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## Nimble OS SNMP Reference Guide



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# Copyright notices

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# Preface

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The Nimble array scales to multiple terbytes of storage capacity, is simple to install and deploy, and is designed to ensure data availability and integrity in the face of failures.

This guide gives you information about the concepts, references, and procedures necessary to install and manage the system. Many parts of the Nimble array are self-explanatory and need no further discussion.

## Audience assumptions


This document is for administrators and evaluators. It is based on certain assumptions. The Nimble array was designed to be as intuitive and easy to use as possible: you do not need extensive training in network or SAN management to manage its day-to-day use. However, you should understand:

- basic networking
- your network environment
- snapshots and replication tasks
- your system usage trends
- the requirements and configuration specific to your applications

## Conventions used in this document

Throughout the documentation, the following conventions are used:


| If you see:              | It means:  |
|--------------------------|--|
| <code>fixed width</code> | the actual text to type. If text appears in italic in this area, replace the italicized text with the information it indicates. Usually shows a command, path, parameter, or URL |
| <i>italics</i>           | a tab on the GUI or emphasis on the text   |
| <b>A &gt; B</b>          | select the first option named, followed by the second  |
| examples                 | example output is shown with a slightly shaded background  |
| <b>bold</b>              | a field name, button, or other unspecified component of the UI   |

The CLI icon  provides the basic method for a procedure using the command line. For complete details about the commands, see the *Nimble OS Command Line Reference Guide*.

The GUI icon  indicates that the method that follows is performed using the GUI.

## Accessing information

Information that addresses individual areas of the array is logically grouped in the general order of use. Each chapter and section discusses an aspect of array management. Some aspects of array management overlap or affect multiple areas of administration. In those cases, the information is located where it will most likely be used. Use the Table of Contents, index, and search feature to find specific information.

A fully integrated online help system is available through the use of tool tips and information icons. Select **Help > User Guide** to see the online version of the user documentation. Wherever you see the Information icon () , hover over the icon for more information.

Troubleshooting and other help is available from the Nimble Storage support site at [www.nimblestorage.com/support](http://www.nimblestorage.com/support) or you can email support at [support@nimblestorage.com](mailto:support@nimblestorage.com). You need to have a username and password to access the Support site. This should have been sent to you by email when the array was shipped. If you did not receive this information, contact technical support by email.

## **Screen shots and information fields**

All screen shots, fields, and parameters shown in this document were accurate at the time the document was produced. As enhancements are added in newer releases, they may differ slightly from what you see on your screen.

## SNMP Basics

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### Topics:

- [Setting up SNMP on the Nimble array](#)
- [IANA and OID numbers](#)

Nimble Storage software provides an SNMP option for monitoring Nimble arrays. You should be familiar with Simple Network Management Protocol (SNMP) before enabling SNMP monitoring. [RFC1155](#) is a good place to start if you are not familiar with SNMP and MIBs.

On each array, an SNMP agent provides information about the network configuration and operations. These SNMP objects are stored in a Management Information Base (MIB). The MIB is a virtual database by the IETF/IEEE as well as device providers like Nimble to ensure a standard method to view network management information on devices from different vendors.

Nimble Storage provides a Nimble array-specific MIB. The Nimble MIB can be downloaded from the Nimble Support site.

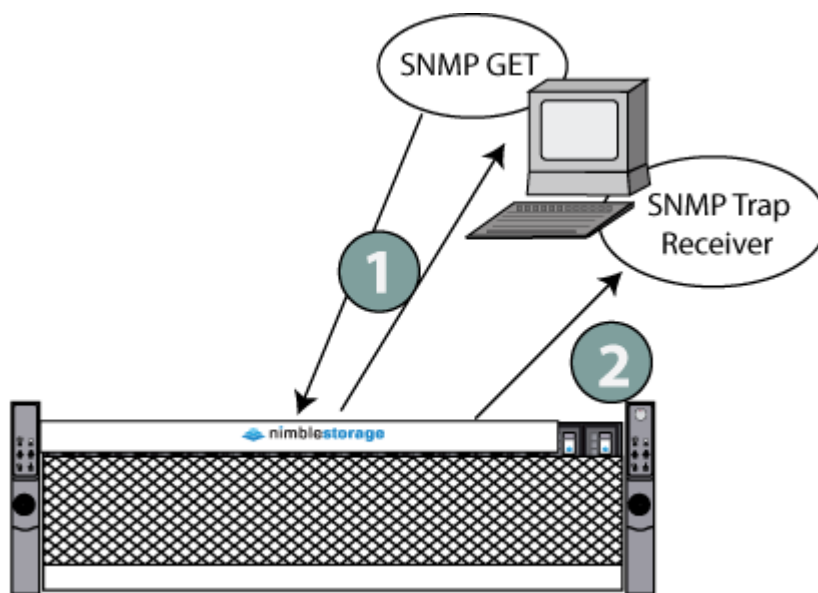
## Setting up SNMP on the Nimble array


The Nimble array uses SNMP to communicate with network management systems. Configure the SNMP settings from the Administration menu.

The Nimble array supports SNMP versions 1, 2, and 2c. The device sends traps but does not receive them. You can download the Nimble SNMP MIB from the Nimble Support site.

