

StarWind Virtual SAN[®]

Configuring Log-structured Write Back-Cache (LSWBC) HA device

2024

TECHNICAL PAPERS



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About StarWind

StarWind is a pioneer in virtualization and a company that participated in the development of this technology from its earliest days. Now the company is among the leading vendors of software and hardware hyper-converged solutions. The company's core product is the years-proven StarWind Virtual SAN, which allows SMB and ROBO to benefit from cost-efficient hyperconverged IT infrastructure. Having earned a reputation of reliability, StarWind created a hardware product line and is actively tapping into hyperconverged and storage appliances market. In 2016, Gartner named StarWind “Cool Vendor for Compute Platforms” following the success and popularity of StarWind HyperConverged Appliance. StarWind partners with world-known companies: Microsoft, VMware, Veeam, Intel, Dell, Mellanox, Citrix, Western Digital, etc.

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IMPORTANT NOTE: Starting from 14869 build, the LWC (LSWBC) feature was excluded and deprecated. During the update, all LSWBC devices will be automatically converted to image devices without cache with RAM-based synchronization journals (for HA devices). See more information in the release notes:
<https://www.starwindsoftware.com/release-notes-build>

Introduction To Log-Structured Write-Back Cache (Lswbc)

Log-structured Write-Back Cache (LSWBC) is a disk storage feature developed for optimizing I/O performance. Data is first written to the RAM cache. Once the cache gets full or some deadline comes, an application finishes the log page that contains both metadata and the written data itself. Log segment flush starts from simply issuing an asynchronous write request to the cache-disk. Once it is finally written to a persistent cache device, no data will be lost in the event of server failure. Then, the log segment finally migrates to the underline storage.

In case of both StarWind servers malfunction, the full synchronization process will be initialized on all devices without LSWBC (follow the [link](#) to get more information). But, if the devices are configured with the Write Log feature, all the recent write operations will be identified. In this way, the feature enables to avoid the full synchronization process during data integrity restoration after node or cluster failures.

Log-structured Write-Back Cache requirements:

- The standard scenario implies using HDD drives as the underlying storage and SSD drives as the storage for a cache-disk.
- To collect RAM cache files and their metadata, StarWind requires at least 3GB of RAM per 1TB of storage. In case of the long-term peak loads, required RAM can be over-provisioned.
- For cache-disk, StarWind service needs at least 16 GB of storage, but it can grow up to 20% of the overall HA device size. In case of the long-term peak loads, cache-disk size can be over-provisioned. Size of the storage available for Write log parameter files varies from 10% to 20% of the overall underlying storage capacity.

This guide is intended for StarWind users who would like to configure the StarWind Virtual SAN solution. It provides the detailed instructions on how to set up the Log-structured Write-Back Cache feature in StarWind Virtual SAN running on top of Windows Server 2012 R2 or Windows Server 2016.

A full set of up-to-date technical documentation can always be found [here](#), or by pressing the Help button in StarWind Management Console.

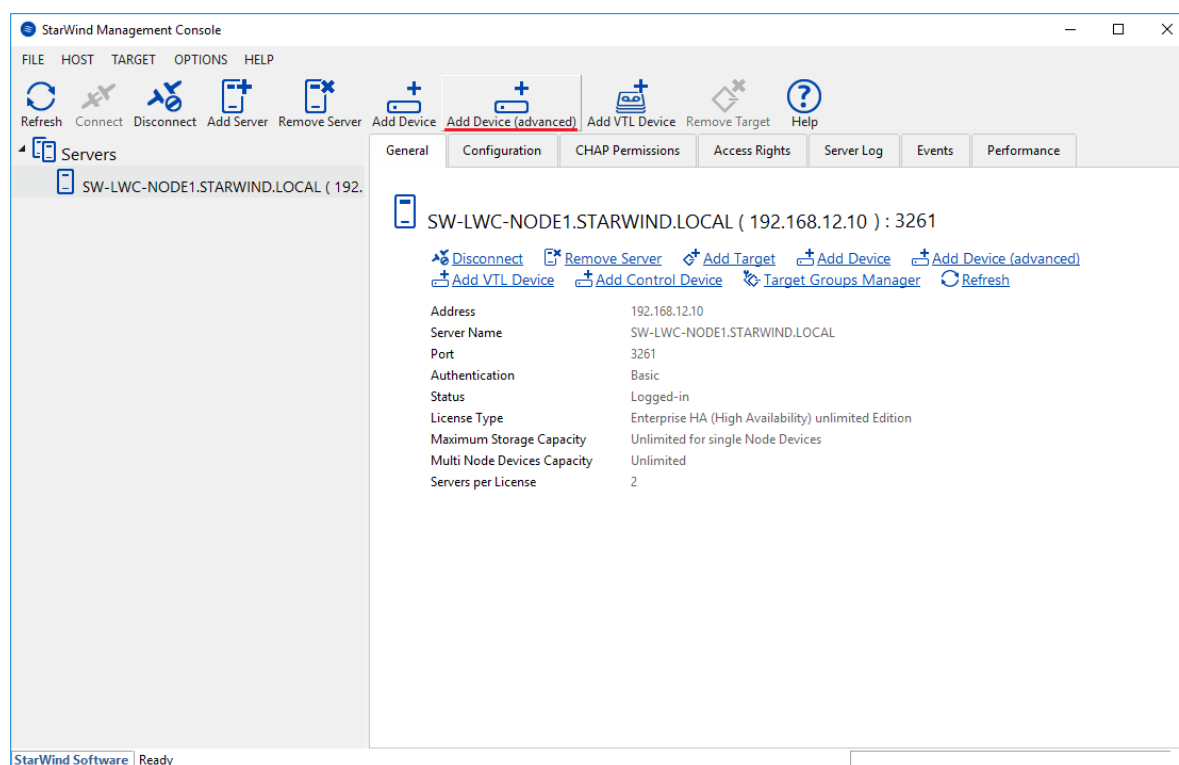
For any technical inquiries, please, visit our [online community](#), [Frequently Asked Questions](#) page, or use the [support form](#) to contact our technical support department.

Configuring Starwind Ha Device With The Lswbc Feature

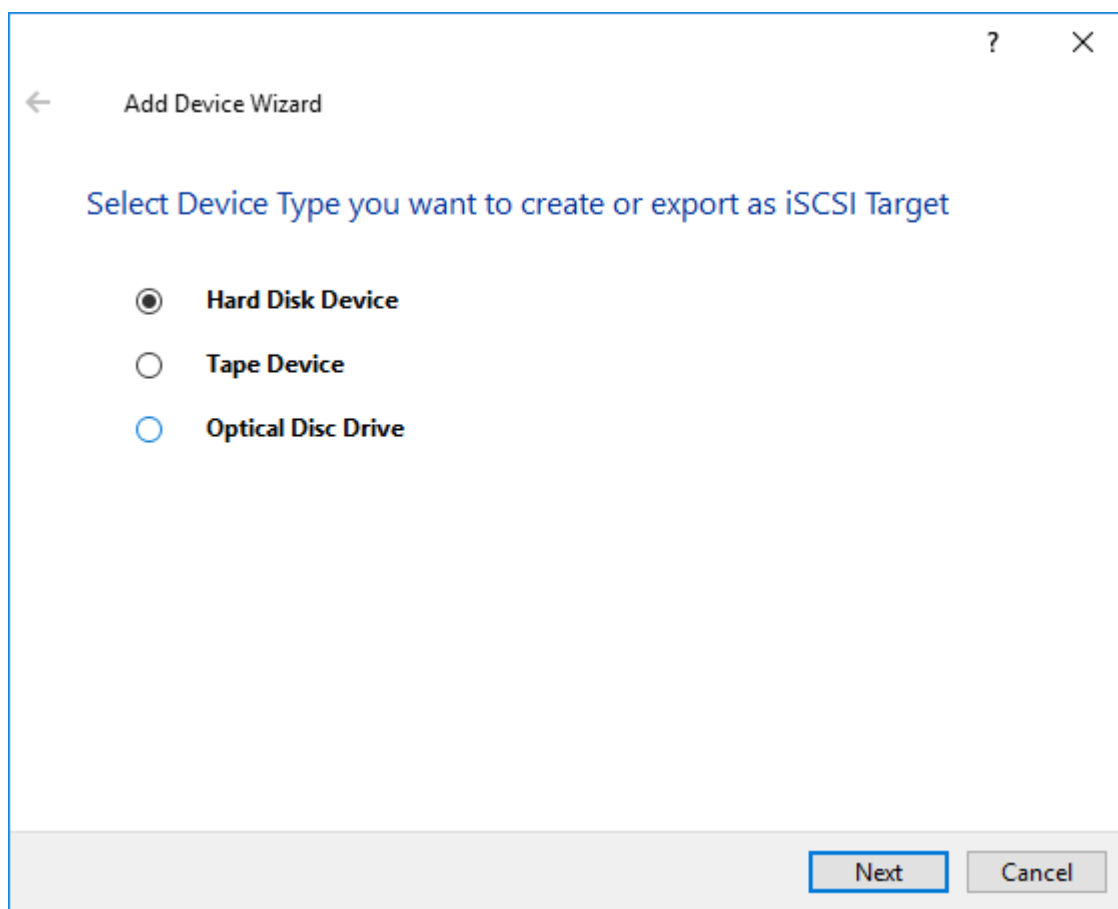
This guide assumes that StarWind Virtual SAN is already installed. Its installation guidelines can be found at the following link:

