

Application Note

February 2014

SnapSAN ALUA in an ESXi Environment



Summary

This application note describes how Asymmetric Logical Unit Access (ALUA) functionality works in an ESXi environment with SnapSAN arrays and how to disable it.

Introduction

The benefit of modern SAN design is the ability to create very reliable and fault tolerant storage. It is now possible to have storage with no single point of failure. This is possible because modern arrays allow access to storage on multiple ports with the connectivity type of iSCSI or Fibre Channel.

Asymmetric Logical Unit Access (ALUA) is a SCSI3 (SPC-3) standard that allows a storage device to signify to VMware ESXi host servers which paths are preferred. By default the SnapSAN ALUA is enabled, thus ESXi complies with this configuration.

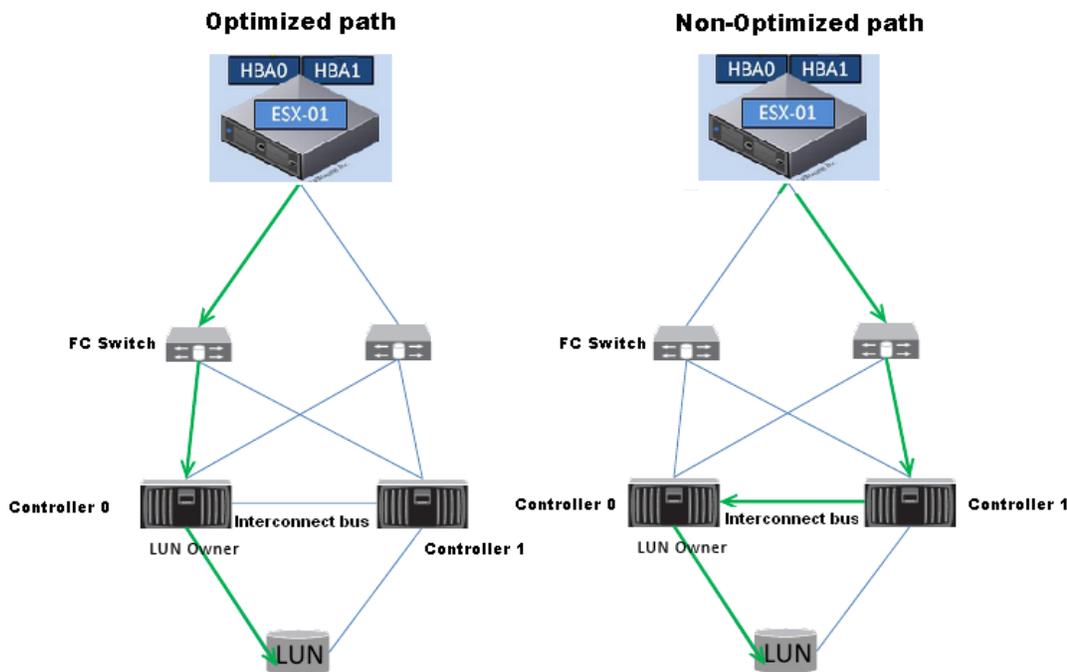
The SnapSAN is ALUA compliant; this means the LUN is accessible through both storage processors (controllers) as **Active**, but only one of these storage processors actually “owns” the LUN.

The path types are:

- **Optimized Path (Active I/O)** - A direct path to the storage processor that owns the LUN.
- **Non-optimized Path (Active)** - A connection with the storage processor that owns the LUN through an interconnected bus.

VMware tracks information about the processor owning the LUNs and prefers sending traffic directly to the owner in the optimized path. The Most Recently Used (MRU) pathing policy takes optimized / non-optimized paths into account. When the optimized path is not available, MRU uses a non-optimized path. Once the optimized path is available, MRU switches back to the optimized path.

The following image depicts the ALUA configuration in an ESXi environment:



This document describes how a SnapSAN Disk Array supports the ALUA functionality in an ESXi environment. This document also explains how to disable ALUA on the SnapSAN in an ESXi environment. The SnapSAN must be at or above the current released firmware/software of U22R.007/082R.007 in order to disable ALUA.

