

QNAP®



Use MC/S with QNAP Turbo NAS

How to connect to your QNAP Turbo NAS from Windows Server 2012 using MC/S

QNAP provides you what others cannot!

In addition to the other available features on your Turbo NAS, MPIO (Multipath Input Output) enables you to have multiple paths to reach an iSCSI target. Notice only x-86 based QNAP NAS support MC/S.

Benefits of using MPIO with a Turbo NAS:

- It allows **better performance**. By using several TCP connections for data transmission, it will enhance network throughput.
- Ensures **failover**. It will avoid downtime in the event of network problems (faulty cable, switch power unit malfunction) with every application remaining online.
- It can provide **load balancing**. Whenever a large transfer occurs, it can use different switches to avoid the possibility of overloading a switch.

In this application note, we will set an iSCSI target with multiple connections to access your favorite Turbo NAS from Windows Server 2012.

Before getting started, please note:

- DO NOT use NIC Teaming on the server: NIC Teaming used with iSCSI is not supported by Microsoft.
- DO NOT use MC/S and MPIO together to connect a target. Microsoft does not support that configuration: *“Although it is technically possible to layer Microsoft MPIO and MCS together since they function at different layers in the Windows stack, Microsoft does not support the layering of MPIO and MCS due to complexities this can introduce if troubleshooting is needed on a configuration.”*
- See “Microsoft iSCSI Software Initiator Version 2.X Users Guide”
<http://download.microsoft.com/download/A/E/9/AE91DEA1-66D9-417C-ADE4-92D824B871AF/uGuide.doc>

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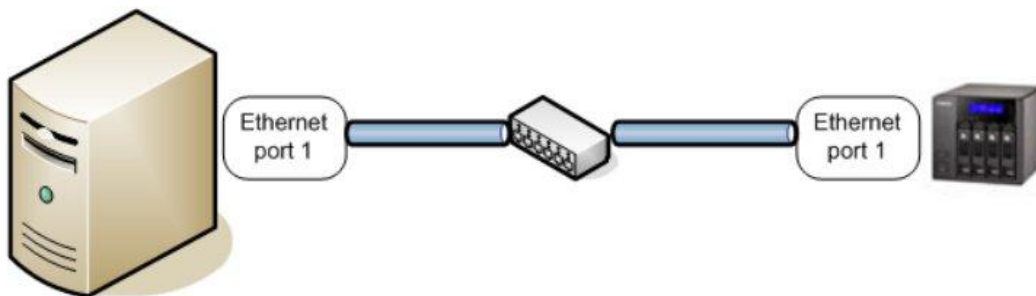
Two different configurations will be demonstrated in this application note.

- The first one is based on simple network architecture.
- The second one will use a more advanced configuration to allow failover and load balancing.

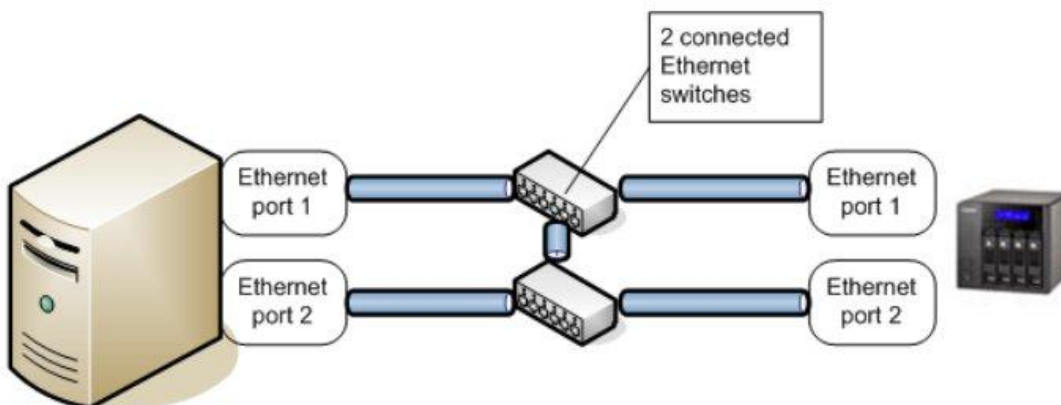
Physical Network architectures

1 network link

The simplest way to try MC/S is to have a simple connection with 1 physical interface on each side.



2 network links

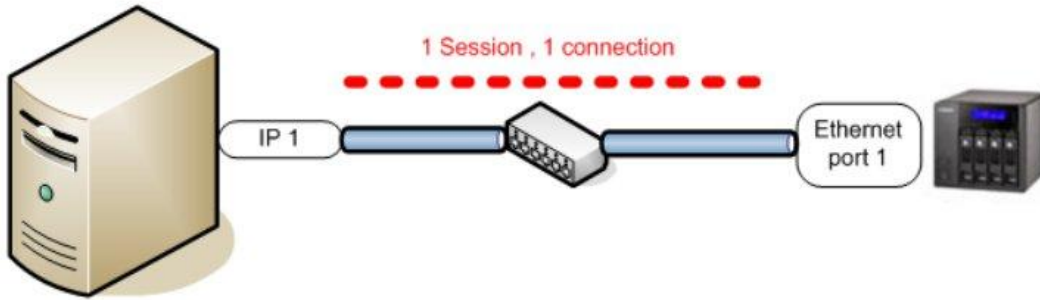


This architecture offers failover, load balancing and enhanced performance.

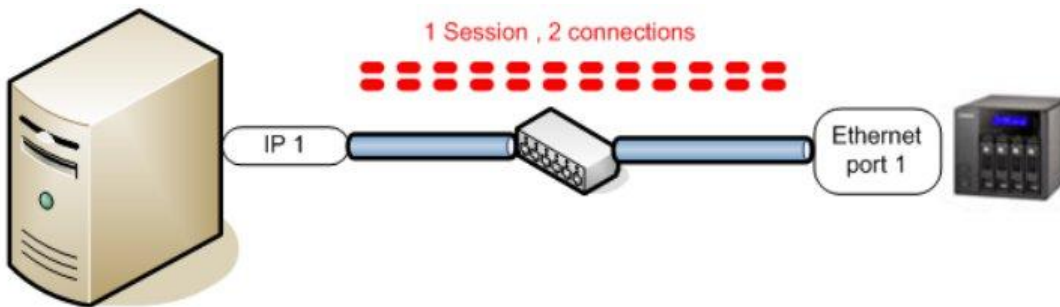
We will see in details how to set up the MC/S feature on this network architecture to allow failover.

MC/S over a single network interface

In this example, we have only one network connection on each side. Without MC/S, one connection to an iSCSI target would result in 1 session each time you click “logon” and connect to an iSCSI target. Each session is composed in this case with 1 CP connection. It would look like:

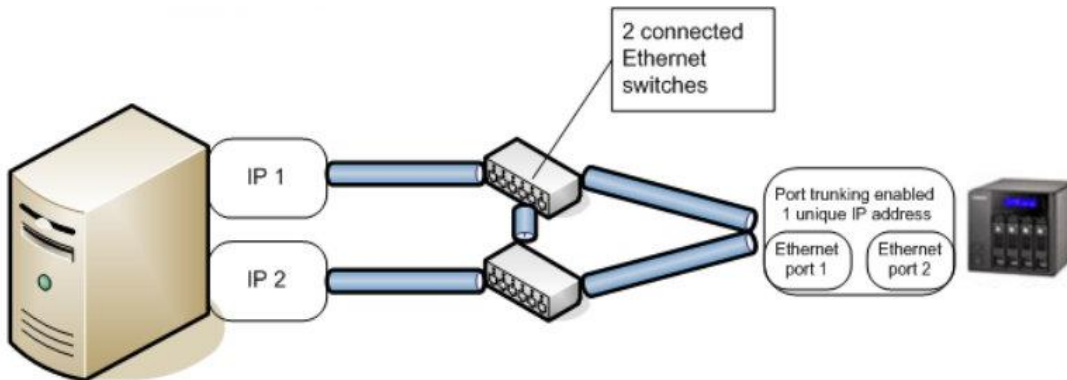


With MC/S, we can have more than 1 TCP connection for each session. That means you can logon to the target and add several connections for the same session, such as:



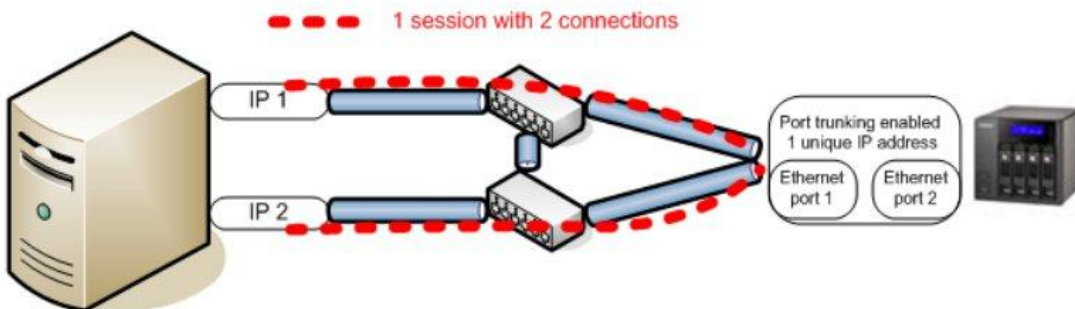
MC/S over a 2 network interfaces

MC/S can also provide failover. If your server has multiple network interfaces, it is possible to use MC/S in that purpose.