<https://www.starwindsoftware.com/help/InstallingStarWindVSAN.htm>

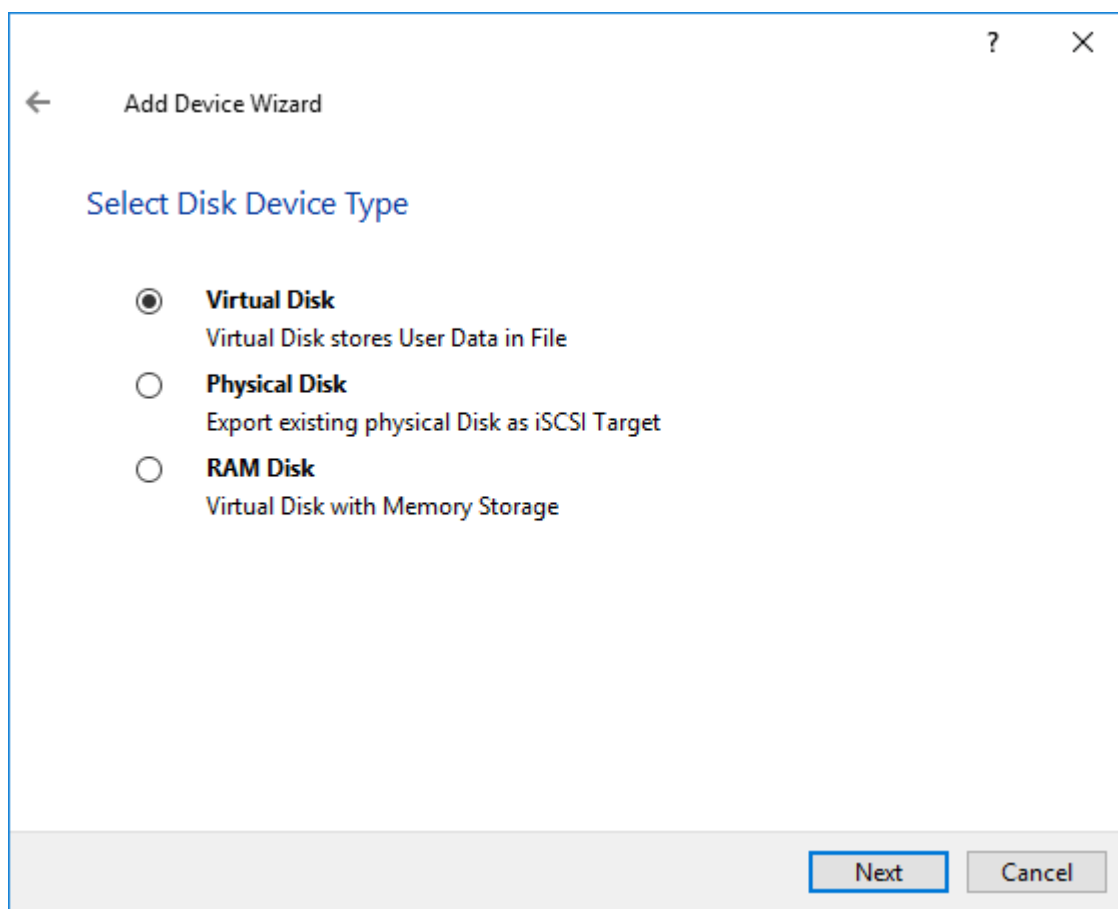
1. Double-click the StarWind tray icon to launch StarWind Management Console. Then click the Add Server button to connect to a StarWind server.
2. Select the StarWind server where the device needs to be created.
3. Press the Add Device (advanced) button on the toolbar.



4. Add Device Wizard will appear. Select Hard Disk Device and click Next.



5. Choose Virtual Disk and click Next.



6. Specify Name, Location, and Size of the virtual disk. Then, click Next to continue.

← Add Device Wizard

Virtual Disk Location

☒ Create a New Virtual Disk

Name:

Location: ...

Size: GB ▾

☐ Use an Existing Virtual Disk

Location: ...

☐ Read-Only Mode

Next Cancel

7. Select the Thick-provisioned with Write Log (experimental) option and click Next.

← Add Device Wizard

Virtual Disk Options

☐ Thick-provisioned

☒ Thick-provisioned with Write Log (experimental)

