

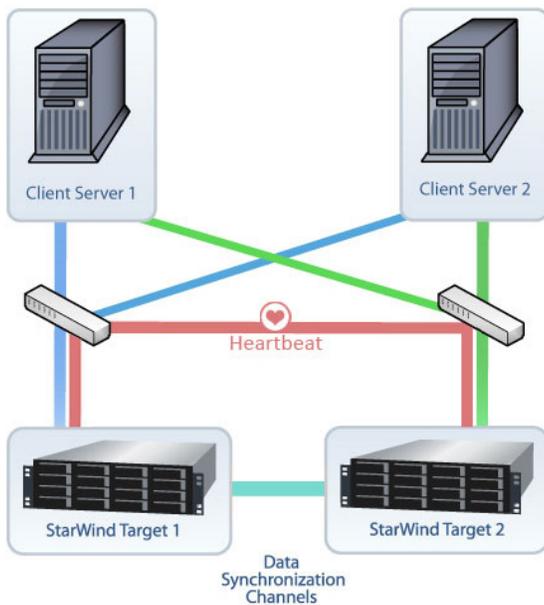
# BENCHMARKING SERVERS GUIDE

## TEST NETWORK PERFORMANCE:

NB: User should perform network benchmarking and tuning in order to get the maximum throughput for iSCSI SAN environment. The tests need to be performed before putting StarWind iSCSI SAN into a live production environment in order to have pure test results and avoid environment's reconfiguration.

StarWind Software has no strict recommendations for the network benchmarking utilities which should be used, however the most common network benchmarking tools according to StarWind Software's clients are NTTTCP and IPerf. The most common disk benchmarking tool is IOMeter.

The diagram bellow shows an optimal and recommended configuration for StarWind HA based SAN infrastructure.



## FOLLOWING LINKS SHOULD BE CHECKED:

1. Synchronization link between StarWind 1 and StarWind 2.
2. The link between StarWind 1 and client 1.
3. The link between StarWind 1 and client 2.
4. The link between StarWind 2 and client 1.
5. The link between StarWind 2 and client 2.

Logical understanding of networking assumes that all links should have almost identic performance; otherwise HA SAN will work at the performance of the slowest link.

Results less than 80% of the links saturation (even if only one) will not be suitable for HA implementation. StarWind HA does not use all the available bandwidth. In case of bad network test results you should fix the link before implementing HA.

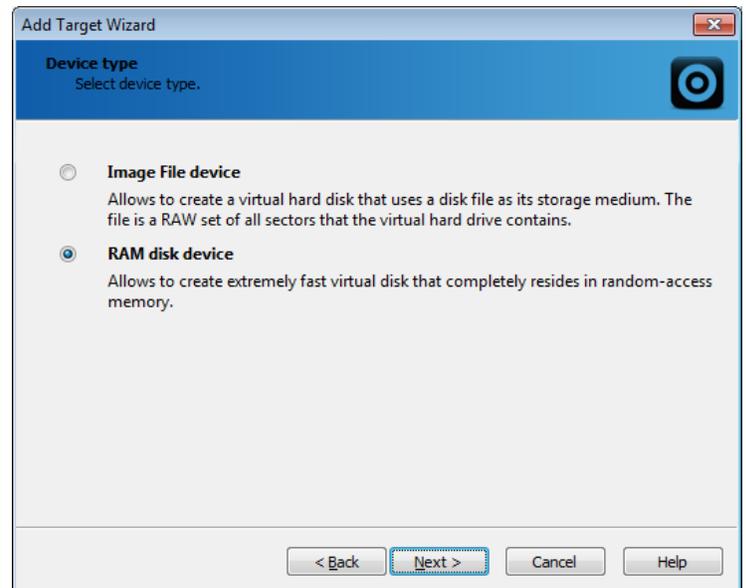
Send and receive tests need to be performed on each server.

Please refer to the appropriate vendor technical documentation when using network benchmarking tools.

## SCSI COMMANDS THROUGHPUT TESTING:

Once you have achieved optimal results you can proceed to next step which is checking the SCSI commands throughput. This can be performed by measuring the performance of an iSCSI connected RAM device. RAM disk is based on the server's local RAM thus it will have the performance exceeding the network speed, as a result user can easily see what is the peak performance of the iSCSI throughput for the particular link.