As seen previously, after an iSCSI logon, we can add TCP connections to the same session (this procedure will be explained in details later). When adding a TCP connection to a session, it is possible to specify the source interface. In that case, if we connect through the first interface, then add a connection through the second interface. The session will remain alive even if one on the network interface fails.

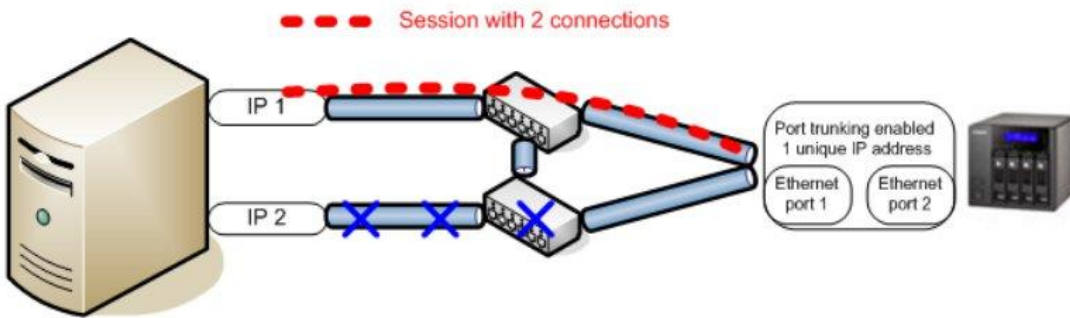
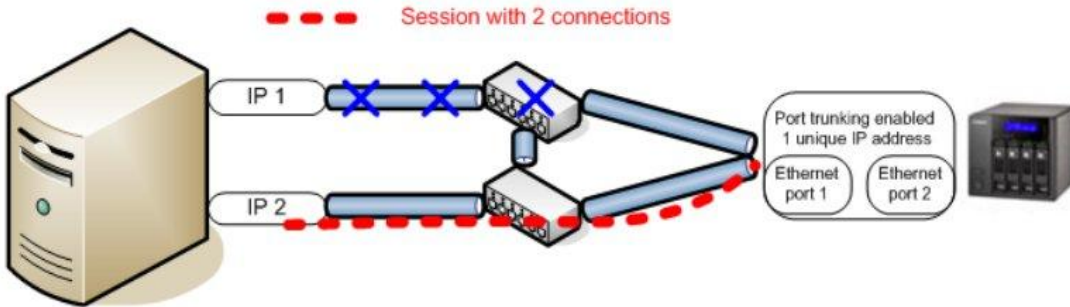
If your Turbo NAS has 2 network interfaces, you can enable failover mode (trunking mode) to allow failover on both sides.



Failures and failover concept

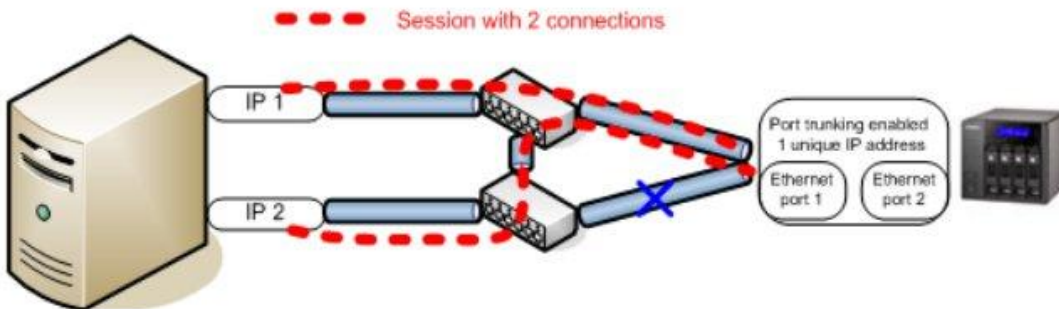
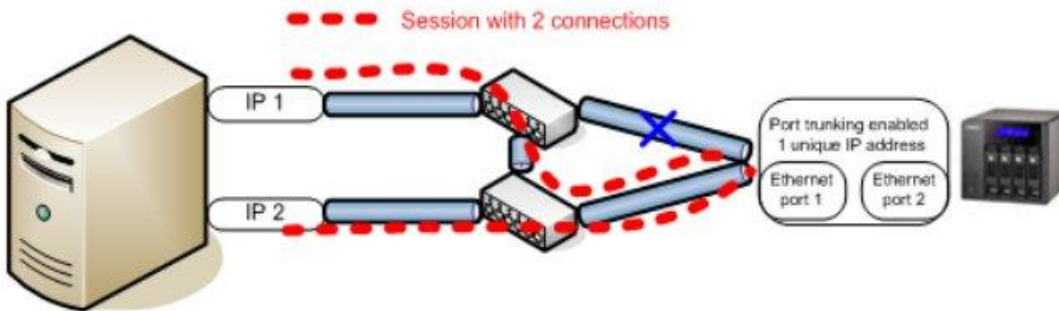
Handled by MC/S feature

If the cable or the switch linked to IP1 or IP2 fails, one of the 2 connections will fail, but the other connection will remain connected:



Handled by QNAP Trunking mode

If one of the cables linked to the Turbo NAS failed, the all path will remain UP, because it is protected by the QNAP port trunking mode:



Pre-requisites of using MC/S

- Have an existing iSCSI target created on the Turbo NAS (firmware version 3.2.0 or later).
- To allow full network failover, have trunking mode enabled on the Turbo NAS.

Set up

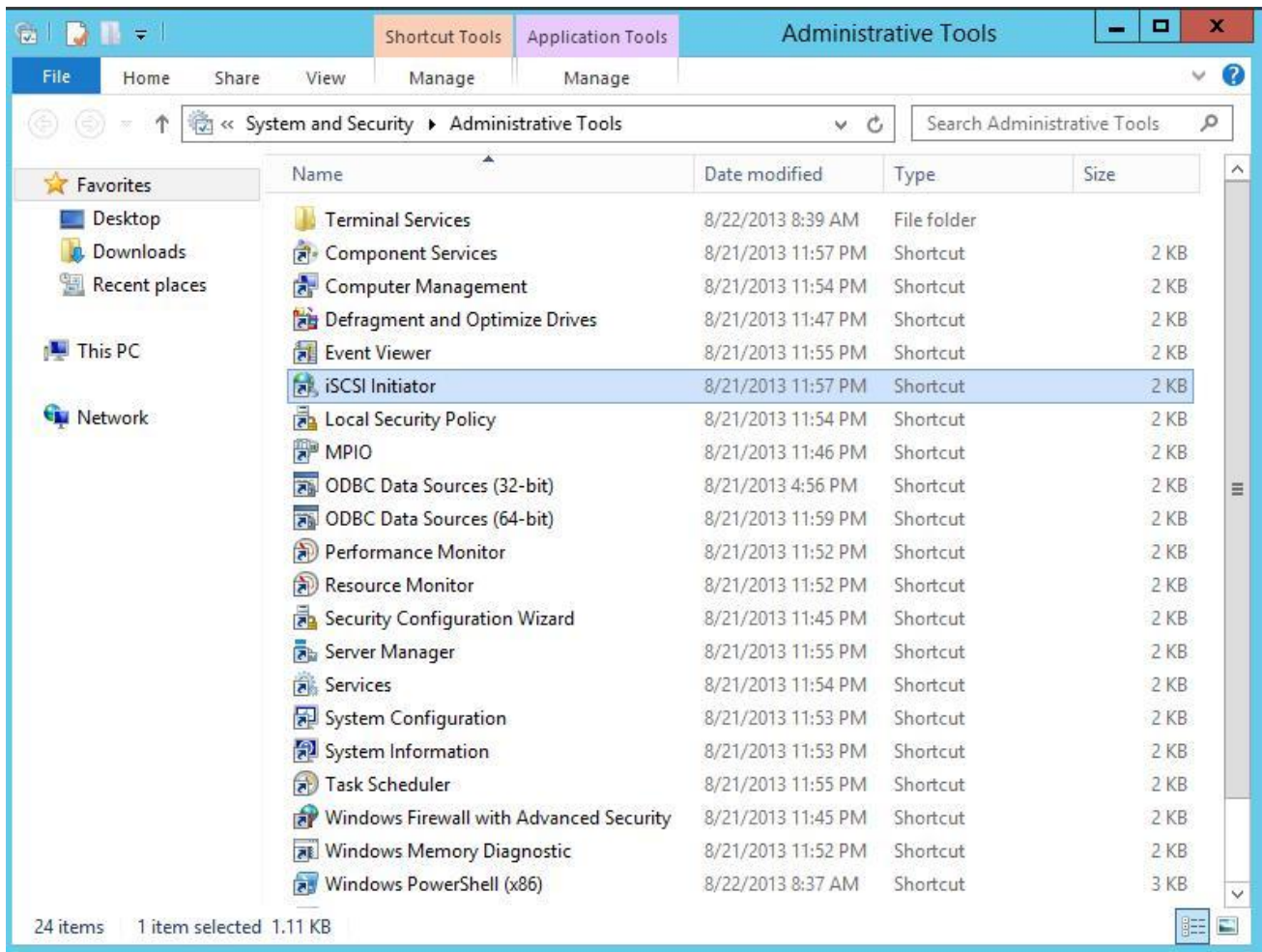
Set up an iSCSI target on your Turbo NAS

You can refer the online application note “How to create and use the iSCSI target service on the QNAP NAS” on http://www.qnap.com/i/en/trade_teach/

