

A Step-by-Step Guide to Synchronous Volume Replication (Block Based) over a LAN with Open-E® DSS™



www.open-e.com

www.open-e.com

Synchronous Volume Replication over a LAN

	Replication Mode		Source/Destination			I/O type		Volume Type		
	Synchronous	Asynchronous	w/ System	LAN	WAN	File based	Block based	NAS	iSCSI	FC
Volume Replication	✓			✓			✓	✓	✓	✓

- **Volume Replication** is a process of coping a source logical volume to a destination system.
 - In contrast to data replication, information is being propagated synchronously.
 - Volume replication provides maximal availability in case one of the systems or units fails.

- **Open-E DSS supports:**
 - Synchronous Volume Replication (block based) over a LAN for NAS, iSCSI and Fibre Chanel appliances.

REPLICATION BETWEEN TWO SYSTEMS WITHIN ONE LAN

■ **Recommended Resources**

- Key Hardware (two systems)
 - ✓ x86 compatible,
 - ✓ RAID Controller,
 - ✓ HDD's,
 - ✓ Network Interface Cards.
- Software
 - ✓ Open-E DSS (recommended) or Open-E iSCSI-R3, 2 units.

■ **Benefits**

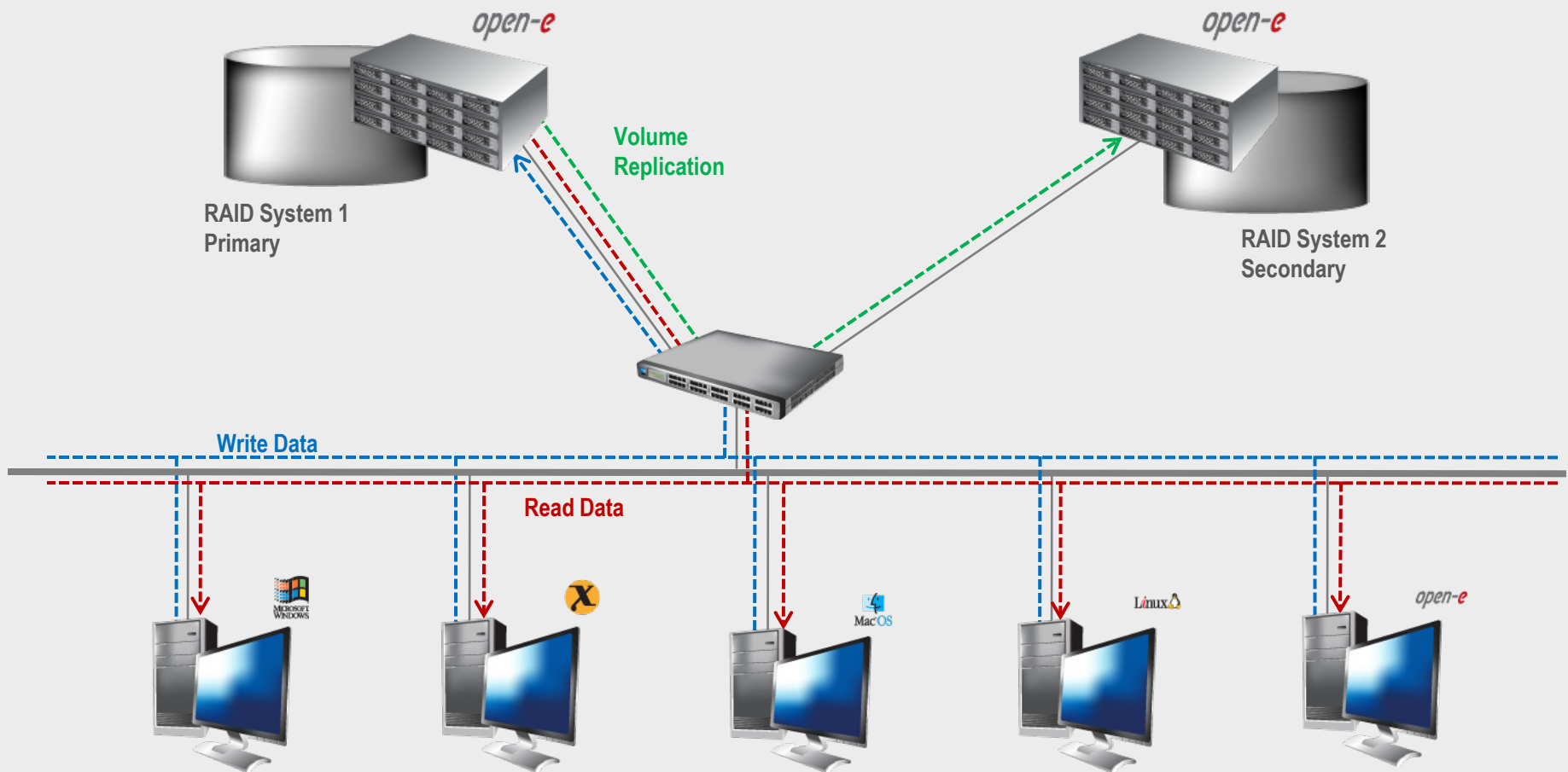
- Data Redundancy over a LAN,
- Enables continuous data access.

