Configure iSCSI on VMware using QSAN XCubeNAS

QSAN Technology, Inc.
www.QSAN.com

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This edition applies to QSAN XCubeNAS NAS storage systems. QSAN believes the information in this publication is accurate as of its publication date. The information is subject to change without notice.

Trademarks

Notices

The information contained in this document has been reviewed for accuracy. But it could include typographical errors or technical inaccuracies. Changes are made to the document periodically. These changes will be incorporated in new editions of the publication. QSAN may make improvements or changes in the products. All features, functionality, and product specifications are subject to change without prior notice or obligation. All statements, information, and recommendations in this document do not constitute a warranty of any kind, express or implied.

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This information contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products.

All of these names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

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Preface

About This Guide

This best practice document provides technical guidance for optimizing the configuration and trying to get the best performance of QSAN's XCubeNAS products in the VMware virtualization environment, and it is intended for use by system administrators, NAS designers, storage consultants, or anyone who has purchased these products and is familiar with server and computer network, network administration, storage system installation and configuration, network attached storage management, and relevant protocols.

CAUTION:
Do NOT attempt to service, change, disassemble or upgrade the equipment's components by yourself. Doing so may violate your warranty and expose you to electric shock. Refer all servicing to authorized service personnel. Please always follow the instructions in this owner's manual.

Technical Support

Do you have any questions or need help troubleshooting a problem? Please contact QSAN Support, we will reply to you as soon as possible.

- Via the Web: http://www.qsan.com/en/contact_support.php
- Via Telephone: +886-2-7720-2118 extension 136
  (Service hours: 09:30 - 18:00, Monday - Friday, UTC+8)
- Via Skype Chat, Skype ID: qsan.support
  (Service hours: 09:30 - 02:00, Monday - Friday, UTC+8, Summertime: 09:30 - 01:00)
- Via Email: support@qsan.com

Information, Tip and Caution

This manual uses the following symbols to draw attention to important safety and operational information.

INFORMATION:
INFORMATION provides useful knowledge, definition, or terminology for reference.

TIP:
TIP provides helpful suggestions for performing tasks more effectively.

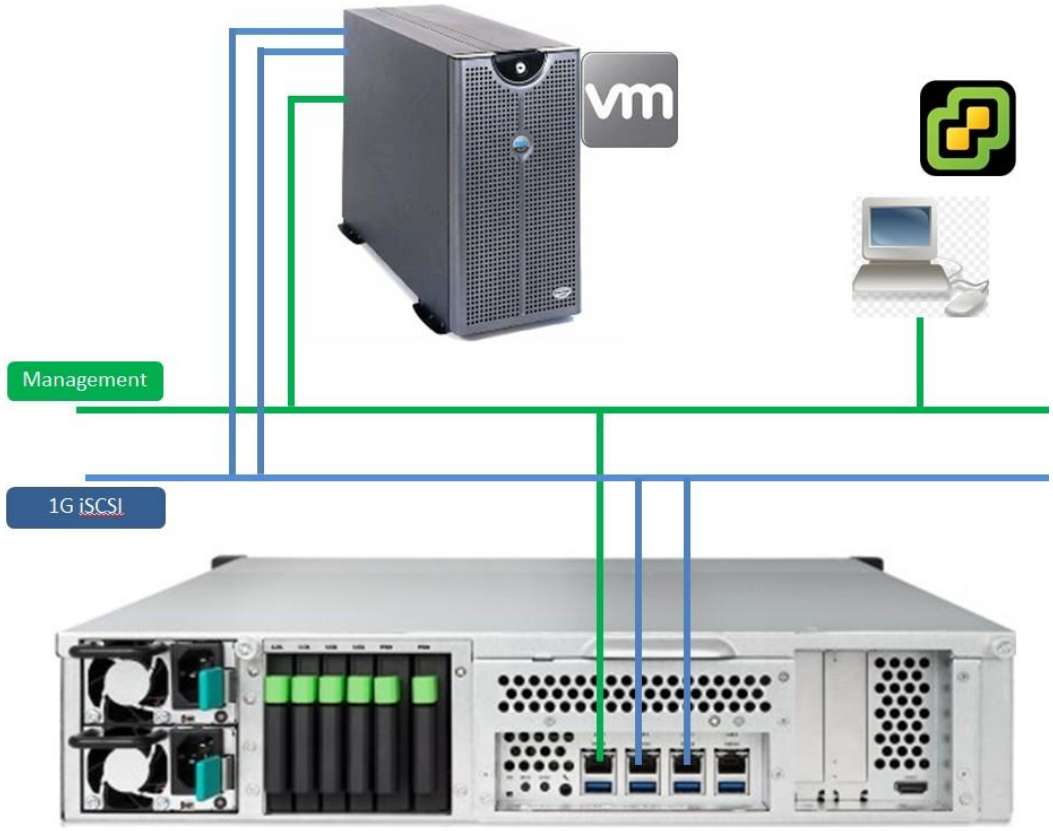
CAUTION:
CAUTION indicates that failure to take a specified action could result in damage to the system.

1. Test Environment

1.1. Environment

Host:	VMware ESXi server 6.x
NICs:	VMnic2 (management) VMnic0/VMnic1 (used for connecting to XCubeNAS)
Storage:	QSAN XCubeNAS
Firmware:	V3.0.0
iSCSI data port:	172.16.135.10/24 172.16.136.10/24
LUN attached:	Target0
Host:	VMware ESXi server 6.x

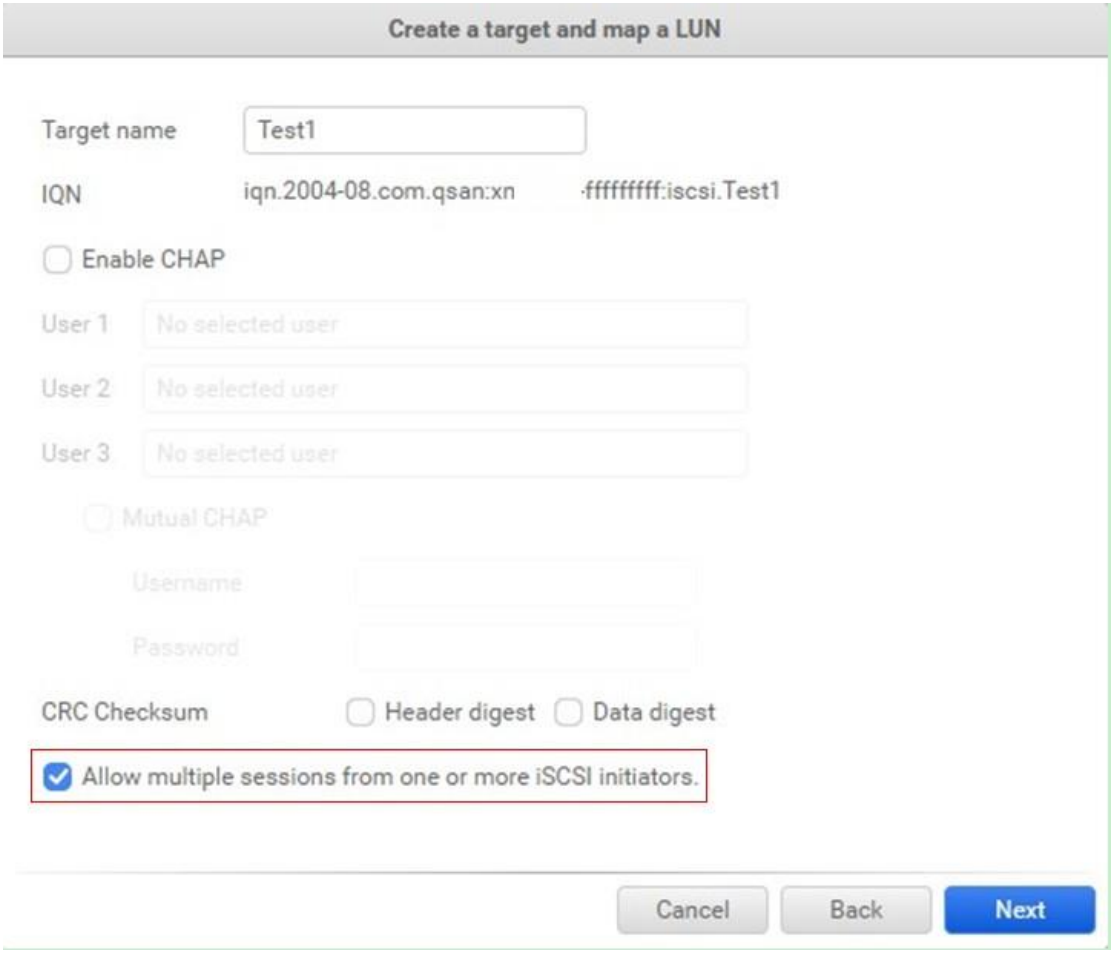
1.2. Diagram



2. System Configuration

2.1. Create iSCSI target and LUN on XCubeNAS

Please follow the attached Tutorial to setup iSCSI target(s) and LUN(s) you need for the VMware environment. Please be reminded that the Allow multiple sessions from one or more iSCSI initiators must be checked when creating an iSCSI target on XCubeNAS.

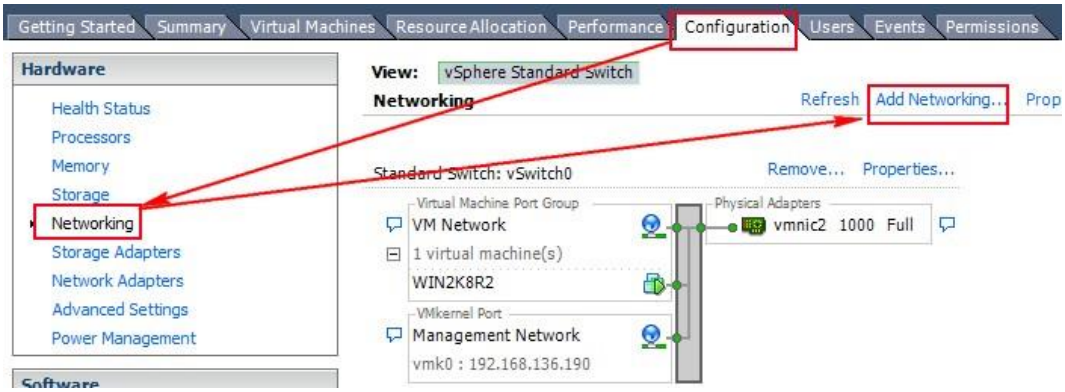


2.2. Login iSCSI target using software iSCSI initiator on VMware

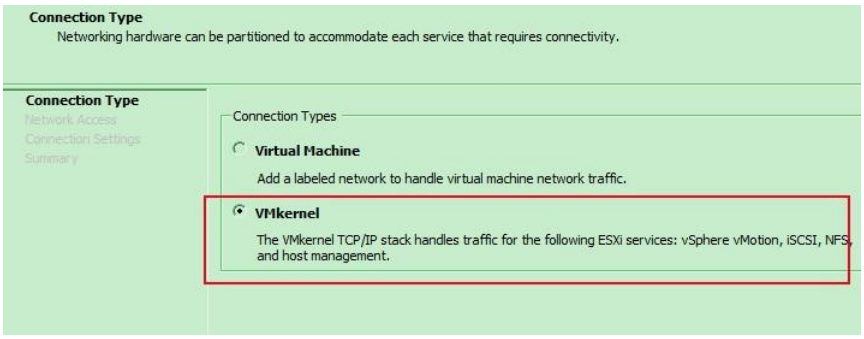
Users can either use VMware vSphere client or VMware Web client to configure the software iSCSI initiator. We are using VMware vSphere client to connect to the ESXi server directly as an example here.

1. Disk Dr Login the ESXi server from VMware vSphere Client.

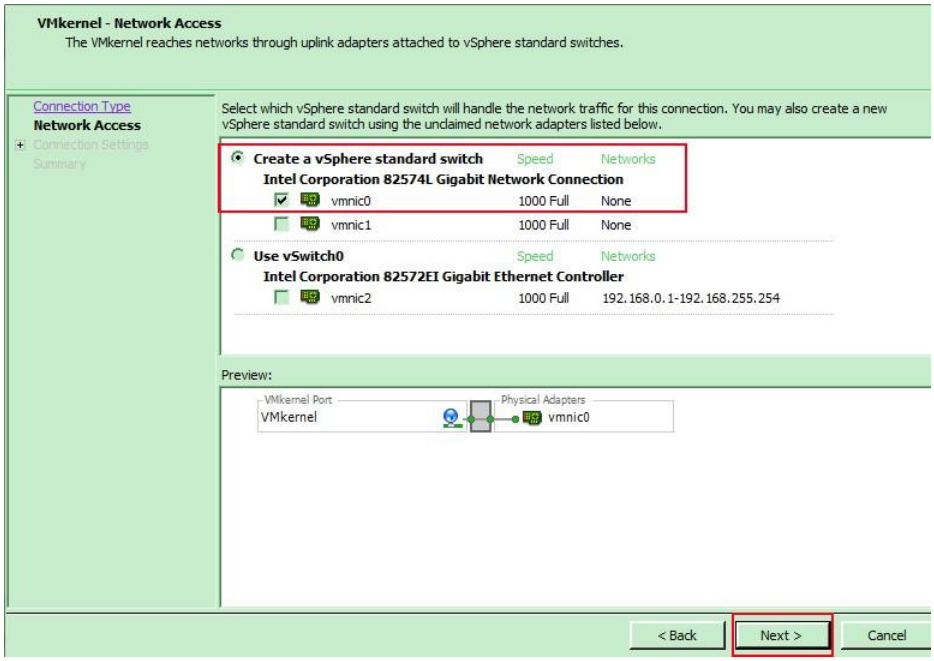
2. In **Configuration** tab, modify **Networking** setting to add a **VMkernel** network (It is the TCP/IP stack which handles traffic for ESXi server services, such as vMotion, iSCSI, and NFS).



