

Configuring VMware vCenter 6.7 to use Zadara VPSA iSCSI storage (including increasing bandwidth by using multiple iSCSI paths)

This guide is based on the new look and feel of vCenter Appliance 6.7 using HTML5.

Instructions for setting up iSCSI connectivity in previous versions of vCenter can be found [here](#).

Further information on Zadara / VMware iSCSI best practices can be found [here](#).

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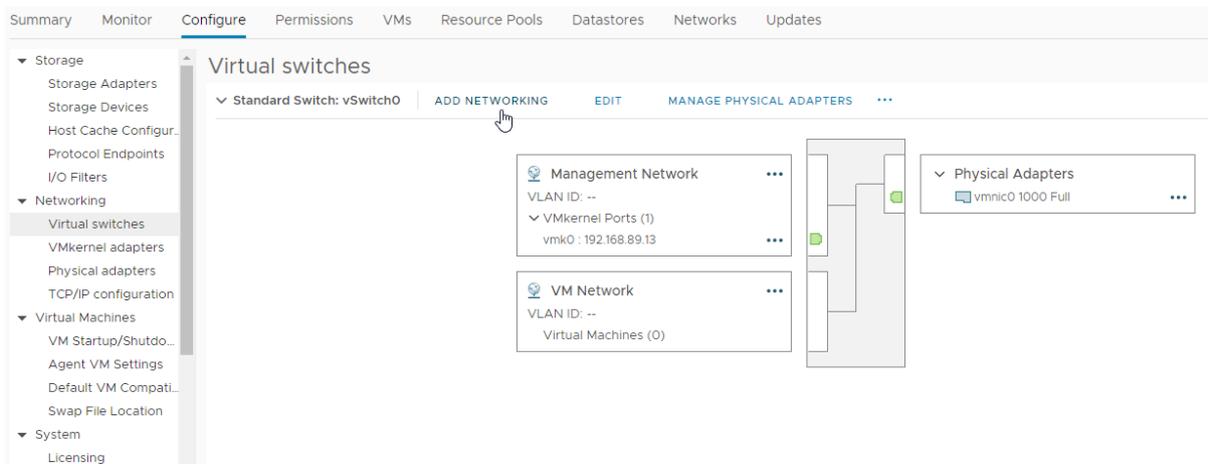
Connecting ESXi hosts to Zadara Storage using iSCSI

These steps will need to be performed on each ESXi host, as required, within the vSphere Datacenter.

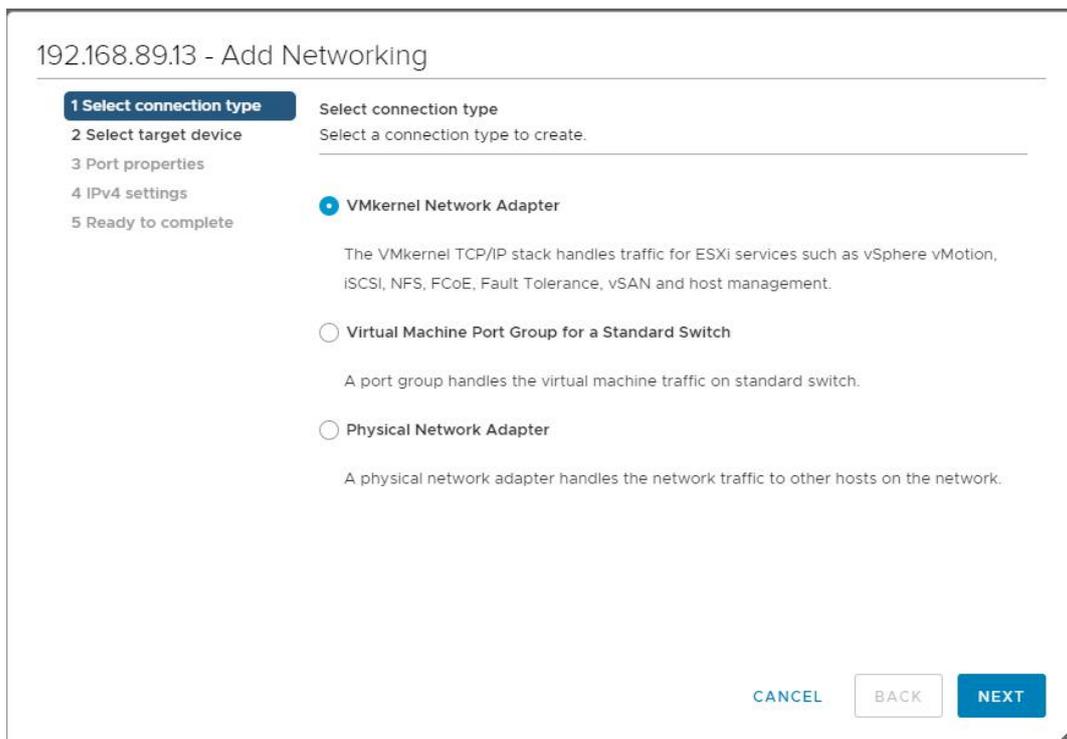
Zadara only supports Port Binding for HA as a single Target IP is made available to all ESXi host Adapters. This is used to maintain iSCSI sessions for HA and multipath capabilities rather than relying on underlying NIC teaming which is not a valid configuration.

Adding a new VMkernel Network Adapter to each ESXi host.

Under 'Networking – Virtual switches' select 'Add Networking':

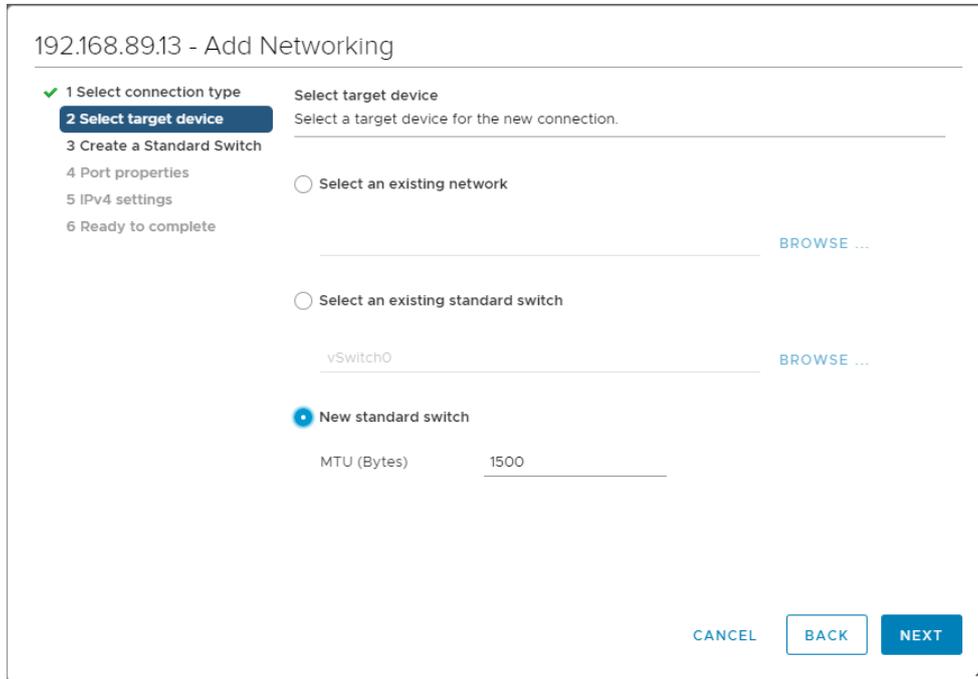


Select 'VMkernel Network Adapter':



Next...

Select 'New standard switch':



192.168.89.13 - Add Networking

- 1 Select connection type
- 2 Select target device**
- 3 Create a Standard Switch
- 4 Port properties
- 5 IPv4 settings
- 6 Ready to complete

Select target device
Select a target device for the new connection.