■ **Disadvantages**

- High cost of solution,
- Natural disasters can destroy local systems.

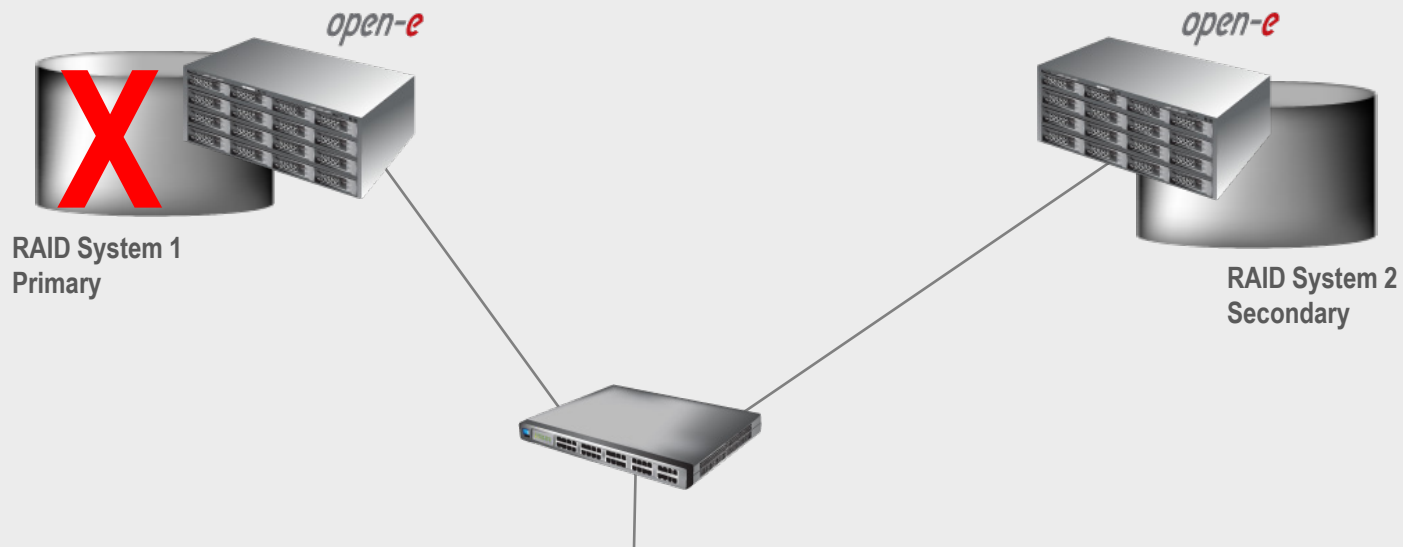
Synchronous Volume Replication over a LAN

- Data is written and read to System 1
- Data is continuously replicated to System 2



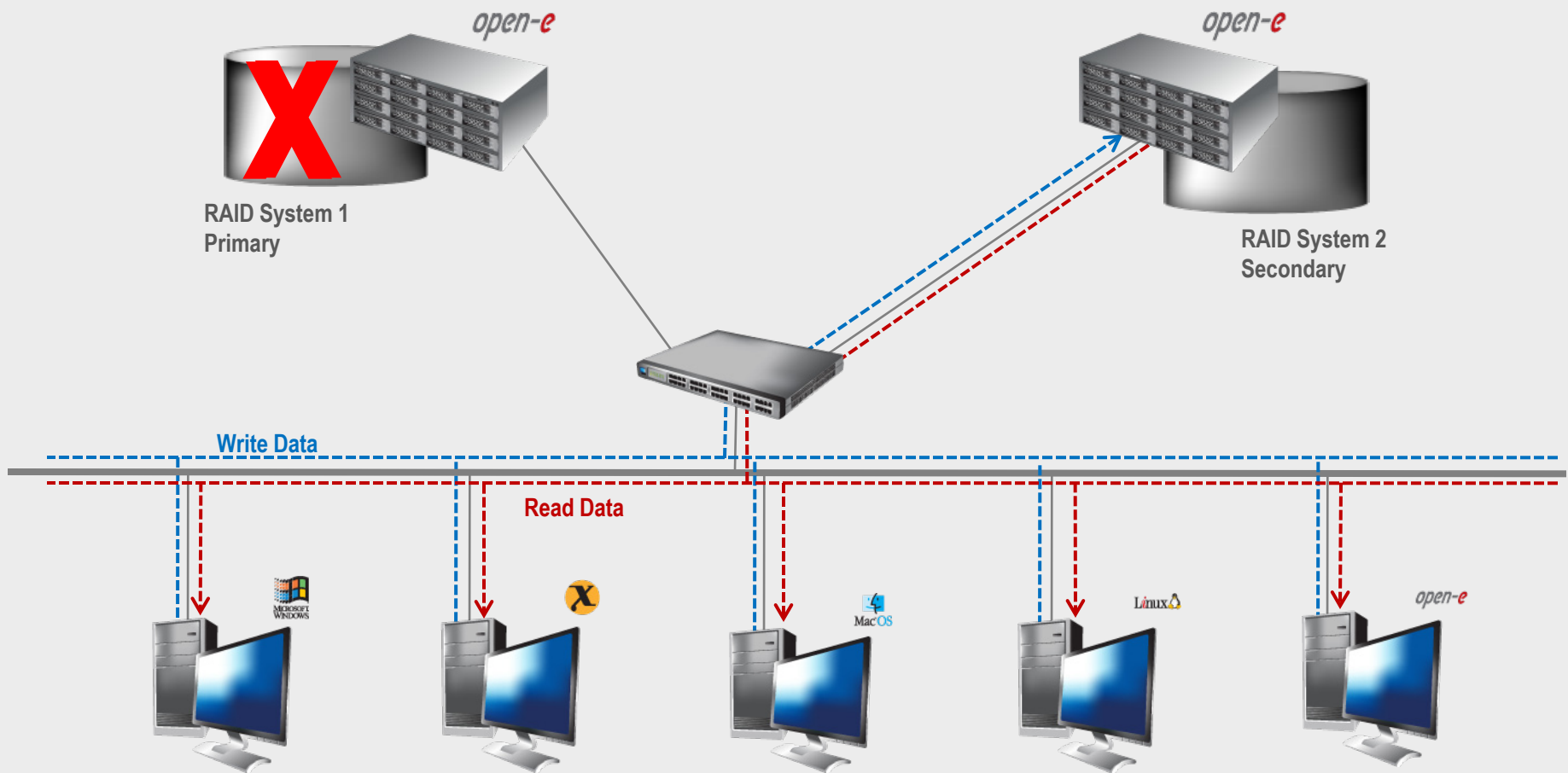
Synchronous Volume Replication over a LAN