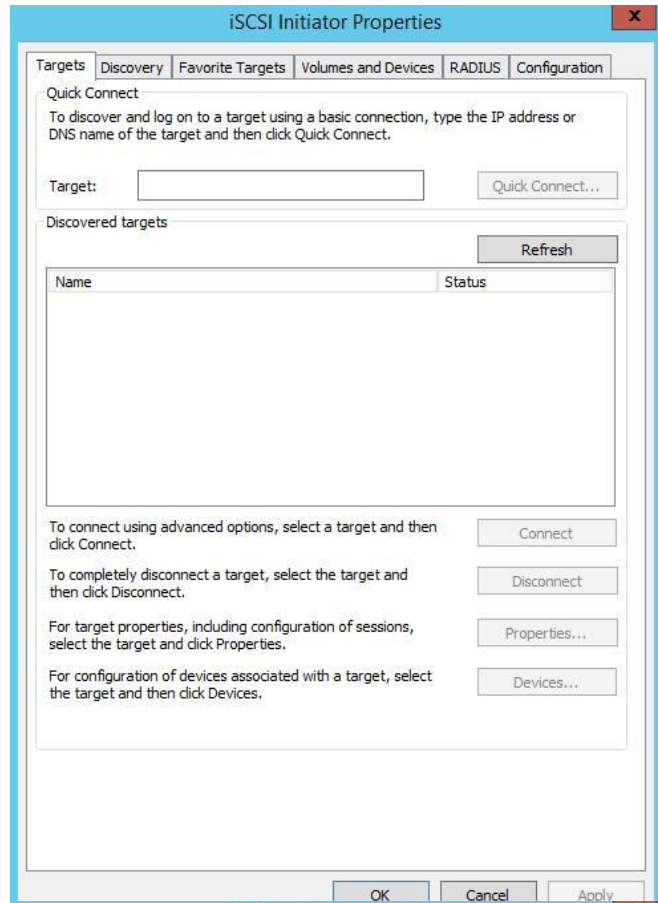
Connect to QNAP iSCSI portal

Once MPIO (Multipath I/O) is enabled on your server, you can add an iSCSI LUN with MPIO support, for ONLY one of your network cards:

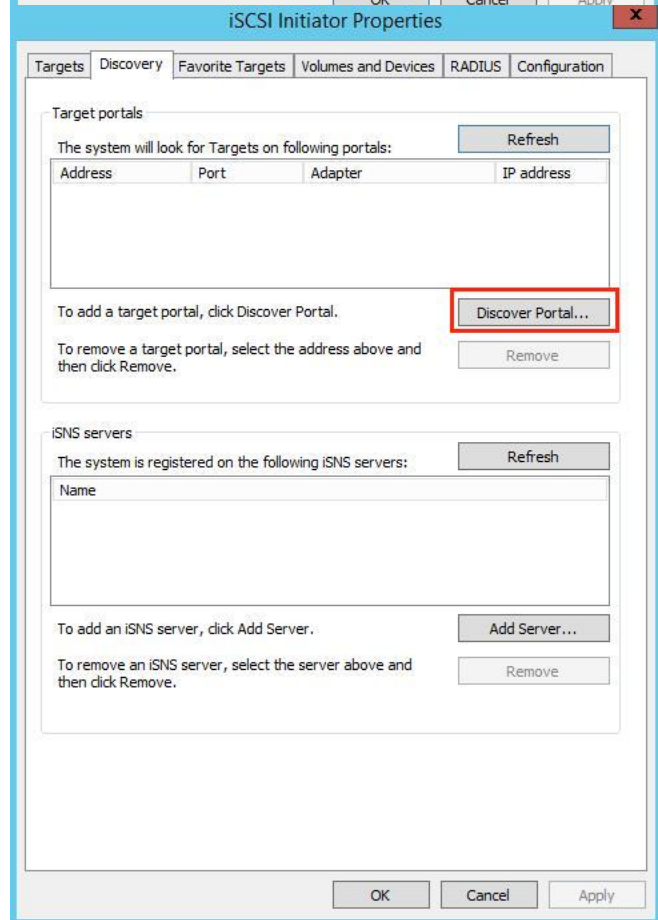
From the Administrative Tools, launch the iSCSI Initiator:



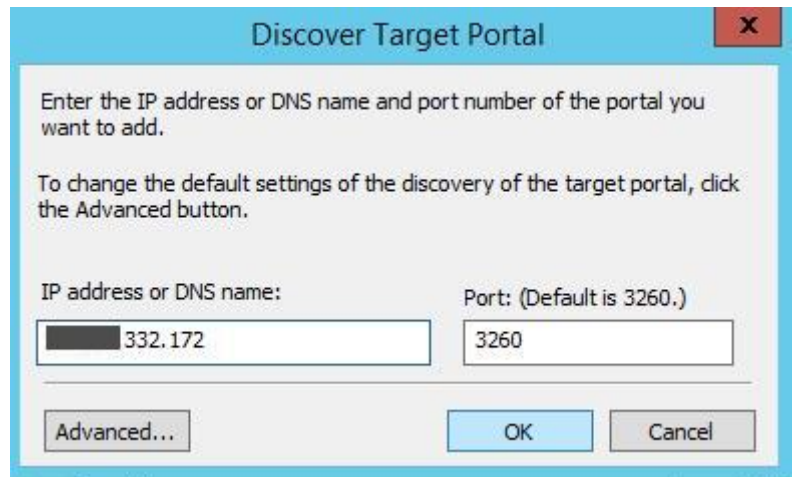
In this new window you will be able to connect the first path to your iSCSI target LUN.



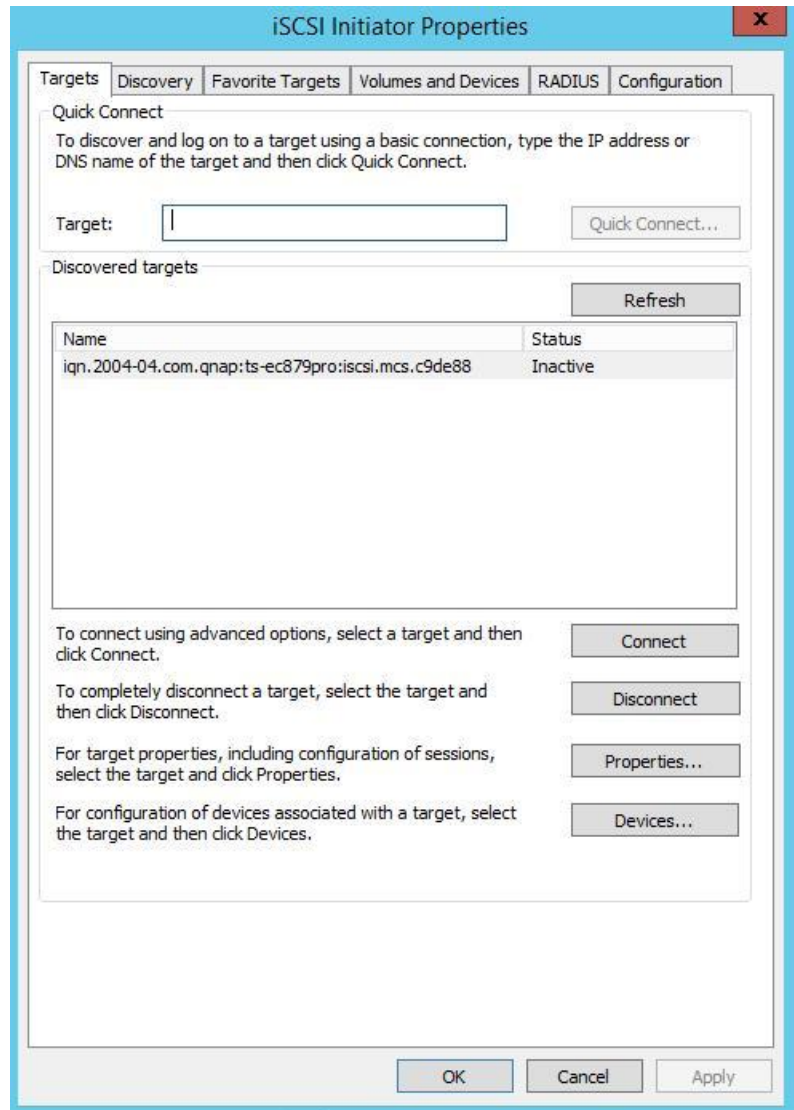
Click the "Discovery" tab, and then click "Add Portal" to add your Turbo NAS:



Enter the IP address or
DNS name of your
Turbo NAS and click “OK”.