Select an existing network
BROWSE ...

Select an existing standard switch
vSwitch0 BROWSE ...

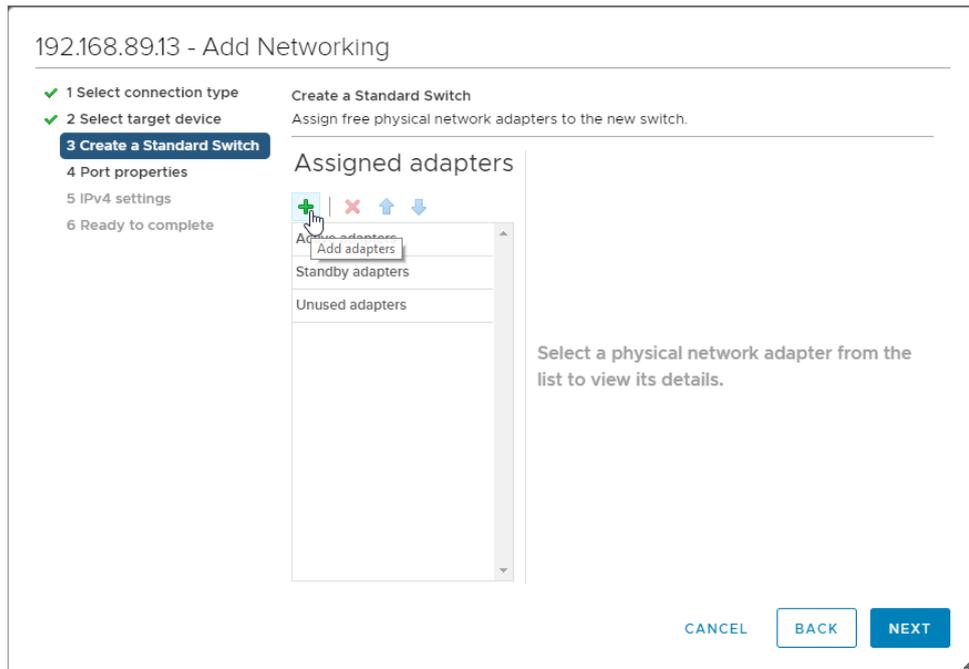
New standard switch

MTU (Bytes) 1500

CANCEL BACK NEXT

Next...

Add both of the required 10G/40G physical adapters:



192.168.89.13 - Add Networking

- 1 Select connection type
- 2 Select target device
- 3 Create a Standard Switch**
- 4 Port properties
- 5 IPv4 settings
- 6 Ready to complete

Create a Standard Switch
Assign free physical network adapters to the new switch.

Assigned adapters

- +
- x
- ↑
- ↓

Add adapters

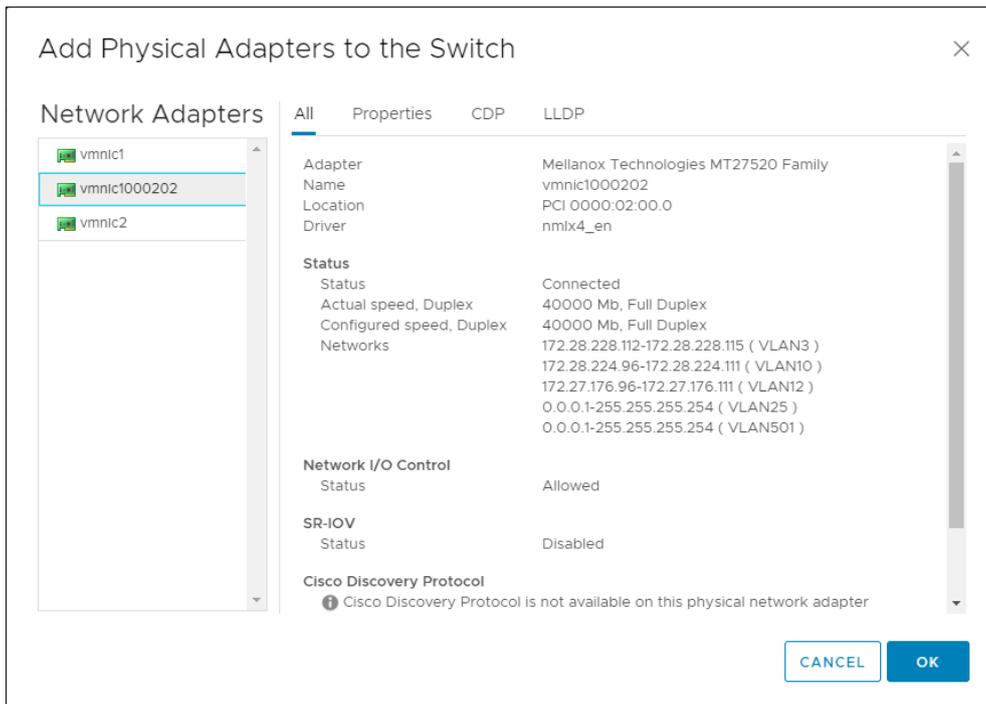
Standby adapters

Unused adapters

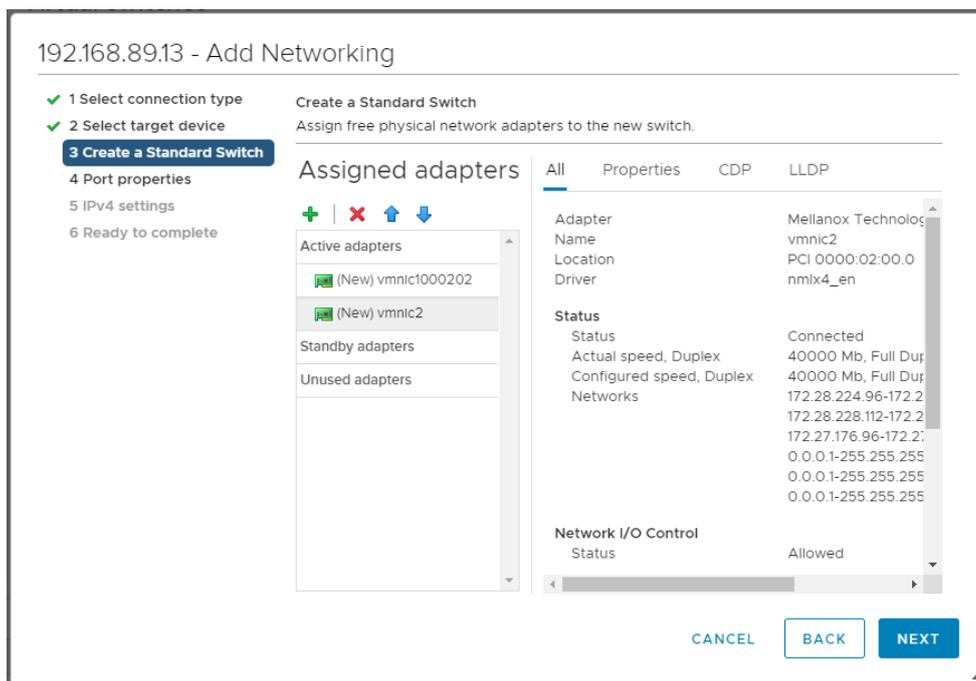
Select a physical network adapter from the list to view its details.

CANCEL BACK NEXT

Add adapters... Next...



Select the 1st adapter then OK. Return here and add the 2nd adapter then OK.



Once both adapters have been assigned, Next...

192.168.89.13 - Add Networking

- ✓ 1 Select connection type
- ✓ 2 Select target device
- ✓ 3 Create a Standard Switch
- 4 Port properties**
- 5 IPv4 settings
- 6 Ready to complete

Port properties
Specify VMkernel port settings.

