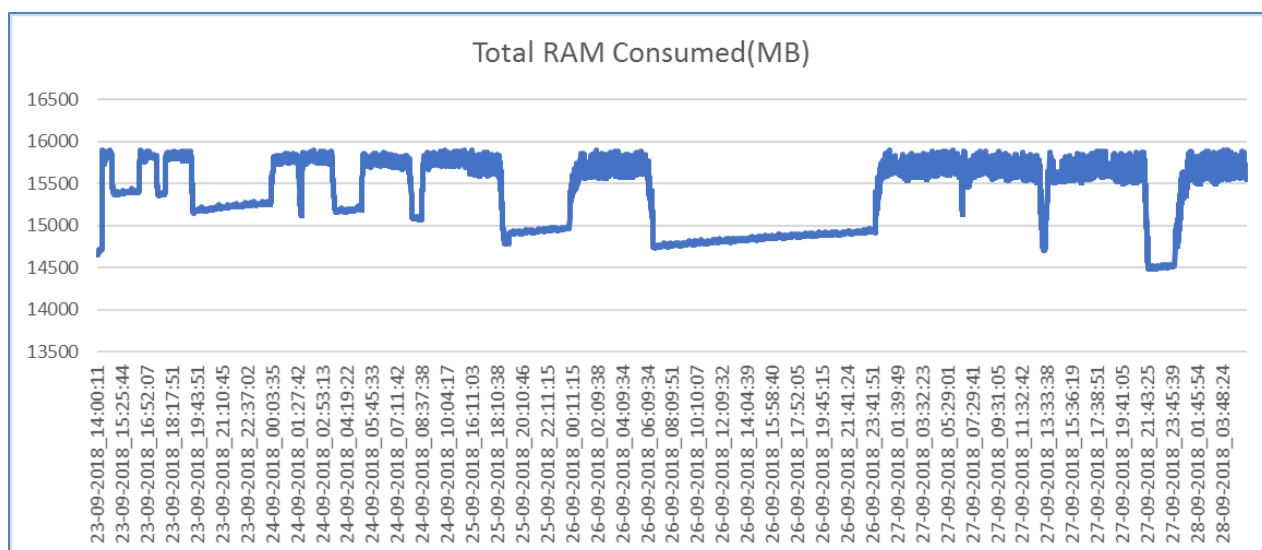
Group of devices

It is recommended to create distinct groups of 250 devices each and run configuration inventory only on them at a given time. It must not be run in parallel. More than 250 devices at one time are not supported.

- Recommendations for setting an environment to test the Configuration Inventory feature in OpenManage Enterprise 3.2

3.3.2 Test environment and results of the Configuration Inventory feature in OpenManage Enterprise 3.2

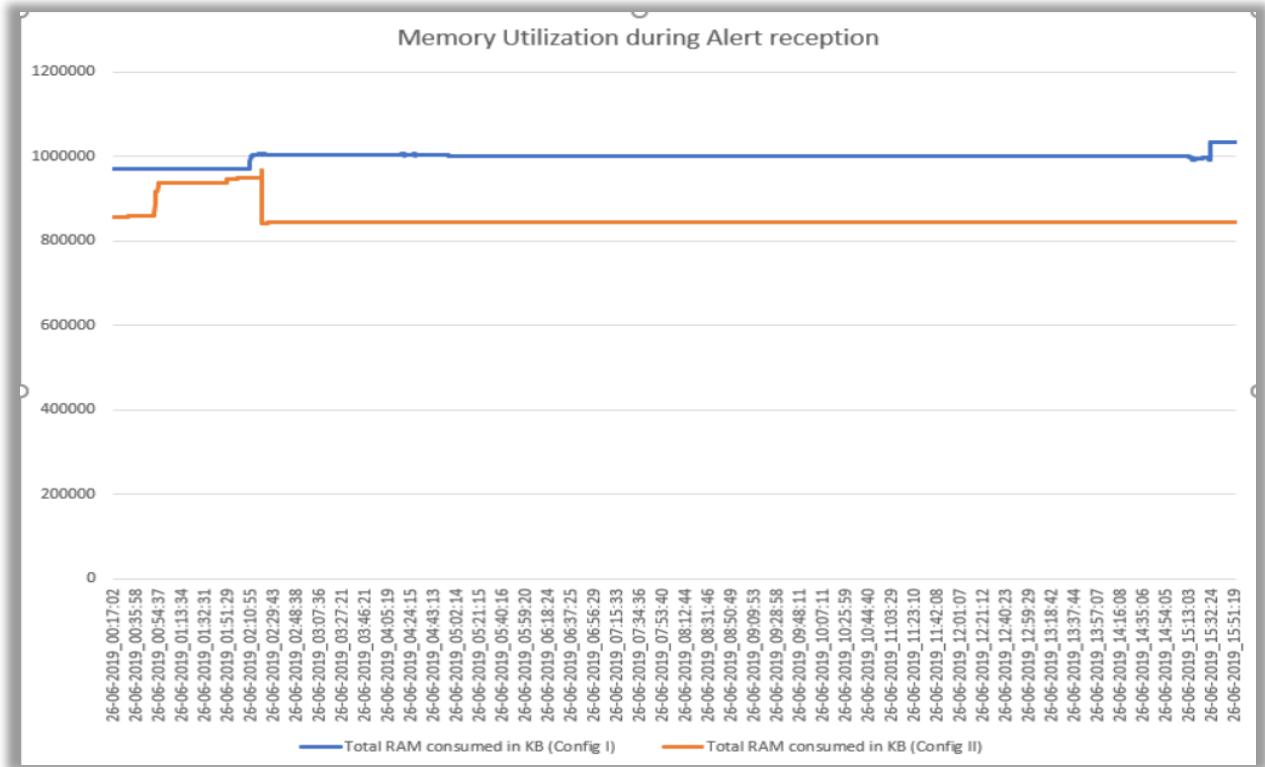




Data about the total RAM consumed to test the Configuration Inventory feature of OpenManage Enterprise on multiple PowerEdge servers

3.4 Test setup and results of the Alert and Task Management feature in OpenManage Enterprise 3.2

- Reception of alerts is supported till 30 alerts per second continuously with no alert actions configured.
- With all the alerts actions configured, reception of alerts is supported till 9 alerts per second with a possibility of 25% alert drop, if continued for long duration. Restarting services will help receive more number of alerts if such a situation happens.
- In case of an alert burst with alert actions configured, reception of alerts is supported till 30 alerts per second for 5 mins. There might be an alert drop after that if the alert burst continues. Once the alert frequency slows down, the alert reception will get back to normal.
- When 50,000 events are generated together in the environment (all discovered servers generate multiple events simultaneously), then all the events are received without any alert drop.
- The time taken to receive 50,000 events at the rate of 30 alerts per second is approximately 40 mins when no alert actions are configured. This time is the overall reception of all the events without any loss.
- The reception of alerts on WAN till a bandwidth of 10 Mbps with 500 ms delay is supported for an alert frequency of 30 alerts per second and lesser.
- CPU and memory data for alerts with alert actions configured was captured for a reception of 50,000 alerts, at 9 alerts per second, for 2 cycles, with an interval of 2 hours between each cycle. All alert actions, except the alert-ignore action, were configured.
- The alert burst data was captured by generating 50,000 alerts together in the network and received by OpenManage Enterprise. Alert actions were not configured.