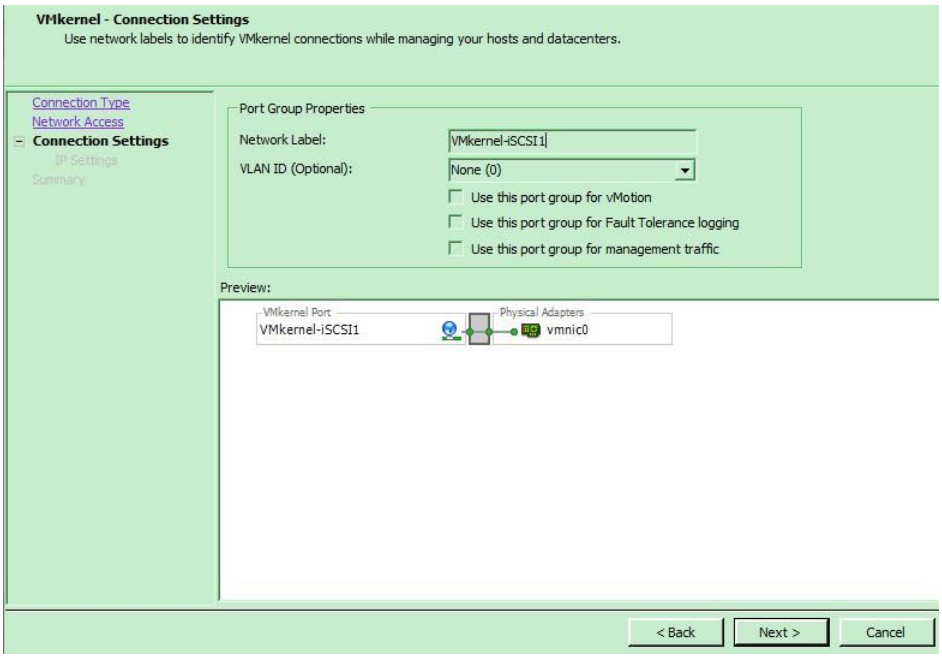
3. Make sure the **VMkernel** connection is selected.

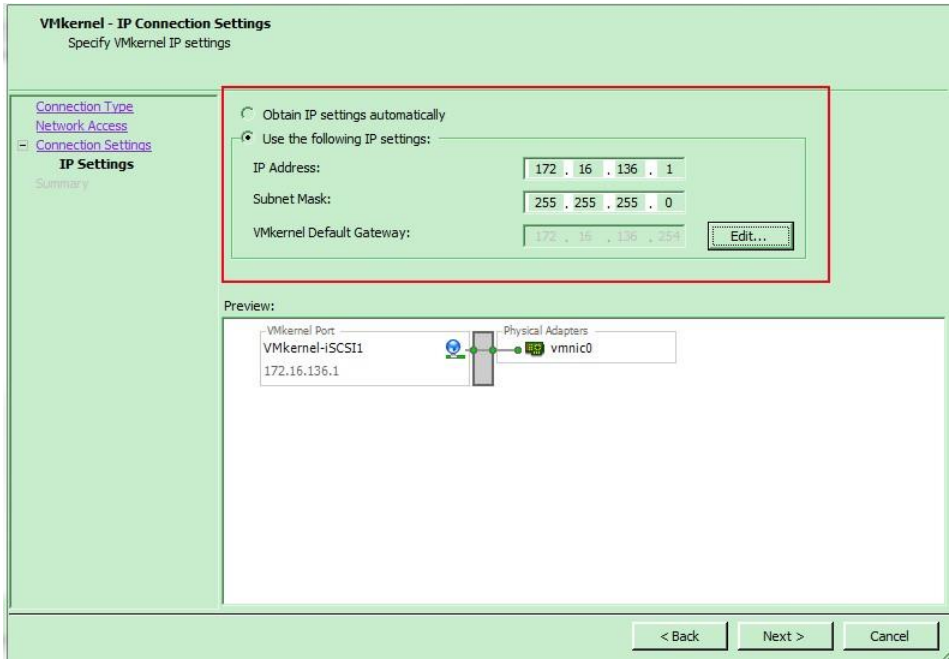


4. Create the first virtual switch and make sure to choose the right network interface which is connected to the same network with XCubeNAS.

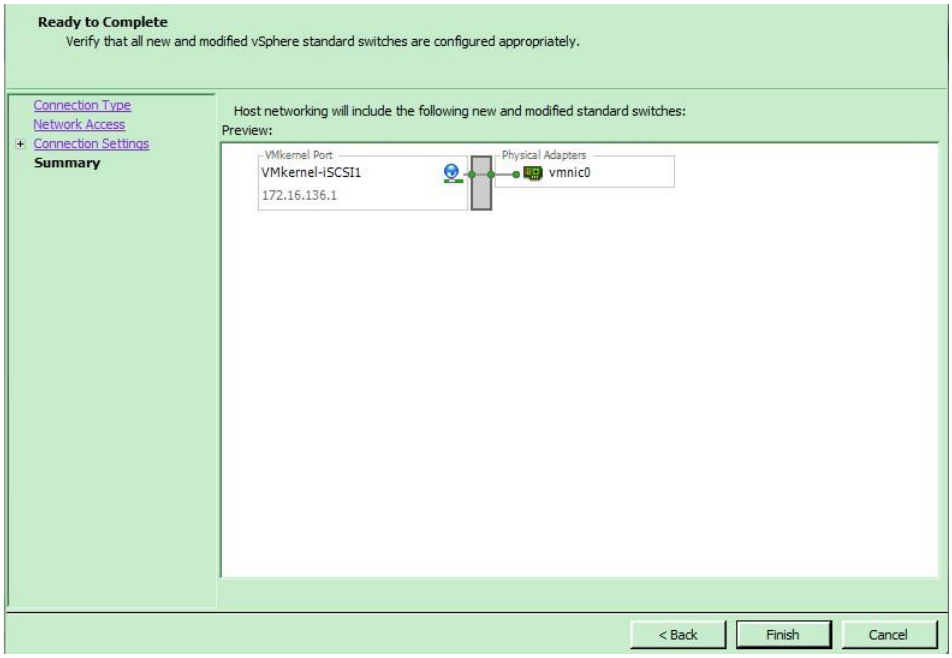


5. Specify **Network Label** and setup a proper **VMkernel** network IP which is used to connect to the iSCSI data port of XCubeNAS.

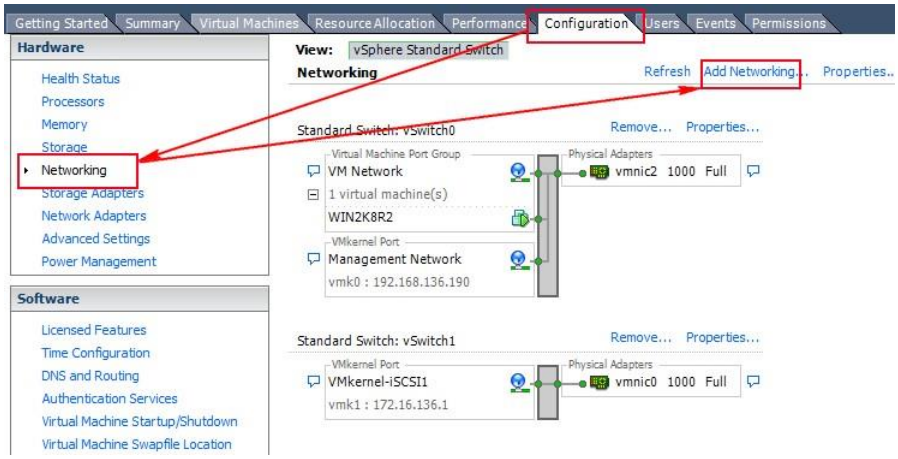


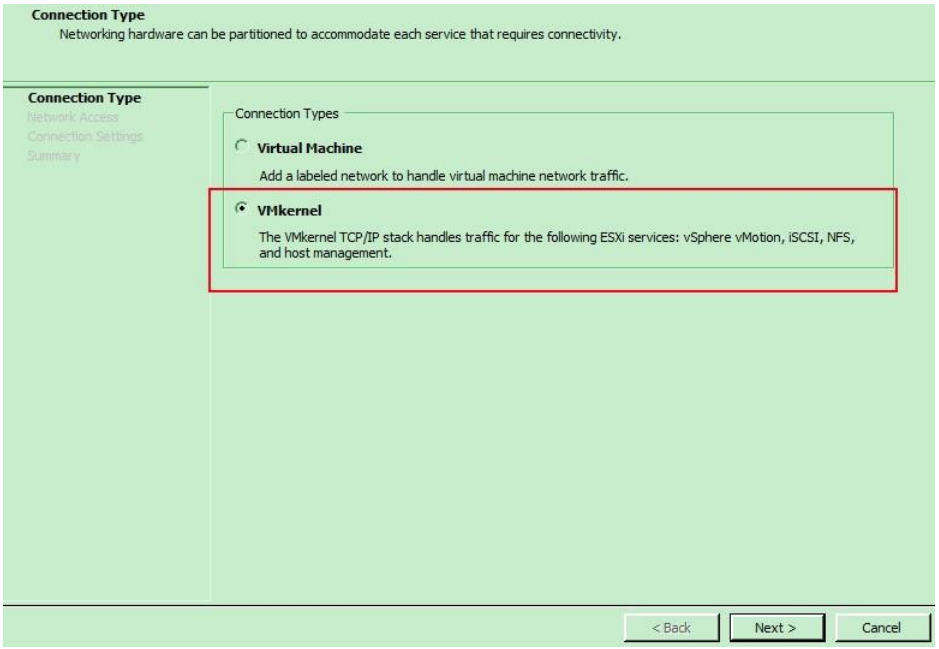


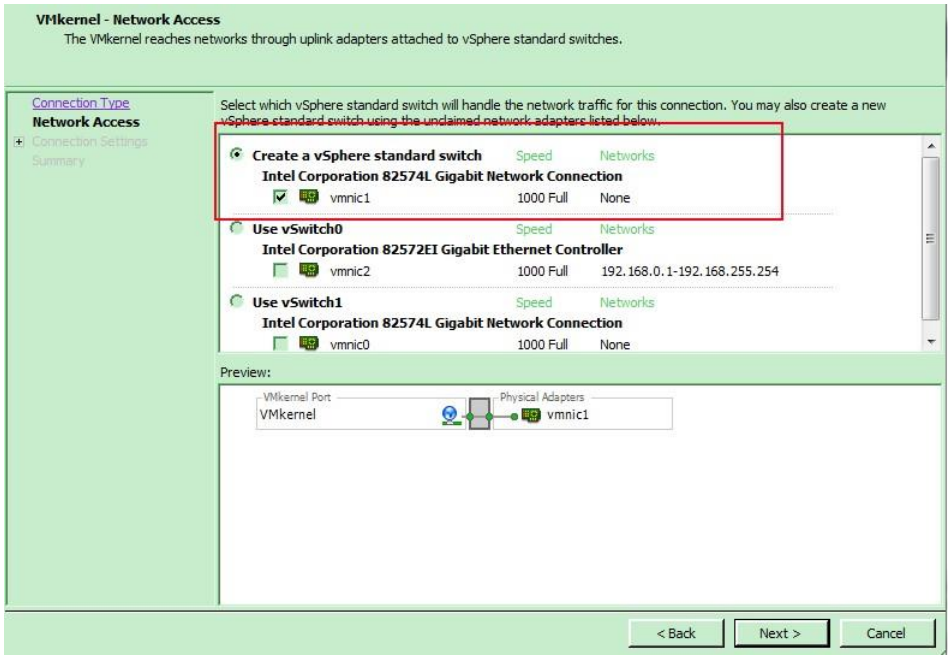
6. Check all configurations are correct, and then click **Finish** button.

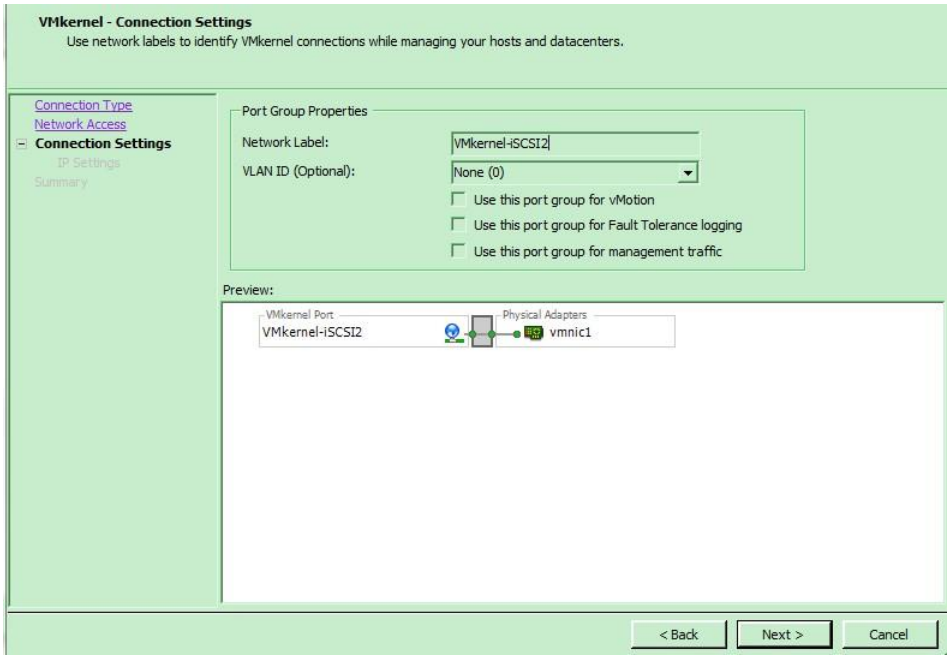


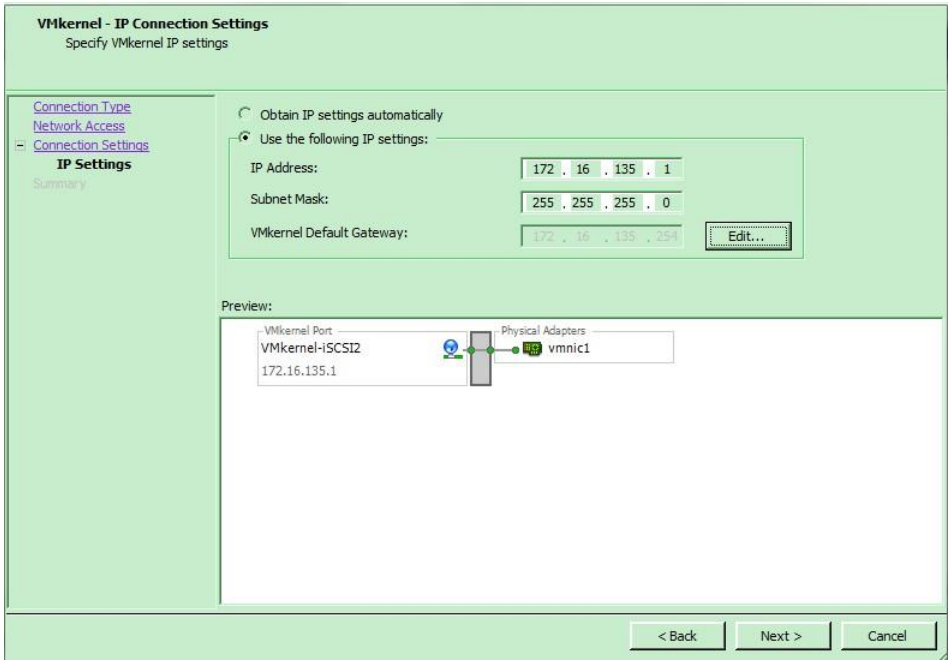
7. In order to create a multipath I/O session to the iSCSI target(s), it's necessary to add another **VMkernel** network, and we suggest to add another vSwitch for separating the network segment and preventing getting user confused

