



Step-by-Step Guide

Open-E JovianDSS Advanced Metro High Availability Cluster with 2 Rings (supported since version up28)

Open-E JovianDSS Advanced Metro High Availability Cluster with 2 Rings *open-e*

The aim of this document is to demonstrate an example setup of an Advanced Metro High Availability Cluster with 2 Rings. The 2 Rings option is available as of version 1.0 up28.

The Advanced Metro High Availability Cluster is using an Ethernet link for Disk Exports instead of SAS. It can work with JBOD-less hardware so that disks are present in both cluster nodes and are mirrored via an Ethernet path.

The Advanced Metro HA Cluster uses the same Ring-Ping design for Cluster Management as the Open-E JovianDSS Standard HA Cluster. But it enables an additional functionality – the “Remote disks mirroring paths for Cluster over Ethernet” – in order to configure a special Ethernet link for disk exports.

In this example (**setup on page 5**), 2 NICs are used for iSCSI Targets only.

The bond is preferred for NFS and SMB shares but for iSCSI path redundancy MPIO is a better choice. The Open-E JovianDSS works as a Unified Storage Appliance, providing NAS and SAN (iSCSI ,NFS, SMB). All services requiring path redundancy will need to configure 2 bonds. **Please refer to other examples shown on pages 46-52.**

In this document, two pools are created with 4 (2-local + 2-remote) disks in every mirror group. In case of the other node, reboots or failure, the mirror groups are still redundant with 2 disks in every mirror.

The 4-way mirror provides limited storage efficiency of only 25%. For increased storage efficiency, a hardware RAID controller and just a simple mirror over 2 disk units with a RAID array behind can be used. Open-E JovianDSS includes built-in all RAID tools and drivers for Broadcom (LSI) and Microsemi (Adaptec). In case of Areca, a driver is included as well but the Web-GUI has to be accessed via the controller's ETH-port.

Open-E JovianDSS Advanced Metro High Availability Cluster with 2 Rings *open-e*

The software version 1.0 up28 supports NEW options for cluster configuration. Here is the comparison summary:

The up27 and older versions:

- Cluster bind-ring and ping nodes must be on the same Active-Backup bond and MUST go via network switch.
- If node has lost all ping nodes signals, all pools on this node will be exported. The export is done because the node is most probably not reachable and must export pools so other node can import and failover will be possible.
- If node has lost all ping nodes and ring-heartbeat, the node will be rebooted immediately. The reason is similar as in the case of all pings lost but in the case of no ping nodes and no ring signal, it is assumed the node is fully isolated and reboot will be safer for other node to failover.

Note: It is not possible to use different bonding than Active-Backup for the cluster bind-ring.

The up28 and newer versions:

- Everything what was valid and working in the up27 will also work in the up28 and newer.
- Up to 2 rings can be configured and ping nodes to be configured on the same path of the storage paths and not on the rings network.
- There is NO obligatory active-backup bond for the cluster bind-ring. Both rings can be configured on nonbonded NIC but optionally can work on an active-backup bond as well.
- The second ring can be configured via a mirror path if Advanced Metro Cluster is used but in such case the mirror path can work on a single NIC or an active-backup bond. If a round-robin bond is configured for the mirror path, it is not possible to configure the second ring on it. In such case, the second ring can be configured on extra point-to-point single path or an active-backup bond path.
- If a node has lost all ping node signals, all pools on this node will be exported. The export is done because the node is most probably not reachable and must export pools, so the other node can import and failover will be possible (**this works the same as in the up27**).
- If a node has lost all ping nodes and a ring-heartbeat, the node will be rebooted immediately. The reason is similar as in the case of all pings lost, but in the case of no ping nodes and no ring signal, it is assumed the node is fully isolated and a reboot will be safer for other node to perform a failover (**this works same as in the up27**).

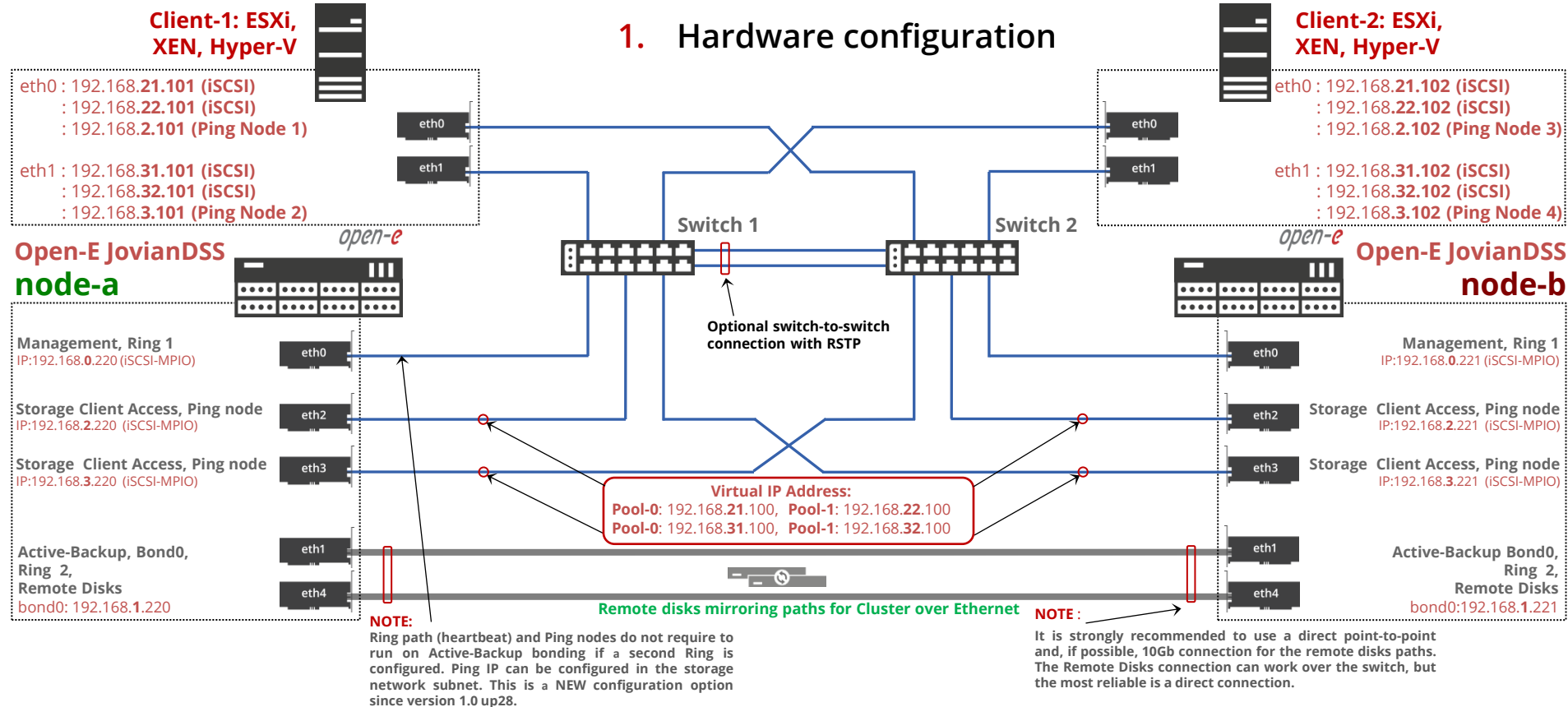
Note: MS Hyper-V cluster as a storage client via iSCSI use Persistent-Reservations synchronization which works on bind-ring only. It does NOT work via a second ring. This is why for Hyper-V cluster it is still obligatory to use an Active-Backup bond for the bind-ring path.

To set up an Advanced Metro HA Cluster, perform the following steps:

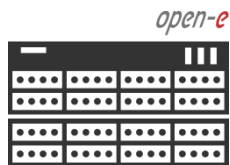
1. Hardware configuration
2. Network configuration
 - 2.1. Create a mirroring path bond
 - 2.2. Select a default gateway
 - 2.3. Network configuration on node-b
3. Time and date settings
4. Nodes binding
5. Adding rings
6. Ping Nodes
7. Mirroring path
8. Start the cluster service
9. Create a new Pool
 - 9.1. Add a data group
 - 9.2. Add a write log
 - 9.3. Add a read cache
10. Enter a virtual IP
11. System monitoring setup
12. Failover test

Open-E JovianDSS Advanced Metro High Availability Cluster with 2 Rings and 2 multipath paths for SAN (iSCSI) storage clients.

1. Hardware configuration



2. Network configuration



Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

Select **System Settings** from the main menu and next select the **Network** tab. Click the **Create bond interface** button.
This will be the bond for the mirror path.

The screenshot shows the Open-E JovianDSS web interface for node-220. The left sidebar contains the following menu items: Storage, User Management, Failover Settings, Storage Settings, Backup & Recovery, System Settings (selected), and Diagnostics. The main content area is titled 'System Settings' and has tabs for Administration, Network (selected), MPIO, System, Settings management, and Update. Under the 'Network' tab, there is a section for 'Interfaces' with a '+ Add interface' button and a '+ Create bond interface' button. Below this is a table of interfaces:

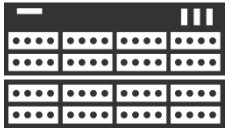
Name	IP	DHCP	Vendor	Negotiated speed	Cable	Status	Options
eth0	192.168.0.220	No	VMware VMXNET3 Ethernet Controll...	10000 Mbps	cable	Active	Options
eth1	192.168.1.220	No	VMware VMXNET3 Ethernet Controll...	10000 Mbps	cable	Active	Options
eth2	192.168.2.220	No	VMware VMXNET3 Ethernet Controll...	10000 Mbps	cable	Active	Options
eth3	192.168.3.220	No	VMware VMXNET3 Ethernet Controll...	10000 Mbps	cable	Active	Options
eth4	192.168.4.220	No	VMware VMXNET3 Ethernet Controll...	10000 Mbps	cable	Active	Options

Below the table is a section for 'Static routing manager' with a search bar and a '+ Add static routing' button. At the bottom, there are sections for 'Default gateway' and 'Settings', each with a help icon.

Open-E JovianDSS Advanced Metro High Availability Cluster with 2 Rings *open-e*

2.1. Network configuration. Create a mirroring path bond

open-e



Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

Enter all required details of the bond and click the **Apply** button.

The screenshot shows the 'Create new channel bonding interface' dialog in the Open-E JovianDSS web interface. The dialog is divided into two main sections: 'Available interfaces' and 'Bonding options'.

Available interfaces:

Name	IP	DHCP	Interface details	Cable	Active	Bond	Select
eth0	192.168.0.220	No	VMware VMXNET3 Ethernet Contr...	cable	Yes		<input type="checkbox"/>
eth1	192.168.1.220	No	VMware VMXNET3 Ethernet Contr...	cable	Yes		<input checked="" type="checkbox"/>
eth2	192.168.2.220	No	VMware VMXNET3 Ethernet Contr...	cable	Yes		<input type="checkbox"/>
eth3	192.168.3.220	No	VMware VMXNET3 Ethernet Contr...	cable	Yes		<input type="checkbox"/>
eth4	192.168.4.220	No	VMware VMXNET3 Ethernet Contr...	cable	Yes		<input checked="" type="checkbox"/>

Bonding options:

Mode: **Active-backup**

Primary interface: **eth1**

Primary reselect policy: **failure (default)**

MAC: **Custom**

MAC address: **b8:a3:9f:a9:1a:61** **Generate MAC**

Internet protocol: **Static**

IP: **192.168.1.220**

Netmask: **255.255.255.0**

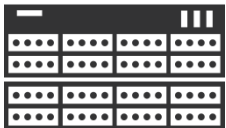
Broadcast: **automatic**

Gateway: **192.168.1.1**

Apply

2.2. Network configuration. Select a default gateway

open-e



Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

A bond is created properly. Overview is shown in the **Interfaces** field.

Next, in the **Default gateway** field, click the **Change** button.

System Settings

Administration Network MPIO System Settings management Update

Interfaces

Name	IP	DHCP	Vendor	Negotiated speed	Cable	Status	Options
bond0	192.168.1.220	No	Ethernet Bonding Driver	10000 Mbps	cable	Active	Options
eth0	192.168.0.220	No	VMware VMXNET3 Ethernet Controll...	10000 Mbps	cable	Active	Options
eth1 (bond0)	N/A	No	VMware VMXNET3 Ethernet Controll...	10000 Mbps	cable	Bond slave	Options
eth2	192.168.2.220	No	VMware VMXNET3 Ethernet Controll...	10000 Mbps	cable	Active	Options
eth3	192.168.3.220	No	VMware VMXNET3 Ethernet Controll...	10000 Mbps	cable	Active	Options
eth4 (bond0)	N/A	No	VMware VMXNET3 Ethernet Controll...	10000 Mbps	cable	Bond slave	Options

Static routing manager

Default gateway

Interface: eth0

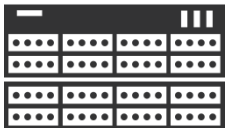
Interface details: VMware VMXNET3 Ethernet Controller (rev 01)

Gateway: static

Change

2.2. Network configuration. Select a default gateway

open-e



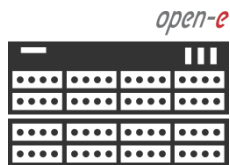
Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

Select a proper interface and click the **Apply** button.

The screenshot shows the Open-E JovianDSS web interface. The 'System Settings' page is active, displaying a table of network interfaces. A modal dialog titled 'Select default gateway' is open, showing a list of available interfaces. The 'eth0' interface is selected. Red arrows indicate the selection of 'eth0' and the 'Apply' button.

Interface	Interface details	Gateway	Active	Select
1 bond0	Ethernet Bonding Driver	static	Yes	<input type="radio"/>
2 eth0	VMware VMXNET3 Ethernet Controller (rev 01)	static	Yes	<input checked="" type="radio"/>
3 eth2	VMware VMXNET3 Ethernet Controller (rev 01)	static	Yes	<input type="radio"/>
4 eth3	VMware VMXNET3 Ethernet Controller (rev 01)	static	Yes	<input type="radio"/>

2.3. Network configuration. Network configuration on node-b



Open-E JovianDSS: **node-b**
IP Address: 192.168.0.221

Go to the **second cluster node** and create a bond interface accordingly.