☐ LSFS

☐ Deduplication

StarPack Cache Size: 16 MB

Block Size

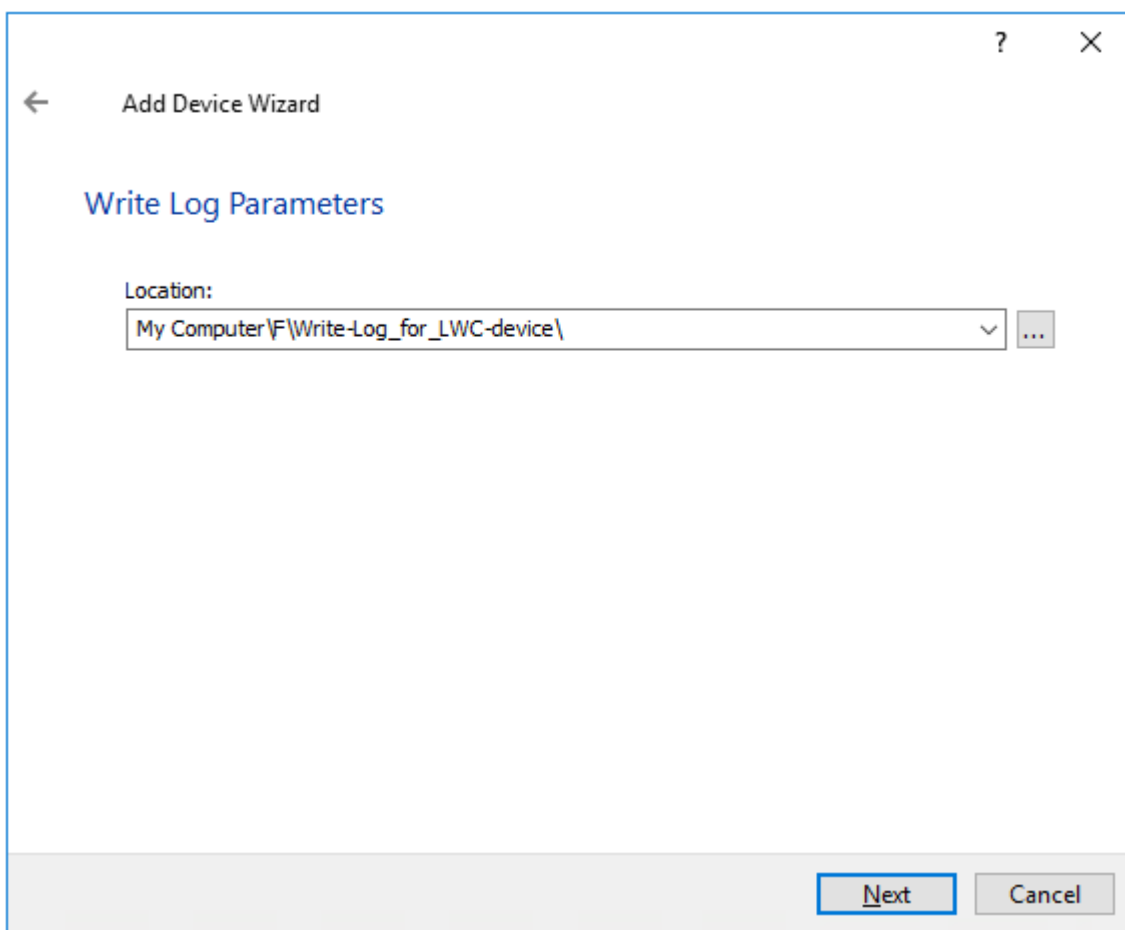
☐ Use 512 bytes sector size

☒ Use 4096 bytes sector size. May be incompatible with some clients.

Next Cancel

NOTE: 4096-byte block size is recommended for Windows-based hypervisors, while 512-byte block size is recommended for Linux-based ones (ESXi/Xen/KVM).

8. Specify the Write Log Parameters location. Click Next to continue.



9. Define the caching policy and specify the cache size. Click Next.

NOTE: It is recommended to assign 1 GB of L1 cache in the Write-Through mode per 1 TB of the underlying storage capacity. The cache size should correspond to the storage working set of the servers. The information on L1 cache implementation can be found at the following link:

<https://www.starwindsoftware.com/resource-library/starwind-virtual-san-l1-and-l2-caches-operational-principles>

← Add Device Wizard

Specify Device RAM Cache Parameters

Mode

☐ **Write-Back**
Writes are performed asynchronously, actual Writes to Disk are delayed, Reads are cached

☐ **Write-Through**
Writes are performed synchronously, Reads are cached

☒ **N/A**
Reads and Writes are not cached

☐ Set Maximum available Size

Size: MB

Next Cancel

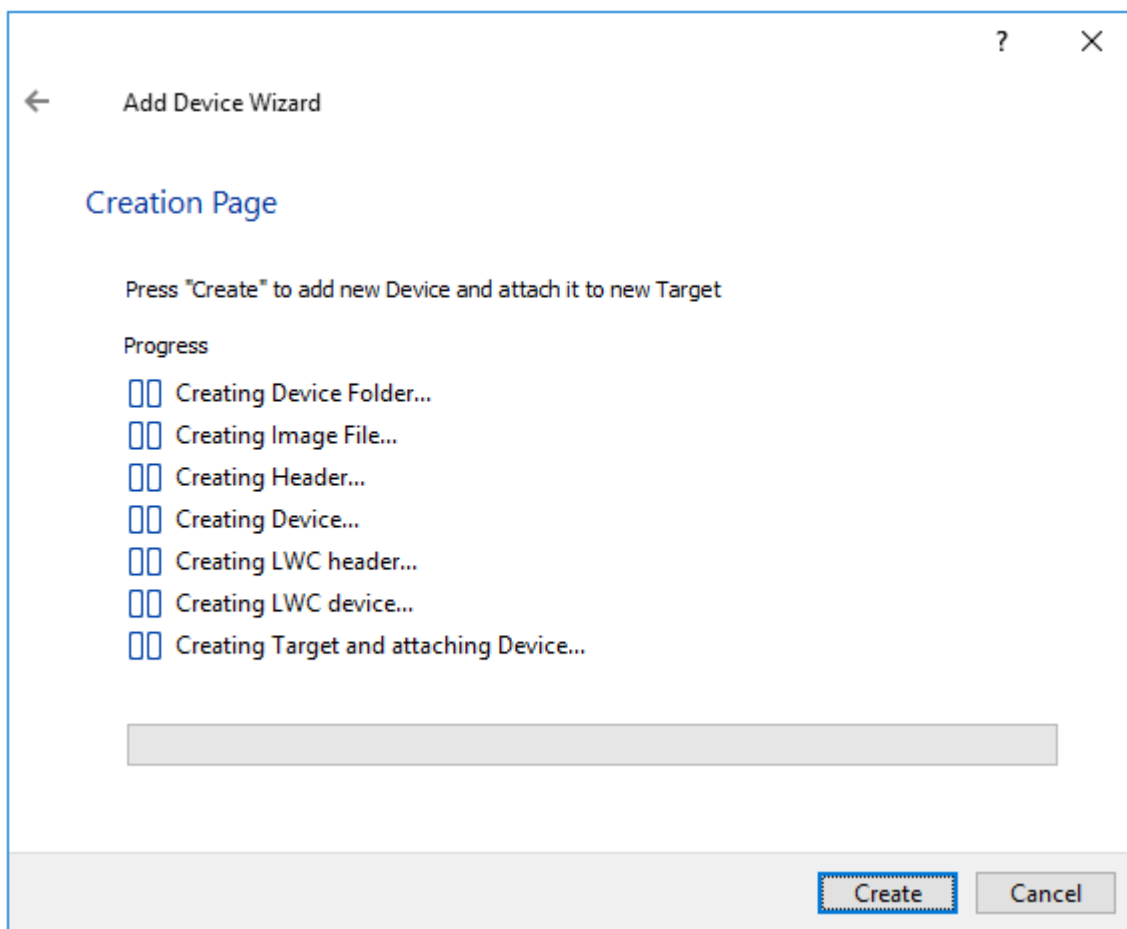
10. Specify Target Parameters. Select the Target Name checkbox to enter a custom target name. Otherwise, the name will be generated automatically based on the target alias. Click Next to continue.

The screenshot shows a window titled "Add Device Wizard" with a back arrow and a close button. The main heading is "Target Parameters". Below this, there are several fields and checkboxes:

- Choose a Target Attachment Method:** A dropdown menu with "Create new Target" selected.
- Target Alias:** A text field containing "LWC-device".
- Target Name:** An unchecked checkbox followed by a text field containing the iSCSI Qualified Name: "iqn.2008-08.com.starwindsoftware:sw-lwc-node1.starwind.local-lwc-device".
- Allow multiple concurrent iSCSI Connections:** A checked checkbox.

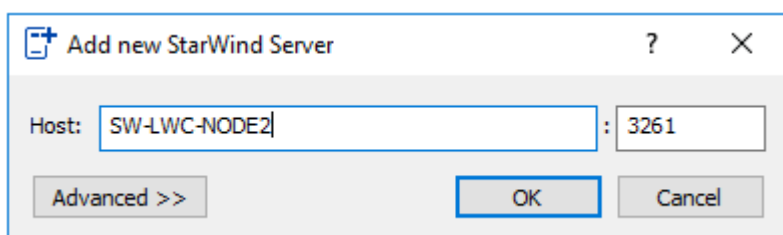
At the bottom right, there are two buttons: "Next" (highlighted with a blue border) and "Cancel".

