



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:

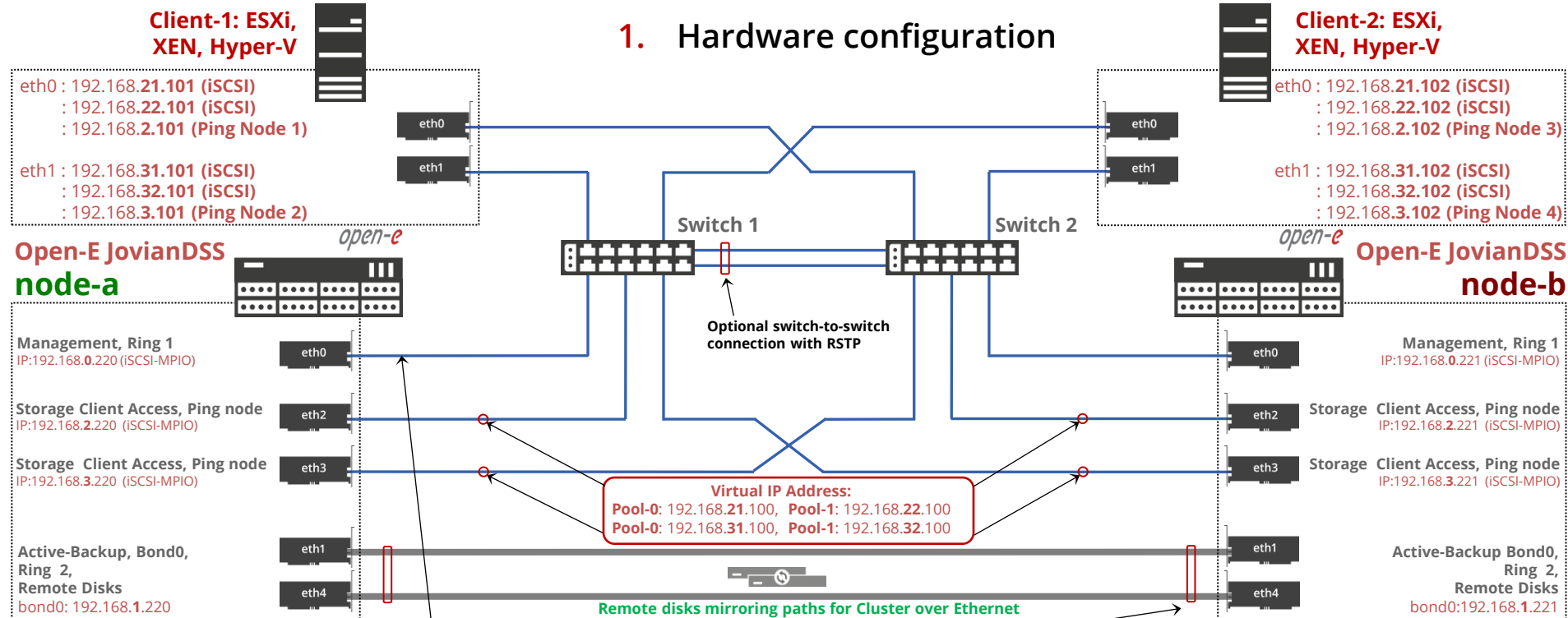
- Everything what was valid and working in the up27 will also work in the up28 and newer.
- Up to 2 rings can be configured and ping nodes to be configured on the same path of the storage paths and not on the rings network.
- There is NO obligatory active-backup bond for the cluster bind-ring. Both rings 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.

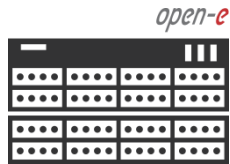
To set up an Advanced Metro HA Cluster, perform the following steps:

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

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.

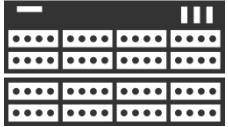
The screenshot shows the Open-E JovianDSS System Settings interface. The left sidebar contains a menu with the following items: Storage, User Management, Failover Settings, Storage Settings, Backup & Recovery, System Settings (highlighted), and Diagnostics. The main content area is titled "System Settings" 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 network 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 "Static routing manager" section with a search box and a "+ Add static routing" button. There is also a "Default gateway" section and a "Settings" section. At the bottom of the interface, there are notification icons for errors (0), warnings (0), and info (0).

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.

Name	IP	DHCP	Interface details	Cable	Active	Bond	Select
eth0	192.168.0.220	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 checked="" type="checkbox"/>

Bonding options

Mode: Active-backup

Primary interface: eth1

Primary reselect policy: failure (default)

MAC: Custom

Internet protocol: Static

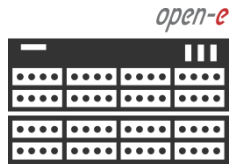
IP: 192.168.1.220

Netmask: 255.255.255.0

Broadcast: automatic

Buttons: Cancel, Apply

2.2. Network configuration. Select a default gateway



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

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

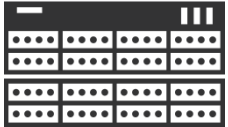
Next, in the **Default gateway** field, click the **Change** button.

The screenshot shows the Open-E JovianDSS System Settings interface. The left sidebar contains navigation options: Storage, User Management, Failover Settings, Storage Settings, Backup & Recovery, System Settings, and Diagnostics. 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 network interfaces with columns for Name, IP, DHCP, Vendor, Negotiated speed, Cable, Status, and Options. The "bond0" interface is highlighted with a red arrow. Below the table, the "Default gateway" section is visible, showing the interface as "eth0" and the gateway as "static". A red arrow points to the "Change" button at the bottom of this section. A trial version warning is visible at the top right of the interface.

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

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 main page is 'System Settings' with a sidebar on the left containing 'Storage', 'User Management', 'Failover Settings', 'Storage Settings', 'Backup & Recovery', 'System Settings', and 'Diagnosis'. The 'System Settings' page has a 'Network/Host' section with a table of interfaces:

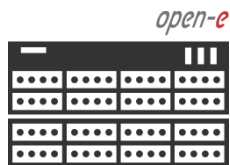
Interface	IP Address	Netmask	Gateway	Speed	Port	Status	Options
eth2	192.168.2.220	No	VMware VMXNET3 Ethernet Controll...	10000 Mbps	cable	Active	Options
eth3	192.168.3.220	No	VMware VMXNET3 Ethernet Controll...	10000 Mbps	cable	Active	Options
eth4 (bond0)	N/A	No	VMware VMXNET3 Ethernet Controll...	10000 Mbps	cable	Bond slave	Options

A modal window titled 'Select default gateway' is open, showing a table of available interfaces:

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"/>

At the bottom of the modal, there are 'Cancel' and 'Apply' buttons. Red arrows point from the text box to the 'eth0' row and the 'Apply' button.

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.

System Settings

Administration Network MPIO System Settings management Update

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

Static routing manager

Search

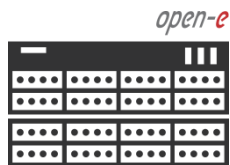
+ Add static routing

Network/Host IP	Netmask	Gateway	Interface
No items found.			

Default gateway

Interface eth0

3. Time and date settings



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

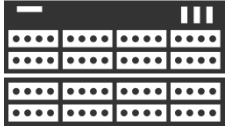
In the **System** tab, in **Time and date settings**, select the **Continuous NTP synchronization** and click apply.

Repeat this step for the second cluster node as well.