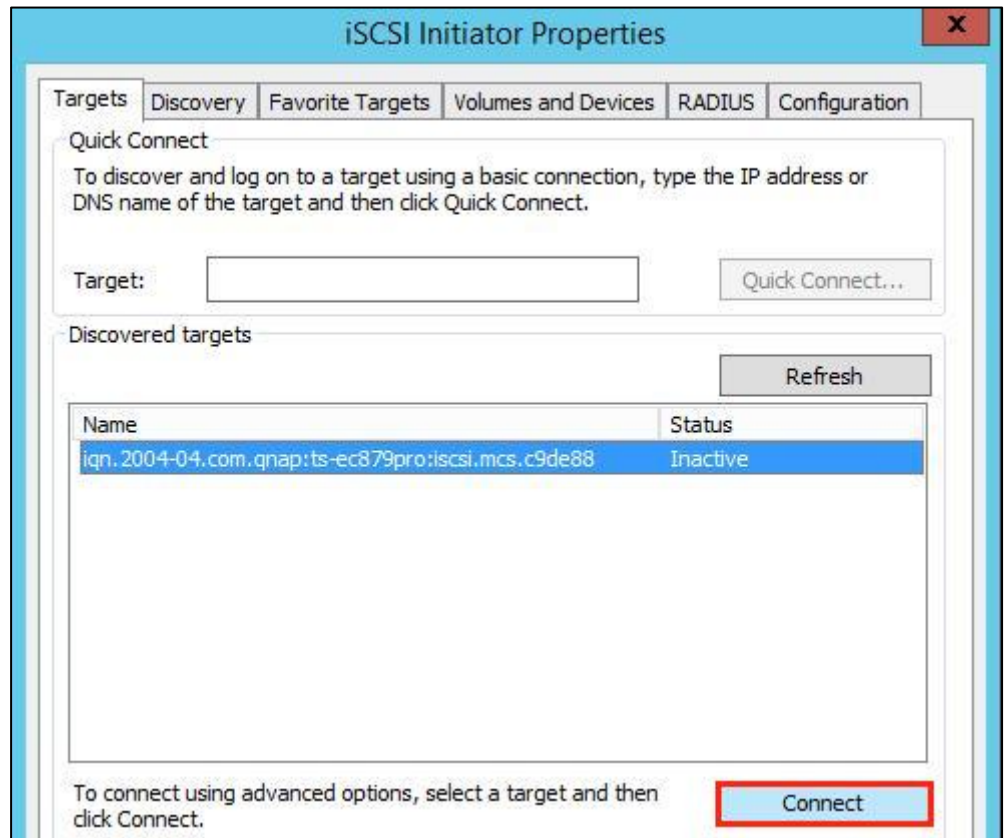


Return to the initiator
window; go to the
“Targets” tab.
You will see all the targets
on your Turbo NAS.



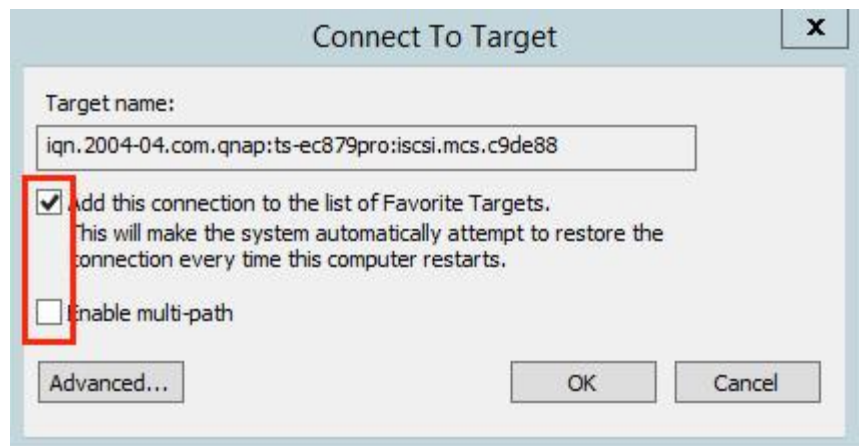
Connect to your iSCSI target

Select the target you want to connect to and click “Connect”



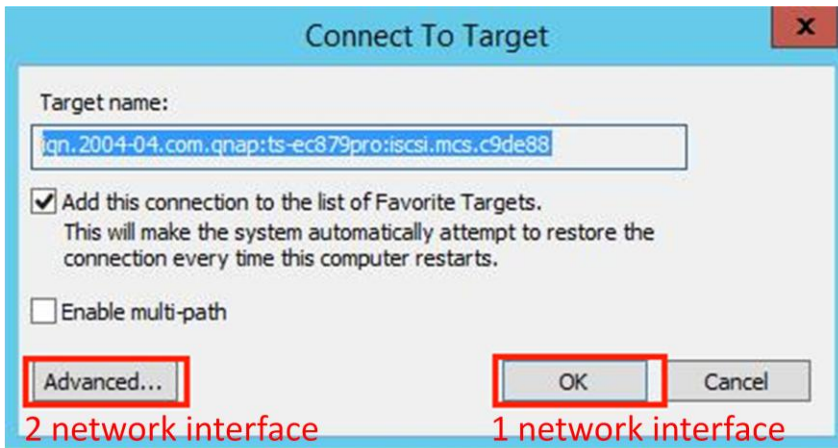
On the new window, check “Automatically restore this connection when computer starts” to ensure the iSCSI target will be connected when Windows starts up.

DO NOT check “Enable multi-path” .

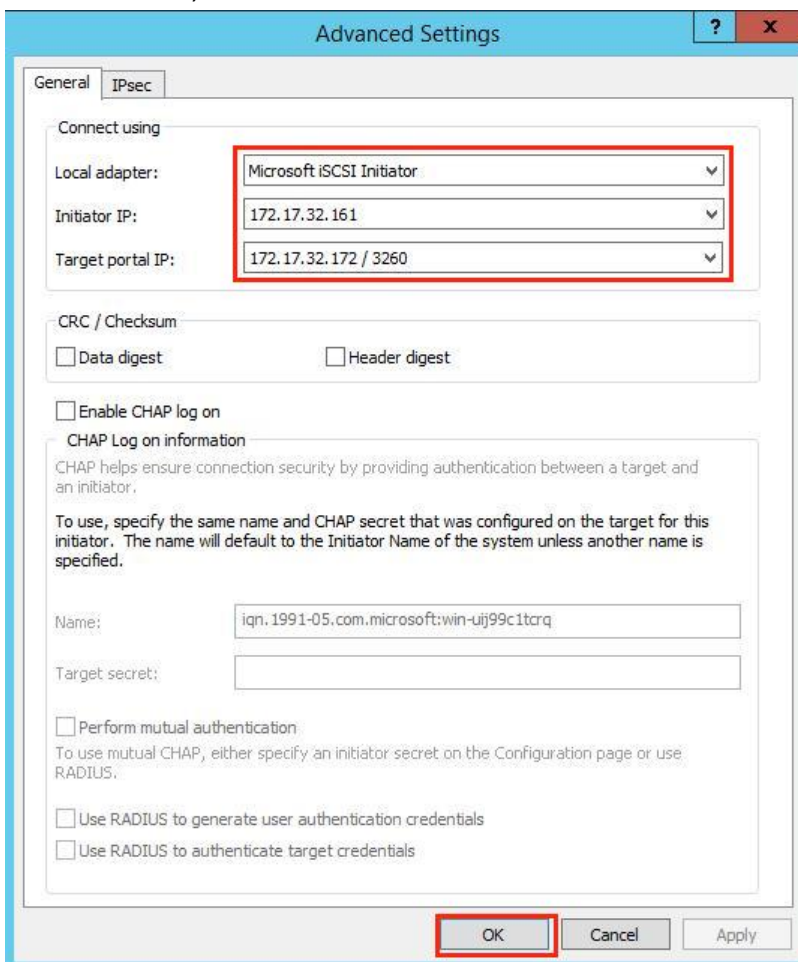


If you have only 1 network interface, click “OK”

If you have more than 2 network interfaces, click “Advanced”



In Advanced Settings you can set the specific target-initiator pair in one of the iSCSI networks ONLY by choosing the initiator, IP source and portal. Assuming we have 2 IP addresses: 172.17.32.161 and 172.17.32.175, we choose the first one:



Click “OK”

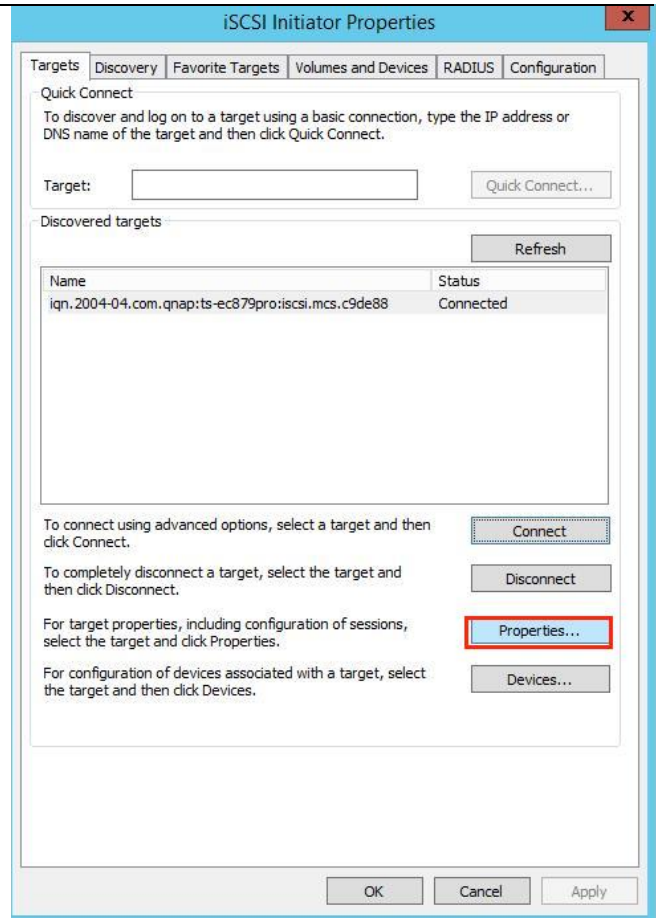
Click “OK” again.

Then, you can see your iSCSI target connected.