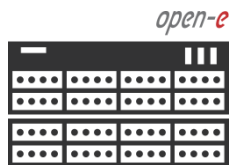
The screenshot shows a properly created bond and a default gateway on the second node.

The screenshot displays the Open-E JovianDSS System Settings web interface. The left sidebar shows the navigation menu with 'System Settings' selected. The main content area is titled 'System Settings' and has tabs for Administration, Network, MPIO, System, Settings management, and Update. The 'Network' tab is active, showing the 'Interfaces' section. A table lists the configured network interfaces:

Name	IP	DHCP	Vendor	Negotiated speed	Cable	Status	Options
bond0	192.168.1.221	No	Ethernet Bonding Driver	10000 Mbps	cable	Active	Options
eth0	192.168.0.221	No	VMware VMXNET3 Ethernet Controll...	10000 Mbps	cable	Active	Options
eth1 (bond0)	N/A	No	VMware VMXNET3 Ethernet Controll...	10000 Mbps	cable	Bond slave	Options
eth2	192.168.2.221	No	VMware VMXNET3 Ethernet Controll...	10000 Mbps	cable	Active	Options
eth3	192.168.3.221	No	VMware VMXNET3 Ethernet Controll...	10000 Mbps	cable	Active	Options
eth4 (bond0)	N/A	No	VMware VMXNET3 Ethernet Controll...	10000 Mbps	cable	Bond slave	Options

Below the interfaces table, the 'Static routing manager' section is visible, showing a search bar and a '+ Add static routing' button. The 'Default gateway' section shows the interface 'eth0' as the default gateway.

3. Time and date settings



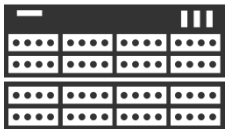
Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

In the **System** tab, in **Time and date settings**, select the **Continuous NTP synchronization** and click apply.

Repeat this step for the second cluster node as well.

4. Nodes binding

open-e

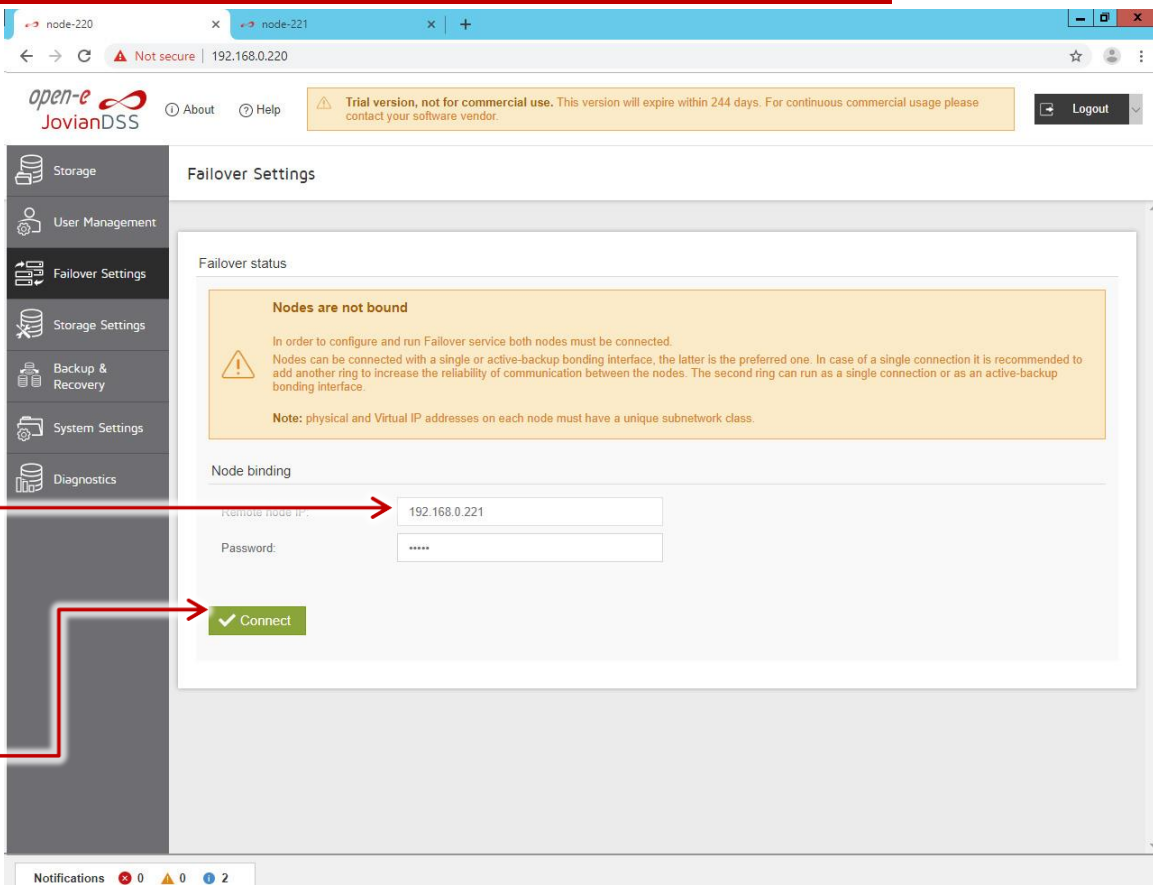


Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

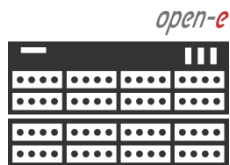
In the main menu, select **Failover Settings** and enter the IP address of the NIC interface of the second node and enter the current administrator password (default: admin) and click the **Connect** button.

NOTE:

This is a new option. Version 1.0 up27 required to use Active-Backup bond for the cluster host binding.



5. Adding rings



Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

In **Failover Settings**, click the **Edit** button in the **Rings** section and select at least two rings.

NOTE:

This is a new option. Version 1.0 up27 required to use an Active-Backup bond for the cluster host binding.

node-220 x node-221 x +

Not secure | 192.168.0.220

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Logout

Storage

User Management

Failover Settings

Storage Settings

Backup & Recovery

System Settings

Diagnostics

Failover Settings

Failover status: Ready to start

Start Failover

Failover nodes

Node	Connection status	Failover status
node-220 (IP: 192.168.0.220, node ID: 2349c36d)	Reachable	N/A
node-221 (IP: 192.168.0.221, node ID: e2dcb4bc)	Reachable	N/A

Disconnect nodes

Failover resources

Zpool name	Active on node	Status
Information about failover resources is not available until failover is started.		

Clustered services

Service name	Status
LDAP database synchronization	Disabled

Rings: 1 configured

Edit

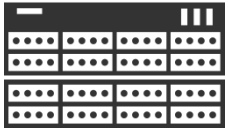
Ping nodes: 0 of 0 reachable

Edit

Notifications

5. Adding rings

open-e

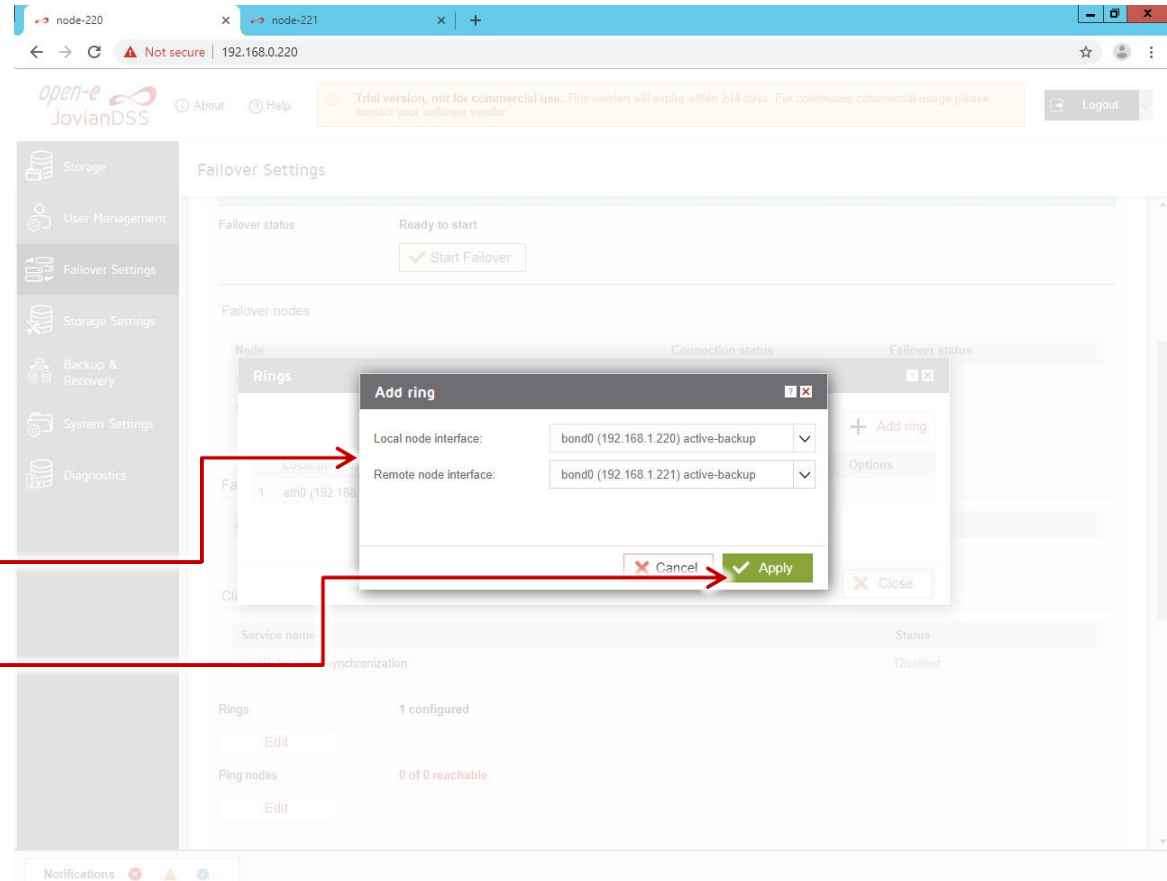


Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

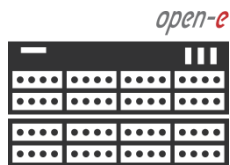
Next, select the interfaces for the ring for local and remote nodes and click the **Apply** button.

NOTE:

The bond0 will be used for mirror path as well.



5. Adding rings



Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

Two rings in local and remote nodes are selected. Now, click the **Close** button.

NOTE:

Maximum number of 2 rings is allowed. If you need to add a new one, delete an existing ring.

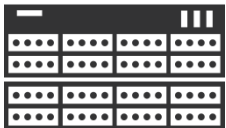
The screenshot shows the Open-E JovianDSS web interface. The 'Rings' dialog box is open, displaying the following table:

	Local node interface	Remote node interface	Status	Options
1	eth0 (192.168.0.220)	eth0 (192.168.0.221)	N/A	
2	bond0 (192.168.1.220)	bond0 (192.168.1.221)	N/A	Delete

The dialog box also includes a 'Close' button at the bottom right. Red arrows point from the text blocks to the 'Close' button and the table.

6. Ping Nodes

open-e



Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

In the Failover settings, click the **Edit** button in the **Ping nodes** section and enter at least two ping nodes.

NOTE:

It is recommended to configure more than 2 ping nodes but NOT more than 6.

node-220 x node-221 x +

Not secure | 192.168.0.220

open-e JovianDSS About Help

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Logout

Storage

User Management

Failover Settings

Storage Settings

Backup & Recovery

Diagnostics

Failover Settings

Failover status Ready to start

Start Failover

Ping nodes

Search + Add ping node

	IP	Local status	Remote status	Options
1	192.168.2.30	Reachable	Reachable	Delete
2	192.168.2.40	Reachable	Reachable	Delete
3	192.168.3.30	Reachable	Reachable	Delete
4	192.168.3.40	Reachable	Reachable	Delete

Close

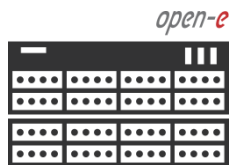
Rings 2 configured

Ping nodes 4 of 4 reachable

Edit

Notifications

7. Mirroring path



Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

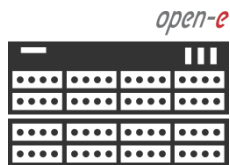
Next, click the **Add mirroring path** button.

The screenshot shows the Open-E JovianDSS web interface. The left sidebar contains navigation links: Storage, User Management, Failover Settings (selected), Storage Settings, Backup & Recovery, System Settings, and Diagnostics. The main content area is titled 'Failover Settings' and includes a 'Zpool name' field, a 'Status' field, and a 'Clustered services' table. The 'Rings' section shows '2 configured' and the 'Ping nodes' section shows '4 of 4 reachable'. The 'Remote disks mirroring paths for Cluster over Ethernet' section contains an information box with the text 'In order to connect remote disks, add a mirroring path. You can configure one mirroring path.' and a '+ Add mirroring path' button. A red arrow points from this button to the text box on the left.

Service name	Status
LDAP database synchronization	Disabled

Local node interface	Remote node interface	Local status	Remote status
No path added.			

7. Mirroring path

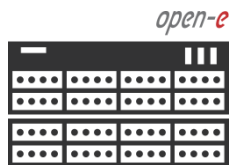


Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

In **Add mirroring path**, select proper interfaces and click the **Apply** button.