11. Click Create to add a new device and connect it to the target. Then click Close to complete the Wizard.

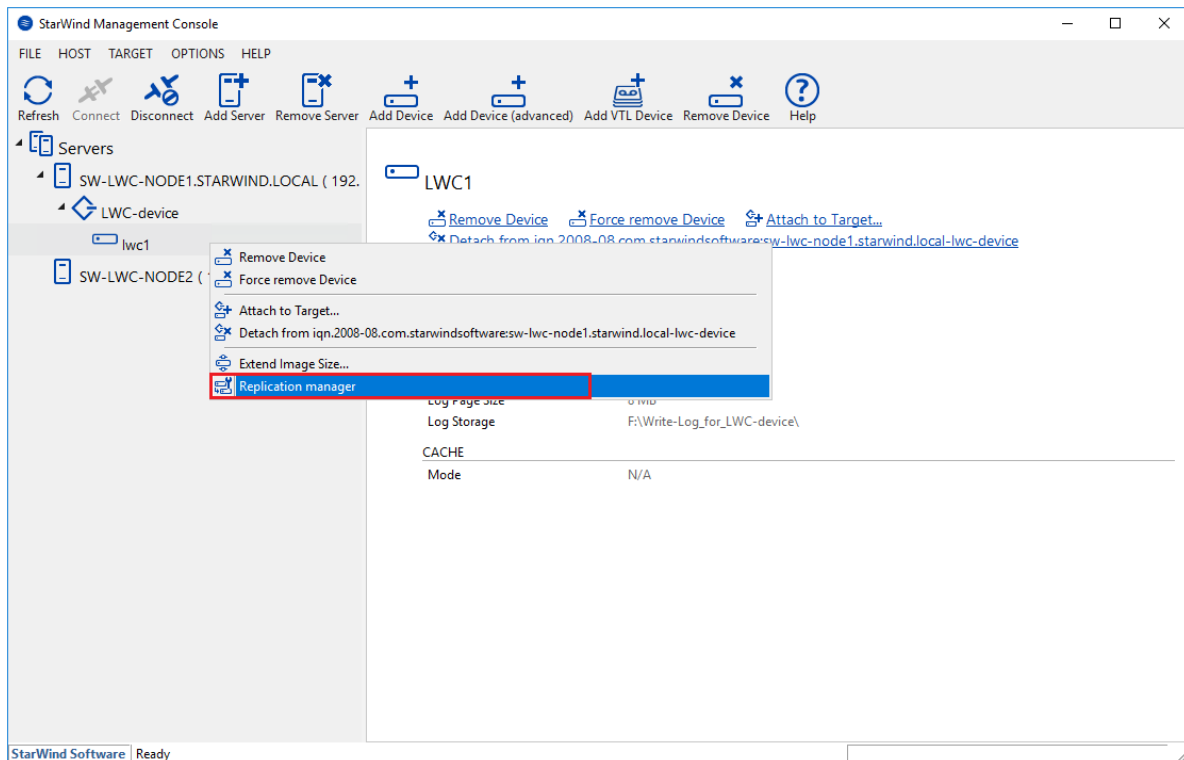


NOTE: Write log configured on a stand-alone device works as L2 cache in the write-back mode. Such design improves both reading and writing performance.

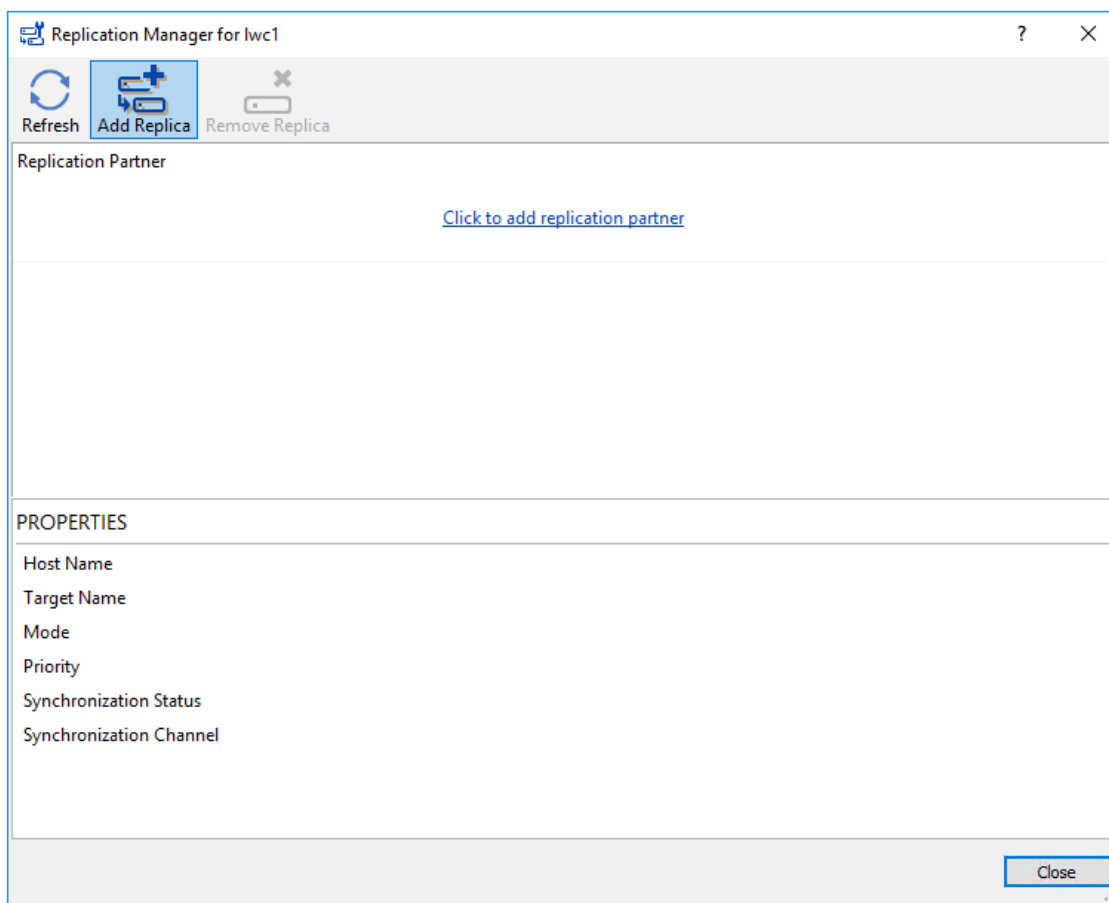
12. Right-click the Servers field and select Add Server. Add a new StarWind server which will be used as the second HA node. Then, click OK.