Add a second connection

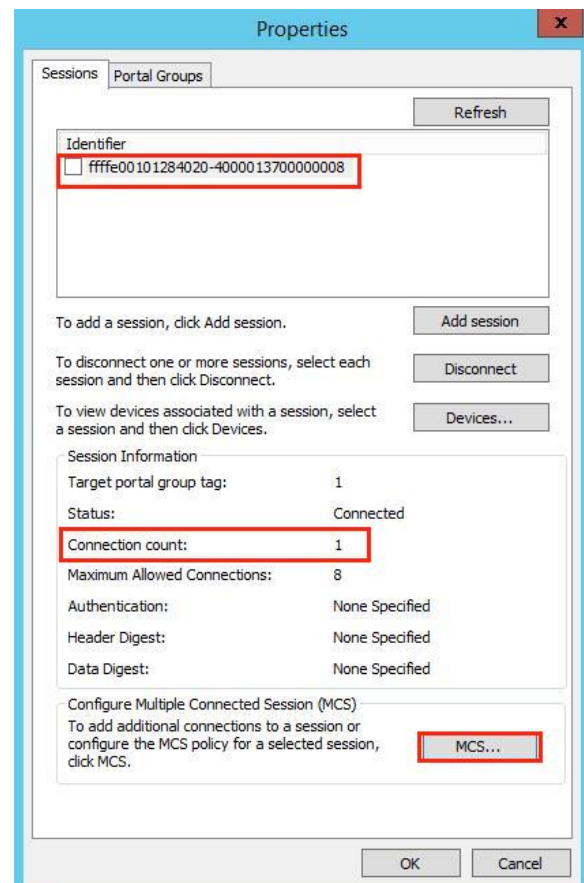
Once you are connected with the first connection, we can add the second TCP connection to the same iSCSI session.

To do so, click “Properties” after selecting the connected target.

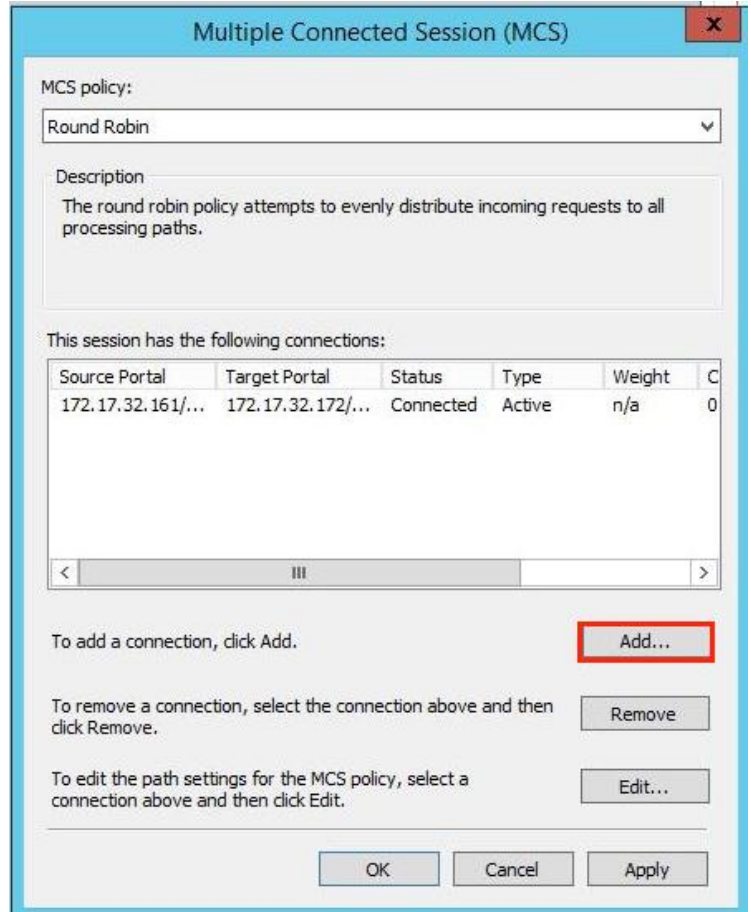


You can see on the next windows the session you have connected to before. You can also see that there is only 1 connection.

Click “MCS...” to add another connection.

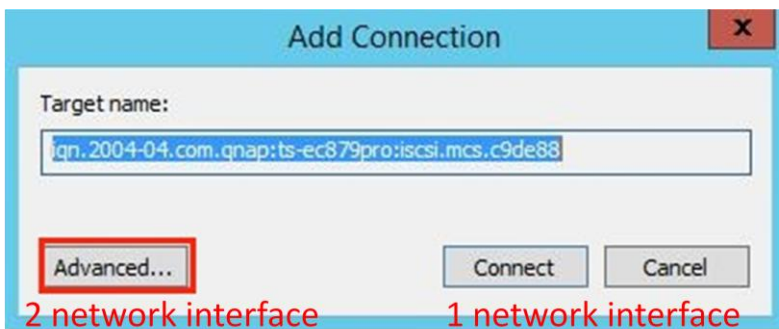


Click "Add"



If you have only 1 network interface, click "OK"

If you have more than 2 network interfaces, click "Advanced"



We have already connected the first IP, and we now choose 172.17.32.175 to connect to the second IP.

Click "OK".

Click "OK" again.

Advanced Settings

General IPsec

Connect using

Local adapter: Microsoft iSCSI Initiator

Initiator IP: 172.17.32.175

Target portal IP: 172.17.32.172 / 3260

CRC / Checksum

Data digest Header digest

Enable CHAP log on

CHAP Log on information

CHAP helps ensure connection security by providing authentication between a target and an initiator.

To use, specify the same name and CHAP secret that was configured on the target for this initiator. The name will default to the Initiator Name of the system unless another name is specified.

Name: iqn.1991-05.com.microsoft:win-uj99c1trq

Target secret:

Perform mutual authentication

To use mutual CHAP, either specify an initiator secret on the Configuration page or use RADIUS.

Use RADIUS to generate user authentication credentials

Use RADIUS to authenticate target credentials

OK Cancel Apply

You will see the second connection.

Multiple Connected Session (MCS)

MCS policy: Round Robin

Description

The round robin policy attempts to evenly distribute incoming requests to all processing paths.

This session has the following connections:

| Source Portal | Target Portal | Status | Type | Weight | C |
|-------------------|-------------------|-----------|--------|--------|---|
| 172.17.32.161/... | 172.17.32.172/... | Connected | Active | n/a | 0 |
| 172.17.32.175/... | 172.17.32.172/... | Connected | Active | n/a | 0 |

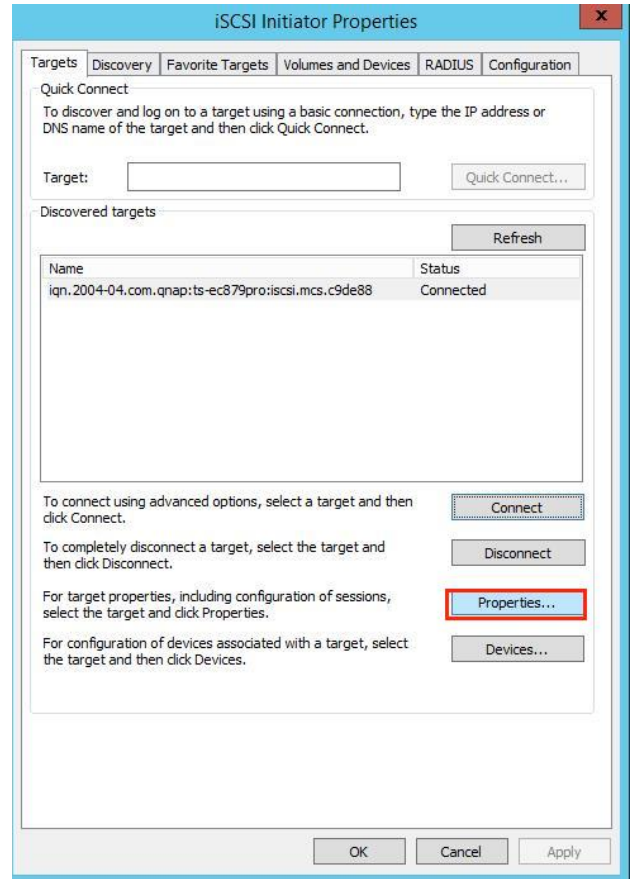
To add a connection, click Add. Add...

To remove a connection, select the connection above and then click Remove. Remove

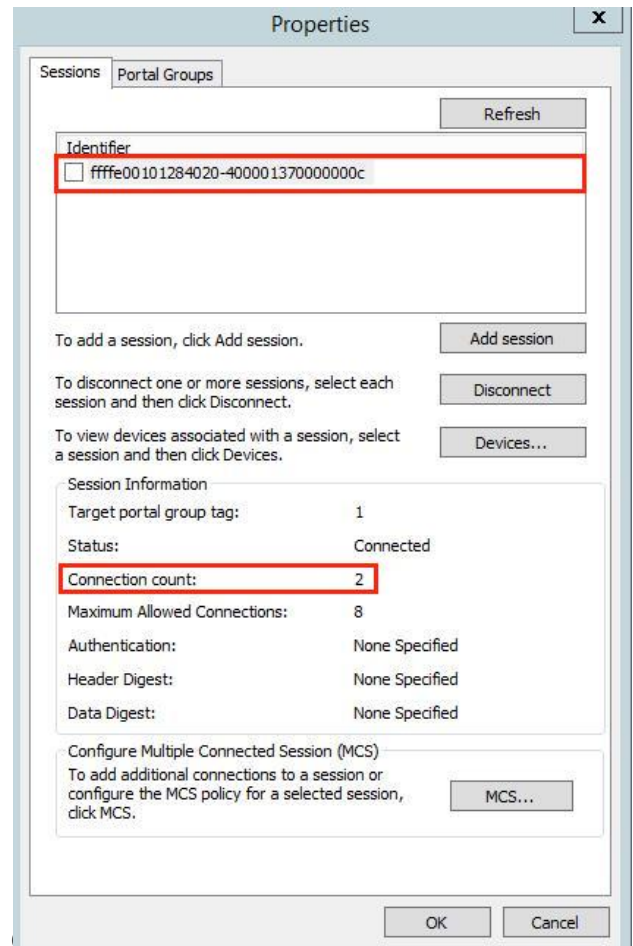
To edit the path settings for the MCS policy, select a connection above and then click Edit. Edit...