Disabling ALUA on the SnapSAN in VMware ESXi environment can help with the following scenarios:

- When there is a single path to the controllers and performance is hindered when all hosts use the optimized path.
- When there is instability of paths in a SAN that potentially can cause the paths to bounce between online and offline conditions which leads to degradation in performance and stability.
- The shift of hosts to one side of the controllers can be caused by update interruptions.
- Disable Explicit ALUA to prevent conflict of the optimized paths to a shared disk (ESXi cluster) configuration of multiple servers with one path. ALUA sets its own port as the optimized path.

The scenarios listed above causes the unbalanced I/O paths found with VMware and native multipath software.

NOTE: Disabling ALUA on the SnapSAN requires a reboot of the ESXi host. This is required for the changes in ALUA to take effect.

Required Information, Tools, and Files

Before you begin these procedures, the following information, tools, and files are required.

Prerequisites

Prior to performing these procedures, ensure that you have the following:

- Overland Storage SnapSAN S3000/S5000 Disk Array must be installed and configured. You can get additional technical support from our website at <http://support.overlandstorage.com>, or by contacting Overland Storage using the information found on the [Contact Us](#) page on our web site.
- The SnapSAN S3000/S5000 must be running firmware U22R.007 and higher.
- The SnapSAN S3000/S5000 must be running software 082R.007 and higher.
- Verify if the following are installed on a supported Windows Server:
 - VCenter Server
 - VSphere client
- This document assumes that the Storage Pool and Logical Disk have already been created. Additional information on Binding a Pool and Logical Disk can be found in the *SnapSAN S3000/S5000 Disk Array User Guide*.
<http://docs.overlandstorage.com/snapsan>
- This document assumes that vCenter Server is already installed and running and the reader has a general understanding and familiarity with the VMware ESXi environment. Any and all additional information can be attained through the VMware Knowledge Center.
- The SnapSAN LUN assigned to ESXi host must be available in the ESXi Datastores list.

Versions

The test environment used for illustration in this document uses the following versions:

- Windows Server 2008R2x64 SP1
- VMware ESXi, 5.1, 799733

- vCenter Server, 5.1, 799733
- vSphere Client 5.1.0, Build 786111
- Emulex LPe11000
- SnapSAN S5000 software version 082R.007
- SnapSAN S5000 firmware version U22R.007

Verifying ALUA Functionality

Checking LUN owner and ALUA Status

1. Login to the SnapSAN controller using SSH with the following **credentials**:

- User: **sysadmin**
- Password: **sys123**

Run the following command:

```
ismview -all
```

The output of the following image shows that the particular logical disk or LUN named **VED_SHARED** with a **Current Owner** and **Default Owner** as **00**. In this case, this is **Controller 0**.

```

--- LD Detail Information ---
LDN(h)           : 0012
OS Type          : WN
LD Name          : VED_SHARED
LD Capacity      : 54.0GB (57,982,058,496Bytes)
Pool No.(h)      : 0002
Pool Name        : VED1
RaidType         : RAID1/10
PD Type          : SAS
LD State         : ready
Capacity Allocation : virtual
Access Mode      : ReadWrite
Expansion/
Rearrangement State : ---
Group            : LD Set
Purpose          : ---
RPL Attribute    : IV
Snapshot Attribute : ---
Current Owner    : 00
Default Owner    : 00
Cache Resident   : no
PD List(h)       : 00-0008,0009
Read Cache Mode  : on
Write Cache Mode : on
Sequential Data Mode : on
Configuration Change :
Data Migration State : ---
MDIR             : 00
ALUA auto trespass time : 0

```

The following image shows the **Target Port Group 00** or **Controller 0** as the recommended active and optimized path. **Target Port Group 01** or **Controller 1** is the non-optimized path and is not recommended.

```

--- Target Port Group Information ---
Target Port Group No.(h) : 00
LUN Access               : recommendation
Asymmetric Access State  : active/optimized/primary
The Cause of Access State : 02
Relative Target Port List(h) : 00-00
                               00-01
                               00-02
                               00-03

Target Port Group No.(h) : 01
LUN Access               : non-recommendation
Asymmetric Access State  : active/non-optimized/primary
The Cause of Access State : 02

```

The following image shows the **ALUA status as enable**.