- In case of raid array error or disk drive error on the System 1, the server will send an e-mail notification to the administrator,
- In the case of a failure of system 1, users will be notified,
- Administrator then switches users to the System 2.



Synchronous Volume Replication over a LAN

- After switching, replicated volume is available on System 2



TO SET UP VOLUME REPLICATION, PERFORM THE FOLLOWING STEPS:

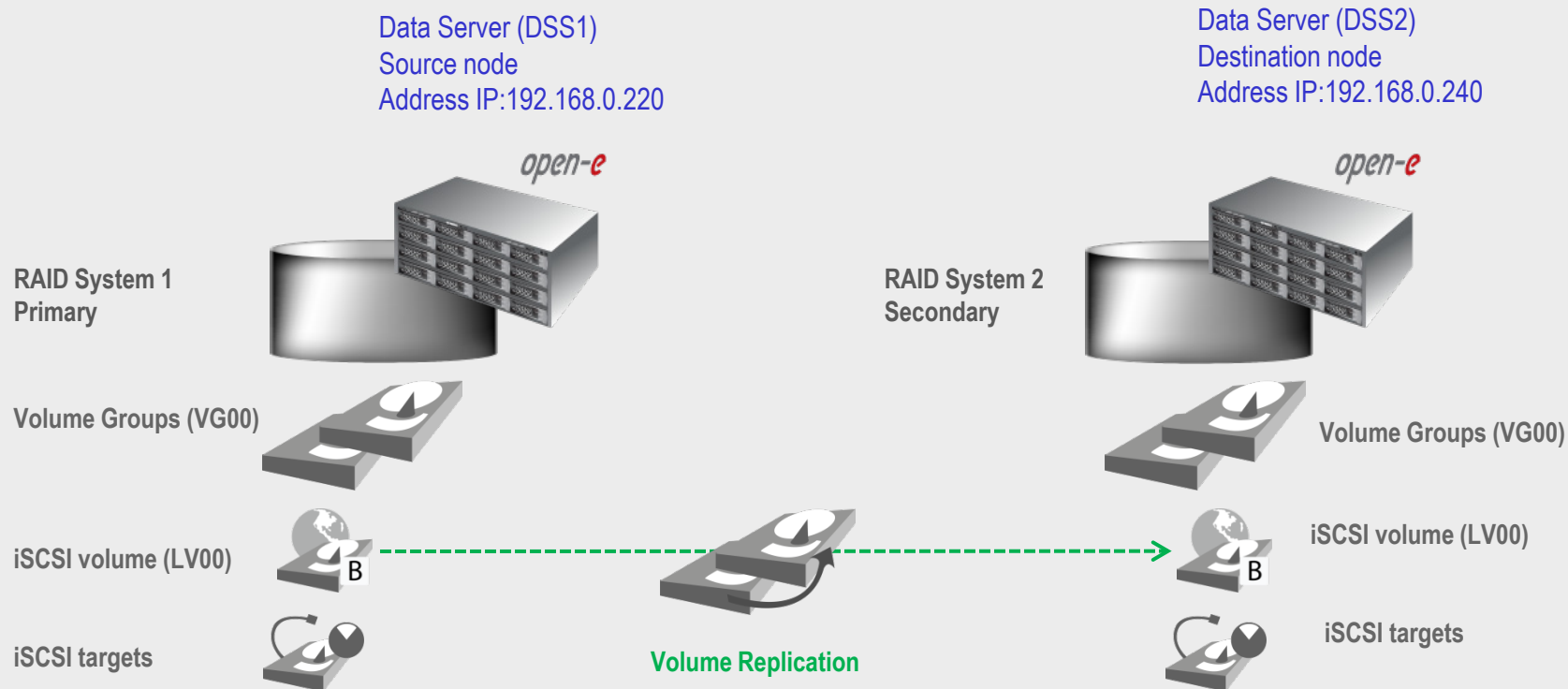
1. Hardware configuration
2. Configure the destination node
3. Configure the source node
4. Create the replication task
5. Checking status volume replication