The screenshot shows the Open-E JovianDSS web interface. The browser address bar shows '192.168.0.220'. The page title is 'open-e JovianDSS'. The left sidebar contains navigation items: Storage, User Management, Failover Settings, Storage Settings, Backup & Recovery, System Settings (highlighted), and Diagnostics. The main content area is titled 'System Settings' and has tabs for Administration, Network, MPIIO, System, Settings management, and Update. The 'System' tab is active, and the 'Time and date settings' section is expanded. It shows 'Time zone' set to 'Europe/Berlin', 'Set time and date' with 'Manual' selected, 'Current time' as '23:27:12', and 'Current date' as '2019-08-23'. The 'Continuous NTP synchronization' option is selected, with 'NTP server' set to '0.pool.ntp.org,1.pool.ntp.org,2.'. A green 'Apply' button is visible. Below this, the 'Boot medium' section shows 'State: HEALTHY', 'Disks: 1/1', and 'Redundancy: Single'. A yellow warning box at the bottom right states: 'Status: No redundancy for boot medium. Action: Add at least one disk to ensure that in case your primary boot disk fails, it will be replaced by other boot disk without losing access to your data. Also, it is highly recommended to add at least one additional spare disk to ensure that if one of the mirrored disks fails, it will be replaced by this spare disk.'

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.

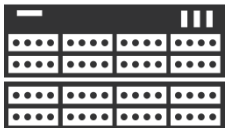
NOTE:

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

The screenshot shows the Open-E JovianDSS web interface. The browser address bar shows the URL 192.168.0.220. The page title is "open-e JovianDSS". A warning banner at the top states: "Trial version, not for commercial use. This version will expire within 244 days. For continuous commercial usage please contact your software vendor." The left sidebar contains a menu with options: Storage, User Management, Failover Settings, Storage Settings, Backup & Recovery, System Settings, and Diagnostics. The main content area is titled "Failover Settings". Under "Failover status", there is a warning box: "Nodes are not bound. In order to configure and run Failover service both nodes must be connected. Nodes can be connected with a single or active-backup bonding interface, the latter is the preferred one. In case of a single connection it is recommended to add another ring to increase the reliability of communication between the nodes. The second ring can run as a single connection or as an active-backup bonding interface. Note: physical and Virtual IP addresses on each node must have a unique subnetwork class." Below this, the "Node binding" section has a form with "Remote node IP" (192.168.0.221) and "Password" (masked with dots). A green "Connect" button is at the bottom of the form. The bottom of the page shows a notifications bar with 0 errors, 0 warnings, and 2 info messages.

5. Adding rings

open-e



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

open-e JovianDSS About Help

Trial version, not for commercial use. This version will expire within 244 days. For continuous commercial usage please contact your software vendor.

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: e2dc4bc)	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

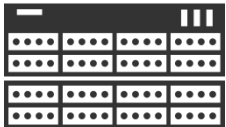
Ping nodes: 0 of 0 reachable

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.

The screenshot displays the Open-E JovianDSS web interface. The main content area is titled "Failover Settings" and shows a "Ready to start" status with a "Start Failover" button. Below this, there is a "Failover nodes" section with a table. A modal window titled "Add ring" is open, showing the configuration for a new ring. The "Local node interface" and "Remote node interface" are both set to "bond0 (192.168.1.220) active-backup". The "Apply" button is highlighted with a red arrow. The background shows a table of rings with one configured and ping nodes showing 0 of 0 reachable.

5. Adding rings

open-e



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.

Failover Settings

Failover status: Ready to start

Start Failover

Failover nodes

Rings

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

+ Add ring

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	X Delete

X Close

Failover nodes table:

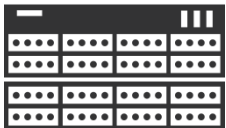
Local node interface	Remote node interface	Status	Options
1 eth0 (192.168.0.220)	eth0 (192.168.0.221)	N/A	
2 bond0 (192.168.1.220)	bond0 (192.168.1.221)	N/A	X Delete

Rings: 2 configured

Ping nodes: 0 of 0 reachable

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

Trial version, not for commercial use. This version will expire within 244 days. For continuous, commercial usage please contact your software vendor

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

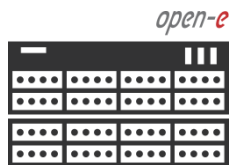
Edit

Ping nodes 4 of 4 reachable

Edit

Notifications

7. Mirroring path

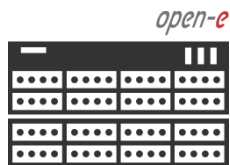


Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

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

The screenshot shows the Open-E JovianDSS web interface. The browser address bar shows the URL 192.168.0.220. The page title is 'open-e JovianDSS'. A navigation sidebar on the left contains the following items: Storage, User Management, Failover Settings (highlighted), Storage Settings, Backup & Recovery, System Settings, and Diagnostics. The main content area is titled 'Failover Settings'. It includes a 'Zpool name' section with the value 'Active on node'. Below that is a 'Clustered services' table with one entry: 'LDAP database synchronization' with a status of 'Disabled'. The 'Rings' section shows '2 configured' with an 'Edit' button. The 'Ping nodes' section shows '4 of 4 reachable' with an 'Edit' button. 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.' Below this box is a button labeled '+ Add mirroring path'. A red arrow points from the text box on the left to this button. At the bottom of the page, there is a 'Notifications' area with three icons: a red 'x', a yellow triangle, and a blue circle.

7. Mirroring path

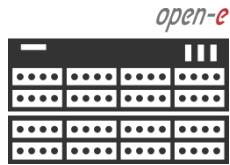


Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

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

The screenshot shows the Open-E JovianDSS web interface. The main content area is titled 'Failover Settings'. A modal dialog box titled 'Add mirroring path' is open, showing two dropdown menus: 'Local node interface' and 'Remote node interface', both set to 'bond0 (192.168.1.220)'. Below the dropdowns are 'Cancel' and 'Apply' buttons. A red arrow points from the text box on the left to the 'Apply' button. The background interface shows a sidebar with navigation options like 'Storage', 'User Management', 'Failover Settings', 'Storage Settings', 'Backup & Recovery', 'System Settings', and 'Diagnostics'. The main content area also shows 'Clustering Services' and 'Rings' sections.

7. Mirroring path



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

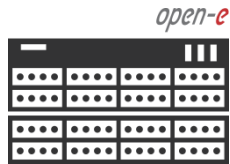
Mirroring path shows the **Connected** status.

The screenshot displays the Open-E JovianDSS web interface. The left sidebar contains navigation options: 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 warning banner for the trial version. Below the warning, there are sections for 'Zpool name', 'Clustered services' (showing 'LDAP database synchronization' as disabled), 'Rings' (2 configured), and 'Ping nodes' (4 of 4 reachable). The 'Advanced failover settings' section is expanded to show 'Remote disks mirroring paths for Cluster over Ethernet'. This section contains a table with the following data:

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

At the bottom of the interface, there is a 'SCSI-3 Persistent Reservation Synchronization' section with a toggle for 'Enable Persistent Reservation Synchronization' which is currently disabled. A notification bar at the very bottom shows 0 errors, 1 warning, and 5 info messages.

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.

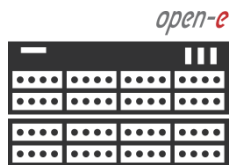
The screenshot shows the Open-E JovianDSS web interface. The left sidebar contains navigation options: Storage, User Management, Failover Settings (selected), Storage Settings, Backup & Recovery, System Settings, and Diagnostics. The main content area is titled 'Failover Settings' and displays the following information:

- Failover status:** Ready to start. A green 'Start Failover' button is visible.
- Windows Failover Clustering:** A message indicating that to ensure proper functioning, it is required to enable SCSI-3 Persistent Reservation Synchronization.
- Failover nodes:** A table showing the status of two nodes.
- Failover resources:** A section for Zpool resources, currently showing no information.
- Clustered services:** A table showing the status of various services.

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

Service name	Status
LDAP database synchronization	Disabled

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**.

The screenshot shows the Open-E JovianDSS web interface. The left sidebar contains navigation options: Storage, User Management, Failover Settings (highlighted with a red arrow), Storage Settings, Backup & Recovery, System Settings, and Diagnostics. The main content area is titled 'Failover Settings' and displays the following information:

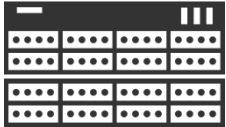
- Failover status:** Started (with a 'Stop Failover' button).
- Failover nodes:** A table with columns 'Node', 'Connection status', and 'Failover status'.

