

StarWind Virtual SAN[®]

Creating Stand-Alone LSFS device

JANUARY 2018

TECHNICAL PAPER



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In 2016, Gartner named StarWind “Cool Vendor for Compute Platforms”.

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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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Introduction

StarWind Virtual SAN® is a native Windows hypervisor-centric hardware-less VM storage solution. It creates a fully fault tolerant and high performing storage pool purpose-built for the virtualization workloads by mirroring the existing server's storage and RAM between the participating storage cluster nodes. **StarWind Virtual SAN** delivers supreme performance compared to any dedicated SAN solution since it runs locally on the hypervisor. All IO is processed by local RAM, SSD cache, and disks and never gets bottlenecked by storage fabric.

This guide is intended for experienced StarWind users and Windows system administrators and IT professionals who would like to configure **StarWind Virtual SAN** solution. It provides detailed instructions on how to create a shared storage configuration using **StarWind Virtual SAN** that runs on top of Windows Server 2012 R2 and Windows Server 2016.

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

Technical description and requirements

LSFS is a snapshot-based file system that uses snapshots according to the concept of journaling file system. LSFS device uses a log-structured file system (journal file system) that keeps the changes made in the journal. This file system keeps no data, only changes. Every snapshot is incremental and occupies additional space equal to changes made since the previous snapshot creation. Junk rate predetermines the maximum-allowed LSFS growth (overprovisioning) comparison to the declared LSFS size. The default rate (60%) causes LSFS file-segments to use 2.5 times more space than the initial LSFS size. Additionally, metadata occupies up to 20% of the initial LSFS size resulting in a total 200% LSFS devices overprovisioning.

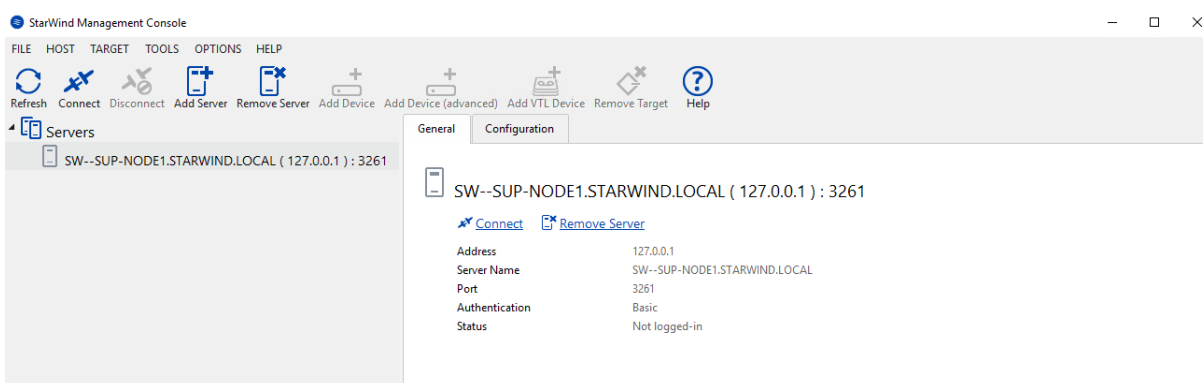
LSFS requirements:

1. 4.6 GB of RAM per 1 TB of LSFS size without deduplication. For example, if you have a 10 TB LSFS device, it requires 46 GB of free RAM.
2. 7.6 GB of RAM per 1 TB of LSFS size with deduplication. For example, if you have a 10 TB LSFS device, it requires 76 GB of free RAM.
3. Over-provisioning is 200% (LSFS files can occupy 3 times more space compared to initial LSFS size).
4. Snapshots require additional space to store them.