➔ **Note:** The array uses the alert level settings for email alerts to determine which events are sent as SNMP traps.

SNMP gets information to the network in one of two ways. In the first method, shown as 1 in the diagram, is when the network management system sends a request to get information and in turn receives a response. In the second method, shown as 2, the traps are sent automatically, based on trap level settings.



 You can set SNMP configuration using the CLI command `array --snmp_trap_host` and to set the SNMP trap destination, use `array --snmp_trap_dest`.

 To configure SNMP using the GUI:

1. From the main menu, choose **Administration > SNMP**.

The Nimble Storage array uses Simple Network Management Protocol, version 2c (SNMPv2c) to communicate with network management systems.

**SNMP GET**

Enable SNMP Get

Community String  Used to poll the Nimble Storage MIB

SNMP Port

**SNMP TRAP**

Enable SNMP Trap

Trap Destination

Trap Destination Port

2. Ensure that the **Enable SNMP Get** box is checked.
3. Enter the **community string** and **SNMP port**.  
By default, *public* is used along with the port 161. The community string is essentially a password shared between the client and server (network management system). The community string can be up to 64 alphanumeric characters, and can contain a hyphen, colon, or period, but only alphanumerics are allowed to begin the string. Contact Technical Support before changing the community string.
4. If you choose not to use the default SNMP *Get* port (161), enter a different port for SNMP Get.
5. Ensure that the **Enable SNMP Trap** box is checked.
6. Enter the trap destination. This is the hostname of the network management system to which SNMP traps are sent. Enter a host name or fully qualified domain name.
7. If you choose not to use the default SNMP Trap destination port (162), enter a different port to use.
8. Click **Save** to save the settings.

## IANA and OID numbers

The Internet Assigned Numbers Authority (IANA) number assigned to Nimble Storage is 37447: everything in the Nimble MIB is under the OID

```
iso(1).org(3).dod(6).internet(1).private(4).enterprises(1).nimble(37447)
```

Wherever you see references to variable names, you can find the corresponding OID numbers in the following section. For details about IANA, visit [www.iana.org](http://www.iana.org).

## OIDs

The following shows the OID numbers for the variables, tables, and traps in the MIB. The indentations show the level for each item.

Indexed table entries in SNMP, such as those in the `volTable`, are accessed by appending the index number after the OID of the entry desired.



For example, if a system has 15 volumes (indicated by the variable `volNumberOfVolumes` value of 15), the name of the 8<sup>th</sup> volume is obtained by polling (performing an SNMP GET operation) on the OID 1.3.6.1.4.1.37447.1.2.1.3.8.

```
(1) iso
  (3) org
    (6) dod
      (1) internet
        (4) private
          (1) enterprises
            (37447) nimble
              (1) nimbleVariables
                (1) volNumberOfVolumes
                (2) volTable
                  (1) volEntry
                    (1) volIndex
                    (2) volID
                    (3) volName
                    (4) volSizeLow
                    (5) volSizeHigh
                    (6) volUsageLow
                    (7) volUsageHigh
                    (8) volReserveLow
                    (9) volReserveHigh
                    (10) volOnline
                    (11) volNumConnections
              (3) nimbleGlobalStats
                (1) statTimeEpochSeconds
                (2) ioReads
                (3) ioSeqReads
                (4) ioWrites
                (5) ioSeqWrites
                (6) ioReadTimeMicrosec
                (7) ioWriteTimeMicrosec
                (8) ioReadBytes
                (9) ioSeqReadBytes
                (10) ioWriteBytes
                (11) ioSeqWriteBytes
                (12) diskVolBytesUsedLow
                (13) diskVolBytesUsedHigh
                (14) diskSnapBytesUsedLow
                (15) diskSnapBytesUsedHigh
                (16) ioNonseqReadHits
```

## Nimble MIB

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### Topics:

- [Volume Information table](#)
- [Global Stats table](#)

The following entries are provided with the Nimble MIB.

## Volume Information table

### Overview

When network management protocols use names of MIB variables in messages, each name has an appended suffix. This suffix is called an instance identifier. For simple variables, the instance identifier 0 refers to the instance of the variable with that name. A MIB also can contain tables of related variables.

Typically, an instance identifier might be a unique interface number or a 0. An instance identifier can also be an IP address. For example, to find the network mask for the route with a destination address of 131.104.211.243, use the variable locRtMask (locate route mask) with an instance identifier of 131.104.211.243. The format is locRtMask. 131.104.211.243.

### Volume Info Table

| Name               | Type          | Indexed (part of table)? | Description                            |
|--------------------|---------------|--------------------------|--|
| volNumberOfVolumes | Unsigned32    | No                       | Number of volumes.                     |
| volIndex           | Unsigned32    | Yes                      | Volume index.                          |
| volID              | Unsigned32    | Yes                      | Volume ID.                             |
| volName            | DisplayString | Yes                      | Volume name.                           |
| volSizeLow         | Unsigned32    | Yes                      | Max. size in bytes (low order bytes).  |
| volSizeHigh        | Unsigned32    | Yes                      | Max. size in bytes (high order bytes). |
| volUsageLow        | Unsigned32    | Yes                      | Usage in bytes (low order bytes).      |
| volUsageHigh       | Unsigned32    | Yes                      | Usage in bytes (high order bytes).     |
| volReserveLow      | Unsigned32    | Yes                      | Reserved bytes (low order bytes).      |
| volReserveHigh     | Unsigned32    | Yes                      | Reserved bytes (high order bytes).     |
| volOnline          | TruthValue    | Yes                      | Volume online (true or false).         |
| volNumConnections  | Unsigned32    | Yes                      | Number of connections to the volume.   |

### Global Stats table

The below variables store various global statistics. They are not updated realtime, but at periodic intervals. The variable statTimeEpochSeconds indicates the UNIX timestamp (in number of seconds since UNIX epoch) at which the current reading was taken.