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
- Failover resources:** A table with columns 'Zpool name', 'Active on node', and 'Status'. It shows 'No resources found.'
- Clustered services:** A table with columns 'Service name' and 'Status'. It shows 'LDAP database synchronization' with a status of 'Disabled'.
- Rings:** 2 of 2 active (with an 'Edit' button).
- Ping nodes:** 4 of 4 reachable (with an 'Edit' button).

At the bottom of the interface, there is a 'Notifications' bar showing 0 errors, 1 warning, and 5 info messages.

9. Create a new Pool

open-e



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

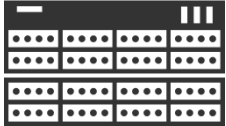
Go to the menu **Storage**. In the **Local disks** tab, all local disks are listed.

The screenshot shows the Open-E JovianDSS web interface. The top navigation bar includes the logo, 'About', 'Help', a trial version warning, and a 'Logout' button. The left sidebar contains a menu with 'Storage' selected. The main content area shows the 'Storage' configuration page. 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 'Rescan required' notification. The 'Unassigned disks' section is active, showing a table of local disks.

	Name	Serial number	Size	Model	Blink
1	sdc	6000c29af6d3cff24bdec7c70dbbd71	16.00 GiB	Virtual disk	●
2	sdd	6000c2978bbacfe2edda580c6da04980	16.00 GiB	Virtual disk	●
3	sde	6000c290be7256959cc9432635100b34	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



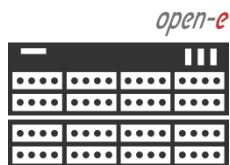
Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

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 options: 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 'Rescan required' notification. The 'Unassigned disks' section has two tabs: 'Local disks' and 'Remote disks', with 'Remote disks' selected. A table lists 10 remote disks with columns for Name, Serial number, Size, Model, and Blink status.

Name	Serial number	Size	Model	Blink
1 sdn (remote)	6000c29af6d3cff24bdec7c70dbbd71	16.00 GiB	Virtual disk	●
2 sdo (remote)	6000c2978bbacfe2edda580c6da04980	16.00 GiB	Virtual disk	●
3 sdp (remote)	6000c290be7256959cc9432635100b34	16.00 GiB	Virtual disk	●
4 sdq (remote)	6000c29156b425e79ddb645dec14b4df	16.00 GiB	Virtual disk	●
5 sdr (remote)	6000c296bed95f47221ccebc55daab1	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 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

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"/> sdl	wwn-0x6000c294460671e709dbdf2c5...	16.00 GiB	●
<input checked="" type="checkbox"/> sdm	wwn-0x6000c2984830a6620c6eda383...	16.00 GiB	●
<input checked="" type="checkbox"/> sdn (remote)	wwn-0x6000c29bc1798069cf73e98dd...	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-0x6000c29c4d4d546080902a17...	16.00 GiB	●
<input type="checkbox"/> sdr (remote)	wwn-0x6000c29abd85a9067594a2fc0...	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-0x6000r>9bfad2f3aa307ef38d6f...	16.00 GiB	●

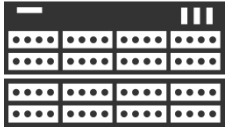
Select redundancy for group:

Warning: 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

9. Create a new Pool

open-e



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

Click the **Next** button.

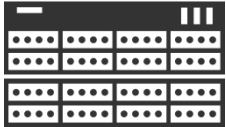
NOTE:

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 'Zpool wizard' interface. The left sidebar contains navigation options: Storage, User Management, Failover Settings, Storage Settings, Backup & Recovery, and Diagnostics. The main area is titled 'Zpool wizard' and shows a progress bar with six steps: 1. Add data group (active), 2. Add write log, 3. Add read cache, 4. Add spare disks, 5. Zpool properties, and 6. Summary. The 'Available disks' table lists various disks with columns for Name, Id, Size, and Blink status. A 'Show only unused disks' checkbox is checked. The 'Data groups' panel on the right shows a 'Mirror' group with four disks: sdi, sdm, sdn (remote), and sdo (remote), each 16.00 GiB. The 'Zpool storage capacity' is 16.00 GiB, and the 'Used licensed storage capacity' is also 16.00 GiB. At the bottom, there is a 'Select redundancy for group:' dropdown set to 'Mirror (single group)' and an '+ Add group' button. The 'Next' button is highlighted in green.

9. Create a new Pool

open-e



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.

Zpool wizard

1. Add data group

2. Add write log

3. Add read cache

4. Add spare disks

5. Zpool properties

6. Summary

Available disks

Show only unused disks Rescan disks

Name	Id	Size	Blink
<input type="checkbox"/> sdb	wwn-0x6000c296a722a1553d31ccd...	16.00 GiB	●
<input type="checkbox"/> sdc	wwn-0x6000c29af6d3cff24bdec7c7...	16.00 GiB	●
<input type="checkbox"/> sdd	wwn-0x6000c2978bbacfa2edda580...	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-0x6000c296be495f47221ccce...	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 checked="" type="checkbox"/> sdk	wwn-0x6000c296a1ef6e208308dd...	16.00 GiB	●
<input checked="" type="checkbox"/> sdp (remote)	wwn-0x6000c2986787edc246c9986...	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	●

Data groups

Mirror

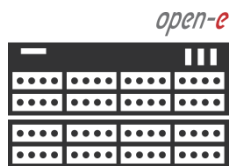
- sdl 16.00 GiB
- sdm 16.00 GiB
- sdn (remote) 16.00 GiB
- sdo (remote) 16.00 GiB

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

Other groups

Group	Size
Blink	●
	●
	●
	●
	●
	●
	●
	●
	●
	●

9. Create a new Pool



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

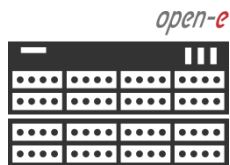
Click the **Next** button.

The screenshot shows the 'Zpool wizard' interface with the following components:

- Wizard Steps:** 1. Add data group, 2. Add write log (current), 3. Add read cache, 4. Add spare disks, 5. Zpool properties, 6. Summary.
- Available disks table:**

Name	Id	Size	Blink
<input type="checkbox"/> sdb	wwn-0x6000c296a722a1553d31ccd...	16.00 GiB	●
<input type="checkbox"/> sdc	wwn-0x6000c29af6d3cfff24bdec7c7...	16.00 GiB	●
<input type="checkbox"/> sdd	wwn-0x6000c2978bbacfa2edda580...	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-0x6000c296be95f47221ccce...	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-0x6000c29c44d45460809082a...	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	●
- Data groups:** Mirror (sdl, sdm, sdn (remote), sdo (remote)).
- Other groups:** Mirrored write log (sdk, sdp (remote)).
- Buttons:** Cancel, Back, Next.

9. Create a new Pool



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.

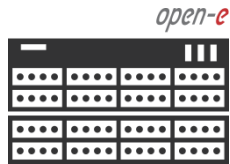
The screenshot shows the 'Zpool wizard' interface with the following details:

- Step 3: Add read cache** is active.
- Available disks table:**

Name	Id	Size	Blink
<input checked="" type="checkbox"/> sdb	wwn-0x6000c296a722a1553d31ccd...	16.00 GiB	●
<input type="checkbox"/> sdc	wwn-0x6000c29af6d3cff24bdec7c7...	16.00 GiB	●
<input type="checkbox"/> sdd	wwn-0x6000c2978bbacfa2edda580...	16.00 GiB	●
<input type="checkbox"/> sde	wwn-0x6000c290b7256959cc9432...	16.00 GiB	●
<input type="checkbox"/> sdf	wwn-0x6000c29156b425e79ddb64...	16.00 GiB	●
<input type="checkbox"/> sdg	wwn-0x6000c296bd95f47221ccce...	16.00 GiB	●
<input type="checkbox"/> sdh	wwn-0x6000c29f58aca3fe831b6cb3...	16.00 GiB	●
<input type="checkbox"/> sdi	wwn-0x6000c29af3cee22280f324a1...	16.00 GiB	●
<input type="checkbox"/> sdj	wwn-0x6000c29fa87c2d5e59b7c8...	16.00 GiB	●
<input type="checkbox"/> sdq (remote)	wwn-0x6000c29c4445460809082a...	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	●

- Redundancy:** Single
- Buttons:** Cancel, Back, Next, Add group (highlighted with a red arrow).
- Summary:** Zpool storage capacity: 16.00 GiB, Used licensed storage capacity: 16.00 GiB.

