



Cisco Prime Performance 1.7 Installation Requirements

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New and Revised Information

Table 1-1 lists new and revised information since the first Prime Performance Manager 1.7 release.

Table 1-1 *New and Revised Information*

Date	Change	Location
2/12/16	Added dnsmasq installation procedure.	Installing dnsmasq, page 2-34
31/03/17	Support for the following: <ul style="list-style-type: none"> • RHEL 7.2 and Ubuntu 14.04 • VMWare ESX 6.0 • Cisco Prime Interoperability • RHCS Requirements • Updated steps to install the local HA gateway on the earlier version of Prime Performance Manager. • Added steps to upgrade an existing Prime Performance Manager local HA gateway while performing an OS upgrade from RHEL 5.X to RHEL 6.X. 	<ul style="list-style-type: none"> • Supported Operating Systems, page 1-3 • VM Environments, page 1-6 • Cisco Prime Interoperability, page 1-7 • RHCS Components and Functionality, page 1-87 • Install the Local HA Gateway, page 2-17 • Upgrade an Existing Local HA Gateway, page 2-40
31/07/17	Support for the following: <ul style="list-style-type: none"> • RHCS Requirements • Prime Central 1.5.3 and Prime Network 4.3.1, 4.3.2 	<ul style="list-style-type: none"> • RHCS Requirements, page 1-88 • Cisco Prime Interoperability, page 1-7
31/03/18	Support for the following <ul style="list-style-type: none"> • Prime Network 5.0 	<ul style="list-style-type: none"> • Cisco Prime Interoperability, page 1-7
31/05/18	Support for the following: <ul style="list-style-type: none"> • RHEL 6.9 requirement • RHCS requirements • Updated steps for Local HA Operation Notes and to install the local HA gateway on the earlier version of Prime Performance Manager 	<ul style="list-style-type: none"> • Supported Operating Systems, page 1-3 • RHCS Requirements, page 1-88 • Install the Local HA Gateway, page 2-17
31/07/18	Support for the following <ul style="list-style-type: none"> • RHEL 7.4 	<ul style="list-style-type: none"> • Supported Operating Systems, page 1-3
25/01/19	Support for the following: <ul style="list-style-type: none"> • RHEL 6.10 • RHCS requirements • Updated steps to install the local HA gateway on the earlier version of Prime Performance Manager • Cisco Prime Interoperability • Client requirements 	<ul style="list-style-type: none"> • Supported Operating Systems, page 1-3 • RHCS Requirements, page 1-88 • Install the Local HA Gateway, page 2-17 • Cisco Prime Interoperability, page 1-7 • Client Requirements, page 1-6

Table 1-1 New and Revised Information

Date	Change	Location
09/27/19	Support for the following: <ul style="list-style-type: none"> • Cisco Prime Interoperability • Updated steps to install the local HA gateway 	<ul style="list-style-type: none"> • Cisco Prime Interoperability, page 1-7 • Install the Local HA Gateway, page 2-17
03/31/20	Support for the following: <ul style="list-style-type: none"> • RHEL 7.7 	<ul style="list-style-type: none"> • Supported Operating Systems, page 1-3
05/29/20	Support for the following: <ul style="list-style-type: none"> • Cisco Prime Interoperability 	<ul style="list-style-type: none"> • Cisco Prime Interoperability, page 1-7
11/30/20	Update to the additional RPM packages	<ul style="list-style-type: none"> • Supported Operating Systems, page 1-3

Supported Operating Systems

You can install Prime Performance Manager gateway and unit servers on the following 64-bit Linux versions:

- Red Hat Enterprise Linux 5.0 Advanced Platform Update 5, Update 6, Update 7, Update 8, Update 9, Update 10, Update 11, or CentOS equivalent.
- Red Hat Enterprise Linux 6.0, Update 2, Update 3, Update 4, Update 5, Update 6, Update 8, Update 9, Update 10, or CentOS equivalent.
- Red Hat Enterprise Linux 7.0, 7.1, 7.2, 7.3, 7.4, 7.7, or CentOS equivalent.
- Linux Ubuntu Server 12.04 and 14.04 Release.
- XenApp 6.0


Note

RHEL 6.9 is supported from Release 1.7 Service Pack 1805 and above.
RHEL 7.4 is supported from Release 1.7 Service Pack 1807 and above.
RHEL 6.10 is supported from Release 1.7 Service Pack 1901 and above.
RHEL 7.7 is supported from Release 1.7 Service Pack 2003 and above.


Note

Only 64-bit Linux images are supported; 32-bit Linux images are not supported.


Note

Solaris is not supported.

In addition, the following additional RPM packages (or later versions) must be installed if they are not already installed:

- crontabs-1.10-8
- vixie-cron-4.1-76
- bzip2-libs-1.0.3-4

- ksh-20080202-2
- glibc-2.5-34
- bc-1.06-21
- bind-utils-9.3.4-10
- time-1.7-27
- words-3.0-9
- freetype-2.2.1-21
- fontconfig-2.4.1-7
- expat-1.95.8-8.2.1
- gawk-3.1.5
- net-tools-1.60

If you are running SELinux (Security-Enhanced Linux) and you enabled Prime Performance Manager user access with SSL enabled, run the following command to load the SSL shared library from Prime Performance Manager:

```
chcon -t textrel_shlib_t '/opt/CSCOppm-gw/apache/libexec/libssl.so'
```

If you are running Red Hat Enterprise Linux Version 6 Update 2 or later:

- Install the following additional RPM packages (or later versions) if not already installed:
 - crontabs-1.10-33
 - cronie-1.4.4-7
 - bzip2-libs-1.0.5-7
 - ksh-20100621-12
 - glibc-2.12-1.47
 - bc-1.06.95-1
 - bind-utils-9.7.3-8
 - time-1.7-37.1
 - words-3.0-17
 - freetype-2.3.11-6
 - fontconfig-2.8.0-3
 - expat-2.0.1-9.1
 - gawk-3.1.5
 - net-tools-1.60
 - expect-5.45.4
- Install the following the compatibility libraries:
Package collections -> Compatibility Libraries

If you will use Prime Performance Manager to manage hypervisors, after installing Prime Performance Manager, run the ppm hypervisor checklibrary command to determine if all required shared libraries are installed:

```
ppm hypervisor checklibrary
```

Missing libraries are listed as “not found”.

Common RPM packages that must be installed—but might not be by default—include:

- cyrus-sasl-lib
- cyrus-sasl-md5
- e2fsprogs-libs
- keyutils-libs
- krb5-libs
- libgcrypt
- libgpg-error
- libidn
- libselinux
- libsepol
- openldap
- compat-openldap
- zlib
- openssl
- openssl-0.9.8e (for RedHat Linux Version 5)
- openssl098e (for RedHat Linux Version 6)
- openssl098e (for RedHat Linux Version 7)

If you are integrating with LDAP using PAM, the following RPMs are required:

- RedHat Linux Version 5
 - nss_ldap
- RedHat Linux Version 6
 - pam_ldap
 - nss-pam-ldapd
- RedHat Linux Version 7
 - nss-pam-ldapd

Libraries for PAM_LDAP are provided with the Linux distribution with no support from Cisco. Any issues with PAM_LDAP in a specific deployment are beyond the scope of Cisco support.

To verify the RPMs that are installed on your system, enter:

```
rpm -q -a01
```

Check for the packages listed above or more recent versions. To get RPMs for Red Hat Enterprise Linux, contact your Red Hat representative or download them from the Red Hat website at: <http://www.redhat.com>.

**Note**

Downloading Red Hat Enterprise Linux RPMs might require a support agreement.

Ubuntu Requirements

Prime Performance Manager supports Ubuntu 12.04 and later with the following guidelines:

- Install the RPMs before you install Prime Performance Manager.
- The apt-get install libssl0.9.8 package must be installed.
- All required Red Hat packages must be installed. To verify whether the packages are installed on your server, enter:

```
apt-get install rpm
```

```
dpkg --get-selections
```

- Configure Ubuntu to not use dash as the default shell. For example:

```
/usr/sbin/dpkg-reconfigure -f readline dash
```

VM Environments

You can install and run Prime Performance Manager in a VM environment as long as the VM meets the equivalent requirements provided in the following sections. VM releases supported as both runtime environments and as targets for monitoring by Prime Performance Manager include:

- VMWare ESX 4.1, ESXi 5.0, 5.1, 5.5, 6.0
- Linux KVM 2.x
- OpenStack Havana, Icehouse, and Juno releases

HyperV and Xen are only supported as targets for monitoring by Prime Performance Manager. They have not been tested as runtime environments.



Note

Run Prime Performance Manager on a VM only for POC or medium size networks, For large networks and higher, run Prime Performance Manager on bare metal servers with direct disk access. (For network sizes, see [Table 1-2 on page 1-8.](#))

Client Requirements

Prime Performance Manager clients do not require a separate installation. Clients can access using a web browsers. The following browsers are supported:

- Microsoft Internet Explorer 9.0 or greater
- Firefox 24 or later up to Firefox 55
- Firefox 24 Extended Support Release (ESR) or later up to Firefox 52 ESR

Later versions of Internet Explorer and Firefox, Safari and Chrome are not formally tested but are widely used without problems.

Other client requirements:

- The minimum screen resolution is 1280 x 960.
- The hostname configured on the Prime Performance Manager gateway must be resolvable to an IP address on the client machine using DNS or a local hosts file.

Cisco Prime Interoperability

Prime Performance Manager 1.7 can inter-operate with the following Cisco Prime products:

- Cisco Prime Central 1.3, 1.4, 1.4.1, 1.5, 1.5.1, 1.5.2, 1.5.3, 2.0, and 2.1
- Cisco Prime Network 3.10, 3.11, 4.0, 4.1, 4.2, 4.2.1, 4.2.2, 4.2.3, 4.3.0, 4.3.1, 4.3.2, 5.0, 5.1, 5.2, and 5.3
- Cisco Prime Service Catalog 10.1
- Cisco Prime Network Service Controller 3.2 and 3.3

If you integrate Prime Performance Manager 1.7 with Prime Carrier Management, integration is only allowed with the following Prime Central and Prime Network releases:

- Prime Central 2.1 with Prime Network 5.3 and Prime Performance 1.7 SP2003 and above
- Prime Central 2.1 with Prime Network 5.2 and Prime Performance 1.7 SP1909 and above
- Prime Central 2.1 with Prime Network 5.1 and Prime Performance 1.7 SP1807 and above
- Prime Central 2.0 with Prime Network 5.0 and Prime Performance 1.7 SP1805 and above
- Prime Central 1.5.3 with Prime Network 4.2.1, 4.2.2, 4.2.3, 4.3.0, 4.3.1, 4.3.2 and Prime Performance 1.7 SP1705 and above
- Prime Central 1.5.1 and 1.5.2 with Prime Network 4.2, 4.2.1, 4.2.2, 4.2.3, 4.3 and Prime Performance 1.7 SP4 and above
- Prime Central 1.5 with Prime Network 4.2, 4.2.1, 4.2.2, 4.2.3 and Prime Performance 1.7
- Prime Central 1.4.1 with Prime Network 4.2.1 and Prime Performance 1.7
- Prime Central 1.4 with Prime Network 4.2 and Prime Performance 1.7
- Prime Central 1.3 and Prime Network 4.1

Evolved Programmable Networks Requirements

For Evolved Programmable Networks (EPNs), Prime Performance Manager gateway and unit(s) can be installed on the same server (single deployment) or on separate servers (distributed deployments). Single deployments are permitted when high availability will not be configured for proof of concept (POC), medium, large, and very large networks. Distributed deployments are required if you plan to configure high availability or your network is in the extremely large or maximum supported categories. Server and operating system requirements depend on your network size. Network sizes are based on maximums numbers for the following:

- Devices
- Layer 3 pseudowires (PWE3s)
- Interfaces—The number of device interface table entries. This number is usually higher than the number of physical ports because it includes pseudowires, virtual circuits, VLANs, and other virtual interfaces.
- Interfaces generating statistics—The number of interfaces generating statistics. This category excludes DS1, DS3, SONET, SDH, and ATM layers that do not return valid statistics for these layers.

Table 1-2 shows the maximums used for the Prime Performance Manager server requirements for single and distributed deployments.

Table 1-2 Network Sizes for Planning Prime Performance Manager Server Requirements

Element	Single Deployment				Distributed Deployment				
	POC	Medium	Large	Very Large	Large	Very Large	Extremely Large	Extremely Large with 5-Minute Reports	Maximum Supported Scale
Devices	200	2,000	5,000	12,500	5,000	10,000	15,000	20,000	150,000
PWE3 links	12,400	124,000	270,380	719,700	270,380	540,000	860,000	1,151,500	8,636,600
Interfaces	37,600	376,000	815,260	2,041,849	815,260	1,630,000	2,470,000	3,266,900	24,501,960
Interfaces generating statistics	20,900	209,000	489,500	1,224,720	489,500	815,000	1,125,000	1,959,600	14,696,880

Additionally, all EPN systems use a device ratio model per 5000 devices below:

Cisco ASR 1002—1 - Route Reflector

Cisco CRS-1—14 - Core

Cisco 7600—28 - Distribution

Cisco ASR 9006—159 - Aggregation/SEN

Cisco Catalyst 4506—1067 - Access

Cisco ISR 3900—1067 - Access

Cisco Catalyst 3750E—1067 - Access

Cisco ME 3400E—1067 - Access

Cisco MWR 2941—530 - Access

EPN requirements are based 200 simultaneous user queries using GUI and REST API data access and initiating 200 queries every 10 seconds for 90 minutes sustained, and the following reports:

Device Level Reports:

- CPU 5 Min Average Utilization 15 Minute
- PWE3 Packet Rate 15 Minute (GUI)
- PWE3 Dashboard 15 Minute (REST)
- Memory Pool Utilization 15 Minute
- ICMP Ping Response Time 15 Minute
- Interface Availability 15 Minute
- SNMP/Hypervisor Availability 15 Minute
- Interface Errors 15 Minute
- Interface Utilization 15 Minute
- Interface Admin / Operational Status Percentage 15 Minute (GUI)
- Interface Operational Status Percentage 15 Minute (REST)

Network Level Reports:

- CPU 5 Min Average Utilization Hourly
- Interface Dashboard Hourly
- PWE3 Dashboard Hourly

Additional Requirements Notes

In addition to requirements provided in the preceding and following sections, review the following notes before you install Prime Performance Manager:

Input/Output Operations Per Second

All IOPS and write operation metrics are collected by the Linux IOSTAT tool and computed as a 95th percentile metric.

Large Networks

For large networks or higher, format the Linux file systems for the following Prime Performance Manager directories to accommodate large file support: data, device cache, backup. You normally do this by adding the -T option to the mkfs.ext3 command:

```
mkfs.ext3 -T largefile /dev/{raidDeviceName}
```

This enables 1 MB block data allocations per inode instead of the default 4K or 16K of block data per inode. To verify, use any of the following commands: `tune2fs -l /dev/{raidDeviceName} | grep group`. The following formula computes the current value: (blocks per group/inodes per group) * block size.

CSV Exports

Prime Performance Manager CSV export is disabled by default. This means CSV report files are not included in the gateway backup file. However the server requirements provided in the following sections assume CSV export is enabled and CSV report files are included in gateway backup file except Maximum Supported Scale Distributed, which assumes CSV export is disabled.

Device Discovery

When discovering network devices, verify the banner page does not include a # character. This character will be interpreted as an enable prompt and cause a CLI/HTTP device access problem.

Server Requirements for Single Deployments

In a single Prime Performance Manager deployment, the gateway and unit are installed on the same server. Server requirements are based on the following criteria:

- Reports—CPU, memory, interface, PWE3s, SNMP and Hypervisor Ping, ICMP Ping.
- The following report aging values were used to establish a baseline for computing disk space requirements:
 - 15-minute reports—7 days
 - Hourly reports—14 days
 - Daily reports—94 days
 - Weekly reports—730 days

- Monthly reports—1825 days

All EPN system requirements assume:

- ppm backup days: 1 both
- ppm backuplogs: disable both

Increasing retention time requires additional disk space. Smaller networks can easily increase the time retention in most cases. Larger networks require capacity planning for disk space usage needs.

For single-server deployments, the following additional disk space is required for every 1000 devices averaging 300 interfaces or PWE3s that can generate statistics for each additional day of retention for 15-minute and hourly reports:

- 1.4 GB for database and reports when CSV export is disabled.
- 3.2GB for backups when CSV export is disabled or CSV report files are not included in the backup file.
- 2.0 GB for database and reports when CSV export is enabled.
- 4.2 GB for backups when CSV export is enabled and CSV report files are included in the backup file.

For distributed deployments for every 1000 devices where each device has an average 300 interfaces or PWE3s that can generate statistics, each standalone gateway or unit requires the following total disk space per additional day of retention of 15-minute and hourly reports.

- 18 MB for database and reports on the gateway when CSV export is disabled.
- 58 MB for backups on the gateway when CSV export is disabled or CSV report files are not included in the gateway backup file.
- 560 MB for the database and reports on the gateway when CSV export is enabled.
- 1.16 GB for backups on the gateway when CSV export is enabled and CSV report files are included in the gateway backup file.
- 1.4 GB for database and reports on units.
- 4.6 GB for backups on units.



Note Adding retention days to daily, weekly, and monthly reports do not impact disk space as significantly as adding retention days to 15-minute and hourly reports. Approximately 98% of disk space usage comes from the 15-minute and hourly reports.

- Hardware or ZFS RAID is recommended for production systems for partitions, storing the database, reports, and backups.

For information on Cisco UCS Server options, see:
<http://www.cisco.com/web/mobile/products/ucs/cseries/docs.html>

- Depending on your network size and server performance, tuning the gateway and unit server JVM heap size is recommended. For high-scale environments, increasing the gateway and unit server JVM heap size to 8-16 GB is recommended. You can change the JVM heap size using the `ppm jvmsize` command.

The following topics provide single deployment server requirements:

- [Proof of Concept Single Deployment Installation Requirements, page 1-11](#)
- [Medium Network Single Deployment Server Requirements, page 1-12](#)
- [Large Network Single Deployment Server Requirements, page 1-16](#)

- [Very Large Network Distributed Deployment Server Requirements, page 1-28](#)

Proof of Concept Single Deployment Installation Requirements

Table 1-3 lists the proof of concept network single deployment Linux server requirements. (See Table 1-2 for network size details.)

Table 1-3 Proof of Concept Network Single Deployment Linux Server Requirements

Item	Specifications
Hardware	<ul style="list-style-type: none"> • Cisco Unified Computing System (UCS) C22M3 for non-NEBs-compliant systems. <p>Note UCS Servers use Xeon 5600/E5-2400 processors.</p> <ul style="list-style-type: none"> • Oracle Sun Netra X4250 or equivalent for NEBs-compliant systems.
Software	See Supported Operating Systems, page 1-3 .
CPU type	One of the following: <ul style="list-style-type: none"> • 4-core (X4250) • 6-core (Cisco UCS C200M2 or Cisco UCS C22M3)
CPU number	1
CPU Speed	2.13 GHz (minimum); 3.0 GHz (recommended)
vCPU number	4 or more (For VM)
Memory (RAM)	8 GB or greater
Swap space	8 GB or greater
Gateway JVM size	2 GB
Unit JVM size	4 GB
Local Storage Options	<ul style="list-style-type: none"> • Cisco UCS C22 M3/C220 M3/B200 M3. • 1*300 GB SAS 15K RPM drive for OS and Prime Performance Manager. • 1*300 GB SAS 15K RPM drive for backups.
External Storage Options and Performance Requirements	
Local Root Partition	<ul style="list-style-type: none"> • Linux OS Prime Performance Manager gateway/unit installation • 80 GB used • 180 IOPS with 75% write operations • Driven by device cache, logs, database, and exported report writes • Device cache, logs, database, and exported reports can be relocated if necessary
First External Partition	<ul style="list-style-type: none"> • Prime Performance Manager gateway/unit backups • 120 GB used • 230 IOPS with 65% write operations • Sustained IOPS during backup periods; quiet at other times

Medium Network Single Deployment Server Requirements

Network size (maximum):

- Number of devices—2,000
- Number of PWE3 links— 124,000
- Number of Interfaces—376,000
- Number of Interfaces with stats—209,000

[Table 1-4](#) lists the medium network single deployment Linux server requirements. (See [Table 1-2](#) for network size details.)

