Step-by-Step Guide

Open-E JovianDSS Advanced Metro High Availability Cluster
The aim of this document is to demonstrate an example setup of an Advanced Metro High Availability Cluster. 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, a bond of 2 NICs is used for iSCSI Targets and SMB, NFS share exports. The bond is preferred for NFS and SMB shares, but for iSCSI path redundancy MPIO is the better choice. If Open-E JovianDSS works as a Unified Storage Appliance, providing NAS and SAN (iSCSI, NFS, SMB), and all services need path redundancy, it will be required to configure 2 bonds. In this case, the first iSCSI path is set up via the first bond and the second iSCSI path via the second bond. In this example we show a single bond for simplicity, so that iSCSI is not redundant.

In this document, the pool is created with 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. The 4-way mirror provide 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. 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 has to be accessed via the controller’s ETH-port.
To set up an Advanced Metro HA Cluster, perform the following steps:

1. Hardware configuration
2. Network Configuration:
   2.1. Create Ring and Management Bond.
   2.2. Create Storage Export bond.
   2.3. Select Default gateway
   2.4. Second cluster node
3. Time and date settings
4. Nodes Binding
5. Ping Nodes
6. Mirroring path
7. Create new Pool
8. Enter Virtual IP
9. Critical I/O handling setup
10. Start the Cluster Service
11. System Monitoring Setup
12. Failover test
1. **Hardware configuration**

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

- **Bond0 (activ backup)**
  - Bond0: 192.168.21.101 (SMB, NFS or iSCSI)
  - Bond0: 192.168.0.32 (Ping Node)

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

- **Bond0 (activ backup)**
  - Bond0: 192.168.21.102
  - Bond0: 192.168.0.42

**JovianDSS node-a**

- Port used for WEB GUI management
- Ring, Ping node
- Bond0 (activ backup)
- IP: 192.168.0.220

- Storage Client Access, Bond1 (activ backup)
- IP: 192.168.2.220

- Remote Disks
- IP: 192.168.4.220

**JovianDSS node-b**

- Port used for WEB GUI management
- Ring, Ping node
- Bond0 (activ backup)
- IP: 192.168.0.221

- Storage Client Access, Bond1 (activ backup)
- IP: 192.168.2.221

- Remote Disks
- IP: 192.168.4.221

**Virtual IP Address:**
192.168.21.100

**Remote disks mirroring paths for Cluster over Ethernet**

**NOTE:**
Ring path (heartbeat) and Ping nodes must run on Active-Backup bonding. Ring and Ping IP must be configured in the same network subnet.

**NOTE:**
It is strongly recommended to use 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

2. Network Configuration

Select System Settings from main menu and next select Network tab. Click on the Create bond interface button.

JovianDSS: node-a
IP Address: 192.168.0.220
2.1. Network Configuration. Create Ring and Management Bond

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

Enter all required details of the Bond and click on the **Apply** button.
2.2. Network Configuration. Create Storage Export Bond

JovianDSS: node-a
IP Address: 192.168.2.220

Next, enter all required details for the second Bond and click on the **Apply** button.
2.3. Network Configuration. Select Default gateway

Both Bonds are created properly. Overview is shown in the Interfaces field.

Next, in the Default gateway field, click on the Change button.
2.3. Network Configuration. Select Default gateway

JovianDSS: node-a
IP Address: 192.168.0.220

Select proper interface and click on the **Apply** button.
Go to the second cluster node and create both Bond interfaces accordingly.

The screenshot shows properly created Bonds and default gateway on the second node.
3. **Time and date settings**

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

Repeat this step for the second cluster node as well.

**JovianDSS: node-a**

IP Address: 192.168.0.220
In main menu select **Failover Settings** and enter IP address of the Bond interface of the second node and enter current administrator password (default: admin) and click on the **Connect** button.

The Bond interface will function as ring path (heartbeat) and ping-path. It MUST go via network switch and ping-nodes must be external to storage nodes. **It is NOT allowed for the ring to use nodes point-to-point connection.**
In Failover settings click on the **Edit** button in Ping nodes section and enter at least two ping nodes.