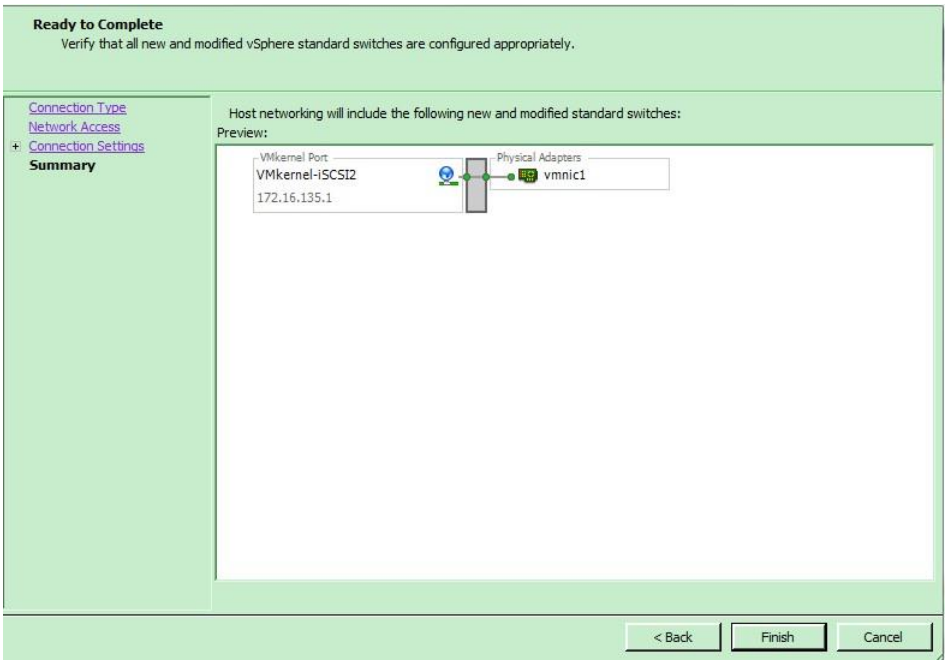


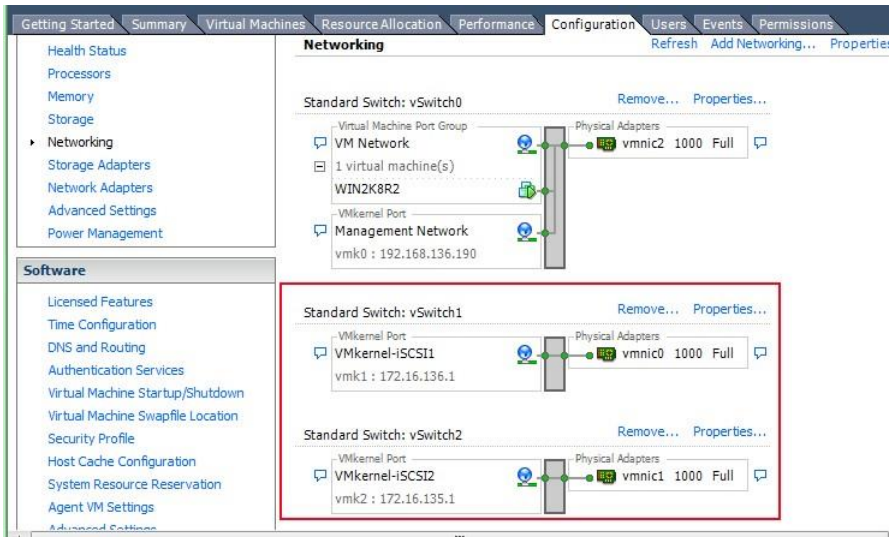




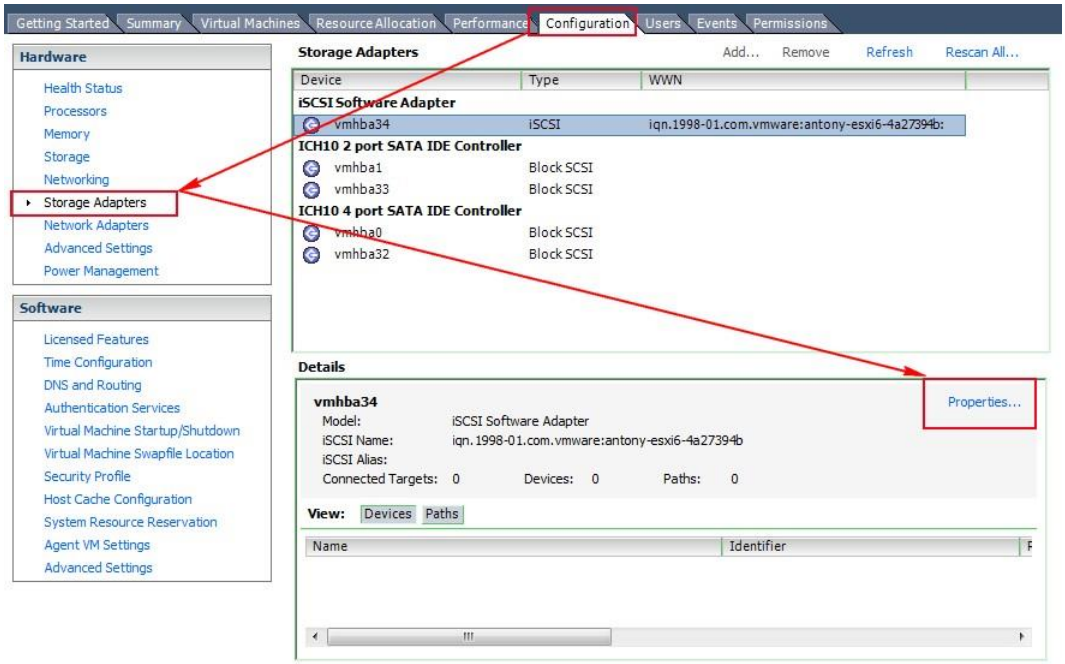

VMkernel - Connection Settings
Use network labels to identify VMkernel connections while managing your hosts and datacenters.
Connection Type
Network Access
Connection Settings
IP Settings
Summary
Port Group Properties
Network Label:
VMkernel-iSCSI2
VLAN ID (Optional):
None (0)
Use this port group for vMotion
Use this port group for Fault Tolerance logging
Use this port group for management traffic
Preview:
VMkernel Port
VMkernel-iSCSI2
Physical Adapters
vmnic1
< Back
Next >
Cancel


VMkernel - IP Connection Settings
Specify VMkernel IP settings
Connection Type
Network Access
Connection Settings
IP Settings
Summary
Obtain IP settings automatically
Use the following IP settings:
IP Address:
172 . 16 . 135 . 1
Subnet Mask:
255 . 255 . 255 . 0
VMkernel Default Gateway:
Edit...
Preview:
VMkernel Port
VMkernel-iSCSI2
172.16.135.1
Physical Adapters
vmnic1
< Back
Next >
Cancel

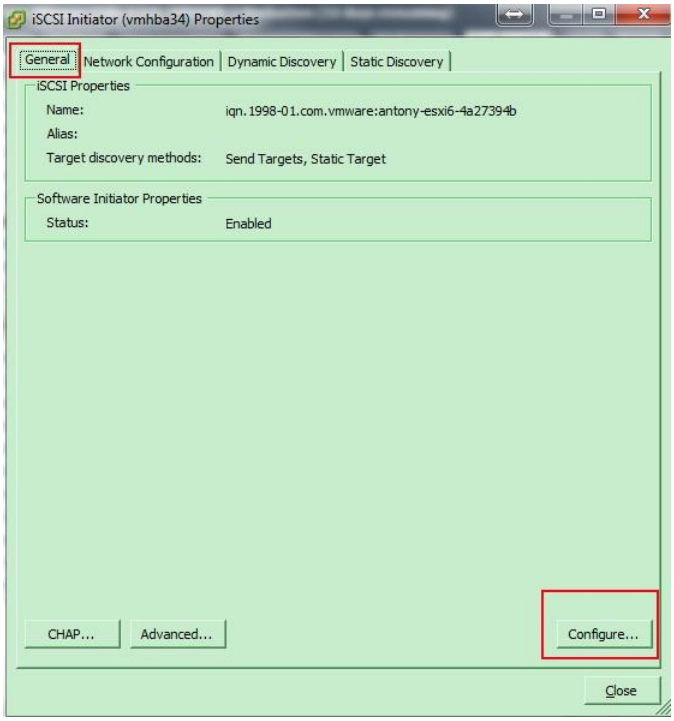




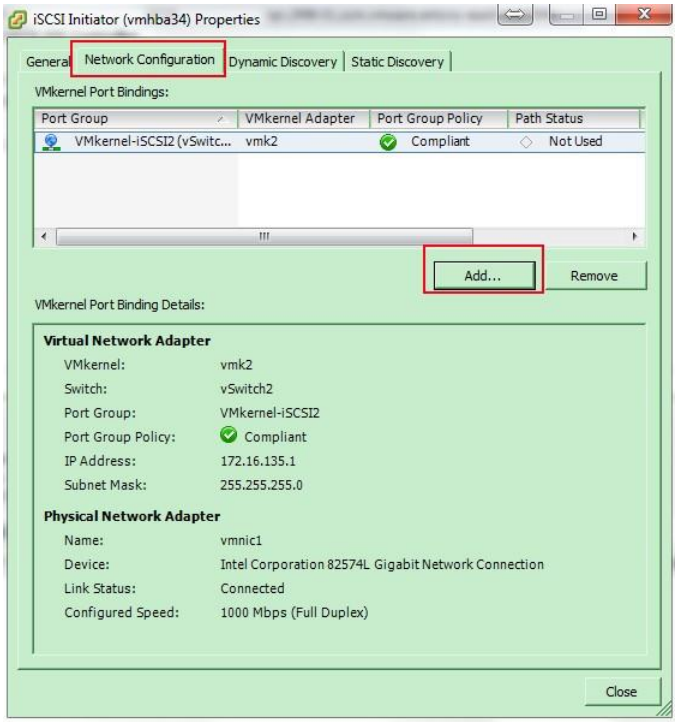
8. In **Configuration** tab, select **Storage Adapters** to list all available storage adapters. Choose **iSCSI Software HBA** and click **Properties** to modify the settings.

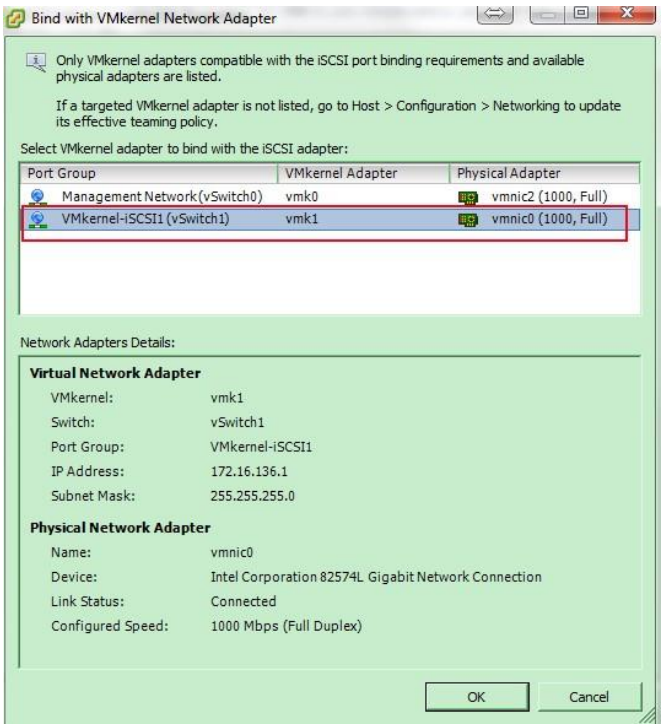


9. In **iSCSI initiator Properties**, select **General** tab and click **Configure** to enable iSCSI initiator.

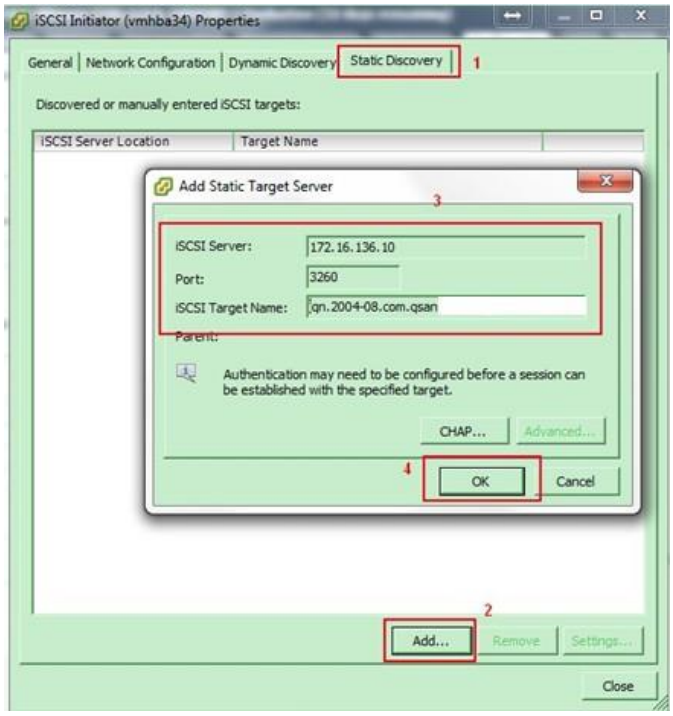


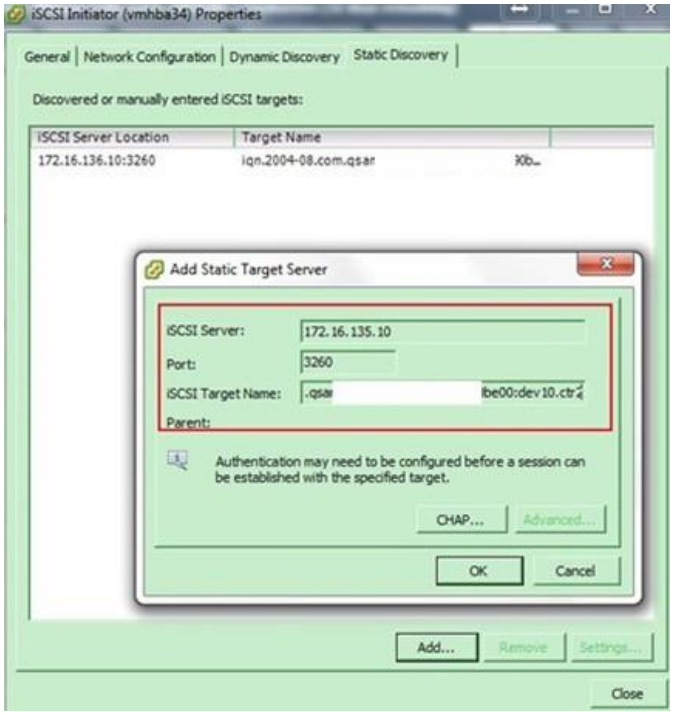
10. Next, please add another VMkernel port (default is one only) into the iSCSI initiator, so that the multipath session can be created smoothly.