Table 1-4 Medium Network Single Deployment Linux Server Requirements

Item	Specifications
Hardware	<ul style="list-style-type: none"> • Cisco UCS C200M2/C22M3 for non-NEBs-compliant systems. • Cisco UCS C240 M3 for non-NEBs-compliant systems. • Sun Netra X4250 or equivalent for NEBs compliant systems.
Software	See Supported Operating Systems, page 1-3 .
CPU type	One of the following: <ul style="list-style-type: none"> • 4-core (X4250) • 6-core (UCS C200M2/C22M3/C240 M3). Note UCS Servers use Xeon 5600/E5-2400 processors.
CPU number	2
CPU Speed	2.13 GHz (minimum); 2.70 GHz (recommended)
Memory (RAM)	24 GB or greater
Swap space	12 GB or greater
Gateway JVM size	4 GB
Unit JVM size	8 GB

Table 1-4 Medium Network Single Deployment Linux Server Requirements (continued)

Item	Specifications
Local Storage Options	<p>Cisco UCS C240 M3 Expansion, Performance, and Reliability Option</p> <ul style="list-style-type: none"> • 2*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0 • 6*300 GB SAS 15K RPM drives for database using RAID10 • 6*300 GB SAS 15K RPM drives for backups using RAID10 and two PCIe RAID controllers • Dual power supply <p>Cisco UCS C240 M3 Performance Option</p> <ul style="list-style-type: none"> • 2*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0 • 3*300 GB SAS 15K RPM drives for database using RAID0 • 3*300 GB SAS 15K RPM drives for backups using RAID0 and two PCIe RAID controllers <p>Cisco UCS C22 M3/C220 M3 Performance Option</p> <ul style="list-style-type: none"> • 2*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0 • 3*300 GB SAS 10K RPM drives for database using RAID0 • 3*300 GB SAS 10K RPM drive for backups using RAID0 and one embedded RAID or PCIe RAID controller <p>Cisco UCS C22 M3/C220 M3 Basic Option</p> <ul style="list-style-type: none"> • 1*300 GB SAS 15K RPM drive for OS and Prime Performance Manager • 1*300 GB SAS 15K RPM drives for database • 1*600 GB SAS 10K RPM drive for backups <p>Cisco UCS C200 M2 LFF Basic Option</p> <ul style="list-style-type: none"> • 1*300 GB SAS 15K RPM drive for OS and Prime Performance Manager • 1*300 GB SAS 15K RPM drives for database • 1*600 GB SAS 10K RPM drive for backups <p>Oracle Netra X3-2 Basic Option</p> <ul style="list-style-type: none"> • 1*300 GB SAS 10K RPM drive for OS and Prime Performance Manager • 1*300 GB SAS 10K RPM drives for database • 1*600 GB SAS 10K RPM drive for backups
External Storage Options and Performance Requirements	

Table 1-4 *Medium Network Single Deployment Linux Server Requirements (continued)*

Item	Specifications
Local Root Partition	Linux OS and Prime Performance Manager gateway/unit installation and gateway database <ul style="list-style-type: none"><li data-bbox="570 444 737 471">• 15 GB used<li data-bbox="570 488 1016 515">• 400 IOPS with 91% write operations<li data-bbox="570 533 1365 559">• driven by Prime Performance Manager device cache writes and logs<li data-bbox="570 577 1182 603">• Device cache and logs can be relocated if necessary

Table 1-4 Medium Network Single Deployment Linux Server Requirements (continued)

Item	Specifications
First External Partition	<p>Prime Performance Manager database and Gateway Exported Reports</p> <ul style="list-style-type: none"> • 175 GB used • 360 IOPS with 67% write operations <p>Gateway export report size:</p> <ul style="list-style-type: none"> • 46 GB disk space used for export report based on below aging • 4 GB export report data generated per day • Average Report data generation rate is about 2.8 MB per minute • 15-minute reports - 7 Days - 3.17 GB disk usage per day • Hourly reports - 14 Days - 0.80 GB disk usage per day • Daily reports - 94 Days - 0.03 GB disk usage per day • Weekly reports - 730 Days - 0.03 GB disk usage per week • Monthly reports - 1825 Days - 0.03 GB disk usage per month <p>Unit database size:</p> <ul style="list-style-type: none"> • 105 GB disk space used for database based on below aging • 9 GB report data generated per day • Average report data generation rate is about 6.4 MB per minute • 15-minute reports - 7 Days - 7.14 GB disk usage per day • Hourly reports - 14 Days - 1.79 GB disk usage per day • Daily reports - 94 Days - 0.07 GB disk usage per day • Weekly reports - 730 Days - 0.07 GB disk usage per week • Monthly reports - 1825 Days - 0.07 GB disk usage per month <p>Database and exported reports partition size:</p> <ul style="list-style-type: none"> • Unit database size above + • Gateway export report size above • Multiply by 1.15 for safety

Table 1-4 Medium Network Single Deployment Linux Server Requirements (continued)

Item	Specifications
Second External Partition	Prime Performance Manager Gateway and Unit backups <ul style="list-style-type: none"> • 500 GB used • 700 IOPS with 70% write operations • Sustained IOPS during backup periods; quiet at other times Unit backup file size: <ul style="list-style-type: none"> • Unit database size above + • 4 GB for unit device cache/other files Gateway backup file size: <ul style="list-style-type: none"> • Gateway export report size + • 3 GB for gateway device cache/database/other files Gateway and Unit backups partition Size: <ul style="list-style-type: none"> • Unit backup file size above * (backup days + 1) + • Gateway backup file size above * (backup days + 1) + • Unit database size above + • 7 GB for device cache/other files; • Multiply by 1.15 for safety backup/restore speed: average of 6 GB per minute

Large Network Single Deployment Server Requirements

Table 1-5 shows the large network Linux server requirements. (See Table 1-2 for network size details.)

Table 1-5 Large Network Single Deployment Linux Server Requirements

Item	Specifications
Hardware	Cisco UCS C240 M3/C220 M3 for non-NEBs-compliant systems
Software	See Supported Operating Systems, page 1-3 .
CPU type	8-core (Cisco UCS C240 M3/C220 M3) Note Cisco UCS Servers use Xeon 5600/E5-2400 processors.
CPU number	2
CPU Speed	2.70 GHz minimum
Memory (RAM)	64 GB or greater
Swap space	32 GB or greater
Gateway JVM size	8 GB
Unit JVM size	8 GB

Table 1-5 Large Network Single Deployment Linux Server Requirements (continued)

Item	Specifications
Local Storage Options	<p>Cisco UCS C240 M3 Expansion, Performance, and Reliability Option</p> <ul style="list-style-type: none"> • 3*300 GB SAS 15K RPM drive for OS using RAID0 • 8*300 GB SAS 15K RPM drives for CSV reports and database using RAID10 • 8*300 GB SAS 15K RPM drives for backups using RAID10 • Using PCIe RAID controllers and 24 SFF disk configuration • Dual power supply <p>Cisco UCS C240 M3 Performance and Reliability Option</p> <ul style="list-style-type: none"> • 3*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0 • 8*300 GB SAS 15K RPM drives for CSV reports and database using RAID10 • 8*300 GB SAS 15K RPM drive for backups using RAID10 • Using PCIe RAID controllers and 24 SFF disk configuration <p>Cisco UCS C240 M3 Performance Option</p> <ul style="list-style-type: none"> • 3*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0 • 4*300 GB SAS 15K RPM drives for CSV reports and database using RAID0 • 4*300 GB SAS 15K RPM drive for backups using RAID0 and two PCIe RAID controllers <p>Cisco UCS C240 M3 Basic Option</p> <ul style="list-style-type: none"> • 2*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0 • 3*300 GB SAS 15K RPM drives for CSV reports and database using RAID0 • 3*300 GB SAS 15K RPM drive for backups using RAID0 and two PCIe RAID controllers <p>Cisco UCS C220 M3 Basic Option</p> <ul style="list-style-type: none"> • 2*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0 • 3*300 GB SAS 15K RPM drives for CSV reports and database using RAID0 • 3*300 GB SAS 15K RPM drive for backups using RAID0 and one embedded RAID, Mezzanine RAID, or PCIe RAID controller
External Storage Options and Performance Requirements	

Table 1-5 Large Network Single Deployment Linux Server Requirements (continued)

Item	Specifications
Local Root Partition	<ul style="list-style-type: none">• Linux OS and Prime Performance Manager gateway/unit installation and gateway database• 20 GB used• 700 IOPS with 90% write operations driven by Prime Performance Manager device cache writes and logs• Device cache and logs can be relocated if necessary

Table 1-5 Large Network Single Deployment Linux Server Requirements (continued)

Item	Specifications
First External Partition	<ul style="list-style-type: none"> • Prime Performance Manager database and gateway exported reports • 360 GB used • 700 IOPS with 60% write operations <p>Gateway export report size:</p> <ul style="list-style-type: none"> • 104 GB disk space used for export report based on below aging • 9 GB export report data generated per day • Average Report data generation rate is about 6.4MB per minute • 15-minute reports - 7 Days - 7.14 GB disk usage per day • Hourly reports - 14 Days - 1.79 GB disk usage per day • Daily reports - 94 Days - 0.07 GB disk usage per day • Weekly reports - 730 Days - 0.07 GB disk usage per week • Monthly reports - 1825 Days - 0.07 GB disk usage per month <p>Unit database size:</p> <ul style="list-style-type: none"> • 223 GB disk space used for database based on below aging • 19 GB report data generated per day • Average report data generation rate is about 13.51MB per minute • 15-minute reports - 7 Days - 15.07 GB disk usage per day • Hourly reports - 14 Days - 3.77 GB disk usage per day • Daily reports - 94 Days - 0.16 GB disk usage per day • Weekly reports - 730 Days - 0.16 GB disk usage per week • Monthly reports - 1825 Days - 0.16 GB disk usage per month <p>Database and Exported reports partition size:</p> <ul style="list-style-type: none"> • Unit database size above + • Gateway export report size above • Multiply by 1.1 for safety

Table 1-5 Large Network Single Deployment Linux Server Requirements (continued)

Item	Specifications
Second External Partition	<ul style="list-style-type: none"> • Prime Performance Manager gateway and unit backups • 998 GB used • 1500 IOPS with 70% write operations • Sustained IOPS during backup periods; quiet at other times Unit backup file size: <ul style="list-style-type: none"> • Unit database size above + • 6 GB For unit device cache/other files Gateway backup file size: <ul style="list-style-type: none"> • Gateway export report size + • 4 GB for gateway device cache/database/other files Gateway and Unit backups partition Size: <ul style="list-style-type: none"> • Unit backup file size above * (backup days + 1) + • Gateway backup file size above * (backup days + 1) + • Unit database size above + • 10 GB for device cache/other files • Multiply by 1.1 for safety factor • Backup/restore speed: average of 6 GB per minute

Very Large Network Single Deployment Server Requirements

Table 1-6 shows the very large network Linux server requirements. (See Table 1-2 for network size details.) Report aging values to establish a baseline for computing disk space requirements:

- 5 minute reports - disabled
- 15-minute reports - 7 days
- Hourly reports - 14 days
- Daily reports - 94 days
- Weekly reports - 730 days
- monthly reports - 1825 days

Table 1-6 Very Large Network Single Deployment Linux Server Requirements

Item	Specifications
Hardware	Cisco UCS C240 M3 for non-NEBs-compliant systems.
Software	See Supported Operating Systems, page 1-3 .
CPU type	8-core (Cisco UCS C240 M3)
CPU number	Two
CPU Speed	2.70 GHz (minimum)
Memory (RAM)	96 GB or greater

Table 1-6 Very Large Network Single Deployment Linux Server Requirements (continued)

Item	Specifications
Swap space	32 GB or greater
Gateway JVM size	8 GB
Unit JVM size	16 GB
Local Storage Options	<ul style="list-style-type: none"> • Cisco UCS C240 M3 Performance and Reliability Option. <ul style="list-style-type: none"> – 4*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0 – 8*300 GB SAS 15K RPM drives for CSV reports and database using RAID10 – 12*600 GB SAS 10K RPM drives for backups using RAID10 – Using PCIe RAID controllers and 24 SFF disk configuration – Dual power supply • Cisco UCS C240 M3 Performance Option <ul style="list-style-type: none"> – 4*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0 – 4*300 GB SAS 15K RPM drives for CSV reports and database using RAID0 – 6*600 GB SAS 10K RPM drives for backups using RAID0 and two PCIe RAID controllers
External Storage Options and Performance Requirements	
Local Root Partition	<p>Linux OS and Prime Performance Manager gateway/unit installation and gateway database</p> <ul style="list-style-type: none"> • 35 GB used • 1300 IOPS with 80% write operations • driven by Prime Performance Manager Device cache writes and logs • Device cache and logs can be relocated if necessary

Table 1-6 Very Large Network Single Deployment Linux Server Requirements (continued)

Item	Specifications
First External Partition	<p>Prime Performance Manager unit database and gateway exported reports</p> <ul style="list-style-type: none"> • 842 GB used • 1580 IOPS with 60% write operations <p>Gateway export report size:</p> <ul style="list-style-type: none"> • 235 GB disk space used for export report based on the aging listed below • 20 GB export report data generated per day • Average report data generation rate is about 14.22MB per minute • 15-minute reports - 7 Days - 13.49 GB disk usage per day • Hourly reports - 14 Days - 3.37 GB disk usage per day • Daily reports - 94 Days - 0.14 GB disk usage per day • Weekly reports - 730 Days - 0.14 GB disk usage per week • Monthly reports - 1825 Days - 0.14 GB disk usage per month <p>Unit database size:</p> <ul style="list-style-type: none"> • 530 GB disk space used for database based on the aging listed below • 45.4 GB report data generated per day • Average report data generation rate is about 32.29 MB per minute • 15-minute reports - 7 Days - 36.02 GB disk usage per day • Hourly reports - 14 Days - 9.00 GB disk usage per day • Daily reports - 94 Days - 0.38 GB disk usage per day • Weekly reports - 730 Days - 0.38 GB disk usage per week • Monthly reports - 1825 Days - 0.38 GB disk usage per month <p>Database and Exported reports partition size:</p> <ul style="list-style-type: none"> • Unit database size above + • Gateway export report size above • Multiply by 1.1 for safety

Table 1-6 Very Large Network Single Deployment Linux Server Requirements (continued)

Item	Specifications
Second External Partition	Prime Performance Manager gateway and unit backups <ul style="list-style-type: none"> • 2350 GB used • 3220 IOPS with nearly 70% write operations • Sustained IOPS during backup periods; quiet at other times Unit backup file size: <ul style="list-style-type: none"> • Unit database size above + • 12 GB For unit device cache/other files Gateway backup file size: <ul style="list-style-type: none"> • Gateway export report size + • 10 GB for gateway device cache/database/other files Gateway and unit backups partition size: <ul style="list-style-type: none"> • Unit backup file size above * (backup days + 1) + • Gateway backup file size above * (backup days +) + • Unit database size above + • 22 GB for device cache/other files • Multiply by 1.1 for safety • Backup/restore speed: average of 6 GB per minute

Server Requirements for Distributed Deployment Installations

In a Prime Performance Manager distributed deployment, the gateway and units are installed on different servers. Server requirements are based on the following criteria:

- Reports: CPU, Memory, Interface, PWE3, SNMP and Hypervisor Ping, ICMP Ping.
- Report aging:
 - 15-minute—7 days
 - Hourly—14 days
 - Daily—94 days
 - Weekly—730 days
 - Monthly—1825 days

For distributed deployments, the following additional disk space is required for every 1000 devices averaging 300 interfaces or PWE3s that can generate statistics, each standalone gateway or unit requires the following total disk space per additional day of retention of 15min and hourly reports.

For gateways:

- 20 MB for database and reports when CSV export is disabled.
- 60 MB for backups when CSV export is disabled or CSV report files are not included in the backup file.
- 580 MB for database and reports when CSV export is enabled.

- 1.2 GB for backups when CSV export is enabled and CSV report files are included in the backup file.

For units:

- 1.5 GB for database and reports.
- 4.7 GB for backups.



Note Adding retention days to daily, weekly, and monthly reports does not impact disk space as significantly as adding retention days to 15-minute and hourly reports.

- Hardware or ZFS RAID is recommended for production systems for partitions, storing the database, reports, and backups.
- Depending on your network size and server performance, tuning the gateway and unit server JVM heap size is recommended. For high scale environments, increasing gateway and unit JVM heap size to 8-24 GB is recommended. You can change the JVM size using the **ppm jvmsize** command.