9. Create a new Pool



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 window is titled 'Zpool wizard' and is currently on step 2, 'Add write log'. The wizard is configuring a new pool on node-220 (IP 192.168.0.220). The 'Available disks' table lists various disks, including local and remote ones. A red arrow points to the 'Next' button at the bottom right of the wizard.

Name	Id	Size	Blink
<input type="checkbox"/> sdc	wwn-0x6000c29af6d3c9f24bdec7c7...	16.00 GiB	●
<input type="checkbox"/> sdd	wwn-0x6000c2978bbacf2eadda580...	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-0x6000c296be95f47221ccce...	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-0x6000c29c4d445460809082a...	16.00 GiB	●
<input type="checkbox"/> sdr (remote)	wwn-0x6000c29abd85a9867594a2f...	16.00 GiB	●
<input type="checkbox"/> sds (remote)	wwn-0x6000c2999b231836f2ef83ee...	16.00 GiB	●
<input type="checkbox"/> sdt (remote)	wwn-0x6000c299995bf3c859b3fec57...	16.00 GiB	●
<input type="checkbox"/> sdu (remote)	wwn-0x6000c29bfdad253aa307ef38...	16.00 GiB	●
<input type="checkbox"/> sdv (remote)	wwn-0x6000c2941a1aed0df93e7ad...	16.00 GiB	●

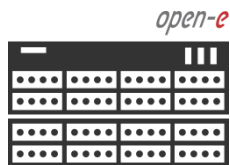
Summary of storage configuration:

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

Other groups:

- Mirrored write log
 - sdk (16.00 GiB)
 - sdp (remote) (16.00 GiB)
- Read cache
 - sdb (16.00 GiB)

9. Create a new Pool



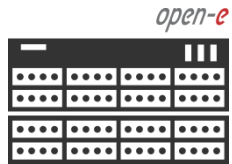
Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

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. The main window is titled "Zpool wizard" and is currently on step 1: "Add data group". The interface includes a sidebar with navigation options like "Storage", "User Manager", "Failover Settings", "Storage Settings", "Backup & Recovery", "System Settings", and "Diagnostics". The main content area displays "Available disks" with a table of disk information. A "Data groups" panel on the right shows a "Mirror" group with disks sdl, sdm, sdn (remote), and sdo (remote). Below that, "Other groups" includes "Mirrored write io" and "Read cache". At the bottom of the wizard, there are "Cancel", "Back", and "Next" buttons. A red arrow points to the "Next" button.

Name	Id	Size	Blink
<input type="checkbox"/> sdc	wwn-0x6000c29af6d3cff24bdec7c7...	16.00 GiB	●
<input type="checkbox"/> sdd	wwn-0x6000c2978bbacfe2adda500...	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-0x6000c296bed95f47221ccce...	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-0x6000c29af8c7c2d5e59b7c8...	16.00 GiB	●
<input type="checkbox"/> sdq (remote)	wwn-0x6000c29c4d45460809082a...	16.00 GiB	●
<input type="checkbox"/> sdr (remote)	wwn-0x6000c29abd85a9867594a2f...	16.00 GiB	●
<input type="checkbox"/> sds (remote)	wwn-0x6000c299b231836f2ef03ee...	16.00 GiB	●
<input type="checkbox"/> sdt (remote)	wwn-0x6000c29995bf3c859b3fec57...	16.00 GiB	●
<input type="checkbox"/> sdu (remote)	wwn-0x6000c29bfad253aa307ef38...	16.00 GiB	●
<input type="checkbox"/> sdv (remote)	wwn-0x6000c2941a1aed0df93e7ad...	16.00 GiB	●

9. Create a new Pool



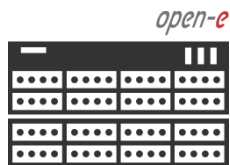
Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

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

The screenshot shows the Open-E JovianDSS web interface. The main navigation menu on the left includes Storage, User Manager, Failover Settings, Storage Settings, Backup & Recovery, System Settings, and Diagnostics. The 'Zpool wizard' dialog is open, displaying a progress bar with 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 5 is currently active. The 'Zpool name' field is filled with '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 points from the 'Next' button to the text box on the left. The background shows a table of storage configurations with columns for ID, name, UUID, size, and type.

ID	Name	UUID	Size	Type
9	sdj	6000c29fa8c7c2d5e59b7c8b3c739bd4	16.00 GiB	Virtual disk
10	sdk	6000c296a1ef6ef208308dd5b6e61053	16.00 GiB	Virtual disk

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.

Zpool wizard

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

Zpool configuration

Data groups	Redundancy	Size
Mirror	Mirror	16 GiB

Data group total capacity: 16 GiB
Used licensed storage capacity: 16.00 GiB

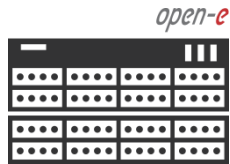
Other groups	Redundancy	Size
Mirrored write log	Mirror	
Read cache		

Zpool properties

Zpool name: Pool-0

Buttons: Cancel, Back, Add zpool

9. Create a new Pool



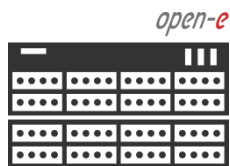
Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

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 options: 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-0'. The pool is in an 'ONLINE' state. A status box indicates 'Zpool is functioning correctly. None required.' Below this, there is a 'Rescan required' notification. The 'Unassigned disks' section shows two disks: sdc and sdd, both 16.00 GiB virtual disks.

Name	Serial number	Size	Model	Blink
1 sdc	6000c29af6d3cff24bdec7c70dbbd71	16.00 GiB	Virtual disk	●
2 sdd	6000c2978bbacfe2edda580c5da04980	16.00 GiB	Virtual disk	●

10. Enter virtual IP



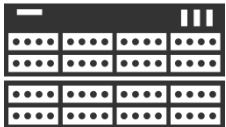
Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

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 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 shows 'Pool-0' with a status of 'ONLINE'. Below this, there are tabs for 'Virtual IPs', 'Disk Groups', 'Local Targets', 'FC Targets', 'Shares', and 'Snapshots'. The 'Virtual IPs' tab is selected, showing a table with columns: Virtual IP, Name, Netmask, Network interface, Remote network int..., State, and Options. Below the table, there is a section for 'Virtual IPs routing' with a search box and a '+ Add static routing' button. At the bottom of the page, there is a 'Zpools available for import' section. The browser address bar shows '192.168.0.220' and the page title is 'node-220'. A trial notice is visible at the top right: 'Trial version, not for commercial use. This version will expire within 244 days. For continuous commercial usage please contact your software vendor.' A 'Logout' button is also present.

10. Enter virtual IP

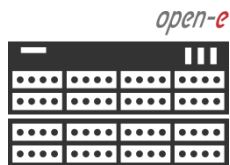
open-e



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 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.

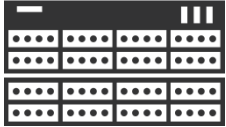
The screenshot shows the Open-E JovianDSS web interface. The left sidebar contains navigation options: Storage, User Management, Failover Settings, Storage Settings, Backup & Recovery, System Settings, and Diagnostics. The main content area displays the configuration for 'Pool-0', which is in an 'ONLINE' state. A status message 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 active, 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, showing 'No items found.'