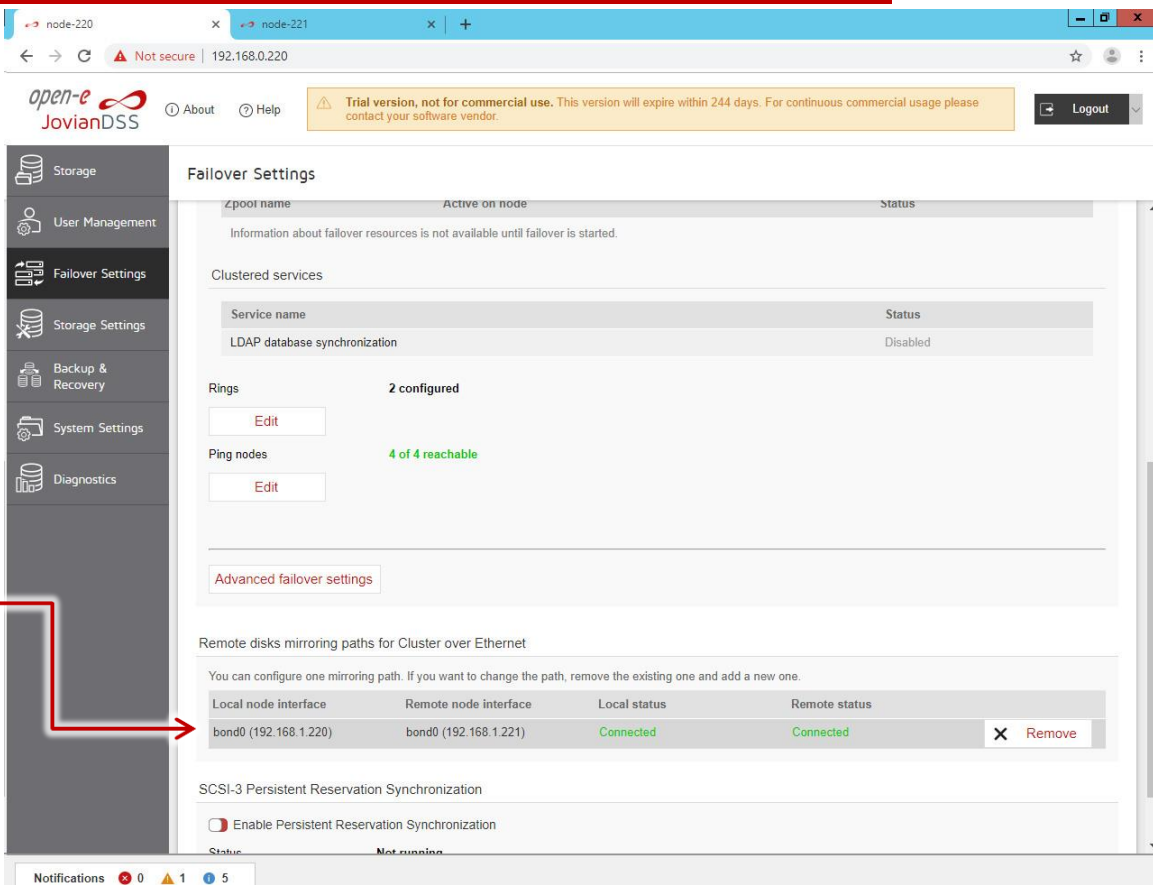
The screenshot shows the Open-E JovianDSS web interface. The left sidebar contains navigation links: Storage, User Management, Failover Settings, Storage Settings, Backup & Recovery, System Settings, and Diagnostics. The main content area is titled 'Failover Settings'. A modal dialog box titled 'Add mirroring path' is open, showing '2 configured' rings. The dialog has two input fields: 'Local node interface' and 'Remote node interface', both set to 'bond0 (192.168.1.220)' and 'bond0 (192.168.1.221)' respectively. At the bottom of the dialog are 'Cancel' and 'Apply' buttons. A red arrow points from the text box on the left to the 'Apply' button. Below the dialog, there is a section for 'Remote disks mirroring paths for Cluster over Ethernet' with a table that currently shows 'No path added'.

7. Mirroring path



Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

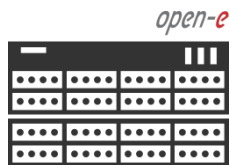
Mirroring path shows the **Connected** status.



The screenshot shows the Open-E JovianDSS web interface for node-220 (IP: 192.168.0.220). The left sidebar contains navigation links: Storage, User Management, Failover Settings (selected), Storage Settings, Backup & Recovery, System Settings, and Diagnostics. The main content area displays the 'Failover Settings' page. It includes a 'Zpool name' section, 'Clustered services' (showing 'LDAP database synchronization' as Disabled), 'Rings' (2 configured), and 'Ping nodes' (4 of 4 reachable). A red arrow points from the 'Mirroring path' text to the 'Advanced failover settings' link. Below this, the 'Remote disks mirroring paths for Cluster over Ethernet' section shows a table with two entries, both in 'Connected' status. The bottom of the interface shows a 'Status' section with 'Not running' and a notification bar at the very bottom.

Local node interface	Remote node interface	Local status	Remote status	
bond0 (192.168.1.220)	bond0 (192.168.1.221)	Connected	Connected	X Remove

8. Start the cluster service



Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

Now, the cluster is ready to start.
In order to start the cluster services,
click the **Start Failover** button.

node-220 x node-221 x +

Not secure | 192.168.0.220

open-e JovianDSS About Help

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Logout

Storage

User Management

Failover Settings

Storage Settings

Backup & Recovery

System Settings

Diagnostics

Failover Settings

Failover status

Windows Failover Clustering

To ensure proper functioning of Windows Failover Clustering feature (including Hyper-V in cluster environment) it is required to enable SCSI-3 Persistent Reservation Synchronization.

Failover status

Ready to start

Start Failover

Failover nodes

Node	Connection status	Failover status
node-220 (IP: 192.168.0.220, node ID: 2349c36d)	Reachable	N/A
node-221 (IP: 192.168.0.221, node ID: e2dcb4bc)	Reachable	N/A

Disconnect nodes

Failover resources

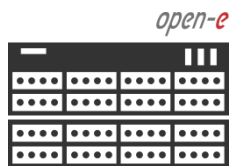
Zpool name	Active on node	Status
Information about failover resources is not available until failover is started.		

Clustered services

Service name	Status
LDAP database synchronization	Disabled

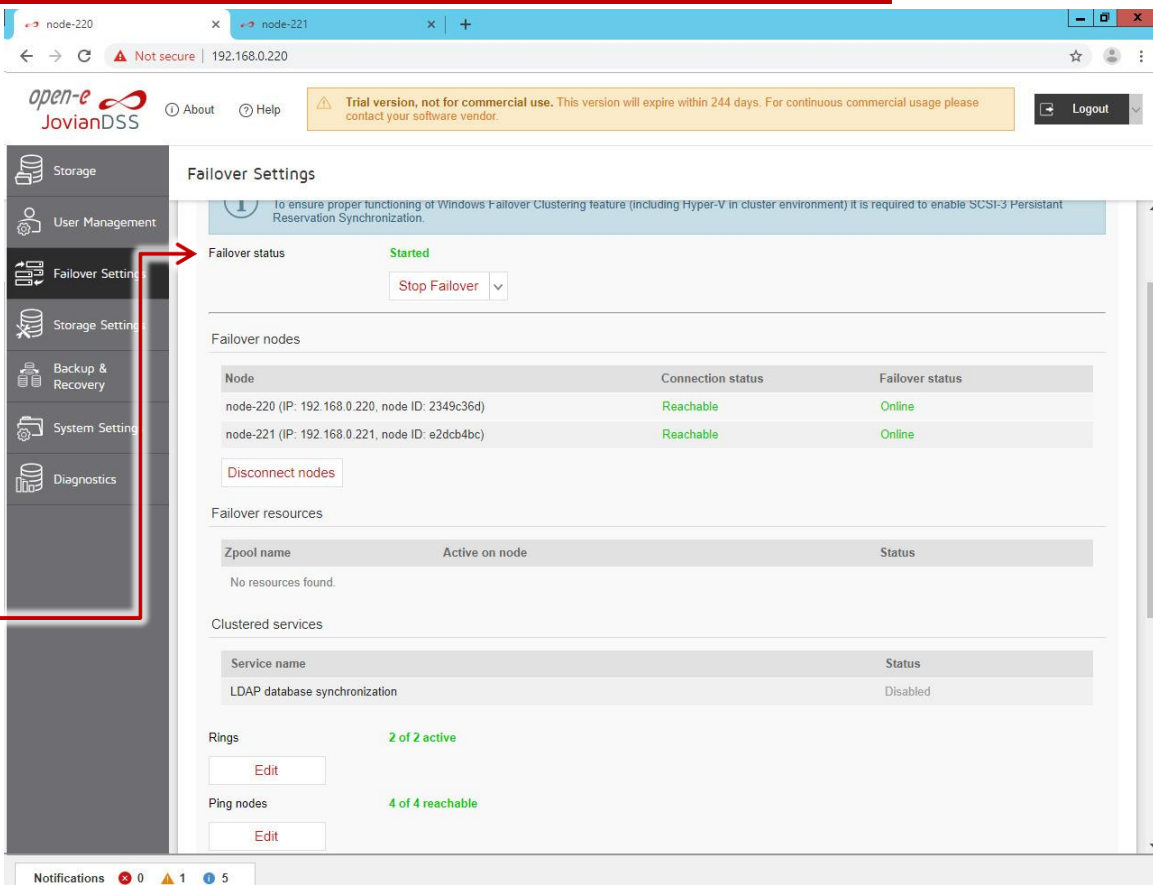
Notifications 0 1 5

8. Start the cluster service



Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

In a short moment, the HA Cluster will be started and the status will show: **Started**.



node-220 x node-221

Not secure | 192.168.0.220

open-e JovianDSS About Help

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Logout

Storage

User Management

Failover Settings

Storage Settings

Backup & Recovery

System Settings

Diagnostics

Failover Settings

To ensure proper functioning of Windows Failover Clustering feature (including Hyper-V in cluster environment) it is required to enable SCSI-3 Persistent Reservation Synchronization.

Failover status: **Started**

Stop Failover

Failover nodes

Node	Connection status	Failover status
node-220 (IP: 192.168.0.220, node ID: 2349c36d)	Reachable	Online
node-221 (IP: 192.168.0.221, node ID: e2dcb4bc)	Reachable	Online

Disconnect nodes

Failover resources

Zpool name	Active on node	Status
No resources found.		

Clustering services

Service name	Status
LDAP database synchronization	Disabled

Rings: 2 of 2 active

Edit

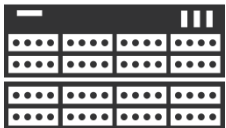
Ping nodes: 4 of 4 reachable

Edit

Notifications: 0 1 5

9. Create a new Pool

open-e



Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

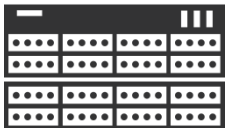
Go to the menu **Storage**. In the **Local disks** tab, all local disks are listed.

The screenshot shows the Open-E JovianDSS web interface. The left sidebar contains a menu with the following items: Storage, User Management, Failover Settings, Storage Settings, Backup & Recovery, System Settings, and Diagnostics. The main content area is titled 'Storage' and includes a 'Rescan' button and an 'Add zpool' button. A message states: 'No imported zpools have been found in the system. Import a zpool (if there are zpools available for import) or create a new zpool by clicking "Add zpool" button.' Below this, there is a 'Zpools available for import' section with a 'Rescan required' warning. The 'Unassigned disks' section is active, showing a table of local disks. A red arrow points from the 'Local disks' tab in the sidebar to the 'Local disks' tab in the 'Unassigned disks' section.

	Name	Serial number	Size	Model	Blink
1	sdc	6000c29af6d3cfff24bdec7c70dbbd71	16.00 GiB	Virtual disk	●
2	sdd	6000c2978bbacfe2edda580c6da04980	16.00 GiB	Virtual disk	●
3	sde	6000c290ba7256959cc9432635100b34	16.00 GiB	Virtual disk	●
4	sdf	6000c29156b425e79ddb645dec14b4df	16.00 GiB	Virtual disk	●
5	sdg	6000c296bed95f47221cccebc5daab1	16.00 GiB	Virtual disk	●
6	sdh	6000c2958aca3fe831b6cb36c5f95a60	16.00 GiB	Virtual disk	●
7	sdi	6000c29af3cee22280f324a14ca3a591	16.00 GiB	Virtual disk	●
8	sdj	6000c29fa8c7c2d5e59b7c8b3c739bd4	16.00 GiB	Virtual disk	●
9	sdk	6000c296a1ef6ef208308dd5b6c61053	16.00 GiB	Virtual disk	●
10	sdl	6000c2944f60671e709dbdf2c50861ae	16.00 GiB	Virtual disk	●

9. Create a new Pool

open-e



Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

In the **Remote disks** tab, all disks from a remote node are listed.

The screenshot shows the Open-E JovianDSS web interface. The left sidebar contains navigation links: Storage, User Management, Failover Settings, Storage Settings, Backup & Recovery, System Settings, and Diagnostics. The main content area is titled 'Storage' and includes a 'Rescan' button and an 'Add zpool' button. A message states: 'No imported zpools have been found in the system. Import a zpool (if there are zpools available for import) or create a new zpool by clicking "Add zpool" button.' Below this, a 'Rescan required' message is displayed. The 'Unassigned disks' section has two tabs: 'Local disks' and 'Remote disks'. The 'Remote disks' tab is active, showing a table of disks. A red arrow points from the text box on the left to the 'Remote disks' tab.

Name	Serial number	Size	Model	Blink
1 sdn (remote)	6000c29af6d3cfff24bdec7c70dbbd71	16.00 GiB	Virtual disk	●
2 sdo (remote)	6000c2978bbacfe2edda580c6da04980	16.00 GiB	Virtual disk	●
3 sdp (remote)	6000c290ba7256959cc9432635100b34	16.00 GiB	Virtual disk	●
4 sdq (remote)	6000c29156b425e79ddb645dec14b4df	16.00 GiB	Virtual disk	●
5 sdr (remote)	6000c296bed95f47221cccebc5daab1	16.00 GiB	Virtual disk	●
6 sds (remote)	6000c2958aca3fe831b6cb36c5f95a60	16.00 GiB	Virtual disk	●
7 sdt (remote)	6000c29af3cee22280f324a14ca3a591	16.00 GiB	Virtual disk	●
8 sdu (remote)	6000c29fa8c7c2d5e59b7c8b3c739bd4	16.00 GiB	Virtual disk	●
9 sdv (remote)	6000c296a1ef6ef208308dd5b6c61053	16.00 GiB	Virtual disk	●
10 sdw (remote)	6000c2944f60671e709dbdf2c50861ae	16.00 GiB	Virtual disk	●

9. Create a new Pool

open-e

Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

In the Storage tab, click **Add zpool** button. Then, add data groups by selecting 4 (2 local and 2 remote) disks and select Mirror (single group) from the pull-down menu and click the Add group button, then click the **Next** button.