Setting up Synchronous Volume Replication over a LAN

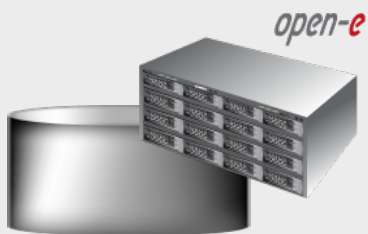
Hardware Requirements

To run the Volume replication of Open-E DSS (or iSCSI-R3), a minimum of two systems are required. Both servers are working in the Local Area Network. An example configuration is shown below:

1. Hardware Configuration



Setting up Synchronous Volume Replication over a LAN



Data Server (DSS2)
Destination node
Address IP:192.168.0.240

2. Configure the Destination Node

Under the „CONFIGURATION” tab, select „volume manager”.

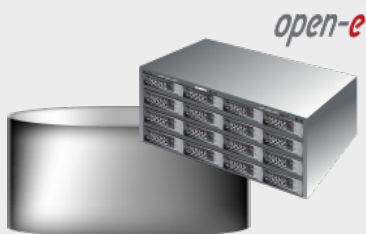
Volume Groups (VG00)



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

The screenshot shows the open-e DSS web interface. The top navigation bar includes 'logout', 'DSS', 'DATA STORAGE SERVER', and the 'open-e' logo. Below this are tabs for 'SETUP', 'CONFIGURATION', 'MAINTENANCE', 'STATUS', and 'HELP'. The 'CONFIGURATION' tab is active, and the 'volume manager' sub-tab is selected. The main content area is divided into two sections: 'Vol. groups' and 'Vol. replication'. In the 'Vol. groups' section, there is a table with columns 'Unit', 'Size (GB)', 'Serial number', and 'Status'. The table contains one entry: 'Unit MD0' with a size of 465.77 GB and a status of 'available'. Below the table, there are input fields for 'Action:' (set to 'new volume group') and 'Name:' (set to 'vg00'). An 'apply' button is located below these fields. In the 'Vol. replication' section, there is a table with columns 'Unit' and 'Serial number'. It contains one entry: 'Unit S000' with a serial number of 'Y636PANE'. A 'status: ✓' indicator is visible at the bottom left of the interface. A footer at the bottom right reads 'Data Storage Server. All rights reserved'.

Setting up Synchronous Volume Replication over a LAN



Data Server (DSS2)
Destination node
Address IP:192.168.0.240

2. Configure the Destination 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.

iSCSI volume (LV00)



Next check box with **Use volume replication**

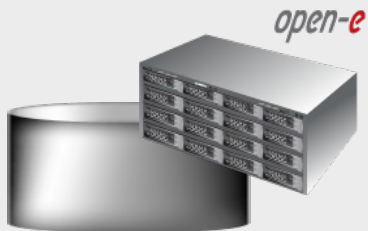
After assigning an appropriate amount of space for the iSCSI volume, click the **apply** button

The screenshot shows the DSS web interface with the following elements:

- Navigation tabs: **SETUP**, **CONFIGURATION** (selected), **MAINTENANCE**, **STATUS**, **HELP**
- Sub-navigation tabs: **volume manager** (selected), **NAS settings**, **NAS resources**, **iSCSI target manager**, **FC target manager**
- Left sidebar: **Vol. groups** (containing **vg00**) and **Vol. replication**
- Main content area: **Volume group: vg00**
- Volume manager** section with a table of system volumes:

System volumes	Size (GB)
Reserved for swap	4.00
Reserved for snapshots	0.00
Reserved for system	1.00
Reserved for replication	0.00
Free	69.56
- Action:** dropdown menu set to **new iSCSI volume**
- Use volume replication**
- File I/O**
- Initialize**
- Block I/O**
- Slider for volume size, currently at 10.00 GB
- add:** **GB** (+0.12 GB for replication)
- apply** button
- Footer: **status: ✓** and **Data Storage Server. All rights reserved**

Setting up Synchronous Volume Replication over a LAN



Data Server (DSS2)
Destination node
Address IP:192.168.0.240

2. Configure the Destination Node

iSCSI volume (LV00)

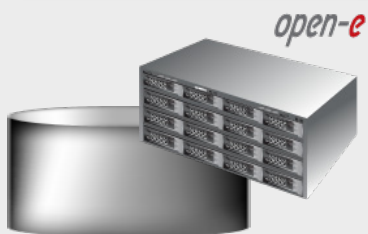


The destination iSCSI Volume Block I/O is now configured.