VMkernel port settings

Network label: VMK_iSCSI_1

VLAN ID: 10

IP settings: IPv4

MTU: Get MTU from switch 1500

TCP/IP stack: Default

Available services

Enabled services

- vMotion
- Provisioning
- Fault Tolerance logging
- Management
- vSphere Replication
- vSphere Replication NFC
- vSAN

CANCEL BACK NEXT

Provide a Network label and specify a VLAN ID (if required). Next...

192.168.89.13 - Add Networking

- ✓ 1 Select connection type
- ✓ 2 Select target device
- ✓ 3 Create a Standard Switch
- ✓ 4 Port properties
- 5 IPv4 settings**
- 6 Ready to complete

IPv4 settings
Specify VMkernel IPv4 settings.

Obtain IPv4 settings automatically

Use static IPv4 settings

IPv4 address: 172.27.225.103

Subnet mask: 255.255.252.0

Default gateway: Override default gateway for this adapter
192.168.90.1

DNS server addresses: 8.8.8.8
8.8.4.4

CANCEL BACK NEXT

Provide the relevant IP address, Subnet Mask and Default Gateway details. Next...

192.168.89.13 - Add Networking

- ✓ 1 Select connection type
- ✓ 2 Select target device
- ✓ 3 Create a Standard Switch
- ✓ 4 Port properties
- ✓ 5 IPv4 settings
- 6 Ready to complete**

Ready to complete
Review your settings selections before finishing the wizard.

New standard switch	vSwitch1
Assigned adapters	vmnic1000202, vmnic2
Switch MTU	1500
New port group	VMK_ISCSI_1
VLAN ID	10
vMotion	Disabled
Provisioning	Disabled
Fault Tolerance logging	Disabled
Management	Disabled
vSphere Replication	Disabled
vSphere Replication NFC	Disabled
vSAN	Disabled

NIC settings

MTU	1500
TCP/IP stack	Default

IPv4 settings

IPv4 address	172.27.225.103 (static)
Subnet mask	255.255.252.0

CANCEL BACK **FINISH**

Review the settings and Finish.

Repeat the previous steps to add a 2nd VMkernel Port, this time to the 'existing standard switch' that was just created (e.g. vSwitch1):

192.168.89.13 - Add Networking

- ✓ 1 Select connection type
- 2 Select target device**
- 3 Port properties
- 4 IPv4 settings
- 5 Ready to complete

Select target device
Select a target device for the new connection.

Select an existing network

_____ BROWSE ...

Select an existing standard switch

vSwitch1 BROWSE ...

New standard switch

MTU (Bytes)

CANCEL BACK **NEXT**

192.168.89.13 - Add Networking

- ✓ 1 Select connection type
- ✓ 2 Select target device
- 3 Port properties**
- 4 IPv4 settings
- 5 Ready to complete

Port properties
Specify VMkernel port settings.

VMkernel port settings

Network label	VMK_iSCSI_2
VLAN ID	10
IP settings	IPv4
MTU	Get MTU from switch 1500
TCP/IP stack	Default

Available services

Enabled services

- vMotion
- Provisioning
- Fault Tolerance logging
- Management
- vSphere Replication
- vSphere Replication NFC
- vSAN

CANCEL BACK NEXT

Provide a Network label and specify a VLAN ID (if required). Next...

192.168.89.13 - Add Networking

- ✓ 1 Select connection type
- ✓ 2 Select target device
- ✓ 3 Port properties
- 4 IPv4 settings**
- 5 Ready to complete

IPv4 settings
Specify VMkernel IPv4 settings.

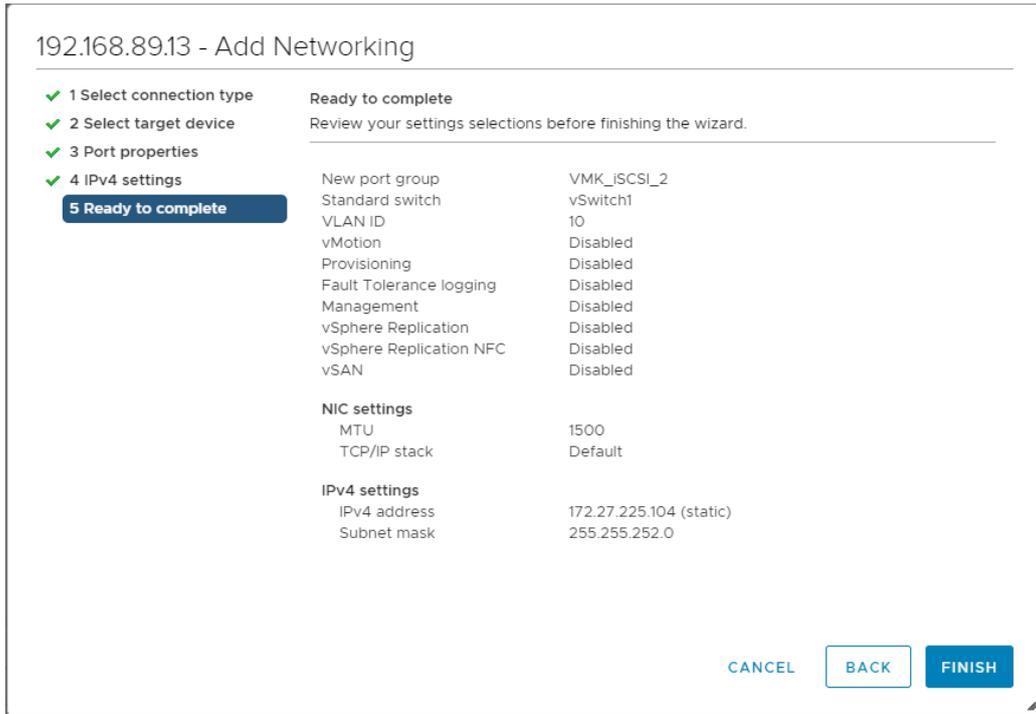
Obtain IPv4 settings automatically

Use static IPv4 settings

IPv4 address	172.27.225.104
Subnet mask	255.255.252.0
Default gateway	<input type="checkbox"/> Override default gateway for this adapter 192.168.90.1
DNS server addresses	8.8.8.8 8.8.4.4

CANCEL BACK NEXT

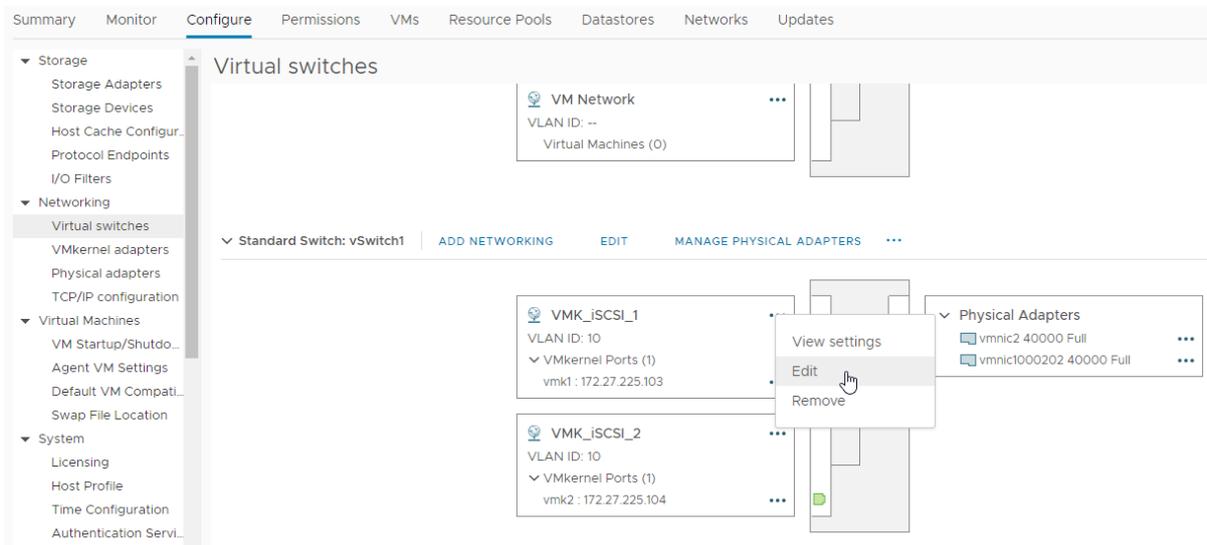
Provide the relevant IP address, Subnet Mask and Default Gateway details. Next...