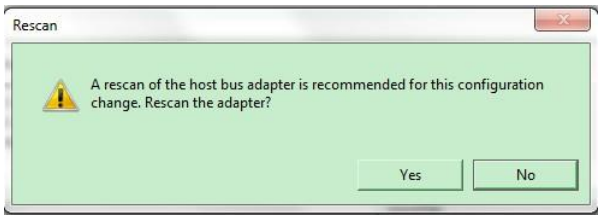


11. Go to **Static Discovery** tab, click **Add** button to set iSCSI target IP, here is iSCSI data port of XCubeNAS, two paths will be added here.

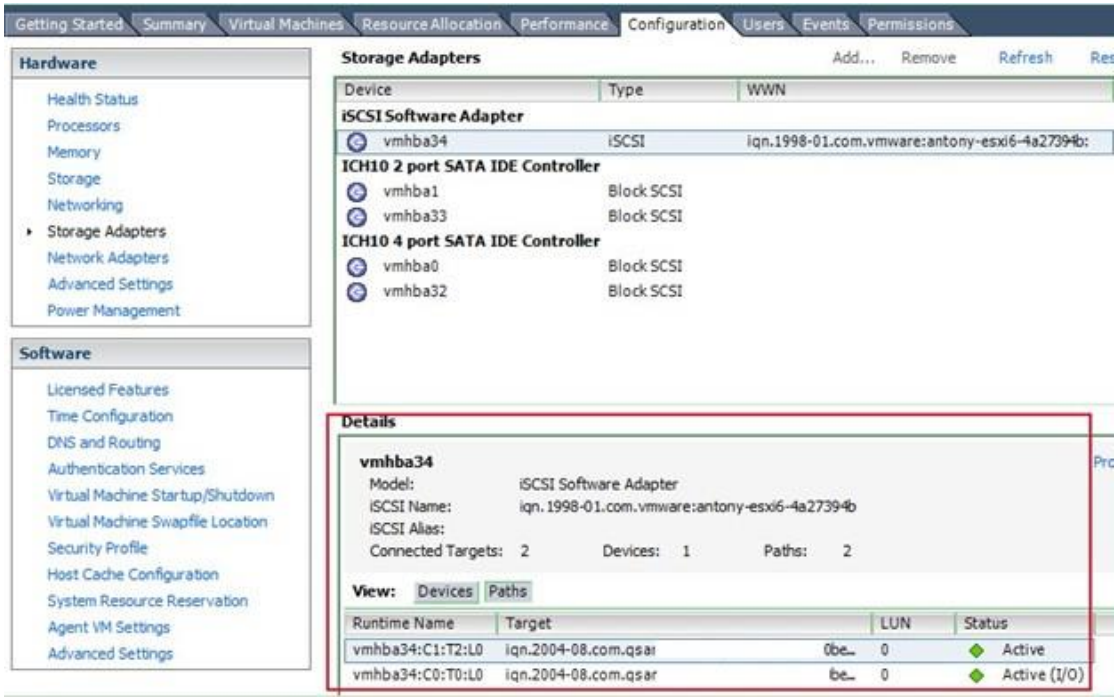




12. A **Rescan** window will pop up after the configuration is finished, click **Yes** button to rescan all devices.

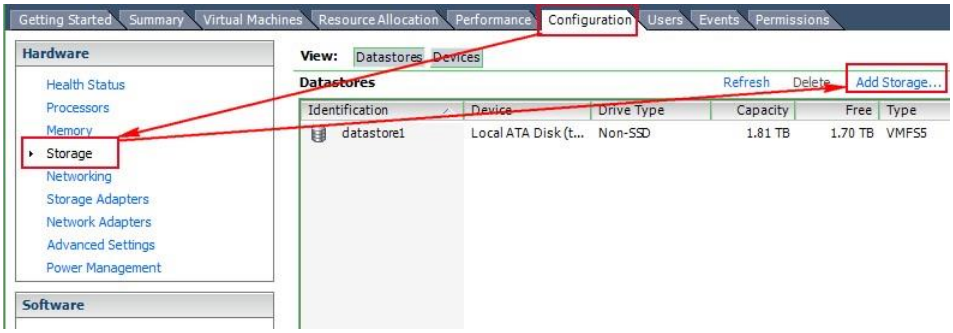


13. After rescanning, the available LUNs will be listed in the **Details** column when selecting the **iSCSI software adapter**. Although only one LUN is created on XCubeNAS, there are two different physical paths to the same LUN, therefore the system displays two different records to the same LUN here.

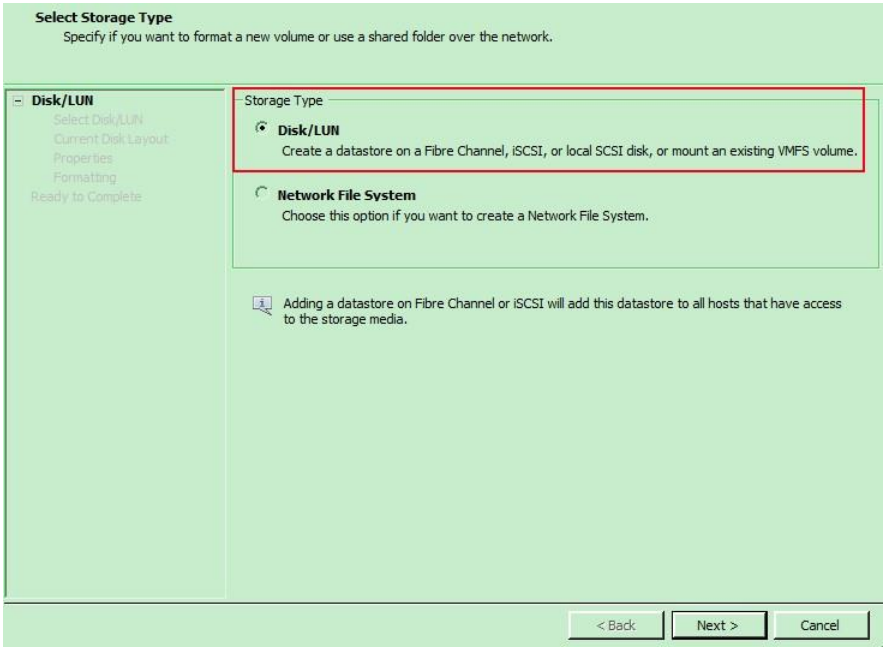


2.3. Add a new storage using the iSCSI LUN

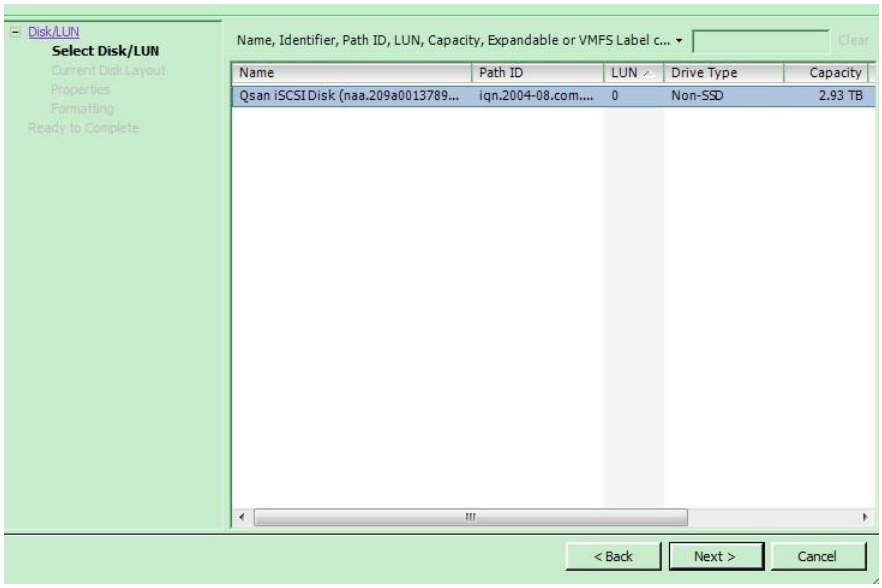
1. The LUN will be used as a virtual disk of the created guest OS. In **Configuration** tab, select **Storage** and click **Add Storage**.