To determine a delta value between two time periods, take one reading and note the timestamp and value desired. Then, take a later reading. If the statistics have been updated in the interim, the timestamp

for the second reading will be higher, and the delta can be computed between the number of seconds in between readings and the difference in the statistic values.

| Name                  | Type       | Indexed (part of table)? | Description  |
|-----------------------|------------|--------------------------|--|
| statTimeEpochSeconds  | Counter64  | No                       | UNIX time (number of seconds since the UNIX epoch) when stats were recorded. |
| ioReads               | Counter64  | No                       | Total cumulative number of Read I/Os (sequential and random).                |
| ioSeqReads            | Counter64  | No                       | Total cumulative number of Sequential Read I/Os.                             |
| ioWrites              | Counter64  | No                       | Total cumulative number of Write I/Os (sequential and random).               |
| ioSeqWrites           | Counter64  | No                       | Total cumulative number of Sequential Write I/Os.                            |
| ioReadTimeMicrosec    | Counter64  | No                       | Total cumulative microseconds the system has spent processing Read I/Os.     |
| ioWriteTimeMicrosec   | Counter64  | No                       | Total cumulative microseconds the system has spent processing Write I/Os.    |
| ioReadBytes           | Counter64  | No                       | Total cumulative number of Read I/O bytes (sequential and random).           |
| ioSeqReadBytes        | Counter64  | No                       | Total cumulative number of Sequential Read I/O bytes.                        |
| ioWriteBytes          | Counter64  | No                       | Total cumulative number of Write I/O bytes (sequential and random).          |
| ioSeqWriteBytes       | Counter64  | No                       | Total cumulative number of Sequential Write I/O bytes.                       |
| diskVolBytesUsedLow   | Unsigned32 | No                       | Total number of bytes used on disk for volumes (low order bytes).            |
| diskVolBytesUsedHigh  | Unsigned32 | No                       | Total number of bytes used on disk for volumes (high order bytes).           |
| diskSnapBytesUsedLow  | Unsigned32 | No                       | Total number of bytes used on disk for snapshots (low order bytes).          |
| diskSnapBytesUsedHigh | Unsigned32 | No                       | Total number of bytes used on disk for snapshots (high order bytes).         |
| ioNonseqReadHits      | Counter64  | No                       | Total cumulative number of cache hits for Non-Sequential Read I/Os.          |

# SNMP Traps

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## Topics:

- [Traps and trap variables](#)
- [Event list](#)

All alerts that can be sent via email to administrators can be sent as SNMP traps.

## Traps and trap variables

### SNMP trap variables

The two variables that follow are included (bound) with traps/notifications.

| Name           | Type       | Indexed (part of table)? | Description    |
|----------------|------------|--------------------------|----------------|
| nimbleTrapCode | Unsigned32 | No                       | Message number |
| nimbleTrapMsg  | Unsigned32 | No                       | Message string |

### SNMP traps

Although commonly referred to as traps, these are actually SNMP v2 notifications.

Traps are sent as part of event notification (along with email alerts, if they have been configured). The following trap categories represent various event notification categories. The specifics of each trap are put in variable bindings, represented by the nimbleTrapCode and nimbleTrapMsg variables.

| Name                             | Description  |
|----------------------------------|--|
| nimbleDataServiceTrap            | Traps related to general data services.  |
| nimbleControllerTrap             | Traps related to controller operation and status.  |
| nimbleServiceTrap                | Traps related to miscellaneous services.   |
| nimbleTestTrap                   | Traps related to the sending of test alerts and traps.   |
| nimbleSoftwareUpdateTrap         | Traps related to software updates.   |
| nimbleDataServiceInteractionTrap | Traps related to interaction with the data service.  |
| nimbleVolAndSnapshotTrap         | Traps related to volumes and snapshots.  |
| nimbleVolumeCollectionTrap       | Traps related to volume collections.   |
| nimbleSystemSpaceTrap            | Traps related to system space utilization.   |
| nimbleReplicationTrap            | Traps related to replication.  |
| nimbleHardwareTrap               | Traps related to general hardware.   |
| nimbleDiskTrap                   | Traps related to disks.  |
| nimbleNicTrap                    | Traps related to NICs.   |
| nimbleEnvironmentalTrap          | Traps related to environmental components (sensors, temperature, NVRAM batteries, fans, power supplies). |
| nimbleRaidTrap                   | Traps related to RAID.   |
| nimbleConnectionTrap             | Traps related to iSCSI connections.  |
| nimbleResourceLimitTrap          | Traps related to system resource limits.   |

## Event list

The Nimble array monitors system events and displays a message or sends an SNMP trap if these events occur. Some events require immediate action, while others are informational. Alerts are grouped by type.

