

## KumoScale CSI Driver System Management

This section explains how to perform several management operations with the KumoScale CSI Driver.

- [Failure Recovery](#)
- [Event Forwarding](#)
- [Collecting Logs on the KumoScale CSI Driver](#)
- [Multipathing](#)
- [Replacing the Trust Store](#)

### Failure Recovery

KumoScale software supports a self-healing process in case of failure. For information on how this process is implemented in KumoScale, see Failure Recovery in the [User Guide](#).

### CSI Event Forwarding

KumoScale software forwards CSI events and configuration commands from the Kubernetes master and node to the KumoScale Provisioner service.You can configure a Syslog server on a KumoScale deployment if you want to log these events and commands.

The following table lists the events reported by the node to the Syslog server:

| Event                           | Level   | Description   |
|---------------------------------|---------|---|
| Host Disconnected               | Fatal   | The host (initiator) NVMe-oF connection to the storage node was disconnected.   |
| Host Reconnected                | Info    | The host (initiator) NVMe-oF connection to the storage node was reconnected.  |
| Replicated Volume Degraded      | Fatal   | A replicated volume is in a degraded state.   |
| Replicated Volume Healed        | Info    | A replicated volume healed.   |
| Replicated Volume Synch Started | Warning | The synchronization of a non-synchronized replica began.  |
| Replicated Volume Synch Ended   | Warning | The synchronization of a non-synchronized replica has completed.  |
| Report Auditing                 | Info    | The node reports these auditing commands to the KumoScale provisioner service:<br><br>Session Established – when an initiator connected to KumoScale software via the NVMe-oF standard for the first time.<br><br>Session Closed – when the latest NVMe-oF connection between an initiator and KumoScale software was closed. |

### Collecting KumoScale CSI Driver Logs

Use kubectl logs to collect the KumoScale CSI Driver logs for each of the containers (ks-csi-plugin, ks-provisioner).

For example, run the following command to collect the logs:

KumoScale Provisioner service logs:

```
kubectl logs -n kube-system csi-kumoscale-controller-<string> ks-provisioner > provisioner.log
```

Controller logs:

```
kubectl logs -n kube-system csi-kumoscale-controller-<string> ks-csi-plugin > controller.log
```

### Multipathing

KumoScale supports NVMe multipathing by default as long as it is enabled in the kernel. To ensure NVMe multipathing is enabled in the kernel:

- Determine whether NVMe multipathing is enabled in the kernel:

```
# cat /sys/module/nvme_core/parameters/multipath
```

One of the following values is returned:  
**N**, if native NVMe multipathing is **disabled**,  
**Y**, if native NVMe multipathing is **enabled**  
By default it is disabled in CentOS 8 and RHEL 8.

2. To enable NVMe multipathing, follow the instructions at [https://access.redhat.com/documentation/en-us/red\\_hat\\_enterprise\\_linux/8/html/managing\\_storage\\_devices/enabling-multipathing-on-nvme-devices\\_managing-storage-devices#doc-wrapper](https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/8/html/managing_storage_devices/enabling-multipathing-on-nvme-devices_managing-storage-devices#doc-wrapper).

The KumoScale Cluster Manager CLI **host-show** and REST API **List Hosts** commands identify whether a host supports multipathing.

If **multipath is true**, the KumoScale CSI driver tries to connect to all portals

If **multipath is false** it settles on the first connected portal.

## Replacing the Truststore

### Replacing the Truststore when using KumoScale in Managed Mode

To replace the key used with the CSI driver with your own when using you own Kubernetes cluster with KumoScale in Managed Mode.

1. Create your own Privacy Enhanced Mail (PEM) file as detailed in the KumoScale User Guide.
2. Create a secret with the content of the new pem file - see **pem-secret.yaml** as an example.
3. Put the content of the pem file in this secret under the field **ks-csi-plugin.pem**
4. Edit the CSI yaml deployment file, **ks-csi.yaml**, as follows:
  - a. Ensure that both the controller pod and the node pod mounts this secret by adding the following to each pod:  
Add a volume under the **volumes** section with

```
- name: ks-csi-plugin-pem
secret:
secretName: ks-csi-plugin-pem
```

Add a volume mount under the **volumeMounts** section with:

```
- name: ks-csi-plugin-pem
mountPath: /etc/ks-csi-plugin-pem/
```

- b. Add a command line parameter to ks-csi-plugin parameter in each of the pods:

```
- "--pem=/etc/ks-csi-plugin-pem/ks-csi-plugin.pem"
```

5. Apply the edited yaml with:

```
kubectl apply ks-csi.yaml
```

### Replacing the Truststore when using KumoScale in Appliance Mode

To replace the key used with the CSI driver with your own when using KumoScale in Appliance Mode.

1. Create your own Privacy Enhanced Mail (PEM) file as detailed in the KumoScale User Guide.
2. Create a secret with the content of the new pem file - see **pem-secret.yaml** as an example. The secret should be in the **kumo-services**
3. Edit the CSI CR located in **/data/cfg/yamls/ks-csi-cr.yaml** and add sslSecret. This line may be commented out in your copy of the file.

[1] 'mdraid' is a Linux OS component that controls storage devices. It is referred to as Linux software RAID as it makes RAID use possible without a hardware RAID controller.