OK Cancel Apply

Click “Properties” in “Targets” tab.



In Properties, you will find one connected session and two connections.



Check the settings

You can also find those 2 connections by opening a command prompt window (cmd.exe) and use "netstat.exe".

If you have 2 network interfaces, we can see the 2 connections that you made from 2 different IP addresses.

| Proto | Local Address | Foreign Address | State |
|-------|---------------------|---------------------|-------------|
| TCP | 127.0.0.1:51490 | 127.0.0.1:51491 | ESTABLISHED |
| TCP | 127.0.0.1:51491 | 127.0.0.1:51490 | ESTABLISHED |
| TCP | 172.17.32.161:49282 | 172.17.32.161:49306 | ESTABLISHED |
| TCP | 172.17.32.161:49306 | 172.17.32.161:49282 | ESTABLISHED |
| TCP | 172.17.32.161:50935 | 172.17.32.172:3260 | ESTABLISHED |
| TCP | 172.17.32.161:50997 | 172.17.32.161:49282 | TIME_WAIT |
| TCP | 172.17.32.161:50999 | 172.17.32.161:49282 | TIME_WAIT |
| TCP | 172.17.32.161:51002 | 172.17.32.161:49282 | TIME_WAIT |
| TCP | 172.17.32.161:51009 | 172.17.32.161:49282 | TIME_WAIT |
| TCP | 172.17.32.161:51010 | 172.17.32.161:49282 | TIME_WAIT |
| TCP | 172.17.32.161:51017 | 210.61.248.241:80 | ESTABLISHED |
| TCP | 172.17.32.175:50971 | 172.17.32.172:3260 | ESTABLISHED |

If you only have one network interface, we can see the 2 connections that you made from the same IP address

```
PS C:\Users\Administrator> netstat -n
```

| Active Connections | | | |
|--------------------|---------------------|---------------------|-------------|
| Proto | Local Address | Foreign Address | State |
| TCP | 127.0.0.1:51490 | 127.0.0.1:51491 | ESTABLISHED |
| TCP | 127.0.0.1:51491 | 127.0.0.1:51490 | ESTABLISHED |
| TCP | 172.17.32.161:49282 | 172.17.32.161:49306 | ESTABLISHED |
| TCP | 172.17.32.161:49282 | 172.17.32.161:51029 | ESTABLISHED |
| TCP | 172.17.32.161:49306 | 172.17.32.161:49282 | ESTABLISHED |
| TCP | 172.17.32.161:51026 | 64.233.187.113:80 | TIME_WAIT |
| TCP | 172.17.32.161:51027 | 172.17.32.161:49282 | TIME_WAIT |
| TCP | 172.17.32.161:51028 | 210.61.248.241:80 | CLOSE_WAIT |
| TCP | 172.17.32.161:51029 | 172.17.32.161:49282 | ESTABLISHED |
| TCP | 172.17.32.161:51030 | 172.17.32.172:3260 | ESTABLISHED |
| TCP | 172.17.32.161:51031 | 172.17.32.172:3260 | ESTABLISHED |

Application

In the “Server Management” console, go to “All Servers” > “File and Storage Services” > “Disks”. You can see the newly-added disks as designated.

The screenshot shows the QNAP Server Manager interface. The breadcrumb navigation is "File and Storage Services > Volumes > Disks". The main content area is titled "DISKS" and shows "All disks | 3 total". A table lists the disks:

| Number | Virtual Disk | Status | Capacity | Unallocated | Partition | Read Only | Clustered | Subsystem | Bus Type | Name |
|---------------------|--------------|---------|----------|-------------|-----------|-----------|-----------|-----------|----------|------|
| WIN-UIJ99C1TCRQ (3) | | | | | | | | | | |
| 2 | | Offline | 10.0 GB | 10.0 GB | Unknown | ✓ | | | iSCSI | QNA |
| 0 | | Online | 233 GB | 0.00 B | MBR | | | | SATA | WDC |
| 1 | | Online | 492 MB | 0.00 B | MBR | | | | USB | USB |

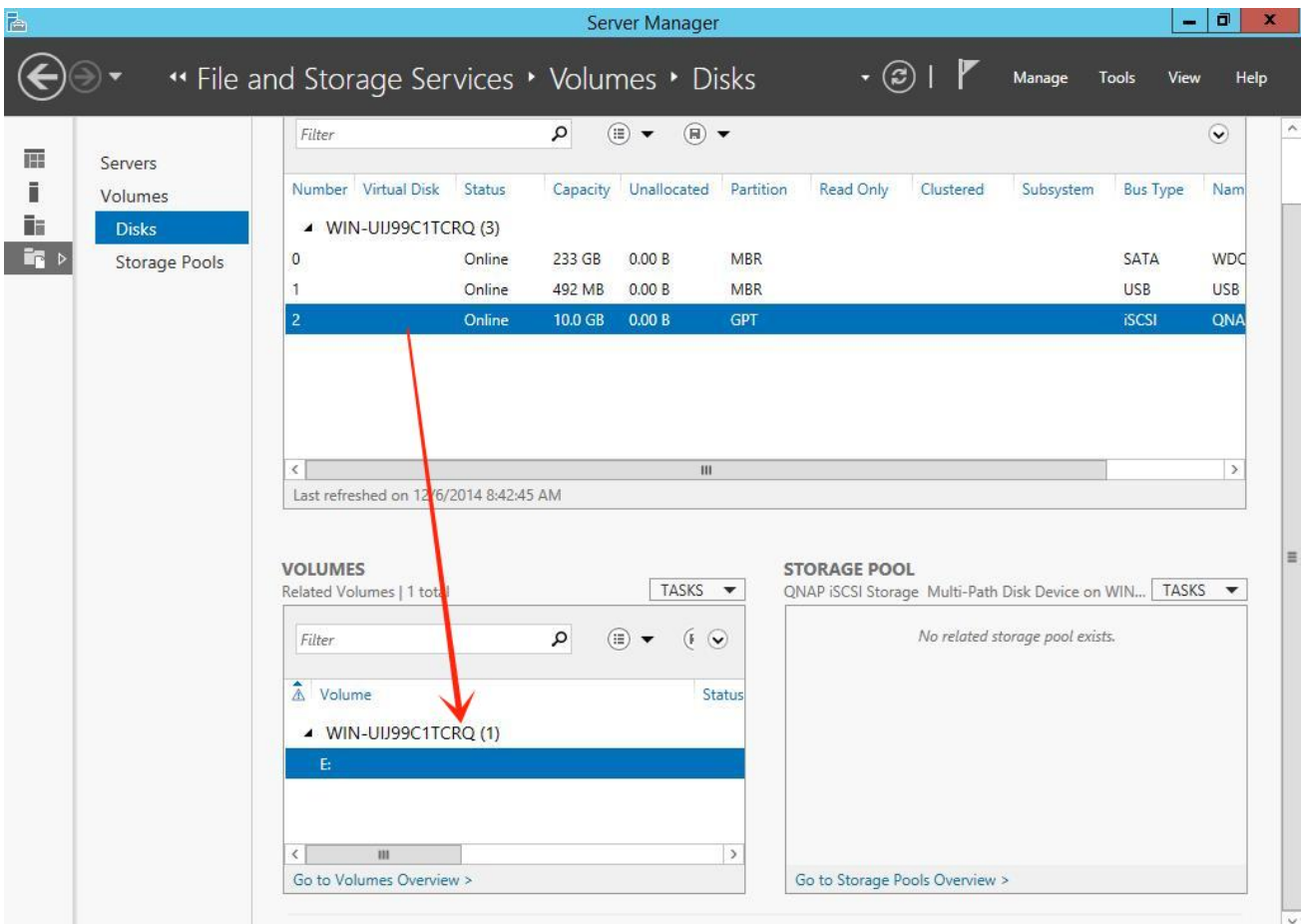
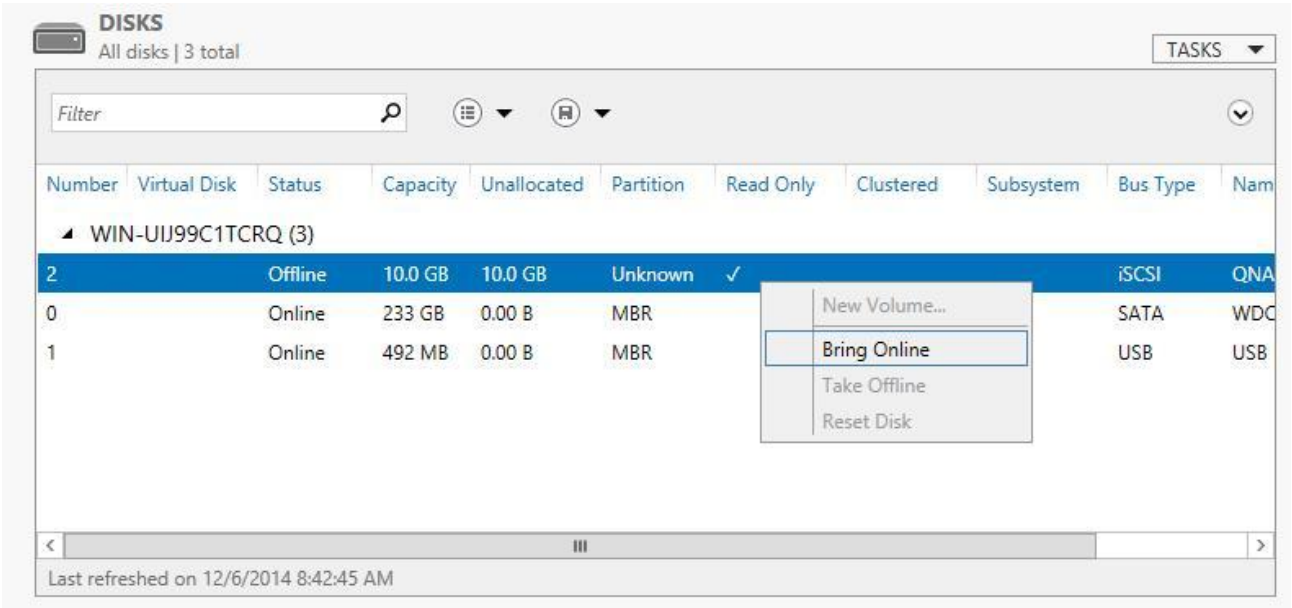
Below the table, it says "Last refreshed on 12/6/2014 8:42:45 AM".