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**.

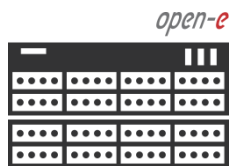
Note: the VIP's are in separate networks as this is recommended.

The screenshot shows the Open-E JovianDSS web interface. The left sidebar contains navigation options: Storage, User Management, Failover Settings, Storage Settings, Backup & Recovery, System Settings, and Diagnostics. The main content area is titled 'Storage' and shows details for 'Pool-1'. The pool status is 'ONLINE'. A message box indicates 'Status: Zpool is functioning correctly. Action: 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 active, showing a search bar and a '+ Add virtual IP' button. A table lists two 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

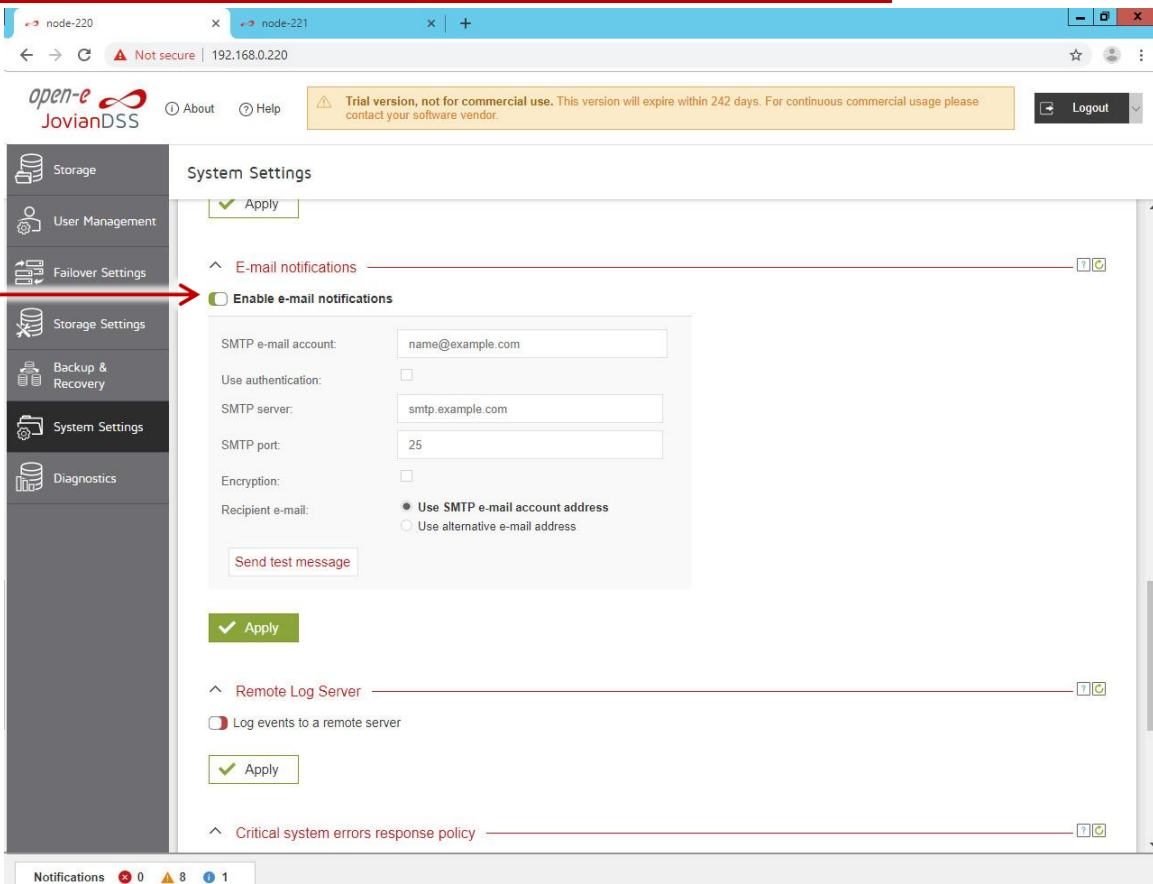
Below the table is a section for 'Virtual IPs routing' with a search bar and a '+ Add static routing' button. A table header is visible with columns: Network/Host IP, Netmask, Gateway, and Virtual IP name. The table currently shows 'No items found.'

11. System monitoring setup



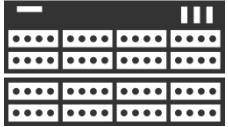
Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

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



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.

node-220 x node-221 x +

Not secure | 192.168.0.220

open-e JovianDSS About Help

Trial version, not for commercial use. This version will expire within 242 days. For continuous commercial usage please contact your software vendor. Logout

Storage

User Management

Failover Settings

Storage Settings

Backup & Recovery

System Settings

Diagnostics

System Settings

Send test message

Apply

Remote Log Server

Log events to a remote server

IP address: []

Set port: 514

Communication protocol: TCP UDP

Apply

Critical system errors response policy

Reboot procedure

System may require reboot when a critical error is detected. Please specify below how each of such errors should be handled:

- **Immediate:** system will reboot the machine immediately after the error occurs (the event will not be recorded in the event viewer).
- **Automatic:** system will restart in 30 seconds from when the errors appear.
- **Manual:** system will prompt for manual restart.

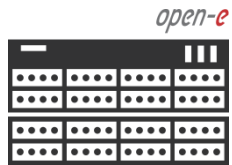
Important!
Please be aware that these settings are applicable only for a single node configuration or for a cluster configuration with the other node being unavailable. **For cluster configuration with both nodes available the policy is set to immediate reboot in all cases.**

ZFS pool I/O suspend
Pool has encountered an uncorrectable I/O failure and is suspended.

Manual (recommended)

Notifications 0 8 1

12. Failover test



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**.

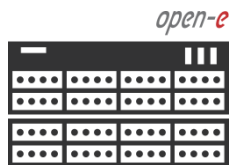
The pool will be exported on the current node and will be imported on the second node.

The screenshot shows the Open-E JovianDSS web interface. The left sidebar contains a navigation menu with items: Storage, User Management, Failover Settings, Storage Settings, Backup &, System Settings, and Diagnostics. The main content area is titled 'Storage' and shows details for 'Pool-1'. The pool status is 'ONLINE'. A message box indicates 'Zpool is functioning correctly. None required.' The 'Options' dropdown menu is open, showing 'Delete Zpool', 'Export Zpool', 'Clear error counters', and 'Move'. A red arrow points from the 'Move' option to the text box on the left. Below the pool details, there are tabs for 'Status', 'Disk Groups', 'iSCSI Targets', 'FC Targets', 'Shares', 'Snapshots', and 'Virtual IPs'. The 'Virtual IPs' section contains a table with two entries:

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 is a section for 'Virtual IPs routing' with a search bar and an 'Add static routing' button. The bottom of the interface shows a notifications bar with 0 errors, 1 warning, and 15 info messages.

12. Failover test



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

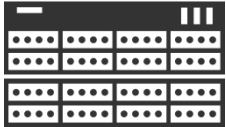
Click the **Move** button to start the failover.