Memory utilized (In KB) to receive alerts when testing the Alerts feature of OpenManage Enterprise 3.2 on multiple PowerEdge servers

Table 5 Memory and CPU utilization for alerts in OpenManage Enterprise 3.2

Test Config	Config I						Config II			
	30 alerts per second	9 alerts per second with alert actions	Alert burst	WAN		30 alerts per second	9 alerts per second with alert actions	Alert burst	WAN	
				100 Mbps, 200 ms delay	10 Mbps, 500 ms delay				100 Mbps, 200 ms delay	10 Mbps, 500 ms delay
Total CPU Usage	41%	47%	28.15%	6.7%	7%	25%	65.5%	18%	44.6%	38.1%
Total Memory Usage	15700 MB	15030 MB	14900 MB	1190 MB	1295 MB	12131 MB	13745 MB	12176 MB	9358 MB	9351 MB

4 Scalability and performance test results of OpenManage Enterprise 3.2 (tested on a single PowerEdge server)

4.1 Test setup and results of the Discovery, Inventory, and Status Poll feature in OpenManage Enterprise 3.2 (tested on a single server)

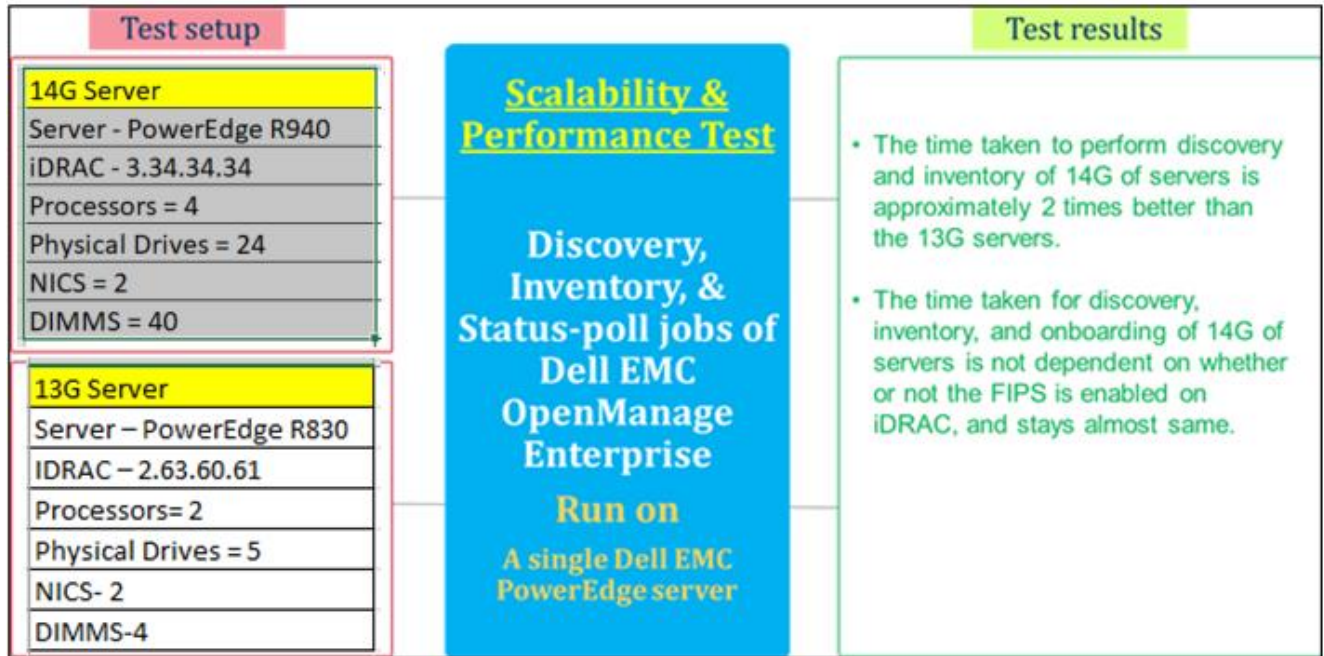


Table 6 Discovery and inventory of a single PowerEdge server by using WS-Man

Protocol used for Discovery	WS-Man	
	14G servers	13G servers
Load parameter	14G servers	13G servers
Time taken for first discovery, inventory, and onboarding	1 m 48 s	2 m 51 s
Time taken for re-discovery and onboarding	1 m 56 s	3 m 11s
Time taken for re-inventory	1 m 20 s	1 m 53 s
Time taken for status-poll	5 s	5s

4.2 Test setup and results of the Firmware Upgrade feature in OpenManage Enterprise 3.2 (tested on a single server)

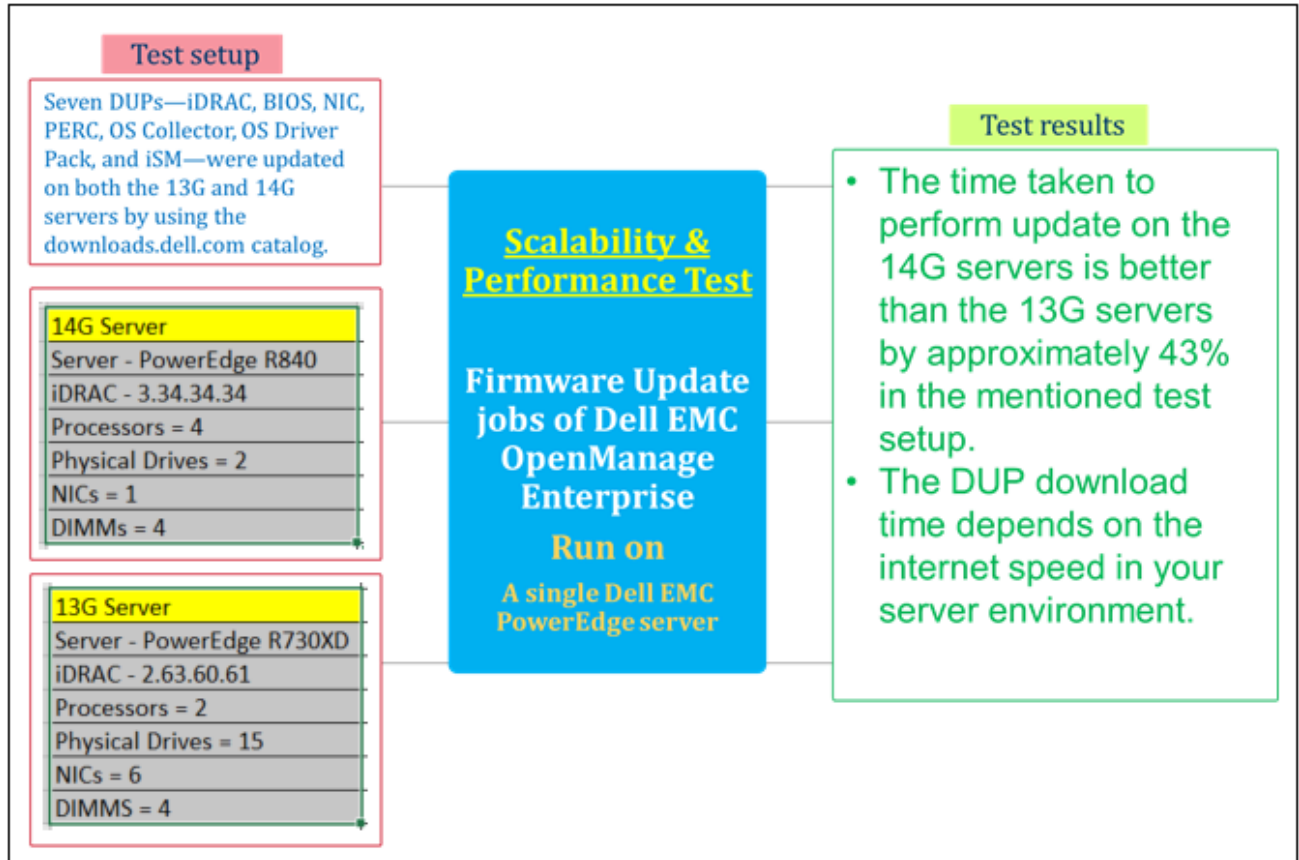
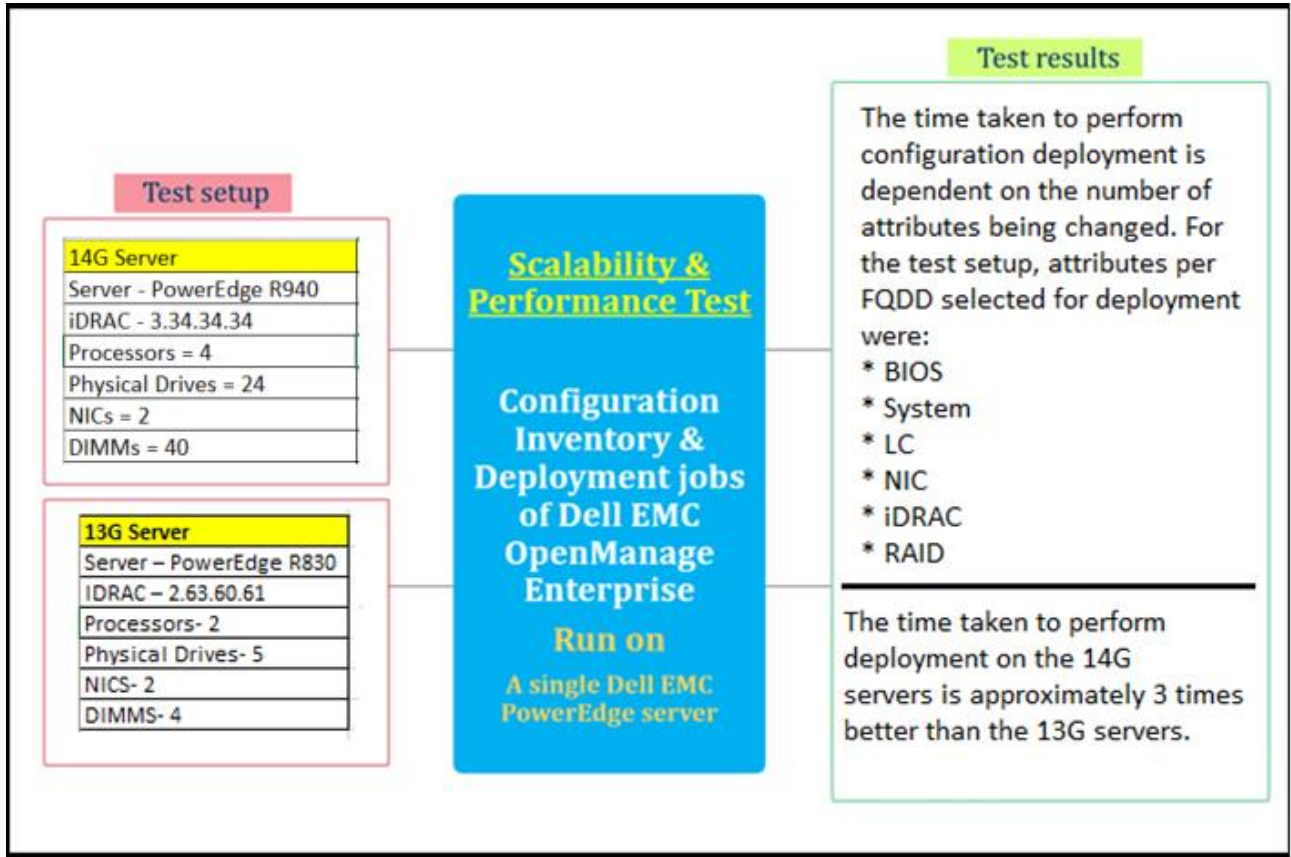


