

open-e

ENTERPRISE LEVEL STORAGE OS
for EVERY BUSINESS

*Step-by-Step Guide to
Synchronous
Volume Replication
(Block Based)
with Failover over a LAN
(with unicast)
Supported by Open-E[®] DSS[™]*

DSS V6
DATA STORAGE SOFTWARE

16 TB



Easy to use, GUI based management provides performance and security.



Reliable disk based backup and recovery, along with Snapshot capability enable fast and reliable backup and restore.



Easy to implement remote Replication, at block or volume level, enables cost-effective disaster recovery.



IP based storage management combines NAS and iSCSI functionality for centralized storage and storage consolidation.

Software Version: DSS ver. 6.00 up50

Presentation updated: September 2010

www.open-e.com

Synchronous Volume Replication with Failover over a LAN *open-e*

	Replication Mode		Source/Destination			Data Transfer		Volume Type			
	Synchronous	Asynchronous	w/ System	LAN	WAN	File based	Block based	NAS	iSCSI		FC
									File-IO	Block-IO	
Synchronous Volume Replication with Failover over a LAN	✓			✓			✓			✓	

- **Open-E DSS Synchronous Volume Replication with Failover** is a fault tolerance process via iSCSI volume replication, that creates mirrored target data volumes.
 - Data is copied in real-time, and every change is immediately mirrored from the primary server to the secondary storage server.
 - In case of a failure, scheduled maintenance of the primary server, or loss of the primary data source, failover automatically switches operations to the secondary storage server, so processes can be continued as usual.

VOLUME REPLICATION WITH FAILOVER BETWEEN TWO SYSTEMS WITHIN ONE LAN

■ Recommended Resources

- Key Hardware (two systems)
 - ✓ x86 compatible
 - ✓ RAID Controller with **Battery Backup Unit**
 - ✓ HDD's
 - ✓ Network Interface Cards
 - ✓ Ping Node (ping node it is any permanently (24/7) available host in the network. In particular case the ping node function can be performed by the server storing the data on the iSCSI failover volume).
- Software
 - ✓ Open-E DSS V6, 2 units

■ Benefits

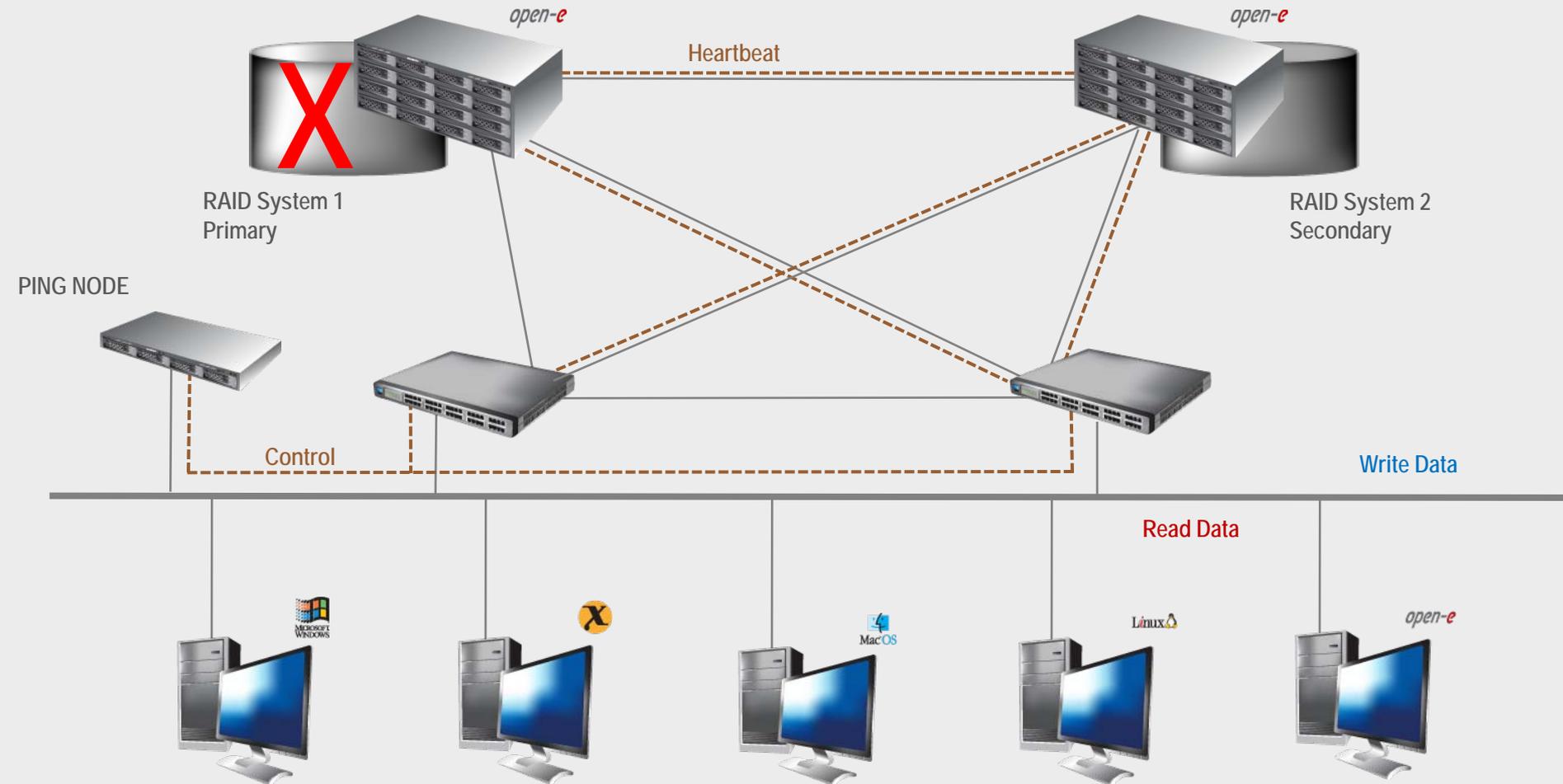
- Eliminate business disruption
- Data Redundancy over a LAN
- Switch Redundancy

■ Disadvantages

- High cost of solution
- Natural disasters (earthquake, fire, flood...) can destroy local systems

