



# Using Citrix Hypervisor with NetApp ONTAP ONTAP SAN Host

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# Table of Contents

- Using Citrix Hypervisor with NetApp ONTAP ..... 1
  - Introduction ..... 1
  - SAN Booting ..... 1
  - Multipathing ..... 1
  - Known Problems and Limitations ..... 5

# Using Citrix Hypervisor with NetApp ONTAP

## Introduction

This document provides guidance on ONTAP SAN host configuration settings for Citrix Hypervisor 8 series OS releases with FC, FCoE and iSCSI protocols.

## SAN Booting

### Before you begin

If you decide to use SAN booting, it must be supported by your configuration. You can use the [NetApp Interoperability Matrix Tool](#) to verify that your OS, HBA, HBA firmware and the HBA boot BIOS, and ONTAP version are supported.

### Steps

1. Map the SAN boot LUN to the host.
2. Verify multiple paths are available.

Remember, multiple paths will only be available after the host OS is up and running on the paths.

3. Enable SAN booting in the server BIOS for the ports to which the SAN boot LUN is mapped.

For information on how to enable the HBA BIOS, see your vendor-specific documentation.

4. Reboot the host to verify the boot is successful.

## Multipathing

Multipath support in Citrix Hypervisor is based on the Device Mapper Multipathd components. Device mapper nodes are not automatically created for all LUNs presented to the hypervisor and are only provisioned when LUNs are actively used by the Storage Management Layer (API). Citrix Hypervisor Storage Manager API plugin handles activating and deactivating multipath nodes automatically.

Due to incompatibilities with the Integrated Multipath Management architecture, Citrix recommends that you use the Citrix XenCenter application for managing the storage configuration. If it is necessary to query the status of Device Mapper tables manually, or list active device mapper multipath nodes on the system, you can use the `/sbin/mpathutil status` command to verify the settings for your ONTAP LUNs. For more information refer to the standard vendor documentation for Citrix Hypervisor.

## Non-ASA Configuration

For non-ASA configuration there should be two groups of paths with different priorities. The paths with the higher priorities are Active/Optimized, meaning they are serviced by the controller where the aggregate is located. The paths with the lower priorities are active but are non-optimized because they are served from a different controller. The non-optimized paths are only used when no optimized paths are available.

### Example

The following example displays the correct output for an ONTAP LUN with two Active/Optimized paths and two Active/Non-Optimized paths:

```
# mpathutil status
show topology
3600a098038303458772450714535317a dm-0 NETAPP , LUN C-Mode
size=80G features='4 queue_if_no_path pg_init_retries 50
retain_attached_hw_handle' hwhandler='1 alua' wp=rw
|+- policy='service-time 0' prio=50 status=active
| |- 2:0:2:0 sdc 8:32 active ready running
| |- 12:0:5:0 sdn 8:208 active ready running
| |- 2:0:6:0 sdg 8:96 active ready running
| `-- 12:0:0:0 sdi 8:128 active ready running
`-+- `policy='service-time 0' prio=10 status=enabled
    |- 2:0:0:0 sda 8:0 active ready running
    |- 2:0:1:0 sdb 8:16 active ready running
    |- 12:0:3:0 sd1 8:176 active ready running
    `--12:0:6:0 sdo 8:224 active ready running
[root@sanhost ~]#
```



Do not use an excessive number of paths to a single LUN. No more than 4 paths should be required. More than 8 paths might cause path issues during storage failures.

## Recommended Settings

The Citrix Hypervisor 8.x OS is compiled with all settings required to recognize and correctly manage ONTAP LUNs. For Citrix Hypervisor 8.x, an empty zero-byte `/etc/multipath.conf` file must exist, but you do not need to make specific changes to the file.