Table 7 Firmware Update of a single PowerEdge server

Test Environment		Test result	
Server Generation		13G	14G
Time taken for firmware update	DUP download time	27 m	28 m
	Firmware update time	39 m	22 m 54 s
	Post update inventory time	3 m 11 s	38 s

4.3 Test setup and results of the Configuration Inventory and Deployment feature in OpenManage Enterprise 3.2



Test setup and results of the Configuration Inventory and Deployment feature in OpenManage Enterprise 3.2 (tested on a single server)

Table 8 Configuration deployment of a single server with 18 attributes

Test Environment	Test result	
Server generation	14G	13G
Time taken for configuration inventory	57 s	2 m 30 s
Time taken for configuration deployment	3 m 30s	13 m 50 s

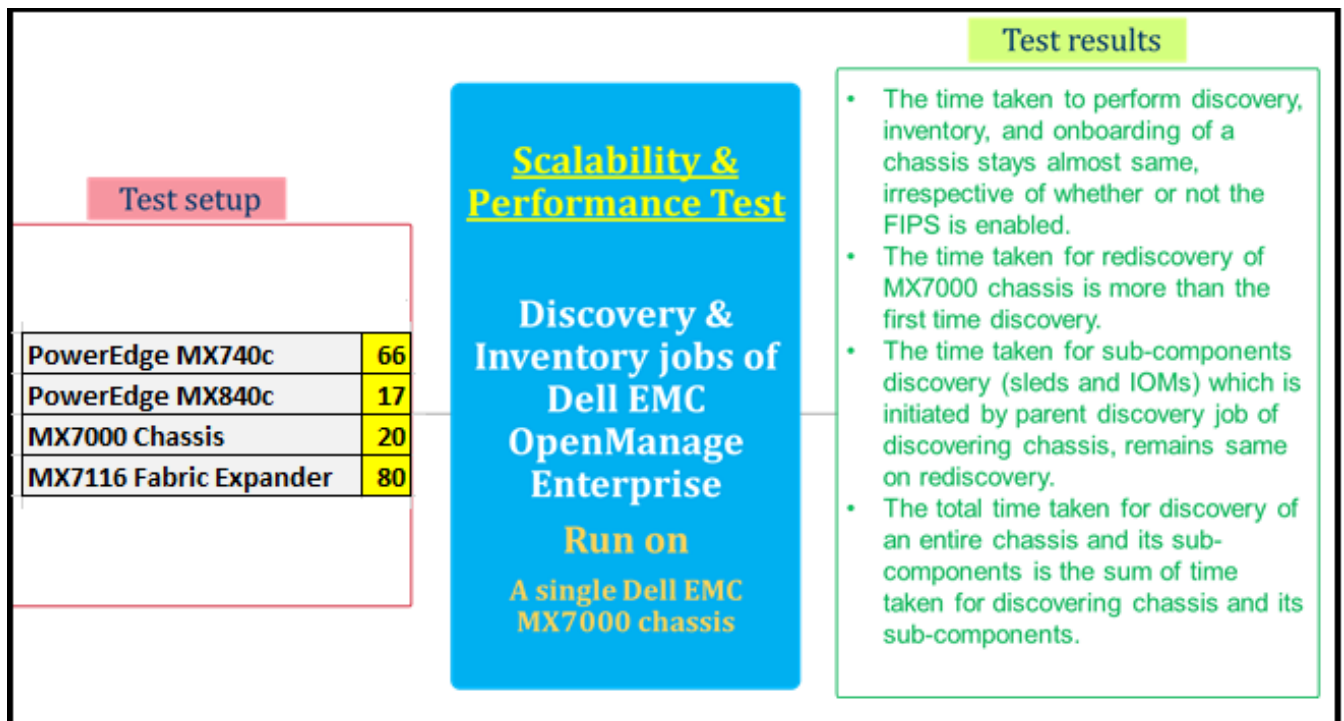
Table 9 Configuration Deployment of 50 servers with 18 attributes

Test Environment	Test results
Server generation	13G
Time taken for configuration deployment	25min

5 Scalability and performance test results of OpenManage Enterprise 3.2 (tested on 20 MX7000 chassis)

5.1 Test setup and results of the Discovery, Inventory, and Status Poll feature in OpenManage Enterprise 3.2 (tested on 20 MX7000 chassis)

Note—The Discovery, Inventory, and Status Poll tasks were performed when all the iDRACs in the chassis had IP address. This technical white paper does not cover the use cases for performing discovery of chassis where the sleds do not have IP addresses.