The screenshot shows the Open-E JovianDSS web interface. A confirmation dialog box is displayed in the foreground with the text: "Confirmation", "Are you sure you want to move the resource?", and two buttons: "Cancel" and "Move". A red arrow points from the "Move" button in the dialog to the "Move" button in the "Virtual IPs" table below. The table contains the following data:

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



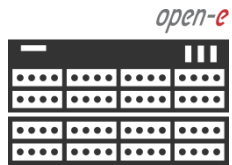
Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

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 browser address bar shows 'node-220' and '192.168.0.220'. The page title is 'open-e JovianDSS'. A navigation sidebar on the left includes 'Storage', 'User Management', 'Failover Settings', 'Storage Settings', 'Backup & Recovery', 'System Settings', and 'Diagnostics'. The main content area is titled 'Storage' and contains a notification: 'System has detected a change in disks configuration. Press Rescan storage button to see updates (e.g. new zpools detected, new zpool statuses)'. Below this, 'Pool-0' is listed with a status of 'ONLINE'. Its details include: State: ONLINE, Zpool ID: 6514485169002797111, Total storage: 15.88 GiB, and Disks: 7. A status box indicates 'Zpool is functioning correctly. Action: None required.' Below 'Pool-0', 'Pool-1' is listed with a status of 'ONLINE' and a warning icon, with the text 'Active on node node-221'. A red arrow points from the text in the callout box to the 'Move to this node' button next to Pool-1. Below the pools, a section titled 'Zpools available for import' shows a message: 'No external zpools available for the import have been found.' The bottom of the page shows a notification bar with 0 errors, 1 warning, and 20 info messages.

12. Failover test

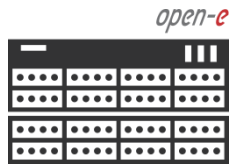


Open-E JovianDSS: **node-a**
IP Address: 192.168.0.220

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 main content area displays the 'Storage' section for 'Pool-0'. The pool is in an 'ONLINE' state. A confirmation dialog box is overlaid on the page, asking 'Are you sure you want to move the resource?' with 'Cancel' and 'Move' buttons. A red arrow points from the 'Move' button in the dialog to the 'Move' button in the interface. The interface also shows a 'Rescan' button and a 'Move to this node' button. The bottom of the page shows a notifications bar with 0 errors, 8 warnings, and 1 info 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.

The screenshot shows the Open-E JovianDSS web interface. The main content area displays the 'Storage' configuration for 'Pool-1'. The status is 'ONLINE'. The Zpool ID is 4323450794484349210, and the total storage is 15.88 GiB. There are 7 disks. A message indicates that the system has detected a change in disks configuration and that the Rescan storage button should be pressed. Below this, 'Zpools available for import' shows 'Pool-0' as ONLINE and ready to import. The interface also includes a sidebar with navigation options like Storage, User Management, and System Settings, and a top navigation bar with a trial version warning and a Logout button.

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.

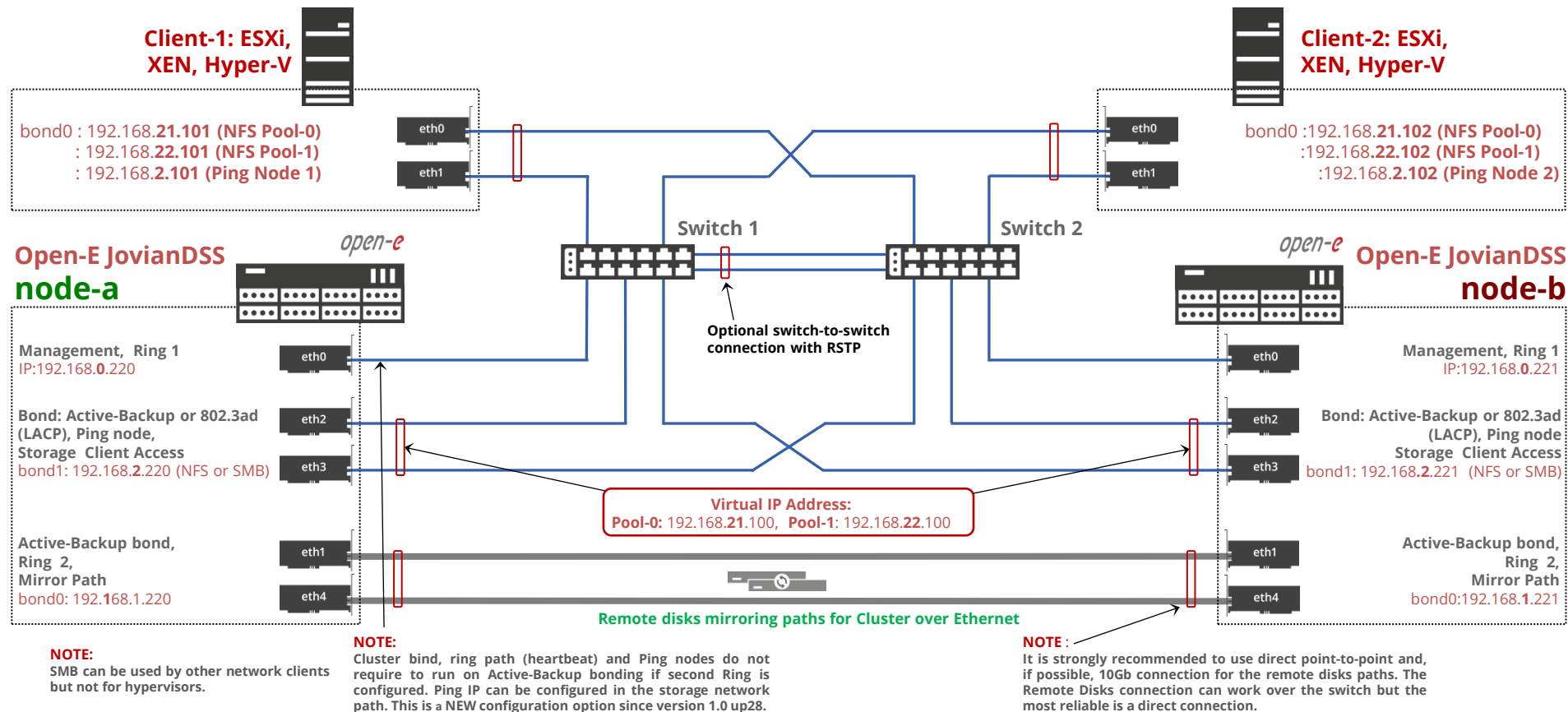
If mirror path is configured over a Round-Robin bond for better mirror performance, the second ring require extra dedicated path like shown on the configuration example on **page 48**. Here, the second ring path is configured over eth5-eth5 point-to-point path. It is strongly recommended to configure 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)