Creating an LSFS device

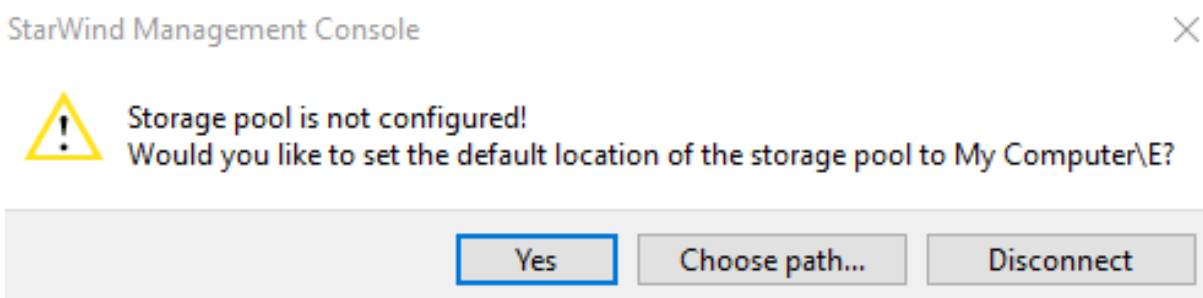
1. Launch **StarWind Management Console**: double-click the StarWind tray icon.

NOTE: StarWind Management Console cannot be installed on an operating system without a GUI. You can install it on any GUI-enabled Windows Editions including the desktop versions of Windows.



If **StarWind Service** and **Management Console** are installed on the same server, the **Management Console** will automatically add the local StarWind instance to the Console tree after the first launch. Then, the **Management Console** connects to it automatically using the default credentials. To add remote StarWind servers to the console use the **Add Server** button on the control panel.

2. StarWind Management Console will ask you to specify the default storage pool on the server you're connecting to for the first time. Please, configure the storage pool to use one of the volumes you've prepared earlier. All the devices created through the Add Device wizard will be stored on it. Should you decide to use an alternative storage path for your StarWind virtual disks, please use the **Add Device (advanced)** menu item.

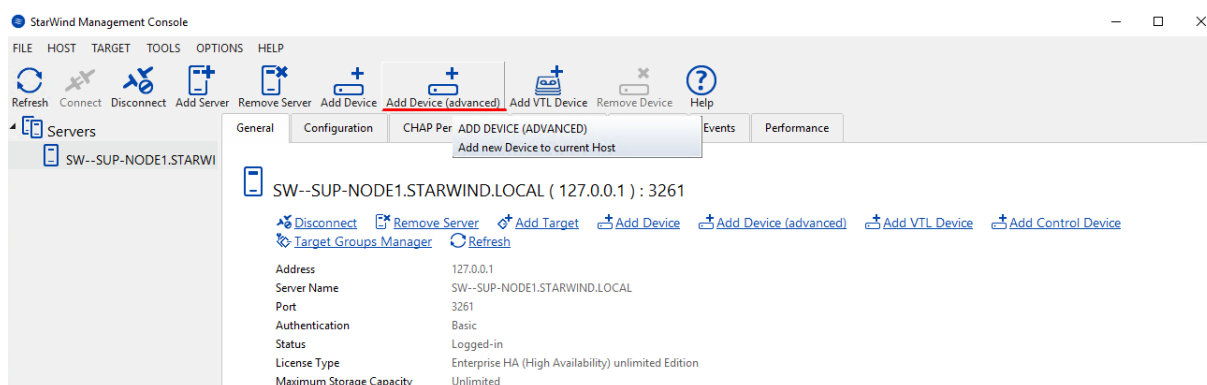


Press **Yes** button to configure the storage pool. If you require changing the storage pool destination, press **Choose path...** and point the browser to the necessary disk.