Enable the host multipath service from the **Xencenter Management Portal** and verify that the multipath service is enabled and running.

```
# systemctl status multipathd
multipathd.service - Device-Mapper Multipath Device Controller
  Loaded: load (/usr/lib/systemd/system/multipathd.service; enabled;
vendor preset: enabled)
  Drop-In: /etc/systemd/system/multipathd.service.d
           slice.config
  Active: active (running) since Fri YYYY-MM-DD 00:00:26 IST; 1 month 9
days ago
  Main PID: 3789 (multipathd)
  CGroup: /control.slice/multipathd.service
          3789 /sbin/multipathd
```

There is no requirement to append content to the `/etc/multipath.conf` file, unless you have devices that you do not want to be managed by multipath or you have existing settings that override defaults. You can add the following syntax to the `multipath.conf` file to exclude the unwanted devices.

```
# cat /etc/multipath.conf
blacklist {
    wwid      <DevId>
    devnode  "^(ram|raw|loop|fd|md|dm-|sr|scd|st) [0-9]*"
    devnode  "^hd[a-z]"
    devnode  "^cciss.*"
}
```



Replace the **<DevID>** with the WWID string of the device you want to exclude.

### Example

In this example for Citrix Hypervisor 8.x, `sda` is the local SCSI disk that we need to the blacklist.

1. Run the following command to determine the WWID:

```
# lib/udev/scsi_id -gud /dev/sda
3600a098038303458772450714535317a
```

2. Add this WWID to the blacklist stanza in the `/etc/multipath.conf`:

```
#cat /etc/multipath.conf
blacklist {
    wwid      3600a098038303458772450714535317a
    devnode  "^(ram|raw|loop|fd|md|dm-|sr|scd|st) [0-9]*"
    devnode  "^hd[a-z]"
    devnode  "^cciss.*"
}
```

Refer to the multipath parameter run time configuration by using the `$multipathd show config` command. You should always check your running configuration for legacy settings that might be overriding default settings, especially in the defaults section.

The following table shows the critical **multipathd** parameters for ONTAP LUNs and the required values. If a host is connected to LUNs from other vendors and any of these parameters are overridden, they need to be corrected by later stanzas in **multipath.conf** that apply specifically to ONTAP LUNs. If this is not done, the ONTAP LUNs might not work as expected. The following defaults should only be overridden in consultation with NetApp and/or the OS vendor and only when the impact is fully understood.

Parameter	Setting
detect_prio	yes
dev_loss_tmo	"infinity"
failback	immediate

Parameter	Setting
fast_io_fail_tmo	5
features	"3 queue_if_no_path pg_init_retries 50"
flush_on_last_del	"yes"
hardware_handler	"0"
path_checker	"tur"
path_grouping_policy	"group_by_prio"
path_selector	"service-time 0"
polling_interval	5
prio	"ontap"
product	LUN.*
retain_attached_hw_handler	yes
rr_weight	"uniform"
user_friendly_names	no
vendor	NETAPP

### Example

The following example illustrates how to correct an overridden default. In this case, the **multipath.conf** file defines values for **path\_checker** and **detect\_prio** that are not compatible with ONTAP LUNs. If they cannot be removed because of other SAN arrays attached to the host, these parameters can be corrected specifically for ONTAP LUNs with a device stanza.

```
# cat /etc/multipath.conf
defaults {
    path_checker readsector0
    detect_prio no
}
devices{
    device{
        vendor "NETAPP "
        product "LUN.*"
        path_checker tur
        detect_prio yes
    }
}
```



Citrix Hypervisor recommends use of Citrix VM tools for all Linux and Windows based guest VMs for a supported configuration.

# Known Problems and Limitations

NetApp Bug ID	Title	Description	Citrix Tracker ID
<a href="#">1242343</a>	Kernel disruption on Citrix Hypervisor 8.0 with QLogic QLE2742 32GB FC during storage failover operations	Kernel disruption might occur during storage failover operations on Citrix Hypervisor 8.0 kernel (4.19.0+1) with QLogic QLE2742 32GB HBA. This issue prompts a reboot of the operating system and causes application disruption. If kdump is configured, the kernel disruption generates a vmcore file under the /var/crash/ directory. You can use the vmcore file to understand the cause of the failure. After the kernel disruption, you can recover the operating system by rebooting the host operating system and restarting the application.	<a href="#">NETAPP-98</a>

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