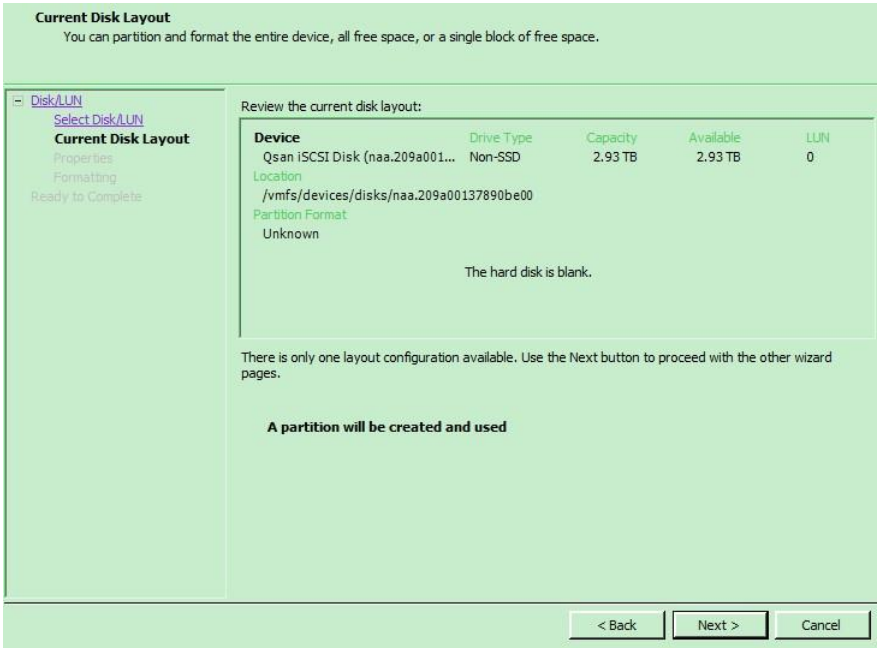


2. Select **Disk/LUN**, and click **Next** button.

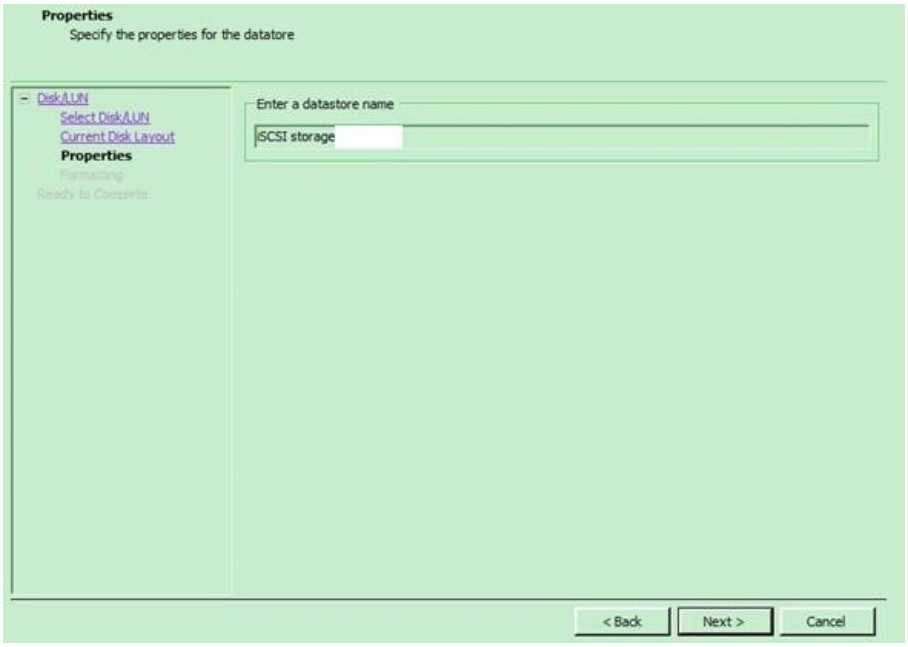


3. Select **Qsan iSCSI Disk**, and click **Next** button.

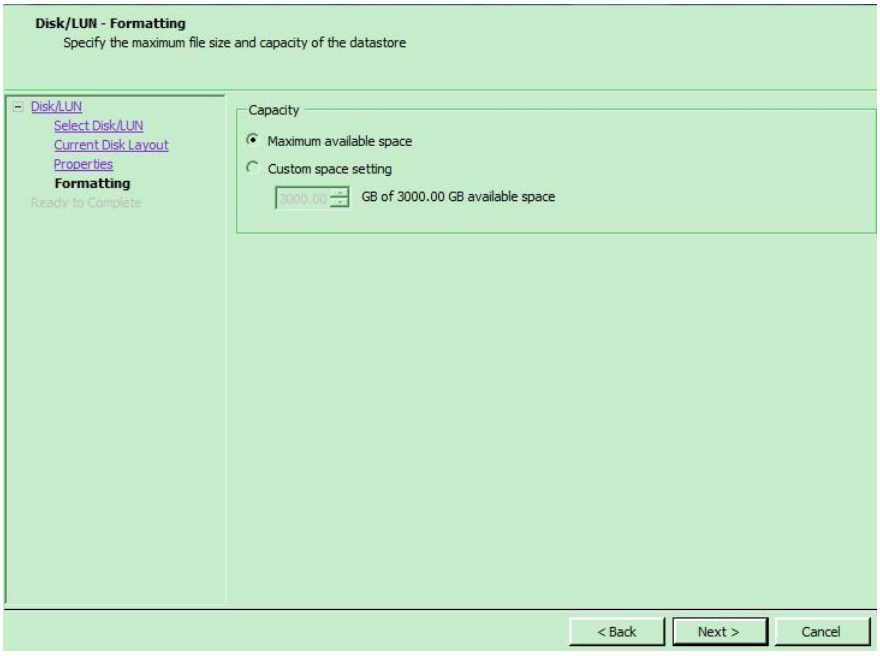




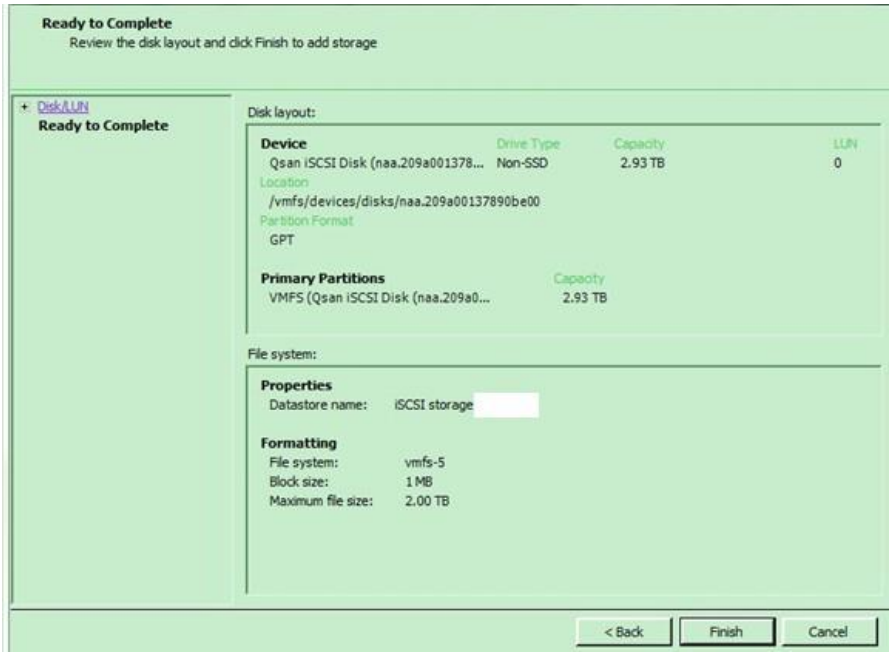
4. Enter a name for the new datstore, and click **Next** button.



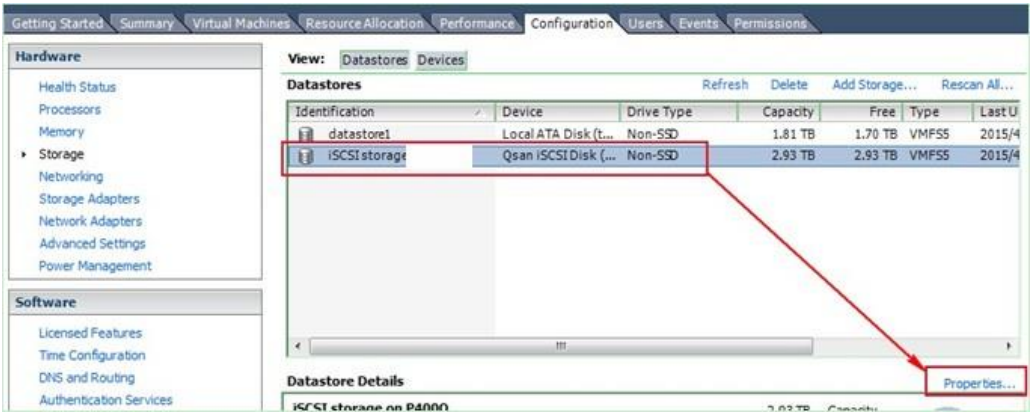
5. Click **Next** button.



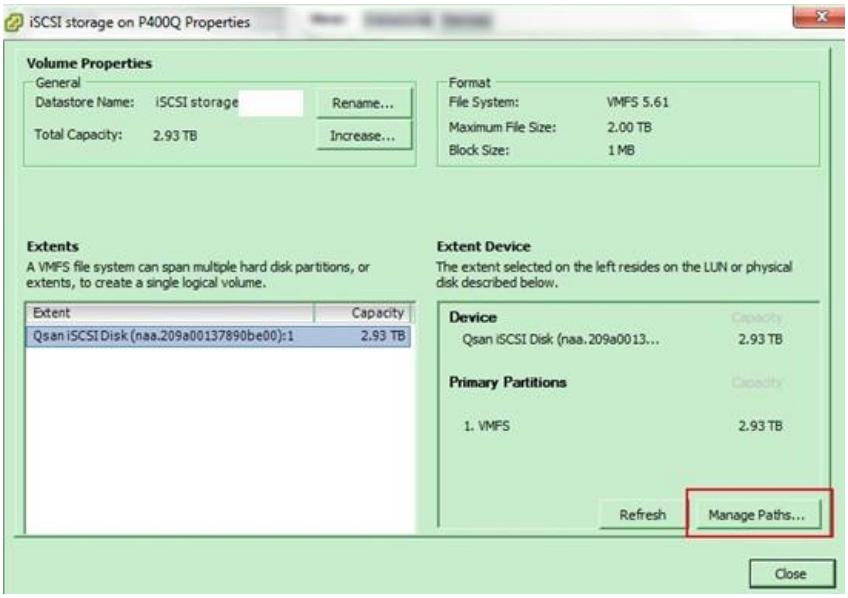
6. Check all settings, then click **Finish** button.



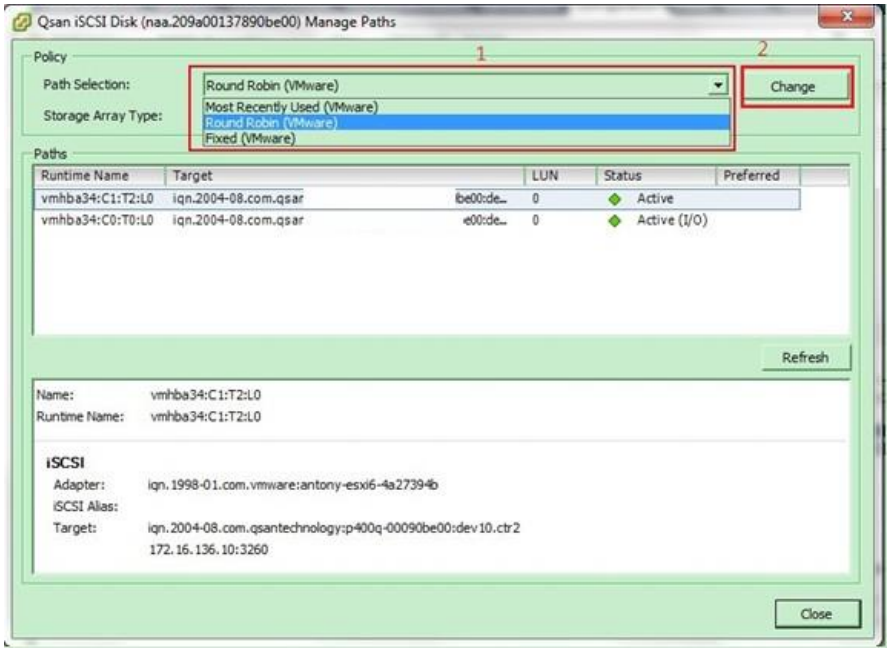
7. A new storage is added under **Datastores** of the ESXi server. The ESXi server provides settings to the multipath I/O. We can select the iSCSI storage and click **Properties** to modify the settings.

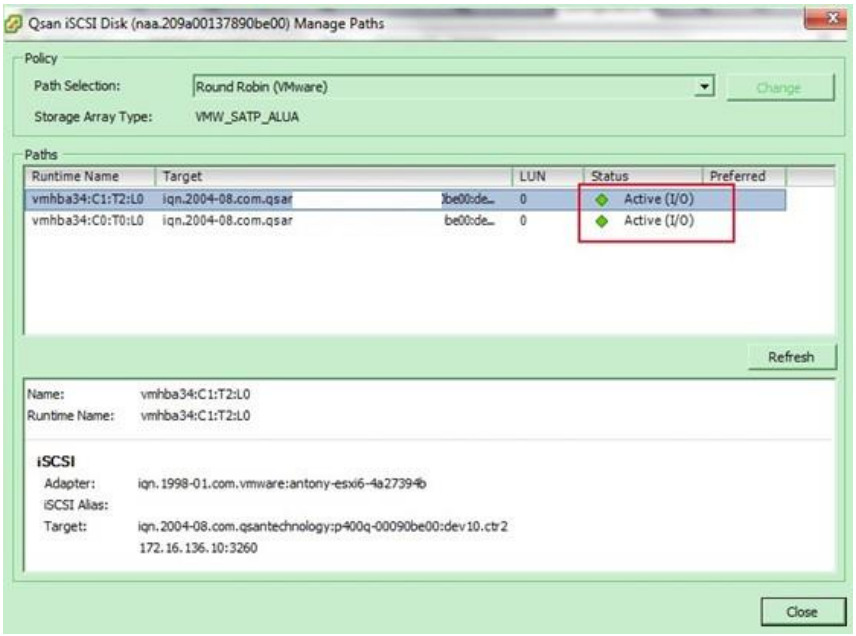


8. Select **Manage Paths** button.



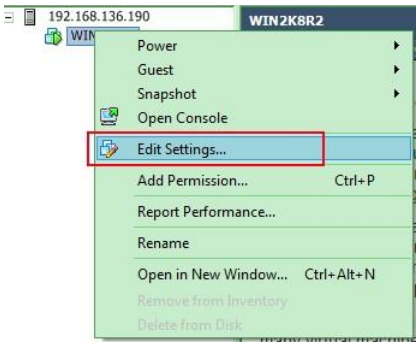
9. In **Manage Paths** window, it will display how many paths connect to this LUN and what path is active now. The policy is in **Fixed** mode by default, it can be modified by the drop-down menu. There are three types available, **Fixed, Most Recently Used**, and **Round Robin**. The difference between **Fixed** and **Most Recently Used** is that **Fixed** will make the active path to failback once the preferred path is restored from a failure status, but **Most Recently Used** policy will keep the active path stay in used. **Fixed** and **Most Recently Used** policies will use only one path to transfer the iSCSI network traffic at the same time, whereas **Round Robin** policy will use all available paths to transfer the data. Remember to click **Change** button for applying the setting.



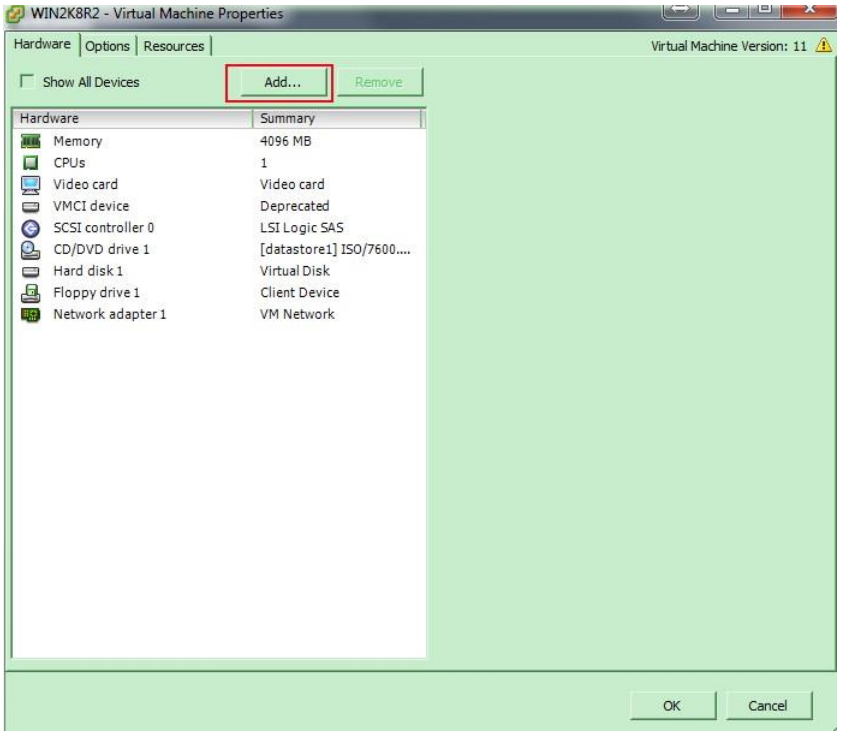


2.4. Add a new HDD to the created guest OS using the added datastore

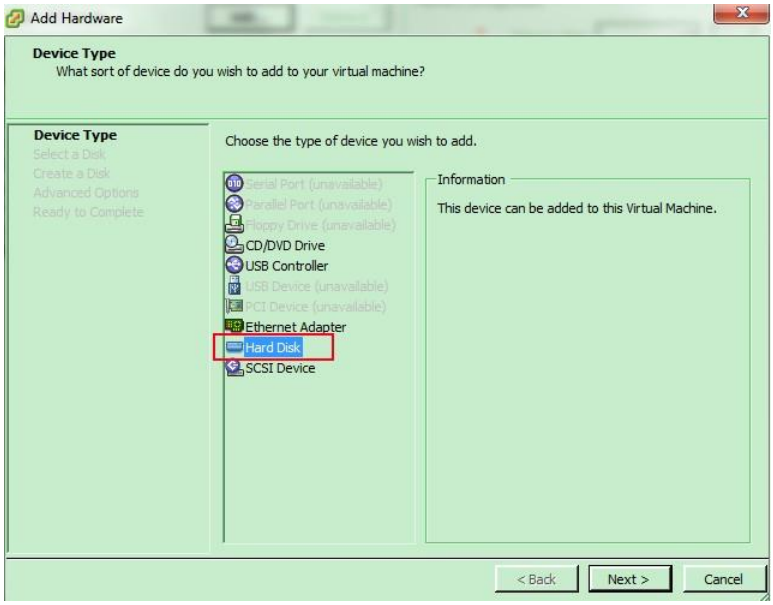
1. Now the datastore can be added as a virtual disk of guest OS. Right click on the guest OS and select **Edit Settings**.