NOTE: It is recommended to set 4 (2-local + 2-remote) disks in every mirror group. In case of other node reboots or failure, the mirror groups are still redundant with 2 disks in every mirror.

Zpool wizard

1. Add data group

Available disks

☐ Show only unused disks Rescan disks

Name	Id	Size	Blink
<input type="checkbox"/> sdh	wwn-0x6000c2958aca3fe831b6cb36c...	16.00 GiB	●
<input type="checkbox"/> sdi	wwn-0x6000c29af3cee22280f324a14c...	16.00 GiB	●
<input type="checkbox"/> sdj	wwn-0x6000c29fa8c7c2d5e59b7c8b3...	16.00 GiB	●
<input type="checkbox"/> sdk	wwn-0x6000c296a1ef6ef208308dd5b...	16.00 GiB	●
<input checked="" type="checkbox"/> sdi	wwn-0x6000c2944f60671e709dbdf2c5...	16.00 GiB	●
<input checked="" type="checkbox"/> sdm	wwn-0x6000c2984830a6620c6eda383...	16.00 GiB	●
<input checked="" type="checkbox"/> sdn (remote)	wwn-0x6000c29bdc1798069cf73e98dd...	16.00 GiB	●
<input checked="" type="checkbox"/> sdo (remote)	wwn-0x6000c29727e00e513313d4df3...	16.00 GiB	●
<input type="checkbox"/> sdp (remote)	wwn-0x6000c2986787edc246c9986f7...	16.00 GiB	●
<input type="checkbox"/> sdq (remote)	wwn-0x6000c29c4d45460809082a17...	16.00 GiB	●
<input type="checkbox"/> sdr (remote)	wwn-0x6000c29abd85a986f7594a2fc0...	16.00 GiB	●
<input type="checkbox"/> sds (remote)	wwn-0x6000c299b231836f2ef83eed0...	16.00 GiB	●
<input type="checkbox"/> sdt (remote)	wwn-0x6000c29995bf3c859b3fec5781...	16.00 GiB	●
<input type="checkbox"/> sdu (remote)	wwn-0x6000r29bfaf253aa307ef38d6f...	16.00 GiB	●

Select redundancy for group: Mirror (single group) + Add group

Cancel Next >

To add first Data Group to your zpool please select disks on the list on the left, select redundancy type and click "Add group" button.

Zpool storage capacity: 0.00 B
Used licensed storage capacity: 0.00 B

Other groups

10 sdk

9. Create a new Pool

open-e

Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

Click the **Next** button.

NOTE:

A 4-way mirror provides limited storage efficiency of only 25%. For increased storage efficiency, a hardware RAID controller can be used with a simple mirror over 2 disk units with a RAID array behind. Open-E JovianDSS includes built-in all RAID tools and drivers for Broadcom (LSI) and Microsemi (Adaptec). In case of Areca, a driver is included as well but the WebGUI of Areca has to be accessed via the controller's ETH-port.

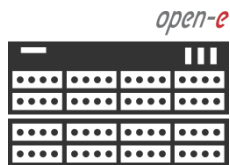
The screenshot shows the Open-E JovianDSS WebGUI interface. The main window displays the 'Zpool wizard' with a sidebar on the left containing navigation links: Storage, User Manager, Failover Settings, Storage Settings, Backup & Recovery, and Diagnostics. The wizard is currently at step 1, 'Add data group'. A list of 'Available disks' is shown, including sdb, sdc, sdd, sde, sdf, sdg, sdh, sdi, sdj, sdk, sdp (remote), sdq (remote), sdr (remote), and sds (remote). A 'Data groups' panel on the right shows a 'Mirror' group with disks sdi, sdm, sdn (remote), and sdo (remote). The 'Next' button is highlighted in green.

Name	Id	Size	Blink
sdb	wwn-0x6000c296a722a1553d31ccd1f...	16.00 GiB	●
sdc	wwn-0x6000c29af6d3cfff24bdec7c70d...	16.00 GiB	●
sdd	wwn-0x6000c2978bbacfa2edda580c6...	16.00 GiB	●
sde	wwn-0x6000c290be7256959cc943263...	16.00 GiB	●
sdf	wwn-0x6000c29156b425e79ddb645d...	16.00 GiB	●
sdg	wwn-0x6000c296be095f47221ccbec...	16.00 GiB	●
sdh	wwn-0x6000c2958aca3fe831b6cb36c...	16.00 GiB	●
sdi	wwn-0x6000c29af3cee22280f324a14c...	16.00 GiB	●
sdj	wwn-0x6000c29fa8c7c2d5e59b7c8b3...	16.00 GiB	●
sdk	wwn-0x6000c296a1ef6ef208308d5b...	16.00 GiB	●
sdp (remote)	wwn-0x6000c2986787edc246c9986f7...	16.00 GiB	●
sdq (remote)	wwn-0x6000c29c4d4d5460809082a17...	16.00 GiB	●
sdr (remote)	wwn-0x6000c29abd85a9867594a2fc0...	16.00 GiB	●
sds (remote)	wwn-0x6000c299b231a36f2ef83aed0...	16.00 GiB	●

Select redundancy for group: Mirror (single group) + Add group

Cancel Next

9. Create a new Pool



Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

Select 2 disks (**local + remote**) for the write log and click the **Add group** button.

The screenshot shows the Open-E JovianDSS web interface. The 'Zpool wizard' is open, and the 'Add write log' step is active. The 'Available disks' table lists various disks, with 'sdk' and 'sdp (remote)' selected. The 'Add group' button is highlighted with a red box and a red arrow pointing to it from the text box on the left.

Name	Id	Size	Blink
sdb	wwn-0x6000c296a722a1553d31ccd...	16.00 GiB	●
sdc	wwn-0x6000c29af6d3cfff24bdec7c7...	16.00 GiB	●
sdd	wwn-0x6000c2978bbacfa2edda580...	16.00 GiB	●
sde	wwn-0x6000c290be7256959cc9432...	16.00 GiB	●
sdf	wwn-0x6000c29156b425e79ddb64...	16.00 GiB	●
sdg	wwn-0x6000c296be95f47221ccce...	16.00 GiB	●
sdh	wwn-0x6000c2958aca3fe831b6cb3...	16.00 GiB	●
sdj	wwn-0x6000c29af3cee22280f324a1...	16.00 GiB	●
sdj	wwn-0x6000c29fa8c7c2d5e59b7c8...	16.00 GiB	●
<input checked="" type="checkbox"/> sdk	wwn-0x6000c296a1eff6f208308dd...	16.00 GiB	●
<input checked="" type="checkbox"/> sdp (remote)	wwn-0x6000c2986707edc246c9986...	16.00 GiB	●
sdq (remote)	wwn-0x6000c29c4d4d5460809082a...	16.00 GiB	●
sdr (remote)	wwn-0x6000c29abd85a9867594a2f...	16.00 GiB	●
sds (remote)	wwn-0x6000c299b231836f2ef83ee...	16.00 GiB	●

Buttons: Cancel, Back, Next

9. Create a new Pool

open-e

Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

Click the **Next** button.

The screenshot shows the Open-E JovianDSS web interface. The main navigation menu on the left includes Storage, User Manager, Failover Settings, Storage Settings, Backup & Recovery, System Settings, and Diagnostics. The 'Storage' section is active, and the 'Zpool wizard' is displayed. The wizard has six steps: 1. Add data group, 2. Add write log, 3. Add read cache, 4. Add spare disks, 5. Zpool properties, and 6. Summary. Step 2 is currently selected.

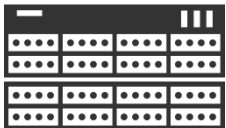
In step 2, 'Add write log', there is a checkbox for 'Show only unused disks' and a 'Rescan disks' button. Below this is a table of available disks:

Name	Id	Size	Blink
sdb	wwn-0x6000c296a722a1553d31ccd...	16.00 GiB	●
sdc	wwn-0x6000c29af6d3cfff24bdec7c7...	16.00 GiB	●
sdd	wwn-0x6000c2978bbacfa2edda580...	16.00 GiB	●
sde	wwn-0x6000c290be7256959cc9432...	16.00 GiB	●
sdf	wwn-0x6000c29156b425e79ddb64...	16.00 GiB	●
sdg	wwn-0x6000c296be095f47221ccce...	16.00 GiB	●
sdh	wwn-0x6000c2958aca3fe831b6cb3...	16.00 GiB	●
sdi	wwn-0x6000c29af3cee22280f324a1...	16.00 GiB	●
sdj	wwn-0x6000c29fa8c7c2d5e59b7c8...	16.00 GiB	●
sdq (remote)	wwn-0x6000c29c4d4d5460809082a...	16.00 GiB	●
sdr (remote)	wwn-0x6000c29abd05a9867594a2f...	16.00 GiB	●
sds (remote)	wwn-0x6000c299b231836f2ef83ee...	16.00 GiB	●
sdt (remote)	wwn-0x6000c29995bf3c859b3fec57...	16.00 GiB	●
sdu (remote)	wwn-0x6000c29bfad253aa307ef38...	16.00 GiB	●

Below the table, there is a dropdown menu for 'Select redundancy for group:' set to 'Mirror', and an '+ Add group' button. To the right of the disk list, there are two pop-up windows. The first, titled 'Data groups', shows a list of groups: sdi (16.00 GiB), sdm (16.00 GiB), sdn (remote) (16.00 GiB), and sdo (remote) (16.00 GiB). The second, titled 'Mirrored write log', shows a list of groups: sdk (16.00 GiB) and sdp (remote) (16.00 GiB). At the bottom of the wizard, there are buttons for 'Cancel', 'Back', and 'Next'. A red arrow points from the 'Next' button to the text 'Click the Next button.'

9. Create a new Pool

open-e



Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

Select a local SSD disk for the level-2 read cache and click the **Add group** button.

The screenshot displays the Open-E JovianDSS web interface. The main content area shows the 'Zpool wizard' with the following steps:

1. Add data group
2. Add write log
3. Add read cache (Current step)
4. Add spare disks
5. Zpool properties
6. Summary

The 'Add read cache' step shows a table of available disks:

Name	Id	Size	Blink
<input checked="" type="checkbox"/> sdb	wwn-0x6000c296a722a1553d31ccd...	16.00 GiB	●
<input type="checkbox"/> sdc	wwn-0x6000c29af6d3cfff24bdec7c7...	16.00 GiB	●
<input type="checkbox"/> sdd	wwn-0x6000c2978bbacfe2edda580...	16.00 GiB	●
<input type="checkbox"/> sde	wwn-0x6000c290be7256959cc9432...	16.00 GiB	●
<input type="checkbox"/> sdf	wwn-0x6000c29156b425e79ddb64...	16.00 GiB	●
<input type="checkbox"/> sdg	wwn-0x6000c296be095f47221ccce...	16.00 GiB	●
<input type="checkbox"/> sdh	wwn-0x6000c2958aca3fe831b6cb3...	16.00 GiB	●
<input type="checkbox"/> sdi	wwn-0x6000c29af3cee22280f324a1...	16.00 GiB	●
<input type="checkbox"/> sdj	wwn-0x6000c29fa8c7c2d5e59b7c8...	16.00 GiB	●
<input type="checkbox"/> sdq (remote)	wwn-0x6000c29c4d4d5460809082a...	16.00 GiB	●
<input type="checkbox"/> sdr (remote)	wwn-0x6000c29abd85a9867594a2f...	16.00 GiB	●
<input type="checkbox"/> sds (remote)	wwn-0x6000c299b231836f2ef83ee...	16.00 GiB	●
<input type="checkbox"/> sdt (remote)	wwn-0x6000c29995bf3c859b3fec57...	16.00 GiB	●
<input type="checkbox"/> sdu (remote)	wwn-0x6000c29bfad253aa307ef38...	16.00 GiB	●

Below the table, there is a 'Select redundancy for group:' dropdown set to 'Single' and an '+ Add group' button. A red arrow points from the text box to this button.

On the right side, there is a 'Data groups' panel showing a list of groups:

Group	Size
Mirror	
sd1	16.00 GiB
sdm	16.00 GiB
sdn (remote)	16.00 GiB
sdo (remote)	16.00 GiB

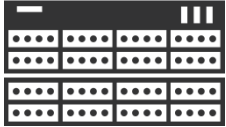
Below this, it shows 'Zpool storage capacity: 16.00 GiB' and 'Used licensed storage capacity: 16.00 GiB'. There is also a 'Mirrored write log' panel with groups 'sdk' and 'sdp (remote)', both 16.00 GiB.

The bottom of the wizard shows 'Cancel', 'Back', and 'Next' buttons. A red arrow points from the text box to the 'Add group' button.

Open-E JovianDSS Advanced Metro High Availability Cluster with 2 Rings *open-e*

9. Create a new Pool

open-e



Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

Click the **Next** button.