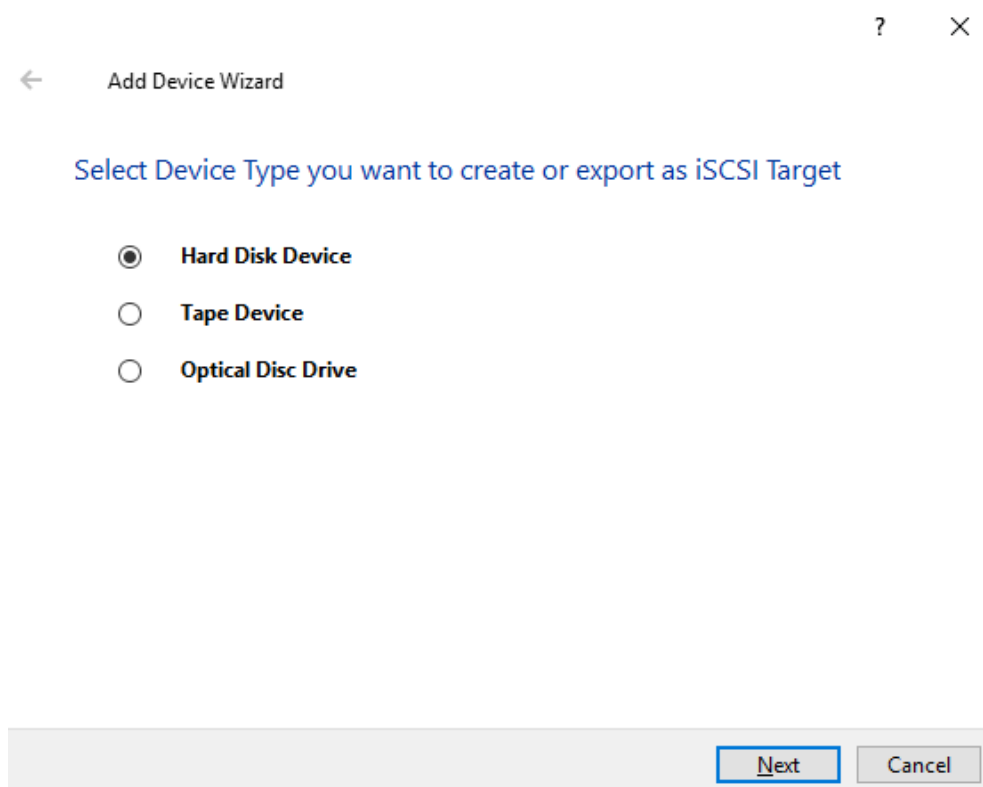
NOTE: Each array used by **StarWind Virtual SAN** to store virtual disk images should meet the following requirements:

- initialized as GPT
- Have a single NTFS-formatted partition
- Have a drive letter assigned

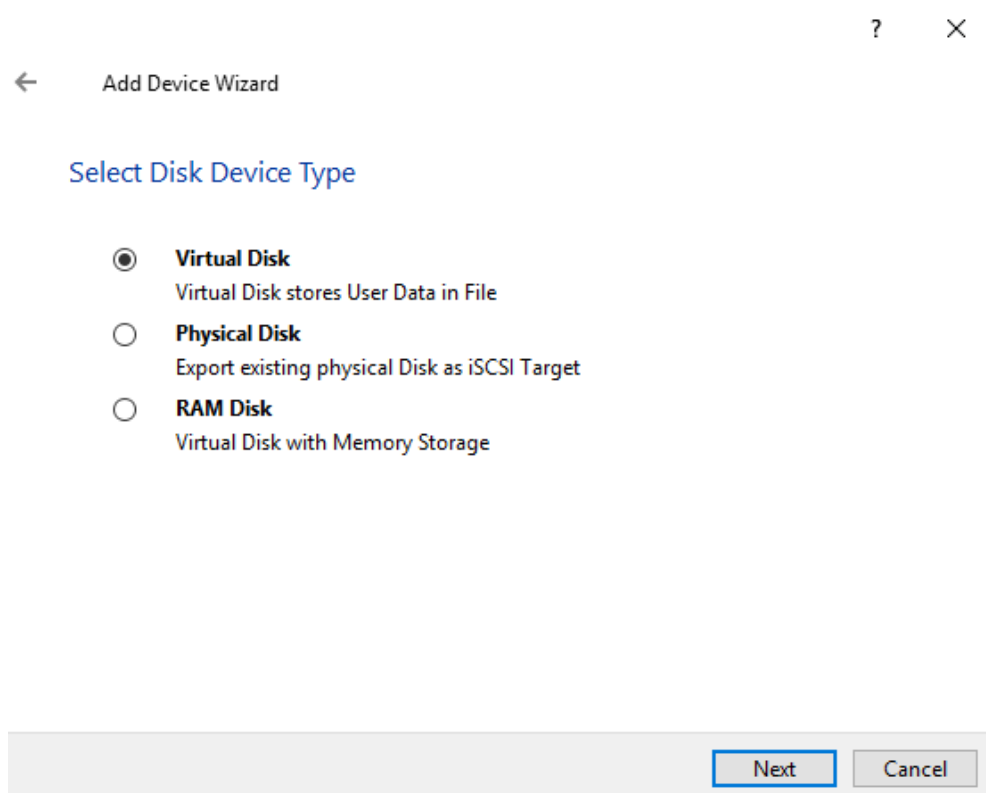
3. Click the **Add Device (advanced)** button on the toolbar.