### General data service

The three alerts following refer to "free space." In this context, free space is disk space used by the system, not space used by volumes for data. The log-structured file system design of the Nimble array can show plenty of free space from the GUI or CLI (for volumes, snapshots, and clones), but have much less space to write new data because space reclamation has not completed. In this case, a system could send out one of these alerts after snapshots and volumes have been deleted, but before the system finishes its update.

| Alert/Event | Severity        | Description/Possible Cause  | Notes/Actions  |
|-------------|-----------------|---|--|
| 0101        | warning         | Free space is down to the stated level, write operations will be slowed.                                      | Delete unneeded snapshots or volumes to regain free space.                               |
| 0102        | information     | Free space has been reclaimed and has returned to the level shown. Write operations are back to normal speed. |  |
| 0103        | <b>critical</b> | Free space is critically low, at the level shown, and write operations will be disabled.                      | Delete unneeded snapshots or volumes to regain free space or add capacity to the array.  |
| 0104        | warning         | The system is currently nearing full.   | Delete unneeded snapshots or volumes to reduce space usage or add capacity to the array. |
| 0105        | information     | The space usage has been restored to less than the defined minimum warning level.                             |  |
| 0106        | <b>critical</b> | The system has reached the critical usage level.  | Delete unneeded snapshots or volumes to reduce space usage or add capacity to the array. |
| 0107        | <b>critical</b> | The system has only minimal space available for writing.  | Application writes will be progressively slowed as space continues to decline.           |
| 0110        | <b>critical</b> | The system has reached critically low space availability for writing.   | Application writes will time out.  |

### Controllers, HA

| Alert/Event | Severity        | Description/Possible Cause                       | Notes/Action   |
|-------------|-----------------|--|--|
| 2001        | <b>critical</b> | An error occurred on the specified controller.   | A software error has occurred. Contact Nimble support.   |
| 2002        | information     | A takeover occurred on the specified controller. | The specified controller has assumed the active role and is now supporting data services. Check for failure symptoms on the peer controller. |
| 2003        | information     | The standby controller specified is available.   | The array is running in a redundant controller configuration. No action needed.  |

| Alert/Event | Severity        | Description/Possible Cause   | Notes/Action   |
|-------------|-----------------|--|--|
| 2005        | <b>critical</b> | Excessive restarts on the specified controller were detected. The specified controller detected repeated failures in a short period of time. | This could be caused by successive power failures or persistent controller hardware or software issues. The controller will not attempt to start data services and will remain in this state in order to provide a stable environment for support personnel to diagnose the issue. Attempts to manually restart the controller once in this state can fail for up to 30 minutes. |
| 2006        | <b>critical</b> | The specified controller is being restarted in order to recover the stated service.  | After the controller restart, verify that the service has restarted.   |
| 2007        | information     | The array received a request from the administrator to reboot the specified controller.  |  |
| 2008        | warning         | The array was not able to complete the request to reboot the controller.   | Contact Nimble support.  |
| 2009        | information     | The array received a request from the administrator to halt the specified controller.  |  |
| 2010        | warning         | The array was not able to complete the request to halt the controller.   | Contact Nimble support.  |
| 2013        | warning         | An error occurred on the specified controller.   | A software error occurred while in a redundant controller configuration. Contact Nimble support.   |
| 2014        | <b>critical</b> | An error occurred on the specified controller and all services have stopped.   | A software error occurred while in a non-redundant controller configuration. Contact Nimble support.   |
| 2015        | warning         | The standby controller has not been available for the amount of time shown.  | The array is not running in a redundant controller configuration. Check for failure symptoms on the peer controller.   |

## Services

| Alert/Event | Severity    | Description/Possible Cause  | Notes/Action  |
|-------------|-------------|---|---|
| 2101        | information | The system services were started, and the system shows the currently installed software version.          |   |
| 2103        | warning     | The specified service has stopped unexpectedly but is not restarting automatically.                       | The specified service is unable to run reliably and is being shut down. Contact Nimble support. |
| 2104        | information | A secure tunnel was created on the specified controller to allow Nimble Storage support personnel access. |   |



| Alert/Event | Severity    | Description/Possible Cause                                       | Notes/Action |
|-------------|-------------|--|--------------|
| 2105        | information | The secure tunnel to Nimble Storage support has been terminated. |              |

## Test messages

These messages appear when an `alert --test` command has been issued from the CLI.

| Alert/Event | Severity        | Description/Possible Cause                                     | Notes/Action                 |
|-------------|-----------------|--|------------------------------|
| 5001        | information     | A test command has triggered an information-level alert.       | No action needs to be taken. |
| 5002        | error           | A test command has triggered an error-level alert.             | No action needs to be taken. |
| 5004        | note            | A test has been triggered for a note-level alert. (Deprecated) | No action needs to be taken. |
| 5005        | warning         | A test command has triggered a warning-level alert.            | No action needs to be taken. |
| 5006        | <b>critical</b> | A test command has triggered a critical-level alert.           | No action needs to be taken. |