First, create a RAM disk device in StarWind management console by opening Add target Wizard and going Hard Disk→Basic Virtual.



Connect the RAM disk device to the server via the link you would like to benchmark.

Next Step is to measure the performance of the device.

Use IOMeter from the client side, choose the following Access Specifications: 64kb, 100% Write, 100% Random.

StarWind Support team can provide you with preset IOMeter configuration file.

Same test needs to be performed on Client 2.

- IOMeter test results charts should not be lower than the results of the network benchmarking.

**IMAGE FILE DEVICE TESTING:**

Once you have reached optimal results with RAM disk device you can check the performance of an image files target.

First, create an Image file device:

Open the Add target Wizard and go to Hard Disk→Basic Virtual→Image File device→Create new virtual disk.

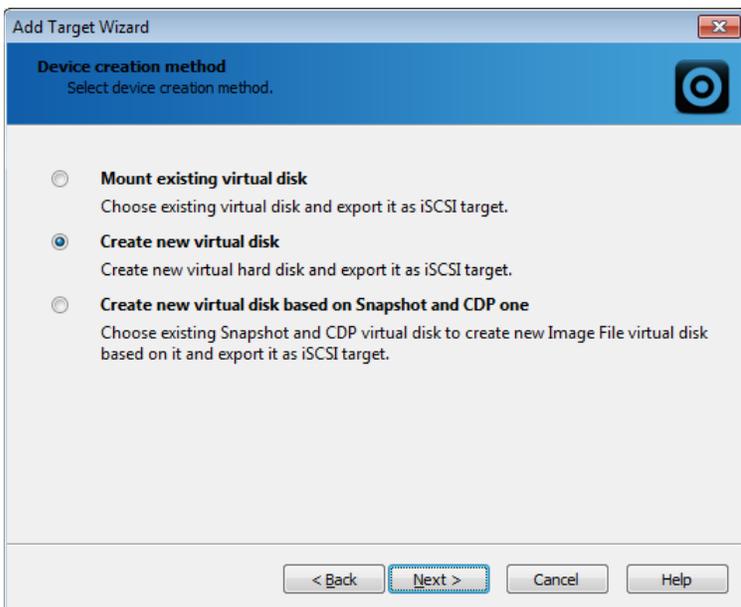
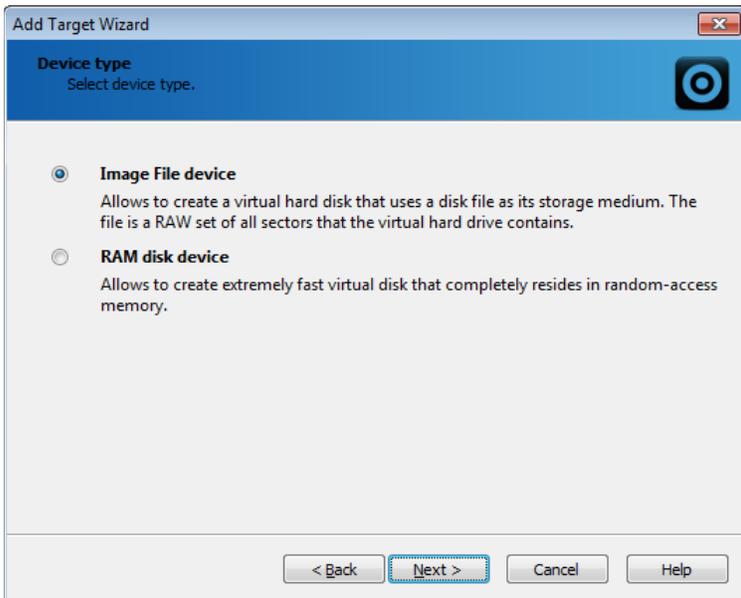


Image file device used for testing needs to be at least 2GB. Device caching mode to use for benchmarking can be normal or write-back. Write-back caching will increase the performance.

Once the device is created connect it to client 1.

Use IOMeter to test the performance. Access specifications are following: 16kb, 32kb, 64kb; 100% Read, 100% Write, 50/50 Read/Write; 100% Sequential, 100% Random.

Same test needs to be performed on client 2.