The following topics provide the distributed network server requirements:

- [Large Network Distributed Deployment Server Requirements, page 1-24](#)
- [Very Large Network Distributed Deployment Server Requirements, page 1-28](#)
- [Extremely Large Network Distributed Deployment Server Requirements, page 1-33](#)

Large Network Distributed Deployment Server Requirements

Maximum Network Size

- Number of Devices—5,000
- Number of PWE3 Links—270,380
- Number of Interfaces—815,260
- Number of Interfaces with Stats—489,500

Gateway with CSV Exporting All Data to Gateway Enabled

- Cisco UCS C240 M3 or Cisco UCS C220 M3 for non-NEBs-compliant systems
- Cisco UCS B200 M3 for non-NEBs compliant systems external storage only

Linux Version From Supported List

- CPU—Two 8-core:
 - UCS C240 M3 Xeon E5-2680 2.7 GHz
 - UCS B200 M3 Xeon E5-2680 2.7 GHz
 - UCS C240 M3 Xeon E5-2670 2.6 GHz
 - UCS C240 M3 Xeon E5-2650v2 2.6 GHz
 - UCS C220 M3 Xeon E5-2680 2.7 GHz
 - UCS C220 M3 Xeon E5-2670 2.6 GHz
 - UCS C220 M3 Xeon E5-2650v2 2.6 GHz
- vCPU—8 or more

- For VM Environments
 - RAM—24 GB minimum
 - Swap space—12 GB minimum
 - JVM—8 GB

Local Storage Options

Cisco UCS C240 M3 Performance and Reliability Option

- 1*300 GB SAS 10K RPM drive for OS
- 4*300 GB SAS 10K RPM drives for CSV reports using RAID10
- 4*300 GB SAS 10K RPM drives for backups using RAID10
- Two PCIe RAID controllers
- Dual Power Supply

Cisco UCS C240 M3/C220 M3 Performance Option

- 1*300 GB SAS 15K RPM drive for OS and Prime Performance Manager
- 2*300 GB SAS 15K RPM drives for CSV reports using RAID0
- 2*300 GB SAS 15K RPM drive for backups using RAID0
- One embedded RAID, Mezzanine RAID, or PCIe RAID controller

External Storage Options and Performance Requirements

Local Root Partition

- Linux OS and Prime Performance Manager gateway installation and database
- 10 GB used
- 125 IOPS with nearly 66% write operations
- Driven by Prime Performance Manager logs and database

First External Partition

- Prime Performance Manager gateway export report
- 115 GB used
- 500 IOPS with 20% write operations
- Burst read export report files during backup periods

Gateway export report size:

- 104 GB disk space used for export report based on below aging
- 9 GB export report data generated per day
- Average report data generation rate is about 6.4MB per minute
- 15-minute reports - 7 Days - 7.14 GB disk usage per day
- Hourly reports - 14 Days - 1.79 GB disk usage per day
- Daily reports - 94 Days - 0.07 GB disk usage per day
- Weekly reports - 730 Days - 0.07 GB disk usage per week
- Monthly reports - 1825 Days - 0.07 GB disk usage per month
- Gateway export report partition size:

- Gateway export report size above
- Multiply by 1.1 for safety

Second External Partition

- Prime Performance Manager gateway backups including export report
- 245 GB used
- 620 IOPS with nearly 58% write operations
- Sustained IOPS during backup periods; quiet at other times
- Gateway backup file size:
 - Gateway export report size above +
 - 4 GB for device cache/gateway database/other files
- Gateway backup partition size:
 - Gateway backup file size * (backup days + 1) +
 - 4 GB for device cache/gateway database/other files
 - Multiply by 1.15 for safety
- Gateway backup/restore speed: average of 6 GB per minute

Unit with 5000 Devices

- Cisco UCS C240 M3 or Cisco UCS C220 M3 for non-NEBs-compliant systems
- Cisco UCS B200M3 for non-NEBs-compliant systems (external storage only)
- Supported Linux version
- CPU type—8-core (UCS B200 M3):
 - Xeon E5-2680 2.7 GHz
 - Xeon E5-2680 2.7 GHz
 - Xeon E5-2670 2.6 GHz
 - Xeon E5-2650v2 2.6 GHz
 - Xeon E5-2680 2.7 GHz
 - Xeon E5-2670 2.6 GHz
 - Xeon E5-2650v2 2.6 GHz
- CPU—2
- vCPU—8 or more for VM environments
- RAM—48 GB or greater
- Swap space—32 GB or greater
- Unit JVM—8 GB

Local Storage Options

- Cisco UCS C240 M3 Expansion, Performance, and Reliability Option
 - 2*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0
 - 6*300 GB SAS 15K RPM drives for database using RAID10
 - 8*300 GB SAS 15K RPM drives for backups using RAID10
 - Two PCIe RAID controllers

- Dual power supply
- Cisco UCS C240 M3 Performance and Reliability Option
 - 2*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0
 - 4*300 GB SAS 15K RPM drives for database using RAID10
 - 6*300 GB SAS 15K RPM drive for backups using RAID0
 - Two PCIe RAID controllers
- Cisco UCS C220 M3/C240 M3 Performance Option
 - 2*146 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0
 - 2*300 GB SAS 15K RPM drives for database using RAID0
 - 3*300 GB SAS 15K RPM drive for backups using RAID0
 - Two PCIe RAID controllers
- Cisco UCS C220 M3/C240 M3 Basic Option
 - 2*146 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0
 - 2*300 GB SAS 15K RPM drives for database using RAID0
 - 2*600 GB SAS 15K RPM drive for backups using RAID0
 - One embedded RAID, Mezzanine RAID, or PCIe RAID controller

External Storage Options and Performance Requirements

- Local Root Partition
 - Linux OS and Prime Performance Manager unit installation
 - 20 GB used
 - 352 IOPS with 84% write operations
 - Driven by Prime Performance Manager device cache writes and logs
 - Device cache and logs can be relocated if necessary

- First External Partition

Prime Performance Manager unit database

- 246 GB used
- 620 IOPS with 58% write operations

Unit database size:

- 223 GB disk space used for database based on below aging
- 19 GB report data generated per day
- Average report data generation rate is about 13.51 MB per minute
- 15-minute reports - 7 Days - 15.07 GB disk usage per day
- Hourly reports - 14 Days - 3.77 GB disk usage per day
- Daily reports - 94 Days - 0.16 GB disk usage per day
- Weekly reports - 730 Days - 0.16 GB disk usage per week
- Monthly reports - 1825 Days - 0.16 GB disk usage per month
- Unit database Partition size: Unit database size above; multiplied by 1.1 for safety

- Second External Partition

- Prime Performance Manager unit backups
- 755 GB used
- 1326 IOPS with nearly 68% write operations
- Sustained IOPS during backup periods; quiet at other times
- Unit backup file size:
 - Unit database size above +
 - 6 GB For device cache/other files
- Unit backup partition size:
 - Unit backup file size above * (backup days + 1) +
 - Unit database size above +
 - 6 GB For device cache/other files
 - Multiply by 1.1 for safety
- Unit backup/restore speed: average of 6 GB per minute

Very Large Network Distributed Deployment Server Requirements

Table 1-7 shows the very large network gateway server requirements.

Table 1-7 Very Large Network Gateway and Unit With 5,000 Devices Requirements

Item	Specifications
Hardware	Cisco UCS C240 M3 for non-NEBs-compliant systems.
Software	See Supported Operating Systems, page 1-3 .
CPU type	8-core (Cisco UCS C240 M3)
CPU number	2
CPU Speed	2.70 GHz minimum
Memory (RAM)	80 GB or greater
Swap space	32 GB or greater
Gateway JVM size	8 GB
Unit JVM size	8 GB

Table 1-7 Very Large Network Gateway and Unit With 5,000 Devices Requirements (continued)

Item	Specifications
Local Storage Options	<ul style="list-style-type: none"> • Cisco UCS C240 M3 Expansion, Performance, and Reliability Option <ul style="list-style-type: none"> – 3*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0 – 10*300 GB SAS 15K RPM drives for CSV reports and database using RAID10 – 10*300 GB SAS 15K RPM drives for backups using RAID10 – Using PCIe RAID controllers and 24 SFF disk configuration – Dual power supply • Cisco UCS C240 M3 Performance and Reliability Option <ul style="list-style-type: none"> – 3*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0 – 8*300 GB SAS 15K RPM drives for CSV reports and database using RAID10 – 8*300 GB SAS 15K RPM drive for backups using RAID0 and – Using PCIe RAID controllers and 24 SFF disk configuration • Cisco UCS C240 M3 Performance Option <ul style="list-style-type: none"> – 3*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0 – 4*300 GB SAS 15K RPM drives for CSV reports and database using RAID0 – 4*300 GB SAS 15K RPM drive for backups using RAID0 and – Using PCIe RAID controllers and 24 SFF disk configuration • Cisco UCS C220 M3/C240 M3 Basic Option <ul style="list-style-type: none"> – 2*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0 – 2*300 GB SAS 15K RPM drives for CSV reports and database using RAID0 – 3*600 GB SAS 10K RPM drive for backups and – Using one embedded RAID0, Mezzanine RAID or PCIe RAID controller
External Storage Options and Performance Requirements	
Local Root Partition	<p>Linux OS and Prime Performance Manager gateway/unit installation and gateway database</p> <ul style="list-style-type: none"> • 30 GB used • 510 IOPS with 77% write operations • Driven by Prime Performance Manager device cache writes and logs • Device cache and logs can also be relocated if necessary

Table 1-7 Very Large Network Gateway and Unit With 5,000 Devices Requirements (continued)

Item	Specifications
First External Partition	<p>Prime Performance Manager database and gateway exported reports</p> <ul style="list-style-type: none"> • 466 GB used • 700 IOPS with 61% write operations • Gateway export report size: <ul style="list-style-type: none"> - 200 GB disk space used for export report based on below aging - 17 GB export report data generated per day - Average Report data generation rate is about 12.09MB per minute - 15-minute reports - 7 Days - 13.49 GB disk usage per day - Hourly reports - 14 Days - 3.37 GB disk usage per day - Daily reports - 94 Days - 0.14 GB disk usage per day - Weekly reports - 730 Days - 0.14 GB disk usage per week - Monthly reports - 1825 Days - 0.14 GB disk usage per month • Unit database size: <ul style="list-style-type: none"> - 223 GB disk space used for database based on below aging - 19 GB report data generated per day - Average report data generation rate is about 13.51 MB per minute - 15-minute reports - 7 Days - 15.07 GB disk usage per day - Hourly reports - 14 Days - 3.77 GB disk usage per day - Daily reports - 94 Days - 0.16 GB disk usage per day - Weekly reports - 730 Days - 0.16 GB disk usage per week - Monthly reports - 1825 Days - 0.16 GB disk usage per month • Database and exported reports partition size: <ul style="list-style-type: none"> - Unit database size above + - Gateway export report size above - Multiply by 1.1 for safety

Table 1-7 Very Large Network Gateway and Unit With 5,000 Devices Requirements (continued)

Item	Specifications
Second External Partition	<p>Prime Performance Manager gateway and unit backups</p> <ul style="list-style-type: none"> • 1225 GB used • 2540 IOPS with 40% write operations • Sustained IOPS during backup periods; quiet at other times • Unit backup file size: <ul style="list-style-type: none"> – Unit database size above + – 6 GB For unit device cache/other files • Gateway backup file size: <ul style="list-style-type: none"> – Gateway export report size + – 8 GB for gateway device cache/database/other files <p>Gateway and Unit backups Partition Size:</p> <ul style="list-style-type: none"> – Unit backup file size above * (backup days + 1) + – Gateway backup file size above * (backup days + 1) + – Unit database size above + – 14 GB for device cache/other files – Multiply by 1.1 for safety <ul style="list-style-type: none"> • Backup/restore speed: average of 6 GB per minute

Table 1-8 shows the very large network server requirements for a unit with 5,000 devices.

Table 1-8 Very Large Network Server Requirements for a Unit with 5,000 Devices

Item	Specifications
Hardware	Cisco UCS C240 M3 for non-NEBs-compliant systems.
Software	See Supported Operating Systems, page 1-3 .
CPU type	8-core (UCS C240 M3)
CPU number	Two
CPU Speed	2.70 GHz minimum
Memory (RAM)	48 GB or greater
Swap space	32 GB or greater
Unit JVM size	8 GB

Table 1-8 Very Large Network Server Requirements for a Unit with 5,000 Devices (continued)

Item	Specifications
Local Storage Options	<ul style="list-style-type: none"> • Cisco UCS C240 M3 Expansion, Performance, and Reliability Option. <ul style="list-style-type: none"> – 2*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0 – 6*300 GB SAS 15K RPM drives for database using RAID10 – 8*300 GB SAS 15K RPM drives for backups using RAID10 and two PCIe RAID controllers – Dual power supply • Cisco UCS C240 M3 Performance and Reliability Option <ul style="list-style-type: none"> – 2*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0 – 4*300 GB SAS 15K RPM drives for database using RAID10 – 6*300 GB SAS 15K RPM drive for backups using RAID0 and two PCIe RAID controllers • Cisco UCS C220 M3/C240 M3 Performance Option <ul style="list-style-type: none"> – 2*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0 – 2*300 GB SAS 15K RPM drives for database using RAID0 – 3*300 GB SAS 15K RPM drive for backups using RAID0 and two PCIe RAID controllers. • Cisco UCS C220 M3/C240 M3 Basic Option. <ul style="list-style-type: none"> – 2*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0. – 2*300 GB SAS 15K RPM drives for database using RAID0. – 2*600 GB SAS 15K RPM drive for backups using RAID0 and one embedded RAID, Mezzanine RAID or PCIe RAID controller.
External Storage Options and Performance Requirements	
Local Root Partition	Linux OS and Prime Performance Manager Unit installation <ul style="list-style-type: none"> • 20 GB used • 352 IOPS with 84% write operations • Driven by Prime Performance Manager device cache writes and logs • Device cache and logs can also be relocated if necessary

Table 1-8 *Very Large Network Server Requirements for a Unit with 5,000 Devices (continued)*

Item	Specifications
First External Partition	<ul style="list-style-type: none"> • Prime Performance Manager unit database. <ul style="list-style-type: none"> – 246 GB used – 620 IOPS with about 58% write operations • Unit database size: <ul style="list-style-type: none"> – 223 GB disk space used for database based on below aging – 19 GB report data generated per day – Average report data generation rate is about 13.51 MB per minute – 15-minute reports - 7 Days - 15.07 GB disk usage per day – Hourly reports - 14 Days - 3.77 GB disk usage per day – Daily reports - 94 Days - 0.16 GB disk usage per day – Weekly reports - 730 Days - 0.16 GB disk usage per week – Monthly reports - 1825 Days - 0.16 GB disk usage per month • Unit database Partition size: <ul style="list-style-type: none"> – Unit database size above – Multiply by 1.1 for safety
Second External Partition	<ul style="list-style-type: none"> • Prime Performance Manager unit backups. <ul style="list-style-type: none"> – 755 GB used. – 1326 IOPS with 68% write operations. – Sustained IOPS during backup periods; quiet at other times. • Unit backup file size: <ul style="list-style-type: none"> – Unit database size above + – 6 GB For device cache/other files • Unit backup partition size: <ul style="list-style-type: none"> – Unit backup file size above * (backup days + 1) + – Unit database size above + – 6 GB For device cache/other files – Multiply by 1.1 for safety • Unit backup/restore speed: average of 6 GB per minute

Extremely Large Network Distributed Deployment Server Requirements

Table 1-9 shows the extremely large network gateway server requirements.

Table 1-9 Extremely Large Network Gateway Server Requirements

Item	Specifications
Hardware	Cisco UCS C240 M3 for non-NEBs-compliant systems
Software	See Supported Operating Systems, page 1-3 .
CPU type	8-core (Cisco UCS C240 M3/B200 M3) Xeon E5-2680 2.7 GHz
CPU number	Two
CPU Speed	2.70 GHz minimum
Memory (RAM)	64 GB or greater
Swap space	32 GB or greater
JVM size	8 GB
Local Storage Options	<ul style="list-style-type: none"> • Cisco UCS C240 M3 Performance and Reliability Option <ul style="list-style-type: none"> – 2*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0 – 6*300 GB SAS 15K RPM drives for CSV reports using RAID10 – 8*300 GB SAS 15K RPM drives for backups using RAID10 and two PCIe RAID controllers – Dual power supply • Cisco UCS C240 M3 Performance Option <ul style="list-style-type: none"> – 2*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0 – 3*300 GB SAS 15K RPM drives for CSV reports using RAID0 – 4*300 GB SAS 15K RPM drive for backups using RAID0 and one embedded RAID Mezzanine RAID, or PCIe RAID controller
External Storage Options and Performance Requirements	
Local Root Partition	Linux OS and Prime Performance Manager gateway installation and database <ul style="list-style-type: none"> • 20 GB used • 200 IOPS with 62% write operations • Driven by Prime Performance Manager logs and database

Table 1-9 *Extremely Large Network Gateway Server Requirements (continued)*

Item	Specifications
First External Partition	Prime Performance Manager gateway export report <ul style="list-style-type: none"> • 308 GB used • 2000 IOPS with 10% write operations • Burst read export report files during backup periods • Gateway export report size: <ul style="list-style-type: none"> – 280 GB disk space used for export report based on below aging – 24 GB export report data generated per day – Average Report data generation rate is about 17.07MB per minute – 15-minute reports - 7 Days - 19.04 GB disk usage per day – Hourly reports - 14 Days - 4.76 GB disk usage per day – Daily reports - 94 Days - 0.20 GB disk usage per day – Weekly reports - 730 Days - 0.20 GB disk usage per week – Monthly reports - 1825 Days - 0.20 GB disk usage per month • Gateway export report partition size: <ul style="list-style-type: none"> – Gateway export report size above – Multiply by 1.1 for safety
Second External Partition	Prime Performance Manager gateway backups including export report <ul style="list-style-type: none"> • 660 GB used • 1300 IOPS with 96% write operations • Sustained IOPS during backup periods; quiet at other times • Gateway export report size: <ul style="list-style-type: none"> – 280 GB disk space used for export report based on below aging – 24 GB export report data generated per day – Average Report data generation rate is about 17.07MB per minute – 15-minute reports - 7 Days - 19.04 GB disk usage per day – Hourly reports - 14 Days - 4.76 GB disk usage per day – Daily reports - 94 Days - 0.20 GB disk usage per day – Weekly reports - 730 Days - 0.20 GB disk usage per week – Monthly reports - 1825 Days - 0.20 GB disk usage per month • Gateway export report partition size: <ul style="list-style-type: none"> – Gateway export report size above – Multiply by 1.1 for safety

Table 1-10 shows the extremely large network server requirements for a unit with 10,000 devices.

Table 1-10 Extremely Large Network Server Requirements for a Unit with 10,000 Devices

Item	Specifications
Hardware	Cisco UCS C240 M3 for non-NEBs-compliant systems
Software	See Supported Operating Systems, page 1-3
CPU type	8-core (Cisco UCS C240 M3)
CPU number	Two
CPU Speed	2.70 GHz minimum
Memory (RAM)	80 GB or greater
Swap space	32 GB or greater
JVM size	16 GB
Local Storage Options	<ul style="list-style-type: none"> • Cisco UCS C240 M3 Performance and Reliability Option <ul style="list-style-type: none"> – 3*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0 – 6*300 GB SAS 15K RPM drives for CSV reports and database using RAID10 – 8*600 GB SAS 10K RPM drives for backups using RAID10 – Using PCIe RAID controllers and 24 SFF Disk Configuration – Dual power supply • Cisco UCS C240 M3 Performance Option <ul style="list-style-type: none"> – 3*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0 – 3*300 GB SAS 15K RPM drives for CSV reports and database using RAID0 – 4*600 GB SAS 10K RPM drives for backups using RAID0 and two PCIe RAID controllers
External Storage Options and Performance Requirements	
Local Root Partition	<ul style="list-style-type: none"> • Linux OS and Prime Performance Manager unit installation <ul style="list-style-type: none"> – 25 GB used – 710 IOPS with 83% write operations; – Driven by Prime Performance Manager device cache writes and logs – Device cache and logs can also be relocated if necessary

Table 1-10 *Extremely Large Network Server Requirements for a Unit with 10,000 Devices*

Item	Specifications
First External Partition	<ul style="list-style-type: none"> • Prime Performance Manager unit database <ul style="list-style-type: none"> – 470 GB used – 1210 IOPS with 60% write operations • Unit database size: <ul style="list-style-type: none"> – 428 GB disk space used for database based on below aging – 37 GB report data generated per day – Average report data generation rate is about 26.31 MB per minute – 15-minute reports - 7 Days - 29.36 GB disk usage per day – Hourly reports - 14 Days - 7.34 GB disk usage per day – Daily reports - 94 Days - 0.31 GB disk usage per day – Weekly reports - 730 Days - 0.31 GB disk usage per week – Monthly reports - 1825 Days - 0.31 GB disk usage per month • Unit database partition size: <ul style="list-style-type: none"> – Unit database size above – Multiply by 1.1 for safety
Second External Partition	<ul style="list-style-type: none"> • Prime Performance Manager unit backups <ul style="list-style-type: none"> – 1450 GB used – 2572 IOPS with 68% write operations – Sustained IOPS during backup periods; quiet at other times • Unit backup file size: <ul style="list-style-type: none"> – Unit database size above + – 10 GB For device cache/other files • Unit backup partition size: <ul style="list-style-type: none"> – Unit backup file size above * (backup days + 1) + – Unit database size above + – 10 GB For device cache/other files • Multiply by 1.1 for safety <ul style="list-style-type: none"> – Unit backup/restore speed: average of 6 GB per minute

Table 1-11 shows the extremely large network server requirements for a unit with 5,000 devices.