The screenshot shows the 'CONFIGURATION' tab of the 'DATA STORAGE SERVER' interface. The 'volume manager' sub-tab is active, showing the configuration for volume group 'vg00'. A table lists logical volumes, with 'lv0000' highlighted and a blue arrow pointing to it from the text box on the left. Below the table, there are options for 'Action' (set to 'new NAS volume'), checkboxes for 'Use volume replication' and 'WORM', and a slider for volume size (set to 0.00 GB). An 'apply' button is at the bottom right.

Logical Volume	Type	Snap.	Rep.	Init.	Blocksize (bytes)	Size (GB)
lv0000	B		✓		N/A	10.00
System volumes						
Reserved for swap						4.00
Reserved for snapshots						0.00
Reserved for system						1.00
Reserved for replication						0.13
Free						59.44

Setting up Synchronous Volume Replication over a LAN



Data Server (DSS2)
Destination node
Address IP:192.168.0.240

2. Configure the Destination Node

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

Volume Replication



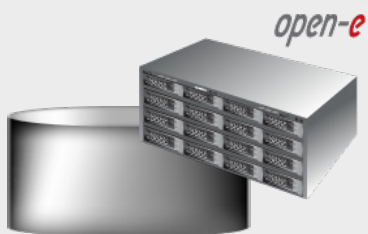
Next, under **Mirror Server IP** function, enter the IP address of the source node. In our example, this would be 192.168.0.220 click the **apply** button

The screenshot shows the 'DSS DATA STORAGE SERVER' web interface. The 'CONFIGURATION' tab is active, and the 'volume manager' sub-tab is selected. On the left, the 'Vol. groups' section shows 'vg00'. Below it, the 'Vol. replication' section is highlighted with a red dot. On the right, the 'Volume replication mode' section contains a table with the following data:

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

Below the table is an 'apply' button. Further down, the 'Mirror server IP' section has an 'Address IP:' field containing '192.168.0.220' and another 'apply' button. At the bottom, there is a 'Create new volume replication task' section with an information icon and the text: 'Info No volumes with replication functionality found or all volumes have a task assigned already.' The status bar at the bottom indicates 'status: ✓' and 'Data Storage Server. All rights reserved'.

Setting up Synchronous Volume Replication over a LAN



Data Server (DSS2)
Destination node
Address IP:192.168.0.240

2. Configure the Destination Node

iSCSI targets



Under the „CONFIGURATION” tab, select „iSCSI target manager”.

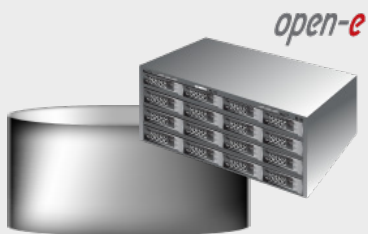
Now, select the Vol. replication and check box under **Destination** and click the **apply** button

The screenshot shows the open-e DSS web interface. The main navigation bar includes 'logout', 'DSS', 'DATA STORAGE SERVER', and 'open-e'. Below this are tabs for 'SETUP', 'CONFIGURATION', 'MAINTENANCE', 'STATUS', and 'HELP'. Under the 'CONFIGURATION' tab, there are sub-tabs for 'volume manager', 'NAS settings', 'NAS resources', 'iSCSI target manager', and 'FC target manager'. The 'iSCSI target manager' tab is selected, showing a 'Targets' section with a search icon and a list of targets. The first target, 'target0', is selected. Below the targets list, there are sections for 'Target volume manager' (with an info box), a table of volumes, and 'CHAP user target access' (with a checked box for 'Enable CHAP user access authentication').

Volume	Rep.	Size (GB)	LUN	RO	WB	Action
lv0000	Destination	10.00	0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="button" value="+"/> <input type="button" value="-"/>

The configuration of the Destination Node (storage server) is now complete.

Setting up Synchronous Volume Replication over a LAN



Data Server (DSS1)
Source node
Address IP:192.168.0.220

3. Configure the Source Node

Under the **CONFIGURATION** tab, select **volume manager**.