The screenshot shows the Open-E JovianDSS web interface. The main menu on the left includes Storage, User Manager, Failover Settings, Storage Settings, Backup & Recovery, System Settings, and Diagnostics. The central panel displays the 'Zpool wizard' with the following steps:

1. Add data group
2. Add write log
3. Add read cache
4. Add spare disks
5. Zpool properties
6. Summary

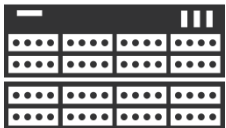
The 'Add data group' step is active. It shows a table of available disks:

Name	Id	Size	Blink
sdc	wwn-0x6000c29af6d3cf2f4bdec7c7...	16.00 GiB	●
sdd	wwn-0x6000c2978bbacf2edda580...	16.00 GiB	●
sde	wwn-0x6000c290be7256959cc9432...	16.00 GiB	●
sdf	wwn-0x6000c29156b425e79ddb64...	16.00 GiB	●
sdg	wwn-0x6000c296be95f47221ccce...	16.00 GiB	●
sdh	wwn-0x6000c2958aca3fe831b6cb3...	16.00 GiB	●
sdi	wwn-0x6000c29af3cee22280f324a1...	16.00 GiB	●
sdj	wwn-0x6000c29fa8c7c2d5e59b7c8...	16.00 GiB	●
sdq (remote)	wwn-0x6000c29c44d5460809082a...	16.00 GiB	●
sdr (remote)	wwn-0x6000c29abd85a9867594a2f...	16.00 GiB	●
sds (remote)	wwn-0x6000c299b231836f2ef83ee...	16.00 GiB	●
sdt (remote)	wwn-0x6000c29995bf3c859b3fec57...	16.00 GiB	●
sdu (remote)	wwn-0x6000c29bfad253aa307ef38...	16.00 GiB	●
sdv (remote)	wwn-0x6000c2941faed0df93e7ad...	16.00 GiB	●

Below the table, there is a 'Select redundancy for group:' dropdown set to 'Single' and an '+ Add group' button. To the right, a 'Data groups' panel shows the configuration for the 'Mirror' group, listing disks sdi, sdm, sdn (remote), and sdo (remote), each with a size of 16.00 GiB. It also shows the 'Zpool storage capacity: 16.00 GiB' and 'Used licensed storage capacity: 16.00 GiB'. At the bottom of the wizard, there are 'Cancel', 'Back', and 'Next' buttons. A red arrow points from the 'Next' button to the text 'Click the Next button.'

9. Create a new Pool

open-e



Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

In this setup, we skip the **Add spare disks**. You can always add spares later if you need. Now, click the **Next** button.

The screenshot shows the Open-E JovianDSS web interface with the Zpool wizard open. The wizard is at step 4, "Add spare disks", but the "Add spare disks" step is skipped. The "Available disks" table lists 16 disks, all 16.00 GiB in size. The "Data groups" section shows a "Mirror" group with disks sdi, sdm, sdn (remote), and sdo (remote). The "Zpool storage capacity" is 16.00 GiB, and the "Used licensed storage capacity" is 16.00 GiB. The "Next" button is highlighted with a red arrow.

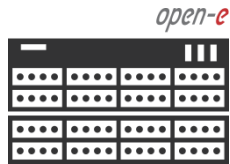
Name	Id	Size	Blink
sdc	wwn-0x6000c29af6d3cfff24bdec7c7...	16.00 GiB	●
sdd	wwn-0x6000c2978bbacfe2edda580...	16.00 GiB	●
sde	wwn-0x6000c290be7256959cc9432...	16.00 GiB	●
sdf	wwn-0x6000c29156b425e79ddb64...	16.00 GiB	●
sdg	wwn-0x6000c296bed95f47221ccce...	16.00 GiB	●
sdh	wwn-0x6000c2958aca3fe831b6cb3...	16.00 GiB	●
sdi	wwn-0x6000c29af3cee22280f324a1...	16.00 GiB	●
sdj	wwn-0x6000c29fa8c7c2d5e59b7c8...	16.00 GiB	●
sdq (remote)	wwn-0x6000c29c4d4d5460809082a...	16.00 GiB	●
sdr (remote)	wwn-0x6000c29abd85a9867594a2f...	16.00 GiB	●
sds (remote)	wwn-0x6000c299b231836f2ef03ee...	16.00 GiB	●
sdt (remote)	wwn-0x6000c29995bf3c859b3fec57...	16.00 GiB	●
sdu (remote)	wwn-0x6000c29bfad253aa307ef38...	16.00 GiB	●
sdv (remote)	wwn-0x6000c2941a1aed0df93e7ad...	16.00 GiB	●

Data groups	Size
Mirror	16.00 GiB
sdh	16.00 GiB
sdn (remote)	16.00 GiB
sdo (remote)	16.00 GiB

Zpool storage capacity: 16.00 GiB
Used licensed storage capacity: 16.00 GiB

Other groups	Size
Mirrored write io	16.00 GiB
sdk	16.00 GiB
sdp (remote)	16.00 GiB
Read cache	16.00 GiB
sdb	16.00 GiB

9. Create a new Pool

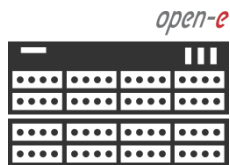


Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

Confirm the pool name, then click the **Next** button.

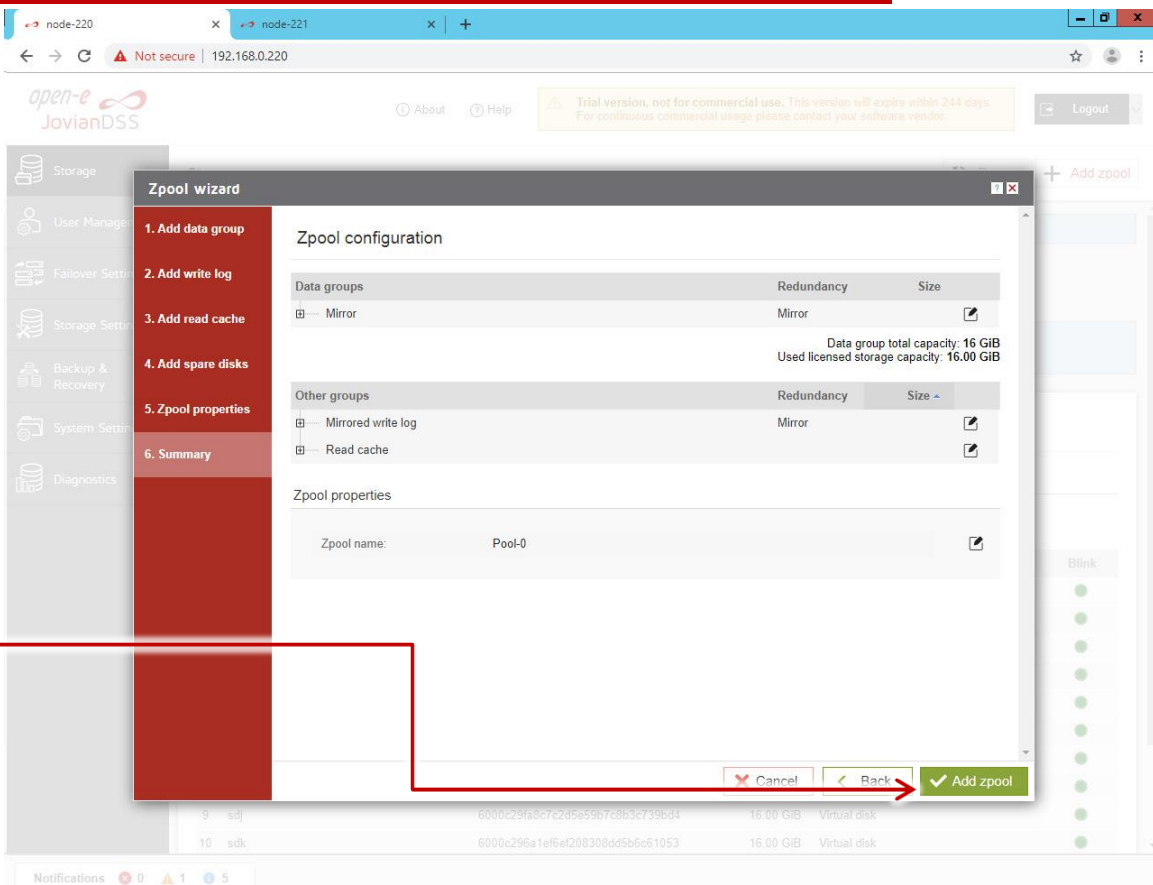
The screenshot shows the Open-E JovianDSS web interface. A 'Zpool wizard' modal is open, displaying a list of steps on the left: 1. Add data group, 2. Add write log, 3. Add read cache, 4. Add spare disks, 5. Zpool properties (selected), and 6. Summary. The main area shows the 'Zpool name' field with the value 'Pool-0'. Below the field, a note states: 'Zpool name: Defines name of the zpool in the system.' At the bottom of the wizard, there are three buttons: 'Cancel', 'Back', and 'Next'. A red arrow originates from the 'Next' button and points to the text box on the left side of the slide.

9. Create a new Pool



Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

Summary of the **Zpool wizard** step,
then click the **Add zpool** button.



The screenshot shows the Open-E JovianDSS web interface with the Zpool wizard open. The wizard is at the 'Summary' step, which is highlighted in red. The wizard configuration shows the following details:

- 1. Add data group:** Mirror
- 2. Add write log:** Mirrored write log
- 3. Add read cache:** Read cache
- 4. Add spare disks:** (Empty)
- 5. Zpool properties:** Zpool name: Pool-0
- 6. Summary:** (Current step)

The Zpool configuration table shows the following data groups:

Data groups	Redundancy	Size
Mirror	Mirror	16 GiB
Mirrored write log	Mirror	16 GiB
Read cache	Mirror	16 GiB

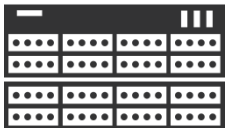
The Zpool properties table shows the following data groups:

Data groups	Redundancy	Size
Mirror	Mirror	16 GiB
Mirrored write log	Mirror	16 GiB
Read cache	Mirror	16 GiB

The Zpool name is set to Pool-0. The wizard includes a 'Cancel' button, a 'Back' button, and an 'Add zpool' button. A red arrow points from the 'Add zpool' button to the 'Add zpool' button in the sidebar.

9. Create a new Pool

open-e



Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

The **Pool-0** is now created.
Accordingly, you can configure a
second pool (**Pool-1**).

The screenshot shows the Open-E JovianDSS web interface. The left sidebar contains navigation links: Storage, User Management, Failover Settings, Storage Settings, Backup & Recovery, System Settings, and Diagnostics. The main content area is titled 'Storage' and shows 'Pool-0' with the following details:

- State: **ONLINE**
- Zpool ID: 6514485169002797111
- Total storage: 15.88 GiB
- Disks: 7

A status box indicates: Status: Zpool is functioning correctly. Action: None required.

Below this, a section titled 'Zpools available for import' shows a 'Rescan required' message with the instruction: 'Click Rescan button above to scan disks for new zpools.'

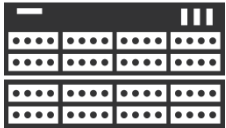
The 'Unassigned disks' section has tabs for 'Local disks' and 'Remote disks'. A search bar is present. Below is a table of unassigned disks:

	Name	Serial number	Size	Model	Blink
1	sdc	6000c29af6d3cff24bdec7c70dbbd71	16.00 GiB	Virtual disk	●
2	sdd	6000c2978bbacf2edda580c6da04980	16.00 GiB	Virtual disk	●

At the bottom, a notifications bar shows 0 errors, 1 warning, and 10 info messages.

10. Enter virtual IP

open-e



Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

In the **Storage** menu, select the **Virtual IPs** tab. Next, click **Add virtual IP**.

The screenshot shows the Open-E JovianDSS web interface. The left sidebar contains the following menu items: Storage, User Management, Failover Settings, Storage Settings, Backup & Recovery, System Settings, and Diagnostics. The main content area is titled 'Storage' and shows 'Pool-0' with a status of 'ONLINE'. Below this, there are tabs for 'Virtual IPs' and 'Virtual IPs routing'. The 'Virtual IPs' tab is selected, and a red arrow points to the '+ Add virtual IP' button. The 'Virtual IPs routing' tab is also visible, with a red arrow pointing to the '+ Add static routing' button. The bottom of the interface shows a notification bar with 0 errors, 1 warning, and 10 info messages.

Storage

Pool-0

State: ONLINE

Zpool ID: 6514485169002797111

Total storage: 15.88 GiB

Disks: 7

Status: Zpool is functioning correctly.

Action: None required.

Virtual IPs

+ Add virtual IP

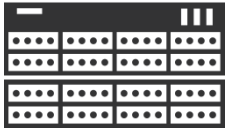
Virtual IPs routing

+ Add static routing

Notifications: 0 errors, 1 warning, 10 info

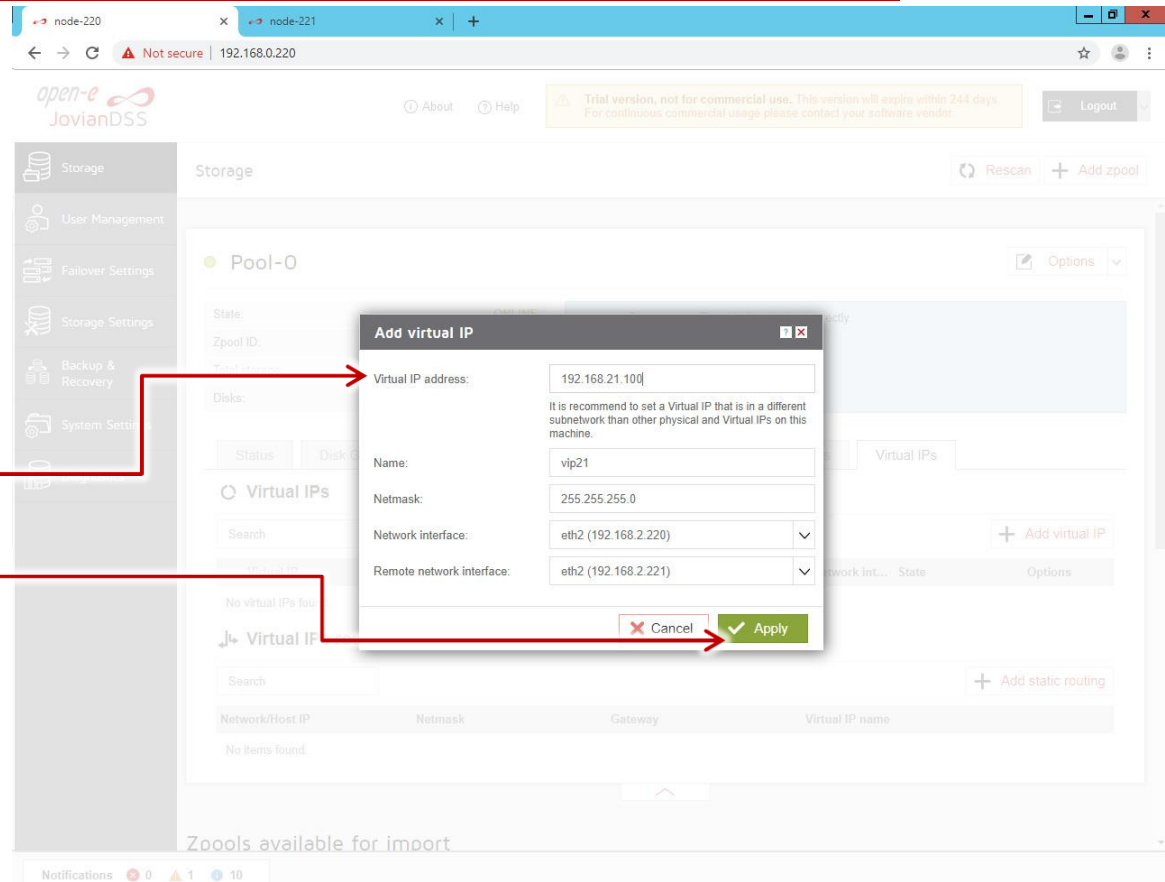
10. Enter virtual IP

open-e



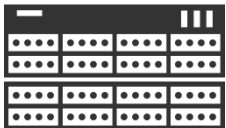
Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

Next, enter the virtual IP address and assign it to the required interfaces. Next, click the **Apply** button.