13. Right-click the created device and select Replication manager.



14. The Replication Manager for lwc1 window will appear. Press the Add Replica button.



15. Select Synchronous “Two-Way” Replication. Click Next to proceed.

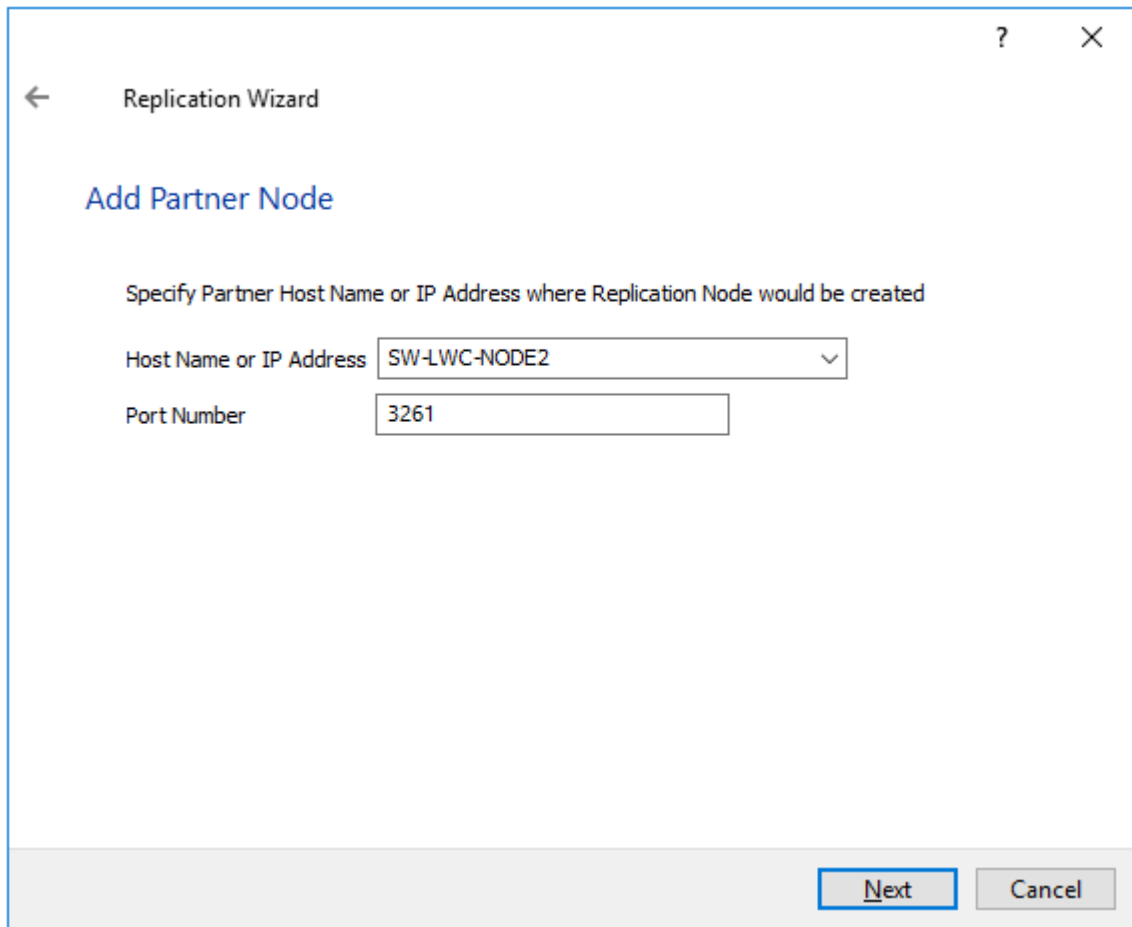
Replication Wizard

Replication Mode

- ☒ **Synchronous "Two-Way" Replication**
Replication Partner must be connected to Client as Source Device as well, MPIO on Client must be enabled, needs dedicated high Performance Network Connection for Synchronization
- ☐ **Asynchronous "One-Way" Replication**
Replica is used to store replicated Data, Data is stored as Snapshots, Client cannot connect to Replication Partner, mount Snapshot from Replica to get Access to replicated Data
- ☐ **Witness Node**
Witness node doesn't contain user data. In case when Node Majority policy is set for Synchronous replication device and there are two storage nodes, Witness Node must be added to cluster to make number of nodes odd number and enable proper functioning of Node Majority policy.

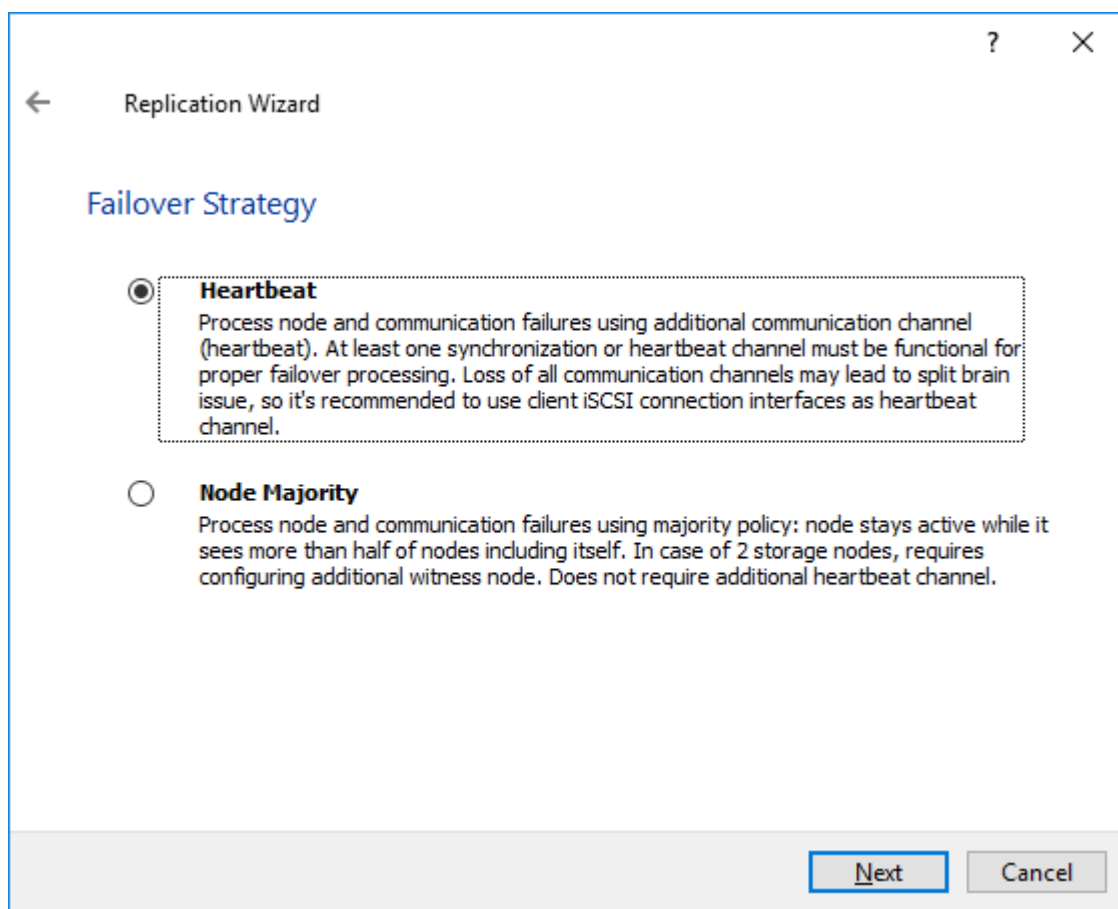
Next Cancel

16. Specify the partner Host Name or IP address and Port Number. The default StarWind management port is 3261. If a different port is configured, please, type it into the appropriate field. Click Next.