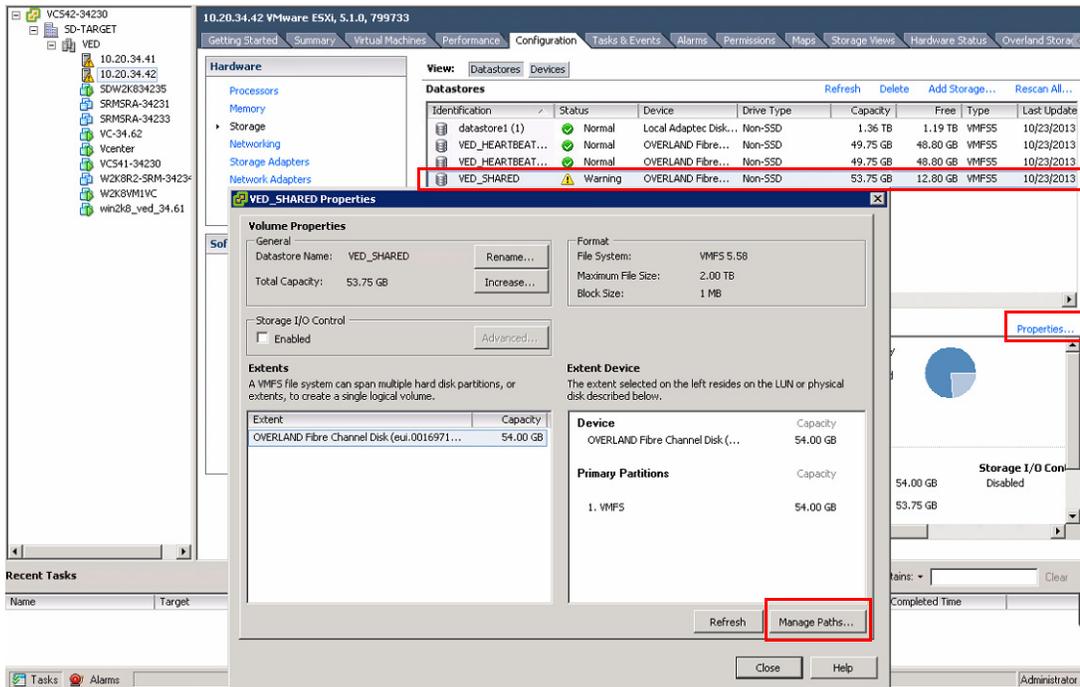
```

--- LD Set Information ---
Platform           : LX
LD Set Name        : SD-ESX51-3442
Configuration Change :
Action mode        : Normal mode
Explicit ALUA      : enable 1
Path List           : 1000-0000-C965-63DE
                   : 1000-0000-C965-63DD
    
```

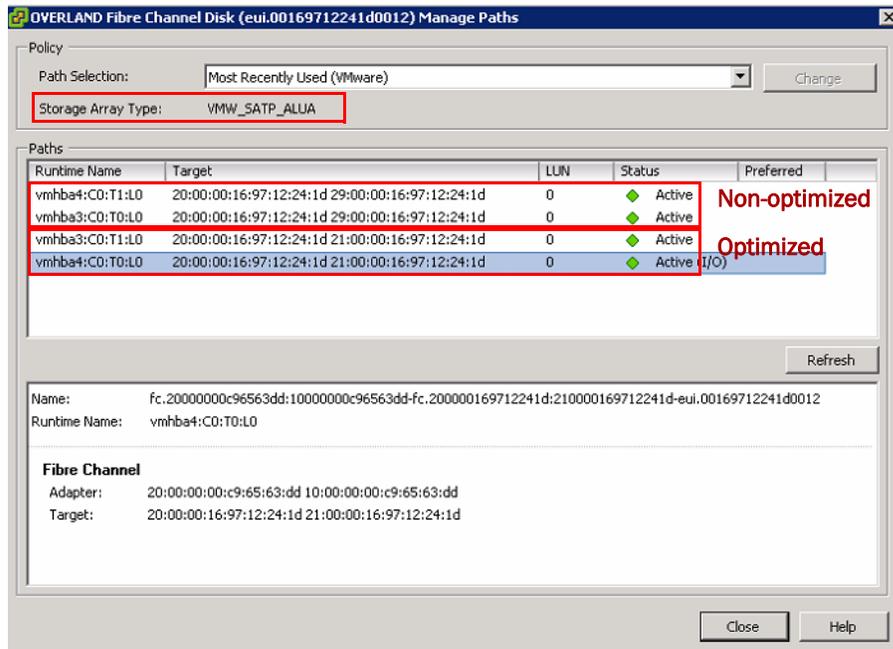
Checking Storage Array Type and available Paths

To check the storage array type and its paths from ESXi, perform the following steps:

1. From the vSphere Client console, select the **host** from the left-pane.
2. Navigate to **Configuration > Storage** view.
3. From **Datastores** list, select the particular **datastore**.
4. Click the **Properties** link.
5. Click **Manage Paths**.