10. Enter virtual IP

open-e



Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

Both virtual IP addresses are created on **Pool-0**.

Note: the VIP's are in separate networks as this is recommended.

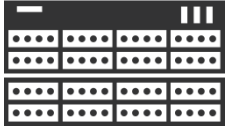
The screenshot shows the Open-E JovianDSS web interface. The left sidebar contains navigation links: Storage, User Management, Failover Settings, Storage Settings, Backup & Recovery, System Settings, and Diagnostics. The main content area displays the 'Storage' configuration for 'Pool-0'. The status is 'ONLINE'. The Zpool ID is 6514485169002797111, and the total storage is 15.88 GiB. There are 7 disks. A message box indicates 'Zpool is functioning correctly. None required.' Below this, there are tabs for Status, Disk Groups, iSCSI Targets, FC Targets, Shares, Snapshots, and Virtual IPs. The 'Virtual IPs' tab is selected, showing a table with two entries:

Virtual IP	Name	Netmask	Network interface	Remote network int...	State	Options
1 192.168.21.100	vip21	255.255.255.0	eth2 (192.168.2.220)	eth2 (192.168.2.221)	Active	Options
2 192.168.31.100	vip31	255.255.255.0	eth3 (192.168.3.220)	eth3 (192.168.3.221)	Active	Options

Below the table is a section for 'Virtual IPs routing' with a search bar and an 'Add static routing' button. The routing table is currently empty.

10. Enter virtual IP

open-e



Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

Both virtual IP addresses are created on **Pool-1**.

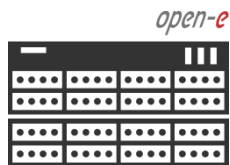
Note: the VIP's are in separate networks as this is recommended.

The screenshot shows the Open-E JovianDSS web interface. The left sidebar contains navigation links: Storage, User Management, Failover Settings, Storage Settings, Backup & Recovery, System Settings, and Diagnostics. The main content area is titled 'Storage' and shows the configuration for 'Pool-1'. The pool status is 'ONLINE'. Below this, there are tabs for Status, Disk Groups, iSCSI Targets, FC Targets, Shares, Snapshots, and Virtual IPs. The 'Virtual IPs' tab is selected, showing a table with two entries:

Virtual IP	Name	Netmask	Network interface	Remote network int...	State	Options
102.168.22.100	vip22	255.255.255.0	eth2 (192.168.2.220)	eth2 (192.168.2.221)	Active	Options
192.168.32.100	vip32	255.255.255.0	eth3 (192.168.3.220)	eth3 (192.168.3.221)	Active	Options

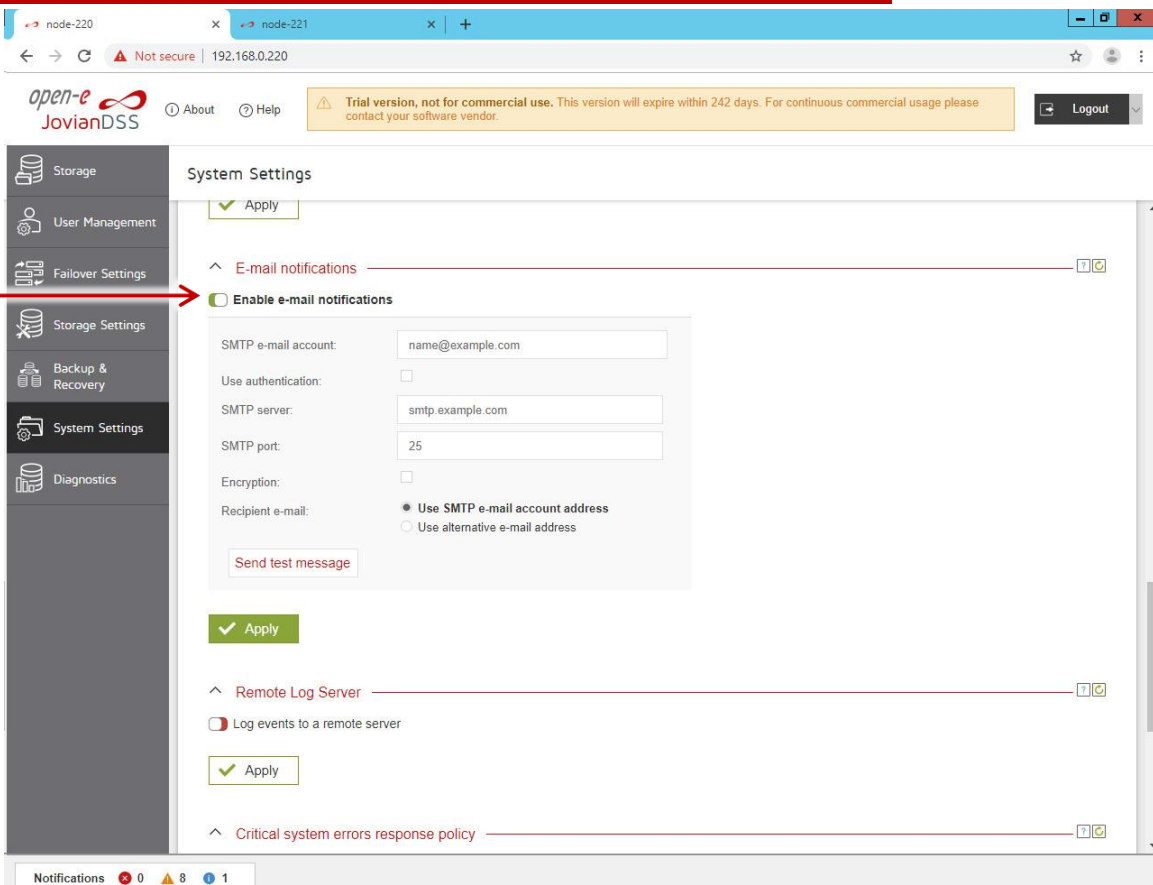
Below the table is a section for 'Virtual IPs routing' with a search bar and a '+ Add static routing' button. The status bar at the bottom shows 0 notifications, 1 warning, and 15 errors.

11. System monitoring setup



Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

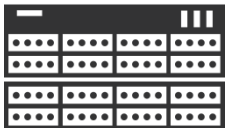
In the **System Settings** tab, set up the proper **E-mail notifications**.



The screenshot shows the Open-E JovianDSS web interface in a browser window. The address bar shows the URL `192.168.0.220`. The interface has a sidebar with navigation options: Storage, User Management, Failover Settings, Storage Settings, Backup & Recovery, System Settings (highlighted), and Diagnostics. The main content area is titled "System Settings" and contains several sections. The "E-mail notifications" section is expanded, showing a toggle for "Enable e-mail notifications" which is currently turned on. Below this, there are input fields for "SMTP e-mail account" (filled with "name@example.com"), "Use authentication" (unchecked), "SMTP server" (filled with "smtp.example.com"), "SMTP port" (filled with "25"), "Encryption" (unchecked), and "Recipient e-mail" (with radio buttons for "Use SMTP e-mail account address" and "Use alternative e-mail address"). A "Send test message" button is at the bottom of this section. Below the email settings is a "Remote Log Server" section with a toggle for "Log events to a remote server" which is currently turned off. At the bottom, there is a "Critical system errors response policy" section. The top of the interface includes a trial version warning and a "Logout" button. The bottom status bar shows "Notifications" with counts: 0 errors, 8 warnings, and 1 info.

11. System monitoring setup

open-e

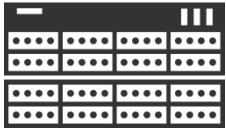


Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

It is obligatory to use external monitoring software via SNMP or **Remote Log Server** or a built-in Checkmk agent.

12. Failover test

open-e



Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

Now, in order to test failover, select **Storage** from the main menu and in the **Options** drop-down menu, select **Move**.

The pool will be exported on the current node and will be imported on the second node.

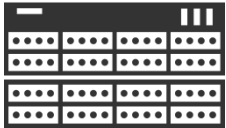
The screenshot shows the Open-E JovianDSS web interface. The left sidebar contains the main menu with 'Storage' selected. The top navigation bar includes 'About', 'Help', a trial notice, and a 'Logout' button. The 'Storage' section displays 'Pool-1' with a status of 'ONLINE'. A message indicates 'Zpool is functioning correctly. None required.' The 'Options' menu is open, showing 'Delete Zpool', 'Export Zpool', 'Clear error counters', and 'Move' (highlighted with a red arrow). Below this, the 'Virtual IPs' section shows a table with two active virtual IPs.

Virtual IP	Name	Netmask	Network interface	Remote network int...	State	Options	
1	102.168.22.100	vip22	255.255.255.0	eth2 (192.168.2.220)	eth2 (192.168.2.221)	Active	Options
2	192.168.32.100	vip32	255.255.255.0	eth3 (192.168.3.220)	eth3 (192.168.3.221)	Active	Options

Below the table, the 'Virtual IPs routing' section is visible, showing a search bar and a table with columns for Network/Host IP, Netmask, Gateway, and Virtual IP name. The table currently shows 'No items found.'

12. Failover test

open-e



Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

Click the **Move** button to start the failover.

The screenshot shows the Open-E JovianDSS web interface. The left sidebar contains navigation links: Storage, User Management, Failover Settings, Storage Settings, Backup & Recovery, System Settings, and Diagnostics. The main content area is titled 'Storage' and shows 'Pool-1' with details: State: ONLINE, Zpool ID: 6514485169002797111, Total storage: 15.88 GiB, and Disks: 7. Below this is a 'Virtual IPs' section with a table listing two virtual IPs. A confirmation dialog box is overlaid on the table, asking 'Are you sure you want to move the resource?'. The dialog has 'Cancel' and 'Move' buttons. A red arrow points from the 'Move' button in the dialog to the 'Move' button in the Virtual IPs table. The background interface also shows a 'Virtual IPs routing' section with a search bar and a table for adding static routing.

Virtual IP	Name	Netmask	Network interface	Remote network int...	State	Options	
1	192.168.21.100	vip21	255.255.255.0	eth2 (192.168.2.220)	eth2 (192.168.2.221)	Active	Options
2	192.168.31.100	vip31	255.255.255.0	eth3 (192.168.3.220)	eth3 (192.168.3.221)	Active	Options

12. Failover test

open-e



Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

The **Pool-1** was exported from Node-220 and imported on Node-221. Node-220 (node-a) GUI will show the **Pool-1** is active on node-221 (node-b).

In order to move pool activity back to node-220 (node-a), click the **Move to this node** button.

The screenshot shows the Open-E JovianDSS web interface. The left sidebar contains navigation links: Storage, User Management, Failover Settings, Storage Settings, Backup & Recovery, System Settings, and Diagnostics. The main content area is titled 'Storage' and shows a notification about a disk configuration change. Below this, 'Pool-0' is listed as ONLINE with a Zpool ID of 6514485169002797111, 15.88 GiB total storage, and 7 disks. 'Pool-1' is listed as ONLINE and 'Active on node node-221'. A red arrow points from the 'Move to this node' button in the Pool-1 section to the text in the callout box. At the bottom, a section titled 'Zpools available for import' shows a message: 'No external zpools available for the import have been found.' The bottom status bar shows 'Notifications' with 0 errors, 1 warning, and 20 info messages.

12. Failover test

open-e

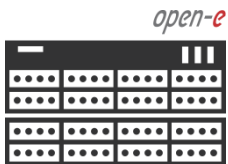


Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

Click the **Move** button to start failover. It will start exporting the pool on Node-221 (**node-b**) and next it will be importing back to Node-220 (**node-a**).

The screenshot shows the Open-E JovianDSS web interface. The left sidebar contains navigation links: Storage, User Management, Failover Settings, Storage Settings, Backup & Recovery, System Settings, and Diagnostics. The main content area displays the 'Storage' section. A confirmation dialog box is overlaid on the Pool-0 details, asking 'Are you sure you want to move the resource?'. The dialog has 'Cancel' and 'Move' buttons. A red arrow points from the 'Move' button in the dialog to the 'Move' button in the Pool-0 details. The Pool-0 details show 'State: ONLINE', 'Zpool ID: 6514485169002797111', 'Total storage: 15.88 GiB', and 'Disks: 7'. Below the Pool-0 details, there is a section for 'Zpools available for import' showing a 'Rescan required' message.

12. Failover test



Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

The failover test is completed. The **Pool-1** is active back on Node-220 (node-a)
Now, create an iSCSI target or NFS, SMB shares and connect storage clients to either of them. Once storage clients are connected, run one more failover test with a reboot of the first node and next after a successful failover, with reboot of the second node.