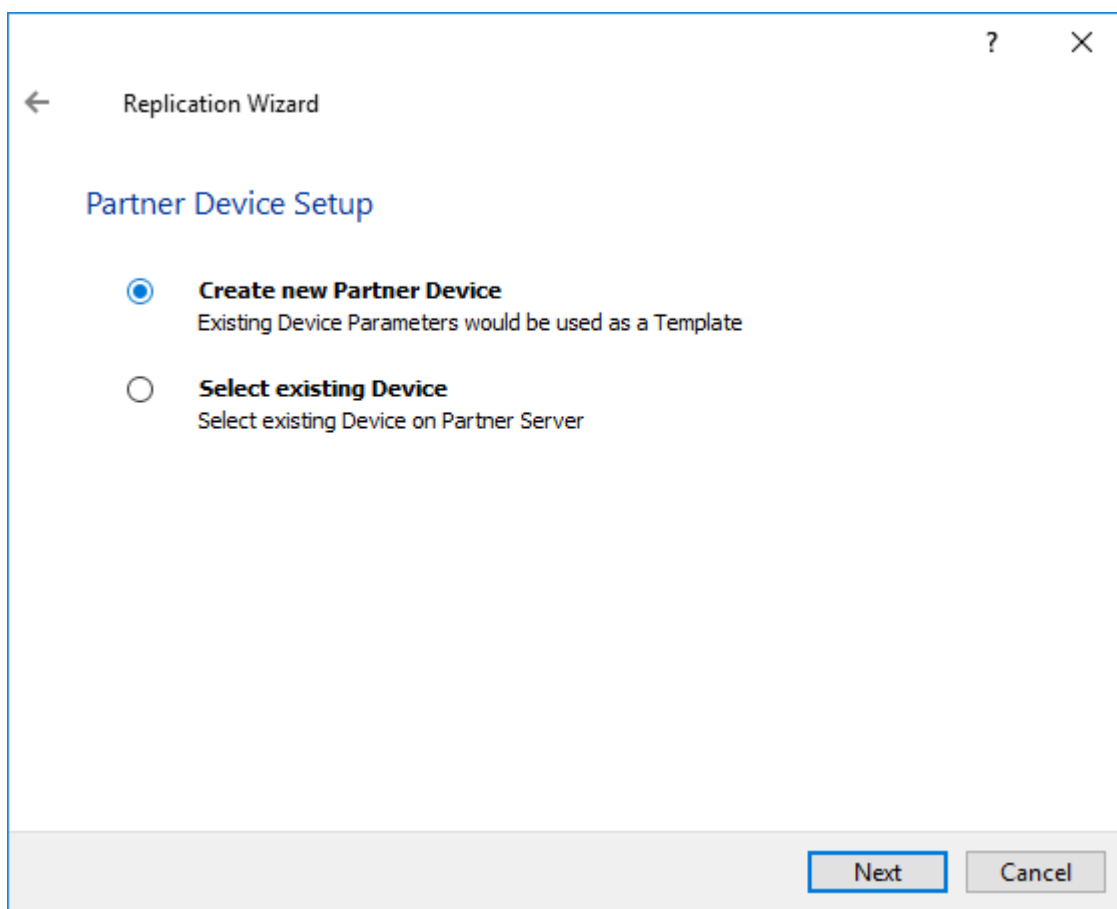


The image shows a 'Replication Wizard' window with a title bar containing a question mark and a close button. Inside the window, there is a back arrow and the text 'Replication Wizard'. Below this is the section header 'Add Partner Node'. A descriptive text reads: 'Specify Partner Host Name or IP Address where Replication Node would be created'. There are two input fields: 'Host Name or IP Address' with a dropdown menu showing 'SW-LWC-NODE2' and a small downward arrow, and 'Port Number' with a text box containing '3261'. At the bottom right, there are two buttons: 'Next' (highlighted with a blue border) and 'Cancel'.

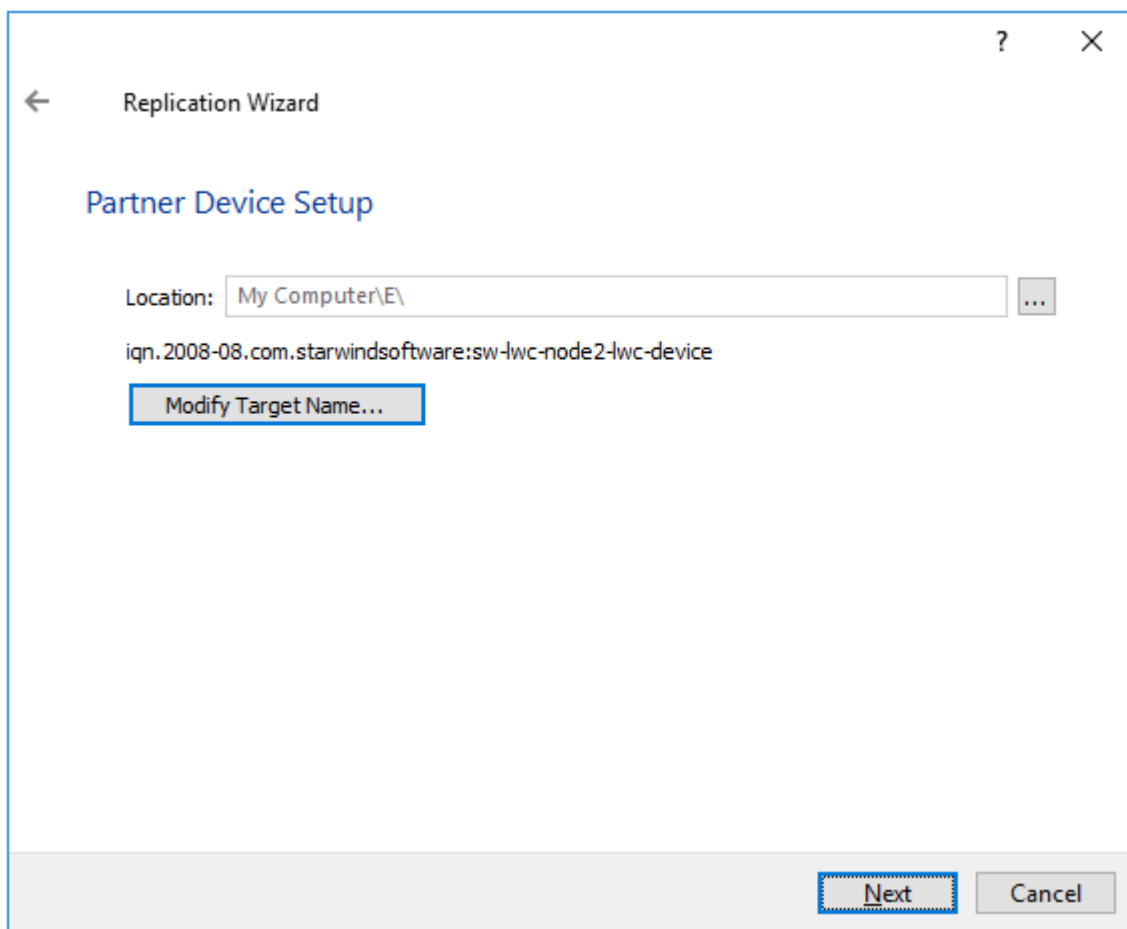
17. Select Heartbeat as the failover strategy. Click Next.



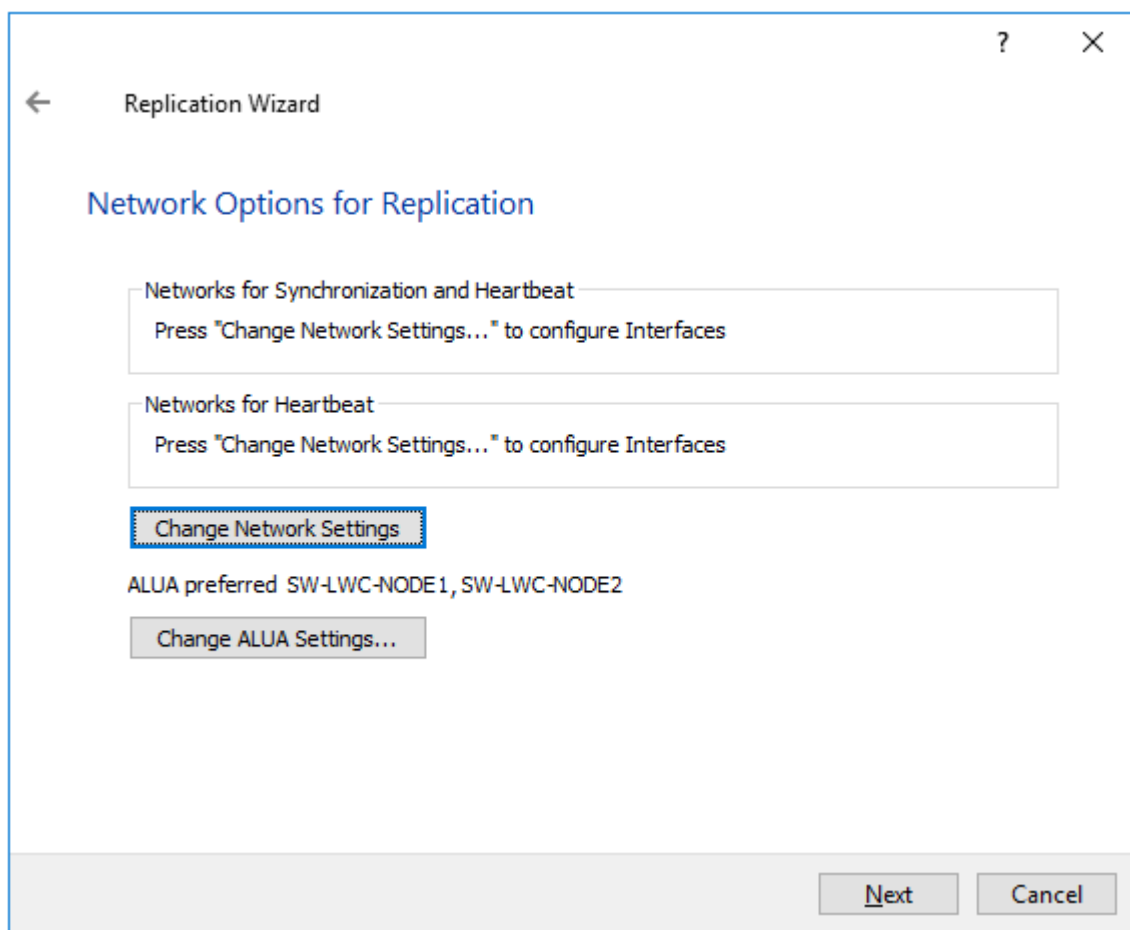
18. Select Create new Partner Device and click Next.