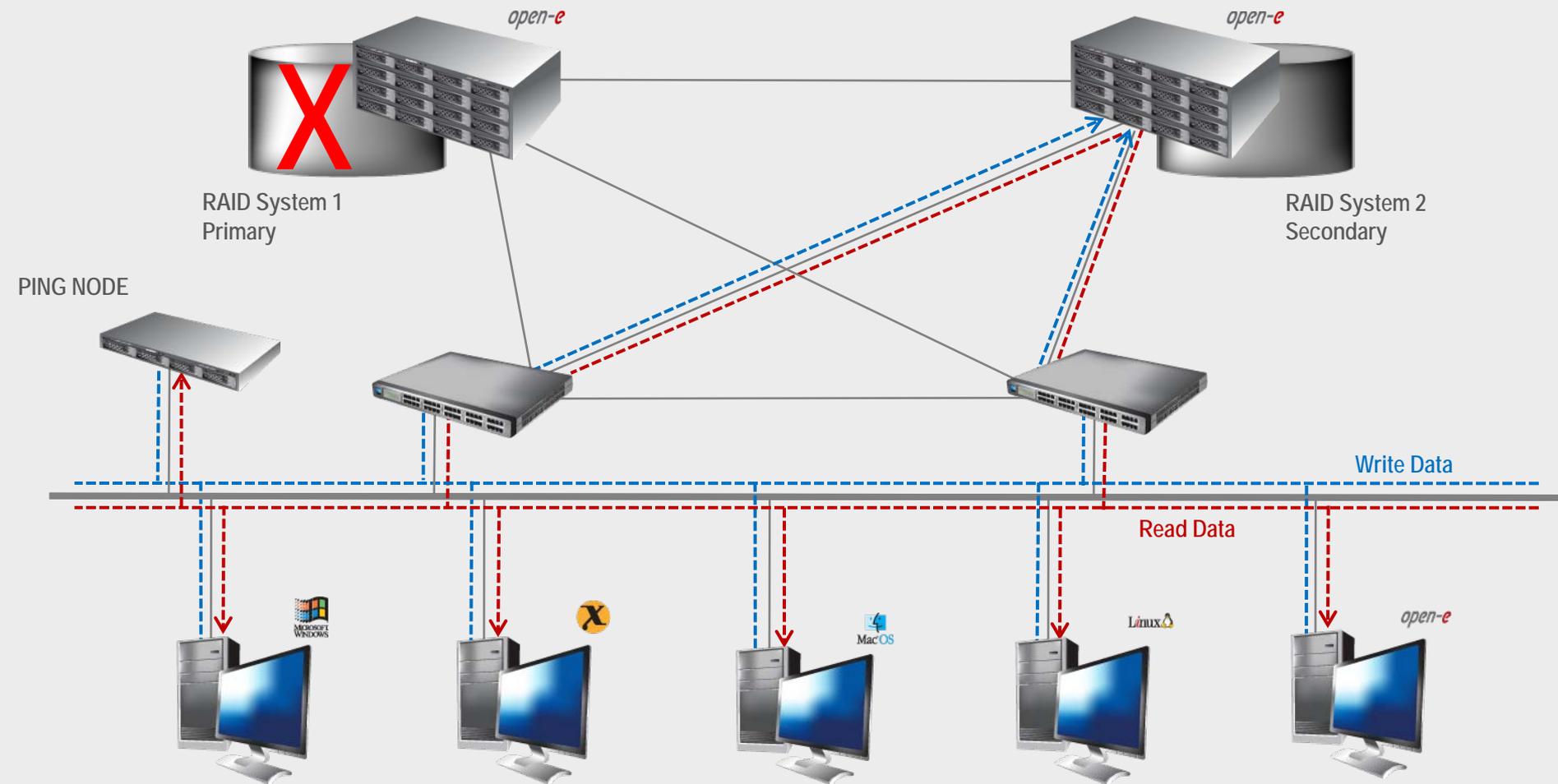
Synchronous Volume Replication with Failover over a LAN *open-e*

- In case system malfunction or power failure or lost network connection of the System1 (primary), the server will send an e-mail Notification to the administrator.
- After a few seconds Automatic Failover is executed and users are switched to System 2 (secondary).



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- After switching, the replicated volume is available on System 2 (secondary)



Synchronous Volume Replication with Failover over a LAN *open-e*

TO SET UP VOLUME REPLICATION WITH FAILOVER, PERFORM THE FOLLOWING STEPS:

1. Hardware configuration:
 - Settings server names, ethernet ports and bonding on secondary and primary node
2. Configure the Secondary node:
 - Create a Volume Group, iSCSI Volume
 - Configure Volume Replication mode (destination mode) – settings mirror IP address
3. Configure the Primary node
 - Create a Volume Group, iSCSI Volume
 - Configure Volume Replication mode (source mode) – settings mirror IP address, creating Volume Replication task and start replication task.
4. Create new target on Secondary node
5. Create new target on Primary node
6. Configure iSCSI Failover (primary and secondary node, unicast)
7. Configure virtual IP and Auxiliary connection
8. Start Failover Service
9. Test Failover Function
10. Run Failback Function

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Hardware Requirements:

To run the Volume Replication with Failover, two DSS systems are required. Both servers must be located and working in the Local Area Network. See below configurations for examples:

1. Hardware Configuration

Data Server (DSS1)

Primary node

IP Address: 192.168.0.220

RAID System 1
Primary

Port used for WEB GUI management

IP: 192.168.0.220

eth0

Volume Replication,
Auxiliary connection (Heartbeat)

IP: 192.168.1.220

eth1

Client Storage Access,
Auxiliary connection (Heartbeat)

bond0 IP: 192.168.2.220 (eth2, eth3)

Volume Groups (vg00)

iSCSI volume (lv00)

iSCSI targets

PING NODE

IP Address : 192.168.2.106

Data Server (DSS2)

Secondary node

IP Address: 192.168.0.221

RAID System 2
Secondary

Port used for WEB GUI management

IP: 192.168.0.221

eth0

Volume Replication,
Auxiliary connection (Heartbeat)

IP: 192.168.1.221

eth1

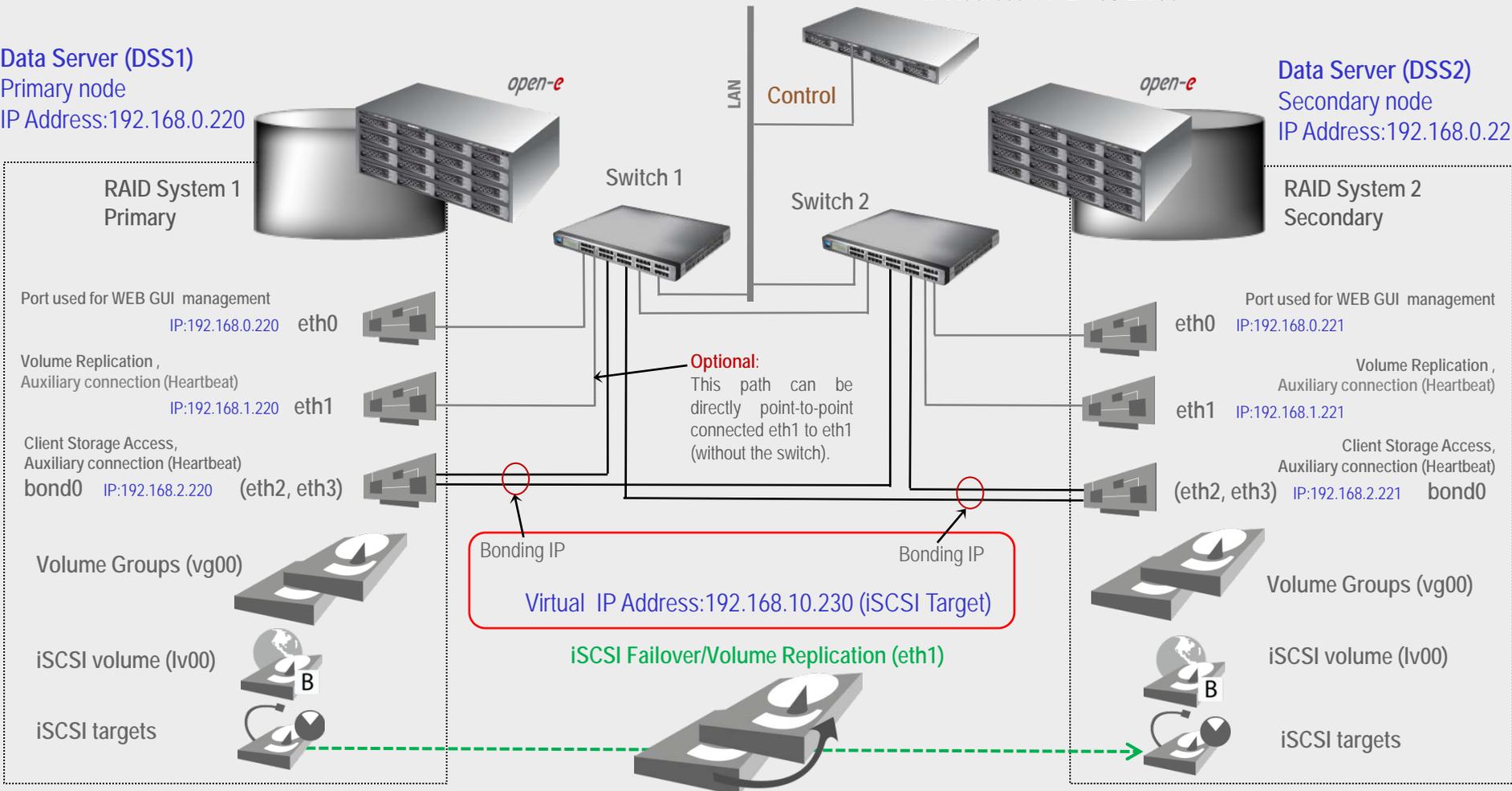
Client Storage Access,
Auxiliary connection (Heartbeat)