Volume Groups (VG00)



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

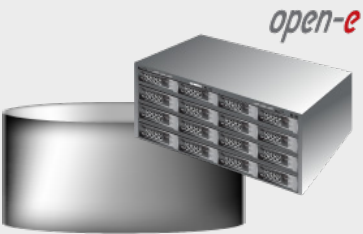
The screenshot shows the DSS web interface with the following elements:

- Navigation tabs: **SETUP**, **CONFIGURATION** (selected), **MAINTENANCE**, **STATUS**, **HELP**.
- Sub-navigation tabs: **volume manager** (selected), **NAS settings**, **NAS resources**, **iSCSI target manager**, **FC target manager**.
- Left sidebar: **Vol. groups** and **Vol. replication** sections.
- Main content area: **Unit rescan** (with **rescan** button), **Unit manager** section containing a table of units and an **apply** button.
- Unit manager table:

Unit	Size (GB)	Serial number	Status
<input type="checkbox"/> Unit MD0	465.77	N/A	available
- Form fields: **Action:** dropdown menu set to **new volume_group**; **Name:** text input field containing **vg00**.
- Drive identifier** section with a table:

Unit	Serial number	Status
<input type="checkbox"/> Unit S000	Y636PANE	
- Footer: **status: ✓** and **Data Storage Server. All rights reserved**.

Setting up Synchronous Volume Replication over a LAN



Data Server (DSS1)
Source node
Address IP:192.168.0.220

3. Configure the Source 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 box with **Use volume replication**

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

System volumes	Size (GB)
Reserved for swap	4.00
Reserved for snapshots	0.00
Reserved for system	1.00
Reserved for replication	0.00
Free	460.72

Action: new iSCSI volume

Use volume replication

File I/O
 Initialize
 Block I/O

0 460.72

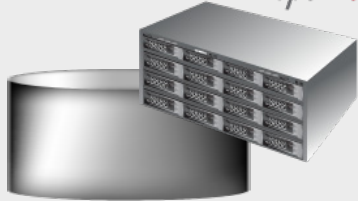
add: 10.00 GB (+0.12 GB for replication)

apply

NOTE:
The source and destination volumes must be of identical size. Remember to enable Volume Replication

Setting up Synchronous Volume Replication over a LAN

open-e



Data Server (DSS1)
Source node
Address IP:192.168.0.220

3. Configure the Source Node

iSCSI volume (LV00)



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

logout **DSS** DATA STORAGE SERVER open-e

SETUP **CONFIGURATION** MAINTENANCE STATUS HELP

volume manager NAS settings NAS resources iSCSI target manager FC target manager

Vol. groups

vg00

Volume group: vg00

Volume manager

Logical Volume	Type	Snap.	Rep.	Init.	Blocksize (bytes)	Size (GB)
lv0000	B		✓		N/A	10.00
System volumes						Size (GB)
Reserved for swap						4.00
Reserved for snapshots						0.00
Reserved for system						1.00
Reserved for replication						0.13
Free						450.59

Action: new NAS volume

Use volume replication

WORM

0 450.59

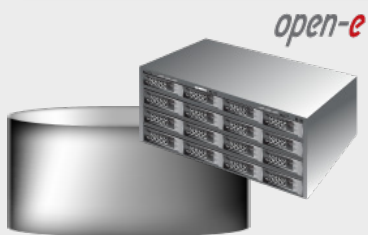
add: 0.00 GB

apply

status: ✓

Data Storage Server. All rights reserved

Setting up Synchronous Volume Replication over a LAN



Data Server (DSS1)
Source node
Address IP:192.168.0.220

3. Configure the Source Node

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

Volume Replication



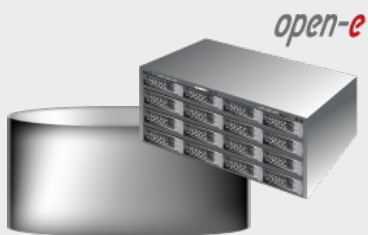
Next, under **Mirror Server IP** function, enter the IP address of the destination node. In our example, this would be 192.168.0.240 click the **apply** button

The screenshot shows the 'DSS DATA STORAGE SERVER' web interface. The 'CONFIGURATION' tab is active, and the 'volume manager' sub-tab is selected. The 'Vol. groups' section shows a group named 'vg00'. The 'Vol. replication' section is expanded, 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 'Address IP:' field containing '192.168.0.240' and another 'apply' button. The 'Create new volume replication task' section shows an info message: 'Mirror Server IP is not set.' The 'Replication tasks manager' section shows an info message: 'No tasks have been found.' The status bar at the bottom indicates 'status: ✓' and 'Data Storage Server. All rights reserved'.

Setting up Synchronous **Volume Replication** over a LAN



Data Server (DSS1)
Source node
Address IP:192.168.0.220

4. Creating replication task

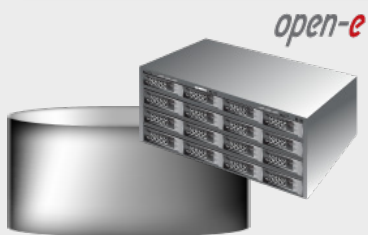
Enter the task name in field **Task name** next, click on the  button

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

The screenshot shows the 'DSS DATA STORAGE SERVER' web interface. The 'CONFIGURATION' tab is active, and the 'Vol. replication' section is selected. The 'Create new volume replication task' form is filled with the following values: Mirror server IP: 192.168.0.240; Task name: Replication_01; Source volume: lv0000; Destination volume: lv0000; Bandwidth for SyncSource (MB): 40. The 'create' button is highlighted. A status message at the bottom indicates 'No tasks have been found.'