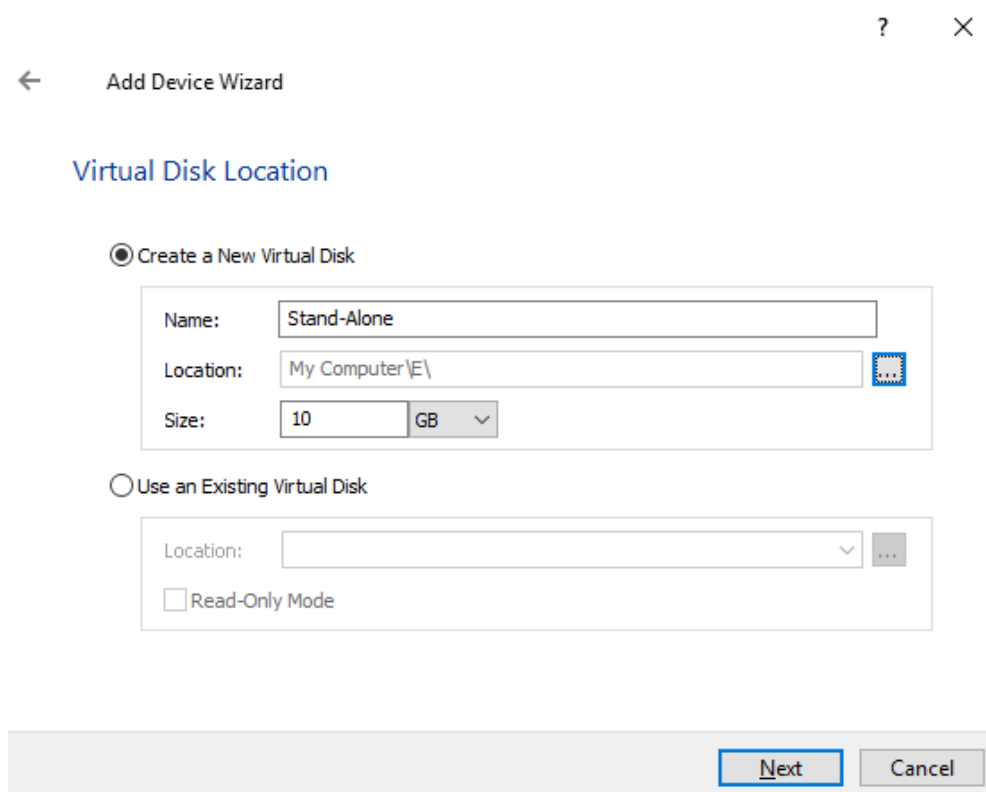
4. **Add Device Wizard** will appear. Select **Hard disk** device and click **Next**.