Test setup and results of the Discovery, Inventory, and Status Poll feature in OpenManage Enterprise 3.2

Table 10 Discovery and inventory of MX7000 chassis

Protocol used for discovery	Redfish for chassis	
	WS-Man for servers	
Number of chassis discovered	20	
Load parameter	Without Power Manger Plugin	With Power Manger Plugin
Time taken for first discovery, inventory, and onboarding of chassis	6 m 14s s	6 m 30s
Time taken for scheduled rediscovery	8 m 45 s	8 m 55 s
Time taken for Status Poll	1 m 23 s	1m 30 s

5.2 Test setup and results of the Firmware Upgrade feature in OpenManage Enterprise 3.2 (tested on a single MX7000 chassis)

Test setup

- **MX7000 chassis**
- **PowerEdge MX740C sleds—2, with 2 network cards**
- **PowerEdge MX840C sleds—2 with 4 network cards**
- **Dell EMC MX1916n fabric engine—2**
- **Firmware was updated on MX7000 by using individual DUPs**

Scalability & Performance Test

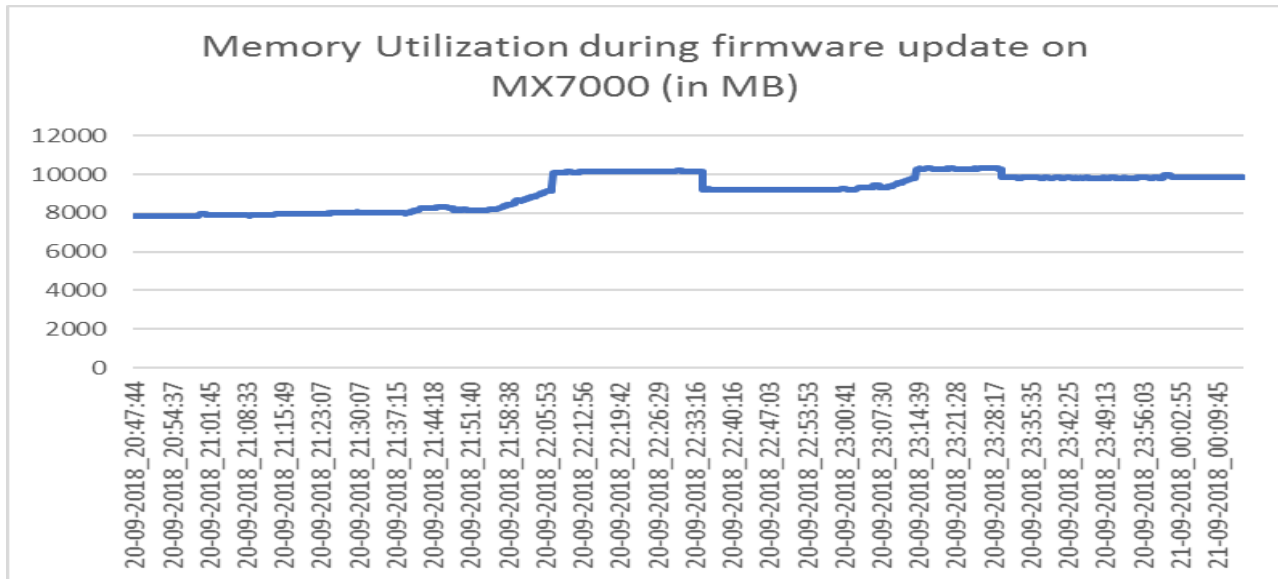
Firmware Update jobs of Dell EMC OpenManage Enterprise

Run on
A single Dell EMC MX7000 chassis

Test results

Test Environment	Small Scale Business
Components Updated	OMEM, server BIOS, iDRAC, Server NIC, and IOM
Time taken for firmware update	OMEM—29 m iDRAC—7 m 30 s Server BIOS—9 m NIC—12 m IOM—17 m

Test setup and results of the Firmware Upgrade feature in OpenManage Enterprise 3.2



Memory utilization while testing the Discovery, Inventory, and Status-poll features of the Dell EMC OpenManage Enterprise 3.2 on multiple Dell EMC M1000e chassis

5.3 Test setup and results of the Configuration Inventory and Deployment feature in OpenManage Enterprise 3.2 (tested on a single MX7000 chassis)

- Test configuration:
 - Dell EMC MX7000 chassis
 - 2 Dell EMC MX840C sleds with four network cards and one FC card
 - 4 MX5108n IOMs
- Identity migration was performed from one Dell EMC PowerEdge MX840c server to another similar Dell EMC PowerEdge MX840c server. The identities selected for deployment include virtual MAC address, virtual iSCSI MAC address, virtual FIP MAC address, virtual WWPN, virtual WWNN for FC and FCoE, and iQN. Few other attributes from BIOS, iDRAC, Lifecycle Controller, NIC, and FC were also deployed and verified for migration. Sample XML, other than the NIC attributes.

```
<SystemConfiguration Model="PowerEdge R840" ServiceTag="PT3C804" TimeStamp="Fri Oct 5 07:57:40 2018">
<Component FQDD="BIOS.Setup.1-1">
<Attribute Name="LogicalProc">Disabled</Attribute>
<Attribute Name="SubNumaCluster">Disabled</Attribute>
<Attribute Name="ProcVirtualization">Enabled</Attribute>
<Attribute Name="MemTest">Enabled</Attribute>
</Component>
<Component FQDD="EventFilters.SystemHealth.1">
<Attribute Name="TMPS_1_2#Alert#Email">Enabled</Attribute>
<Attribute Name="TMPS_1_2#Alert#SNMP">Enabled</Attribute>
<Attribute Name="TMPS_1_2#Alert#SysLog">Enabled</Attribute>
</Component>
<Component FQDD="iDRAC.Embedded.1">
<Attribute Name="SNMP.1#AgentEnable">Enabled</Attribute>
<Attribute Name="SNMP.1#AgentCommunity">testvalue</Attribute>
<Attribute Name="SNMPAlert.1#Destination">192.168.1.12</Attribute>
</Component>
<Component FQDD="RAID.Slot.2-1">
<Attribute Name="RAIDresetConfig">True</Attribute>
<Attribute Name="RAIDreconstructRate">50</Attribute>
</Component>
<Component FQDD="LifecycleController.Embedded.1">
<Attribute Name="LCAttributes.1#CollectSystemInventoryOnRestart">Enabled</Attribute>
<Attribute Name="LCAttributes.1#PartConfigurationUpdate">Apply Always</Attribute>
<Attribute Name="LCAttributes.1#PartFirmwareUpdate">Match firmware of replaced part</Attribute>
</Component>
</SystemConfiguration>
```

Test setup and results of the Configuration Inventory and Deployment feature in OpenManage Enterprise 3.2 (tested on a single MX7000 chassis)

5.4 Test results of the Configuration Inventory and Deployment feature in OpenManage Enterprise 3.2 (tested on a single MX7000 chassis)

- The time taken to perform identity and VLAN deployment took 11 mins. This time is based on the identity attributes that were selected for deployment along with the three attributes per FQDD.
- The time taken to perform deployment increases slightly when more number of attributes are selected for performing a configuration operation.
- The time taken to perform migration is almost double the time taken to perform deployment.