The "VOLUMES" section shows a message: "Disk is Offline".

The "STORAGE POOL" section shows a message: "No related storage pool exists.".

The Windows taskbar at the bottom shows the time as 9:08 AM on 12/6/2014.

- You can now format the disk, bring it online, and create a volume for it

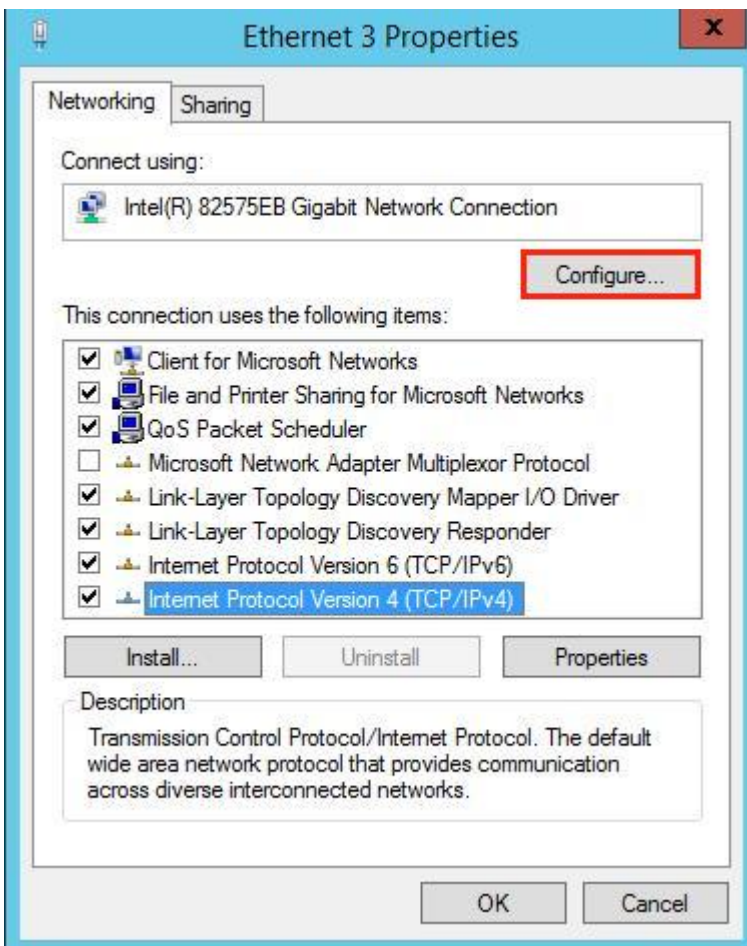


Jumble Frame

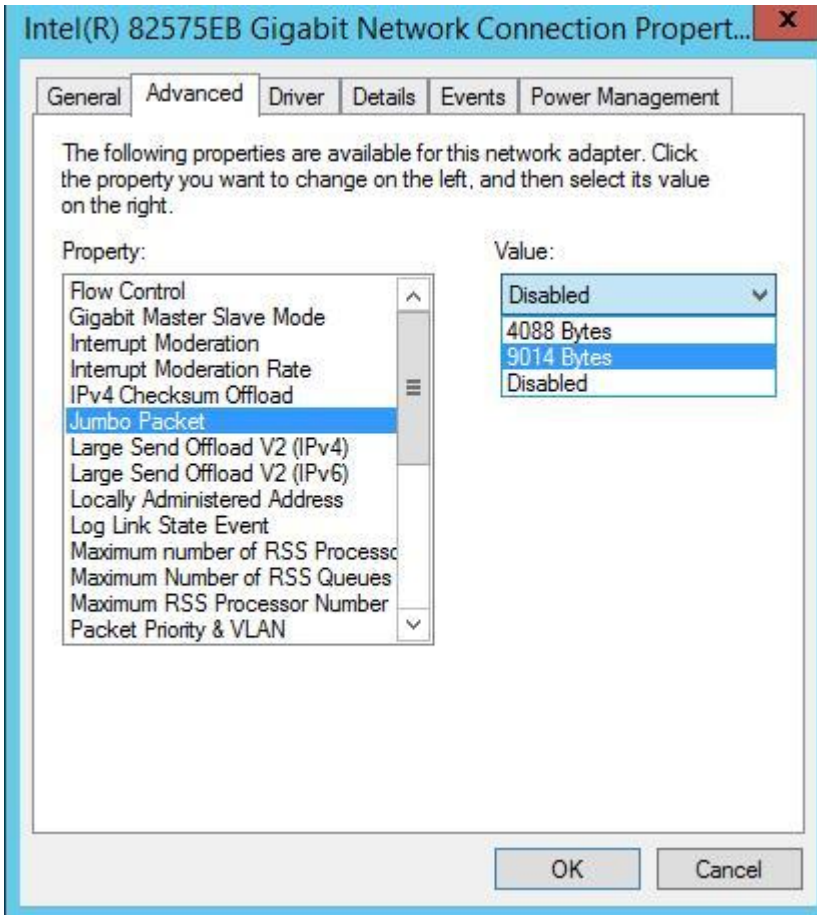
According to the Microsoft iSCSI Software Initiator Version 2.X Users Guide, you can enable Jumbo Frame (jumbo packet) on all your equipment to enhance performance.

“if Jumbo Frames if supported in your network infrastructure. Jumbo Frames can be used to allow more data to be transferred with each Ethernet transaction and reduce the number of frames. This larger frame size reduces the overhead on both your servers and iSCSI targets. For end to end support, each device in the network needs to support Jumbo frames including the NIC and Ethernet switches.”

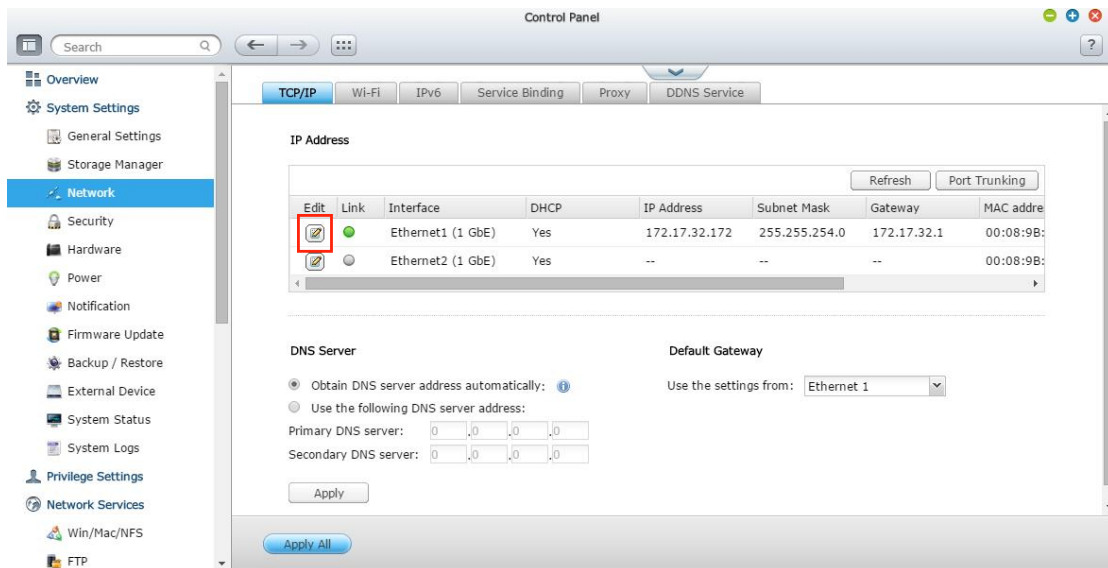
In Windows Server 2012, click “Configure” in your network interface properties