Table 1-11 *Extremely Large Network Server Requirements for a Unit with 5,000 Devices*

Item	Specifications
Hardware	Cisco UCS C240 M3 for non-NEBs-compliant systems
Software	See Supported Operating Systems, page 1-3
CPU type	8-core (Cisco UCS C240 M3)

Table 1-11 *Extremely Large Network Server Requirements for a Unit with 5,000 Devices*

Item	Specifications
CPU number	2
CPU Speed	2.70 GHz minimum
Memory (RAM)	48 GB or greater
Swap space	32 GB or greater
Unit JVM size	8 GB
Local Storage Options	<ul style="list-style-type: none"> • Cisco UCS C240 M3 Expansion, Performance, and Reliability Option <ul style="list-style-type: none"> – 2*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0 – 6*300 GB SAS 15K RPM drives for database using RAID10 – 8*300 GB SAS 15K RPM drives for backups using RAID10 and two PCIe RAID controllers – Dual power supply • Cisco UCS C240 M3 Performance and Reliability Option <ul style="list-style-type: none"> – 2*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0 – 4*300 GB SAS 15K RPM drives for database using RAID10 – 6*300 GB SAS 15K RPM drive for backups using RAID0 and two PCIe RAID controllers • Cisco UCS C220 M3/C240 M3 Performance Option <ul style="list-style-type: none"> – 2*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0 – 2*300 GB SAS 15K RPM drives for database using RAID0 – 3*300 GB SAS 15K RPM drive for backups using RAID0 and two PCIe RAID controllers • Cisco UCS C220 M3/C240 M3 Basic Option <ul style="list-style-type: none"> – 2*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0 – 2*300 GB SAS 15K RPM drives for database using RAID0 – 2*600 GB SAS 15K RPM drive for backups using RAID0 and one embedded RAID, Mezzanine RAID, or PCIe RAID controller
External Storage Options and Performance Requirements	
Local Root Partition	Linux OS and Prime Performance Manager unit installation <ul style="list-style-type: none"> • 20 GB used • 352 IOPS with 84% write operations • Driven by Prime Performance Manager device cache writes and logs • Device cache and logs can also be relocated if necessary

Table 1-11 *Extremely Large Network Server Requirements for a Unit with 5,000 Devices*

Item	Specifications
First External Partition	Prime Performance Manager unit database <ul style="list-style-type: none"> • 246 GB used • 620 IOPS with 58% write operations • Unit database size: <ul style="list-style-type: none"> – 223 GB disk space used for database based on below aging – 19 GB report data generated per day – Average report data generation rate is about 13.51 MB per minute – 15-minute reports - 7 Days - 15.07 GB disk usage per day – Hourly reports - 14 Days - 3.77 GB disk usage per day – Daily reports - 94 Days - 0.16 GB disk usage per day – Weekly reports - 730 Days - 0.16 GB disk usage per week – Monthly reports - 1825 Days - 0.16 GB disk usage per month • Unit database partition size: <ul style="list-style-type: none"> – Unit database size above – Multiply by 1.1 for safety
Second External Partition	Prime Performance Manager unit backups <ul style="list-style-type: none"> • 755 GB used • 1326 IOPS with 68% write operations • Sustained IOPS during backup periods; quiet at other times • Unit backup file size: <ul style="list-style-type: none"> – Unit database size above + – 6 GB For device cache/other files • Unit backup partition size: <ul style="list-style-type: none"> – Unit backup file size above * (backup days + 1) + – Unit database size above + – 6 GB For device cache/other files – Multiply by 1.1 for safety • Unit backup/restore speed: average of 6 GB per minute

Extremely Large Network Distributed Deployment Server Requirements with 5-Minute Reports Enabled

Enabling 5-minute reports requires additional server capacity and power. [Table 1-12](#) shows the extremely large network gateway server requirements when 5-minute reports are enabled. The aging for 5-minute reports is three days.

Table 1-12 Extremely Large Network Gateway Server Requirements With 5-Minute Reports

Item	Specifications
Hardware	Cisco UCS C240 M3 for non-NEBs-compliant systems
Software	See Supported Operating Systems, page 1-3 .
CPU type	8-core (Cisco UCS C240 M3)
CPU number	Two
CPU Speed	2.70 GHz minimum
Memory (RAM)	80 GB or greater
Swap space	32 GB or greater
Gateway JVM size	8 GB
Local Storage Options	<ul style="list-style-type: none"> • Cisco UCS C240 M3 Performance and Reliability Option <ul style="list-style-type: none"> – 2*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0 – 6*300 GB SAS 15K RPM drives for CSV reports using RAID10 – 8*300 GB SAS 15K RPM drives for backups using RAID10 and two PCIe RAID controllers – Dual power supply • Cisco UCS C240 M3 Performance Option <ul style="list-style-type: none"> – 2*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0 – 3*300 GB SAS 15K RPM drives for CSV reports using RAID0 – 4*300 GB SAS 15K RPM drive for backups using RAID0 and one embedded RAID, Mezzanine RAID, or PCIe RAID controller
External Storage Options and Performance Requirements	
Local Root Partition	<ul style="list-style-type: none"> • Linux OS and Prime Performance Manager gateway installation and database <ul style="list-style-type: none"> – 30 GB used – 400 IOPS with 30% write operations – Driven by Prime Performance Manager logs

Table 1-12 *Extremely Large Network Gateway Server Requirements With 5-Minute Reports*

Item	Specifications
First External Partition	<ul style="list-style-type: none"> • Prime Performance Manager gateway export report <ul style="list-style-type: none"> – 696 GB used – 2500 IOPS with 20% write operations – Driven by burst read during backup periods • Gateway export report size: <ul style="list-style-type: none"> – 635 GB disk space used for export report based on below aging – 100 GB export report data generated per day – Average report data generation rate is about 71.11 MB per minute – 5-minute reports - 3 Days - 70.42 GB disk usage per day – 15-minute reports - 7 Days - 23.47 GB disk usage per day – Hourly reports - 14 Days - 5.87 GB disk usage per day – Daily reports - 94 Days - 0.24 GB disk usage per day – Weekly reports - 730 Days - 0.24 GB disk usage per week – Monthly reports - 1825 Days - 0.24 GB disk usage per month • Gateway export report partition size: <ul style="list-style-type: none"> – Gateway export report size above – Multiply by 1.1 for safety
Second External Partition	<ul style="list-style-type: none"> • Prime Performance Manager Gateway backups including export report <ul style="list-style-type: none"> – 1465 GB used – 2910 IOPS with 98% write operations – Sustained IOPS during backup periods; quiet at other times • Gateway backup file size: <ul style="list-style-type: none"> – Gateway export report size above + – 20 GB For device cache/other files/gateway database • Gateway backup partition size: <ul style="list-style-type: none"> – backup file size * backup days + – 20 GB For device cache/other files/gateway database – Multiply by 1.1 for safety • Gateway backup/restore speed: average of 6 GB per minute

Table 1-13 shows the extremely large network server requirements for a unit with 10,000 devices:

Table 1-13 *Extremely Large Network Server Requirements for a Unit with 10,000 Devices With 5-Minute Reports*

Item	Specifications
Hardware	Cisco UCS C240 M3 for non-NEBs-compliant systems
Software	See Supported Operating Systems, page 1-3 .
CPU type	8-core (Cisco UCS C240 M3)
CPU number	Two
CPU Speed	2.70 GHz minimum
Memory (RAM)	96 GB or greater
Swap space	32 GB or greater
JVM size	16 GB
Local Storage Options	<ul style="list-style-type: none"> • Cisco UCS C240 M3 Performance and Reliability Option <ul style="list-style-type: none"> - 4*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0 - 10*300 GB SAS 15K RPM drives for CSV reports and database using RAID10 - 10*600 GB SAS 10K RPM drives for backups using RAID10 - Using PCIe RAID controllers and 24 SFF disk configuration - Dual power supply • Cisco UCS C240 M3 Performance Option <ul style="list-style-type: none"> - 4*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0 - 5*300 GB SAS 15K RPM drives for CSV reports and database using RAID0 - 5*600 GB SAS 10K RPM drives for backups using RAID0 and two PCIe RAID controllers
External Storage Options and Performance Requirements	
Local Root Partition	<ul style="list-style-type: none"> • Linux OS and Prime Performance Manager gateway/unit installation <ul style="list-style-type: none"> - 35 GB used - 1200 IOPS with 84% write operations - Driven by Prime Performance Manager device cache writes and logs - Device cache and logs can also be relocated if necessary

Table 1-13 *Extremely Large Network Server Requirements for a Unit with 10,000 Devices With 5-Minute Reports (continued)*

Item	Specifications
First External Partition	<ul style="list-style-type: none"> • Prime Performance Manager unit database <ul style="list-style-type: none"> – 600 GB used – 2800 IOPS with 59% write operations • Unit database size: <ul style="list-style-type: none"> – 535 GB disk space used for database based on below aging – 86 GB report data generated per day – Average report data generation rate is about 61.16 MB per minute – 5-minute reports - 3 Days - 60.56 GB disk usage per day – 15-minute reports - 7 Days - 20.19 GB disk usage per day – Hourly reports - 14 Days - 5.05 GB disk usage per day – Daily reports - 94 Days - 0.21 GB disk usage per day – Weekly reports - 730 Days - 0.21 GB disk usage per week – Monthly reports - 1825 Days - 0.21 GB disk usage per month • Unit database partition size: <ul style="list-style-type: none"> – Unit database size above – Multiply by 1.1 for safety
Second External Partition	<ul style="list-style-type: none"> • Prime Performance Manager unit backups <ul style="list-style-type: none"> – 1835 GB used – 3400 IOPS with 70% write operations – Sustained IOPS during backup periods; quiet at other times • Unit backup file size: <ul style="list-style-type: none"> – Unit database size above + – 20 GB For device cache/other files • Unit backup partition size: <ul style="list-style-type: none"> – Unit backup file size above * (backup days + 1) + – Unit database size above + – 20 GB For device cache/other files – Multiply by 1.1 for safety • Unit backup/restore speed: average of 6 GB per minute

Maximum Supported Scale Distributed Deployment Server Requirements

Server requirements for maximum support scale in a distributed deployment include:

- Gateway with CSV data exports disabled.
- Report aging values used to establish disk space requirements

- 5-minute reports - Disabled
- 15-minute reports - 7 Days
- Hourly reports - 14 Days
- Daily reports - 94 Days
- Weekly reports - 730 Days
- Monthly reports - 1825 Days

**Note**

Exporting data from units to CSVs on the gateway is not supported in this deployment. Therefore, less memory is required on the central gateway.

Table 1-14 shows the maximum supported scale gateway server requirements with CSV export disabled.

Table 1-14 Maximum Supported Scale Gateway Server Requirements

Item	Specifications
Hardware	<ul style="list-style-type: none"> • Cisco UCS C240 M3 for non-NEBs-compliant systems • Cisco UCS B200 M3 for non-NEBs-compliant systems (external storage only)
Software	See Supported Operating Systems, page 1-3 .
CPU type	8-core (UCS C240 M3/B200 M3) Xeon E5-2680 2.7 GHz
CPU number	2
CPU Speed	2.70 GHz minimum
Memory (RAM)	48 GB or greater
Swap space	48 GB or greater
Gateway JVM size	16 GB
Local Storage Options	<ul style="list-style-type: none"> • Cisco UCS C240 M3 Performance Option <ul style="list-style-type: none"> - 2*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0 - 2*300 GB SAS 15K RPM drive for Prime Performance Manager backups using RAID0 • Cisco UCS C240 M3 Basic Option <ul style="list-style-type: none"> - 2*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0

External Storage Options and Performance Requirements

Table 1-14 Maximum Supported Scale Gateway Server Requirements (continued)

Item	Specifications
Local Root Partition	Linux OS and Prime Performance Manager gateway/unit installation, gateway database <ul style="list-style-type: none"> • 35 GB used • 510 IOPS with 67% write operations • Driven by Prime Performance Manager logs and database
First External Partition	Prime Performance Manager gateway backups <ul style="list-style-type: none"> • 30 GB used • 160 IOPS with 38% write operations • Sustained IOPS during backup periods; quiet at other times

Table 1-15 shows the maximum supported scale server requirements for a unit with 12,500 devices:

Table 1-15 Maximum Supported Scale Requirements for a Unit with 12,500 Devices

Item	Specifications
Hardware	Cisco UCS C240 M3 for non-NEBs-compliant systems
Software	See Supported Operating Systems, page 1-3 .
CPU type	8-core (Cisco UCS C240 M3)
CPU number	Two
CPU Speed	2.70 GHz minimum
Memory (RAM)	96 GB or greater
Swap space	32 GB or greater
JVM size	16 GB
Local Storage Options	<ul style="list-style-type: none"> • Cisco UCS C240 M3 Performance and Reliability Option <ul style="list-style-type: none"> – 4*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0 – 10*300 GB SAS 15K RPM drives for database using RAID10 – 10*600 GB SAS 10K RPM drives for backups using RAID10 – Using PCIe RAID controllers and 24 SFF disk configuration – Dual power supply • Cisco UCS C240 M3 Performance Option <ul style="list-style-type: none"> – 4*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0 – 5*300 GB SAS 15K RPM drives for database using RAID0 – 5*600 GB SAS 10K RPM drives for backups using RAID0 and two PCIe RAID controllers

External Storage Options and Performance Requirements

Table 1-15 Maximum Supported Scale Requirements for a Unit with 12,500 Devices (continued)

Item	Specifications
Local Root Partition	Linux OS and Prime Performance Manager unit installation <ul style="list-style-type: none"> • 30 GB used • 1165 IOPS with 80% write operations • Driven by Prime Performance Manager device cache writes and logs • Device cache and logs can also be relocated if necessary
First External Partition	Prime Performance Manager unit database <ul style="list-style-type: none"> • 583 GB total used • 1550 IOPS with 57% write operations • Unit database size: <ul style="list-style-type: none"> - 530 GB disk space used for database based on below aging - 45.4 GB report data generated per day - Average report data generation rate is about 32.29 MB per minute - 15-minute reports - 7 Days - 36.02 GB disk usage per day - Hourly reports - 14 Days - 9.00 GB disk usage per day - Daily reports - 94 Days - 0.38 GB disk usage per day - Weekly reports - 730 Days - 0.38 GB disk usage per week - Monthly reports - 1825 Days - 0.38 GB disk usage per month • Unit database partition size: <ul style="list-style-type: none"> - Unit database size above - Multiply by 1.1 for safety
Second External Partition	Prime Performance Manager unit backups <ul style="list-style-type: none"> • 1790 GB used assuming saving one day of backups • 3130 IOPS with 68% write operations • Sustained IOPS during backup periods; quiet at other times • Unit backup file size: <ul style="list-style-type: none"> - Unit database size above + - 12 GB For device cache/other files • Unit backup partition size: <ul style="list-style-type: none"> - Unit backup file size above * (backup days + 1) + - Unit database size above + - 12 GB For device cache/other files - Multiply by 1.1 for safety • Unit backup/restore speed: average of 6 GB per minute

Requirements for Mobility StarOS Networks

Server requirements for Cisco StarOS mobility networks are provided in the following sections. Disk space requirements are based on the following report aging values:

- 5-minute reports - 3 Days
- 15-minute reports - 7 Days
- Hourly reports - 14 Days
- Daily reports - 94 Days
- Weekly reports - 730 Days
- Monthly reports - 1825 Days
- Bulk statistics aging - 14 Days

Fast and slow threads settings on units:

- ppm numslowthreads 12
- ppm numfastthreads 12

Backup days and logs settings:

- ppm backupdays 1 both
- ppm backuplogs disable both

Mobility StarOS Medium Scale EPC on Single VM

StarOS requirements are based on the following:

- StarOS 16.0 MR1
- Reports: APN, Card, Context, DCCA, DCCA-group, DPCA, Diameter, Diameter-Acct, Diameter-Auth, ECS, eGTP-C, GTP-C, GTP-U, GTPP, ICSR, IMSA, IP Pool, Port, RADIUS Server, RADIUS-Group, SAEGW, RLF, RLF-Detailed, System, VLAN-NPU
- Gateway JVM size: 8 GB (ppm jvmsize 8192 gw)
- Unit JVM size: 16 GB (ppm jvmsize 16384 unit)
- 40 simultaneous users
- Maximum Network Size:
 - Number of StarOS ASR 5000/ASR5500s per unit: 40
 - Number of units: 1 unit installed with gateway on a VM machine
- Configurations:
 - 5 StarOS ASR 5000/ASR 5500s with heavy bulk statistics configuration
 - 35 StarOS ASR 5000/ASR 5500s with light bulk statistics configuration

Number of instances for each bulk statistics schema name/number of instances)

- Heavy StarOS bulk statistics schema configuration:
 - APN/1000
 - Card/16
 - Context/14

- DCCA/15
- DPCA/18
- Diameter-Auth/15
- Diameter-Acct/15
- ECS/1
- eGTP-C/3
- GTP-C/1
- GTP-U/3
- GTPP/13
- ICSR/1
- IMSA/10
- IP Pool/2000
- Port/46
- RADIUS /200
- RADIUS-Group/200
- RLF/1
- RLF-Detailed/1
- SAEGW/1
- System/1
- VLAN-NPU/40
- Light StarOS bulk statistics schema configuration:
 - APN/50
 - Card/16
 - Context/6
 - DCCA/5
 - DPCA/18
 - Diameter-Auth/5
 - Diameter-Acct/5
 - ECS/1
 - eGTP-C/3
 - GTP-C/1
 - GTP-U/3
 - GTPP/4
 - ICSR/1
 - IMSA/10
 - IP Pool/100
 - Port/46
 - RADIUS /1

- RADIUS-Group/1
- RLF/1
- RLF-Detailed/1
- SAEGW/1
- System/1
- VLAN-NPU/24
- Linux version from [Supported Operating Systems, page 1-3](#)
- CPU type: 8-core Xeon E5-2680 2.70 GHz
- CPU type: 8-core Xeon E5-2670 2.60 GHz
- CPU type: 8-core Xeon E5-2650V2 2.60 GHz
- CPU type: 8-core Xeon X5675 3.07 GHz
- CPU number:2
- vCPU number:16 or more for VM environments
- RAM size: 64 GB or greater
- Swap space: 100 GB or greater
- Gateway JVM size: 8 GB
- Unit JVM size: 16 GB
- Local Storage Options for VM environments:
 - 1*146 GB SAS 15K RPM drive for OS and Prime Performance Manager
 - 2*146 GB SAS 15K RPM drive for bulk statistics CSV file
 - 2*146 GB SAS 15K RPM drive for Prime Performance Manager database
 - 2*146 GB SAS 15K RPM drive for backups

Mobility StarOS Scale EPC Distributed Active Only Configuration

Mobility StarOS scale EPC distributed in an active-only configuration requirements are based on the following:

- StarOS 17.0
- Reports:
 - Availability
 - Mobile StarOS All Counters
 - Mobile StarOS KPI
 - Mobile StarOS Statistics
 - Transport Statistics
 - Prime Performance Manager System
- 200 simultaneous users
- 1+1 unit-HA deployments are recommended
- Maximum network size:

- Number of StarOS Cisco ASR 5000/5500s per unit: 100
 - Number of units: 3
 - Total number of StarOS Cisco ASR 5000/5500s: 300
 - Configurations:
 - 10 StarOS ASR 5000/ASR 5500s/QvPC with heavy bulk statistics configuration
 - 90 StarOS ASR 5000/ASR 5500s/QvPC with light bulk statistics configuration
 - Report aging values and baseline unit disk space requirements.
 - 5-minute reports - 3 Days - 52.00 GB disk usage per day
 - 15-minute reports - 7 Days - 17.50 GB disk usage per day
 - Hourly reports - 14 Days - 4.40 GB disk usage per day
 - Daily reports - 94 Days - 0.18 GB disk usage per day
 - Weekly reports - 730 Days - 0.18 GB disk usage per week
 - Monthly reports - 1825 Days - 0.18 GB disk usage per Month
 - 74.1 GB data generated per day with data generation rate of 899 KB/sec
 - Unit backup file size: total data size of unit database + 40 GB for logs/device cache/other files
 - Unit backup partition size:
 - 2 * unit backup file size
 - Multiply by 1.1 for safety
 - Number of instances for each bulk statistics schema (SchemaName/NumberOfInstances)
- Heavy StarOS bulk statistics schema configuration:
- APN/1000
 - Card/16
 - Context/14
 - DCCA/15
 - DPCA/18
 - Diameter-Auth/15
 - Diameter-Acct/15
 - ECS/1
 - eGTP-C/3
 - GTP-C/1
 - GTP-U/3
 - GTPP/13
 - ICSR/1
 - IMSA/10
 - IP Pool/2000
 - Port/46
 - RADIUS /200
 - RADIUS-Group/200