## Software update

| Alert/Event | Severity    | Description/Possible Cause   | Notes/Action   |
|-------------|-------------|--|--|
| 6000        | warning     | The system failed to unpack the software update package on the specified controller.         | Verify that the software version is compatible, and retry or redownload. If the problem persists, contact Support. |
| 6001        | information | The system has begun the software update to the specified version.                           |  |
| 6002        | warning     | The system is reverting the software to the previous version.                                | Verify that the software version is compatible, and retry or redownload. If the problem persists, contact Support. |
| 6003        | information | The software update was successful on the specified controller.                              |  |
| 6004        | information | The system is rolling back the software to the specified version.                            |  |
| 6005        | warning     | The precheck failed on the update package.   | Retry the download. If the problem persists, contact Support.  |
| 6007        | warning     | Precheck failed because the file system is out of space.                                     | Contact Support.   |
|             |             | Precheck failed indicating that network connectivity will degrade after the software update. | Check standby controller network links, switches links, and retry software update.                                 |
| 6008        | information | The system is unpacking the specified update package on the named controller.                |  |

| Alert/Event | Severity    | Description/Possible Cause  | Notes/Action  |
|-------------|-------------|---|---|
| 6009        | information | The unpacking process has completed on the software update package.                                       |   |
| 6010        | information | To complete a software update, the system is rebooting the specified controller.                          |   |
| 6011        | warning     | Failed to download software update package.   | Make sure the network connections are active and retry.   |
| 6012        | warning     | The software update failed because the "/tmp" directory is full.  | Schedule to reboot the target controller (by pulling it out and pushing it in)  |
| 6013        | warning     | The software update failed because the scratch space is full.   | Contact Support.  |
| 6014        | warning     | The software update failed because the "/var" directory is full.  | Contact Support.  |
| 6015        | warning     | The software update failed because the configuration space is full.                                       | Contact Support.  |
| 6016        | warning     | The software update failed because the Recovery OS space is full.   | Contact Support.  |
| 6017        | warning     | The software update package was not found.  | Download the package again and retry the update.  |
| 6018        | warning     | The software update package has the wrong signature.  | Make sure that your firewall doesn't change the update package. Retry to download or upload. If upload is used, make sure that the uploaded package is a Nimble update package. |
| 6019        | warning     | The software update package has the wrong checksum.   | Retry the download. If upload is used, make sure that the update package is not corrupted.  |
| 6020        | warning     | The software update precheck failed. Network connectivity will degrade after software update is complete. | Check network connectivity on the standby controller.   |
| 6021        | warning     | The software update failed because only one controller is available.                                      | Bring the other controller back to standby mode.  |

## General

| Alert/Event | Severity    | Description/Possible Cause                              | Notes/Actions |
|-------------|-------------|---|---------------|
| 10101       | information | Cache was cleared by the administrator (using the CLI). |               |

## Volumes, snapshots, and clones

| Alert/Event | Severity | Description/Possible Cause  | Notes/Actions   |
|-------------|----------|---|---|
| 10200       | warning  | The space usage of the specified volume is over the configured warning limit. | Add more space to the volume, or reset the warning limit. |

| Alert/Event | Severity        | Description/Possible Cause   | Notes/Actions   |
|-------------|-----------------|--|---|
| 10201       | information     | The space usage of the specified volume has returned to below the configured warning limit.          |   |
| 10202       | warning         | The space usage of the specified volume is over the configured quota.                                | Extend the quota limit or add more space to the volume.                   |
| 10203       | information     | The space usage of the specified volume has returned to below the configured quota.                  |   |
| 10204       | warning         | The snapshot space usage on the specified volume is over the configured warning limit.               | Add more space or reset the warning limit.                                |
| 10205       | information     | The snapshot space usage on the specified volume has returned to below the configured warning limit. |   |
| 10206       | error           | The snapshot space usage on the specified volume is over the configured quota.                       | Add more space or reset the snapshot quota.                               |
| 10207       | information     | The snapshot space usage on the specified volume has returned to below the configured quota.         |   |
| 10208       | warning         | Volume attribute synchronization has been delayed.   | The system will automatically retry synchronization.                      |
| 10209       | <b>critical</b> | The volume usage exceeds the critical quota threshold.   | If usage exceeds the quota, the volume will be taken offline.             |
| 10210       | information     | The volume usage has dropped to below the defined critical quota level.                              |   |
| 10211       | <b>critical</b> | The amount of space on the volume defined for snapshots is exceeding the defined quota.              | The volume will be taken offline if the snapshot levels exceed the quota. |
| 10212       | information     | The snapshot levels have returned to below the defined snapshot quota.                               |   |
| 10213       | warning         | A volume is above the snapshot quota level and is being taken offline.                               |   |
| 10214       | warning         | The quota for the volume is being set to 100% because it is above its quota.                         | This is a one-time action. Adjust volume quotas appropriately.            |
| 10215       | warning         | The volume is being taken offline because it exceeds its snapshot quota.                             | Adjust the quota or add capacity and bring the volume back online.        |
| 10216       | warning         | The snapshot quota for the volume is being set to unlimited because it is above its quota.           | This is a one-time action. Adjust snapshot quotas appropriately.          |
| 10217       | warning         | The volume being taken offline because it is above its reserve, and the system is out of free space. | Adjust the reserve, add more capacity, and bring the volume back online.  |