Ping nodes IP addresses must be reachable from Ring interfaces. So the ping node must use the same network subnet as ring interfaces.
6. Mirroring path

JovianDSS: node-a
IP Address: 192.168.0.220

Next, please click Add mirroring path button.
6. **Mirroring path**

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

JovianDSS: node-a
IP Address: 192.168.0.220
6. Mirroring path

JovianDSS: node-a
IP Address: 192.168.0.220

Mirroring path shows Connected status.
7. Create new Pool

Go to menu Storage. In the Local disks tab, all local disks are listed.
Open-E JovianDSS Advanced Metro High Availability Cluster

7. Create new Pool

JovianDSS: node-a
IP Address: 192.168.0.220

In the Remote disks tab, all disks from remote node are listed.
7. Create new Pool

In menu Storage and click on Add zpool button. Add data groups by selecting 4 (or 2) disks and select Mirror (single group) from the pull-down menu and click on Add group button, then click on 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.
7. Create new Pool

Next, add the second mirror group.

**NOTE:**
A 4-way mirror provide 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. 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 has to be accessed via the controller’s ETH-port.
7. Create new Pool

JovianDSS: node-a
IP Address: 192.168.0.220

Click Next button.
7. Create new Pool

JovianDSS: node-a
IP Address: 192.168.0.220

Select 2 disks (local + remote) for the write log and click on Add group button, then click on the Next button.
Open-E JovianDSS Advanced Metro High Availability Cluster

7. Create new Pool

JovianDSS: node-a
IP Address: 192.168.0.220

Click **Next** button.
7. Create new Pool

JovianDSS: node-a
IP Address: 192.168.0.220

Select local SSD disk for level-2 read cache and click on the **Add group** button, then click on the **Next** button.
Open-E JovianDSS Advanced Metro High Availability Cluster

7. Create new Pool

JovianDSS: node-a
IP Address: 192.168.0.220

Click Next button.
7. Create new Pool

To confirm the pool name click on the **Next** button then click on the next screen, and click on the **Add zpool** button.
7. Create new Pool

Click **Add zpool** button.

JovianDSS: node-a
IP Address: 192.168.0.220
Open-E JovianDSS Advanced Metro High Availability Cluster

7. Create new Pool

JovianDSS: node-a
IP Address: 192.168.0.220

The Pool-0 is created.
8. Enter Virtual IP

JovianDSS: node-a
IP Address: 192.168.0.220

Click on Virtual IPs tab.
8. **Enter Virtual IP**

In main menu **Storage**, select **Virtual IPs** tab then click on the **Add virtual IP** button and enter the virtual IP address and assign it to the required interfaces. Next, click **Apply** button.
9. Critical I/O handling setup

It is strongly recommended to select **Immediate** option in order to execute immediate reboot in case of a critical I/O error.

**JovianDSS: node-a**
IP Address: 192.168.0.220
Open-E JovianDSS Advanced Metro High Availability Cluster

10. Start the Cluster Service

JovianDSS: node-a
IP Address: 192.168.0.220

Now, the Cluster is ready to start. In order to start the cluster please click on **Start Failover** button.
10. Start the Cluster Service

JovianDSS: node-a
IP Address: 192.168.0.220

After a while the HA-cluster is started. The Failover status shows: **Started**.
Open-E JovianDSS Advanced Metro High Availability Cluster

11. System Monitoring Setup

JovianDSS: node-a
IP Address: 192.168.0.220

Setup proper **E-mail notifications**.
It is recommended to setup the system monitoring with Remote Log Server or SNMP.

Open-E JovianDSS Advanced Metro High Availability Cluster

11. System Monitoring Setup

JovianDSS: node-a
IP Address: 192.168.0.220
12. Failover test

JovianDSS: node-a
IP Address: 192.168.0.220

Now, in order to test failover, select Storage from 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.
Open-E JovianDSS Advanced Metro High Availability Cluster

12. Failover test

JovianDSS: node-a
IP Address: 192.168.0.220

Click on Move button to start the failover.
Open-E JovianDSS Advanced Metro High Availability Cluster

12. Failover test

The Pool was exported from Node-220 and imported on Node-221. Node-220 (node-a) GUI show the Pool-0 is active on node-221 (node-b).