Review the settings and Finish.

We now need to configure each VMkernel adapter's 'Failover order' to set one of the adapters as 'Unused' for each adapter.

Click on the three dots in the top right corner of the 1st VMkernel adapter box and select 'Edit':



VMK_iSCSI_1 - Edit Settings

Properties

Security

Traffic shaping

Teaming and failover

Load balancing Override Route based on originating virtual port

Network failure detection Override Link status only

Notify switches Override Yes

Failback Override Yes

Failover order

Override

Active adapters

- vmnic1000202

Standby adapters

Unused adapters

- vmnic2

Select active and standby adapters. During a failover, standby adapters activate in the order specified above.

CANCEL OK

All	Properties	CDP	LLDP
Adapter Name	Mellanox Technologies MT27520 Family vmnic2		
Location	PCI 0000:02:00.0		
Driver	nmlx4_en		
Status			
Status	Connected		
Actual speed, Duplex	40000 Mb, Full Duplex		
Configured speed, Duplex	40000 Mb, Full Duplex		
Networks	172.27.176.96-172.27.176.111 (VLAN12)		
	172.28.224.96-172.28.224.111 (VLAN10)		

Under 'Teaming and failover', check the 'Failover order' Override box and move the 2nd physical adapter down to be an 'Unused adapter'. OK...

VMK_iSCSI_2 - Edit Settings

Properties

Security

Traffic shaping

Teaming and failover

Load balancing Override Route based on originating virtual port

Network failure detection Override Link status only

Notify switches Override Yes

Failback Override Yes

Failover order

Override

Active adapters

- vmnic2

Standby adapters

Unused adapters

- vmnic1000202

Select active and standby adapters. During a failover, standby adapters activate in the order specified above.

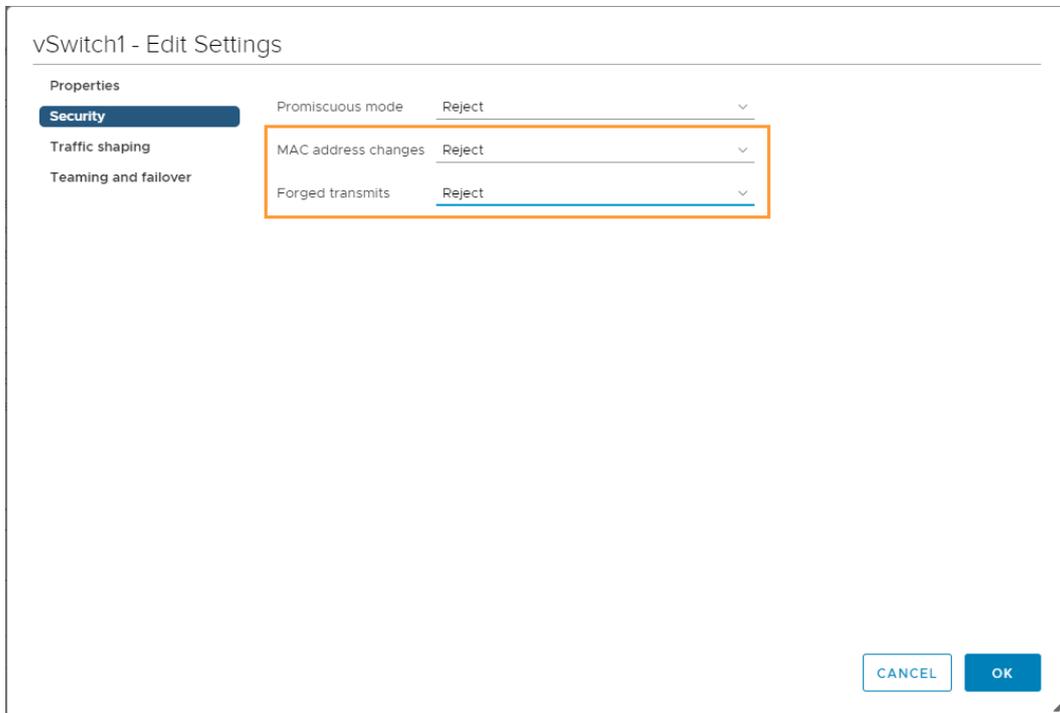
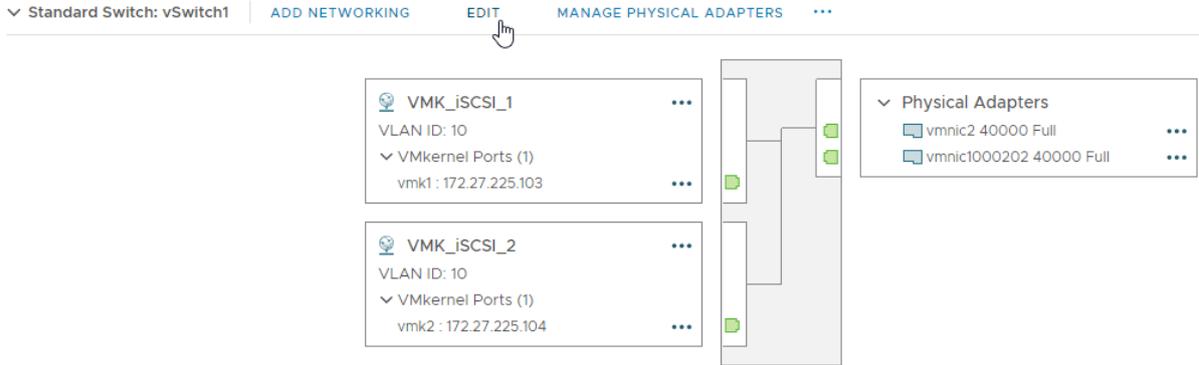
CANCEL OK

All	Properties	CDP	LLDP
Adapter Name	Mellanox Technologies MT27520 Family vmnic1000202		
Location	PCI 0000:02:00.0		
Driver	nmlx4_en		
Status			
Status	Connected		
Actual speed, Duplex	40000 Mb, Full Duplex		
Configured speed, Duplex	40000 Mb, Full Duplex		
Networks	172.27.176.96-172.27.176.111 (VLAN12)		
	172.28.224.96-172.28.224.111 (VLAN10)		