| Alert/Event | Severity    | Description/Possible Cause   | Notes/Actions   |
|-------------|-------------|--|---|
| 10218       | warning     | The volume reserve is being reset to zero because it is above its reserve, and the system is out of free space.    | This is a one time action. Adjust volume reserves appropriately.                  |
| 10219       | warning     | The volume being taken offline because it is above its snapshot reserve, and system is out of free space .         | Adjust reserve settings and add more capacity, then bring the volume back online. |
| 10220       | warning     | The volume snapshot reserve is being set to zero because it is above its reserve, and system is out of free space. | Adjust volume snapshot reserves appropriately and add capacity if needed.         |
| 10221       | warning     | Volume space use has reached the defined warning limit.  | Adjust space usage limits or add capacity.  |
| 10222       | information | The volume space that was previously over limit has returned to below warning limit level.                         |   |
| 10223       | error       | The consumed volume space is over the configured quota.  | Increase the quota or add capacity.   |
| 10224       | information | The volume space that was previously over quota has returned to below defined quota limits.                        |   |
| 10225       | warning     | The volume snapshot space usage has exceeded the defined warning limit.  | Adjust space usage limits or add capacity.  |
| 10226       | information | The volume snapshot space that was previously over quota has returned to below defined warning limit.              |   |
| 10227       | warning     | The consumed volume snapshot space is over the configured quota.   | Increase the quota or add capacity.   |
| 10228       | information | The volume space that was previously over quota has returned to below defined quota limits.                        |   |

## Performance policies and protection sets

| Alert/Event | Severity    | Description   | Notes/Actions  |
|-------------|-------------|---|--|
| 10300       | information | The system successfully took all snapshots on volumes associated with the specified volume collection schedule. |  |
| 10301       | warning     | The system failed to complete snapshots on volumes associated with the specified volume collection schedule.    | Verify that the system is active and healthy, that the volumes are accessible, that there is space available, and that there are no conflicting schedules. |
| 10303       | information | The system skipped a scheduled snapshot collection because a handover in progress.                              | Snapshots cannot be taken during a handover.   |

| Alert/Event | Severity    | Description  | Notes/Actions  |
|-------------|-------------|--|--|
| 10304       | information | The system successfully created the snapshot for volumes associated with the specified volume collection schedule, and shows details about the schedule. |  |
| 10305       | warning     | A VMware-based snapshot failed because the system could not log into the vCenter server.   | Verify that the vCenter authentication is correct.   |
| 10306       | warning     | A VMware-based snapshot failed because the connection to the vCenter server timed out.   | Verify that the connection is active and that the defined server name and IP address are correct.  |
| 10307       | warning     | A VMware-based snapshot failed because the vCenter server refused the connection.  | Verify that the connection is active and that the defined server name and IP address are correct.  |
| 10308       | warning     | A VMware-based snapshot failed because the vCenter server is not connected to the Nimble Protection Manager.   | Verify the connections.  |
| 10309       | warning     | A VMware-based snapshot failed because the system could not find a route to the vCenter server.  | Check network connections.   |
| 10310       | warning     | A VMware-based snapshot failed because because the socket read from the vCenter server timed out.  |  |
| 10311       | warning     | A VMware-based snapshot failed because the network is unreachable.   | Check network connections.   |
| 10312       | warning     | A VMware-based snapshot failed because because snapshots are disabled.   | Some VMWare products such as MVDI and Lab Manager create virtual machines with restricted controls. Do not use datastores in Volume Collections that use vCenter-synchronized snapshots on the Nimble array. |
| 10313       | warning     | A VMware-based snapshot failed because the volume doesn't exist.   |  |
| 10314       | warning     | A VMware-based snapshot failed because the system does not have the proper permissions to perform the action.  | Configure the system with proper permissions or log in as a user with the proper permissions.  |
| 10315       | warning     | A VMware-based snapshot failed because the system was unable to look up the vCenter server.  | Verify the vCenter server name and IP address.   |
| 10316       | warning     | A VMware-based snapshot failed due to an encoding error, usually from a browser using foreign-language encoding for English.                             | Use UTF-8 browser encoding when you enter the vCenter server, user name, and password.   |

| Alert/Event | Severity | Description  | Notes/Actions   |
|-------------|----------|--|---|
| 10317       | warning  | A VMware-based snapshot failed because the server socket was closed before a reply was written.                              |   |
| 10318       | warning  | A VMware-based snapshot failed because no Datacenter exists.   | Locate the datacenter.  |
| 10319       | warning  | A VMware-based snapshot failed because the Nimble volume serial number is empty.   | Without the serial number for the array, the the vCenter server cannot determine what array to use. |
| 10320       | warning  | A VMware-based snapshot failed due to an unknown error.  |   |
| 10321       | warning  | A VMware-based snapshot failed because the VMFS datastore block size is not large enough to accommodate the files in the VM. | Associate the VM to a datastore with the appropriate block size.                                    |