- The SnapSAN is ALUA aware thus the **Storage Array Type** by default is **VMW_SATP_ALUA** this is displayed in the following image along with the available paths:

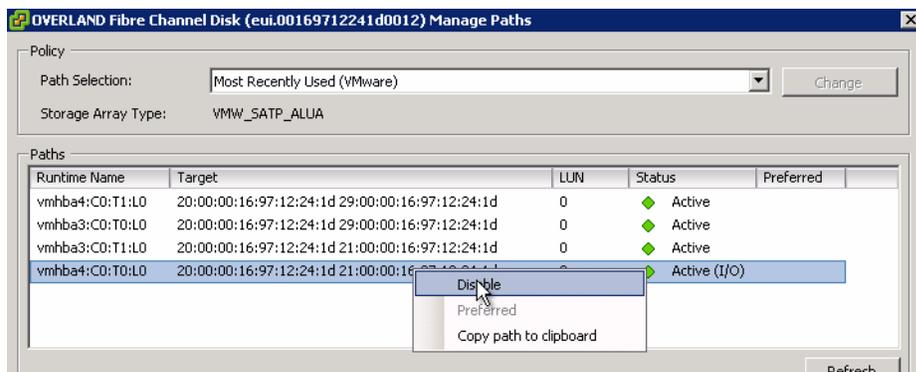


- vmhba4:C0:T1:L0 and vmhba3:C0:T0:L0 are non-optimized paths.
- vmhba3:C0:T1:L0 and vmhba4:C0:T0:L0 are optimized paths.

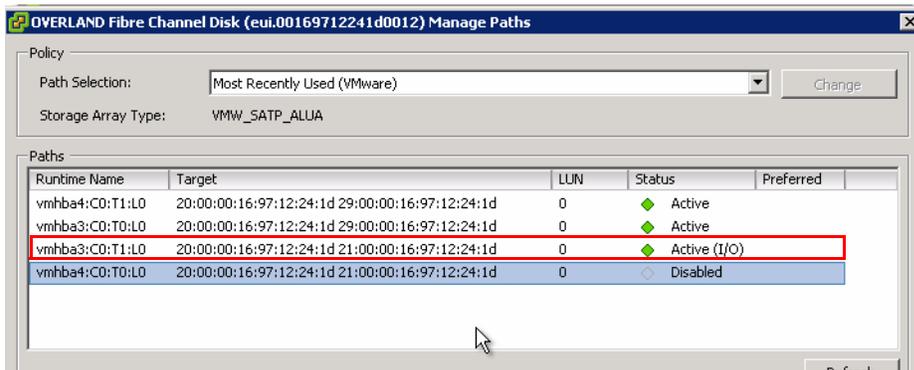
Disabling the Active (I/O) path

The following steps show how failover of the Active I/O takes place with ALUA. The examples provided show how Active I/O paths behave when the paths become unavailable (**Disabled**) and how SnapSAN works in an ESXi environment.

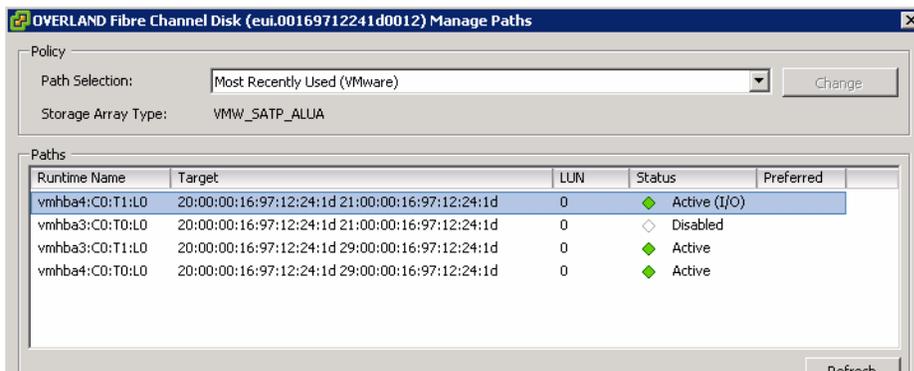
- Right-click the **path with Active (I/O)** and select **Disable**.



