



Manage NFS over RDMA

ONTAP 9

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Manage NFS over RDMA

NFS over RDMA

NFS over RDMA provides a higher performance realization of NFSv4.0 utilizing RDMA adapters to allow memory to be copied directly from storage to the GPU, circumventing the CPU overhead.

NFS over RDMA configurations are designed for customers with GPU intensive workloads—such as AI and machine learning—who are using the NVIDIA GDX ecosystem.

In ONTAP 9.10.1, this configuration is only supported for the NFSv4.0 protocol when used with the Mellanox CX-5 or CX-6 adapter, which provides support for RDMA using version 2 of the RoCE protocol.

Requirements

- ONTAP version 9.10.1 or later
- Storage appliance configured with RDMA-supported hardware (e.g. Mellanox CX-5 or CX-6)
- NIC controllers must have RDMA support (currently A400, A700, and A800)
- Both the LIF and its HA pair must be upgraded to the same ONTAP version and be RDMA-capable

Next Steps

- [Configure NICs for NFS over RDMA](#)
- [Configure LIFs for NFS over RDMA](#)
- [NFS settings for NFS over RDMA](#)

Further reading

- [RFC 7530: NFS Version 4 Protocol](#)
- [RFC 8166: Remote Direct Memory Access Transport for Remote Procedure Call Version 1](#)
- [RFC 8167: Bidirectional Remote Procedure Call on RPC-over-RDMA Transports](#)
- [RFC 8267: NFS Upper-Layer Binding to RPC-over-RDMA version 1](#)

Configure NICs for NFS over RDMA

NFS over RDMA requires NIC configuration for both the client system and storage platform.

Storage platform configuration

A CX-5 or CX-6 RDMA adapter needs to be installed on the server. If you are using an HA configuration, you must have a corresponding CX-5 or CX-6 adapter on the failover partner so RDMA service can continue during failover. The NIC must be ROCE capable.

Beginning in ONTAP 9.10.1, you can view a list of RDMA offload protocols with the command: `network port show -rdma-protocols roce`

Client system configuration

A CX-5 adapter needs to be installed on the client. Although the client and server can be directly connected, the use of switches is recommended due to improved failover performance with a switch.

The client, server, and any switches, and all ports on switches must be configured using Jumbo frames. Also ensure that priority flow-control is in effect on any switches.

Once this configuration is confirmed, you can mount the NFS.

Steps

1. Check if RDMA access is enabled on the NFS server with the command:

```
vserver nfs show-vserver vserver_name
```

By default, `-rdma` should be enabled. If it is not, enable RDMA access on the NFS server:

```
vserver nfs modify -vserver vserver_name -rdma enabled
```

2. Mount the client via NFSv4.0 over RDMA:

- a. The input for the `proto` parameter depends on the server IP protocol version. If it is v4, use `proto=rdma`. If it is v6, use `proto=rdma6`.
- b. Specify the NFS target port as `port=20049` instead of the standard port of 2049:

```
mount -o vers=4,minorversion=0,proto=rdma,port=20049 Server_IP_address  
:/volume_path mount_point
```

3. **OPTIONAL:** If you need to unmount the client, run the command `umount mount_path`

Configure LIFs for NFS over RDMA

To utilize NFS over RDMA, you must configure your LIFs to be RDMA compatible. Both the LIF and its failover pair must be RDMA capable.

Beginning in ONTAP 9.10.1, there is a new `rdma_protocols` parameter on the network interface commands where you can configure support, along with setting an appropriate service policy.

Procedure to create a new LIF

1. Create a LIF:

```
network interface create -vserver vserver_name -lif lif_name -service-policy  
service_policy_name -home-node node_name -home-port port_name {-address  
IP_address -netmask netmask_value | -subnet-name subnet_name} -firewall-policy  
policy_name -auto-revert {true|false} -rdma-protocols roce
```

- a. The service policy must be either `default-data-files` or a custom policy that includes the `data-nfs` network interface service.
- b. The `-rdma-protocols` parameter accepts a list, which is by default empty. When `roce` is added as a value, the LIF can only be configured on ports supporting RoCE offload, affecting both LIF migration and failover.

Procedure to modify a LIF

1. You can check the status of your LIFs with the `network interface show` command. The service policy must include the data-nfs network interface service. The `-rdma-protocols` list should include `roce`. If either of these conditions are untrue, modify the LIF.
2. To modify the LIF, run:

```
network interface modify vserver vserver_name -lif lif_name -service-policy
service_policy_name -home-node node_name -home-port port_name {-address
IP_address -netmask netmask_value | -subnet-name subnet_name} -firewall-policy
policy_name -auto-revert {true|false} -rdma-protocols roce
```

It is an error to modify a LIF to require a particular offload protocol when the LIF is not currently assigned to a port that supports that protocol.

More Information

[Create a LIF](#)

[What LIFs are](#)

Modify the NFS configuration

In most cases, you will not need to modify the configuration of the NFS-enabled vserver for NFS over RDMA.

If you are, however, dealing with issues related to Mellanox chips and LIF migration, you should increase the NFSv4 locking grace period. By default, the grace period is set to 45 seconds. Beginning in ONTAP 9.10.1, the grace period can go as high as 180 seconds.

Steps

1. Set the privilege level to advanced:

```
set -privilege advanced
```

2. Enter the following command:

```
vserver nfs modify -vserver vserver_name -v4-grace-seconds number_of_seconds
```

For more about this task, see [Specifying the NFSv4 locking grace period](#).

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