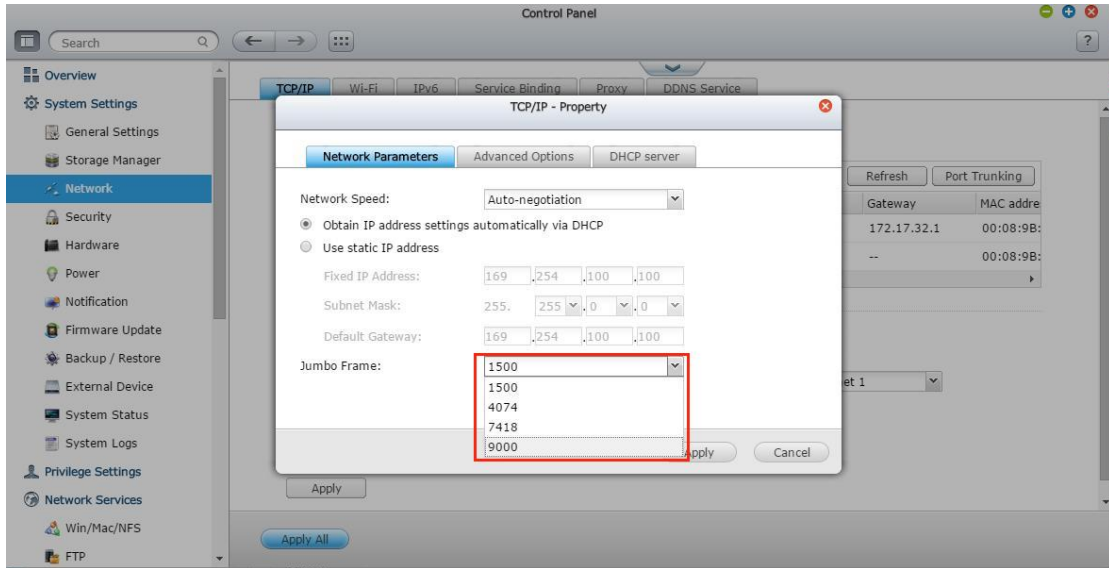
Go the “Advanced” tab, find “Jumbo Packet” in menu and specify its speed in Value.



On your Turbo NAS, go to “Control Panel” > “System Settings” > “Network”. Find the interface used to connect to Window Server 2012 and click the “Edit” icon



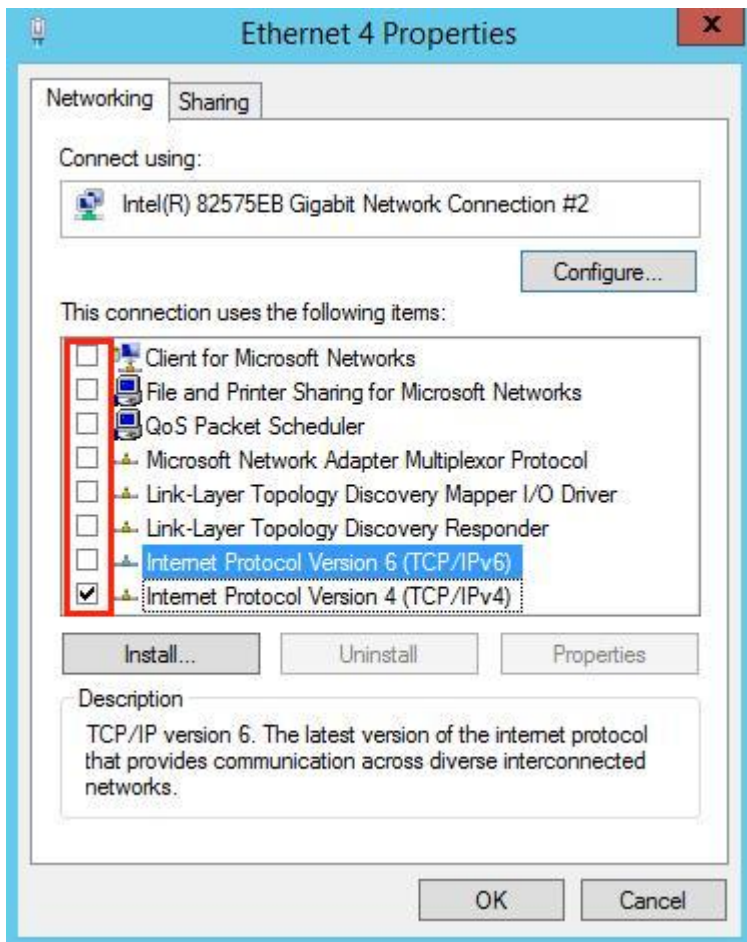
In the “Network Parameters” tab, specify the speed in the “Jumbo Frame” menu.



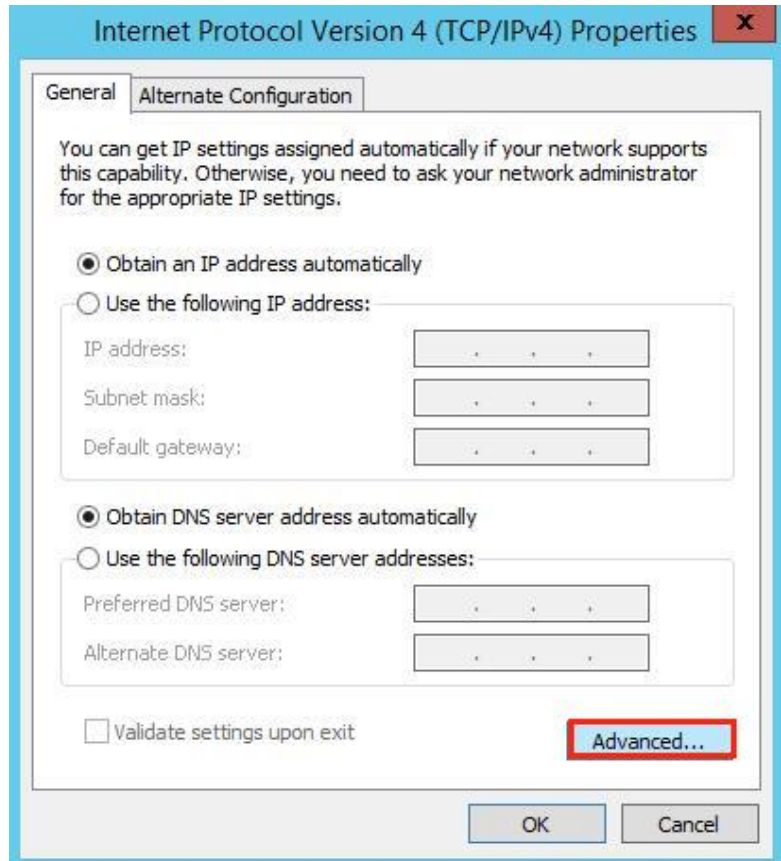
Unbind Unnecessary Protocols

You can also unbind unnecessary protocols from your iSCSI NICs to optimize your connection. This should only be done on DEDICATED network interfaces that are used only for iSCSI.

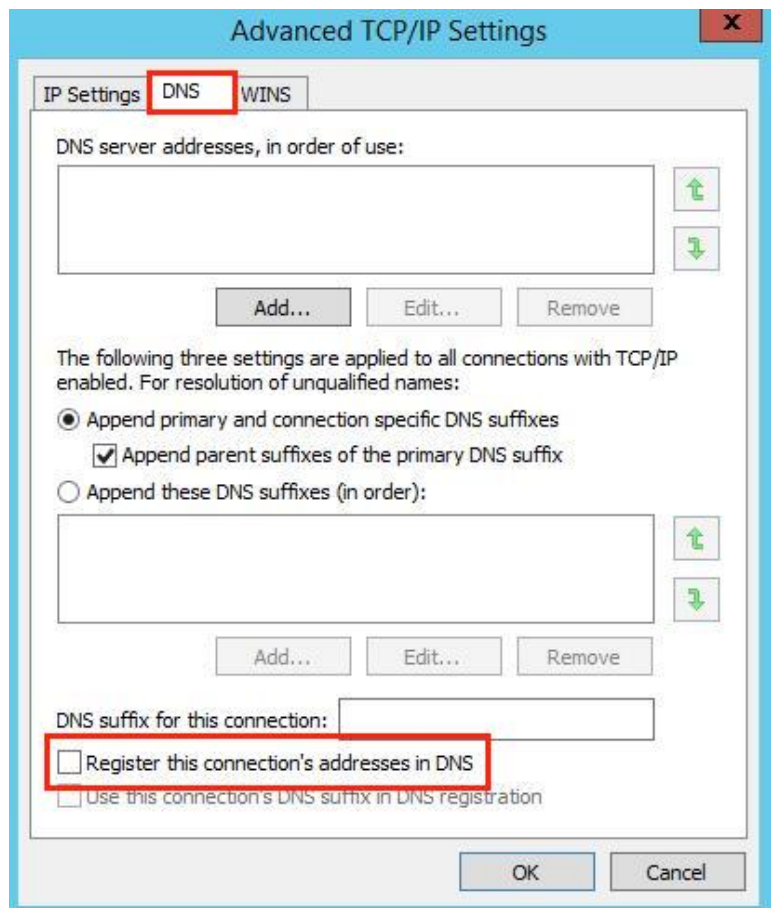
- Clear the checkbox for “Client for Microsoft Networks”
- Clear the checkbox for “File and Printer Sharing for Microsoft Networks”
- Clear the checkbox for “QoS Packet Scheduler”
- Clear the checkboxes for the “Link-Layer Topology Discovery Mapper I/O Driver”
- Clear the checkboxes for the “Link-Layer Topology Discovery Responder”
- Clear the checkboxes for the “Internet Protocol Version 6 (TCP/IPv6)”



Double-click "Internet Protocol Version 4 (TCP/IP4)"; click "Advanced" in the "General" tab



Go to the "DNS" tab and clear the checkbox for "Register this connection's addresses in DNS"



Go to the “WINS” tab and clear the checkbox for “Enable LMHOSTS Lookup” and select the radio button for “Disable NetBIOS over TCP/IP”