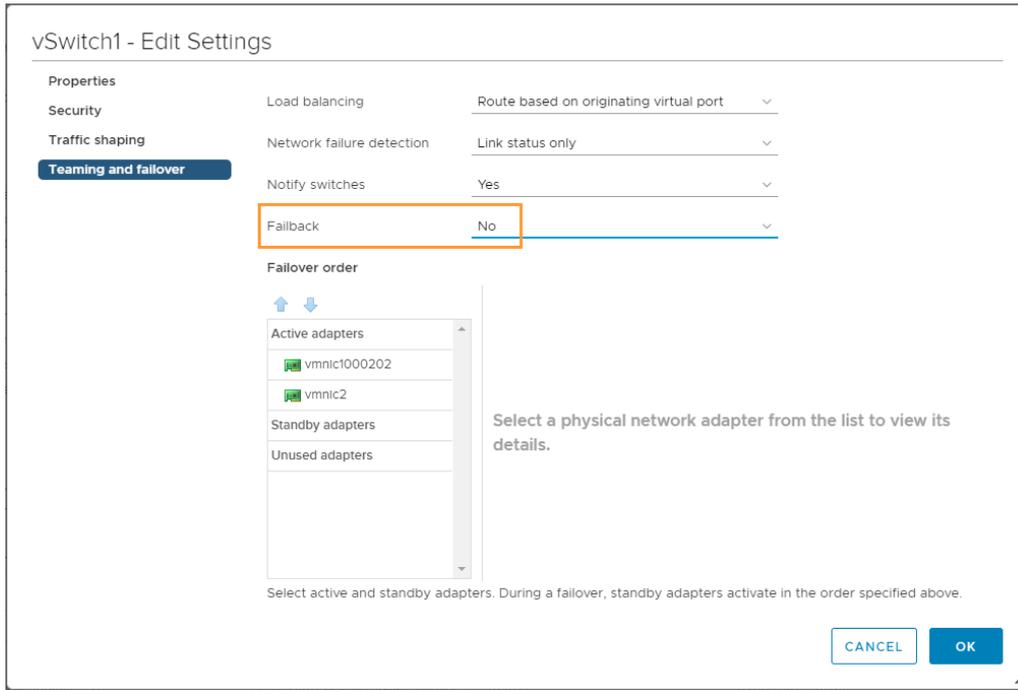
Now select 'Edit' for the 2nd VMkernel adapter and perform the same steps as above, but this time move the 1st adapter down to be an 'Unused adapter'. OK...

Next we need to change the default Security settings for the new vSwitch (e.g. vSwitch1):

For the vSwitch, select 'Edit'.



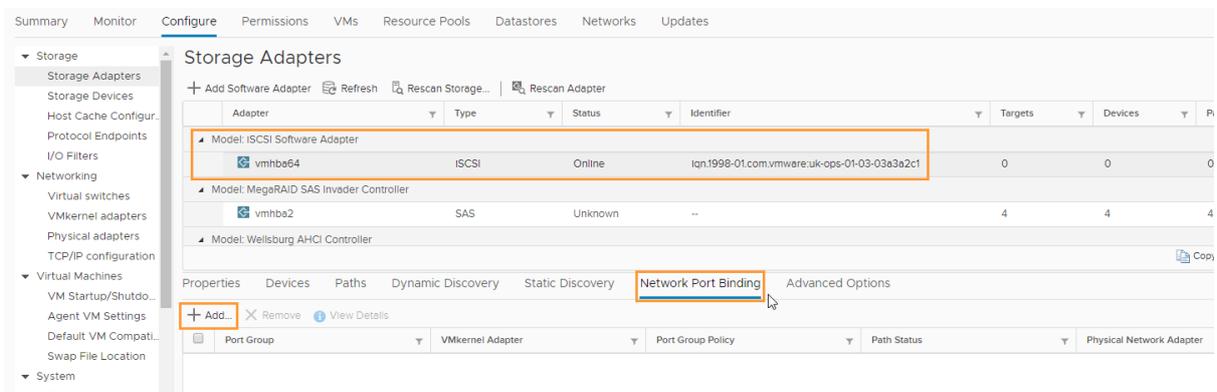
Under 'Security' change 'MAC address changes' and 'Forged transmits' to 'Reject'. OK...

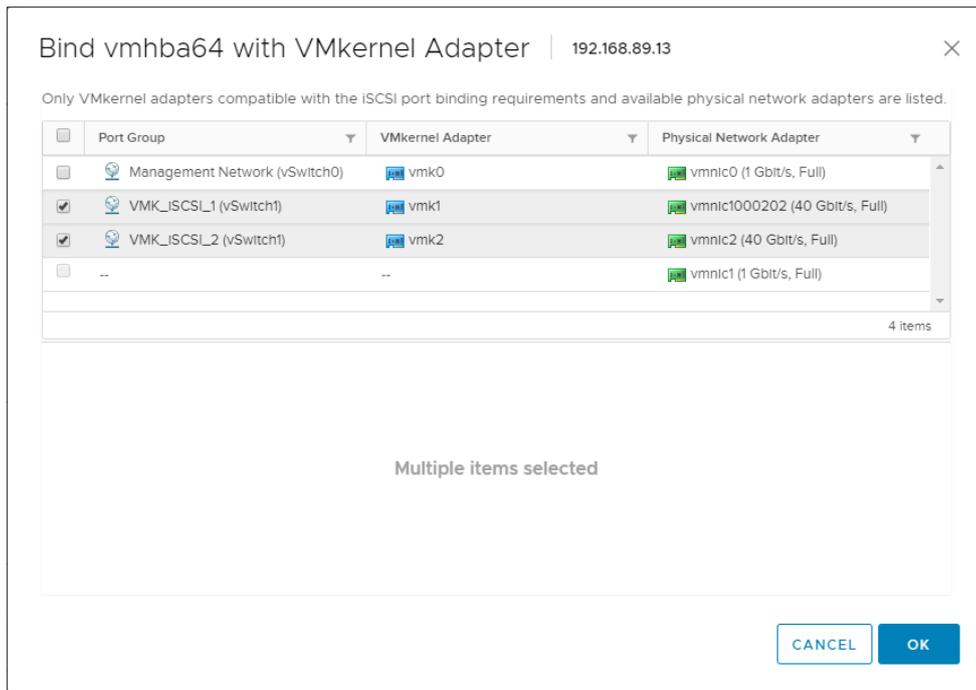


Then under 'Teaming and failover', change 'Failback' to 'No'. OK...

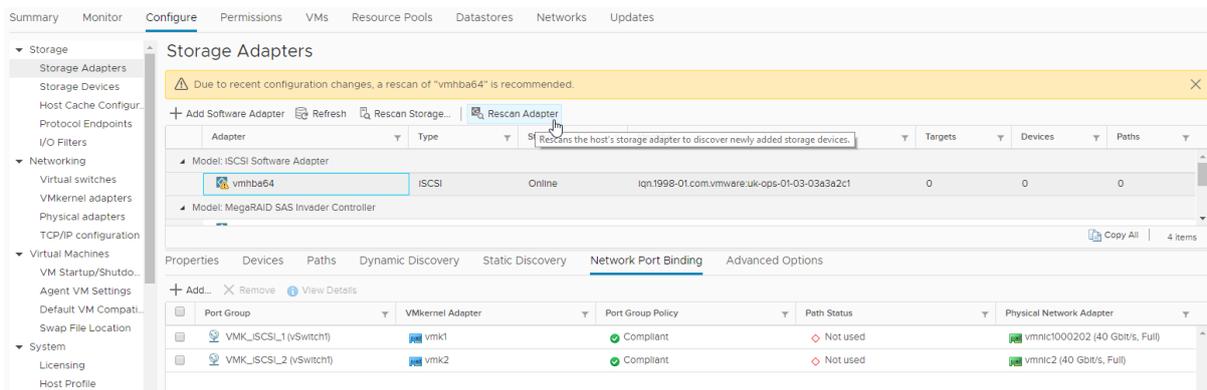
We are now ready to add these new VMkernel ports to the iSCSI software adapter.