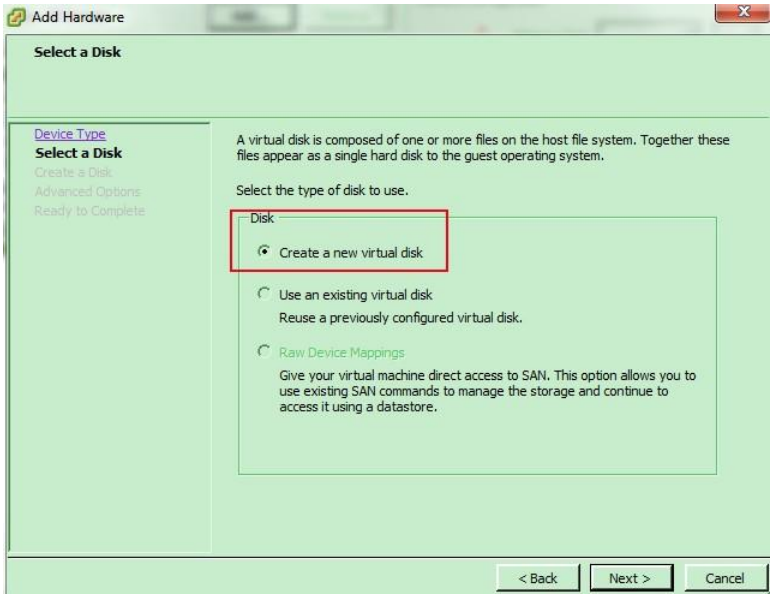
2. In the **Hardware** tab, click **Add** button.



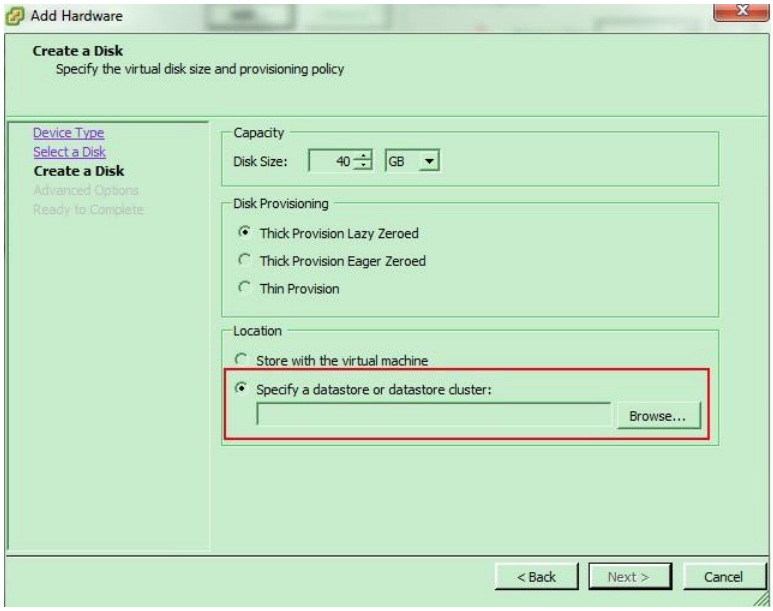
3. Select **Hard Disk**, and click **Next** button.



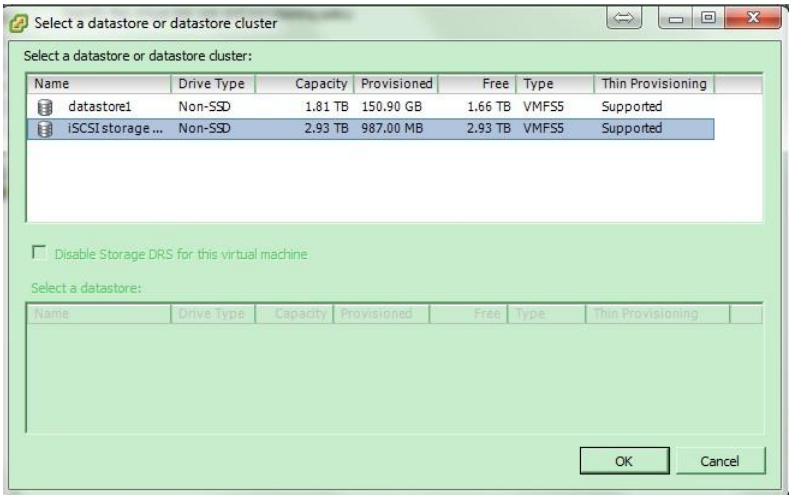
4. Choose **Create a new virtual disk**, and click **Next** button.



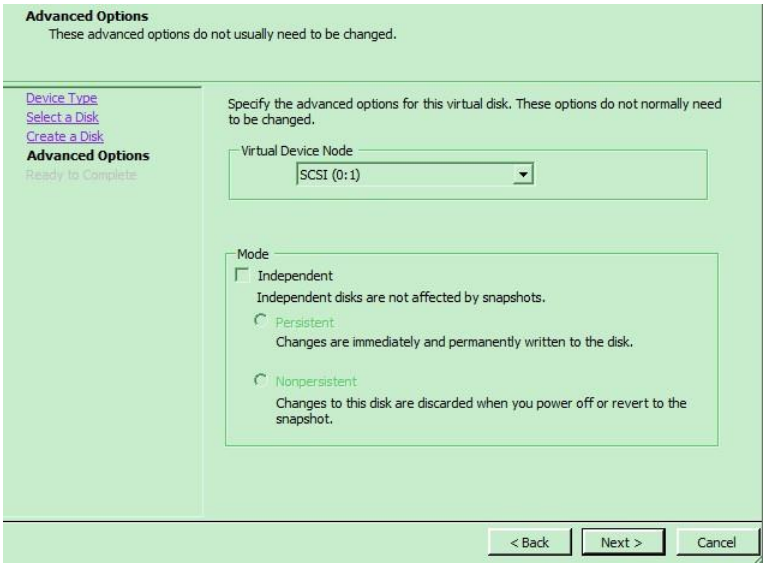
5. Select **Specify a datastore or datastore cluster**, and click **Browse** button.



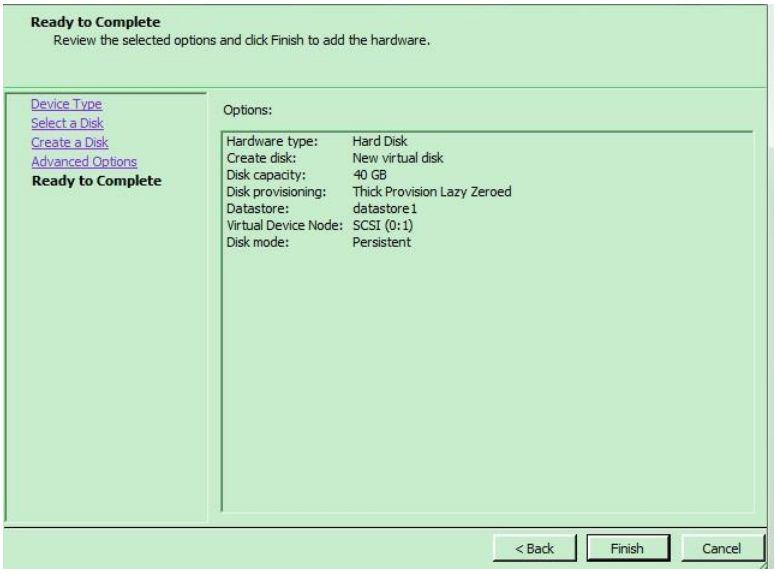
6. Select **iSCSI storage**, and click **OK** button.



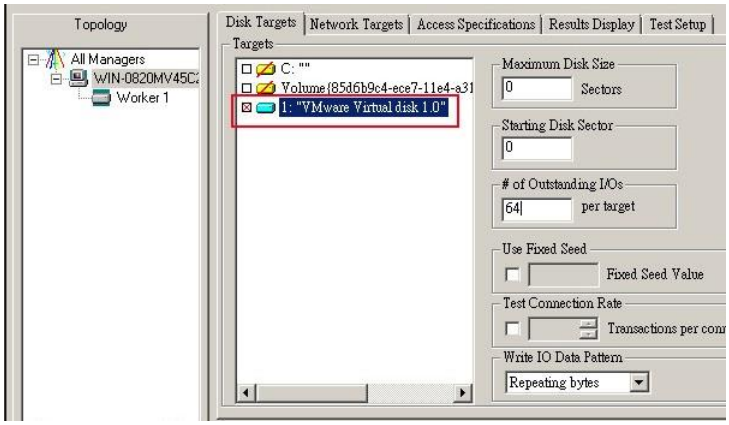
7. Leave all settings by default, click **Next** button.

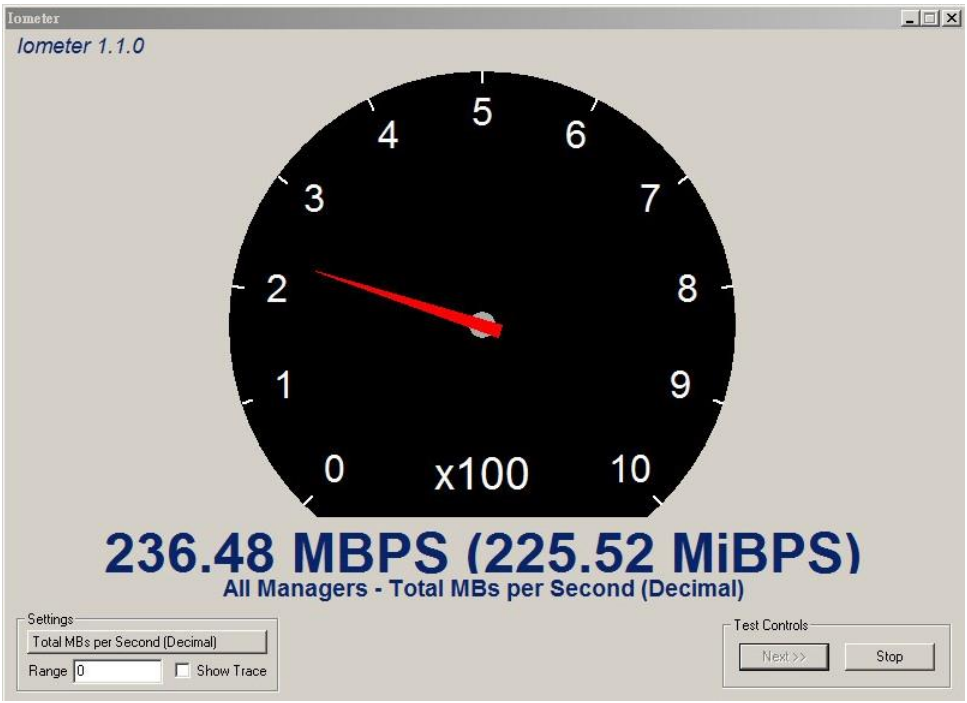


8. Check all settings, then click **Finish** button.



9. Verify that the multipath is working by IOmeter on the created guest OS.





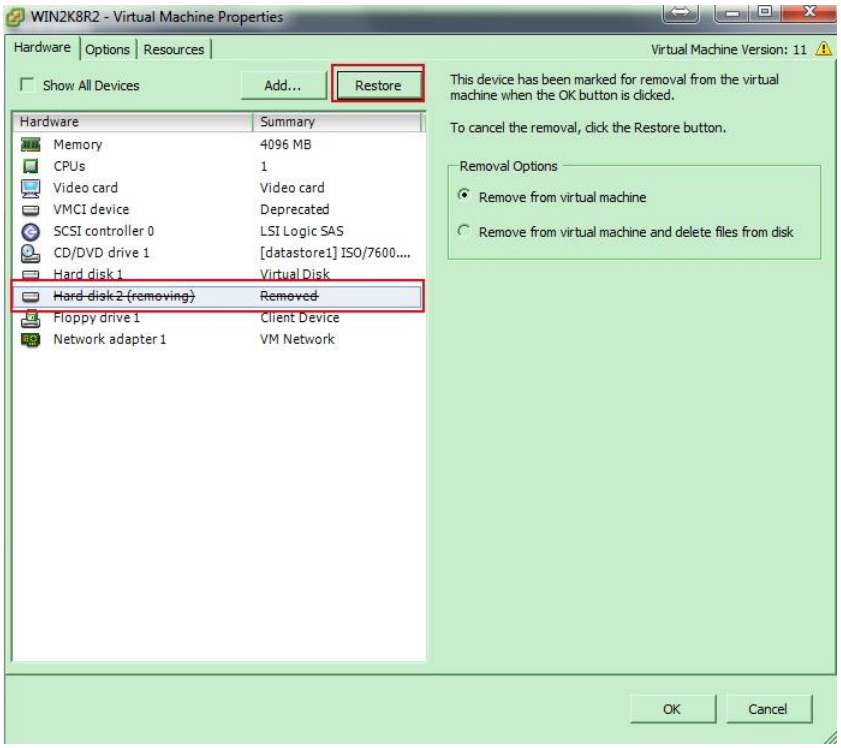
10. In this case we used only two iSCSI connections to the iSCSI target on XCubeNAS, so the maximum throughput we get is expected.

INFORMATION:
If you have installed **10GbE** addon card, the maximum performance for a two-ports **10GbE** card is around **2000MB/s**, but please be sure that the installed HDDs are capable of delivering the performance up to **2000MB/s**.