Table 11 Server configuration, identity, and VLAN deployment

Operation performed	Server configuration, identity, and VLAN deployment
Time taken to perform identity and VLAN deployment	11 m
Time taken to perform identity + VLAN migration to another server in same chassis	24 m

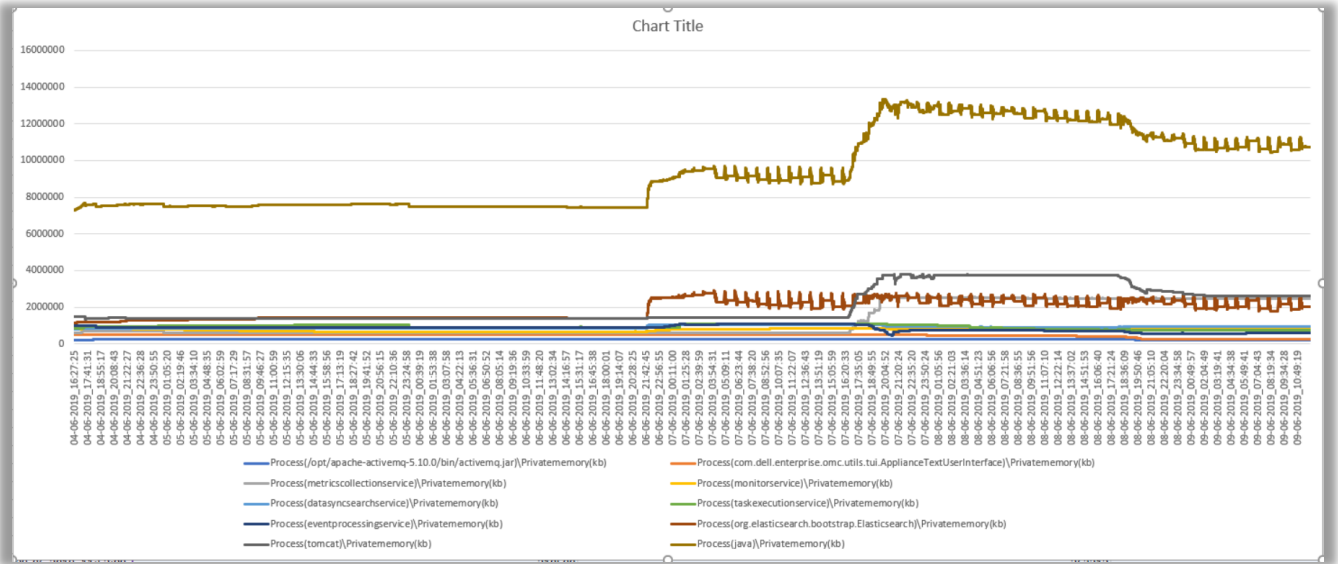
6 Longevity Test results for OpenManage Enterprise 3.2

6.1 Longevity test configuration for OpenManage Enterprise 3.2

- IPv4 and IPv6 were enabled in OpenManage Enterprise 3.2
- Discovery and inventory of maximum supported number of devices were distributed in two weeks. Half the devices were discovered in the first week and next half in the second week. The OpenManage Enterprise 3.2 devices were discovered by using IPv6 addresses.
- OpenManage Power Manager Plugin was installed, and 3,000 Devices were added to the working set..
- All the alert actions, including remote Shell scripts, were created and events were generated in the test environment such that OpenManage Enterprise 3.2 would receive events at regular intervals on a daily-basis
- The firmware update operation on 50 servers was performed in first- and another 50 servers in the second week.
- Various RACADM tasks were run on different servers on a weekly-basis.
- The IP address of a few of the servers were changed and these servers were rediscovered in the second week.
- Approximately 1,000 servers were discovered by using AD credentials in the second week.
- All the scheduled jobs were allowed to run at their default time interval.
- Around 200 static and dynamic groups were created based on different criteria for different servers.
- The GUI load time was captured for different load parameters on the same appliance every fourth day.

6.2 Longevity test results for OpenManage Enterprise 3.2

- The time taken for performing scheduled discovery, inventory, and status poll remained approximately constant for a period of 15 days for the supported number of devices
- An uninterrupted service was observed while performing the Longevity test
- The time taken to open the GUI and access different pages increases slowly as more data is loaded in the appliance. The test data was captured after every third day. To reduce the time taken in opening the GUI, restart the appliance VM. (Link to Page load data table)
- The time taken to receive alerts, process alert actions, and run tasks stayed constant for the duration of test.

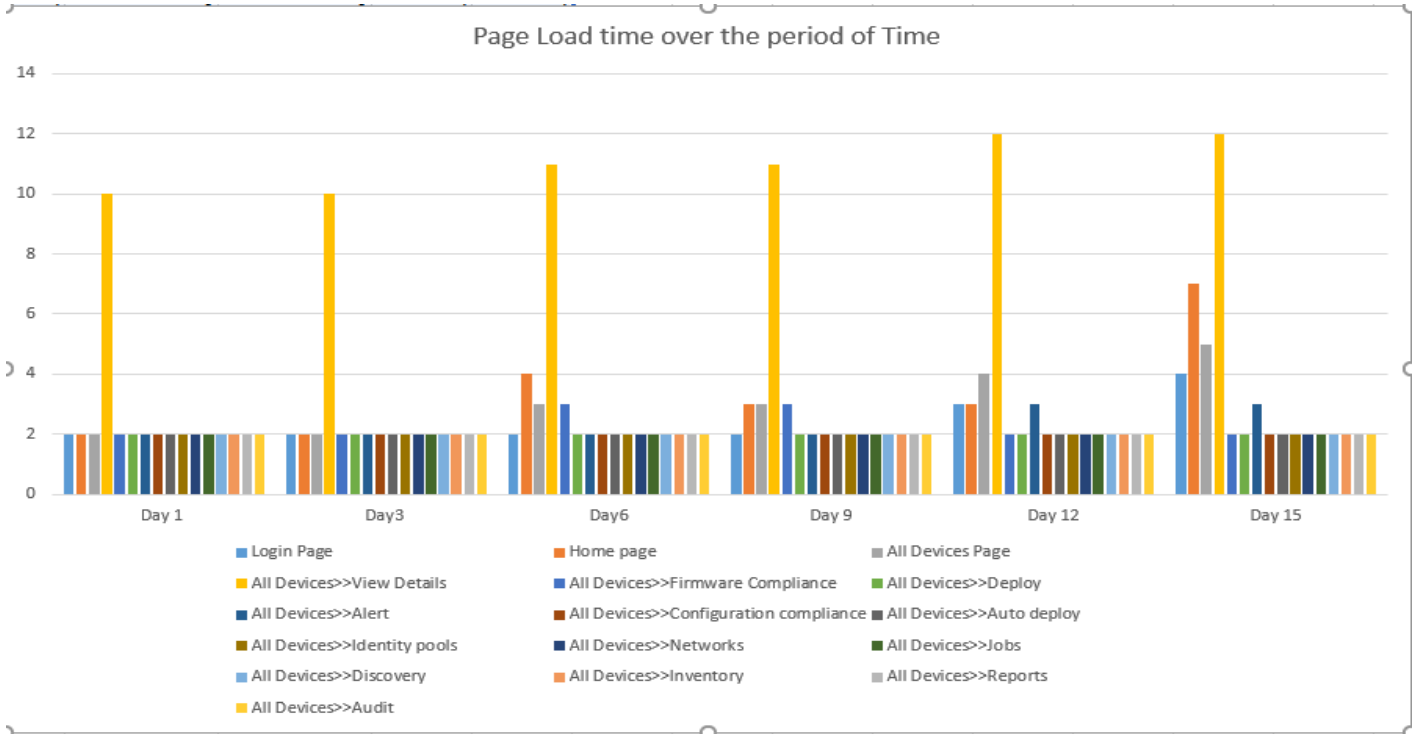


Memory consumption (in KBs) of appliance services throughout Longevity testing in OpenManage Enterprise 3.2

Table 12 Test results of the Page load time in Longevity testing in OpenManage Enterprise 3.2

Metric	Page Load Time (In Seconds)					
	Day 1	Day3	Day6	Day 9	Day 12	Day 15
Collection Interval						
Login Page	2	2	2	2	3	4
Home page	2	2	4	3	3	7
All Devices Page	2	2	3	3	4	5
All Devices>>View Details	10	10	11	11	12	12
All Devices>>Firmware Compliance	2	2	3	3	2	2
All Devices>>Deploy	2	2	2	2	2	2
All Devices>>Alert	2	2	2	2	3	3
All Devices>>Configuration compliance	2		2		2	2
All Devices>>Auto deploy	2	2	2	2	2	2
All Devices>>Identity pools	2	2	2	2	2	2
All Devices>>Networks	2	2	2	2	2	2
All Devices>>Jobs	2	2	2	2	2	2

All Devices>>Discovery	2	2	2	2	2	2
All Devices>>Inventory	2	2	2	2	2	2
All Devices>>Reports	2	2	2	2	2	2
All Devices>>Audit	2	2	2	2	2	2



6.3 Test results of REST API in a longevity setup in OpenManage Enterprise 3.2

Test setup:

- 8,000 Devices were discovered in Open Manage Enterprise 3.2.
- 50,000 alerts were present in database.
- OpenManage Power Manager Plugin was installed with 3,000 Devices added to the working set. There is no major difference in results with Power Management Plugin installed.