Open-E JovianDSS Advanced Metro High Availability Cluster with 2 Rings *open-e*

NOTE:

The step-by-step guide is based on a configuration from **page 5**. It uses two storage access paths and two virtual IPs per pool. This setup can be used for iSCSI with a multipath for non-zero-point-of-failure cluster.

There are plenty of possible configurations. Next examples are shown on **page 46 and 52**.

On **page 46** instead of two storage paths, there is a single bond. This setup can be used for NFS or SMB as a bond, assuring redundancy on the storage path. This setup cannot be used for iSCSI, as iSCSI requires two storage paths for redundant iSCSI multipaths.

On **page 47** instead of just two storage paths, there are two bonds. This setup can be used also for iSCSI Initiators with multipath or for mixed iSCSI/SMB/NFS environments.

Both configurations on **page 46 and 47** have redundant mirroring path. It uses a point-to-point Active-Backup bond instead of a single Ethernet connection. The Round-Robin bond cannot be used if the ring 2 is also configured over the mirror path.

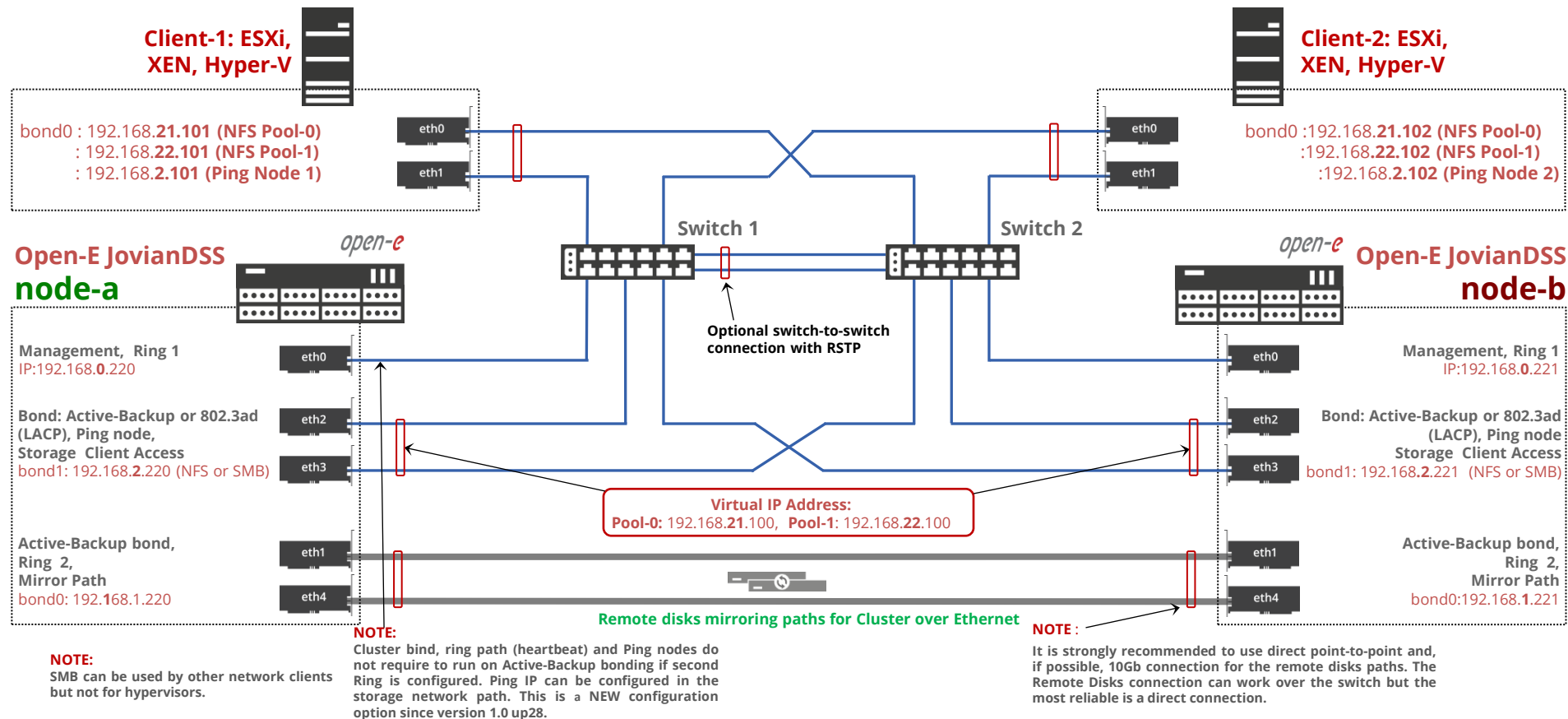
If mirror path is configured over a Round-Robin bond for better mirror performance, the second ring require extra dedicated path like shown on the configuration example on **page 48**. Here, the second ring path is configured over eth5-eth5 point-to-point path. It is strongly recommended to configure the second ring via point-to-point path as this will be switch failure independent and will not need both storage nodes to reboot in case of all Ethernet networks are down.

On **page 49** another example with 4 NICs only in every storage node. Here, the single point-to-point path is used for mirror path and second ring, 2 lines for iSCSI multipath and the first NIC pair is used for first ring, web management, and also for On- & Off-site Data Protection to another Open-E JovianDSS (not shown on the chart).

On **page 50..52** sites are connected via **limited number of connections**. On **page 50** connection between switches and direct point-to-point mirror path is available. On **page 51 and 52** only switch-to-switch connection is available. In such case, **ping nodes must be configured on one site only** so cluster will not force to import pools and split in case of lost connections between both sites. Such situation can happen if a switch failed or switch port used for site-to-site connection failed, or the cable was removed or damaged.

If the setup shown on **page 51 or 52** is used and **ping nodes are configured on both sites**, and connection between both sites is lost, both storage cluster nodes are obviously split. On both sites all pools will be imported in the degraded mode and cluster status on both nodes will be “separated”. The mirror path will show the “disconnected” status. This will be as long as the disconnected cluster status shows the “separated” mode. The reason for this behavior is to prevent auto-rejoin after restoring the connection between both sites. The re-join is impossible and the administrator must detach the lost (UNAVAILABLE) disks from mirrors on proper pools, delete wrong pools on the lost and detached disks. The cluster nodes must be disconnected using the “Disconnect” button in the GUI. After disconnect, the cluster must be re-configured, plus new and empty disks (after wrong pools are deleted) must be attached in order to re-mirror all data (GUI will show resilver running). It is required to restore the cluster after this split, **THIS KIND OF SETUP (no direct-point-to-point mirror path and switch-to-switch connection only, and ping nodes configured on both sites) IS STRONGLY NOT RECOMMENDED AND MUST BE AVOIDED**. This is why the setup on **page 51 and 52** shows ping nodes configured on one site only!

Open-E JovianDSS Advanced Metro High Availability Cluster with 2 Rings and bonded storage path for NAS (NFS, SMB) storage clients.



Open-E JovianDSS Advanced Metro High Availability Cluster with 2 Rings and bonded storage path for NAS (NFS, SMB) and iSCSI storage clients.



**Client-1: ESXi,
XEN, Hyper-V**

**Client-2: ESXi,
XEN, Hyper-V**

eth0 : 192.168.21.101 (iSCSI or NFS Pool-0)
: 192.168.22.101 (iSCSI or NFS Pool-1)
eth1 : 192.168.31.101 (iSCSI or NFS Pool-0)
: 192.168.32.101 (iSCSI or NFS Pool-1)
eth0 or eth1:192.168.1.101 (Ping Node)

eth0 : 192.168.21.102 (iSCSI or NFS Pool-0)
: 192.168.22.102 (iSCSI or NFS Pool-1)
eth1 : 192.168.31.102 (iSCSI or NFS Pool-0)
: 192.168.32.102 (iSCSI or NFS Pool-1)
eth0 or eth1 : 192.168.3.102 (Ping Node)

Open-E JovianDSS node-a

Open-E JovianDSS node-b

Management, Ring 1
IP:192.168.0.220

Management, Ring 1
IP:192.168.0.221

Bond: Active-Backup or
802.3ad(LACP), Ping node
Storage Client Access
bond0: 192.168.1.220 (iSCSI, NFS or SMB)

Bond: Active-Backup or
802.3ad(LACP), Ping node
Storage Client Access
bond0: 192.168.1.221 (iSCSI, NFS or SMB)

Bond: Active-Backup or
802.3ad(LACP), Ping node
Storage Client Access
bond1: 192.168.3.220 (iSCSI, NFS or SMB)

Bond: Active-Backup or
802.3ad(LACP), Ping node
Storage Client Access
bond1: 192.168.3.221 (iSCSI, NFS or SMB)

Active-Backup bond,
Ring 2,
Mirror Path
bond2: 192.168.5.220

Active-Backup bond,
Ring 2,
Mirror Path
bond2: 192.168.5.221

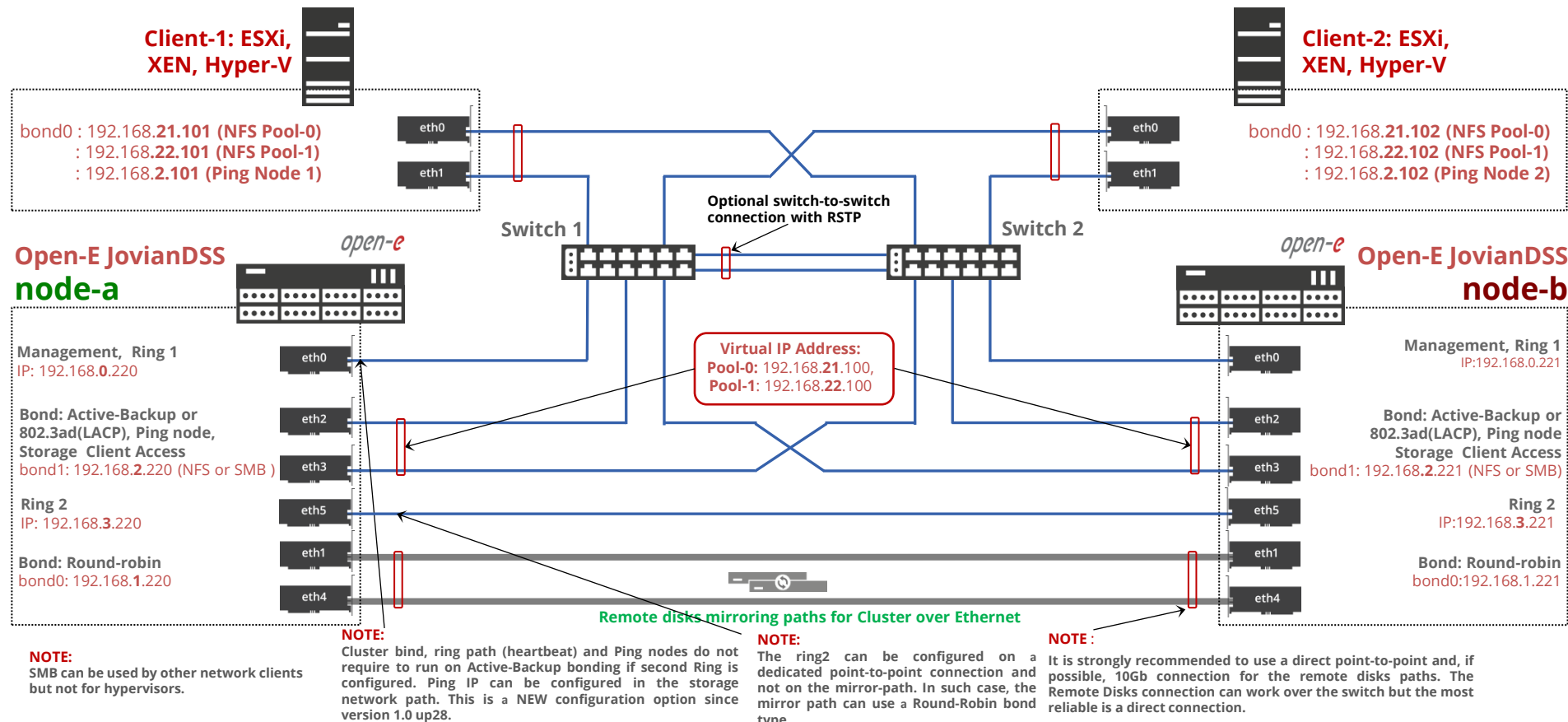
Remote disks mirroring paths for Cluster over Ethernet

NOTE:
SMB can be used by other network clients
but not for hypervisors.