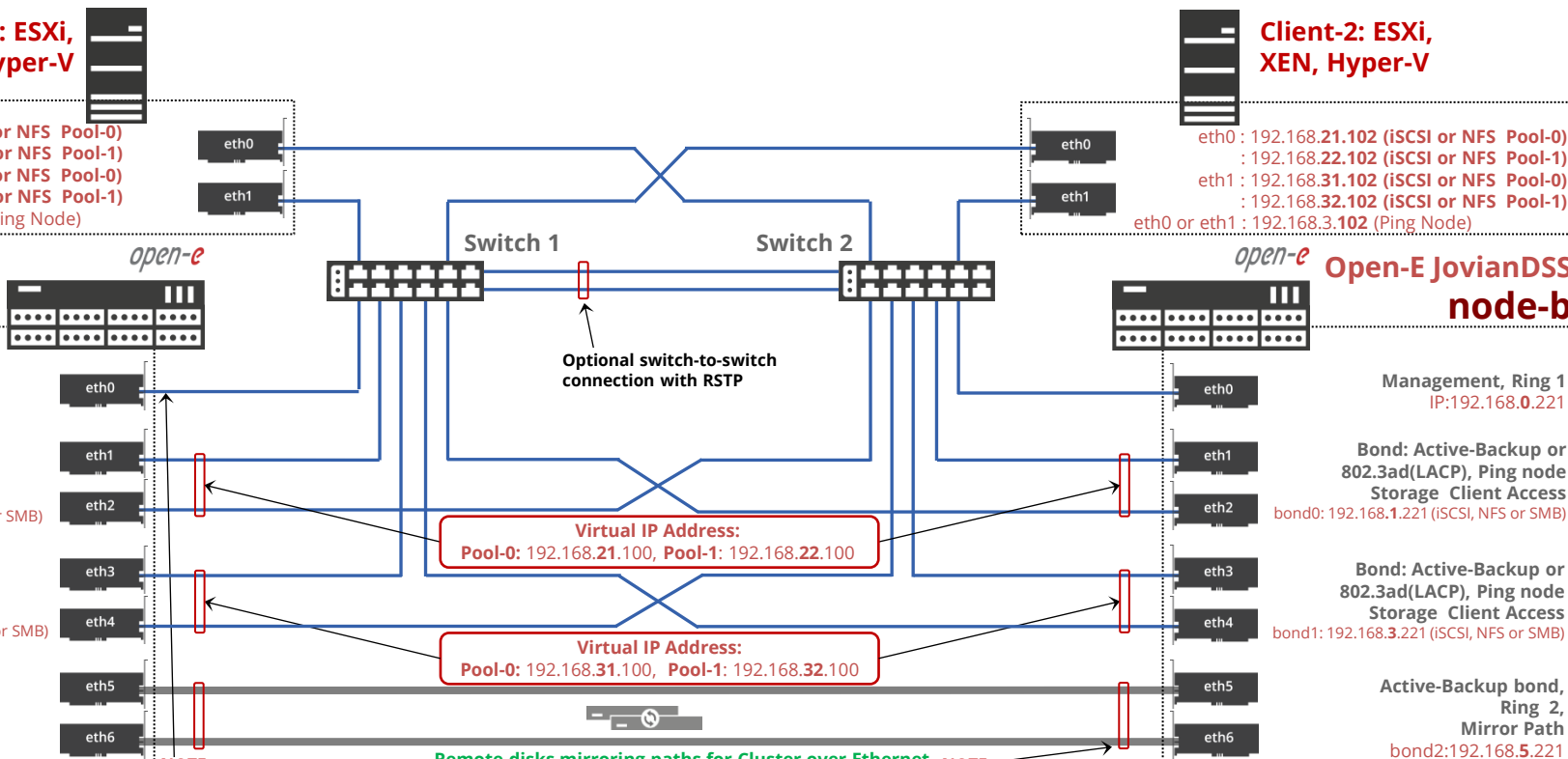
Bond: Active-Backup or 802.3ad(LACP), Ping node
 Storage Client Access
 bond0: 192.168.1.221 (iSCSI, NFS or SMB)

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



Virtual IP Address:
 Pool-0: 192.168.21.100, Pool-1: 192.168.22.100

Virtual IP Address:
 Pool-0: 192.168.31.100, Pool-1: 192.168.32.100

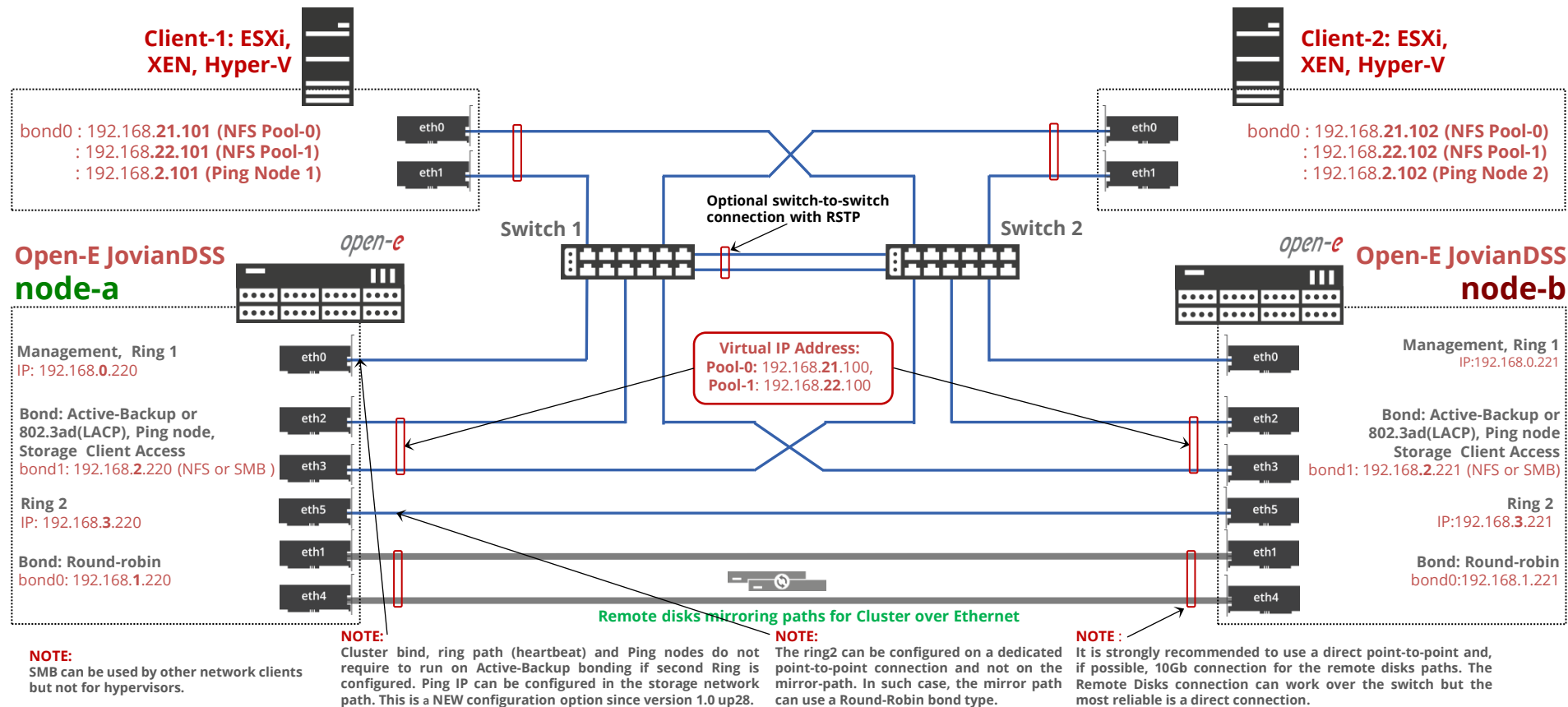
NOTE: Remote disks mirroring paths for Cluster over Ethernet