SL. No	URL Name	Rest URL	DAY1	DAY 30
	FilterAlertsByPolicy	https://<IP Address>/api/AlertService/Actions/AlertService.FilterAlertsByPolicy?\$top=99999999	Average Response Time(hh:mm:ss) 00:00:00.03	Average Response Time(hh:mm:ss) 00:00:00.03

getdevicestatussummary	https://<IP Address>/api/GroupService/Groups(500)/DeviceStatusSummary?\$top=99999999	00:00:0.02	00:00:0.03
eventcatalogs	https://<IP Address>/api/MIBImportService/MIBImportService/EventCatalogs?\$top=99999999	00:00:0.02	00:00:0.02
getreportdefs	https://<IP Address>/api/ReportService/ReportDefs?\$top=99999999	00:00:0.15	00:00:0.13
gettimezones	https://<IP Address>/api/ApplicationService/Network/TimeZones?\$top=99999999	00:00:0.03	00:00:0.03
getalldevices	https://<IP Address>/api/DeviceService/Devices?\$top=99999999	00:02:19.400	00:02:25.800
getnetworkcurrentaddressconfiguration	https://<IP Address>/api/ApplicationService/Network/CurrentAddressConfiguration?\$top=99999999	00:00:0.03	00:00:0.03
groupaudits	https://<IP Address>/api/GroupService/GroupAudits?\$top=99999999	00:00:0.03	00:00:0.03
groupservice	https://<IP Address>/api/GroupService/Groups?\$top=99999999	00:00:0.07	00:00:0.06
mobilesubscriptions	https://<IP Address>/api/AlertService/MobileSubscriptions?\$top=99999999	00:00:0.05	00:00:0.04
getalljobs	https://<IP Address>/api/JobService/Jobs?\$top=99999999	00:00:0.13	00:00:0.15
gettemplates	https://<IP Address>/api/TemplateService/Templates?\$top=99999999	00:00:0.03	00:00:0.03
getbaselines	https://<IP Address>/api/TemplateService/Baselines?\$top=99999999	00:00:0.03	00:00:0.03
getmibs	https://<IP Address>/api/MIBImportService/MIBS?\$top=99999999	00:00:0.02	00:00:0.02
templatetypes	https://<IP Address>/api/TemplateService/TemplateTypes?\$top=99999999	00:00:0.02	00:00:0.02
SubscriptionNotificationService	https://<IP Address>/api/AlertService/SubscriptionNotificationService?\$top=99999999	00:00:0.02	00:00:0.02
getnetworkproxyconfiguration	https://<IP Address>/api/ApplicationService/Network/ProxyConfiguration?\$top=99999999	00:00:0.02	00:00:0.02
eventcategories	https://<IP Address>/api/MIBImportService/MIBImportService/EventCatalogs?\$top=99999999	00:00:0.02	00:00:0.02
getnetworkaddressconfiguration	https://<IP Address>/api/ApplicationService/Network/AddressConfiguration?\$top=99999999	00:00:0.02	00:00:0.02
querycontextsummarises	https://<IP Address>/api/QuerySupportService/QueryContextSummaries?\$top=99999999	00:00:0.02	00:00:0.02
getnetwork	https://<IP Address>/api/ApplicationService/Network?\$top=99999999	00:00:0.02	00:00:0.02

globalexcludes	https://<IP Address>/api/DeviceService/GlobalExcludes?\$stop=99999999	00:00:0.02	00:00:0.02
geatallleafdevices	https://<IP Address>/api/GroupService/Groups(500)/AllLeafDevices?\$stop=999999999	00:02:20.200	00:02:35.800
templateviewtypes	https://<IP Address>/api/TemplateService/TemplateViewTypes?\$stop=999999999	00:00:0.03	00:00:0.03
geteventstatussummary	https://<IP Address>/api/GroupService/Groups(500)/EventStatusSummary?\$stop=999999999	00:00:0.03	00:00:0.03
eventseverities	https://<IP Address>/api/MIBImportService/MIBImportService/EventSeverities?\$stop=999999999	00:00:0.02	00:00:0.02
getallalerts	https://<IP Address>/api/AlertService/Alerts?\$stop=999999999	00:00:24.174	00:00:25.123
gettimeconfigurations	https://<IP Address>/api/ApplicationService/Network/TimeConfiguration?\$stop=999999999	00:00:0.02	00:00:0.02
operatorinfo	https://<IP Address>/api/QuerySupportService/OperatorInfo?\$stop=999999999	00:00:0.02	00:00:0.02
getconsolesettings	https://<IP Address>/api/ApplicationService/Settings?\$stop=999999999	00:00:0.02	00:00:0.02
getSessions	<u>https://<IP Address>/api/SessionService/Sessions</u>	00:00:33.224	00:00:33.267
getwarrantySetting	<u>https://<IP Address>/omc/api/Console/WarrantySettings?settingName=WARRANTY_EXPIRY_SETTING</u>	00:00:0.12	00:00:0.12
getallgroupheirarchy	<u>https://<IP Address>/api/GroupService/AllGroupsHierarchy</u>	00:00:0.127	00:00:0.127
getInventoryInfo/OsName/OsVersion	<u>https://<IP Address>/api/DeviceService/Devices(Deviceid)/InventoryDetails('serverOperatingSystems')</u>	00:00:1.622	00:00:1.782
getapplicationserviceinfo	<u>https://<IP Address>/api/ApplicationService/Info</u>	00:00:0.164	00:00:0.164

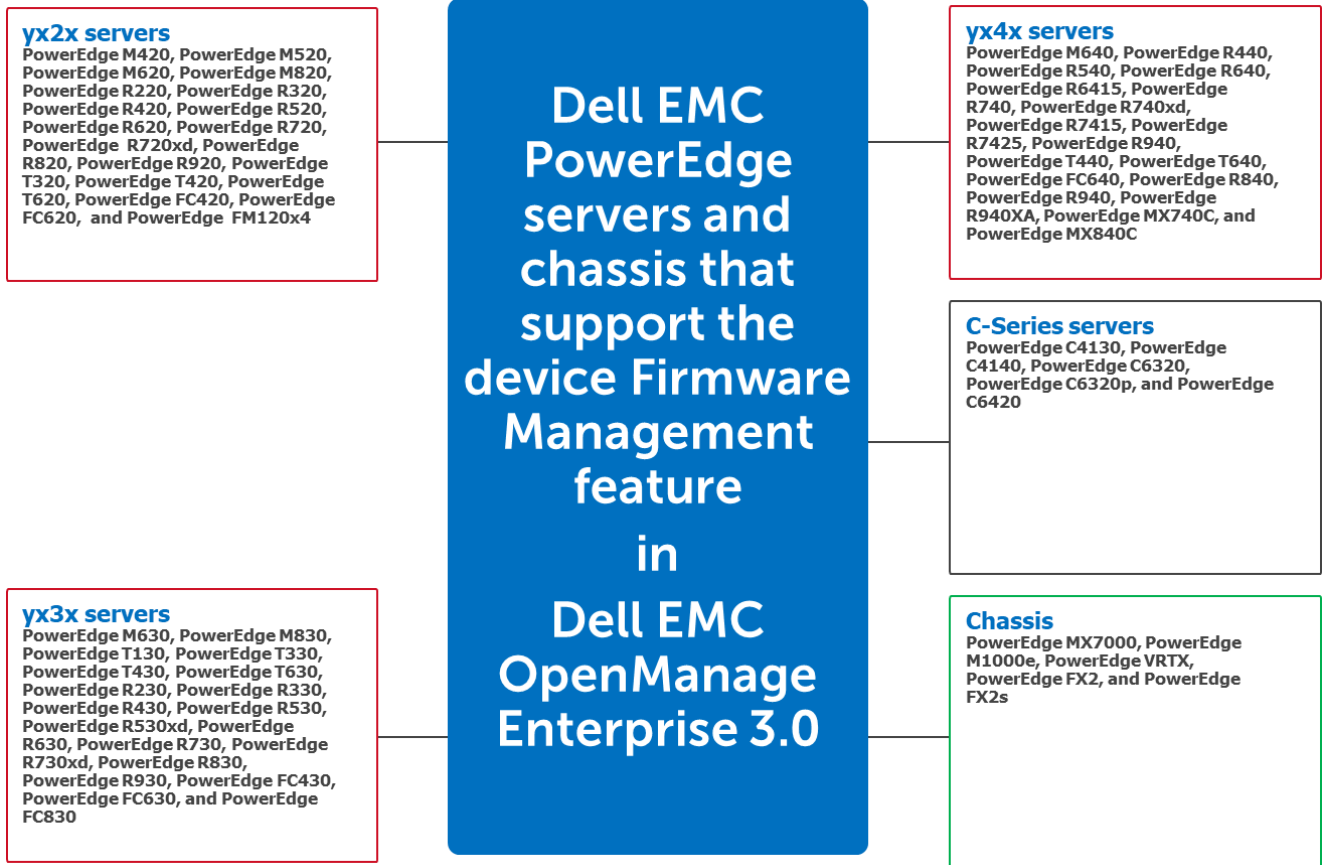
7 Additional references and troubleshooting topics