- RLF/1
- RLF-Detailed/1
- SAEGW/1
- System/1
- VLAN-NPU/40

Light StarOS bulk statistics schema configuration:

- APN/50
 - Card/16
 - Context/6
 - DCCA/5
 - DPCA/18
 - Diameter-Auth/5
 - Diameter-Acct/5
 - ECS/1
 - eGTP-C/3
 - GTP-C/1
 - GTP-U/3
 - GTPP/4
 - ICSR/1
 - IMSA/10
 - IP Pool/100
 - Port/46
 - RADIUS /1
 - RADIUS-Group/1
 - RLF/1
 - RLF-Detailed/1
 - SAEGW/1
 - System/1
 - VLAN-NPU/24
- Gateway:
 - Cisco UCS C240 M3 for non-NEBs-compliant systems
 - Linux version from [Supported Operating Systems, page 1-3](#)
 - CPU: Xeon E5-2680 2.7 GHz
 - Core number: 8 or more
 - RAM size: 32 GB or greater
 - Swap space: 16 GB or greater
 - Gateway JVM size: 8 GB
 - Storage

Cisco UCS C240 M3 Performance and Reliability Option

- 2*300 GB SAS 15K RPM drive for OS
- 8*300 GB SAS 15K RPM drives for database using RAID10
- 8*300 GB SAS 15K RPM drives for backups using RAID10
- Using two PCIe RAID controllers
- Dual power supply

Cisco UCS C240 M3 - Basic Option

- 2*300 GB SAS 15K RPM drive for OS
- 4*300 GB SAS 10K RPM drives for database using RAID0
- 4*300 GB SAS 10K RPM drive for backups using RAID0
- Using two PCIe RAID controllers

External Storage Options and Performance Requirements

- Local root partition
 - Linux OS and Prime Performance Manager gateway installation and database
 - 50 GB used
 - 25 GB used for CSV exports enabled using Prime Performance Manager/3GPP format
 - 60 IOPS with about 100% write operations
 - Driven by Prime Performance Manager logs and database
 - Each units with 100 active StarOS ASR 5000/ASR 5500s - 3 total units
 - Cisco UCS C240 M3 for non-NEBs-compliant systems
 - Linux version from [Supported Operating Systems, page 1-3](#)
 - CPU: Xeon E5-2680 2.7 GHz
 - Core number: 8 or more
 - RAM size: 96 GB or greater
 - Swap space: 32 GB or greater
 - Unit JVM size: 24 GB
 - Unit number of slow threads: 12
 - Unit number of fast threads: 12

Storage: Cisco UCS C240 M3 - Performance and Reliability Option

- 1*300 GB SAS 15K RPM drive for OS
- 8*300 GB SAS 15K RPM drives for database using RAID10
- 8*300 GB SAS 15K RPM drives for backups using RAID10
- 8*300 GB SAS 15K RPM drives for bulk statistics CSV file using RAID10
- Using two PCIe RAID controllers
- Dual power supply

Storage Cisco UCS C240 M3 - Performance Option

- 1*300 GB SAS 10K RPM drive for OS
- 8*300 GB SAS 15K RPM drives for database using RAID0

- 8*300 GB SAS 15K RPM drives for backups using RAID0
- 8*300 GB SAS 15K RPM drives for bulk statistics CSV file using RAID0
- Using two PCIe RAID controllers

External Storage Options and Performance Requirements

Local root partition

- Linux OS and Prime Performance Manager unit installation
- 15 GB used
- 90 IOPS with about 99% write operations
- Driven by Prime Performance Manager device cache writes and logs
- Device cache and logs can also be relocated if necessary

First external partition:

- Prime Performance Manager unit database
- 350 GB used
- 300 IOPS with about 30% write operations

Second external partition:

- Prime Performance Manager unit backups
- 750 GB used
- 600 IOPS with about 30% write operations
- Sustained IOPS during backup periods; quiet at other times

Third external partition:

- Prime Performance Manager directory for storing Cisco ASR 5000 bulk statistics CSV files
- 210 GB used
- 20 IOPS with about 99% write operations directory

Code Division Multiple Access Distributed Mobility Scale Requirements

Code Division Multiple Access (CDMA) mobility scale requirements are based on the following configurations:

- StarOS 15.0
- Reports: BCMCS, FA, HA, HSGW, LAC, LNS, MIPv6 HA, MVS, PPP, RP
- Gateway JVM size: 8 GB (ppm jvmsize 8192 gw)
- Unit JVM size: 24 GB (ppm jvmsize 24576 unit)
- 50 simultaneous users
- 1+1 unit HA deployments are recommended
- Maximum network size:
 - Number of StarOS Cisco ASR 5000/5500s per unit: 140

- Number of units: 2
- Total StarOS Cisco ASR 5000/5500s: 280

Number of instances for each bulk statistics schema (schema name/number of instances)

- Default StarOS bulk statistics schema configuration:
 - BCMCS/100
 - FA/100
 - HA/100
 - HSGW/100
 - LAC/100
 - LNS/100
 - MIPv6 HA/100
 - MVS/100
 - PPP/100
 - RP/100
- Gateway:
 - Cisco UCS C240 M3 for non-NEBs-compliant systems
 - Linux version from [Supported Operating Systems, page 1-3](#)
 - CPU type: 8-core (UCS C240 M3) Xeon E5-2680 2.7 GHz
 - CPU number: 2
 - RAM size: 32 GB or greater
 - Swap space: 16 GB or greater
 - Gateway JVM size: 8 GB
- Storage
 - Cisco UCS C240 M3 - Performance and Reliability Option
 - 1*300 GB SAS 15K RPM drive for OS
 - 4*300 GB SAS 15K RPM drives for database using RAID10
 - 4*300 GB SAS 15K RPM drives for backups using RAID10
 - Using PCIe RAID controllers
 - Dual power supply
 - Cisco UCS C240 M3 - Basic Option
 - 1*300 GB SAS 15K RPM drive for OS
 - 2*300 GB SAS 10K RPM drives for database using RAID0
 - 2*300 GB SAS 10K RPM drive for backups using RAID0
 - Using PCIe RAID controllers
- Units with 140 active StarOS Cisco ASR 5000/5500 chassis - 2 total units:
 - Cisco UCS C240 M3 for non-NEBs-compliant systems
 - Linux version from [Supported Operating Systems, page 1-3](#)
 - CPU type: 8-core (UCS C240 M3) Xeon E5-2680 2.7 GHz

- CPU number: 2
- RAM size: 96 GB or greater
- Swap space: 32 GB or greater
- Unit JVM size: 24 GB
- Storage
 - Cisco UCS C240 M3 - Performance and Reliability Option
 - 1*300 GB SAS 15K RPM drive for OS
 - 4*300 GB SAS 15K RPM drives for database using RAID10
 - 4*300 GB SAS 15K RPM drives for backups using RAID10
 - 6*300 GB SAS 15K RPM drives for bulk statistics CSV files using RAID10
 - Using PCIe RAID controllers
 - Dual power supply
 - Cisco UCS C240 M3 - Performance Option
 - 1*300 GB SAS 10K RPM drive for OS
 - 2*300 GB SAS 15K RPM drives for database using RAID0
 - 2*300 GB SAS 15K RPM drives for backups using RAID0
 - 3*300 GB SAS 15K RPM drives for bulk statistics CSV files using RAID0
 - Using PCIe RAID controllers

Requirements for Small Cell Networks

Small cell server requirements are based on the following configurations:

- Access Point (AP) models and software:
 - Models: USC 3330, USC 3331, USC 7330, USC 5310
 - Software versions: 3.4, 3.5
- Enabled RMS reports:
 - UCS 3K/5K/7K/9K Series InterDevice: UCS XK 3G AP ALL KPI InterDevice
 - UCS 3K/5K/7K/9K Series InterDevice: UCS XK 3G AP Availability InterDevice
 - UCS 3K/5K/7K/9K Series InterDevice: UCS XK 3G AP CS InterDevice
 - UCS 3K/5K/7K/9K Series InterDevice: UCS XK 3G AP PS InterDevice
 - UCS 3K/5K/7K/9K Series: UCS XK 3G AP ALL KPI
 - UCS 3K/5K/7K/9K Series: UCS XK 3G AP AP Availability
 - UCS 3K/5K/7K/9K Series: UCS XK 3G AP CS KPI
 - UCS 3K/5K/7K/9K Series: UCS XK 3G AP Multi DB Table
 - UCS 3K/5K/7K/9K Series: UCS XK 3G AP PS KPI
- Report intervals: 15-minute, hourly, daily, weekly, monthly
- All systems specified were tested with:
- ppm backupdays 1 both; ppm backuplogs disable both

- CSV exporting all data to gateway ENABLED
- Report aging:
 - 15-minute—7 days
 - Hourly—14 days
 - Daily—94 days
 - Weekly—730 days
 - Monthly—1825 days
 - Bulk statistics—14 days

300,000 3G Access Points Small Cell Scale on a Distributed Servers with Managed ULS Redundancy

Requirements for 300,000 APs on a distributed servers with managed ULS redundancy include:

- Network size:
 - Number of 3G APs per ULS: 150,000
 - Number of ULS: 2
 - Total Number of 3G APs per Unit: 150,000
 - Number of units: 2
 - 3G AP file format: gz

Each LUS supports 150,000 APs with each AP configured as follows:

- 50,000 3G APs with 15 Minute pegging and upload interval
- 100,000 3G APs with 1 hour pegging and 1 day upload intervals

Gateway side configured with 2,500 distinct groups via GDDT

- Report aging and disk space usage baselines:
 - 15-minute reports - 7 Days - 6.4 GB disk usage per day
 - Hourly reports - 14 Days - 1.9 GB disk usage per day
 - Daily reports - 94 Days - 0.12 GB disk usage per day
 - Weekly reports - 730 Days - 0.12 GB disk usage per week
 - Monthly reports - 1825 Days - 0.12 GB disk usage per month
 - 8.6 GB unit DB data generated per day with a data generation rate of 104.3 KB/sec
- Unit backup file size: 100 GB: total data size of unit database plus 5 GB for logs/device cache/other files
- Unit backup partition size: 220 GB
 - 2 * unit backup file size
 - Multiply by 1.1 for safety
- Unit backup/restore speed: average of 6 GB per minute
- Cisco UCS C210 M3 for non-NEBs-compliant systems
- Cisco UCS C220 M3 for non-NEBs-compliant systems

- Cisco UCS C240 M3 for non-NEBs-compliant systems
- Cisco UCS B200 M3 for non-NEBs-compliant systems
- Linux from [Supported Operating Systems, page 1-3](#).
- CPU type: Intel (R) Xeon CPU E5-2680 @ 2.7 GHz
- Core number: 8 or more
- RAM size: 98 GB or greater
- Swap space: 50 GB or greater
- Gateway JVM size: 8 GB
- Unit JVM size: 12 GB
- Local storage options
 - Cisco UCS C210 M2/C220 M3/C240 M3 - Performance Option
 - 1*100 GB SAS 15K RPM Drive for OS and Prime Performance Manager
 - 2*200 GB SAS 15K RPM Drives for Database using RAID0
 - 4*200 GB SAS 10K RPM Drives for Backup using RAID0
 - Cisco UCS C240 M3/C220M3/C210 M3/B200M3 - Basic Option
 - 4*300 GB SAS 10K RPM Drive for OS and Prime Performance Manager using RAID0

External Storage Options and Performance Requirements

- Local root partition
 - Linux OS and Prime Performance Manager gateway/unit installation and gateway database
 - 50 GB used
 - 10 IOPS with nearly 100% write operations
 - Driven by device cache writes and logs (device cache and logs can be relocated if necessary)
- First External partition
 - Prime Performance Manager database and gateway exported reports
 - 100 GB used
 - 35 GB used for CSV export in ppm format
 - 180 IOPS with nearly 98% write operations
- Second external partition
 - Prime Performance Manager gateway and unit backups
 - 200 GB used
 - 1500 IOPS with nearly 100% write operations
 - Sustained IOPS during backup periods; quiet at other times

120,000 3G Access Points Small Cell Scale on a Single Server

Requirements for 120,000 3G APs on a single server in small cell scale include:

- Report aging and disk space usage baselines:
 - 15-minute reports - 7 Days - 8.8 GB disk usage per day

- Hourly reports - 14 Days - 2.2 GB disk usage per day
- Daily reports - 94 Days - 0.1 GB disk usage per day
- Weekly reports - 730 Days - 0.1 GB disk usage per week
- Monthly reports - 1825 Days - 0.1 GB disk usage per month
- 11.1 GB data generated per day with data generation rate of 134.7 KB/sec
- Unit backup file size: total data size of unit database + 40 GB for logs/device cache/other files
- Unit backup partition size: 2 * Unit backup file size; multiplied by 1.1 for safety
- Unit backup/restore speed: average of 6 GB per minute
- Network size:
 - 120,000 3G APs per ULS
 - One ULS
 - 120,000 3G APs per unit
- 3G AP file format: gz



Note If the 3G AP file format is XML, only 20,000 APs per ULS are supported

- Each ULS supports 120,000 3G APs:
 - 50,000 3G APs with 15- minute pegging and upload intervals
 - 70,000 3G APs with 1-hour pegging and 1 day upload intervals

Table 1-16 shows the UCS C240 M3 non-NEBs-compliant configuration.

Table 1-16 UCS C240 M3 Non-NEBs-Compliant Systems

Item	Specifications
Hardware	Cisco UCS C240 M3 for non-NEBs-compliant systems with Linux version from Supported Operating Systems, page 1-3
CPU type	Xeon E5-2680 2.7 GHz
CPU Core number	8 or more
RAM size	24 GB or greater
Swap space	24 GB or greater
Gateway JVM size	8 GB
Unit JVM size	24 GB

Table 1-16 UCS C240 M3 Non-NEBs-Compliant Systems (continued)

Item	Specifications
Local Storage Options	<ul style="list-style-type: none"> • Cisco UCS C240 M3—Performance and Reliability Option <ul style="list-style-type: none"> – 1*300 GB SAS 10K RPM drive for OS and Prime Performance Manager – 4*300 GB SAS 10K RPM drives for database using RAID1 – 8*300 GB SAS 10K RPM drives for backups using RAID1 – Dual power supply • Cisco UCS C240 M3—Performance Option <ul style="list-style-type: none"> – 1*300 GB SAS 10K RPM drive for OS – 2*300 GB SAS 10K RPM drives for database using RAID0 – 4*300 GB SAS 10K RPM drives for backup using RAID0 – Dual power supply • Cisco UCS C240 M3—Basic Option <ul style="list-style-type: none"> – 4*300 GB SAS 15K RPM drive for OS, database, and backup
External Storage Options and Performance Requirements	<ul style="list-style-type: none"> • Local root partition: <ul style="list-style-type: none"> – Linux OS and Prime Performance Manager gateway/unit installation and gateway database – 10 GB used – 80 IOPS with 100% write operations; driven by Prime Performance Manager device cache writes and logs (device cache and logs can also be relocated if necessary) • First external partition: <ul style="list-style-type: none"> – Prime Performance Manager database and gateway exported reports – 110 GB used – 30 GB used for CSV export in Prime Performance Manager format – 180 IOPS with 100% write operations; sustained IOPS during backup periods; quiet at other times • Second external partition: <ul style="list-style-type: none"> – Prime Performance Manager gateway and unit backups. – 200 GB used. – 300 IOPS with 100% write operations. – Sustained IOPS during backup periods; quiet at other times.

RAN Management System Requirements

Requirements for the small cell RAN Management System (RMS) are based on 120,000 3G APs on a single server. Requirements are based on the following configurations:

- Enabled reports:
 - RMS: 3G AP InterDevice: 3G AP Availability InterDevice

- RMS: 3G AP InterDevice: 3G AP CS InterDevice
- RMS: 3G AP InterDevice: 3G AP PS InterDevice
- RMS: 3G AP KPI: 3G AP Availability
- RMS: 3G AP KPI: 3G AP CS KPI
- RMS: 3G AP KPI: 3G AP PS KPI
- RMS: 3G AP Multi DB Table
- Report intervals: 15-minute, hourly, daily, weekly, monthly
- Aging values and baseline disk space requirements:
 - 15-minute reports: 7 days, 8.8 GB disk usage per day
 - Hourly reports: 14 days, 2.2 GB disk usage per day
 - Daily reports - 94 days, 0.1 GB disk usage per day
 - Weekly reports - 730 days, 0.1 GB disk usage per week
 - Monthly reports - 1825 days, 0.1 GB disk usage per month
 - 11.1 GB data generated per day with data generation rate of 134.7 KB/sec
- Unit backup file size: total data size of unit database plus 40 GB for logs/device cache/other files
- Unit backup partition size:
 - 2 * unit backup file size
 - Multiply by 1.1 for safety
- Network size:
 - Number of 3G APs per ULS: 120,000
 - Number of ULS: 1
 - Total Number of 3G APs per unit: 120,000
 - 3G AP file format: gz
 - Each ULS has 50,000 3G APs with 15-minute data and upload intervals, and 70,000 3G APs with 1-hour pegging intervals and 1-day upload interval
 - Cisco UCS C22M3 for non-NEBs-compliant systems
 - Cisco UCS C220 M3 for non-NEBs-compliant systems
 - Cisco UCS C240 M3 for non-NEBs-compliant systems
 - Cisco UCS B200M3 for non-NEBs-compliant systems
 - Linux version from [Supported Operating Systems, page 1-3](#)
 - CPU: Xeon E5-2680 2.7 GHz
 - Core number: 8 or more
 - RAM size: 24 GB or greater
 - Swap space: 24 GB or greater
 - Gateway JVM size: 8 GB
 - Unit JVM size: 24 GB

Local Storage Options

- Cisco UCS C240 M3/C22 M3/C220 M3 Performance and Reliability Option

- 1*146 GB SAS 15K RPM drive for OS
- 4*146 GB SAS 15K RPM drives for database using RAID10
- 8*146 GB SAS 10K RPM drives for backups using RAID10
- Dual Power Supply
- Cisco UCS C240 M3/C22M3/C220 M3 - Performance Option
 - 1*146 GB SAS 15K RPM drive for OS and Prime Performance Manager
 - 2*146 GB SAS 15K RPM drives for database
 - 4*146 GB SAS 10K RPM drives for backup using RAID0
- Cisco UCS C240 M3/C22M3/C220 M3/B200M3 - Performance Option
 - 4*300 GB SAS 10K RPM drive for OS and Prime Performance Manager using RAID0
- Cisco UCS C240 M3/C22M3/C220 M3/B200M3 - Basic Option
 - 4*300 GB SAS 10K RPM drive for OS and Prime Performance Manager using RAID0

External Storage Options and Performance Requirements

- Local Root partition
- Linux OS and Prime Performance Manager gateway/unit installation and gateway database
 - 10 GB used
 - 8 IOPS with nearly 100% write operations
 - Driven by Prime Performance Manager device cache writes and logs
 - Device cache and logs can also be relocated if necessary
- First external partition database and gateway exported reports:
 - 110 GB used
 - 30 GB used for CSV export in Prime Performance Manager format
 - 180 IOPS with nearly 100% write operations
- Second external partition gateway and unit backups
 - 350 GB used
 - 300 IOPS with nearly 100% write operations
 - Sustained IOPS during backup periods; quiet at other times

Requirements for collectd

Prime Performance Manager supports Apache and MySQL collectd reports with a maximum of 5,000 devices. Server requirements are based on the following report aging values:

- 5-minute—3 days
- 15-minute—7 days
- Hourly—14 days
- Daily—94 days
- Weekly—730 days
- Monthly—1825 days

- Back up days and logs settings:
 - ppm backupdays 1 both
 - ppm backuplogs disable both

Table 1-17 shows the collectd server requirements.