Under 'Storage – Storage Adapters' select the relevant iSCSI software adapter. In the lower pane select 'Network Port Binding' and then 'Add':

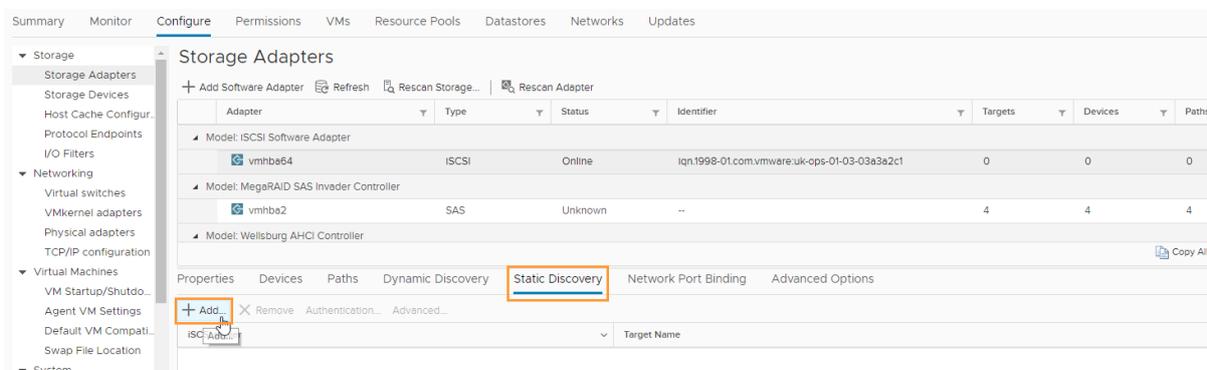




Select the two VMkernel adapters that were created. OK...



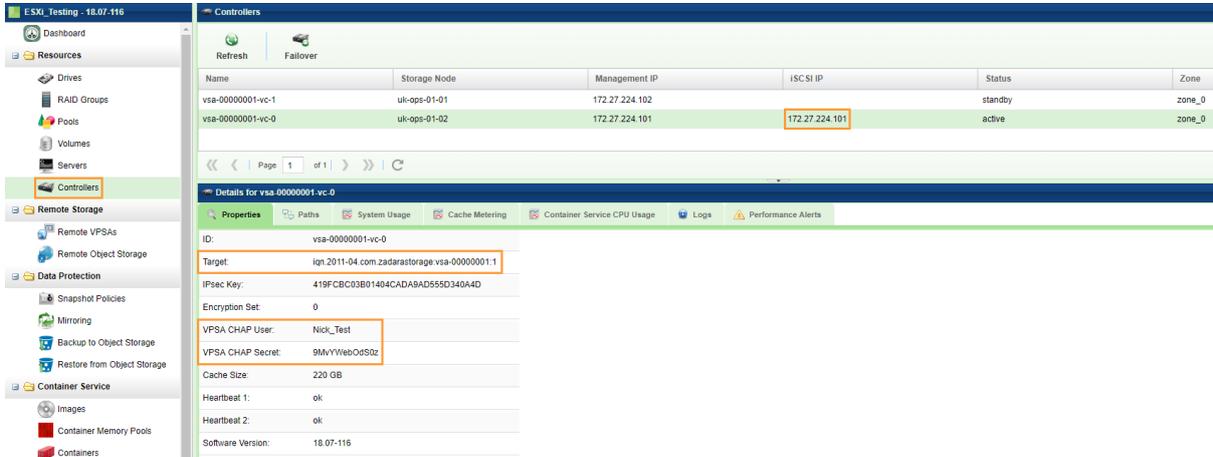
Select 'Rescan Adapter'.



Next, select 'Static Discovery' in the lower pane and 'Add'. Here we need to add in the iSCSI Target server details. We need to obtain this information from the VPSA. If you use Dynamic Discovery with

multiple VPSA Arrays in multiple VLANs then host rescan and reboots will be excessive as each VMkernel will have to wait for a timeout for the VPSA Controllers to which it is not bound to occur, this is a result of the underlying VMKernel architecture and a commonly misconfigured setup.

Under the 'Controllers' tab, select the 'Active' controller:



The screenshot shows the vSphere Controller configuration page for 'vsa-00000001-vc-0'. The 'Active' controller is highlighted in the table below:

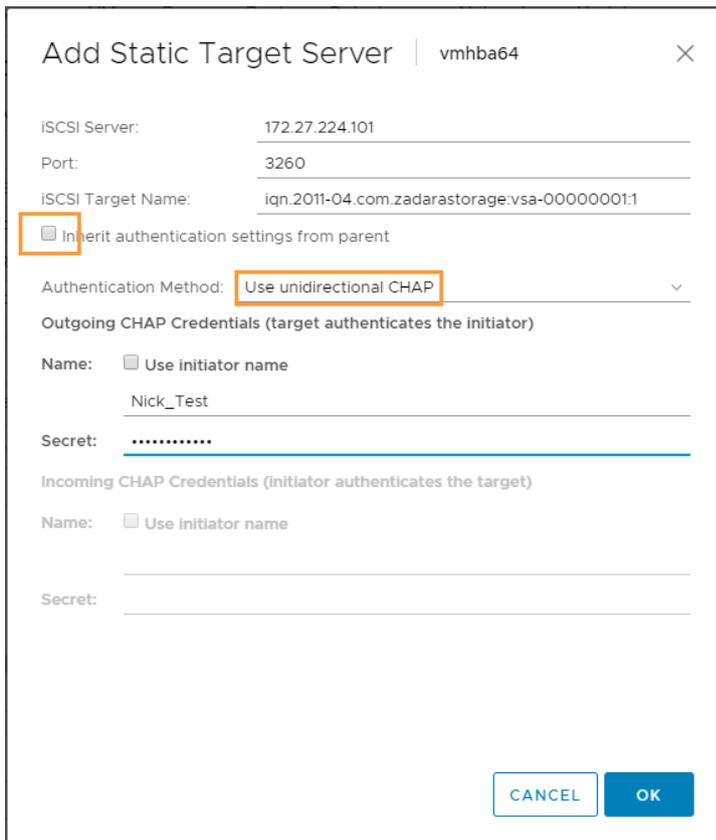
Name	Storage Node	Management IP	iSCSI IP	Status	Zone
vsa-00000001-vc-1	uk-ops-01-01	172.27.224.102		standby	zone_0
vsa-00000001-vc-0	uk-ops-01-02	172.27.224.101	172.27.224.101	active	zone_0

The details pane for 'vsa-00000001-vc-0' shows the following configuration:

- ID: vsa-00000001-vc-0
- Target: iqn.2011-04.com.zadarastorage.vsa-00000001:1
- IPsec Key: 419FCBC83B01404CADA8AD555D340A4D
- Encryption Set: 0
- VPSA CHAP User: Nick_Test
- VPSA CHAP Secret: 9MvYYWebOIS0z
- Cache Size: 220 GB
- Heartbeat 1: ok
- Heartbeat 2: ok
- Software Version: 18.07-116

Make a note of the IP address under 'iSCSI IP'.

In the lower pane we can obtain the information needed (Target, VPSA CHAP User and Secret) which can be copied & pasted into the vSphere 'Add Static Target Server' boxes.



The 'Add Static Target Server' dialog box is shown with the following configuration:

- iSCSI Server: 172.27.224.101
- Port: 3260
- iSCSI Target Name: iqn.2011-04.com.zadarastorage.vsa-00000001:1
- Inherit authentication settings from parent
- Authentication Method: Use unidirectional CHAP
- Outgoing CHAP Credentials (target authenticates the initiator)
 - Name: Use initiator name
 - Nick_Test
 - Secret:
- Incoming CHAP Credentials (initiator authenticates the target)
 - Name: Use initiator name
 - Secret:

Buttons: CANCEL, OK

Untick 'Inherit authentication settings from parent', select 'Use unidirectional CHAP' and enter all of the details obtained above.

Storage Adapters

⚠ Due to recent configuration changes, a rescan of "vmhba64" is recommended.

[+ Add Software Adapter](#)
[Refresh](#)
[Rescan Storage...](#)
[Rescan Adapter](#)

Adapter	Type	Status
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Rescan the iSCSI software adapter.