(eth2, eth3) IP: 192.168.2.221 bond0

Volume Groups (vg00)

iSCSI volume (lv00)

iSCSI targets



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Data Server (DSS2)
Secondary node
IP Address:192.168.0.221

1. Hardware Configuration

After logging on the DSS V6 please go to „**SETUP**“ tab, „**network**“ and „**Interfaces**“. In „**Server name**“ function enter Server name, in this example „**dss2**“ and click **apply** button. (All connections will be restarted)

The screenshot shows the open-e web interface for Data Storage Software V6. The navigation tabs at the top are SETUP, CONFIGURATION, MAINTENANCE, STATUS, and HELP. The current page is 'Interfaces' under the 'network' section. On the left, there are two panels: 'Interfaces' and 'iSCSI Failover', both showing a list of network interfaces (eth0, eth1, eth2, eth3). The 'Server name' configuration panel is open, showing the 'Server name' field with the value 'dss2' and the 'Comment' field with the value 'Data Storage Software'. The 'apply' button is highlighted. Below it, the 'Hostname' panel shows the 'Hostname' field with the value 'dssA0000032'. The 'DNS settings' panel is also visible, showing the 'DNS' field. The footer of the interface includes 'Event Viewer' and 'Data Storage Software V6 - All rights reserved'.

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Data Server (DSS2)
Secondary node
IP Address: 192.168.0.221

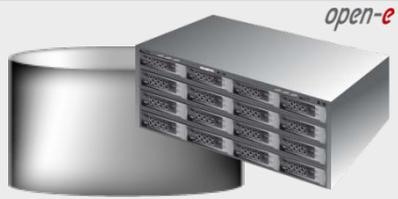
1. Hardware Configuration

Next select **eth0** interface and change IP Address from 192.168.0.220 in field IP address to 192.168.0.221, and click **apply** button. (This will restart network configuration).

The screenshot shows the open-e web interface for configuring the eth0 interface. The breadcrumb trail is: You are here: SETUP > network > Interfaces > eth0. The interface configuration page is divided into several sections:

- Interfaces:** A list of interfaces (eth0, eth1, eth2, eth3) with eth0 selected.
- Interface info:** Shows the hardware details: Intel Corporation 82546GB Gigabit Ethernet Controller (rev 03).
- IP address:** Contains a warning: "Warning! You are currently connected through this interface." Below this, the configuration options are:
 - Active
 - MAC: 00:04:23:B9:86:FA
 - DHCP
 - Static
 - IP address: 192.168.0.221
 - Netmask: 255.255.255.0
 - Broadcast: auto
 - Gateway: (empty field)
- Buttons:** An "apply" button is located at the bottom right of the IP address section.
- Footer:** "Please apply changes or press 'reload' button to discard" is displayed at the bottom of the configuration area.

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Data Server (DSS2)
Secondary node
IP Address: 192.168.0.221

1. Hardware Configuration

Next select **eth1** interface and change IP address from 192.168.1.220 in field IP address to 192.168.1.221 and click **apply** button.

The screenshot shows the open-e web interface for configuring the eth1 interface. The breadcrumb trail is: SETUP > network > Interfaces > eth1. The 'Interfaces' section on the left lists eth0, eth1 (selected), eth2, and eth3. The 'Interface info' section shows 'Intel Corporation 82546GB Gigabit Ethernet Controller (rev 03)'. The 'IP address' section has the following settings: Active (checked), MAC: 00:04:23:B9:86:FB, DHCP (unchecked), Static (selected), IP address: 192.168.1.221, Netmask: 255.255.255.0, Broadcast: auto, and Gateway: (empty). An 'apply' button is at the bottom right of the IP address section. A blue box with arrows points to the 'eth1' interface in the list and the 'IP address' field.

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Data Server (DSS2)
Secondary node
IP Address:192.168.0.221

1. Hardware Configuration

Again select „Interfaces” and in Create new bond interface function check two boxes with eth2 and eth3. In field Create select bonding mode. In this example select New balance-rr.

Next enter IP Address in field Address IP 192.168.2.221, Netmask, and click **create** button.

The screenshot shows the open-e web interface for configuring network interfaces. The main content area is titled "Create new bond interface" and contains a table of interfaces and a configuration form.

Primary	Interface	Active	Cable	State
<input type="checkbox"/>	eth0	yes	cable	Single
<input type="checkbox"/>	eth1	yes	cable	Single
<input checked="" type="checkbox"/>	eth2	yes	cable	Single
<input checked="" type="checkbox"/>	eth3	yes	cable	Single

Configuration form fields:

- Create:
- MAC:
- Static: DHCP:
- Address IP:
- Netmask:
- Broadcast:
- Gateway:
-

Below the form is an "HTTP proxy" section with a checkbox for "Use HTTP proxy" and an "apply" button.

Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS2)
Secondary node
IP Address:192.168.0.221

1. Hardware Configuration

After reloading page on the dss2 server you have configured bond0. Setting of the network interfaces on the secondary node is finished.

The screenshot displays the open-e web management interface. At the top, the header includes the open-e logo, the text "ENTERPRISE CLASS STORAGE OS for EVERY BUSINESS", and "DATA STORAGE SOFTWARE V6". Below the header is a navigation menu with tabs for "SETUP", "CONFIGURATION", "MAINTENANCE", "STATUS", and "HELP". The current page is "Interfaces", indicated by the breadcrumb "You are here: SETUP > network > Interfaces".

The main content area is divided into two columns. The left column contains two expandable sections: "Interfaces" and "iSCSI Failover". The "Interfaces" section is expanded, showing a list of network interfaces: eth0, eth1, eth2 (bond0), eth3 (bond0), and bond0. The "iSCSI Failover" section is also expanded, showing eth0, eth1, and bond0. A blue callout box with an arrow points to the "bond0" interface in the "Interfaces" list.

The right column contains three configuration panels: "Server name", "Hostname", and "DNS settings". The "Server name" panel has a "Server name" field with the value "dss2" and a "Comment" field with the value "Data Storage Software". The "Hostname" panel has a "Hostname" field with the value "dssA0000032" and an "Info" message: "Please do not change the hostname unless it is absolutely necessary, as changing the hostname can cause serious issues with several advanced functions (such as iSCSI failover). This function requires server restart." The "DNS settings" panel has a "DNS" field.