Table 1-17 collectd Server Requirements

Item	Specifications
Hardware	Cisco UCS C240 M3 for non-NEBs-compliant systems.
Software	See Supported Operating Systems, page 1-3 .
CPU type	8-core (Cisco UCS C240 M3)
CPU number	2
CPU Speed	2.70 GHz minimum
Memory (RAM)	64 GB or greater
Swap space	32 GB or greater
Storage	<ul style="list-style-type: none"> • Cisco UCS C240 M3—Performance Option. <ul style="list-style-type: none"> – OS—One 300 GB SAS 15K RPM drive. – Database—Two 300 GB SAS 10K RPM drives. – Backups using RAID10—Three 300 GB SAS 10K RPM drives. – LSI MegaRAID controllers. – Dual power supply.

Single Server ESXi Hypervisor Requirements

Requirements for a single-server ESXi hypervisor are based on the following configurations:

- Aging values:
 - 15-minute reports—7 days
 - Hourly reports—14 days
 - Daily reports—94 days
 - Weekly reports—730 days
 - Monthly reports—1825 days
- Back up days and logs settings:
 - ppm backupdays 1 both
 - ppm backuplogs disable both
- On the unit, slow and fast threads must be set to 60:


```
ppm numslowthreads 60
ppm numfastthreads 60
```
- 15-minute, hourly, daily, weekly, and monthly EXSi hypervisor report intervals
- Maximum network size:

- 5,000 ESXi
- 10 active VMs on each ESXi
- 59,999 total active VMs

Table 1-18 shows the UCS C240 M3 non-NEBs compliant requirements.

Table 1-18 UCS C240 M3 Non-NEBs Compliant Systems

Item	Specifications
Hardware	Cisco UCS C240 M3 for non-NEBs-compliant systems with Linux version from Supported Operating Systems, page 1-3
CPU type	8-core (UCS C240 M3), UCS servers use Xeon(R) E5-2680 processors
CPU number	2
CPU Speed	2.70 GHz minimum
RAM size	64 GB or greater
Swap space	32 GB or greater
Gateway JVM size	8 GB
Unit JVM size	16 GB
Unit slow threads	60
Unit fast threads	60
Local Storage	Cisco UCS C240 M3/C220 M3 Performance Option: <ul style="list-style-type: none"> • 1*300 GB SAS 15K RPM drive for OS and Prime Performance Manager • 2*300 GB SAS 15K RPM drives for CSV reports and database using RAID0 • 3*300 GB SAS 15K RPM drive for backups using RAID0 • using two PCIe RAID controllers • Dual power supply
External Storage Options and Performance Requirements	
Local Root Partition	Linux OS and Prime Performance Manager gateway, unit installation, and gateway database. <ul style="list-style-type: none"> • 10 GB used • 67 IOPS with 97% write operations • Driven by Prime Performance Manager device cache writes and logs • Device cache and logs can also be relocated if necessary
First External Partition	Prime Performance Manager unit database and gateway exported reports. <ul style="list-style-type: none"> • 100 GB used • 134 IOPS with 76% write operations
Second External Partition	Prime Performance Manager gateway and unit backups. <ul style="list-style-type: none"> • 300 GB used • 1688 IOPS with 37% write operations • Sustained IOPS during backup periods; quiet at other times

Single Server Requirements for Data Collection Manager

Single server requirements for Data Collection Manager (DCM) are based on the following configurations:

- Enabled reports: Resource CPU and Resource Memory
- Enabled report intervals: 5 minute, 15-minute, Hourly, Daily, Weekly, Monthly
- Report aging values and baseline disk space requirements:
 - 5-minute reports - 3 Days - 1.57 GB disk usage per day
 - 15-minute reports - 7 Days - 0.52 GB disk usage per day
 - Hourly reports - 14 Days - 0.13 GB disk usage per day
 - Daily reports - 94 Days - 0.01 GB disk usage per day
 - Weekly reports - 730 Days - 0.01 GB disk usage per week
 - Monthly reports - 1825 Days - 0.01 GB disk usage per month
 - 2.23 GB data generated per day with data generation rate of 27 KB/sec
- Unit backup file size: total unit database data size plus 10 GB for logs/device cache/other files
- Unit backup partition size:
 - 2 * unit backup file size
 - Multiply by 1.1 for safety
- Unit backup/restore speed: average of 6 GB per minute
- Back up days and logs settings:
 - ppm backupdays 1 both
 - ppm backuplogs disable both

To run at maximum supported scale, set the following configurations in the unit Bulkstats.properties file located in the properties directory:

- DCM_DROP_DIR = /root/dcmdrop (Example. Set to your actual drop folder)
- DCM_PROFILE_FILE_RETAIN = 300
- DCM_DIR_MONITOR_REFRESH_INTERVAL = 100

Network size (maximum):

- Number of devices: 3000 devices
- Device type: Cisco ASR 1000
- Bulk statistics interval for 3000 devices: 300 seconds
- Cisco UCS C240 M3 for non-NEBs-compliant systems
- Cisco UCS C220 M3 for non-NEBs-compliant systems
- Linux version from [Supported Operating Systems, page 1-3](#)
- CPU type: 8-core (UCS C240 M3) Xeon E5-26802.7 GHz
- RAM size: 64 GB or greater
- Swap space: 32 GB or greater
- Gateway JVM size: 8 GB

- Unit JVM size: 16 GB

Local Storage Options

- Cisco UCS C240 M3 - Expansion, Performance, and Reliability Option
 - 1*300 GB SAS 15K RPM drive for OS and Prime Performance Manager
 - 4*300 GB SAS 10K RPM drives for CSV reports and database using RAID10
 - 6*600 GB SAS 10K RPM drives for backups using RAID10
 - Using PCIe RAID controllers
 - Dual power supply

External Storage Options and Performance Requirements

- Local Root partition
 - Linux OS and Prime Performance Manager gateway/unit installation and gateway database
 - 10 GB used
 - 340 IOPS with nearly 99% write operations
 - Driven by Prime Performance Manager device cache writes and logs
 - Device cache and logs can also be relocated if necessary
- First External partition
 - Prime Performance Manager unit database and gateway exported reports
 - 50 GB used
 - 20 IOPS with nearly 95% write operations
- Second External partition
 - Prime Performance Manager gateway and unit backups
 - 100 GB used
 - 550 IOPS with nearly 89% write operations
 - Sustained IOPS during backup periods; quiet at other times

Requirements for Managing KVM Deployments

Prime Performance Manager requirements for KVM deployments are based on the following configurations:

- 100 KVM Hosts and 3000 active VMs on a single server
- Reports:
 - KVM VM Availability
 - KVM VM CPU Utilization
 - KVM VM Memory Bytes
 - KVM VM Hypervisor-Level Disk Space
 - KVM VM Disk Read and Write
 - KVM VM Interface Send
 - KVM VM Interface Send Rates

- KVM VM Interface Receive
- KVM VM Interface Receive Rates
- KVM VM Interface Bytes
- KVM VM Interface Byte Rates
- KVM Host CPU Utilization
- KVM Host Memory Utilization
- KVM Host Memory Bytes
- KVM Host VM Availability
- KVM Host VM Availability Numbers
- KVM VM Interface Packets
- KVM VM Interface Packet Rates
- Report intervals: 1-minute, 5-minute, 15-minute, hourly, daily, weekly, monthly
- Back up days and logs:
 - ppm backupdays 1 both
 - ppm backuplogs disable both
- Report aging values:
 - 1-minute reports - 7 Days
 - 5-minute reports - 365 Days
 - 15-minute reports - 365 Days
 - Hourly reports - 365 Days
 - Daily reports - 365 Days
 - Weekly reports - 730 Days
 - Monthly reports - 1825 Days
- CSV exporting of all data to the gateway disabled
- Network size:
 - KVM hosts: 100
 - Active VMs: 3,000
 - VMs: 3,500
 - Cisco UCS C240 M3 for non-NEBs-compliant systems
 - Cisco UCS C22 M3 for non-NEBs-compliant systems
 - Cisco UCS C200 M2 for non-NEBs-compliant systems - EOS
 - Cisco UCS B200 M3 for non-NEBs-compliant systems (external storage only)
 - Oracle Netra X3-2 or equivalent for NEBs compliant systems
 - Linux version from [Supported Operating Systems, page 1-3](#)
 - CPU type: 6-core (UCS C240 M3) Xeon E5-2640 2.5 GHz
 - CPU type: 6-core (UCS B200 M3) Xeon E5-2640 2.5 GHz
 - CPU type: 6-core (UCS C22 M3) Xeon E5-2430v2 2.5 GHz
 - CPU type: 6-core (UCS C22 M3) Xeon E5-2440 2.4 GHz

- CPU type: 6-core (UCS C220 M3) Xeon E5-2640 2.5 GHz
- CPU type: 6-core (UCS C220 M3) Xeon E5-2630v2 2.6 GHz
- CPU type: 6-core (UCS C200 M2) Xeon E5645 2.4 GHz
- CPU type: 8-core (Oracle X3-2) Xeon E5-2658 2.1 GHz
- CPU number: 2
- vCPU number: 6 or more for VM Environments
- RAM size: 24 GB or greater
- Swap space: 24 GB or greater
- Gateway JVM size: 8 GB
- Unit JVM size: 8 GB

Local Storage Options

- Cisco UCS C240 M3 - Expansion, Performance, and Reliability Option
 - 1*300 GB SAS 15K RPM drive for OS and Prime Performance Manager
 - 6*300 GB SAS 15K RPM drives for database using RAID10
 - 8*300 GB SAS 15K RPM drives for backups using RAID10
 - Using PCIe RAID controllers
 - Dual power supply
- Cisco UCS C240 M3 - Performance Option
 - 1*300 GB SAS 15K RPM drive for OS and Prime Performance Manager
 - 3*300 GB SAS 15K RPM drives for database using RAID0
 - 4*300 GB SAS 15K RPM drives for backups using RAID0
 - Using PCIe RAID controllers
- Cisco UCS C22M3/C220 M3 - Performance Option
 - 1*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0
 - 3*300 GB SAS 10K RPM drives for database using RAID0
 - 4*300 GB SAS 10K RPM drive for backups using RAID0
 - Using one embedded RAID or PCIe RAID controller
- Cisco UCS C22M3/C220 M3 - Basic Option
 - 1*300 GB SAS 15K RPM drive for OS and Prime Performance Manager
 - 1*600 GB SAS 15K RPM drives for database
 - 2*600 GB SAS 10K RPM drive for backups using RAID0
- Cisco UCS C200M2 LFF - Basic Option
 - 1*146 GB SAS 15K RPM drive for OS and Prime Performance Manager
 - 1*600 GB SAS 15K RPM drives for database
 - 2*600 GB SAS 10K RPM drive for backups using RAID0
- Oracle Netra X3-2 - Basic Option
 - 1*146 GB SAS 10K RPM drive for OS and Prime Performance Manager
 - 1*600 GB SAS 10K RPM drives for database

- 2*600 GB SAS 10K RPM drive for backups using RAID0

External Storage Options and Performance Requirements

- Local root partition
 - Linux OS and Prime Performance Manager gateway/unit installation and gateway database
 - 15 GB used
 - 150 IOPS with nearly 100% write operations
 - Driven by Prime Performance Manager device cache writes and logs
 - Device cache and logs can also be relocated if necessary
- First external partition
 - Prime Performance Manager database and gateway exported reports
 - 290 GB used
 - 380 IOPS with nearly 99% write operations
- Second external partition
 - Prime Performance Manager Gateway and unit backups
 - 890 GB used
 - 2200 IOPS with nearly 98% write operations
 - Sustained IOPS during backup periods; quiet at other times

Server Requirements for Managing KVM and Cisco Unified Computing Service Manager Deployments

Prime Performance Manager requirements for managing KVM and Cisco Unified Computing Service Manager are listed below. Requirements are based on the following Prime Performance Manager settings:

- Reports:
 - KVM: KVM Host, KVM Host Inventory, and KVM VM
- UCS Clusters: All
- Availability: ICMP Ping/ ICMP Ping Aggregate
- Availability: Interface Status/ Interface Status Aggregate/ Interfaces
- OpenStack: All
- PPM System: All
- Resource: All
- Report intervals: 5 Min, 15 Min, Hourly, Daily, Weekly, Monthly
- ppm backupdays 1 both
- ppm backuplogs disable both
- CSV exporting of all data to gateway: Disabled
- 510 KVM hosts with 11,000 active VMs and 65 UCSM devices on a single server
- Integrate with OpenStack Ceilometer

Report aging values:

- 5 Minute reports: 30 Days (5.61 GB disk usage per day)
- 15 Minute reports: 30 Days (1.87 GB disk usage per day)
- Hourly reports: 90 Days (0.47 GB disk usage per day)
- Daily reports: 94 Days (0.02 GB disk usage per day)
- Weekly reports: 730 Days (0.02 GB disk usage per week)
- Monthly reports: 1825 Days (0.02 GB disk usage per month)
- 8 GB data generated per day with data generation rate of 97.1 KB/sec
- Unit Backup File Size: 350GB
 - Total Data Size Of Unit Database +
 - 40 GB for logs/device cache/other files
- Unit backup partition size: 780 GB
 - 2 * unit backup file size
 - Multiply by 1.1 for safety
- Unit backup/restore speed: average of 6 GB per minute
- Network size:
 - Number of KVM hosts: 510
 - 500 hosts have average 20 VMs, 10 hosts have average 100 VMs
 - Number of active VMs: 11,000
 - Total number of VMs: 11,000
 - Number of UCSM devices: 65
- Linux version from [Supported Operating Systems, page 1-3](#)
- KVM VM server in UCS B200 M3 with RHEL6.5
 - CPU: E5-2680 2.8 GHz
 - Core: 10 or more
 - RAM: 64 GB or greater
 - Swap space: 40 GB or greater
 - Gateway JVM size: 4 GB
 - Unit JVM size: 8 GB

Local Storage Options

- Cisco UCS C240M3 - Performance Option
 - 1*100 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0
 - 4*300 GB SAS 15K RPM drives for database using RAID10
 - 8*300 GB SAS 15K RPM drives for backups using RAID10
 - Using PCIe RAID controllers

External Storage Options and Performance Requirements

- Local Root Partition
 - LinuxOS and Prime Performance Manager Unit Installation

- 30 GB used
- 12 IOPS with nearly 94% write operations
- Driven by Prime Performance Manager device cache writes and logs
- First External Partition: unit database
 - 350 GB Total Disk Used
 - 27 IOPS With about 93% Write Operations
- Second External Partition: gateway and unit backups
 - 780 GB used
 - 960 IOPS with nearly 100% write operations
 - Sustained IOPS during backup periods
 - Quiet at other times

Requirements for Ceph Deployments

Prime Performance Manager requirements for Ceph deployments are based on the following configurations:

- Reports
 - Storage: CEPH: Cluster Level: Global space
 - Storage: CEPH: Cluster Level: Monitors
 - Storage: CEPH: Cluster Level: OSD IO Aggregate
 - Storage: CEPH: Cluster Level: OSD Latency Aggregate
 - Storage: CEPH: Cluster Level: Placement Groups
 - Storage: CEPH: Cluster Level: Pools
 - Storage: CEPH: Node Level: OSD: Filestore
 - Storage: CEPH: Node Level: OSD: IO
 - Storage: CEPH: Node Level: OSD: Journal
 - Storage: CEPH: Node Level: OSD: Latency
 - Storage: CEPH: Node Level: OSD: OSD space
 - Storage: CEPH: Node Level: OSD: Queue
- Report intervals: 1-minute, 5-minute, 15-minute, hourly, daily, weekly, monthly
- Back up days and logs:
 - ppm backupdays 1 both
 - ppm backuplogs disable both
- Report aging values and baseline disk space requirements.
 - 1-minute reports - 7 Days - 0.98 GB disk usage per day
 - 5-minute reports - 365 Days - 0.20 GB disk usage per day
 - 15-minute reports - 365 Days - 0.07 GB disk usage per day
 - Hourly reports - 365 Days - 0.02 GB disk usage per day

- Daily reports - 365 Days - 0.001 GB disk usage per day
- Weekly reports - 730 Days - 0.001 GB disk usage per week
- Monthly reports - 1825 Days - 0.001 GB disk usage per month
- 1.27 GB data generated per day with data generation rate of 15.4 KB/sec
- Unit backup file size: total unit database data size plus 0.5 GB for logs/device cache/other files
- Unit backup partition size:
 - 2 * unit backup file size
 - Multiply by 1.1 for safety
- Unit backup/restore speed: average of 6 GB per minute

100 Ceph Nodes with 1-Minute Reports Enabled on a Single Server

Requirements for 100 Ceph nodes with 1-minute reports enabled on a single server are based on the following configurations:

- CSV exporting of all data to gateway is disabled.
- Network size:
 - Number of Ceph Nodes: 100
 - Cisco UCS C240 M3 for non-NEBs-compliant systems
 - Cisco UCS C220 M3 for non-NEBs-compliant systems
 - Linux version from [Supported Operating Systems, page 1-3](#)
 - CPU type: Xeon E5-2680 @ 2.7 GHz
 - Core number: 4 or more
 - RAM size: 64 GB or greater
 - Swap space-- 64 GB or greater
 - Gateway JVM size: 4 GB
 - Unit JVM size: 8 GB

Local Storage Options

- Cisco UCS C220 M3/C240 M3
- 1*300 GB SAS 15K RPM drive for OS and Prime Performance Manager
- 3*300 GB SAS 15K RPM drives for database using RAID0
- 4*300 GB SAS 15K RPM drives for backups using RAID0
- Using PCIe RAID controllers
- Dual power supply

External Storage Options and Performance Requirements

- Local Root partition
 - Linux OS, Prime Performance Manager gateway/unit installation and gateway database
 - 25 GB used

- 14 IOPS with 95% write operations; driven by Prime Performance Manager device cache writes and logs
- First external partition
 - Prime Performance Manager database
 - 500 GB used
 - 15 IOPS with nearly 89% write operations
- Second external partition
 - Prime Performance Manager gateway and unit backups
 - 1.2 TB used
 - 375 IOPS with nearly 98% write operations; sustained IOPS during backup periods; quiet at other times

Requirements for TCP/HTTP Probes

Prime Performance Manager probe support is based on 500 TCP and 500 HTTP probes added in a low-end VM environments with no performance impact. This configuration is not an upper limit for the number of HTTP or TCP probes Prime Performance Manager can support.