The configuration of the Source Node (storage server) is now complete.

Setting up Synchronous Volume Replication over a LAN



Data Server (DSS1)
Source node
Address IP:192.168.0.220

4. Creating replication task

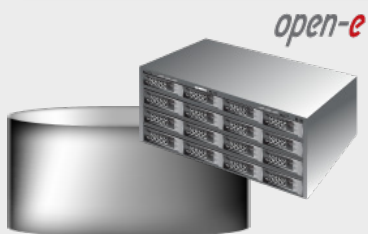
After the DSS console has reloaded, you can start, stop or delete the task within the **Replication task manager** function.

The screenshot shows the DSS web interface with the following elements:

- Navigation tabs: SETUP, CONFIGURATION, MAINTENANCE, STATUS, HELP.
- Sub-navigation tabs: volume manager, NAS settings, NAS resources, iSCSI target manager, FC target manager.
- Left sidebar: Vol. groups (vg00) and Vol. replication (Replication_01).
- Main content area: Mirror server IP (Address IP: 192.168.0.240), Create new volume replication task (Info: No volumes with replication functionality found or all volumes have a task assigned already.), and Replication tasks manager.
- Replication tasks manager table:

Name	Start time	Action
Replication_01	2008-10-19 21:07:47	[Play] [Stop] [Close]
Source volume: lv0000		
Destination volume: lv0000		
Destination IP: 192.168.0.240		
- Status: status: ✓
- Footer: Data Storage Server. All rights reserved

Setting up Synchronous Volume Replication over a LAN



Data Server (DSS1)
Source node
Address IP:192.168.0.220

4. Creating replication task

Also, you can start, stop or delete the task within the **Replication Task Manager** function by clicking on the name replication (in this case, **Replication_01**)

The screenshot shows the open-e Data Storage Server (DSS) web interface. The main navigation bar includes 'logout', 'DSS', and 'DATA STORAGE SERVER'. Below this are tabs for 'SETUP', 'CONFIGURATION', 'MAINTENANCE', 'STATUS', and 'HELP'. Under 'CONFIGURATION', there are sub-tabs for 'volume manager', 'NAS settings', 'NAS resources', 'iSCSI target manager', and 'FC target manager'. The 'volume manager' tab is active, showing a tree view with 'Vol. groups' containing 'vg00' and 'Vol. replication' containing 'Replication_01'. A blue box with arrows points from the 'Replication_01' entry in the 'Vol. replication' list to the 'Replication tasks manager' section on the right. This section displays a table with the following data:

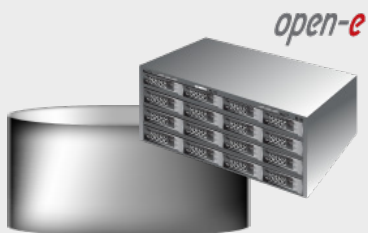
Name	Start time	Action
Replication_01	2008-09-08 02:00:13	[Start] [Stop] [Delete]
Source volume: lv0000		
Destination volume: lv0000		
Destination IP: 192.168.0.240		

At the bottom of the interface, there is a 'status:' indicator with a green checkmark and a footer that reads 'Data Storage Server. All rights reserved'.

NOTE:

Once the replication process has started, the replication direction cannot be changed.

Setting up Synchronous **Volume Replication** over a LAN



Data Server (DSS1)
Source node
Address IP:192.168.0.220

5. Checking volume replication status

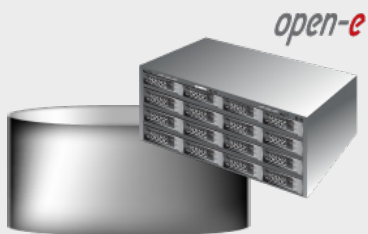
Under the „STATUS” tab, select „tasks”.

The screenshot shows the DSS (Data Storage Server) web interface. The top navigation bar includes 'logout', 'DSS', 'DATA STORAGE SERVER', and the 'open-e' logo. Below this is a secondary navigation bar with tabs: 'SETUP', 'CONFIGURATION', 'MAINTENANCE', 'STATUS', and 'HELP'. Under the 'STATUS' tab, there are sub-tabs: 'network', 'logical volume', 'connections', 'system', 'hardware', 'tasks', and 'S.M.A.R.T.'. The 'tasks' sub-tab is selected. On the left, a sidebar shows a tree view of tasks: Backup, Restore from backup, Data Replication, Antivirus, Volume Replication, and Snapshots. The main content area is divided into two sections: 'Running tasks' and 'Tasks log'. The 'Running tasks' section shows a table with one entry: 'Replication_01' of type 'Volume replication' starting at '2008-10-19 21:07:47'. The 'Tasks log' section shows a table with four entries, all of type 'Volume replication' and status 'OK'. The first entry started at '2008-10-19 21:07:53', the second at '2008-10-19 19:24:55', the third stopped at '2008-10-19 17:51:53', and the fourth started at '2008-10-19 17:51:01'. A blue arrow points from the 'tasks' sub-tab to the 'tasks' section in the main content area. At the bottom left, a status indicator shows 'status: ✓'. At the bottom right, a footer reads 'Data Storage Server. All rights reserved'.

