Configuring a Subnet Manager

opensm is an InfiniBand-compliant Subnet Manager for SUSE Linux Enterprise Server for NVIDIA that initializes, configures and manages InfiniBand networking fabrics. By automating device discovery, local identifier address assignment, routing path optimization and topology monitoring, opensm provides essential fabric initialization and health management, enabling high-bandwidth, low-latency communication across high-performance computing cluster environments.

Prerequisites

- An installation of SUSE Linux Enterprise Server for NVIDIA with InfiniBand hardware installed

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1 Introduction to opensm

The following sections explain what opensm is and outline its role in the InfiniBand networking environment.

1.1 What is InfiniBand?

InfiniBand is a standard for computer networking communications. It offers a high-speed, low-latency networking technology commonly used in high-performance computing (HPC) environments. InfiniBand provides a high-bandwidth interconnect for connecting servers, storage and other network devices, for example, network switches. In the InfiniBand context, the group of connected network devices is called a *fabric*.

1.2 What is a Subnet Manager?

A Subnet Manager is a component of InfiniBand architecture. It manages and configures InfiniBand switches and connected devices. The Subnet Manager is important for discovering network devices, assigning addresses to them, and maintaining the overall health and configuration of the network.

1.3 What is opensm?

opensm is an InfiniBand compliant Subnet Manager that performs all required tasks for initializing InfiniBand hardware. InfiniBand switches usually come with a Subnet Manager embedded in their firmware. Because it may be outdated or has limited control over network devices, SUSE Linux Enterprise Server for NVIDIA offers opensm. At least one Subnet Manager must be running for each InfiniBand subnet.

1.4 How does opensm work?

opensm attaches to a specific InfiniBand port on the local host and configures only devices connected to it. If the local machine has other InfiniBand ports, opensm ignores devices connected to them. If no port is specified, opensm selects the first available port. By default, the opensm run is logged to `/var/log/opensm.log`. All errors reported in this file should be treated as indicators of InfiniBand fabric health issues.

1.5 Responsibilities of opensm

Key responsibilities of opensm include:

Device discovery

Identifying and managing the devices, such as nodes or switches, within the InfiniBand fabric.

Address assignment

Assigning a unique InfiniBand address to each device in the fabric. InfiniBand uses a unique addressing scheme known as the *local identifier* (LID) to identify each device.

Routing

Determining the optimal paths for data transmission within the fabric. InfiniBand supports both direct and routed communication between devices.

Topology management

Managing the topology of the InfiniBand fabric, including configuring and maintaining the connections between switches and devices.

Error handling

Monitoring the fabric for errors and handling them appropriately to ensure the reliability of communication.

2 Configuring opensm



Tip

The **`opensm`** command stores its main configuration in `/etc/rdma/opensm.conf`. Because the main configuration file gets updated on opensm upgrades, we recommend editing `/etc/rdma/opensm` instead, to prevent the need to merge changes manually.

1. Install the opensm package on any hosts that will be running the Subnet Manager.
2. Use the **`ibstat -p`** command to find `GUID0` and `GUID1` of the host channel adapter (HCA) ports, for example:

```
> ibstat -p
0x248a070300a80a80
```

```
0x248a070300a80a81
```

3. If you are using a single switch, follow these steps:

   a. Start the `opensm` service.

   ```
   > sudo systemctl start opensm
   ```

   b. Enable the `opensm` service on boot.

   ```
   > sudo systemctl enable opensm
   ```

   c. Edit the `/etc/rdma/opensm` file to add the identifier for the corresponding port.

   ```
   > sudo opensm -c /etc/rdma/opensm
   # The port GUID on which the OpenSM is running
   guid 0x248a070300a80a80
   ```

4. If you are using a direct connect method or if you have multiple switches, enable the Subnet Manager on each port of the connected HCA on the host by adding the following lines to `/etc/rc.d/after.local`. Substitute the `GUID0` and `GUID1` with your discovered values. For `P0` and `P1`, use the Subnet Manager priorities, with 1 being the lowest and 15 the highest.

   ```
   opensm -B -g GUID0 -p P0 -f /var/log/opensm-ib0.log
   opensm -B -g GUID1 -p P1 -f /var/log/opensm-ib1.log
   ```

   For example:

   ```
   > sudo cat /etc/rc.d/rc.local
   opensm -B -g 0x248a070300a80a80 -p 15 -f /var/log/opensm-ib0.log
   opensm -B -g 0x248a070300a80a81 -p 1 -f /var/log/opensm-ib1.log
   ```

3 For more information

Find detailed information in the following sources:

- InfiniBand (https://www.infinibandta.org/about-infiniband/) home page
- NVIDIA documentation on Subnet Manager (https://docs.nvidia.com/networking/display/mlnxosv3111014/subnet+manager)
- NVIDIA documentation on opensm (https://networking-docs.nvidia.com/mlnxofedswum/24.10-5.1.6.1lts/nvidia-sm)

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