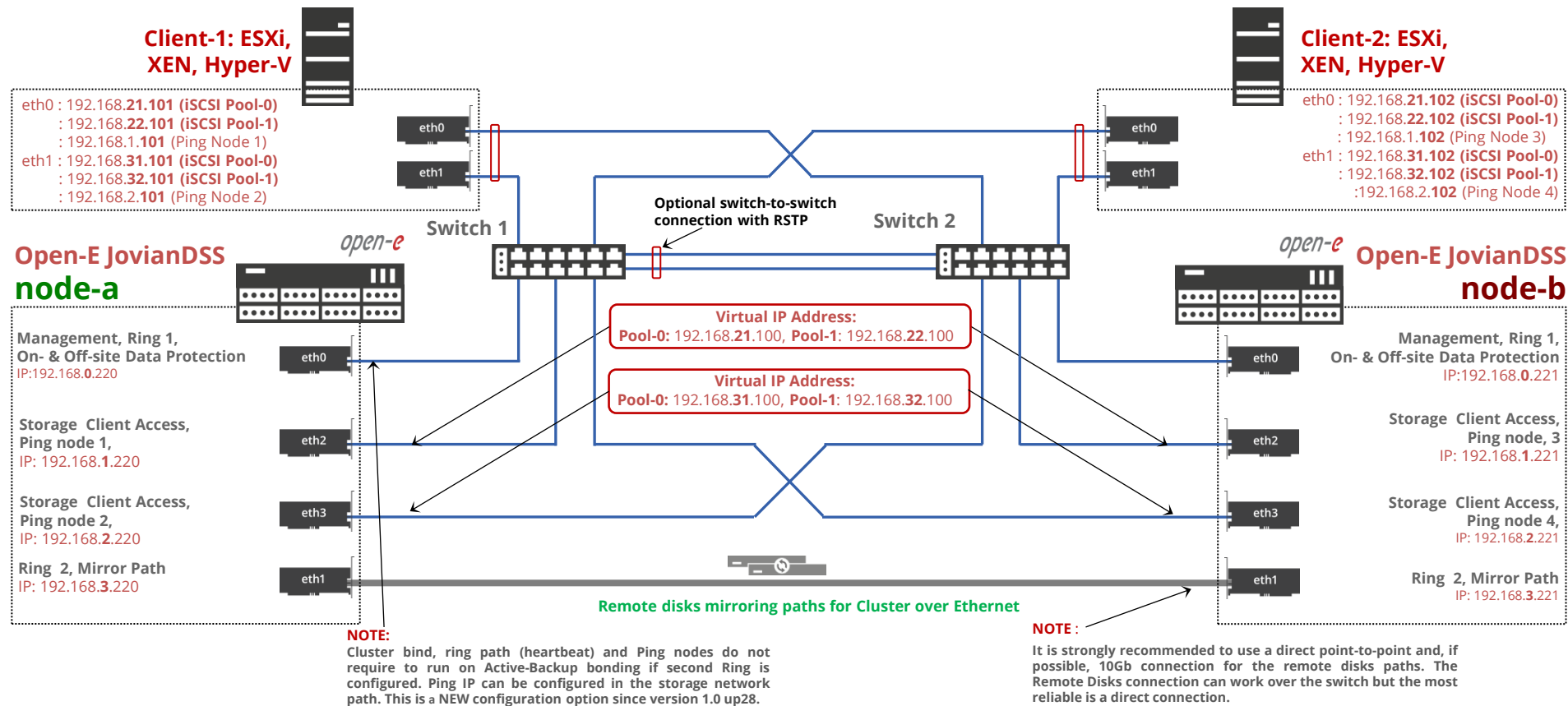
NOTE:
Cluster bind, ring path (heartbeat) and Ping nodes do not
require to run on Active-Backup bonding if second Ring is
configured. Ping IP can be configured in the storage network
path. This is a NEW configuration option since version 1.0
up28.

NOTE:
It is strongly recommended to use a direct point-to-point, and if
possible, 10Gb connection for the remote disks paths. The Remote
Disks connection can work over the switch but the most reliable is a
direct connection.

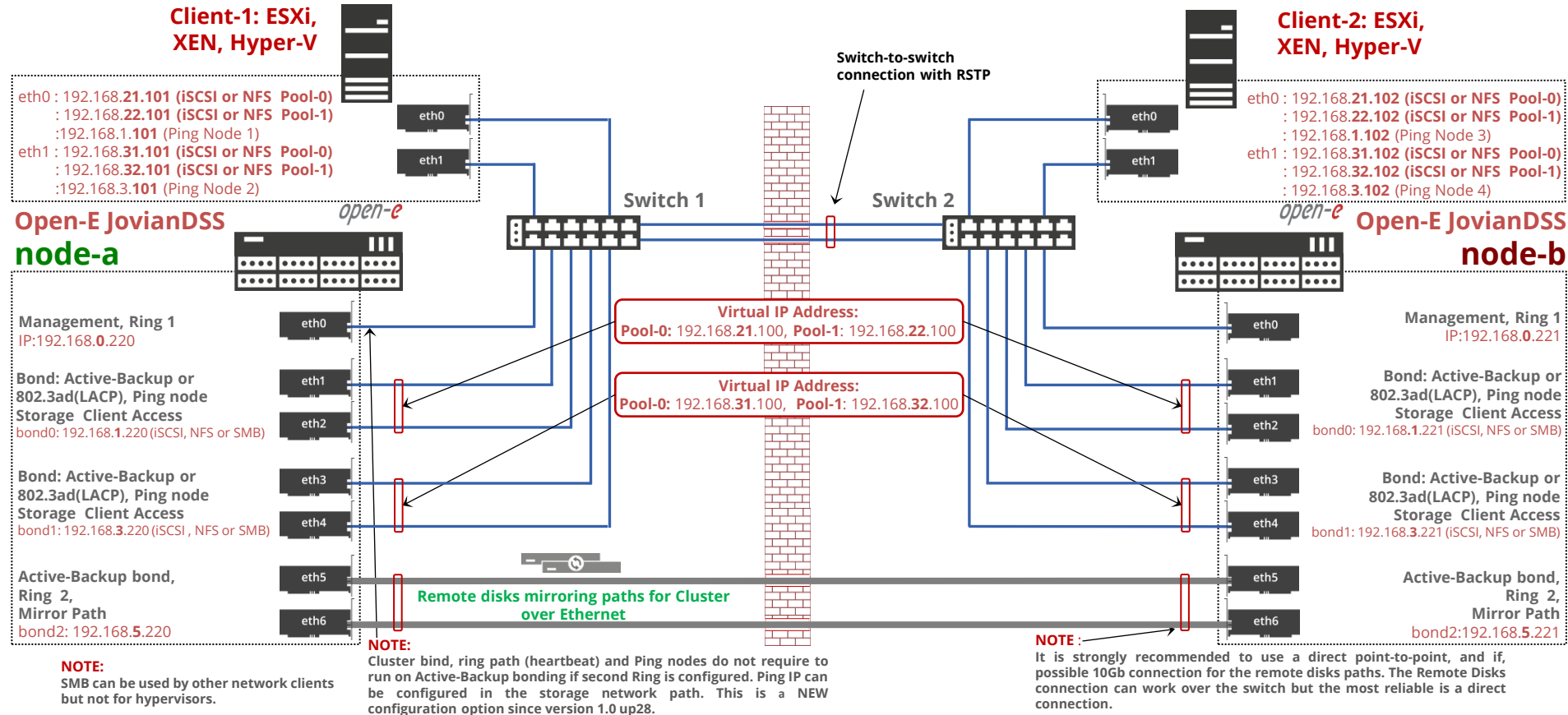
Open-E JovianDSS Advanced Metro High Availability Cluster with 2 Rings and bonded storage path for NAS (NFS, SMB) storage clients.



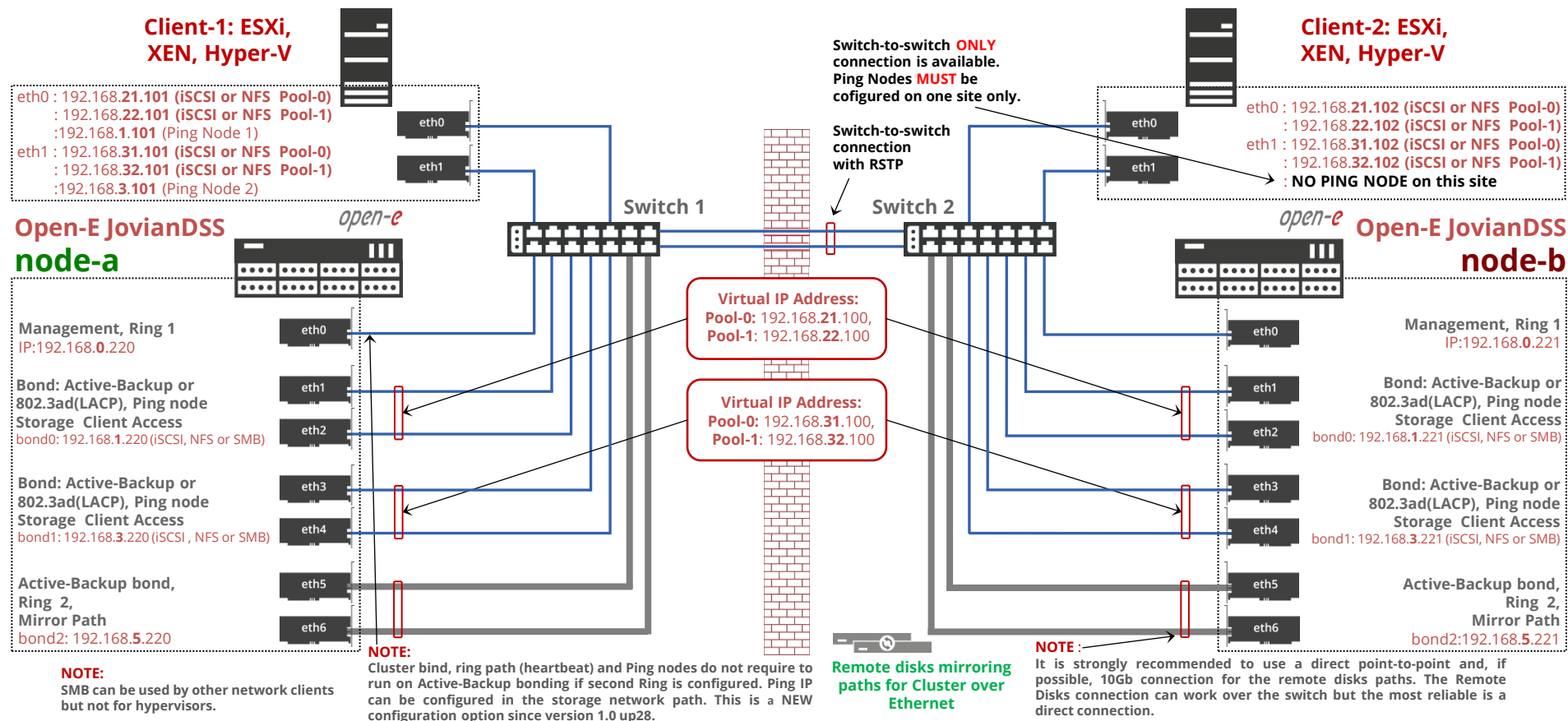
Open-E JovianDSS Advanced Metro High Availability Cluster with 2 Rings and bonded storage path for iSCSI storage clients.



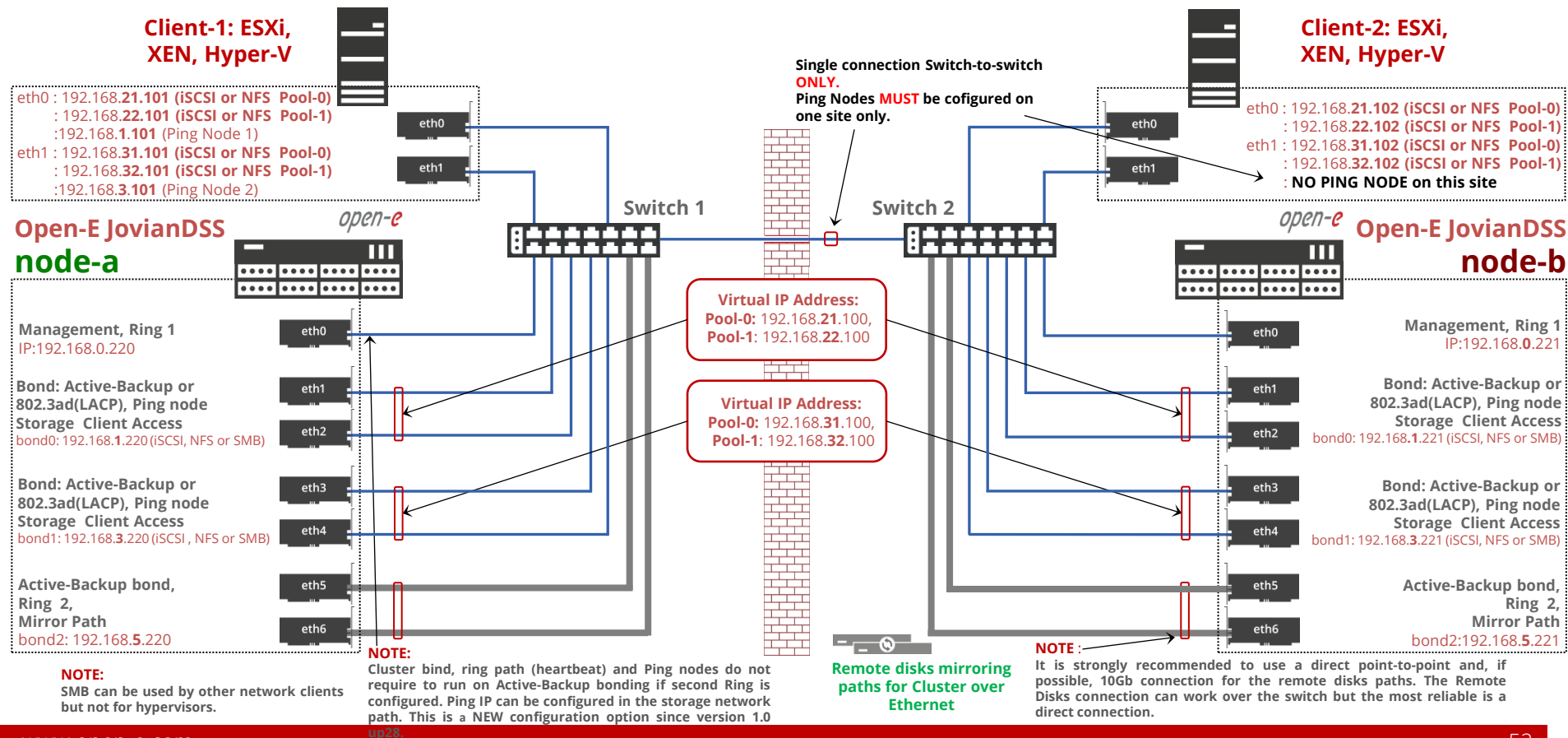
Open-E JovianDSS Advanced Metro High Availability Cluster with 2 Rings and bonded storage path for NAS (NFS, SMB) and iSCSI storage clients.



Open-E JovianDSS Advanced Metro High Availability Cluster with 2 Rings and bonded storage path for NAS (NFS, SMB) and iSCSI storage clients.



Open-E JovianDSS Advanced Metro High Availability Cluster with 2 Rings and bonded storage path for NAS (NFS, SMB) and iSCSI storage clients.



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Thank You!