19. Specify the partner device Location and modify the device target name if necessary.



20. Select the Synchronization and Heartbeat networks for the HA device. Click Change Network Settings.



21. Specify the interfaces for the Synchronization and Heartbeat channel. Click OK. Then click Next.

Specify Interfaces for Synchronization Channels

Select synchronization channel

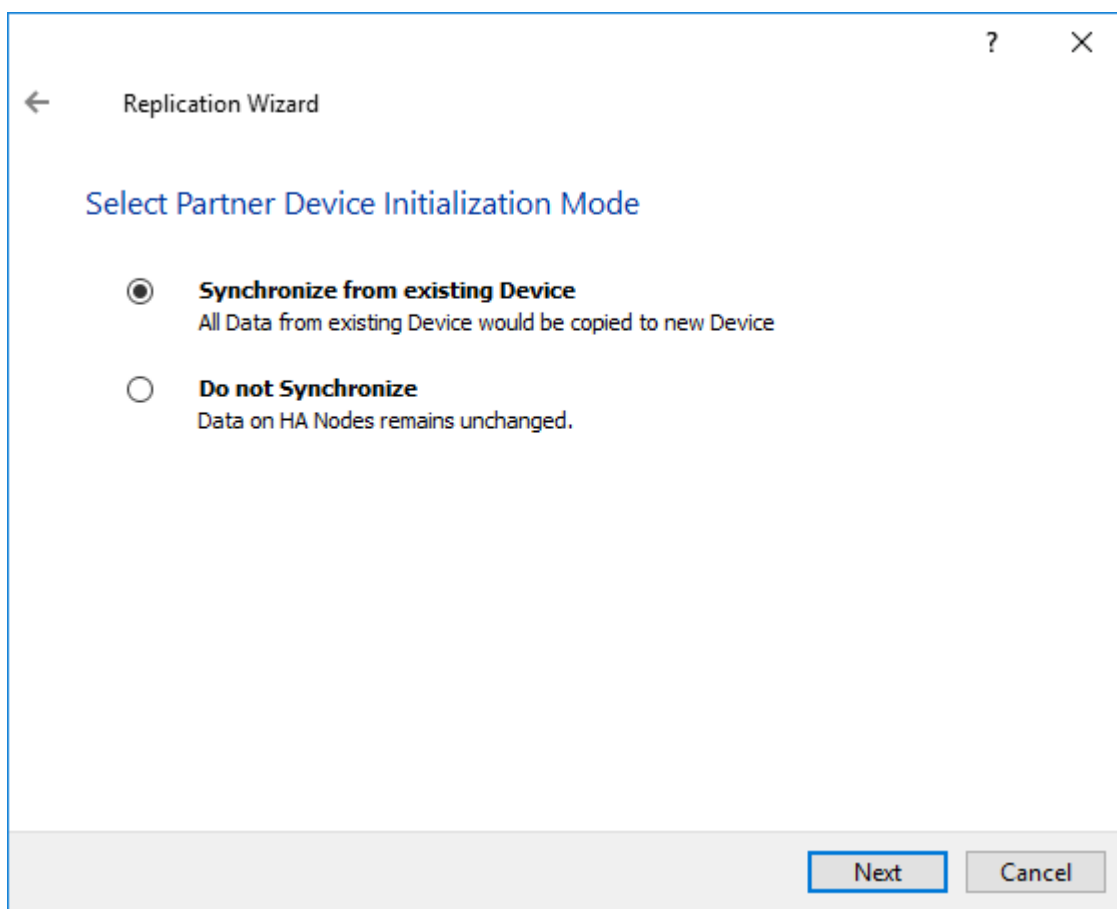
Interfaces	Networks	Synchronization and H...	Heartbeat
<div> Host Name: 127.0.0.1 </div>			
172.16.10.10	172.16.10.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>
172.16.20.10	172.16.20.0	<input checked="" type="checkbox"/>	<input type="checkbox"/>
192.168.12.10	192.168.12.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<div> Host Name: SW-LWC-NODE2 </div>			
172.16.10.20	172.16.10.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>
172.16.20.20	172.16.20.0	<input checked="" type="checkbox"/>	<input type="checkbox"/>
192.168.12.20	192.168.12.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>