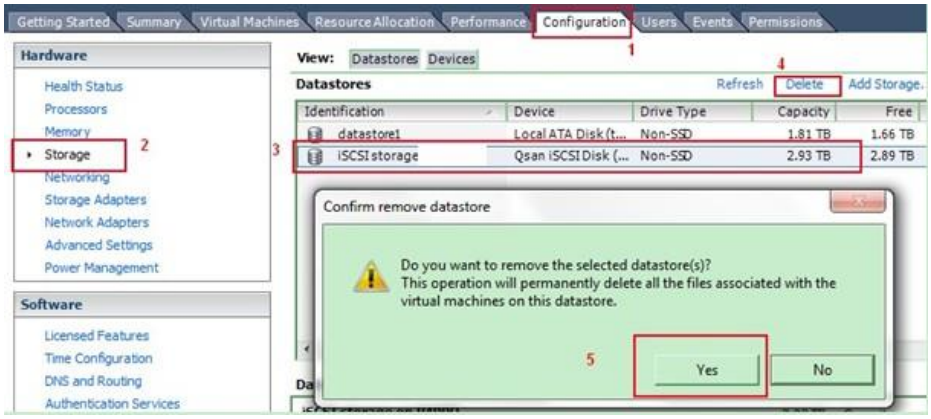
2.5. Logging iSCSI target directly from the guest OS

Users may also login the iSCSI target on XCubeNAS directly from the created guest OS, however, before you try to do so, please make sure the LUN will only be used by this guest OS, otherwise you have to confirm that there is LUN masking well-configured on the XCubeNAS, to prevent any possibility of data inconsistency caused by multiple hosts log in the same LUN in the same time.

1. Remove the new added Hard disk on the guest OS.

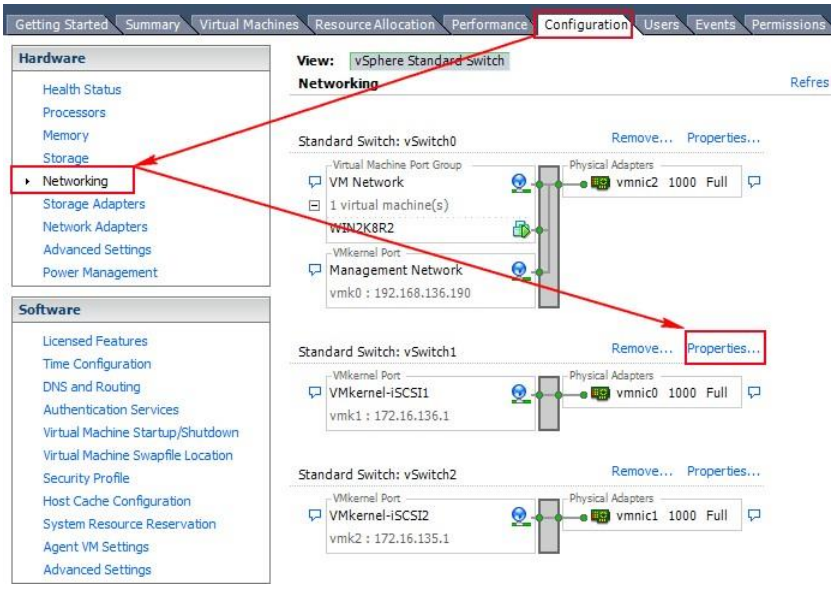


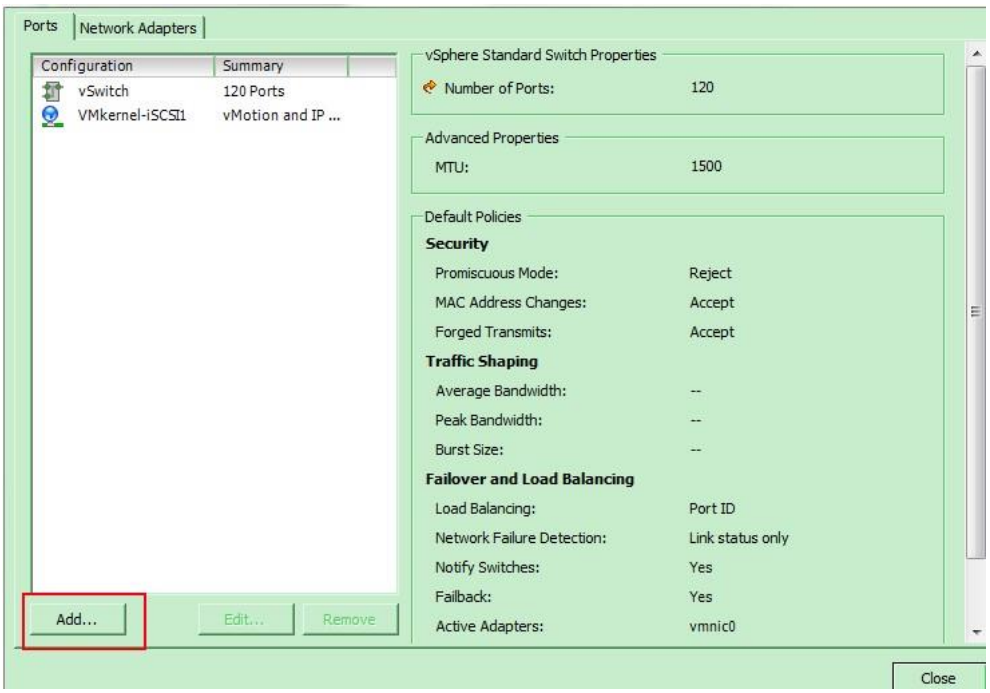
2. Remove the new added datastore on ESXi server.

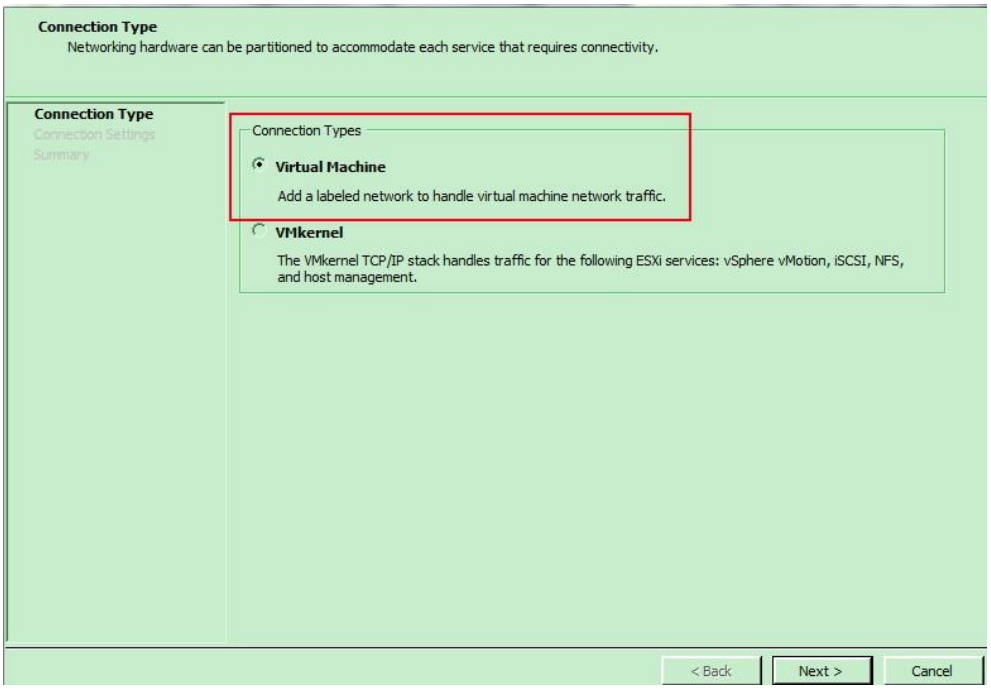


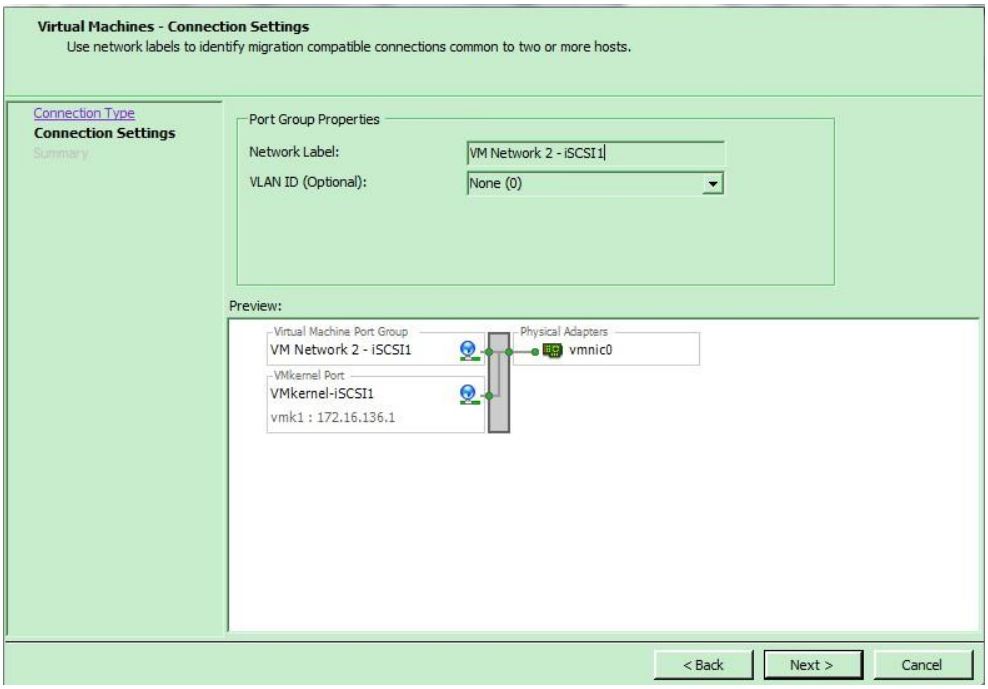
3. Log out the iSCSI target(s).