## Space usage

| Alert/Event | Severity        | Description   | Action/Notes   |
|-------------|-----------------|---|--|
| 10401       | warning         | The amount of space used on the array has exceeded the defined warning limit. | Free some space or add capacity.   |
| 10402       | information     | The amount of space used has been lowered to below the defined warning limit. |  |
| 10403       | <b>critical</b> | The amount of space used on the array has exceeded critical level settings.   | Volumes above their reserve will be taken offline once the free space has been exhausted. Adjust reserves. |
| 10404       | information     | The space usage has returned to levels below critical settings.               |  |
| 10405       | information     | The space usage for the array is okay.  | The message shows the actual space usage level.  |
| 10406       | information     | The space available on the array is low.                                      | Delete unneeded snapshots or volumes to reduce space usage.  |
| 10407       | warning         | The space available on the array is below defined warning levels.             | Delete unneeded snapshots or volumes to reduce space usage.  |
| 10408       | <b>critical</b> | The array space is currently above the defined critical level.                | Delete unneeded snapshots or volumes to reduce space usage.  |

## Replication

| Alert/Event | Severity    | Description  | Action/Notes |
|-------------|-------------|--|--------------|
| 11000       | information | The system successfully replicated the specified snapshot collection to the replication partner. |              |

| Alert/Event | Severity    | Description   | Action/Notes   |
|-------------|-------------|---|--|
| 11002       | warning     | There is an excessive delay replicating the specified volume collection to its replication partner. | Make sure that the replication partners can communicate, that replication has not been paused, and that there are no overlapping schedules or configuration conflicts. |
| 11003       | warning     | Failed to synchronize the replication configuration to the replication partner specified.           | Make sure that the replication partners can communicate and that there are no configuration conflicts.   |
| 11004       | warning     | A replication has stalled.  | Remove the specified volume on the partner.  |
| 11005       | information | The system has completed the handover of the volume collection.                                     | Ownership has been transferred.  |

## General hardware

| Alert/Event | Severity        | Description   | Notes/Actions  |
|-------------|-----------------|---|--|
| 12000       | <b>critical</b> | The specified controller is over the safe operating temperature and is being shut down. | Check the environmental temperature where the array is placed, and make sure the temperature is within acceptable range and that air flow is not blocked. If there are fan alerts or the problem persists, contact Support.. |
| 12001       | <b>critical</b> | The specified controller is over the safe operating temperature.                        |  |
| 12002       | <b>critical</b> | The backplane is over the safe operating temperature.                                   |  |

## System monitor - disk

| Alert/Event | Severity        | Description   | Notes/Actions  |
|-------------|-----------------|---|--|
| 12100       | <b>critical</b> | The disk in the specified slot has failed, and only the shown number of disks are left. |  |
| 12101       | warning         | The disk in the specified slot has failed.  | Replace the disk.  |
| 12102       | warning         | The disk in the specified slot is missing.  | Verify that the disk is in place and seated correctly, or reseal the disk. If necessary, reinsert or replace the disk. |
| 12103       | information     | A disk has been added to the specified slot.  |  |
| 12104       | information     | The disk in the specified slot was removed by an administrator, using the CLI.          |  |
| 12105       | warning         | An SSD has failed at the specified slot.  | Replace the SSD disk.  |
| 12106       | warning         | An SSD is missing from the specified slot.  | Verify that the disk is seated properly. Reinsert or replace the disk.   |

| Alert/Event | Severity    | Description   | Notes/Actions   |
|-------------|-------------|---|---|
| 12107       | information | An SSD has been added at the specified slot.                                  |   |
| 12108       | information | The SSD in the specified slot was removed by an administrator, using the CLI. |   |
| 12109       | warning     | The specified disk is not a Nimble array disk.                                | Replace the disk with a Nimble disk.                                |
| 12110       | warning     | The specified SSD is not a Nimble array disk.                                 | Replace the SSD with a Nimble disk.                                 |
| 12111       | warning     | The specified disk is not the right size disk for this hardware model.        | Replace the disk with one of the correct size (shown on the alert). |

## System monitor - NIC

| Alert/Event | Severity        | Description  | Notes/Actions   |
|-------------|-----------------|--|---|
| 12200       | warning         | The specified IP interface is down.  |   |
| 12201       | information     | The specified IP interface is up.  |   |
| 12202       | warning         | The group IP interface is unavailable.   |   |
| 12203       | warning         | All of the data IP interfaces are unavailable.   | Verify that the network is active and that the connection configuration is valid.   |
| 12204       | <b>critical</b> | IP connectivity has been lost, all links are down.   | Check the network.  |
| 12205       | warning         | The NIC for the specified subnet does not exist. The system is migrating configuration to the named NIC.         | Edit the configuration if necessary.  |
| 12206       | warning         | The NIC for the specified subnet does not exist.   | Edit the configuration to ensure that the subnet is configured for an existing NIC. |
| 12207       | warning         | The NIC for the displayed IP address does not exist. The system is migrating the configuration to the NIC shown. | Edit the configuration if necessary.  |
| 12208       | warning         | The NIC for the specified IP address does not exist  | Edit the configuration to ensure that the IP address is configured for the NIC.     |
| 12209       | warning         | The NIC for the configured route gateway does not exist. Migrating configuration to the named NIC.               | Edit the configuration if necessary.  |
| 12210       | warning         | The NIC for the configured route gateway does not exist.   | Edit the configuration to ensure that a route is configured for this NIC.           |