5. Select **Virtual disk** and click **Next**.



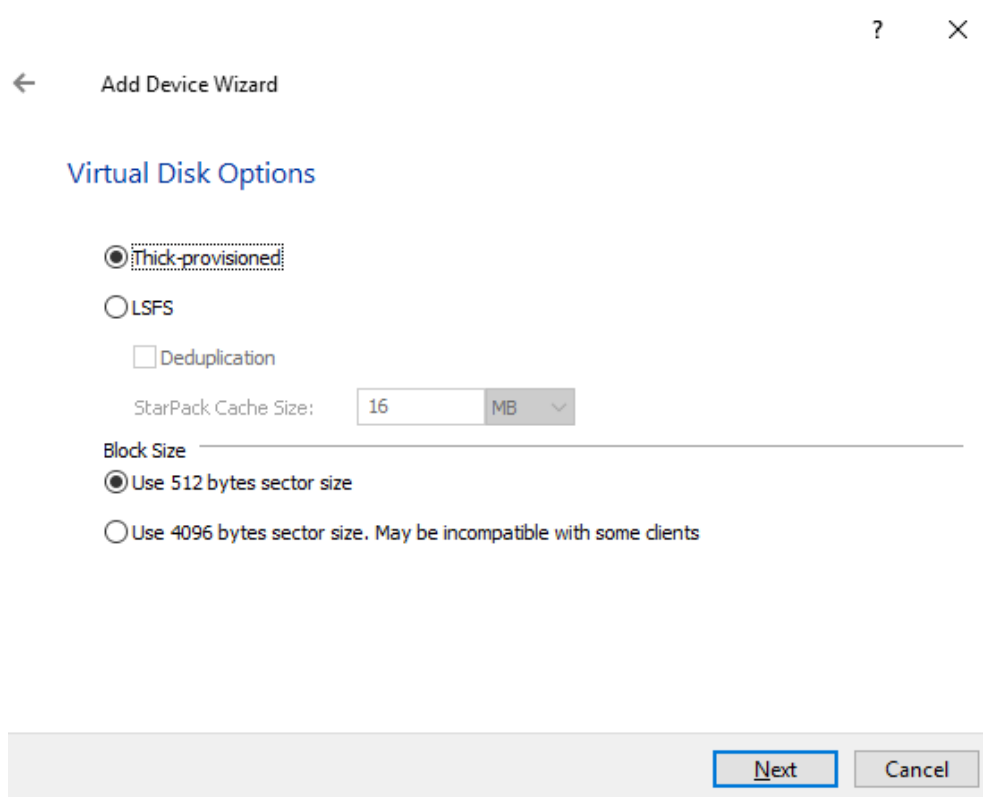
6. Specify the virtual disk Name, location, size and click the **Next** button.



7. Choose the LSFS option instead of the Thick-provisioned one. If you need enable the LSFS device deduplication, check the “Deduplication” box. Click the **Next** button to proceed.

NOTE: StarPack Cache is the low-level cache located between the disk and the LSFS log. It caches log fragments, which are later prepared for writing to the disk or read from it. If deduplication is enabled on the device, the data in the StarPack cache is also deduplicated. The recommended size is 16 MB.

NOTE: 4096 Virtual Block size is recommended for Windows-based hypervisors; 512 for Linux-based ones (ESXi/Xen/KVM)



8. Define the caching policy, specify the cache size (in MB) and click **Next**.

NOTE: It is not recommended to configure cache in Write-Back mode on Standalone devices in order to avoid possible data corruption upon power outage or incorrect service shutdown. It is recommended to put 1 GB of L1 cache per 1 TB storage capacity.