- Tests results of the write-back cached image file device are usually an 80-95% speed for the GbE channel. If using 10GbE network interfaces the performance will be 110-120% of the disk array's performance or 80-95% if the disk array is faster than the network.

Depending on the network, disks performance and configuration, the Image file device performance can be less of the network performance.

**IN CASE OF SIGNIFICANT DIFFERENCE YOU SHOULD CHECK WHAT CAN BE CAUSING THESE:**

- Firewalls
- Jumbo frames
- Antivirus
- Improper Stripe Size in RAIDs.

**HA DEVICE TESTING:**

For creating HA device please refer to the appropriate technical document in the embedded help file.

Following tests are based on fact of using a recommended configuration, as shown on the diagram in the beginning of this document.

HA device performance directly depends on your network and disks.

HA device performance will not be higher than your network and disks performance.

MPIO policy on the client side directly affects the HA device performance, "Round Robin" provides better results than "Failover only" (fixed path).

Caching highly increases the performance. It is recommended to use a minimum of 512MB for cache, in write-back mode (increases write speed) or in write-through mode (increases read performance).

To test HA speed a customer has to mount the HA volume to the client server and run test from and to this VMA.

**THE FOLLOWING TESTS MUST BE PERFORMED:**

1. Use IOMeter to measure the HA volume performance from the both clients and with different MPIO policy.
2. Use NNTTTC (or iPerf) to measure the network performance. In both directions.
3. Use network diagnostic tools to check the throughput over the sync channel.
4. The link between both StarWind and ESX server.

Taking into account that HA is an array of two disks connected over the network and performing permanent real time synchronization it is clear that performance of the HA device will be lower than the performance of the network and disks. Best practice configuration does deliver 40-80MB/s on a single Gigabit Ethernet channel.

Test results with the disk performance lower than 35% of the practical network throughput are considered as low performance issue and can be forwarded to StarWind Support Department after performing the needed tests and troubleshooting with test's results attached.

**ABOUT RAIDS:**

Recommended RAID for implementing an HA are RAID 1, 0 or 10, RAID 5 or 6 are not recommended due to low write performance.

The performance of a RAID array directly depends on the Stripe Size used. There are no exact recommendations of which stripe size to use. It is a test-based choice. As best practice we recommend at first step to set recommended by vendor and run tests. Then set a bigger value and run tests again. In third step set a smaller value and test again. These 3 results should guide you to the optimal stripe size value to set. In some configuration smaller stripe size value like 4k or 8k give better performance and in some other cases 64k, 128k or even 256k values will give better performance.

Performance of the HA will depend on the performance of the RAID array used. It's up to the customer to determine the optimal stripe size.

NB: We do not recommend the use of software RAID solution to be base of an HA volume.

**TROUBLESHOOTING:**

Basic troubleshooting advices in case of bad performance:

- Check that all firewalls have 3260 and 3261 open. (In some cases after Windows update Firewalls turns on automatically)
- Antivirus can be the reason of low performance.
- Jumbo frames can increase performance in most cases, however in many cases they can be the reason of bad performance. Customer has to test performance both using Jumbo frames (with different sizes) and without jumbo frames. Jumbo frames (if used) have to be enabled in all NICs, switches and client's sides. Check with your hardware vendor to be sure that your networking hardware does really support Jumbo Frames.
- Widespread NIC teaming and bonding practice provides higher performance, but not in all cases. This is another point that should be checked and tests should be performed both with and without the use of NIC teaming or bonding.

**ABOUT STARWIND**

Since 2003, StarWind has been a pioneer in the iSCSI storage industry and has been the solution of choice for thousands of global customers in over 50 countries, from SMBs, to governments, and to Fortune 1000 clients.

US Headquarters  
40 Mall Rd.  
Burlington, MA 01803  
+1-817-449-7717 Main  
+1-817-507-5845 Fax

EMEA and APAC  
+44 (0) 207 193-6350  
+44 (0) 07 193-6727  
Email:  
[sales@starwindsoftware.com](mailto:sales@starwindsoftware.com)

USA and LATAM:  
+1-817-449-7717 Main  
+1-817-507-5845 Fax  
Email:  
[sales@starwindsoftware.com](mailto:sales@starwindsoftware.com)