7.1 Role-based user privileges in Dell EMC OpenManage Enterprise 3.2

Dell EMC OpenManage Enterprise 3.2 Features	User levels for accessing Dell EMC OpenManage Enterprise		
	Admin	Device Manager	Viewer
Run reports	Y	Y	Y
View	Y	Y	Y
Manage Baseline	Y	Y	N
Configure device	Y	Y	N
Firmware update	Y	Y	N
Manage jobs	Y	Y	N
Create monitoring policies	Y	Y	N
Deploy OS	Y	Y	N
Power control	Y	Y	N
Manage reports	Y	Y	N
Manage templates	Y	Y	N
Set up the OpenManage Enterprise appliance	Y	N	N
Manage discovery	Y	N	N
Manage groups	Y	N	N
Refresh inventory	Y	N	N
Set up security	Y	N	N
Manage traps	Y	N	N

Note—To view the latest information about the minimum requirements for Dell EMC OpenManage Enterprise, see the *Dell EMC OpenManage Enterprise Support Matrix* on the support site.

7.2 Dell EMC OpenManage Enterprise Firmware Update Support Matrix



Dell EMC PowerEdge servers supporting device firmware management in Dell EMC OpenManage Enterprise 3.2

Note—The following Dell EMC devices do not support the firmware update operation at the time when this technical white paper is published:

- Dell EMC 11G PowerEdge servers
- Dell EMC VxRail Hyper-converged appliances
- Dell EMC XC Series Web-Scale converged appliances
- Dell EMC PowerEdge FD332 Storage module
- Dell EMC Storage devices (previously Dell Compellent devices)—FS8600 version 6, SC4020, SC7020, SC8000, and SCv2000.
- Dell EMC Networking Devices (previously Dell Force 10 devices)—C150, C300, S25P, S50, S55, S60, S3048, S4048, S4810, S4820P, S4820T, Z9000, and MXL 10 GbE/40 GbE.

Note—For more information about the other supported features and hardware/software requirements, see the *Dell EMC OpenManage Enterprise Version Support Matrix* available on the support site.

7.3 Troubleshooting issues in Dell EMC OpenManage Enterprise when performing firmware update on target devices

- [Unable to update firmware on target device by using Dell EMC OpenManage Enterprise because of internet connection issues](#)
- [Unable to update firmware on target device by using Dell EMC OpenManage Enterprise because target device is unreachable](#)
- [Unable to update firmware on target device by using Dell EMC OpenManage Enterprise because Lifecycle Controller is in use](#)
- [Unable to update firmware on target device by using Dell EMC OpenManage Enterprise because either an incorrect file is used or file signature is incorrect](#)
- [Dell EMC OpenManage Enterprise is unable to create a firmware catalog](#)

7.3.1 Unable to update firmware on target device by using Dell EMC OpenManage Enterprise because of internet connection issues

7.3.1.1 Issue

The Dell EMC OpenManage Enterprise firmware version cannot be updated either because connection to the internet is ended or data packets are lost while downloading the DUPs from Dell.com.

Results:

Target System: WIN-02GODDHDJTC

Messages:

Running

Error while Downloading the file. Firmware cannot continue
Task Failed. Completed With Errors.

Firmware on target device cannot be updated because of internet issues in Dell EMC OpenManage Enterprise

7.3.1.2 Resolution

Ensure that uninterrupted network connection is available.

7.3.2 Unable to update firmware on target device by using Dell EMC OpenManage Enterprise because target device is unreachable

7.3.2.1 Issue

The firmware cannot be updated because either the target device is not reachable or is not responding.

Results:

Target System: idrac-VSJRPT2

Messages:

Running

Connection failed. Target is not reachable.

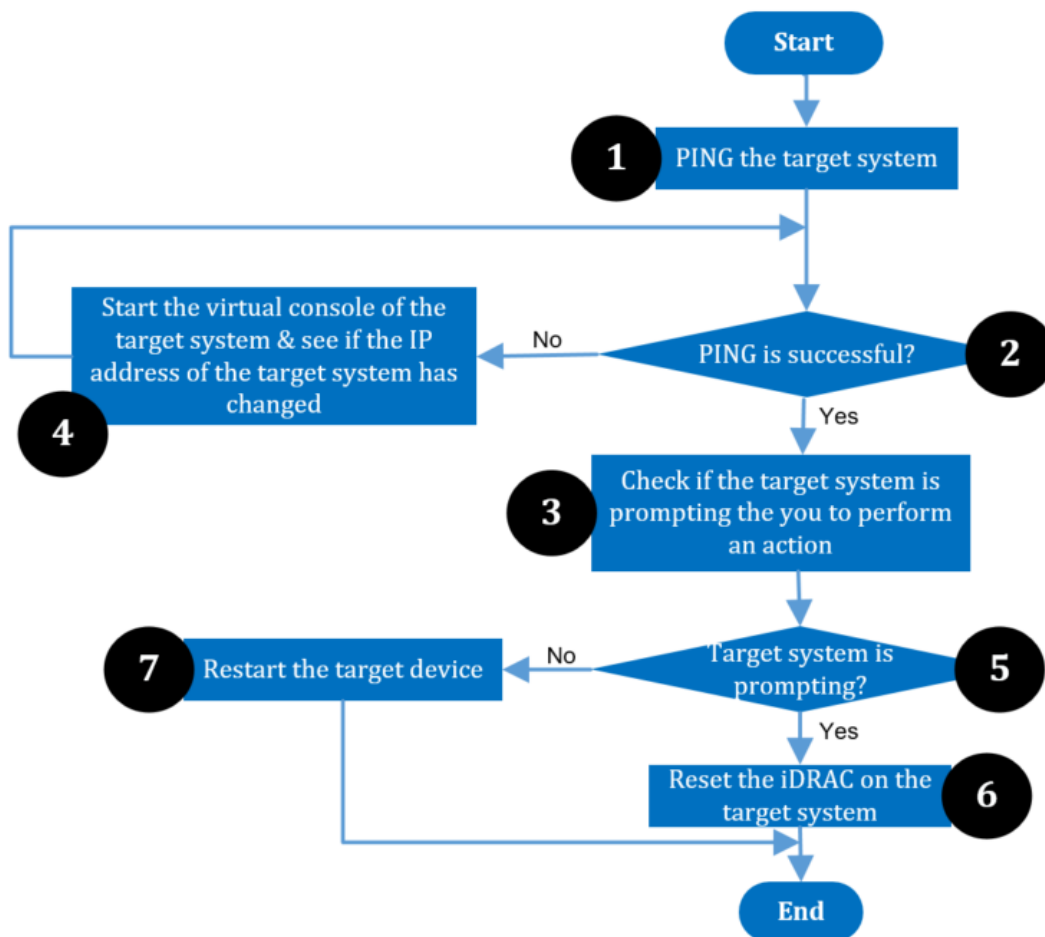
Task Failed. Completed With Errors.