## System management monitor

| Alert/Event | Severity | Description/Possible Cause   | Notes/Actions |
|-------------|----------|--|---------------|
| 12301       | warning  | A sensor has reported a warning for the temperature, and shows the last temperature reading. |               |



| Alert/Event | Severity        | Description/Possible Cause   | Notes/Actions              |
|-------------|-----------------|--|----------------------------|
| 12302       | information     | The sensor reports that the temperature has returned to within the acceptable range. |                            |
| 12303       | warning         | A temperature sensor has failed.   |                            |
| 12304       | information     | The sensor has returned to normal.   |                            |
| 12305       | warning         | The specified temperature sensor is missing.   |                            |
| 12306       | warning         | The NVRAM battery on the specified controller has been disabled.                     | Contact Technical Support. |
| 12307       | <b>critical</b> | All NVRAM batteries on the specified controller have been disabled.                  | Contact Technical Support. |
| 12308       | information     | The specified NVRAM battery has returned to normal.                                  |                            |

## Temperature sensors

| Alert/Event | Severity    | Description/Possible Cause  | Notes/Actions  |
|-------------|-------------|---|--|
| 12323       | warning     | The specified temperature sensor reports that the current temperature is high, and shows the temperature. | Check the ambient temperature and make any needed corrections. If the ambient temperature is good, attempt to locate the hot spot. |
| 12324       | warning     | The specified temperature sensor reports that the current temperature is low, and shows the temperature.  |  |
| 12325       | information | System temperature is now within acceptable range and the current temperature for the sensor shown.       |  |
| 12326       | warning     | The specified temperature sensor is not operational.  |  |
| 12327       | information | The specified temperature sensor is operational, and the current temperature is shown.                    |  |

## Fan sensors

| Alert/Event | Severity    | Description/Possible Cause   | Notes/Actions |
|-------------|-------------|--|---------------|
| 12328       | information | The specified fan is running fast: the system shows the current speed. |               |
| 12329       | information | The specified fan is running slow: the system shows the current speed. |               |
| 12330       | information | The specified fan is now running at normal speed.                      |               |

| Alert/Event | Severity | Description/Possible Cause         | Notes/Actions   |
|-------------|----------|------------------------------------|---|
| 12331       | warning  | The specified fan stopped working. | Verify that the fan is seated correctly and is receiving power, and repair or replace the fan as necessary. |
| 12332       | warning  | The specified fan is missing.      | Verify that the fan is correctly seated, and if necessary, restore or replace the fan.                      |

## Power supply

| Alert/Event | Severity    | Description/Possible Cause  | Notes/Actions   |
|-------------|-------------|---|---|
| 12333       | warning     | The specified power supply is either not connected or has failed. | Check the power supply and replace if necessary.  |
| 12334       | warning     | The specified power supply is missing.                            | Determine if the power supply has been removed or failed and replace or reset if necessary. |
| 12335       | information | The specified power supply is working correctly.                  |   |

## RAID management

| Alert/Event | Severity        | Description/Possible Cause   | Notes/Actions  |
|-------------|-----------------|--|--|
| 12400       | warning         | The RAID array is degraded by the number of disks shown.                             | Replace any failed disks.  |
| 12401       | information     | The RAID array has started rebuilding the specified disk.                            |  |
| 12402       | information     | The RAID array has successfully completed rebuilding the specified disk.             |  |
| 12403       | warning         | The system failed to rebuild the RAID array because not enough disks are available.  |  |
| 12404       | warning         | The system failed to rebuild the RAID array on the specified disk due to I/O errors. |  |
| 12405       | warning         | The specified disk is missing from the RAID array.                                   | Determine if the disk has failed or has been removed and take corrective action.                                   |
| 12406       | information     | The specified disk has been marked as a spare.                                       |  |
| 12407       | <b>critical</b> | There were not enough spare disks available to assemble RAID on the array.           | Fix any conditions that could be causing disks to fail or not been seen. If the problem persists, contact Support. |

## System management (ACL) messages

| Alert/Event | Severity    | Description/Possible Cause   | Notes/Action   |
|-------------|-------------|--|--|
| 12500       | information | iSCSI login is rejected.   | Multiple initiator logins are not allowed.           |
| 12501       | warning     | Unable to connect another iSCSI connection: too many iSCSI connections | Reduce the number of iSCSI connections to the array. |

## System management (resource) messages

| Alert/Event | Severity    | Description/Possible Cause  | Notes/Action                                  |
|-------------|-------------|---|---|
| 13101       | warning     | The total number of volumes on this system is approaching system limit.       | Consider moving some volumes to other arrays. |
| 13102       | information | The number of volumes on this system has been reduced to an acceptable level. |   |

## Nimble SNMP FAQ

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|   |  |
|---|--|
| <b>What versions of SNMP does Nimble support?</b>             | SNMP v1, v2, and v2c   |
| <b>Are acknowledged traps (informs) supported?</b>            | Not in the current version. UDP traps are supported.   |
| <b>How can I configure SNMP?</b>                              | Through the GUI using the <b>Administration &gt; SNMP</b> menu or the CLI <code>snmp</code> command. |
| <b>What security features are supported?</b>                  | Community name.  |
| <b>How many trap recipients are supported on each device?</b> | One.   |
| <b>Does the device receive and forward traps?</b>             | No. In this release, the device only sends traps.  |

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