At the bottom of the interface, there is an "Event Viewer" icon and a footer that reads "Data Storage Software V6 - All rights reserved".

Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS1)
Primary node
IP Address:192.168.0.220

1. Hardware Configuration

After logging on the primary node please go to „**SETUP**“ tab, „**network**“ and „**Interfaces**“. In „**Server name**“ function enter Server name. In this example enter **dss1** and click **apply** button. (All connection will be restarted).

Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS1)
Primary node
IP Address:192.168.0.220

1. Hardware Configuration

Again select „Interfaces” and in Create new bond interface function check two boxes with eth2 and eth3. In field Create select mode for bonding. In this example selected New balance-rr..

Next enter IP Address in field Address IP 192.168 .2.220, Netmask, and click **create** button.

Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS1)
Primary node
IP Address: 192.168.0.220

1. Hardware Configuration

After reloading page on the dss1 server you have configured **bond0**. Setting of the network interfaces on the secondary node is finished.

The screenshot displays the open-e web management interface for the primary node. The top navigation bar includes 'SETUP', 'CONFIGURATION', 'MAINTENANCE', 'STATUS', and 'HELP'. The current page is 'Interfaces', with a breadcrumb trail 'You are here: SETUP > network > Interfaces'. On the left, there are two expandable sections: 'Interfaces' and 'iSCSI Failover'. The 'Interfaces' section is expanded, showing a list of network interfaces: eth0, eth1, eth2 (bond0), eth3 (bond0), and bond0. The 'iSCSI Failover' section is also expanded, showing eth0, eth1, and bond0. On the right, there are three configuration panels: 'Server name' (with fields for 'Server name' containing 'dss1' and 'Comment' containing 'Data Storage Software'), 'Hostname' (with an 'Info' box and a field for 'Hostname' containing 'dssA0000031'), and 'DNS settings' (with a field for 'DNS'). Each panel has an 'apply' button. The footer of the interface shows 'Event Viewer' and 'Data Storage Software V6 - All rights reserved'.

Synchronous Volume Replication with Failover over a LAN *open-e*



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Data Server (DSS2)
Secondary node
IP Address:192.168.0.221

2. Configure the Secondary node

Under the „CONFIGURATION” tab, select „volume manager” and next Vol. Groups.



Volume Groups (vg00)

In Unit manager function add the selected physical units (Unit S000 or other) to create a new volume group (in this case, vg00) and click **apply** button

The screenshot shows the open-e web interface with the following elements:

- Header: *open-e* | ENTERPRISE CLASS STORAGE OS for EVERY BUSINESS | DATA STORAGE SOFTWARE V6
- Navigation tabs: SETUP, CONFIGURATION, MAINTENANCE, STATUS, HELP
- Breadcrumb: You are here: CONFIGURATION > volume manager > Vol. groups
- Left sidebar: Vol. groups (selected), Vol. replication
- Main content area:
 - Unit rescan**: A panel with a "rescan" button.
 - Unit manager**: A table with columns Unit, Size (GB), Serial number, and Status. The table contains one entry: Unit S000, 230.08 GB, N/A, available. Below the table, the "Action" dropdown is set to "new volume group" and the "Name" field contains "vg00". An "apply" button is at the bottom.
 - Drive identifier**: A table with columns Unit, Serial number, and Status. The table contains one entry: Unit S000, N/A. An "apply" button is at the bottom.

Blue arrows point from the text boxes to the "Vol. groups" tab, the "Unit S000" row in the Unit manager table, and the "apply" button in the Unit manager section.

Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS2)
Secondary node
IP Address:192.168.0.221

2. Configure the Secondary node

Select the appropriate volume group (**vg00**) from the list on the left and create a **new iSCSI volume** of the required size. This logical volume will be the destination of the replication process.

Next check the box with **Use volume replication**

After assigning an appropriate amount of space for the iSCSI volume, click the **apply** button

The screenshot shows the open-e web interface for configuring a new iSCSI volume. The breadcrumb trail is: CONFIGURATION > volume manager > Vol. groups > vg00. The left sidebar shows 'Vol. groups' with 'vg00' selected and 'Vol. replication' below it. The main area is titled 'Volume manager' and contains a table of system volumes and configuration options.

System volumes	Size (GB)
Reserved Pool	4.00
Reserved for snapshots	0.00
Reserved for system	4.00
Reserved for replication	0.00
Free	222.03

Configuration options:

- Action: new iSCSI volume
- Options: Just create volume
- Use volume replication
- File I/O
 - Initialize
 - Rate: medium
- Block I/O
 - Slider: 0 to 222.03
 - add: 10 GB (+0.12 GB for replication)

apply button

Please apply changes or press "reload" button to discard

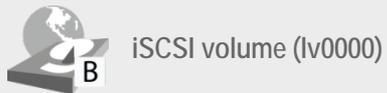
Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS2)
Secondary node
IP Address:192.168.0.221

2. Configure the Secondary node

The destination iSCSI Volume Block I/O is now configured.



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SETUP CONFIGURATION MAINTENANCE STATUS HELP

You are here: CONFIGURATION > volume manager > Vol. groups > vg00

Vol. groups

- vg00

Vol. replication

Volume manager

Info
Logical volume lv0000 has been created successfully.

Logical Volume	Type	Snap.	Rep.	Init.	Blocksize (bytes)	Size (GB)
lv0000	B2		✓		N/A	10.00
System volumes						Size (GB)
Reserved Pool						4.00
Reserved for snapshots						0.00
Reserved for system						4.00
Reserved for replication						0.13
Free						211.91

Action: new NAS volume

Use volume replication
 WORM

0 211.91

add: 0.00 GB

apply

Event Viewer: [icon]

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Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS2)
Secondary node
IP Address:192.168.0.221

2. Configure the Secondary node

Now, select the **Vol. replication** and check the box under **Destination** and click the **apply** button

Next, under **Mirror Server IP** function, enter the IP address of the Primary node (in our example, this would be 192.168.1.220) and click the **apply** button

Logical Volume	Init	Source	Destination	Clear metadata
lv0000	done	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

NOTE:

The Mirror server IP Address must be on the same subnet in order for the replication to communicate. VPN connections can work providing you are not using a NAT. Please follow example:

- Source: 192.168.1.220
- Destination: 192.168.1.221

Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS1)
Primary node
IP Address:192.168.0.220

3. Configure the Primary node

Under the „CONFIGURATION“ tab, select „volume manager“ and next „Vol. Groups“

Add the selected physical units (Unit MD0 or other) to create a new volume group (in this case, vg00) and click **apply** button



Volume Groups (vg00)

The screenshot shows the open-e web interface with the following elements:

- Navigation tabs: SETUP, CONFIGURATION, MAINTENANCE, STATUS, HELP.
- Breadcrumb: You are here: CONFIGURATION > volume manager > Vol. groups
- Left sidebar: Vol. groups (selected), Vol. replication.
- Main content area:
 - Unit rescan**: A panel with a "rescan" button.
 - Unit manager**: A table with columns Unit, Size (GB), Serial number, and Status. The row for "Unit MD0" is checked and has a status of "available". Below the table, the "Action" dropdown is set to "new volume group" and the "Name" field contains "vg00". An "apply" button is at the bottom right of this panel.
 - Drive identifier**: A table with columns Unit, Serial number, and Status. Rows for "Unit S001" and "Unit S000" are shown. An "apply" button is at the bottom right of this panel.