Finished firmware update job on member 28152 with jobid:35119

Task Failed. Completed With Errors.

Firmware on target device cannot be updated because the target device is not responding in Dell EMC OpenManage Enterprise

7.3.2.2 Resolution



Process chart showing the resolution to firmware update issues because the target device is not responding

7.3.3 Unable to update firmware on target device by using Dell EMC OpenManage Enterprise because Lifecycle Controller is in use

7.3.3.1 Issue

Unable to update Dell EMC OpenManage Enterprise firmware because of an issue in Lifecycle Controller.

```
Results:
Target System: idrac-492MD2S

Messages:
Running
Starting communication with the device.
Checking LC-Service state
Checking Remote Services availability
Remote Services are not available.
Recommended Actions:
1) Lifecycle Controller is in use or it is disable in the iDrac settings
2) Verify if CSIOR is enabled
3) Reset iDrac, if iDrac is not responsive
Task Failed. Completed With Errors.
```

Firmware on target device cannot be updated by using Dell EMC OpenManage Enterprise because of an issue in Lifecycle Controller

7.3.3.2 Resolution

1. Start the virtual console of the target appliance.
 - a. Check if the target server is requesting for an input from you.
 - b. Else, reboot the system and wait until the target IP is booted to the operating system.
 - c. If the tasks in 1–3 does not resolve the issue, reset the iDRAC.
 - d. Update the firmware after the iDRAC reset operation is completed.

7.3.4 Unable to update firmware on target device by using Dell EMC OpenManage Enterprise because either an incorrect file is used or file signature is incorrect

7.3.4.1 Issue

Unable to update Dell EMC OpenManage Enterprise firmware because either an incorrect file is used or file signature is incorrect.

Results:

Target System: MX-STBX003

Messages:

Running

The package downloaded couldn't be validated. Invalid Package.
Task Failed. Completed With Errors.

Firmware on target device cannot be updated by using Dell EMC OpenManage Enterprise because of an incorrect file is used

7.3.4.2 Resolution

Try any one of the following:

- Update the firmware by using the online versions. See [Create online firmware catalog by using Dell EMC OpenManage Enterprise](#).
- Download the update package once again and retry the operation.

7.3.5 Dell EMC OpenManage Enterprise is unable to create a firmware catalog

7.3.5.1 Issue

This issue occurs during any of the following scenarios:

- Dell EMC OpenManage Enterprise is unable to connect to internet while creating an online catalog.
- The proxy configuration settings are not correctly configured.
- Incorrect credentials are entered while creating a custom firmware catalog by using CIFS or HTTPS.
- Invalid catalog file path or share address is entered while creating custom firmware catalog by using NFS, CIFS, HTTP, or HTTPS.

Error occurred while downloading catalog



Job execution details:

Running

Repository creation failed. Please provide valid credentials and/or repository path.

Task Failed. Completed With Errors.

Close

Dell EMC OpenManage Enterprise is unable to create firmware catalogs

7.3.5.2 Resolution

Make sure that the following are correct and retry the operation:

- Internet connection to the device.
- Correct file path or file name while creating the catalogs.
- Correct credentials while creating the custom catalogs.

Conclusion

Dell EMC provides its customers with products that simplify and streamline their IT processes, freeing administrator's time to focus on activities that help grow the business. This technical white paper provides comprehensive information about the test environment, recommendations, and test results in the form of neatly arranged infographics to make it easy for reading, scanning, and comprehension. To maximize utilization, special notes and cautions are specified, where necessary. For more information about different Dell EMC PowerEdge servers, see the [Dell PowerEdge Servers Portfolio Guide](#).



You can also view the following videos to get more information about using the Dell EMC OpenManage Enterprise Graphical User Interface (GUI):

- [Creating a firmware baseline in Dell EMC OpenManage Enterprise—Tech Release](#) (01:22 m)
 - [Dell EMC OpenManage Enterprise Systems Management Console](#) (02:02 m)
 - [Dell EMC OpenManage Enterprise](#) (01:44 m)
 - [Viewing device details by using Dell EMC OpenManage Enterprise](#) (01:28 m)
 - [Discovering new devices by using Dell EMC OpenManage Enterprise](#) (01:21 m)
-

A Technical support and resources

- [Dell.com/support](https://www.dell.com/support) is focused on meeting customer needs with proven services and support.
- To watch quick and short videos about handling the PowerEdge server components, visit the [QRL video website](#).

A.1 Related resources

A.1.1 Contacting Dell EMC

Dell provides several online and telephone-based support and service options. Availability varies by country and product, and some services may not be available in your area. To contact Dell for sales, technical support, or customer service issues:

1. Visit www.dell.com/support.
 - a. Select your support category.
 - b. Verify your country or region in the **Choose a Country/Region** drop-down menu at the top of page.
 - c. Select the appropriate service or support link based on your need.

For information about documentation support:

1. Go to dell.com/support/manuals.
 - a. In the **Tell us about your Dell system** section, under No, select **Choose from a list of all Dell products** and click **Continue**.
 - b. In the **Select your product type** section, click **Software, Monitors, Electronics & Peripherals**.
 - c. In the **Choose your Dell Software, Monitors, Electronics & Peripherals** section, click **Software**.
 - d. In the **Choose your Dell Software** section, click the required link from the following:
 - Client System Management
 - Enterprise System Management
 - Remote Enterprise
 - System Management–Serviceability Tools
 - e. To view the document, click the required product version.

A.1.2 About Dell EMC OpenManage Enterprise

Dell EMC OpenManage Enterprise is a hardware management and monitoring application that provides a comprehensive view of the Dell EMC servers, chassis, storage, network switches, and other devices on the enterprise network. With Dell EMC OpenManage Enterprise, a web-based and one-to-many Systems Management application for Dell EMC systems and other third-party devices, you can:

- Discover and manage devices in a data center environment.
- Create and manage Dell EMC OpenManage Enterprise users and their permissions.
- Group and manage devices.
- Monitor the health of your devices.
- Manage device firmware versions and perform system updates and remote tasks.
- Create and deploy device configuration templates.

- View and manage system alerts and alert policies.
- View hardware inventory and compliance reports.
- Monitor and report about warranty and licenses.

Note—For information about supported browsers, see the Dell EMC OpenManage Enterprise Support Matrix available on the support site.

Some of the security features of Dell EMC OpenManage Enterprise are:

- Role-based access that limits access to console settings and device actions.
- Hardened appliance with Security-Enhanced Linux (SELinux) and an internal firewall.
- Encryption of sensitive data in an internal database.
- Use of encrypted communication outside the appliance (HTTPS).
- Create and enforce firmware and configuration-related policies.
- Provision for configuring and updating the bare-metal servers.

Note—Dell EMC OpenManage Enterprise has a domain-task-based GUI, where the navigation is designed by considering the sequence of tasks that are predominately used by an administrator and device manager. When you add a device to an environment, Dell EMC OpenManage Enterprise automatically detects the device properties, places it under relevant device group, and enables you to manage the device. The typical sequence of tasks performed by Dell EMC OpenManage Enterprise:

- Deploy and managing Dell EMC OpenManage Enterprise
- Configure Dell EMC OpenManage Enterprise by using Text User Interface
- Discover devices for monitoring or management
- Manage All Devices
- Monitor devices by using the Dell EMC OpenManage Enterprise dashboard
- Organize devices into groups
- Manage the device firmware
- View and configuring devices
- Monitor device alerts
- View archived alerts
- View device warranty information
- Manage device configuration templates
- Manage the device configuration compliance baseline
- Monitor device compliance with compliance templates
- Manage audit logs
- Manage Dell EMC OpenManage Enterprise appliance settings
- Run an inventory job now
- Manage the device warranty
- Manage reports and MIB files