Name	iSCSI / FC Connectivity	IP or CIDR Block	iSCSI IQN	iPsec iSCSI	iPsec NFS	Registered	OS
iqn.1998-01.com.vmware.uk-ops-01-04-112a495	Active	172.27.225.102	iqn.1998-01.com.vmware.uk-ops-01-04-112a495	Disabled	Disabled	no	
iqn.1998-01.com.vmware.uk-ops-01-03-03a3a2c1	Active	172.27.225.103	iqn.1998-01.com.vmware.uk-ops-01-03-03a3a2c1	Disabled	Disabled	no	

Initiator	Target	Connected	Number of sessions	VC
iqn.1998-01.com.vmware.uk-ops-01-03-03a3a2c1	iqn.2011-04.com.zadarastorage.vsa-00000001:1	YES	2	0

Looking in the VPSA under 'Servers' the new ESXi host (IQN NAME and IP address) should have appeared.

Name	Capacity	Protection	Data Type	Pool
ESXi_Datastore_1	1 TB		BLOCK	RAID-10-Pool-1

General		Capacity	
ID:	volume-00000001	Provisioned Capacity:	1 TB
Name:	ESXi_Datastore_1	Mapped Capacity:	43.59 GB
Comment:		Data Copies Capacity:	532.48 MB
Status:	In-use		
Data Type:	BLOCK		
Pool:	RAID-10-Pool-1		

This 'Server' now needs to be attached to the required Volume(s). Go to the 'Volumes' view, select the required Volume, then under the 'Servers' dropdown button, select 'Attach to Server(s)'.

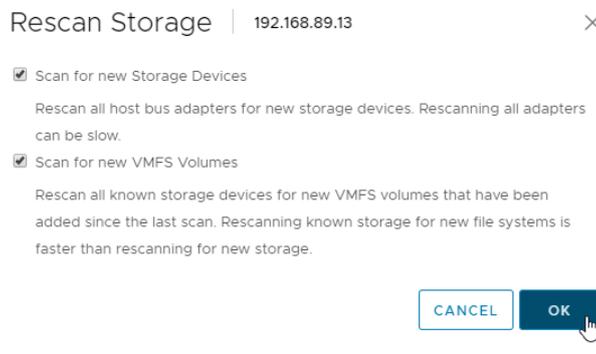
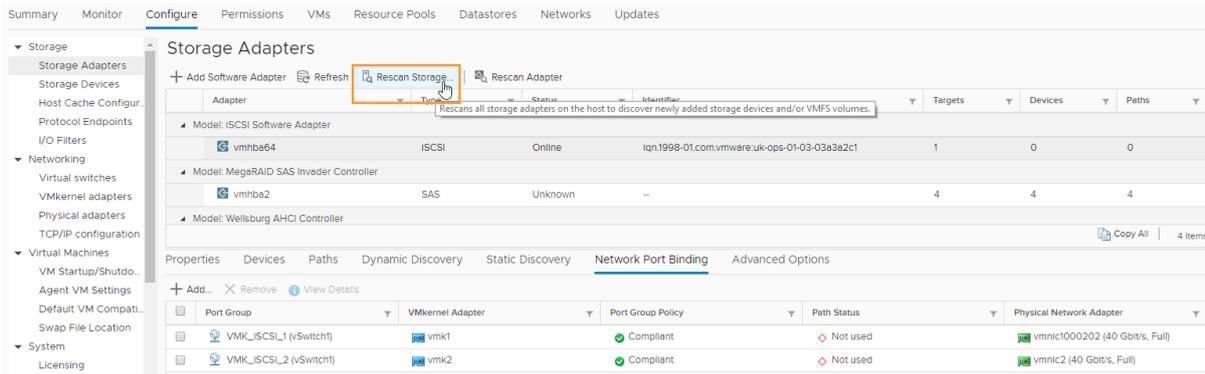
<input checked="" type="checkbox"/>	Name	IP or CIDR Block	iSCSI IQN	iPsec iSCSI	OS	Access Type	LUN
<input checked="" type="checkbox"/>	iqn.1998-01.com...	172.27.225.103	iqn.1998-01.com...	Disabled		ISCSI	0

Manually select LUNs:

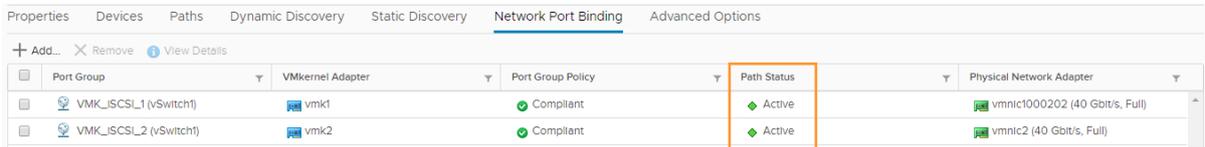
Submit Cancel

Tick the box to select the relevant server and also tick the box to 'Manually select LUNs' (**Note: Do this even if the LUN will be the default '0'**) All ESX Hosts must have the same LUN ID for the same Volume.

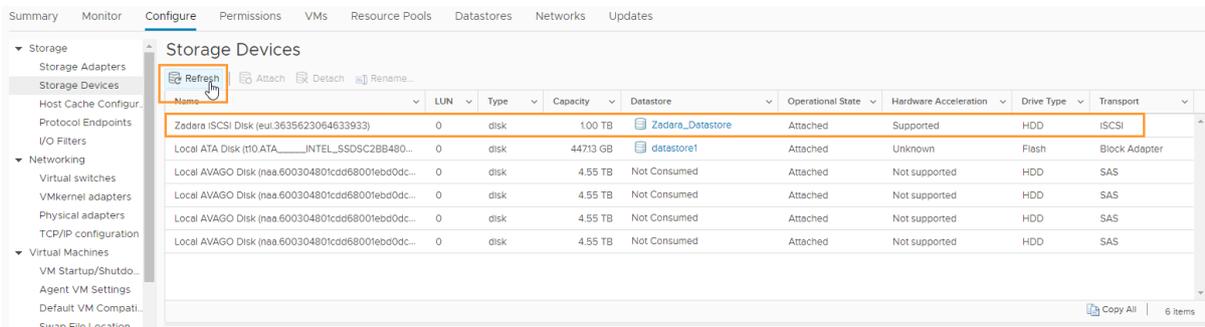
Now go back to the vSphere client and under 'Storage Adapters' select 'Rescan Storage...'



OK...



Note that the 'Path status' has now changed to 'Active'.



Next, go to 'Storage Devices' and select 'Refresh'. The VPSA Volume should now appear in the list of Datastores and can now be used.

Next, set the new Datastore to use the 'Round Robin' Multipath selection policy:

The screenshot shows the 'Storage Devices' configuration page in vSphere. A table lists several disks, including two 'Zadara ISCSI Disk' entries. The second entry is selected, and its 'Properties' are shown below. Under the 'Multipathing Policies' section, the 'Path Selection Policy' is set to 'Round Robin (VMware)'. An orange arrow points to the 'Edit Multipathing...' link.

Name	LUN	Type	Capacity	Datastore	Operational State	Hardware Acceleration	Drive Type	Transport
Zadara ISCSI Disk (eui.6331643361646263)	1	disk	500.00 GB	Not Consumed	Attached	Supported	HDD	iSCSI
Zadara ISCSI Disk (eui.3635623064633933)	0	disk	2.00 TB	Zadara_Datastore	Attached	Supported	HDD	iSCSI
Local ATA Disk (10.ATA_____INTEL_SSDSC2B8480G6...	0	disk	44713 GB	Not Consumed	Attached	Unknown	Flash	Block Adapter
Local AVAGO Disk (naa.600304801cdd68001ebd0dc77...	0	disk	4.55 TB	Not Consumed	Attached	Not supported	HDD	SAS
Local AVAGO Disk (naa.600304801cdd68001ebd0dc77...	0	disk	4.55 TB	Not Consumed	Attached	Not supported	HDD	SAS
Local AVAGO Disk (naa.600304801cdd68001ebd0dc37...	0	disk	4.55 TB	Not Consumed	Attached	Not supported	HDD	SAS
Zadara ISCSI Disk (eui.6331643361646263)	5	disk	1.00 TB	Zadara_Datastore	Attached	Supported	HDD	iSCSI

Properties

Path Selection Policy: Round Robin (VMware)

Storage Array Type Policy: VMW_SATP_DEFAULT_AA

[Edit Multipathing...](#)

The final task is to change the Round Robin IOPS Limit for all Zadara Devices using the instructions here: <https://support.zadara.com/hc/en-us/articles/360000501266-VMware-Set-Round-Robin-IOPS-Limit-for-all-Zadara-Devices>.