In order to move pool activity back to node-220 (node-a), please click on Move to this node button.
12. Failover test

JovianDSS: node-a
IP Address: 192.168.0.220

Click on Move button to start failover. It will start exporting the pool at Node-221 (node-b) and next it will be importing back on Node-220 (node-a).
Open-E JovianDSS Advanced Metro High Availability Cluster

12. Failover test

JovianDSS: node-a
IP Address: 192.168.0.220

Now, the failover test is completed. The **Pool-0** is active back on Node-220 (node-a)
Please create iSCSI target or NFS, SMB shares and connect storage clients. Once storage clients are connected, run one more failover test with reboot of the first node and next after successful failover, with reboot of the second node.
NOTE:
The step-by-step guide is based on configuration from page 4, use VIP's addresses on bond1 for storage access this will work with SMB, NFS or iSCSI.
Next on page 42 will show setup with two storage access paths and two virtual IPs. This setup can be used for iSCSI Initiators with multipath. It can be used also without multipath, just to separate load on 2 separate network paths.
On page 43 instead of just two storage paths, there are two bonding. This setup can be used also for iSCSI Initiators with multipath or for mixed iSCSI/SMB/NFS environments.
On page 44, the mirroring path use point-to-point Round-Robin bond instead of single Ethernet connection. The Round-Robin bond provide better reliability and better mirror performance.
Open-E JovianDSS Advanced Metro High Availability Cluster

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

- eth0: 192.168.21.101 (SMB, NFS or iSCSI)
- eth1: 192.168.31.101 (SMB, NFS or iSCSI)
- eth0 or eth1: 192.168.2.101 (Ping Node)

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

- eth0 (SMB, NFS or iSCSI) 192.168.21.102
- eth1 (SMB, NFS or iSCSI) 192.168.31.102

**JovianDSS node-a**

- Storage Client Access, eth0: 192.168.0.220 (iSCSI-MPIO)
- eth1: 192.168.1.220 (iSCSI-MPIO)
- Port used for WEB GUI management, Ring, Ping node Bond (active backup) bond0: 192.168.2.220
- Remote Disks IP: 192.168.4.220

**JovianDSS node-b**

- Storage Client Access, eth0: 192.168.0.221 (iSCSI-MPIO)
- eth1: 192.168.1.221 (iSCSI-MPIO)
- Port used for WEB GUI management, Ring, Ping node Bond (active backup) bond0: 192.168.2.221
- Remote Disks IP: 192.168.4.221

**Virtual IP Address:**
- 192.168.21.100
- 192.168.31.100

**NOTE:**
- Ring path (heartbeat) and Ping nodes must run on Active-Backup bonding. Ring and Ping IP must be configured in the same network subnet.

**NOTE:**
- It is strongly recommended to use 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

Client-1: ESXi, XEN, Hyper-V

Client-2: ESXi, XEN, Hyper-V

NOTE:
Ring path (heartbeat) and Ping nodes must run on Active-Backup bonding. Ring and Ping IP must be configured in the same network subnet.

JovianDSS node-a

JovianDSS node-b

Virtual IP Address:
192.168.21.100

Virtual IP Address:
192.168.31.100

Remote disks mirroring paths for Cluster over Ethernet
NOTE:
Ring path (heartbeat) and Ping nodes must run on Active-Backup bonding. Ring and Ping IP must be configured in the same network subnet.

Virtual IP Address: 192.168.21.100

Virtual IP Address: 192.168.31.100

Remote disks mirroring paths for Cluster over Ethernet
Copyright
(c) 2004-2018 Open-E, Inc. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form, by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior written consent of Open-E, Inc.

Trademarks
The names of actual companies and products mentioned herein may be the trademarks of their respective owners.

Disclaimer
Open-E, Inc. assumes no responsibility for errors or omissions in this document, and Open-E, Inc. does not make any commitment to update the information contained herein.
Thank You!