? X

← 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

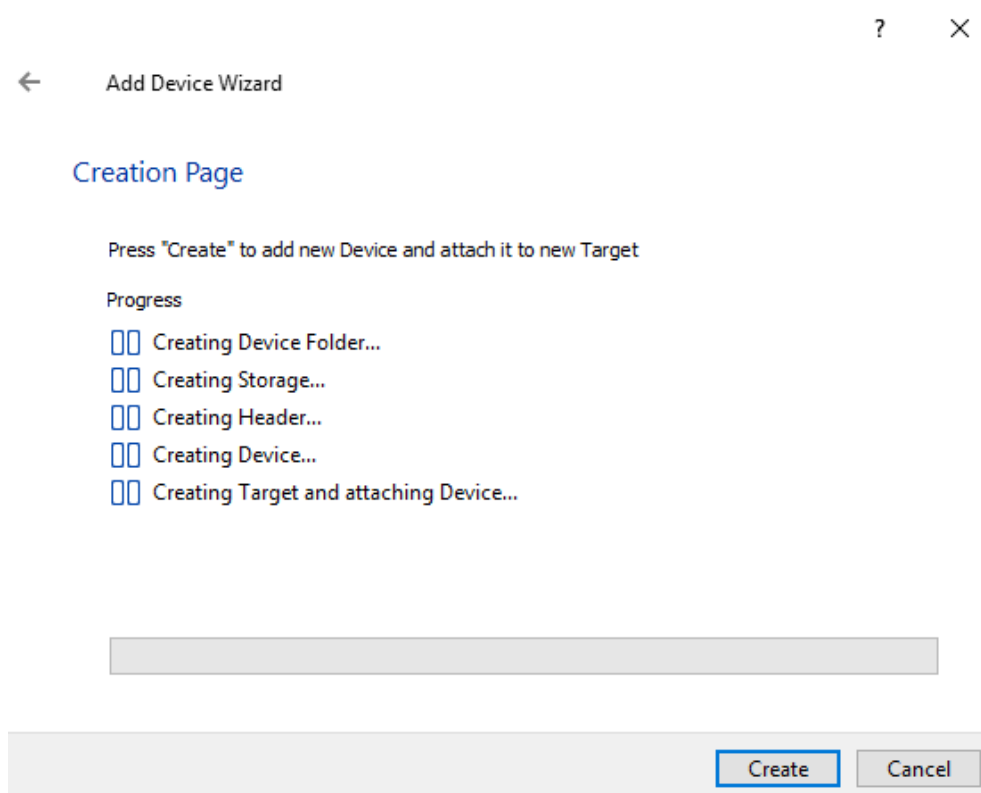
Size:

- Define the **Flash Cache Parameters** policy and size if necessary. Choose SSD location in the wizard.

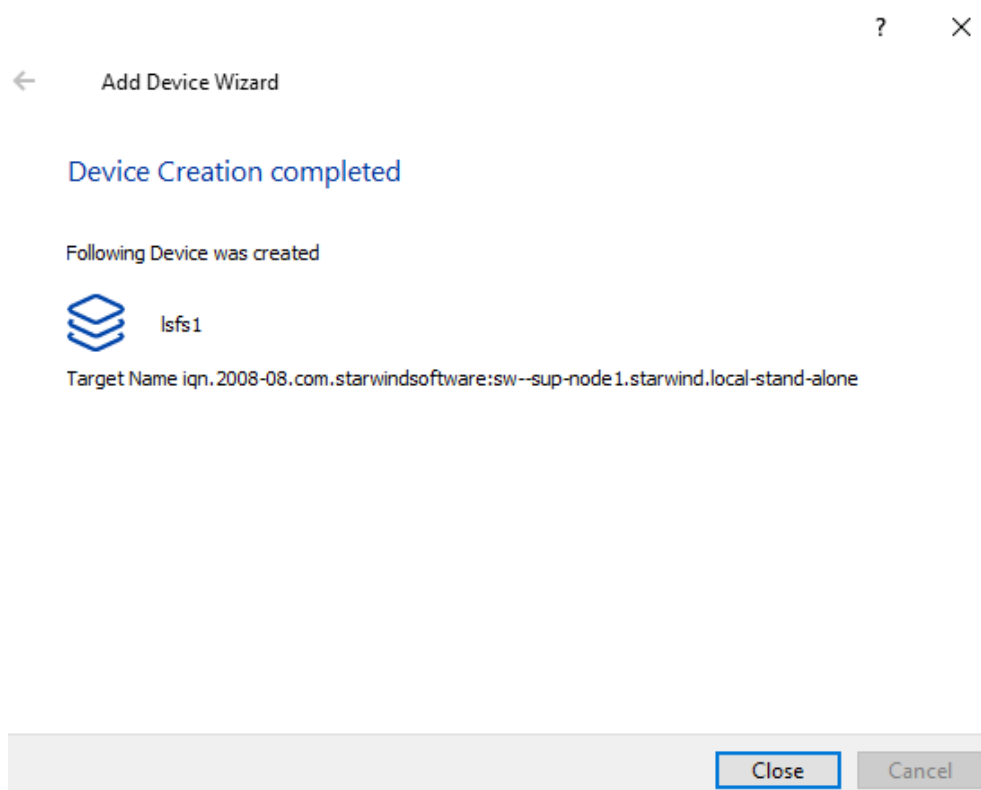
NOTE: The recommended L2 cache size is 10% of initial StarWind device capacity.