Optional: Adding additional VMkernel adapters to increase bandwidth

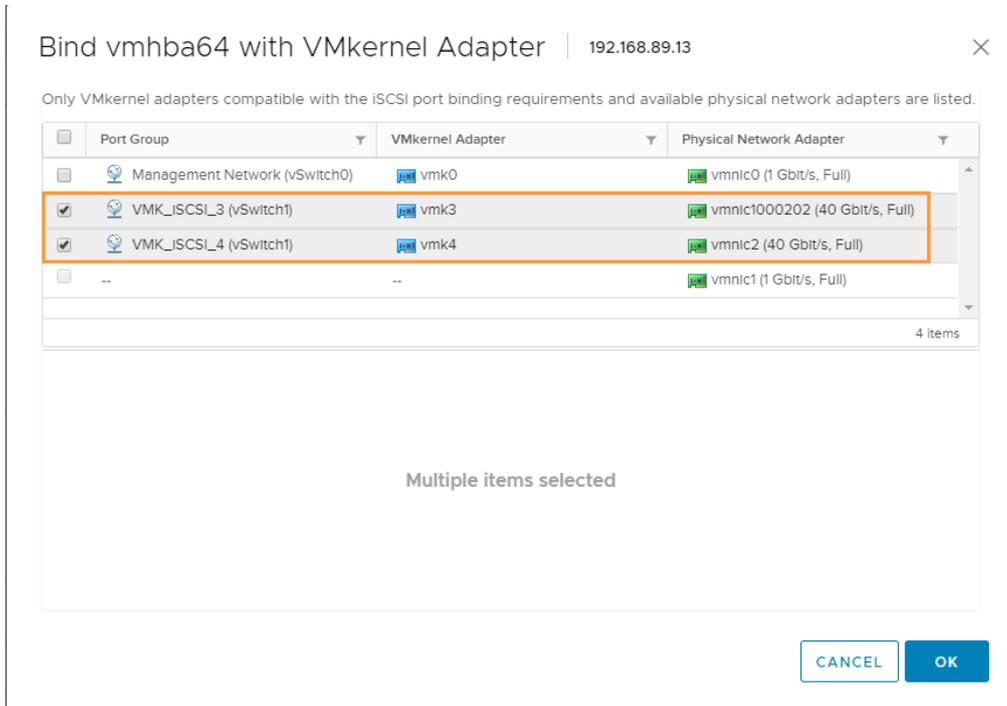
Repeat the steps from the previous section to add 2 more (or as many as are required) VMkernel adapters. E.g. create VMK_iSCSI_3 and VMK_iSCSI_4.

The key here is to alternate the 'Active adapter' and the 'Unused adapter' in the 'Teaming and failover' Override setting of each new VMkernel adapter. I.e. VMK_iSCSI_3 should use the 1st adapter and VMK_iSCSI_4 should use the 2nd adapter.

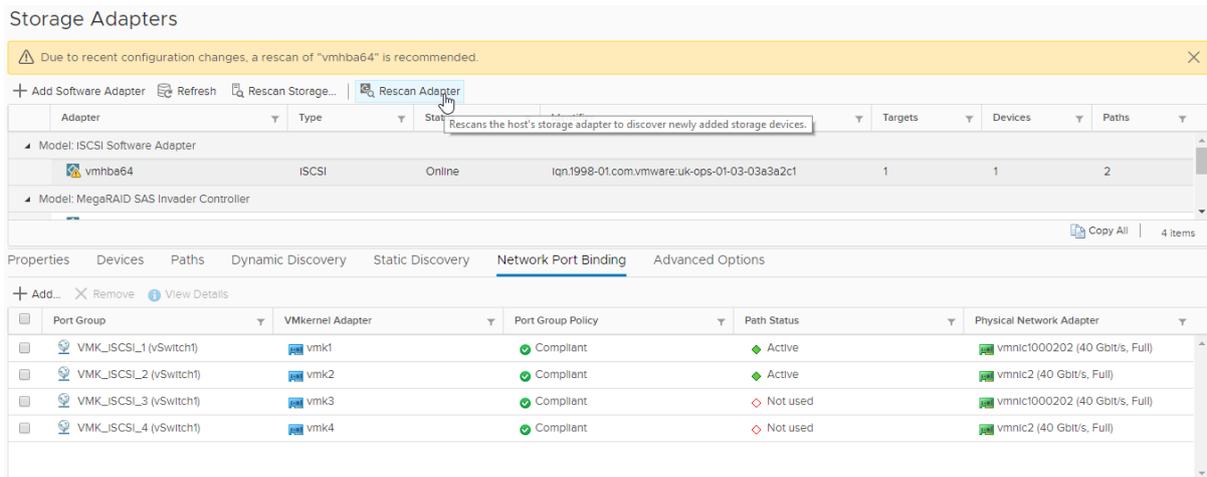
The screenshot shows the 'Storage Adapters' configuration page in vSphere. It lists three adapters: 'Model: iSCSI Software Adapter', 'Model: MegaRAID SAS InVader Controller', and 'Model: Wellsburg AHCI Controller'. Below this, the 'Network Port Binding' tab is active, showing a table of VMkernel adapters.

VMkernel Adapter	Port Group Policy	Path Status	Physical Network Adapter	
VMK_iSCSI_1 (vSwitch1)	vmk1	Compliant	Active	vmnic1000202 (40 Gbit/s, Full)
VMK_iSCSI_2 (vSwitch1)	vmk2	Compliant	Active	vmnic2 (40 Gbit/s, Full)

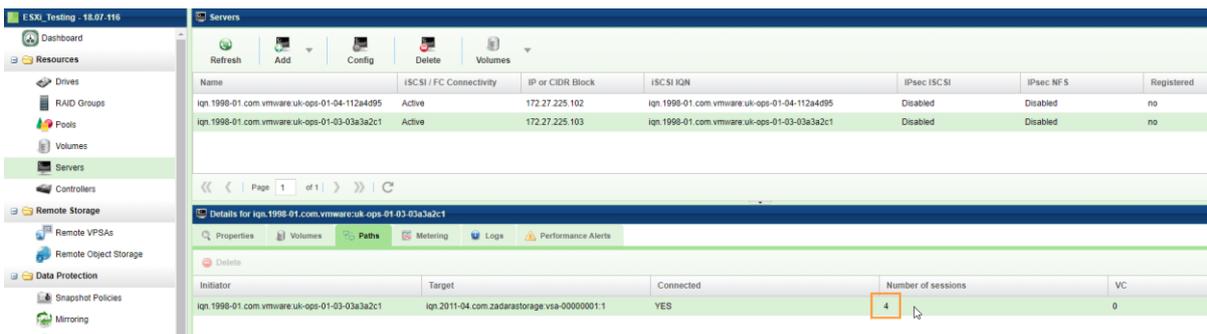
Once the above has been configured, the new VMkernel adapters can be added to the iSCSI Software adapter:



OK...



Rescan the adapter.



In the VPSA, under 'Servers – Paths' it should now indicate 4 (or however many) sessions.

Final checks

To be prudent, it is worth checking in the 'Virtual switches' view, for the new vSwitch, that each VMkernel shows only one connection to a Physical adapter.

Select each VMkernel in turn and confirm that they alternate and that there are an equal number of connections to each Physical adapter.