☐ Allow Free Select Interfaces

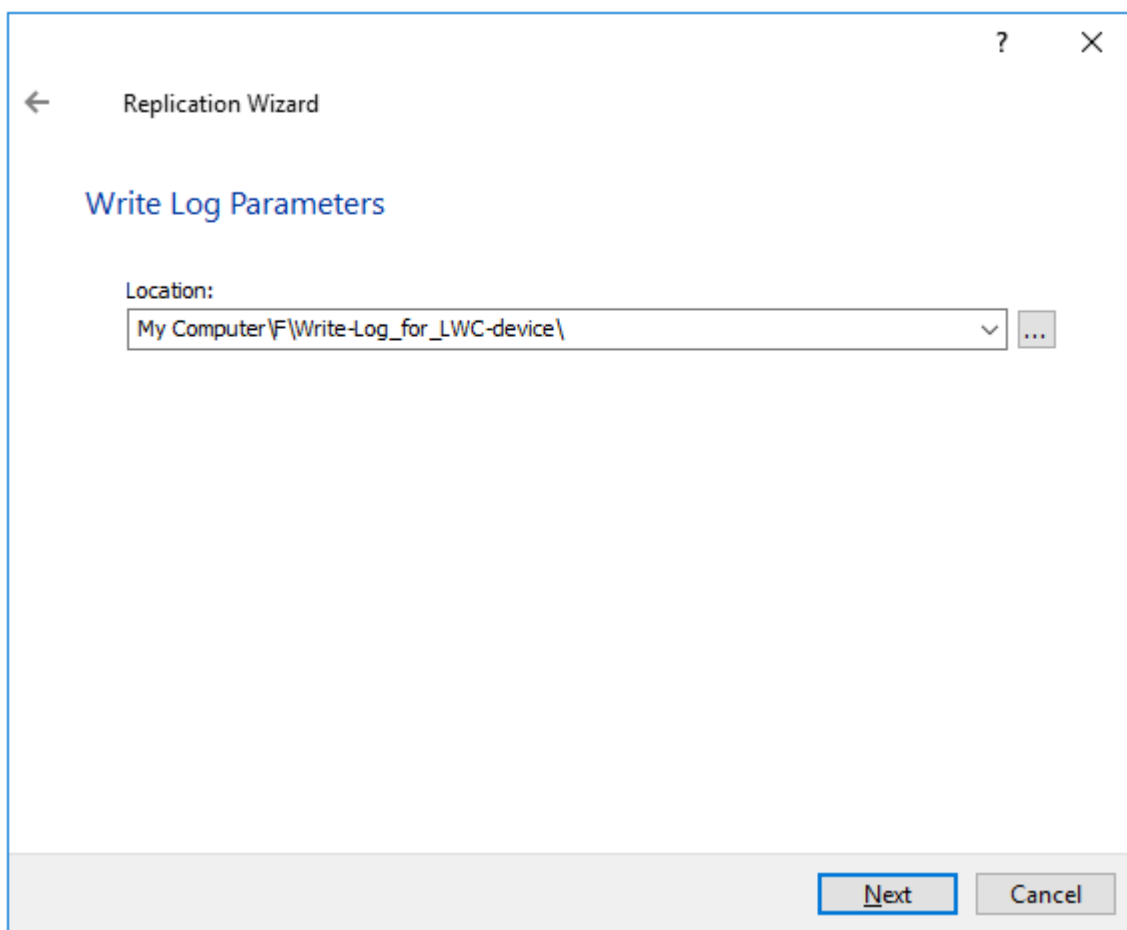
OK
Cancel

NOTE: Use separate network adapters for Heartbeat and Synchronization channels. It is recommended to configure Heartbeat and iSCSI channels on the same interfaces to avoid the split-brain issue.

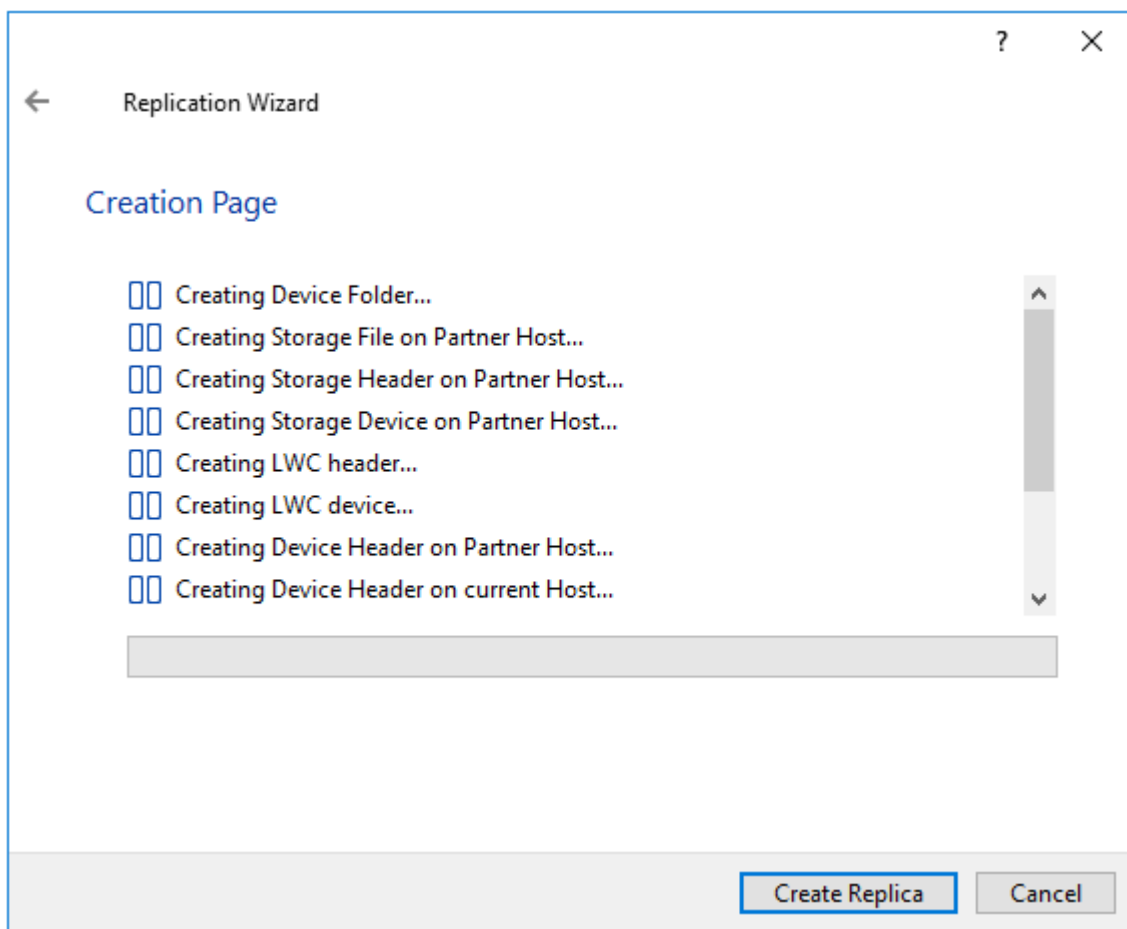
22. Select Synchronize from existing Device as a partner device initialization mode and click Next.



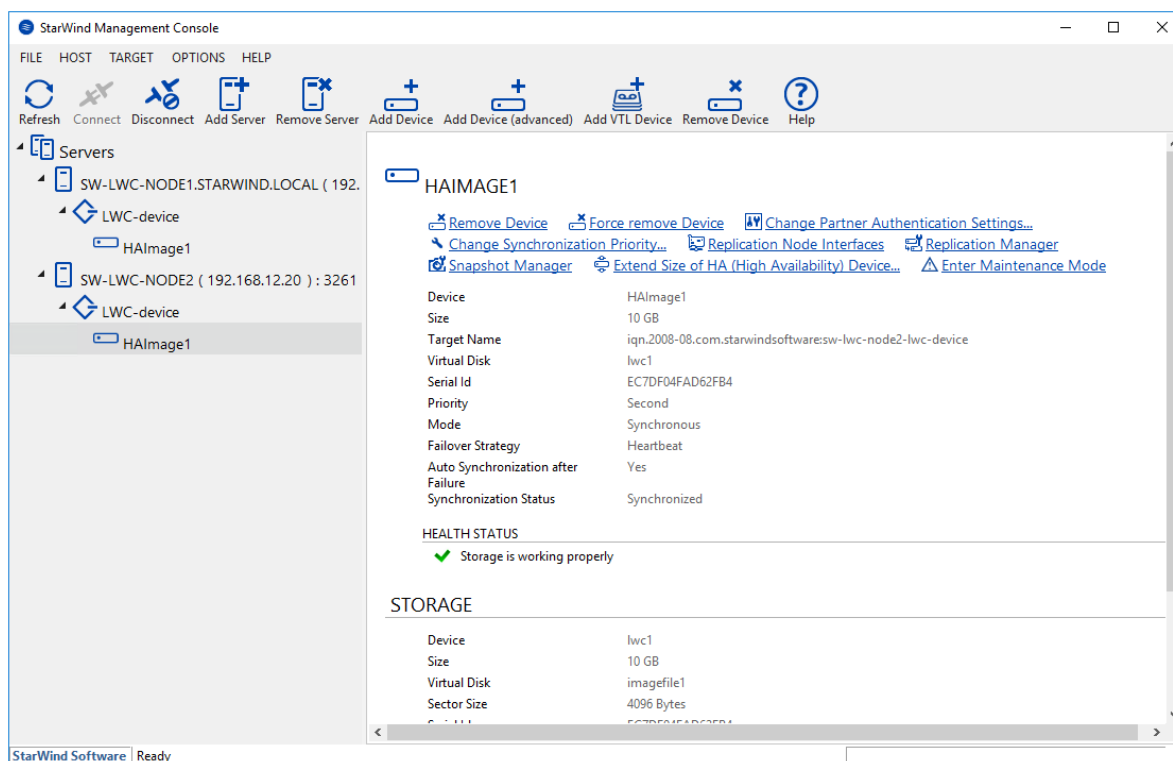
23. In Write Log Parameters, specify the partner Location. Click Next to continue.



24. Click the Create Replica button.










25. The added device will appear in StarWind Management Console.



26. Discover and connect the created targets in the iSCSI initiator that is used in this environment.

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