Name	Type	Start time
Replication_01	Volume replication	2008-10-19 21:07:47

Time	Name	Type	Status	Action
2008-10-19 21:07:53	Replication_01	Volume replication	OK	Started
2008-10-19 19:24:55	Replication_01	Volume replication	OK	Started
2008-10-19 17:51:53	Replication_01	Volume replication	OK	Stopped
2008-10-19 17:51:01	Replication_01	Volume replication	OK	Started

Setting up Synchronous **Volume Replication** over a LAN



Data Server (DSS1)
Source node
Address IP:192.168.0.220

5. Checking volume replication status

Select Volume Replication to display information on existing volume replication tasks

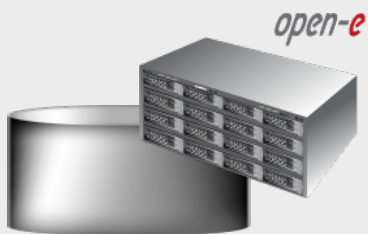
The screenshot shows the DSS web interface with the following structure:

- Logout button
- Navigation tabs: SETUP, CONFIGURATION, MAINTENANCE, STATUS (selected), HELP
- Sub-navigation tabs: network, logical volume, connections, system, hardware, tasks (selected), S.M.A.R.T.
- Left sidebar: Tasks menu with options: Backup, Restore from backup, Data Replication, Antivirus, **Volume Replication** (selected), Snapshots
- Main content area: Tasks: Volume Replication
- Running tasks table:

Name	Type	Start time
Replication_01	Volume replication	2008-10-19 21:07:47
- Tasks log table:


Time	Name	Type	Status	Action
2008-10-19 21:07:53	Replication_01	Volume replication	OK	Started
2008-10-19 19:24:55	Replication_01	Volume replication	OK	Started
2008-10-19 17:51:53	Replication_01	Volume replication	OK	Stopped
2008-10-19 17:51:01	Replication_01	Volume replication	OK	Started
- Footer: status: ✓ and Data Storage Server. All rights reserved

Setting up Synchronous Volume Replication over a LAN



Data Server (DSS1)
Source node
Address IP:192.168.0.220

5. Checking volume replication status

Click on  button with task name (in this case **Replication_01**) to display detailed information on the current replication task.

The screenshot shows the open-e Data Storage Server (DSS) web interface. The main navigation bar includes 'logout', 'DSS', 'DATA STORAGE SERVER', and the 'open-e' logo. Below this are tabs for 'SETUP', 'CONFIGURATION', 'MAINTENANCE', 'STATUS', and 'HELP'. A secondary set of tabs includes 'network', 'logical volume', 'connections', 'system', 'hardware', 'tasks', and 'S.M.A.R.T.'. The 'tasks' tab is selected, displaying a 'Tasks: Volume Replication' section. On the left, a 'Tasks' sidebar lists various tasks, with 'Volume Replication' highlighted. The main content area shows a table of running tasks:

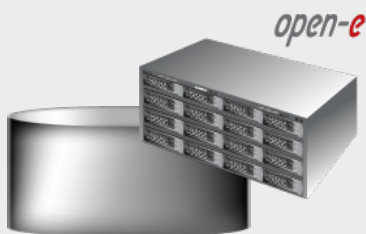
Name	Type	Start time
Replication_01	Volume replication	2008-10-19 19:24:45

Below the table, detailed information for the selected task is shown:

- Connection: SyncSource
- Total size to replicate: 8549 MB
- Remain to replicate: 2454 MB
- Speed (avg): 68316 kB/s (32500 kB/s)
- Time left: 0:00:36
- Source info:**
 - Logical volume: lv0000
 - Consistency: Consistent
- Destination info:**
 - Logical volume: lv0000
 - Consistency: **Inconsistent**
 - IP address: 192.168.0.240

The status bar at the bottom indicates 'status: ✓' and 'Data Storage Server. All rights reserved'.

Setting up Synchronous Volume Replication over a LAN



Data Server (DSS1)
Source node
Address IP:192.168.0.220

5. Checking volume replication status

The replication task is show info about of consistency of data on destination node. In this case replication proces on destination mode is ended.

logout **DSS** DATA STORAGE SERVER open-e

SETUP CONFIGURATION MAINTENANCE **STATUS** HELP

network logical volume connections system hardware **tasks** S.M.A.R.T.

Tasks: Volume Replication

Running tasks

Name	Type	Start time
Replication_01	Volume replication	2008-10-19 19:24:45

Connection: Connected

Source info:
Logical volume: lv0000
Consistency: Consistent

Destination info:
Logical volume: lv0000
Consistency: Consistent
IP address: 192.168.0.240

Tasks log

Time	Name	Type	Status	Action
------	------	------	--------	--------

status: ✓

Data Storage Server. All rights reserved

Volume Replication, between source and destination nodes, is now complete

Thank You!