- 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

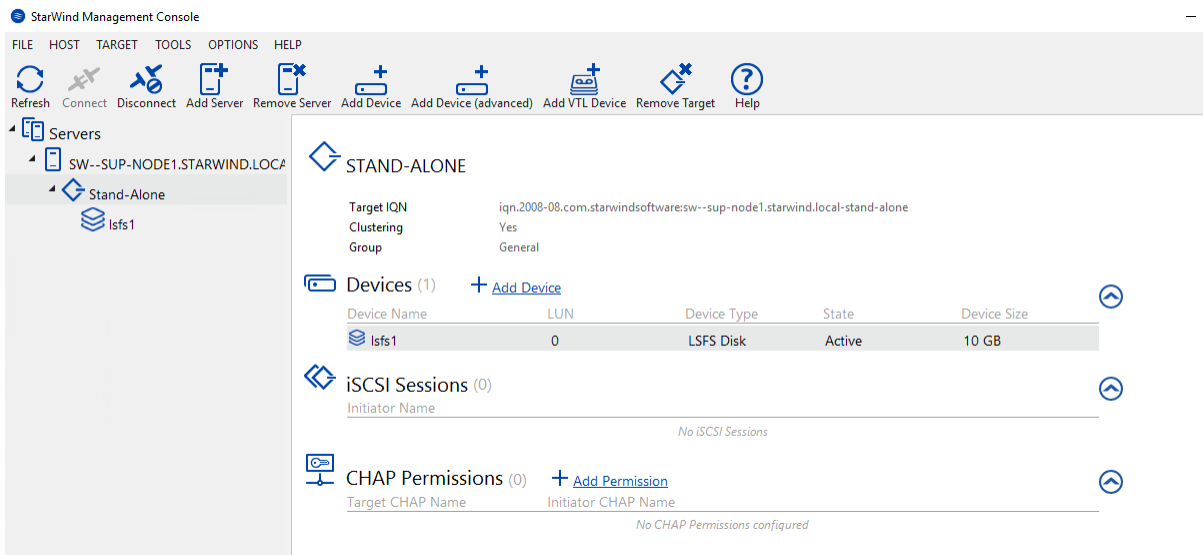
11. Click **Create** to add a new device and assign it to the target.