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

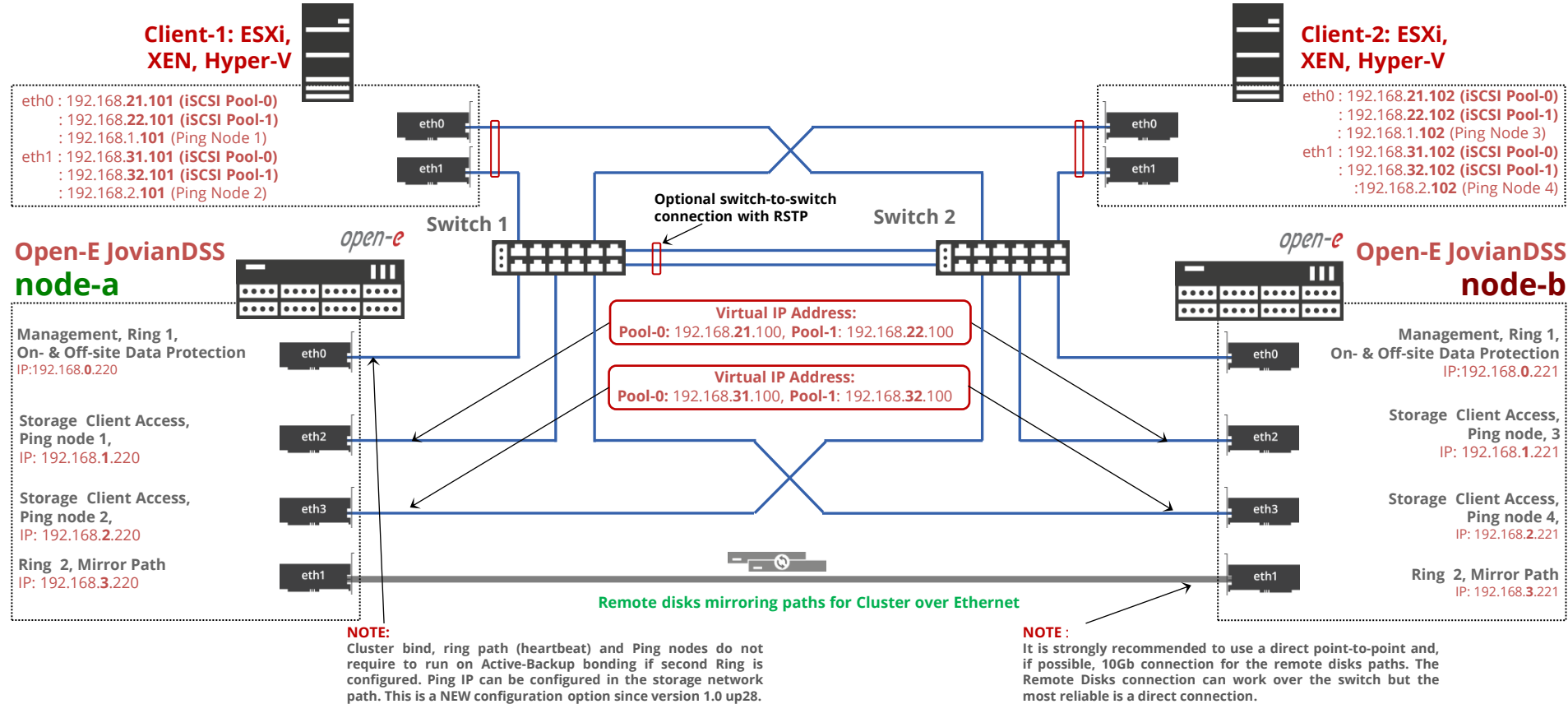
Cluster bind, ring path (heartbeat) and Ping nodes do not require to run on Active-Backup bonding if second Ring is configured. Ping IP can be configured in the storage network path. This is a NEW configuration option since version 1.0 up28.

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.



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)
 : 192.168.1.101 (Ping Node 1)
 eth1 : 192.168.31.101 (iSCSI or NFS Pool-0)
 : 192.168.32.101 (iSCSI or NFS Pool-1)
 : 192.168.3.101 (Ping Node 2)

eth0 : 192.168.21.102 (iSCSI or NFS Pool-0)
 : 192.168.22.102 (iSCSI or NFS Pool-1)
 : 192.168.1.102 (Ping Node 3)
 eth1 : 192.168.31.102 (iSCSI or NFS Pool-0)
 : 192.168.32.102 (iSCSI or NFS Pool-1)
 : 192.168.3.102 (Ping Node 4)

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)

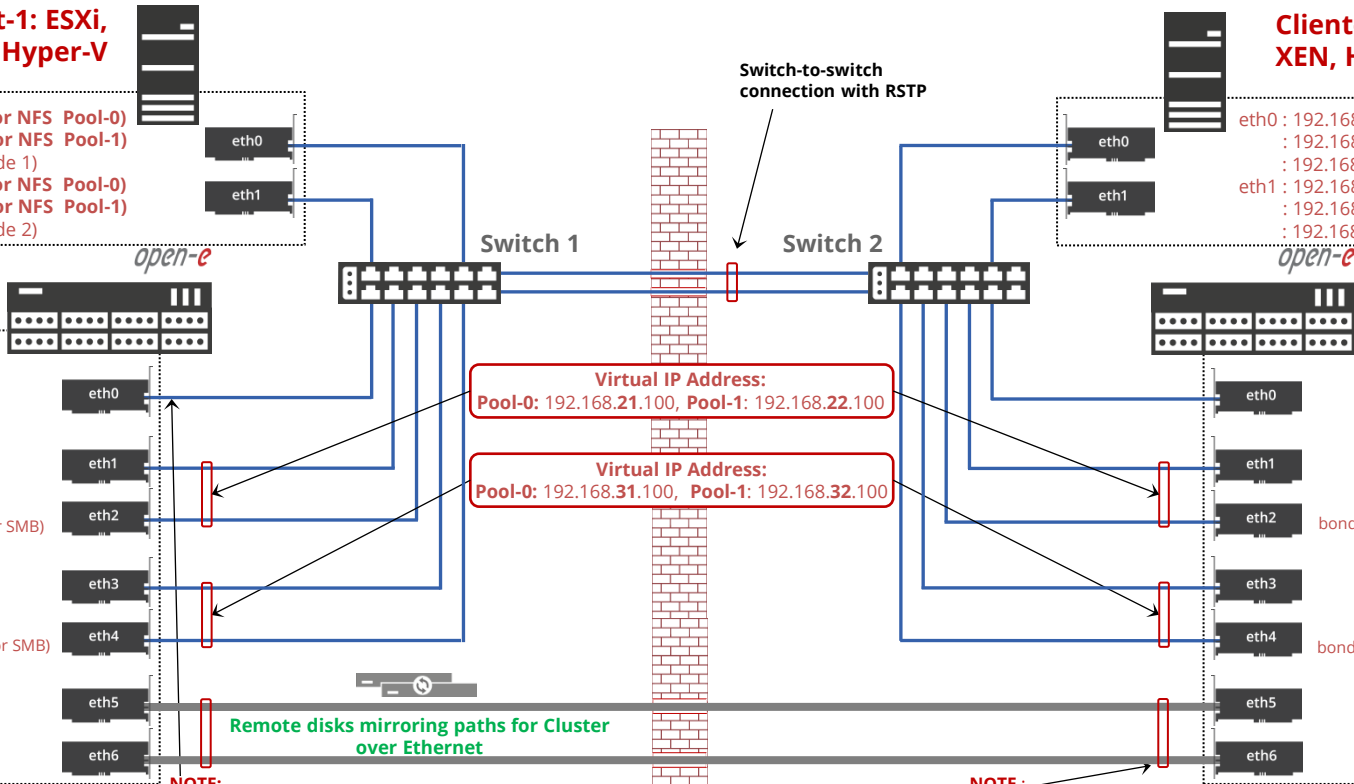
Bond: Active-Backup or 802.3ad(LACP), Ping node
 Storage Client Access
 bond0: 192.168.1.221 (iSCSI, NFS or SMB)

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



Virtual IP Address:
 Pool-0: 192.168.21.100, Pool-1: 192.168.22.100

Virtual IP Address:
 Pool-0: 192.168.31.100, Pool-1: 192.168.32.100

Remote disks mirroring paths for Cluster over Ethernet

Switch-to-switch connection with RSTP

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 use 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) 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)
 : 192.168.1.101 (Ping Node 1)
 eth1 : 192.168.31.101 (iSCSI or NFS Pool-0)
 : 192.168.32.101 (iSCSI or NFS Pool-1)
 : 192.168.3.101 (Ping Node 2)

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)
 : **NO PING NODE on this site**

Switch-to-switch **ONLY** connection is available. Ping Nodes **MUST** be configured on one site only.

Switch-to-switch connection with RSTP

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

Virtual IP Address:
 Pool-0: 192.168.21.100,
 Pool-1: 192.168.22.100

Virtual IP Address:
 Pool-0: 192.168.31.100,
 Pool-1: 192.168.32.100

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.

Remote disks mirroring paths for Cluster over Ethernet

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.

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

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)
 : 192.168.1.101 (Ping Node 1)
 eth1 : 192.168.31.101 (iSCSI or NFS Pool-0)
 : 192.168.32.101 (iSCSI or NFS Pool-1)
 : 192.168.3.101 (Ping Node 2)

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)
 : **NO PING NODE on this site**

Single connection Switch-to-switch ONLY.
 Ping Nodes **MUST** be configured on one site only.

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

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.

Remote disks mirroring paths for Cluster over Ethernet

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.

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Thank You!