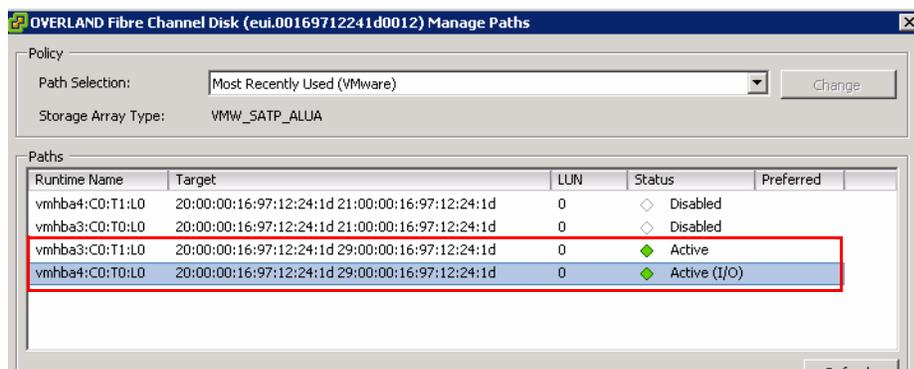
- The results after disabling the default path show that the second optimized path is now the primary with a status of **Active I/O**.



- Repeat [Step 1](#) to disable the **other optimized path**. This assigns the **Active (I/O)** to a non-optimized path:



- Right-click on the **optimized path** and select **Activate**. Immediately after the enable action, the **Active (I/O)** switches back to one of the optimized paths from a non-optimized path.



Disabling the ALUA

- Login to the SnapSAN controller using SSH as user **sysadmin** and the password **sys123**.
- Run the following **command**:

```
sysadmin@SSS3000SD-0# ismcfg setpathpolicy -ldset LX:SD-ESX51-3442 -mode off
```

 This command disables ALUA on host (LD set) basis. Check the status of **Explicit ALUA** which should now show a status of **off**.

```

--- LD Set Information ---
Platform           : LX
LD Set Name        : SD-ESX51-3442
Configuration Change :
Action mode        : Normal mode
Explicit ALUA      : off
Path List          : 1000-0000-C965-63Df
                   : 1000-0000-C965-63DD
    
```

Verifying the Active (I/O) after disabling ALUA

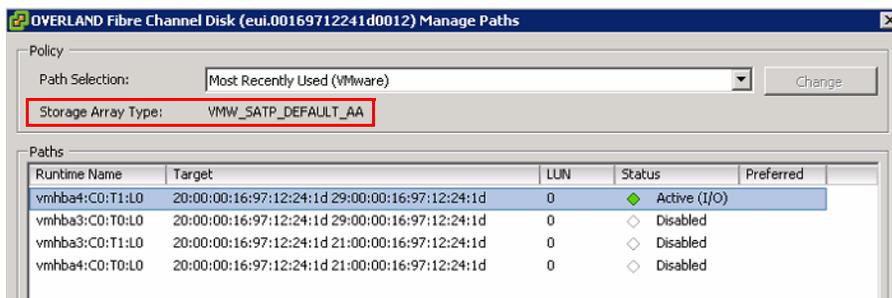
The following procedure describes how to verify the optimized paths when ALUA is disabled on the SnapSAN array.

NOTE: After disabling ALUA on the SnapSAN array, the ESXi host has to be rebooted. Take all necessary precautions when rebooting the ESXi host. Such precautions can be found in VMware’s knowledge base

1. **Reboot** the ESXi server on which ALUA is disabled.
This is required for the changes in ALUA to take effect.
2. From the vSphere Client console, select the **host** in the left pane.
3. Navigate to the **Configuration > Storage** view and select the particular datastore from **Datastores** list.
4. Click the **Properties** link.
5. Click **Manage Paths**.

NOTE: The **Storage Array Type** is now **VMW_SATP_DEFAULT_AA**. For test purposes, we have disabled all the optimized paths.

6. The **Active (I/O)** now switches to a non-optimized path.



7. Enable one of the original **optimized paths** and confirm that **Active (I/O)** does not switch back to the optimized path.

This is because ALUA has been disabled on the SnapSAN. In some cases disabling ALUA on the SnapSAN may be beneficial.