4. Add a new VM port group to each created vSwitch (VMkernel-iSCSI1, iSCSI2).

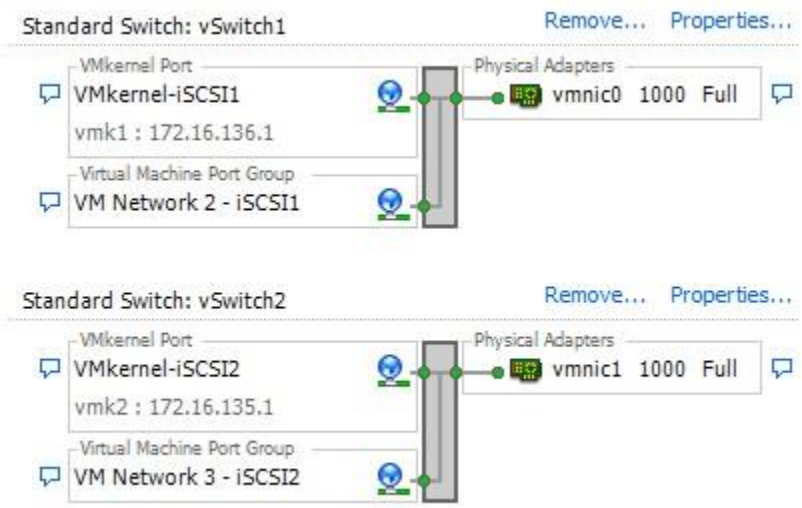




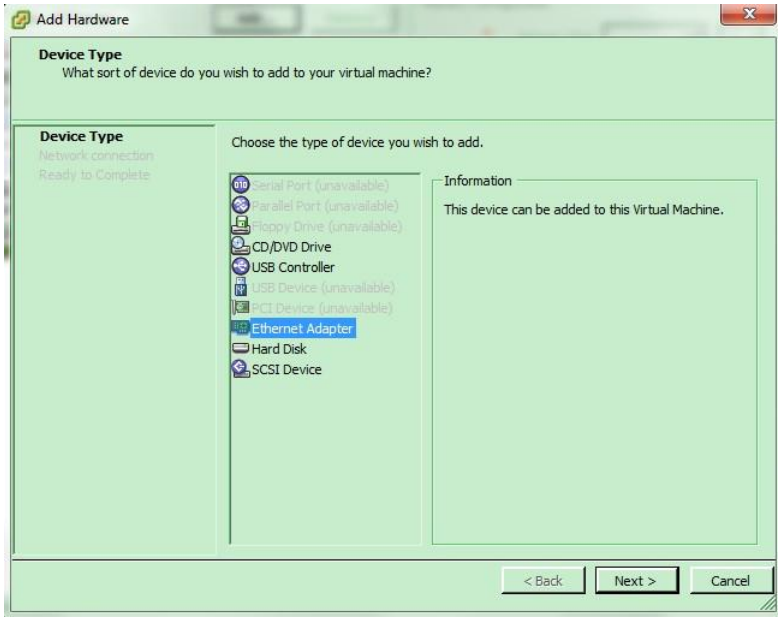


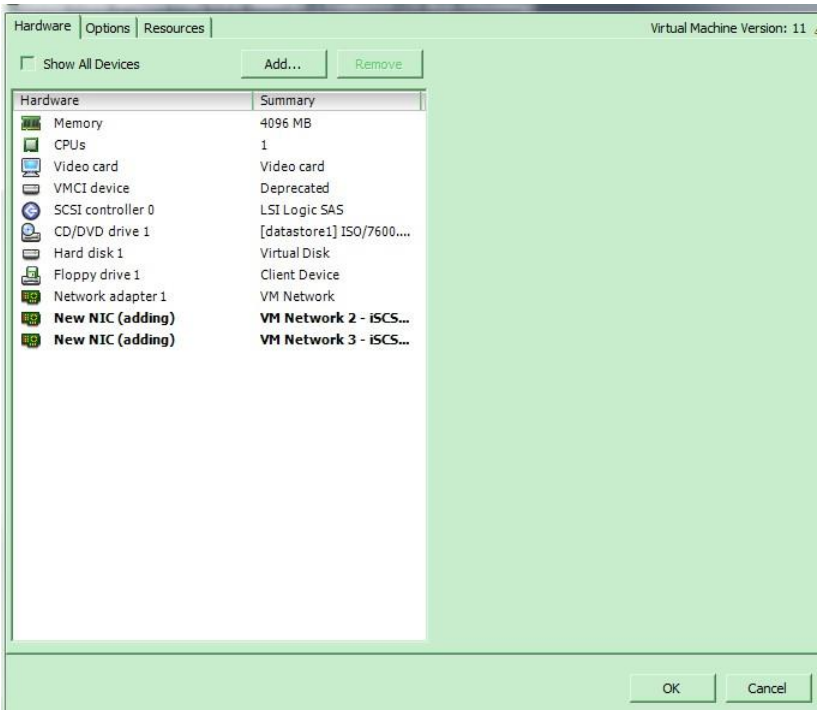


5. And so on for the other vSwitch, there will be another 2 VM port group available for VM guest OS.

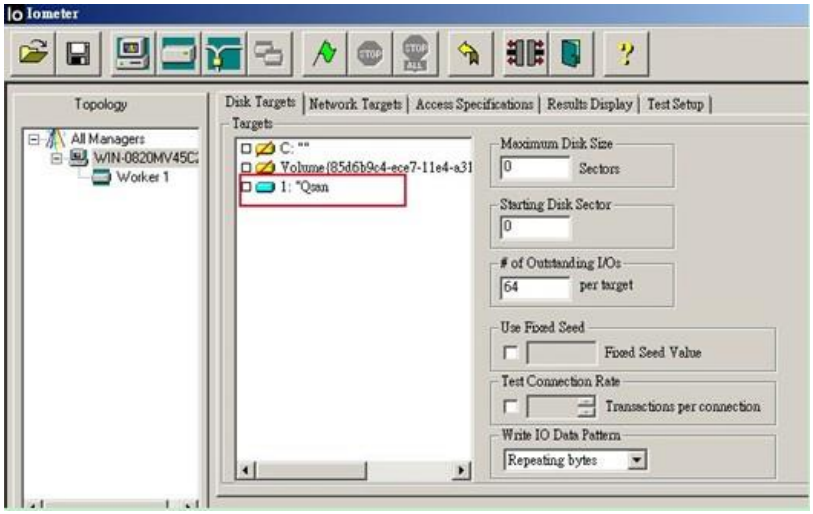


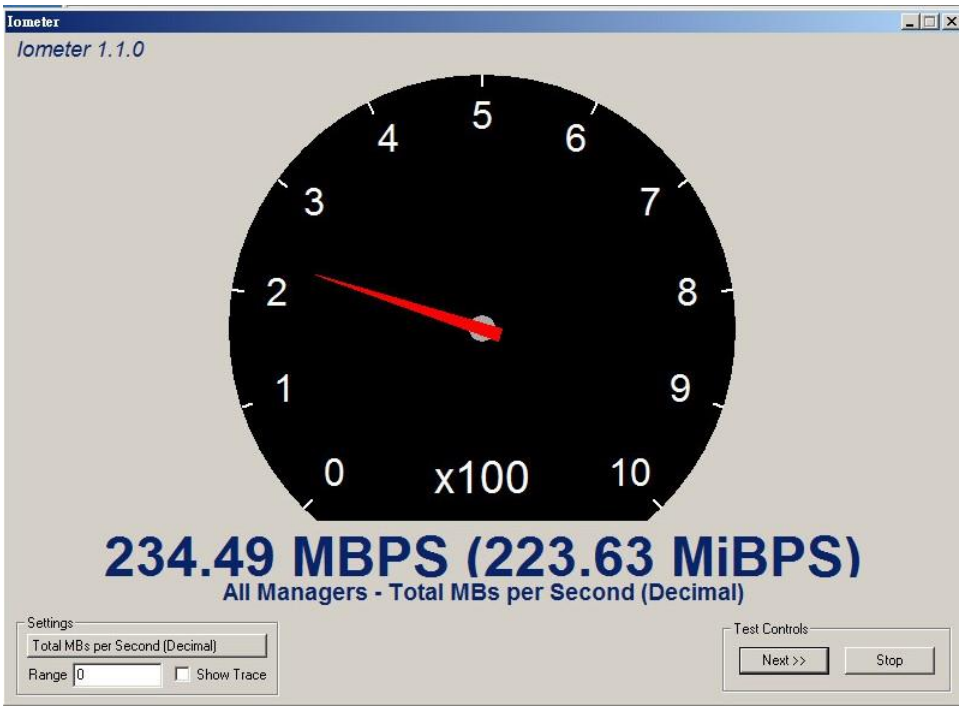
6. Add 2 more Ethernet NIC to the created guest OS, using the VM port group that was created.





7. Configure the new added 2 NICs on the guest OS, so that the guest OS can ping to iSCSI data port on the XCubeNAS, and log in the iSCSI target.
8. Verify the performance via IOmeter.

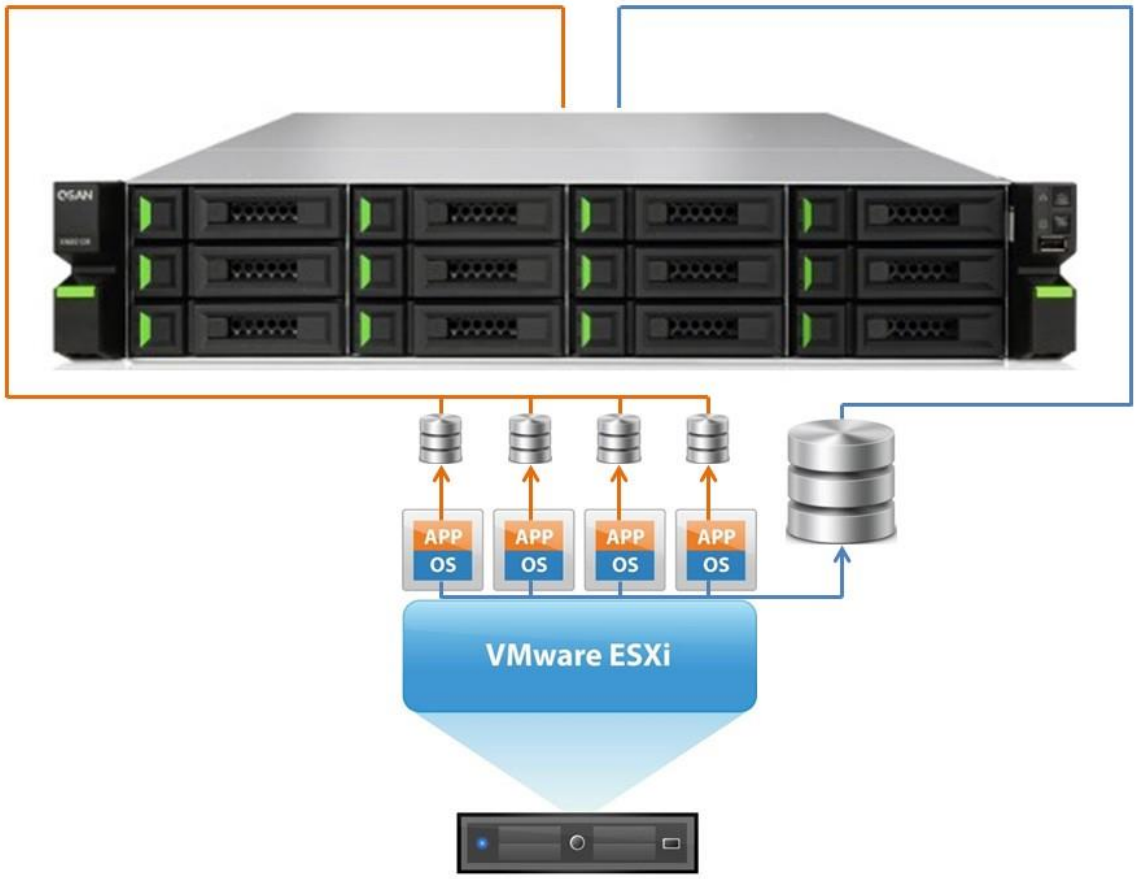

Iometer
Topology
All Managers
WIN-0820MV45C
Worker 1
Disk Targets
Network Targets
Access Specifications
Results Display
Test Setup
Targets
C: ""
Volume{85d6b9c4-ece7-11e4-a31
1: "Qsan
Maximum Disk Size
0
Sectors
Starting Disk Sector
0
# of Outstanding I/Os
64
per target
Use Fixed Seed
Fixed Seed Value
Test Connection Rate
Transactions per connection
Write IO Data Pattern
Repeating bytes


Iometer
Iometer 1.1.0
0
1
2
3
4
5
6
7
8
9
10
x100
234.49 MBPS (223.63 MiBPS)
All Managers - Total MBs per Second (Decimal)
Settings
Total MBs per Second (Decimal)
Range 0
Show Trace
Test Controls
Next >>
Stop

3. Gain the Maximum Performance

3.1. Create multiple iSCSI LUNs and assign to different purpose

Please check the illustration below to realize how the data of a virtualization environment is recommended to be implemented.



TIP:
In the example above we separated the data of APP and OS on each VM to be stored in different LUNs, which gives you a clear idea about how to create an optimal configuration for virtualization.

It is suggested to have one iSCSI target attached to one LUN to have a better performance and data flow management.

3.2. Adjust IOPS value

The default IOPS value (rr_min_io) on an ESXi server when using multipath is 1000, it is recommended to adjust the value from 1000 to 1 to get the best performance according to the KB described by VMware:

https://kb.vmware.com/selfservice/microsites/search.do?language=en_US&cmd=displayKC&externalId=2069356

To adjust the IOPS parameter from the default 1000 to 1, run this command in ESXi 5.x/6.x:

```
for i in `esxcfg-scsidevs -c |awk '{print $1}' | grep naa.xxxx`; do esxcli storage
nmp psp roundrobin deviceconfig set --type=iops --iops=1 --device=$i; done
```

3.3. Adjust path selection policy (PSP)

Adjust path select policy for multipath transmission. In the practice, we use Round-Robin to implement to achieve the best practice. Please refer to the information regarding to PSP:

Round Robin (RR): The VMW_PSP_RR policy uses an automatic path selection, rotating through all available paths, enabling the distribution of load across the configured paths.

https://kb.vmware.com/selfservice/microsites/search.do?language=en_US&cmd=displayKC&externalId=1011340

4. Support and Other Resources

4.1. Getting Technical Support

After installing your device, locate the serial number on the sticker located on the side of the chassis and register your product at partner.qsan.com/ (End-User Registration). We recommend registering your product in QSAN partner website for firmware updates, document download, and latest news in eDM. To contact QSAN Support, please use the following information.

1. Via the Web: http://www.qsan.com/en/contact_support.php
2. Via Telephone: +886-2-7720-2118 extension 136
   (Service hours: 09:30 - 18:00, Monday - Friday, UTC+8)
3. Via Skype Chat, Skype ID: qsan.support
   (Service hours: 09:30 - 02:00, Monday - Friday, UTC+8, Summertime: 09:30 - 01:00)
4. Via Email: support@qsan.com

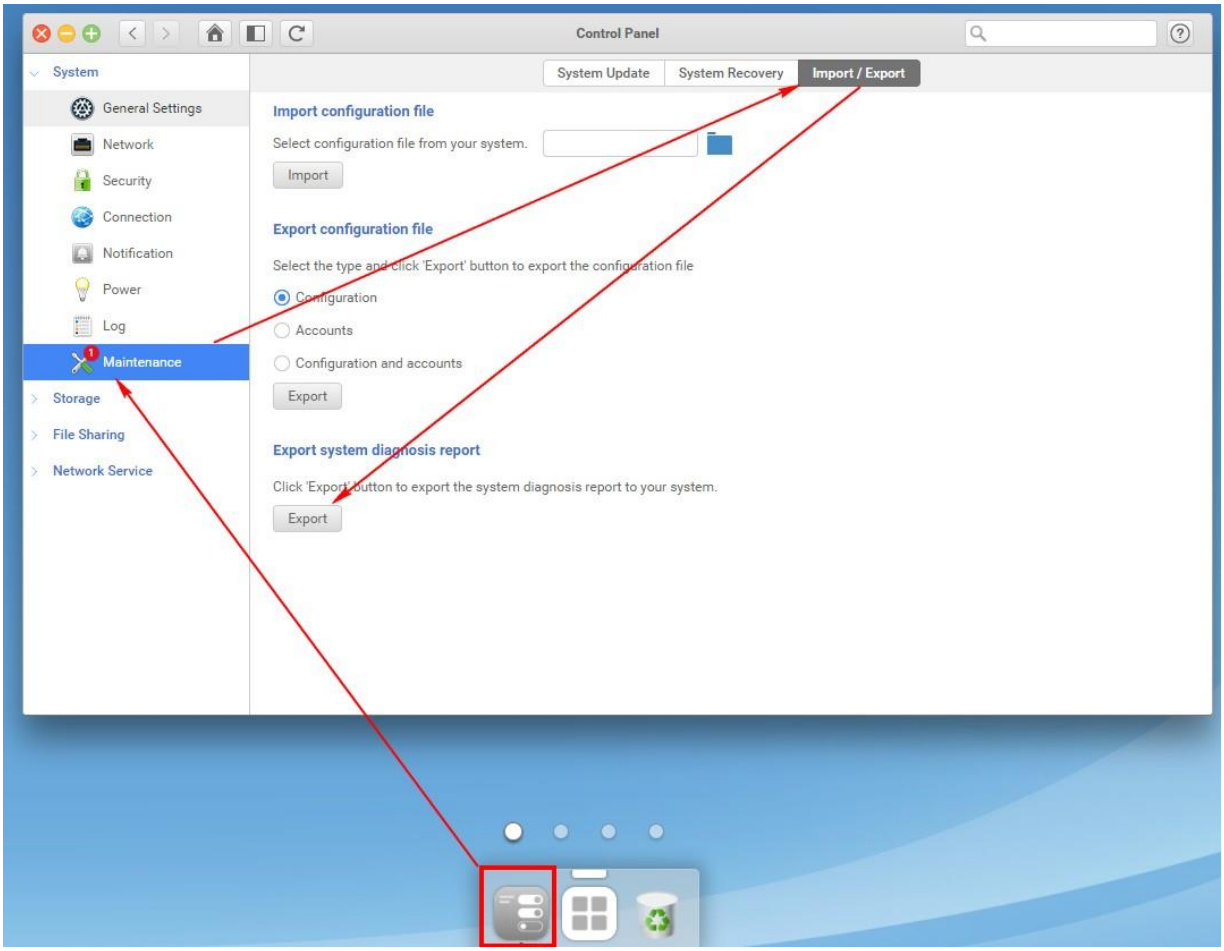
Collect Information for Analysis

1. Product name, model or version, and serial number
2. Firmware version
3. Error messages or screenshot images
4. Product-specific reports and logs
5. Add-on products or components installed
6. Third-party products or components installed

Information for Technical Support

The following system information is necessary for technical support, please refer to following for what and where to get the information of your XN3002T model.

If the technical support requests you to download the service log, please navigate to the QSM UI → **Control Panel → System → Maintenance → Import/Export → Export system diagnosis report**, and then click the **Export** button.



4.2. Documentation Feedback

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When submitting your feedback, including the document title, part number, revision, and publication date located on the front cover of the document.

Appendix

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