Blue arrows point from the text boxes to the "Vol. groups" tab, the "Unit MD0" row in the "Unit manager" table, and the "apply" button in the "Unit manager" panel.

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Data Server (DSS1)
Primary node
IP Address:192.168.0.220

3. Configure the Primary node

Select the appropriate volume group (**vg00**) from the list on the left and create a **new iSCSI volume** of the required size. This logical volume will be the source of the replication process

Next, check box **Use volume replication**

After assigning an appropriate amount of space for the iSCSI volume, click the **apply** button

NOTE:

The source and destination volumes must be of identical size.

The screenshot shows the open-e web interface for configuring a new iSCSI volume. The breadcrumb trail is: CONFIGURATION > volume manager > Vol. groups > vg00. The 'Vol. groups' section on the left shows 'vg00' selected. The 'Vol. replication' section is also visible. The main configuration area is titled 'Volume manager' and contains the following details:

System volumes	Size (GB)
Reserved Pool	4.00
Reserved for snapshots	0.00
Reserved for system	4.00
Reserved for replication	0.00
Free	457.72

Configuration options include:

- Action: new iSCSI volume
- Options: Just create volume
- Use volume replication
- File I/O
 - Initialize
 - Rate: medium
- Block I/O

A slider for Block I/O shows a value of 10 GB, with a note '(+0.12 GB for replication)'. The 'apply' button is highlighted in red.

Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS1)
Primary node
IP Address:192.168.0.220

3. Configure the Primary node

The source iSCSI Volume Block I/O is now configured.



The screenshot shows the open-e management interface. The top navigation bar includes 'SETUP', 'CONFIGURATION', 'MAINTENANCE', 'STATUS', and 'HELP'. The breadcrumb trail indicates the current location: 'CONFIGURATION > volume manager > Vol. groups > vg00'. The main content area is divided into two panes. The left pane shows the 'Vol. groups' section with 'vg00' selected. The right pane shows the 'Volume manager' configuration for 'lv0000'. A blue arrow points from the text box to the 'lv0000' entry in the table.

Logical Volume	Type	Snap.	Rep.	Init.	Blocksize (bytes)	Size (GB)
lv0000	B2		✓		N/A	10.00
System volumes						Size (GB)
Reserved Pool						4.00
Reserved for snapshots						0.00
Reserved for system						4.00
Reserved for replication						0.13
Free						447.59

Below the table, the 'Action:' dropdown is set to 'new NAS volume'. There are checkboxes for 'Use volume replication' and 'WORM', both of which are unchecked. At the bottom, there is a slider and an 'add:' field with a value of '0.00' and a unit of 'GB'. An 'apply' button is located at the bottom right of the configuration pane.

Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS1)
Primary node
IP Address:192.168.0.220

3. Configure the Primary node

Now, select Vol. replication, and check the box under **Source** and click the **apply** button

Next , under **Mirror Server IP** function, enter the IP address of the Secondary node (in our example this would be 192.168.1.221) and click the **apply** button

The screenshot shows the open-e web interface for configuring volume replication. The breadcrumb trail is: CONFIGURATION > volume manager > Vol. replication. The 'Vol. groups' section shows a group named 'vg00'. The 'Vol. replication' section is active, showing a table for 'Volume replication mode'.

Logical Volume	Init	Source	Destination	Clear metadata
lv0000	done	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Below the table is an 'apply' button. The 'Mirror server IP' section has an 'IP address' field containing '192.168.1.221' and a 'WAN' checkbox which is unchecked. There is also an 'apply' button here. A message at the bottom of this section says 'Please apply changes or press "reload" button to discard'. The 'Create new volume replication task' section shows an 'Info' message: 'Mirror Server IP is not set.'. The 'Replication tasks manager' section also shows an 'Info' message.

Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS1)
Primary node
IP Address:192.168.0.220

3. Configure the Primary node

Enter the task name in field
Task name next click on the
button 

In the **Destination volume**
field select the appropriate
volume (in this example,
lv0000) and click **create** to
confirm

The screenshot shows the open-e web interface for configuring volume replication. The top navigation bar includes 'SETUP', 'CONFIGURATION', 'MAINTENANCE', 'STATUS', and 'HELP'. The breadcrumb trail indicates the current location: 'You are here: CONFIGURATION > volume manager > Vol. replication'. The main content area is divided into several panels:

- Vol. groups:** A tree view showing a group named 'vg00'.
- Mirror server IP:** A form with 'IP address:' set to '192.168.1.221' and a 'WAN' checkbox. An 'apply' button is at the bottom.
- Create new volume replication task:** A form with the following fields:
 - 'Task name:' set to 'MirrorTask'
 - 'Source volume:' set to 'lv0000'
 - 'Destination volume:' set to 'lv0000' (with a dropdown arrow icon)
 - 'Bandwidth for SyncSource (MB):' set to '40'
 - 'Asynchronous protocol:' checkbox is unchecked.An 'create' button is at the bottom. A note below the form reads: 'Please apply changes or press "reload" button to discard'.
- Replication tasks manager:** A panel with an 'Info' icon and the text 'No tasks have been found.'

At the bottom of the interface, there is an 'Event Viewer' icon and a footer that reads 'Data Storage Software V6 - All rights reserved'.

Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS1)
Primary node
IP Address:192.168.0.220

3. Configure the Primary node

Now, in the **Replication task manager** function, click on  button under to start the Replication task on the Primary node

The screenshot shows the open-e web interface for configuring a primary node. The breadcrumb trail is: CONFIGURATION > volume manager > Vol. replication. The left sidebar shows a tree view with 'Vol. groups' containing 'vg00' and 'Vol. replication' containing 'MirrorTask'. The main content area has several sections:

- Mirror server IP:** IP address: 192.168.1.221, with a checkbox for 'WAN' and an 'apply' button.
- Create new volume replication task:** An info message states: 'No volumes with replication functionality found or all volumes have a task assigned already.'
- Replication tasks manager:** A table with columns 'Name', 'Start time', and 'Action'. The 'MirrorTask' row shows 'n/a' for start time and three control buttons (play, stop, delete).

At the bottom, there is an 'Event Viewer' icon and a footer: 'Data Storage Software V6 - All rights reserved'.

Synchronous Volume Replication with Failover over a LAN *open-e*



open-e
Data Server (DSS1)
Primary node
IP Address:192.168.0.220

3. Configure the Primary node

In the Replication tasks manager function information is available about the current running replication task.

The screenshot shows the open-e web interface for configuring a primary node. The interface includes a navigation menu with options: SETUP, CONFIGURATION, MAINTENANCE, STATUS, and HELP. The current page is titled "Vol. replication" under the "CONFIGURATION" section. The breadcrumb trail is "You are here: CONFIGURATION > volume manager > Vol. replication".

The main content area is divided into several sections:

- Vol. groups:** A tree view showing a group named "vg00".
- Vol. replication:** A tree view showing a task named "MirrorTask".
- Mirror server IP:** A configuration panel with a text input field for "IP address" containing "192.168.1.221" and a checkbox for "WAN". An "apply" button is located at the bottom right.
- Create new volume replication task:** An information panel with a blue "Info" icon and the text: "No volumes with replication functionality found or all volumes have a task assigned already."
- Replication tasks manager:** A table displaying the details of the "MirrorTask".

Name	Start time	Action
MirrorTask	2010-09-03 00:17:52	  

Below the table, the following details are listed:

- Source volume: lv0000
- Destination volume: lv0000
- Destination IP: 192.168.1.221
- Protocol type: Synchronous

The footer of the interface includes "Event Viewer:  Data Storage Software V6 - All rights reserved".

Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS1)
Primary node
IP Address:192.168.0.220

3. Configure the Primary node

Under the „STATUS“ tab,
select „tasks“ and Volume
Replication

Click on the  button with
task name (in this case
MirrorTask) to display detailed
information on the current
replication task

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SETUP | CONFIGURATION | MAINTENANCE | STATUS | HELP

You are here: STATUS > tasks > Volume Replication

Tasks

- Backup
- Restore from backup
- Data Replication
- Antivirus
- Volume Replication**
- Snapshots

Running tasks

Name	Type	Start time
MirrorTask	Volume replication	2010-09-03 00:17:52

Protocol type: Synchronous
Connection: Connected

Source info:
Logical volume: lv0000
Consistency: Consistent

Destination info:
Logical volume: lv0000
Consistency: Consistent
IP address: 192.168.1.221

Tasks log

Time	Name	Type	Status	Action
2010-09-03 00:17:58	MirrorTask	Volume replication	OK	Started

Event Viewer: 

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NOTE:

Please allow the replication task to complete similar to above with status being "Consistent" before writing to the iSCSI Logical Volume.

Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS2)
Secondary node
IP Address:192.168.0.221

4. Create new target on the Secondary node

Choose „CONFIGURATION“, „iSCSI target manager“ and „Targets“ from the menu

In the Create new target function, uncheck the box Target Default Name, and enter a name for the new target in the Name field and click **apply** to confirm.

iSCSI targets



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SETUP CONFIGURATION MAINTENANCE STATUS HELP

You are here: CONFIGURATION > iSCSI target manager > Targets

Targets

Create new target

Target Default Name

Name: mytarget

Alias: target0

apply

Please apply changes or press "reload" button to discard

Discovery CHAP user access

Enable CHAP user access authentication

apply

CHAP users

Event Viewer: [icon]

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NOTE:

Both systems must have the same Target name.

Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS2)
Secondary node
IP Address:192.168.0.221

4. Create new target on the Secondary node

Select target0 within the Targets field.

To assign a volume to the target, click the button located under **Action**

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SETUP CONFIGURATION MAINTENANCE STATUS HELP

You are here: CONFIGURATION > iSCSI target manager > Targets > mytarget (target0)

Targets

- target0

CHAP users

Target volume manager

Info
Currently there are no LUN's added to this target. In order to add a LUN, click on the plus "+" sign in the "Action" column for this LUN.

Info
There are logical volumes selected as mirror destination volume. In order to access such volume, you can stop mirror task and switch destination mode to source mode or create a snapshot on the destination volume and assign the snapshot to a new target.

Info
Please note that in order to access iSCSI-enabled data from an initiator, the target needs to have a LUN 0, otherwise the data in all other LUNs will be inaccessible. The data will also be inaccessible if you select an inactive snapshot or a destination volume (volume replication) as LUN 0.

Volume	SCSI ID	LUN	RO	WB	Action
lv0000	ytwT4E9Dka90xUMI	0	<input type="checkbox"/>	<input type="checkbox"/>	

Discovery CHAP user access

Enable CHAP user access authentication

apply

Event Viewer:

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NOTE:
Both systems must have the same SCSI ID and LUN#

WARNING:
Please do not switch on the write back (WB) cache !

Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS1)
Primary node
IP Address:192.168.0.220

5. Create new target on the Primary node

Choose „CONFIGURATION“ and „iSCSI target manager“ and „Targets“ from the menu

In the Create new target function, uncheck the box Target Default Name, and enter a name for the new target in the Name field and click **apply** to confirm

iSCSI targets



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SETUP | CONFIGURATION | MAINTENANCE | STATUS | HELP

You are here: CONFIGURATION > iSCSI target manager > Targets

Targets

Create new target

Target Default Name

Name: mytarget

Alias: target0

apply

Please apply changes or press "reload" button to discard

Discovery CHAP user access

Enable CHAP user access authentication

apply

Event Viewer: [icon]

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NOTE:

Both systems must have the same Target name.

Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS1)
Primary node
IP Address:192.168.0.220

5. Create new target on the Primary node

Select the target0 within the Targets field

To assign a volume to the target, click the button  located under **Action**

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SETUP | CONFIGURATION | MAINTENANCE | STATUS | HELP

You are here: CONFIGURATION > iSCSI target manager > Targets > mytarget (target0)

Targets

- target0

Target volume manager

Info
Currently there are no LUN's added to this target. In order to add a LUN, click on the plus "+" sign in the "Action" column for this LUN.

Info
Please note that in order to access iSCSI-enabled data from an initiator, the target needs to have a LUN 0, otherwise the data in all other LUNs will be inaccessible. The data will also be inaccessible if you select an inactive snapshot or a destination volume (volume replication) as LUN 0.

Volume	SCSI ID	LUN	RO	WB	Action
lv0000	ytwT4E9Dka90xUMI	0	<input type="checkbox"/>	<input type="checkbox"/>	 

Please apply changes or press "reload" button to discard

Discovery CHAP user access

Enable CHAP user access authentication

apply

Target IP access

Deny access:

Allow access:

Event Viewer: 

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WARNING:
Please do not switch on the write back cache (WB) !

Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS1)
Primary node
IP Address: 192.168.0.220

6. Configure iSCSI Failover

Now, select iSCSI Failover

In the Failover configuration function, check the box **Enable iSCSI failover functionality**. Select **Network connection mode** (in this example **Unicast**) and select **Network interface for unicast** (**bond0**). Next enter the **Secondary node IP** and the **Ping Node IP** (must be on the same subnet) and click the **apply** button.

Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS2)
Secondary node
IP Address:192.168.0.221

6. Configure iSCSI Failover

Now, select iSCSI Failover

Now, in Failover configuration function, check the box Enable iSCSI failover functionality. Select Network connection mode (in this example Unicast) and select Network interface for unicast (bond0). After choose Secondary node on localhost enter Primary node IP address and click the **apply** button

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SETUP CONFIGURATION MAINTENANCE STATUS HELP

You are here: SETUP > network > iSCSI Failover

Interfaces

- eth0
- eth1
- eth2 (bond0)
- eth3 (bond0)
- bond0

Failover status

Info

Failover statistics are unavailable due to the iSCSI Failover service being disabled. Please go to Failover Configuration to enable it.

Failover configuration

Enable iSCSI failover functionality

Network connection mode: Unicast

Network interface for unicast: bond0 » 192.168.2.221

Primary node on localhost

Secondary node IP: []

Ping node IP(s): []

Show advanced >>

Secondary node on localhost

Primary node IP: 192.168.2.220

Show advanced >>

apply

Please apply changes or press "reload" button to discard

Failover Tasks

Event Viewer: []

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Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS1)
Primary node
IP Address: 192.168.0.220

7. Configure Virtual IP and Auxiliary connection

Now, select the **bond0** within **iSCSI Failover**. In the **Virtual IP Settings** function check box **Enable virtual IP** and enter IP address, Netmask, Broadcast, and click the **apply** button.

By setting the address of the secondary node in a **Failover configuration**, automatic detection of the interface for communication. This step is necessary to complement the destination IP address used in unicast.

The screenshot shows the open-e web interface with the following configuration steps:

- Interfaces:** A list of network interfaces including eth0, eth1, eth2 (bond0), eth3 (bond0), and bond0.
- iSCSI Failover:** A configuration panel where the **bond0** interface is selected.
- Virtual IP Settings:** A panel where the **Enable virtual IP** checkbox is checked. The IP address is set to 192.168.10.230, the netmask to 255.255.255.0, and the broadcast address to 192.168.10.255.
- Auxiliary connection:** A panel where the checkbox **Use this network interface to communicate between the nodes** is checked, and the unicast remote IP is set to 192.168.2.221.