Probe support is based on the following configurations:

- Reports
 - TCP Probe
 - TCP Probe Aggregate
 - HTTP Probe
 - HTTP Probe Aggregate
- Report intervals: 1 minute, 5 minute, 15-minute, hourly, daily, weekly, monthly
- Aging values:
 - 1-minute reports -2 Days
 - 5-minute reports -5 Days
 - 15-minute reports -7 Days
 - Hourly reports - 14 Days
 - Daily reports - 94 Days
 - Weekly reports - 730 Days
 - Monthly reports - 1825 Days
- Back up days and logs:
 - ppm backupdays 1 both
 - ppm backuplogs disable both
- CSV exporting of all data to gateway is disabled
- Network size:
 - Number of devices: 100
 - Number of HTTP probes: 500

- Number of TCP probes: 500
- Number of Total probes: 1000
- Recommended JVM size settings:
 - Gateway JVM size: 4 GB
 - Unit JVM size: 6 GB

Requirements for NetFlow

Prime Performance Manager NetFlow requirements are based on the following configurations:

- Reports:
 - NetFlow All Flows—Lowest Interval Only
 - NetFlow Autonomous Systems—NetFlow AS
 - NetFlow Endpoints—NetFlow Conversations
 - NetFlow Endpoints—NetFlow Destinations
 - NetFlow Endpoints—NetFlow Source Destinations
 - NetFlow Endpoints—NetFlow Sources
 - NetFlow Protocols—NetFlow Protocol
 - NetFlow Interfaces
- Report aging and baseline disk space requirements:
 - 5-minute reports - 3 Days - 65.7 GB disk usage per day
 - 15-minute reports - 7 Days - 21.9 GB disk usage per day
 - Hourly reports - 14 Days - 5.48 GB disk usage per day
 - Daily reports - 94 Days - 0.23 GB disk usage per day
 - Weekly reports - 730 Days - 0.23 GB disk usage per week
 - Monthly reports - 1825 Days - 0.23 GB disk usage per month
 - 94 GB data generated per day with data generation rate of 1.114 MB/sec

Unit database size increment metrics are based on NetFlow V5 150K scale listed below.

- Unit backup file size:
 - Total data size of unit database +
 - 40 GB for logs/device cache/other files
- Unit backup partition size:
 - 2 * unit backup file size
 - Multiply by 1.1 for safety
- Unit backup/restore speed: average of 3-4 GB per minute

For better NetFlow processing performance, disable the following in Administration > Report Settings:

- Weekly Report Flag
- Monthly Report Flag
- Export reports

- Export hourly 5-minute reports
- Export hourly 15-minute reports
- Backup days: ppm backupdays 1 both

Add the following to the unit System.properties file located in the properties directory:

- NF_MAX_UNPROCESSED_PKTS = 1000000
- DEV_CACHE_CONC_LOADERS = 32
- NETFLOW_MAX_PKTS_PROCESSED_PER_POLL = 500
- DB_QUEUE_SIZE = 100000
- DB_DEF_MAX_COMMIT_RECS = 5000
- DB_DEF_MAX_COMMIT_BYTES = 16777216

Restart the unit for these settings to take effect. Set the following in the gateway Reports.properties file in the properties directory:

- RESOLVE_HOST_NAMES = disabled
- Maximum network size: NetFlow V5 150K Scale
- Number of devices: 750 Devices
- Speed of flow per device: 200 Flows/second
- Speed of flow per unit: 150,000 Flows/second
- Flow conversation number: 600 conversations (The conversation number is calculated by multiplying all flow field value numbers such as: sourceIPAddress, destIPAddress, Port, Interface, AS.
- Maximum network size: NetFlow V9/IPFIX 150K Scale
- Number of devices: 500
- Flow speed per device: 200 flows/second
- Flow speed per unit: 100,000 flows/second
- Flow conversation number: 12000 conversations

Table 1-19 shows the NetFlow Linux server requirements.

Table 1-19 NetFlow Report Linux Server Requirements

Item	Specifications
Hardware	Cisco UCS C240 M3 or Cisco UCS C220 M3 for non-NEBs-compliant systems.
Software	See Supported Operating Systems, page 1-3 .
CPU type	8-core (Cisco UCS C240 M3; UCS servers use Xeon(R) E5-2680 processors)
CPU number	2
CPU Speed	2.70 GHz minimum
Memory (RAM)	64 GB or greater
Swap space	32 GB or greater
Gateway JVM size	16 GB
Unit JVM size	24 GB

Table 1-19 NetFlow Report Linux Server Requirements (continued)

Item	Specifications
Local Storage Options	Cisco UCS C240 M3 Expansion, Performance, and Reliability Option. <ul style="list-style-type: none"> • 1*300 GB SAS 15K RPM drive for OS and Prime Performance Manager • 4*300 GB SAS 10K RPM drives for CSV reports and database using RAID10. • 6*600 GB SAS 10K RPM drives for backups using RAID10. • Two PCIe RAID controllers. • Dual power supply.
External Storage Options and Performance Requirements	Local Root partition: <ul style="list-style-type: none"> • Linux OS and Prime Performance Manager gateway/unit installation and gateway database • NetFlow V5 • 10 GB used • 50 IOPS with 86% write operations <ul style="list-style-type: none"> – Driven by Prime Performance Manager device cache writes and logs – Device cache and logs can also be relocated if necessary
First External Partition	<ul style="list-style-type: none"> • Prime Performance Manager unit database and gateway exported reports: <ul style="list-style-type: none"> – NetFlow V5 – 450GB used – 1620 IOPS with 49% write operations
Second External Partition	<ul style="list-style-type: none"> • Prime Performance Manager gateway and unit backups: <ul style="list-style-type: none"> – NetFlow V5 – 1000 GB used. – 2760 IOPS with 99% write operations; sustained IOPS during backup periods; quiet at other times

**Note**

The NetFlow Conversations, NetFlow Destinations, NetFlow Source Destinations, NetFlow Sources reports can decrease performance if a wide source and destination address range occurs in the NetFlow streams. To monitor performance, enable only the hourly reports. Monitor the device cache folder size on unit server for few hours. If the folder size increases rapidly, do not enable the NetFlow report daily, weekly and monthly intervals. Set the unit JVM size to 32G using the ppm jvmsize. See the [Cisco Prime Performance Manager 1.7 User Guide](#) for more information.

Linux Update Requirements

Prime Performance Manager requires Red Hat Enterprise Linux Version 5 Update 3 or later or CentOS equivalent. The following RPM packages, or later, must be installed:

- crontabs-1.10-8

- vixie-cron-4.1-76
- bzip2-libs-1.0.3-4
- glibc-2.5-34
- bc-1.06-21
- bind-utils-9.3.4-10
- time-1.7-27
- words-3.0-9
- freetype-2.2.1-21
- fontconfig-2.4.1-7
- expat-1.95.8-8.2.1
- gawk-3.1.5

If you are running SELinux (Security-Enhanced Linux) and using User Access with SSL enabled you must run the following command to enable loading of the SSL shared library from Prime Performance Manager.

```
chcon -t textrel_shlib_t '/opt/CSCOppm-gw/apache/libexec/libssl.so'
```

If you are running Red Hat Enterprise Linux Version 6 Update 2 or later, the following RPM packages, or later, must be installed:

- crontabs-1.10-33
- cronie-1.4.4-7
- bzip2-libs-1.0.5-7
- glibc-2.12-1.47
- bc-1.06.95-1
- bind-utils-9.7.3-8
- time-1.7-37.1
- words-3.0-17
- freetype-2.3.11-6
- fontconfig-2.8.0-3
- expat-2.0.1-9.1
- gawk-3.1.7

For Red Hat Enterprise Linux Version 6 Update 2 or later, install the Package collections > Compatibility Libraries.

If you will use Prime Performance Manager to manage hypervisors, after installation run the following command to ensure all required shared libraries are installed:

```
ppm hypervisor checklibrary.
```

Missing libraries will be listed as “not found”. RPM packages required for hypervisor management include:

- cyrus-sasl-lib
- 2fsprogs-libs
- keyutils-libs

- krb5-libs
- libgcrypt
- libgpg-error
- libidn
- libselenium
- libsepol
- openldap
- openssl
- zlib

If these are not installed, you must install them.

**Note**

Always install packages for the appropriate hardware architecture of your machine. For example install x86_64 RPMs on x86_64 machines and i686 RPMs on i686 machines. Do not install i686 packages on x86_64 machines.

To verify the RPMs that are installed on your system, use **rpm -q -a** to check for the above listed packages or more recent versions.

To obtain RPMs for Red Hat Enterprise Linux, contact your Red Hat representative or download them from the Red Hat website at: <http://www.redhat.com>.

**Note**

Downloading Red Hat Enterprise Linux RPMs might require a support agreement.

Gateway Requirements Large Number of Units Distributed Scale

Gateway requirements for managing large numbers of units in a distributed environment are based on the following configurations:

- Network size:
 - Number of gateways: 2 (running Geographical HA environment)
 - Number of units: 26
 - Number of unit groups: 10
 - 1:1 unit groups: 5
 - 1:2 unit groups: 4
 - 1:3 unit groups: 1
 - Number of devices: 23,440
- Nine units managing devices as follows:
 - 1 unit managing ESXi with 15-minute reports and 3000 ESXi devices
 - 1 unit managing ESXi with 15-minute reports and 2000 ESXi, 250 UCSM, and 1430 SNMP devices
 - 1 unit managing KVM with 5-minute reports and 2000 KVM, 250 UCSM, and 1430 SNMP devices

- 2 units managing ESXi with 5-minute reports and 1200 ESXi, 150 UCSM, and 1430 SNMP devices
- 2 units managing ESXi with 5-minute reports and 600 ESXi, 75 UCSM, and 1430 SNMP devices
- 2 units managing ESXi with 5 Minute reports and 200 ESXi, 25 UCSM and 1430 SNMP devices



Note For large numbers of units, the network delay between gateway and units must be less than 80 ms for reliable failovers in a geographical HA configuration. Network bandwidth to the gateway must be at least 140 Mbps.

- Enabled reports:
 - Application Traffic: all
 - Compute: all
 - Prime Performance Manager System: all
 - Resource: all
 - Transport Statistic: all
- Gateway with CSV exporting of all data to gateway disabled
 - Linux from [Supported Operating Systems, page 1-3](#)
 - CPU type: Xeon E5-2680 2.7 GHz
 - Core number: 8 or more
 - RAM size: 64 GB or greater
 - Swap space: 64 GB or greater
 - Gateway JVM size: 16 GB
 - Unit JVM size: 16 GB

Local Storage Options

- Cisco UCS C240 M3 - Performance Option
 - 2*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0
 - 2*300 GB SAS 15K RPM drive for backups Prime Performance Manager using RAID0

External Storage Options and Performance Requirements

- Local root partition
 - Linux OS and Prime Performance Manager gateway installation, gateway database
 - 30 GB used
 - 50 IOPS with Nearly 91.6% write operations; driven by Prime Performance Manager database, logs and device cache
 - 210 MB gateway database data generated per day
- First external partition
 - Prime Performance Manager gateway backups
 - 5.5 GB used
 - 253 IOPS with nearly 94.4% write operations; sustained IOPS during backup periods; quiet at other times

- Unit managing 3000 ESXi devices:
 - Linux from [Supported Operating Systems, page 1-3](#)
 - PU type: E5-2680 2.8 GHz
 - Core number: 14 or more
 - RAM size: 64 GB or greater
 - Swap space: 64 GB or greater
 - Unit JVM size: 16 GB
- Local storage options
 - Cisco UCS C240 M3 - Performance Option
 - 1*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0
 - 1*300 GB SAS 15K RPM drives for database using RAID0
 - 1*600 GB SAS 10K RPM drives for backups using RAID0
 - Using PCIe RAID controllers

External Storage Options and Performance Requirements

Local root partition

- Linux OS and Prime Performance Manager unit installation
 - 25 GB Used
 - 25 IOPS with nearly 94% write operations driven by Prime Performance Manager device cache writes and logs

First external partition

- Prime Performance Manager unit database
 - 110 GB total disk used
 - 200 IOPS with about 99% write operations
- Unit database size:
 - 15-minute reports - 7 Days - 7.54 GB disk usage per day
 - Hourly reports - 14 Days - 1.89 GB disk usage per day
 - Daily reports - 94 Days - 0.08 GB disk usage per day
 - Weekly reports - 730 Days - 0.08 GB disk usage per week
 - Monthly reports - 1825 Days - 0.08 GB disk usage per month
 - 100.0 GB disk space used based on 9.5 GB data generated per day at a generation rate of 115 KB/sec
- Unit database partition size: unit database size above; multiplied by 1.1 for safety
- Second external partition:
 - Prime Performance Manager unit backups: 250 GB used assuming 1 day of backups saved
 - 5500 IOPS with nearly 100% write operations
 - Sustained IOPS during backup periods; quiet at other times
 - Unit backup file size: unit database size above + 5 GB for device cache/other files

- Unit backup partition size: unit backup file size above * backup days + unit database size above + 5 GB for device cache/other files; multiplied by 1.1 for safety

- Unit backup/restore speed: 6 GB per minute average

Unit managing 2000 ESXi + 250 UCSM + 1430 SNMP devices:

- Linux from [Supported Operating Systems, page 1-3](#)
- CPU type: E5-2680 2.8 GHz
- Core number: 12 or more
- RAM size: 64 GB or greater
- Swap space: 64 GB or greater
- Unit JVM size: 16 GB
- Local storage options:
 - Cisco UCS C240 M3 - Performance Option
 - 1*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0
 - 1*300 GB SAS 15K RPM drives for database using RAID0
 - 1*600 GB SAS 10K RPM drives for backups using RAID0
 - Using PCIe RAID controllers

External Storage Options and Performance Requirements

- Local root partition:
 - Linux OS and Prime Performance Manager unit installation
 - 25 GB used
 - 15 IOPS with nearly 93% write operations driven by Prime Performance Manager device cache writes and logs
- First external partition:
 - Prime Performance Manager unit database
 - 105 GB total disk used
 - 180 IOPS with about 98% write operations
- Unit database size:
 - 5-minute reports - 3 days - 12.33 GB disk usage per day
 - 15-minute reports - 7 days - 4.11 GB disk usage per day
 - Hourly reports - 14 days - 1.03 GB disk usage per day
 - Daily reports - 94 days - 0.05 GB disk usage per day
 - Weekly reports - 730 days - 0.05 GB disk usage per week
 - Monthly reports - 1825 days - 0.05 GB disk usage per month
 - 95.0 GB disk space used for database based on the above report aging
 - 17.5 GB data generated per day
 - Data generation rate: 213 KB/sec
 - Unit database partition size: unit database size above; multiplied by 1.1 for safety
- Second external partition:

Prime Performance Manager unit backups:

- 240 GB used assuming 1 day of backups saved
- 1850 IOPS with nearly 100% write operations
- Sustained IOPS during backup periods; quiet at other times
- Unit backup file size: unit database size above + 5 GB for device cache/other files
- Unit backup partition size: unit backup file size above * backup days + unit database size above + 5 GB for device cache/other files; multiplied by 1.1 for safety
- Unit backup/restore speed: average of 6 GB per minute

Unit managing 1200 ESXi, 150 UCSM, and 1430 SNMP devices:

- Linux from [Supported Operating Systems, page 1-3](#)
- CPU type: E5-2680 2.8 GHz
- Core number: 12 or more
- RAM size: 64 GB or greater
- Swap space: 64 GB or greater
- Unit JVM size: 16 GB
- Local storage options

Cisco UCS C240 M3 - Performance Option

- 1*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0
- 1*300 GB SAS 15K RPM drives for database using RAID0
- 1*600 GB SAS 10K RPM drives for Backups using RAID0
- Using PCIe RAID controllers

External Storage Options and Performance Requirements

- Local root partition:

Linux OS and Prime Performance Manager unit installation

- 25 GB used
- 15 IOPS with nearly 86% write operations driven by Prime Performance Manager device cache writes and logs

- First external partition

Prime Performance Manager unit database:

- 92 GB total disk used
- 180 IOPS with about 97% write operations

- Unit database size:

- 5-minute reports - 3 days - 10.92 GB disk usage per day
- 15-minute reports - 7 days - 3.64 GB disk usage per day
- Hourly reports - 14 days - 0.91 GB disk usage per day
- Daily reports: 94 days - 0.04 GB disk usage per day
- Weekly reports - 730 days - 0.04 GB disk usage per week
- Monthly reports - 1825 days - 0.04 GB disk usage per month

- 83.0 GB disk space used for database based on the following aging
- 15.5 GB data generated per day
- Data generation rate: 188 KB/sec
- Unit database partition size: unit database size above; multiplied by 1.1 for safety
- Second external partition
 - Prime Performance Manager unit backups:
 - 214 GB used assuming 1 day of backups saved
 - 600 IOPS with nearly 100% write operations
 - Sustained IOPS during backup periods; quiet at other times
- Unit backup file size: unit database size above + 5 GB for device cache/other files
- Unit backup partition size: unit backup file size above * backup days + unit database size above + 5 GB for device cache/other files; multiplied by 1.1 for safety
- Unit backup/restore speed: average of 6 GB per minute

Unit managing 600 ESXi + 75 UCSM + 1430 SNMP devices:

- Linux from [Supported Operating Systems, page 1-3](#)
- CPU type: E5-2680 2.8 GHz
- Core number: 8 or more
- RAM size: 64 GB or greater
- Swap space: 64 GB or greater
- Unit JVM size: 16 GB

Local Storage Options

- Cisco UCS C240 M3 - Performance Option
 - 1*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0
 - 1*300 GB SAS 15K RPM drives for database using RAID0
 - 1*600 GB SAS 10K RPM drives for Backups using RAID0
 - Using PCIe RAID controllers

External Storage Options and Performance Requirements

- Local Root partition
 - Linux OS and Prime Performance Manager unit installation
 - 5 GB used
 - 10 IOPS with Nearly 95% write operations driven by Prime Performance Manager device cache writes and logs
- First external partition
 - Prime Performance Manager unit database
 - 66 GB total disk used
 - 80 IOPS with about 99% write operations
- Unit database size:
 - 5-minute reports - 3 days - 7.75 GB disk usage per day

- 15-minute reports - 7 days - 2.59 GB disk usage per day
- Hourly reports - 14 days - 0.65 GB disk usage per day
- Daily reports - 94 days - 0.03 GB disk usage per day
- Weekly reports - 730 days - 0.03 GB disk usage per week
- Monthly reports - 1825 days - 0.03 GB disk usage per month
- 60 GB disk space used for database based on below aging
- 11 GB data generated per day; data generation rate:134 KB/sec
- Unit database partition size: unit database size above; multiplied by 1.1 for safety

Second external partition

- Prime Performance Manager unit backups
 - 156 GB used assuming 1 day of backups saved
 - 500 IOPS with nearly 100% write operations
 - Sustained IOPS during backup periods; quiet at other times
- Unit backup file size:
 - Unit database size above + 5 GB for device cache/other files
 - Unit backup partition size: unit backup file size above * backup days + unit database size above + 5 GB for device cache/other files; multiplied by 1.1 for safety
- Unit backup/restore speed: average of 6 GB per minute

Unit managing 200 ESXi + 25 UCSM + 1430 SNMP devices

- Linux from [Supported Operating Systems, page 1-3](#)
- CPU type: E5-2680 2.8 GHz
- Core number: 4 or more
- RAM size: 64 GB or greater
- Swap space: 64 GB or greater
- Unit JVM size: 16 GB
- Local storage options

Cisco UCS C240 M3 - Performance Option

- 1*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0
- 1*300 GB SAS 15K RPM drives for database using RAID0
- 1*600 GB SAS 10K RPM drives for Backups using RAID0
- Using PCIe RAID controllers

External Storage Options and Performance Requirements

- Local root partition
 - Linux OS and Prime Performance Manager unit installation
 - 25 GB used
 - 8 IOPS with Nearly 94% write operations driven by Prime Performance Manager device cache writes and logs
- First external partition

Prime Performance Manager unit database

- 50 GB total disk used
- 60 IOPS With about 99% write operations

Unit database size:

- 5-minute reports - 3 days - 5.78 GB disk usage per day
- 15-minute reports - 7 days - 1.93 GB disk usage per day
- Hourly reports - 14 days - 0.49 GB disk usage per day
- Daily reports - 94 days - 0.02 GB disk usage per day
- Weekly reports - 730 days - 0.02 GB disk usage per week
- Monthly reports - 1825 days - 0.02 GB disk usage per month
- 44.0 GB disk space used for database based on below aging
- 8.2 GB data generated per day
- Data generation rate: 100 KB/sec
- Unit database partition size: unit database size above; multiplied by 1.1 for safety
- Second external partition

Prime Performance Manager unit backups

- 120 GB used assuming 1 day of backups saved
- 500 IOPS with nearly 100% write operations
- Sustained IOPS during backup periods; quiet at other times

Unit backup file size:

- Unit database size above + 5 GB for device cache/other files
- Unit backup partition size: unit backup file size above * backup days + unit database size above + 5 GB for device cache/other files; multiplied by 1.1 for safety
- Unit backup/restore speed: average of 6 GB per minute

Unit managing 2000 KVM, 250 UCSM, and 1430 SNMP devices:

- Linux from [Supported Operating Systems, page 1-3](#)
- CPU type: E5-2680 2.8 GHz
- Core number: 6 or more
- RAM size: 64 GB or greater
- Swap space: 64 GB or greater
- Unit JVM size: 16 GB
- Local storage options

Cisco UCS C240 M3 - Performance Option

- 1*300 GB SAS 15K RPM drive for OS and Prime Performance Manager using RAID0
- 1*300 GB SAS 15K RPM drives for database using RAID0
- 1*600 GB SAS 10K RPM drives for backups using RAID0
- Using PCIe RAID controllers

External Storage Options and Performance Requirements

- Local Root partition
Linux OS and Prime Performance Manager unit installation
 - 25 GB used
 - 12 IOPS with nearly 95% write operations
 - driven by Prime Performance Manager device cache writes and logs
- First external partition
Prime Performance Manager unit database
 - 70 GB total disk used
 - 160 IOPS with about 100% write operations
- Unit database size:
 - 5-minute reports - 3 days - 8.45 GB disk usage per day
 - 15-minute reports - 7 days - 2.82 GB disk usage per day
 - Hourly reports - 4 days - 0.71 GB disk usage per day
 - Daily reports - 94 days - 0.03 GB disk usage per day
 - Weekly reports - 730 days - 0.03 GB disk usage per week
 - Monthly reports - 825 days - 0.03 GB disk usage per month
 - 64 GB disk space used for database based on below aging
 - 12 GB data generated per day
 - Data generation rate of 146 KB/sec
- Unit database partition size: unit database size above; multiplied by 1.1 for safety
- Second external partition
Prime Performance Manager unit backups
 - 165 GB used assuming 1 day of backups saved
 - 510 IOPS with nearly 100% write operations
 - Sustained IOPS during backup periods; quiet at other times
- Unit backup file size: unit database size above + 5 GB for device cache/other files
- Unit backup partition size: unit backup file size above * backup days + unit database size above + 5 GB for device cache/other files; multiplied by 1.1 for safety
- Unit backup/restore speed: average of 6 GB per minute

Gateway High Availability Installation Requirements

Prime Performance Manager can be installed in a local and/or geographical high availability environment. gateways and units configured for HA must meet all the requirements provided in [Evolved Programmable Networks Requirements, page 1-7](#). In addition, requirements specific to HA are provided in the following topics:

- [Local High Availability Requirements, page 1-86](#)
- [Geographical HA Requirements, page 1-90](#)

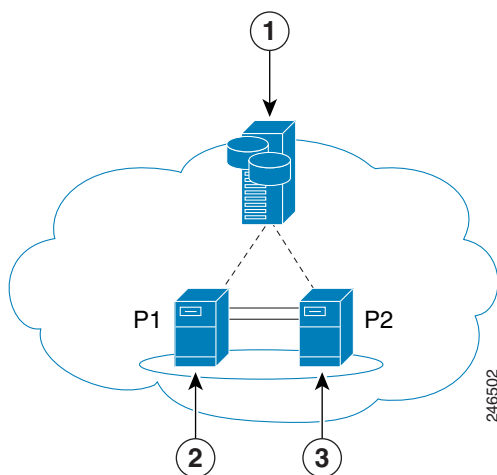
Local High Availability Requirements

The Prime Performance Manager gateway local HA configuration has the following requirements:

The gateway is installed in a dual-node cluster. Figure 1-1 shows a basic dual-node cluster local redundancy configuration.

- Units cannot be installed on the same server as the gateway; they must be installed on separate servers.
- The Red Hat Cluster Suite (RHCS) must be installed on both gateways in the dual-node cluster. RHCS manages the local HA. (See the [RHCS Requirements, page 1-88](#) for more information.)
- RHCS requires a disk resource that is mountable from both nodes,
- The Prime Performance Manager installer places the gateway on the node where you ran the installation. After installation, you can relocate them as needed.
- The gateway is always mounted with the external shared storage. RHCS runs the services and continuously obtains the cluster status by running a set of scripts. Prime Performance Manager does not recognize RHCS. If a problem occurs, RHCS unmounts, then mounts the appropriate gateway and database. Therefore, every node in the RHCS gateway HA must be able to mount the storage.
- Each service has its own virtual IP address (floating IP). This means Prime Performance Manager clients treat failovers or switchovers like a local service restart.
- Only one instance of the Prime Performance Manager files exists, and this is located on the shared storage. Duplicate home directories are created on each node as place holders. If a switchover occurs, the storage unmounts on one node and mounts on the other.
- Local redundancy configuration requires a fencing hardware unit for cutting a node off from the shared storage. Fencing ensures data integrity and prevents a “split brain” scenario. When this occurs, the servers are disconnected from each other, and each assumes the other server failed. If a failure occurs, the cut off can be performed, for example, by powering off the node with a remote power switch, disabling a switch channel, or revoking a host's SCSI 3 reservations. If any problem with cluster node occurs, RHCS invokes the fencing device with the peer and waits for the success signal.

Figure 1-1 Prime Performance Manager Gateway Dual-Node Local Redundancy Cluster



1	External storage	3	Local cluster Node 2
2	Local cluster Node 1		

RHCS Components and Functionality

RHCS is included with Red Hat Enterprise Linux 5.X Advanced Program and Red Hat Enterprise Linux 6.X. The RHCS cluster infrastructure provides the basic functions for a group of computers (nodes) to work together as a cluster. The cluster infrastructure performs the following functions:

- Cluster management
- Lock management
- Fencing
- Cluster configuration management

RHCS has the following components:

- **Cluster infrastructure**—Provides fundamental functions for nodes to work together as a cluster: configuration-file management, membership management, lock management, and fencing.
- **High Availability Service Management**—Provides failover of services from one cluster node to another when a node becomes inoperative.
- **Cluster administration tools**—Provides configuration and management tools for setting up, configuring, and managing a Red Hat cluster including the cluster infrastructure components, the high availability and service management components, and storage.

Cluster services include a set of resources grouped together. These include Filesystem, IP address, and Script. The cluster stops, starts, relocates and monitors a service based upon its configuration. The Script resource is an SysV init script with stop(), start() and status() capabilities.

The main Red Hat cluster utilities include:

- clustat—Displays the cluster status.
- clusvcadm—Managers the cluster.

Additional RHCS information can be found at the Red Hat website: <http://www.redhat.com/>.

Supported RHCS Fencing Options

A fencing device cuts a node off from shared storage to ensure data integrity. The cut off can be performed by, for example, powering off the node with a remote power switch, disabling a switch port Fibre Channel, or by revoking a host SCSI 3 reservations.

Supported local HA fencing options include:

- fence_ipmilan—Intelligent Platform Management Interface (IPMI) v1.5 or higher compliant devices over a LAN.
- fence_manual—Assigns the manual fencing agent. This agent is temporary and should not be used in production because it does not perform automated actions. If a cluster problem occurs, you must manually disconnect the node and storage, or you must use another fencing agent to disconnect them. If you choose this option during the installation because you want to add a different Red Hat-supported fencing device, for example, fence_vmware_soap or fence_ilo, change the fencing device after installation using the RHCS GUI.
- fence_ilo—HP Integrated Lights-Out fencing.
- fence_vmware_soap—VMware fencing.

- fence_cisco_ucs—Cisco Unified Computing System fencing.

**Note**

To provision and manage dual-node cluster fencing devices, follow the RHCS user documentation. General information about the RHCS web GUI is provided in [Linux Update Requirements, page 1-75](#). However, see the Red Hat *Conga User Guide* for complete information about using the RHCS GUI.

**Note**

To prevent fencing loops, the cluster interconnect and power fencing (for example, ipmilan) should use the same network, such as bond0.

RHCS Requirements

[Table 1-20](#) shows the RHCS local HA core requirements.

Table 1-20 Prime Performance Manager Local HA Gateway Requirements

Area	Requirement
Operating System	Red Hat Enterprise for Linux, 5.5, 5.7, 5.8, 5.9, 5.10, 5.11, 6.5, 6.8, 6.9, or 6.10, x86_64 with the Red Hat Clustering Suite.
Hardware	RHEL 5.5, 5.7, 5.8, 5.9, 5.10, 5.11, 6.5, 6.8, 6.9, or 6.10 certified platform with fencing capabilities. Note Hardware installation with no single point of failure is recommended. See Figure 1-2 for an example.
Network	<ul style="list-style-type: none"> • Cluster nodes must be able to communicate with each other using multicast. • Each network switch and associated networking equipment in a Red Hat cluster must be configured to enable multicast addresses and support IGMP. Without multicase and IGMP, not all nodes can participate in a cluster, causing the cluster to fail. • Network timing must be configured.
Storage	A shared Fibre Channel, Fibre Channel over Ethernet (FCoE), or Internet Small Computer System Interface (iSCSI) storage that presents an ext3 file system and is accessible from all cluster nodes.

Table 1-20 Prime Performance Manager Local HA Gateway Requirements (continued)

Area	Requirement
Disk space	5 GB under /tmp is required for installation.
RPM and iptables	<p>Perform the following steps on both local HA machines for RHCS on RHEL6:</p> <ol style="list-style-type: none"> 1. Install the high availability and resilient storage package groups on each node in the cluster by executing the following command: <pre># yum groupinstall 'High Availability' 'Resilient Storage'</pre> 2. Install the required additional cluster packages by executing the following command: <pre># yum install luci</pre> 3. (Optional) Configure the iptables firewall on each node in the cluster. <p>The iptables firewall can be disabled, or it can be configured to allow cluster traffic to pass through the firewall.</p> <p>To disable the iptables system firewall, execute the following commands:</p> <pre># service iptables stop # chkconfig iptables off</pre> <p>Note To enable and configure the firewall, refer:</p> <p>RedHat - Configuring the iptables Firewall to Allow Cluster Components</p> <p>In addition to configuring the firewall, udp snmp port 161 and port 162 must be open between the members of the cluster.</p> 4. (Optional) Configure the SELinux on each node in the cluster. <p>The SELinux is supported on the RHEL6 cluster nodes in the enforcing or permissive mode with a targeted policy, or it can be disabled.</p> <p>Check the current SELinux state by executing the following command:</p> <pre># getenforce</pre> <p>For more details on using SELinux with Cluster services, refer:</p> <p>RedHat - Red Hat High Availability Add-On and SELinux</p>

Additional RHCS requirements include:

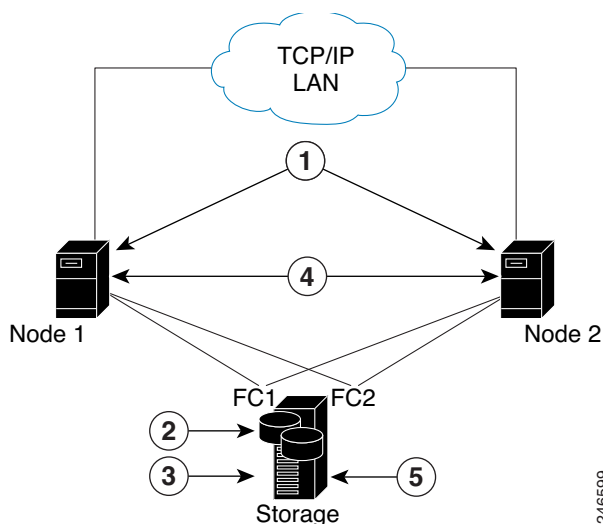
- The same subnet must be assigned to all nodes including all services (virtual IPs in the same subnet).
- All nodes must have RHEL 5.5, 5.7, 5.8, 5.9, 5.10, 5.11, 6.5, 6.8, 6.9, or 6.10 installed.
- The gateway cannot utilize IPv6 addresses. (This is an RHCS restriction.)
- All systems must be homogeneous with the same configuration versions and packages.
- Shared storage should not be auto-mounted because RHCS performs the mounting. Use one partition for each cluster service. For a single shared disk, use a single partition for each service on the same disk. In other words, the shared storage should not appear in /etc/fstab.
- All shared storage units must be configured with a label. RHCS uses the label to mount and unmount storage.

- Virtual IP addresses must be assigned for each service. IP addresses assigned to services should not be attached to any server. RHCS will manage them, that is, add and remove them from the server running the service.
- Fencing devices must be deployed. The fence_ipmilan, fence_vmware_soap, and fence_manual fencing types are supported during Prime Performance Manager Local HA installation.
- Verify that the multicast communication is not blocked by a firewall.

Hardware installation designed to avoid a single point of failure is strongly recommended. Hardware elements designed to do this, shown in [Figure 1-2](#), include:

- Disk mirroring at the storage location.
- Redundant RAID controllers.
- Redundant storage and gateway power supplies.
- Dual NICs on both gateways.
- Separate NIC connections to switches.
- NIC bonding in active/backup mode.

Figure 1-2 Local Redundancy Hardware Installation to Avoid Single Points of Failure



1	Dual NICs on both gateways	4	NIC bonding (active/backup mode)
2	Disk mirroring	5	Each NIC connects to separate switch
3	Redundant RAID controllers		

Geographical HA Requirements

For geographical HA, the primary and secondary gateways:

- Must meet all server requirements provided in [Evolved Programmable Networks Requirements, page 1-7](#).
- Must have identical hardware, software, and operating systems with identical Prime Performance Manager binary installation paths.

- Should be configured with the same geographical HA parameters.
- Cannot have units installed; units must be installed on separate servers.
- Must have adequate bandwidth and delay value between them, especially for the large deployments.
- Must use the same RMI port number for communication. You can change the RMI port, but it must be the same port on each gateway.

Network Device Configuration

Network devices must have two-way IP connectivity with the Prime Performance Manager units. Each device must be accessible from the Prime Performance Manager unit. Configure devices to use SNMP community names. Prime Performance Manager requires that the names be at least read-only (RO). Read-write (RW) names can also be used. To implement these requirements, enter the following IOS commands on all Prime Performance Manager-managed devices:

```
snmp-server community snmp community string RO 1
```

In addition to SNMP, Telnet or SSH must be enabled on the device so that certain reports, such as Y.1731 and Ethernet Flow Point, which are based on PAL, can work. For more information about these commands, see <http://www.cisco.com/univercd/cc/td/doc/product/software/ios122>.

Enter the Telnet or SSH credentials in Prime Performance Manager for each device. For information, see the *Cisco Prime Performance Manager 1.7 User Guide*.

Prime Performance Manager Ports

Table 1-21 lists the default ports used by the Prime Performance Manager gateway.

Table 1-21 Ports Used by the Prime Performance Manager Gateway

Function	Port
RMI Registry	45742
Login Server	45752
Client	46173-46273 (The range depends on the number of expected units)
HTTP Web Server	4440
Data Server	45751

The Prime Performance Manager unit must know the ports that are used by the Prime Performance Manager gateway. Table 1-22 lists the default ports used by the Prime Performance Manager unit.

Table 1-22 Ports Used by Prime Performance Manager Units

Function	Port
Web Server	5440
RMI Registry Port	55742

Table 1-22 Ports Used by Prime Performance Manager Units (continued)

Function	Port
Data Server Port	55751
Login Server Port	55752
Client Port	56173

Sometimes the default ports cannot be used because they are used by other system functions. If the Prime Performance Manager gateway uses ports not listed in [Table 1-21](#), specify the ports during the Prime Performance Manager unit installation. No additional configuration is required after you specify the non-default port.

During installation, Prime Performance Manager identifies port conflicts. To find available TCP ports, enter:

```
netstat -a -n -t
```

If you use an alternate port, do not use Ports 1 through 1023. These are reserved for system processes. For more information about Prime Performance Manager ports, see the [Cisco Prime Performance Manager 1.7 User Guide](#).

**Note**

You generally should not need to change the default Prime Performance Manager ports.

Permissible IPv4 and IPv6 Addresses

Prime Performance Manager gateways and units support dual stack IP address deployments. [Table 1-23](#) lists the permissible IPv4 and IPv6 gateway and unit dual stack deployments.

Table 1-23 Permissible Dual Stack Deployments

Gateway		Unit		
IP Stack	Bind Server to:	IP Stack	Bind Server To:	Connect to Gateway
Single	IPv4	Single	IPv4	IPv4
		Dual	IPv4	IPv4
	IPv6	Single	IPv6	IPv6
		Dual	IPv6	IPv6
Dual	IPv4	Single	IPv4	IPv4
		Dual	IPv4	IPv4
			IPv6	IPv6
	IPv6	Single	IPv6	IPv6
		Dual	IPv6	IPv6
			IPv4	IPv4

Bandwidth and Latency Requirements

Latency is the delay across the network between two things. It has an impact on disk IO in environments where the disks are on a remote Storage Area Network (SAN). Bandwidth and latency requirements are based on Evolved Programmable Networks and the following default set of reports: CPU, Memory, Interface, PWE3, SNMP/Hypervisor Ping, and ICMP Ping. Prime Performance Manager bandwidth and latency requirements are described in the following sections.

Bandwidth Requirements Between Gateway and Units

Bandwidth requirement between gateway and one unit with 10,000 devices is approximately 8 Mbps. Each additional unit with 10,000 devices require an additional 8 Mbps. This is based on an EPN environment.

Bandwidth Requirements Between Units and Devices

Bandwidth requirement between one unit and 10,000 devices is approximately 35 Mbps.

Bandwidth will increase if additional reports are enabled beyond the default set specified above. Refer to [Evolved Programmable Networks Requirements, page 1-7](#) for more details.

Bandwidth Requirements Between Primary and Secondary Gateway

In a geographical HA environment, the recommended bandwidth is 10 Mbps if exported CSVs are synchronized between gateways, otherwise 6 Mbps is recommended. 100 ms delay is the recommended maximum delay in the geographical HA environment between primary and secondary gateways.

The maximum network latency requirements for Prime Performance Manager single deployments include:

- Maximum latency between gateway and units: 200 ms
- Maximum latency between primary and secondary gateway: 100 ms.
- Maximum latency between primary unit and devices: see [Evolved Programmable Networks Requirements, page 1-7](#) for more details.
- If you use external SAN storage for Prime Performance Manager data, maximum latency between the computing server and the external storage: 5 ms.

Latency Recommendations

[Table 1-24](#) shows the latency recommendations between units and devices with five-minute polling intervals.

Table 1-24 Unit and Device Latency Recommendations: Five-Minute Polling Intervals

Devices	Maximum Latency
200	150 ms
500	120 ms
2000	80 ms
5000	50 ms
10000	20 ms

Table 1-25 shows the latency recommendations between units and devices with fifteen-minute polling intervals.

Table 1-25 Unit and Device Latency Recommendations: Fifteen-Minute Polling Intervals

Devices	Maximum Latency
200	300 ms
500	300 ms
2000	250 ms
5000	180 ms
10000	70 ms
12500	50 ms

Table 1-26 shows the latency recommendations for components of Prime Performance Manager.

Table 1-26 Components of Prime Performance Manager

Devices	Maximum Latency
Between gateway and units	200 ms
Between primary and secondary gateways in a geographical HA configuration	100 ms