Blue arrows point from the text boxes to the corresponding configuration fields in the interface.

NOTE:

There need to be at least two *auxiliary connections*. The interface with the virtual IP can also serve as one of the auxiliary connections. Please set the Virtual IP Address in a different network subnet than the physical IP Address. To have additional iSCSI Failover systems, please set this pair in a different network subnet from the other iSCSI Failover systems. This limitation will be removed in the future.

Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS1)
Primary node
IP Address:192.168.0.220

7. Configure Virtual IP and Auxillary connection

Now, select the eth1 within iSCSI Failover. In the Auxiliary connection function check box Use this network interface to communicate between the nodes next enter IP address for Unicast remote IP and click the **apply** button.

The screenshot shows the open-e web interface for configuring iSCSI Failover. The breadcrumb trail is "You are here: SETUP > network > iSCSI Failover".

Interfaces

- eth0
- eth1
- eth2 (bond0)
- eth3 (bond0)
- bond0

iSCSI Failover

- eth0
- eth1**
- bond0

Virtual IP Settings

Info
Virtual IP must be set in different subnetwork than physical IP on this machine and must be in different subnetwork than Virtual IP sets on other machines in the same network area configured also as failover.

MAC: 00:15:17:18:e7:f5

Enable virtual IP

apply

Auxiliary connection

Use this network interface to communicate between the nodes.

Unicast remote IP:

apply

Please apply changes or press "reload" button to discard

Event Viewer:

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Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS2)
Secondary node
IP Address: 192.168.0.221

7. Configure Virtual IP and Auxiliary connection

Choose, „**SETUP**“ and „**network**“ and „**Interfaces**“ from the menu

Now, select the **bond0** within **iSCSI Failover**. In the **Virtual IP Settings** function check the box **Enable virtual IP** and enter **IP address**, **Netmask**, **Broadcast**, and click the **apply** button.

By setting the address of the primary node in a **Failover configuration**, automatic detection of the interface for communication. This step is necessary to complement the destination IP address used in unicast.

The screenshot shows the open-e web interface with the following elements:

- Navigation:** SETUP, CONFIGURATION, MAINTENANCE, STATUS, HELP. Breadcrumbs: You are here: SETUP > network > iSCSI Failover.
- Virtual IP Settings:**
 - Info: Virtual IP must be set in different subnetwork than physical IP on this machine and must be in different subnetwork than Virtual IP sets on other machines in the same network area configured also as failover.
 - MAC: 02:f9:64:ad:ae:a3
 - Enable virtual IP
 - IP address: 192.168.10.230
 - Netmask: 255.255.255.0
 - Broadcast: 192.168.10.255
 - apply button
 - Link: Please apply changes or press "reload" button to discard
- Auxiliary connection:**
 - Use this network interface to communicate between the nodes.
 - Unicast remote IP: 192.168.2.220
 - apply button
 - Link: Please apply changes or press "reload" button to discard
- Interfaces:** eth0, eth1, eth2 (bond0), eth3 (bond0), bond0
- iSCSI Failover:** eth0, eth1, bond0

Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS2)
Secondary node
IP Address:192.168.0.221

7. Configure Virtual IP and Auxillary connection

Now, select the eth1 within iSCSI Failover. In the Auxiliary connection function check box Use this network interface to communicate between the nodes next enter IP address for Unicast remote IP and click the **apply** button.

The screenshot shows the open-e web interface for configuring network settings. The top navigation bar includes 'SETUP', 'CONFIGURATION', 'MAINTENANCE', 'STATUS', and 'HELP'. The current page is 'iSCSI Failover' under 'network'. The 'Interfaces' section lists 'eth0', 'eth1', 'eth2 (bond0)', 'eth3 (bond0)', and 'bond0'. The 'iSCSI Failover' section lists 'eth0', 'eth1', and 'bond0'. The 'Virtual IP Settings' section shows 'MAC: 00:04:23:b9:86:fb' and an unchecked 'Enable virtual IP' checkbox. The 'Auxiliary connection' section has a checked checkbox 'Use this network interface to communicate between the nodes.' and a text input field for 'Unicast remote IP' containing '192.168.1.220'. Arrows from the blue text box point to 'eth1' in the iSCSI Failover list and the 'Use this network interface...' checkbox.

Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS1)
Primary node
IP Address:192.168.0.220

8. Start Failover Service

Move the iSCSI Tasks to be used for the failover service to the Failover Tasks area by clicking  button and click **apply**

The screenshot displays the open-e web interface for configuring iSCSI failover. The top navigation bar includes 'SETUP', 'CONFIGURATION', 'MAINTENANCE', 'STATUS', and 'HELP'. The breadcrumb trail indicates the current location: 'You are here: SETUP > network > iSCSI Failover'. The main content area is divided into several sections:

- Interfaces:** A list of network interfaces: eth0, eth1, eth2 (bond0), eth3 (bond0), and bond0.
- iSCSI Failover:** A list of iSCSI tasks: eth0, eth1, and bond0.
- Failover Tasks:** A section for managing failover tasks. It includes an info message: 'Please note asynchronous replication tasks will not be displayed in this window, as only synchronous tasks can be used for failover.' Below this are search fields for 'iSCSI Tasks' and 'Failover Tasks'. The 'Failover Tasks' list currently contains 'MirrorTask'. A right-pointing arrow button is located between the iSCSI Failover and Failover Tasks lists.
- Failover manager:** A section with an info message: 'No task has been selected.'

An 'apply' button is located at the bottom right of the Failover Tasks section. A blue arrow from the text box on the left points to the right-pointing arrow button between the iSCSI Failover and Failover Tasks lists.

Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS1)
Primary node
IP Address: 192.168.0.220

8. Start Failover Service

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SETUP CONFIGURATION MAINTENANCE STATUS HELP

You are here: SETUP > network > iSCSI Failover

Interfaces

- eth0
- eth1
- eth2 (bond0)
- eth3 (bond0)
- bond0

iSCSI Failover

- eth0
- eth1
- bond0

Search: [] Search: []

MirrorTask

apply

Failover manager

start stop

In order to delegate (switch) active server state to the passive server click the Manual failover button. This will initiate a failover event and switch the primary server to suspend mode, while the secondary server will be promoted to active mode. Please note this will stop the volume replication process.

Manual failover

Event Viewer: []

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At this point both nodes are ready to start the Failover service

Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS1)
Primary node
IP Address: 192.168.0.220

8. Start Failover Service

After clicking the **start** button configuration of both nodes will be complete

NOTE:

You can now connect via your iSCSI initiator and use your targets via the Virtual IP address e.g. 192.168.10.230 (For example, in a Microsoft Windows environment, download Microsoft iSCSI Initiator ver 2.0 or later).

Synchronous Volume Replication with Failover over a LAN *open-e*

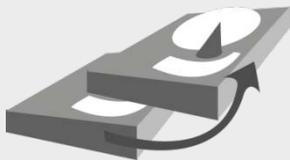


Data Server (DSS1)
Primary node
IP Address: 192.168.0.220

8. Start Failover Service

After start Failover, check the status in **Failover status** function. All must read OK. In the task status, the destination volume must be consistent

iSCSI Failover/Volume Replication



Names	Status
Global status	
Service running	ok
Node status	primary/active
Ping node group status	ok
Individual ping node status:	
IP: 192.168.2.106	ok
Communication via:	
bond0	ok
eth1	ok
Task status	
MirrorTask	running
Connection:	Connected
Source info:	
Logical volume:	lv0000
Consistency:	Consistent
Destination info:	
Logical volume:	lv0000
Consistency:	Consistent
IP address:	192.168.1.221

Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS1)
Primary node
IP Address:192.168.0.220

9. Test Failover Function

In order to test Failover in Manual Failover, function, click on the **Manual failover** button.

Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS1)
Primary node
IP Address:192.168.0.220

9. Test Failover Function

The screenshot shows the open-e web interface for configuring iSCSI failover. The top navigation bar includes 'SETUP', 'CONFIGURATION', 'MAINTENANCE', 'STATUS', and 'HELP'. The current page is 'iSCSI Failover' under 'network'. On the left, there are two panels: 'Interfaces' and 'iSCSI Failover', both listing network interfaces: eth0, eth1, eth2 (bond0), eth3 (bond0), and bond0. The main content area is divided into two sections. The top section is for interface configuration, with an 'apply' button. The bottom section is the 'Failover manager', which shows an 'Info' message: 'Server is in suspend mode.' Below this are 'start' and 'stop' buttons, and a 'Manual failover' button. A blue arrow points from a text box to the 'Info' icon in the failover manager.

After clicking on the **Manual failover** button, primary node enters suspend mode

Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS1)
Primary node
IP Address: 192.168.0.220

9. Test Failover Function

The Failover status function shows the **Global status** of the primary node. Status service is in **suspend** mode and the node is **inactive**.

The screenshot displays the open-e web interface for the iSCSI Failover configuration. The top navigation bar includes 'SETUP', 'CONFIGURATION', 'MAINTENANCE', 'STATUS', and 'HELP'. The breadcrumb trail indicates the current location: 'You are here: SETUP > network > iSCSI Failover'.

The main content area is divided into several sections:

- Interfaces:** Lists network interfaces: eth0, eth1, eth2 (bond0), eth3 (bond0), and bond0.
- iSCSI Failover:** Lists iSCSI interfaces: eth0, eth1, and bond0.
- Failover status:** A table showing the current status of the failover service and node.
- Failover configuration:** A section for configuring the failover functionality.

Names	Status
Global status	
Service running	suspend
Node status	inactive
Ping node group status	unknown
Individual ping node status:	
IP: 192.168.2.106	ok
Communication via:	
bond0	unknown
eth1	unknown
Task status	
MirrorTask	stopped

The 'Failover configuration' section includes an information box stating: 'While a failover is turned on, you cannot make changes to its configuration.' Below this, there is a checkbox for 'Enable iSCSI failover functionality' which is checked. The 'Network connection mode' is set to 'Unicast' and the 'Network interface for unicast' is set to 'bond0'.

Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS2)
Secondary node
IP Address: 192.168.0.221

9. Test Failover Function

In Failover status function
Global status shows the status
of the secondary node. The
service status is degraded and
Node status is active.

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SETUP CONFIGURATION MAINTENANCE STATUS HELP

You are here: SETUP > network > iSCSI Failover

Interfaces

- eth0
- eth1
- eth2 (bond0)
- eth3 (bond0)
- bond0

iSCSI Failover

- eth0
- eth1
- bond0

Failover status

Names	Status
Global status	
Service running	degraded
Node status	secondary/active
Ping node group status	ok
Individual ping node status:	
IP: 192.168.2.106	ok
Communication via:	
bond0	failed
eth1	failed
Task status	
MirrorTask_reverse	stopped

Failover configuration

Info
While a failover is turned on, you cannot make changes to its configuration.

Enable iSCSI failover functionality

Network connection mode: Unicast

Network interface for unicast: bond0 v 192.168.0.221

Event Viewer: [icon]

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Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS2)
Secondary node
IP Address: 192.168.0.221

10. Run Failback Function

In order to run Failback in Failover manager function click on the **Sync volumes** button first.

Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS2)
Secondary node
IP Address: 192.168.0.221

10. Run Failback Function

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SETUP CONFIGURATION MAINTENANCE STATUS HELP

You are here: SETUP > network > iSCSI Failover

Interfaces

- eth0
- eth1
- eth2 (bond0)
- eth3 (bond0)
- bond0

iSCSI Failover

- eth0
- eth1
- bond0

Failover status

Names	Status
Global status	
Service running	degraded
Node status	secondary/active
Ping node group status	ok
Individual ping node status:	
IP: 192.168.2.106	ok
Communication via:	
bond0	failed
eth1	failed
Task status	
MirrorTask_reverse	running
Connection:	Connected
Source info:	
Logical volume:	lv0000
Consistency:	Consistent
Destination info:	
Logical volume:	lv0000
Consistency:	Consistent
IP address:	192.168.1.220

Event Viewer: [icon]

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After synchronization the task status of the destination volume must be **Consistent**

Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS2)
Secondary node
IP Address: 192.168.0.221

10. Run Failback Function

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SETUP CONFIGURATION MAINTENANCE STATUS HELP

You are here: SETUP > network > iSCSI Failover

Interfaces

- eth0
- eth1
- eth2 (bond0)
- eth3 (bond0)
- bond0

iSCSI Failover

- eth0
- eth1
- bond0

Failover manager

Info
Volume replication process started. Please go to Failover Status to check the status of your tasks.

Info
When in secondary mode, the start and stop buttons control this node only. Please use the relevant buttons on the primary node to control both nodes.

start **stop**

In order to synchronize data from the secondary/active server to the primary server, click the Sync volumes button.

Sync volumes

Clicking the Failback button will return the active server state to the primary server, while the secondary server will return to passive mode. Please note this is only possible when the participating volumes are in sync. After the failback has been completed, the primary server is ready for another failover.

Failback

Event Viewer: [icon]

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In order to return the active server state to the Primary server click on the **Failback** button

Synchronous Volume Replication with Failover over a LAN *open-e*



Data Server (DSS1)
Primary node
IP Address:192.168.0.220

10. Run Failback Function

After clicking on **Failback** button (in Failover manager function on Secondary node) Primary node is now active.

Synchronous Volume Replication with Failover over a LAN *open-e*

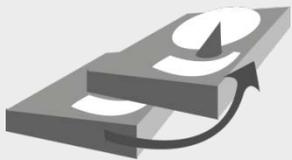


Data Server (DSS1)
Primary node
IP Address: 192.168.0.220

10. Run Failback Function

Primary node is active again and ready for Failover.

iSCSI Failover/Volume Replication



The configuration and testing of iSCSI Failover/Failback is now complete.

The screenshot shows the open-e web interface for configuring iSCSI failover. The breadcrumb trail indicates the user is in the 'iSCSI Failover' configuration page. The 'Interfaces' section lists network interfaces: eth0, eth1, eth2 (bond0), eth3 (bond0), and bond0. The 'iSCSI Failover' section lists the same interfaces. The 'Failover status' section provides a detailed overview of the failover configuration and its current state.

Names	Status
Global status	
Service running	ok
Node status	primary/active
Ping node group status	ok
Individual ping node status:	
IP: 192.168.2.106	ok
Communication via:	
bond0	ok
eth1	ok
Task status	
MirrorTask	running

The 'Failover configuration' section includes an information box stating that configuration changes are disabled while failover is active. Below this, there are checkboxes for 'Enable iSCSI failover functionality' and 'Network connection mode' (set to Unicast), and a dropdown for 'Network interface for unicast' (set to bond0).

Thank you!