12. Click **Close** to complete the wizard.

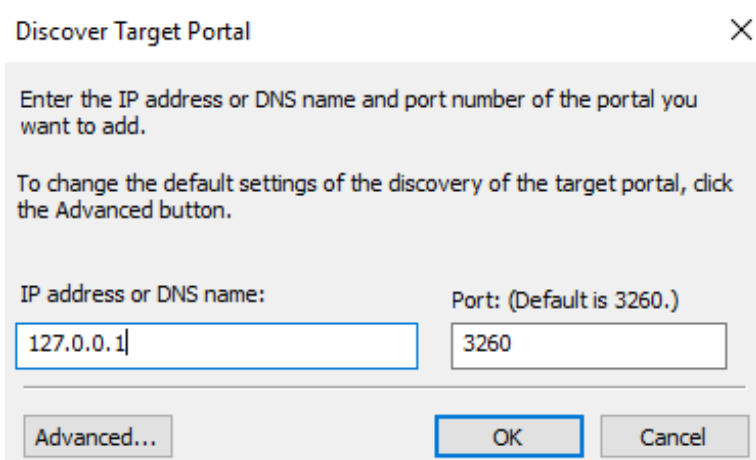


13. The added device will appear in the **StarWind Management Console**.

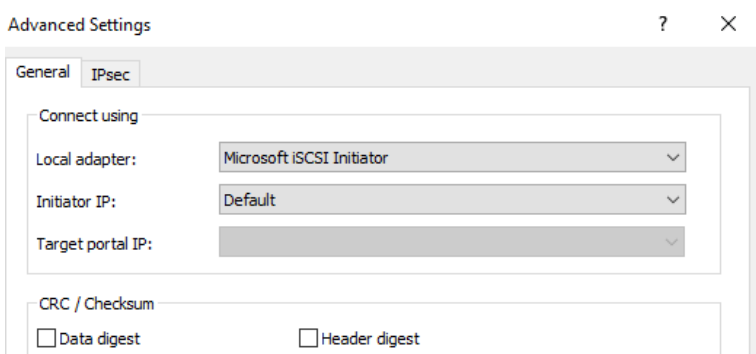


Discovering and Connecting Target Portals

14. Launch Microsoft iSCSI Initiator: Start > Administrative Tools > iSCSI Initiator or `iscsicpl` from the command line interface. The iSCSI Initiator Properties window appears.
15. Navigate to the **Discovery** tab.
16. Click the Discovery button. Discover Target Portal dialog appears. Type in 127.0.0.1 if you are going to connect the virtual drive from the local host.



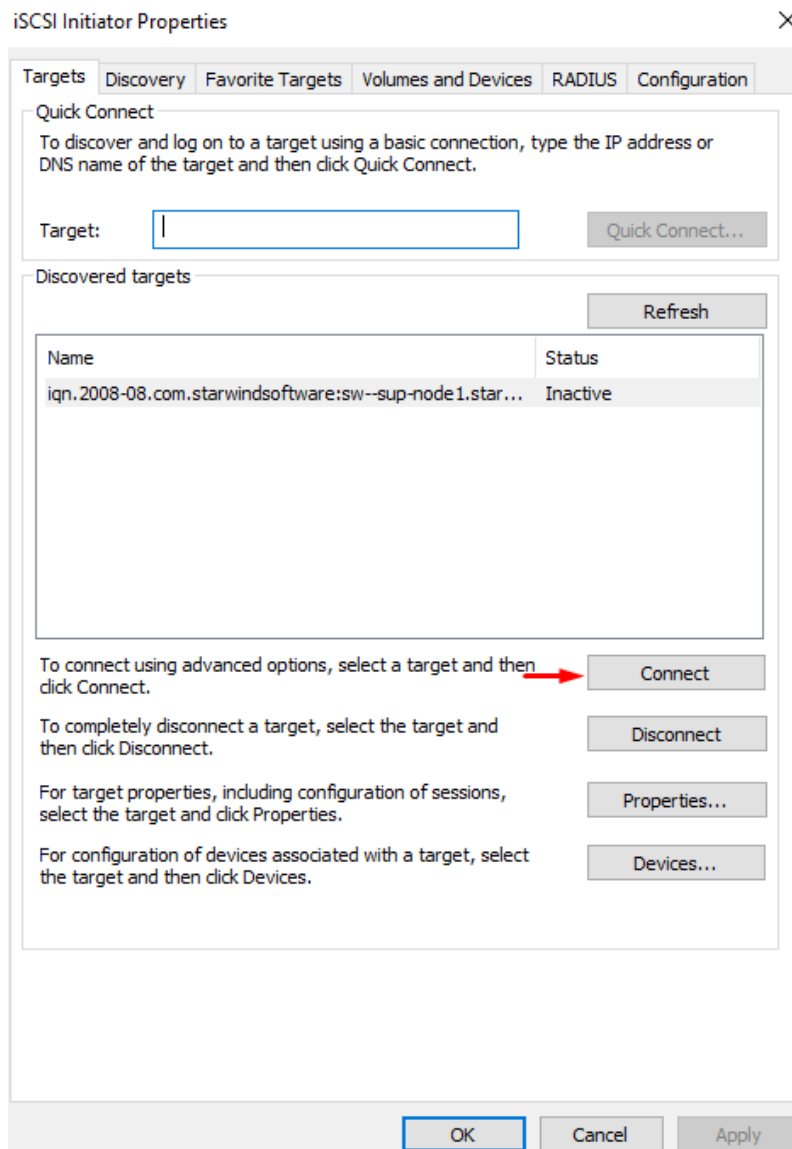
17. Click the **Advanced** button. Select Microsoft iSCSI Initiator as your Local adapter and select your Initiator IP (leave default for 127.0.0.1)



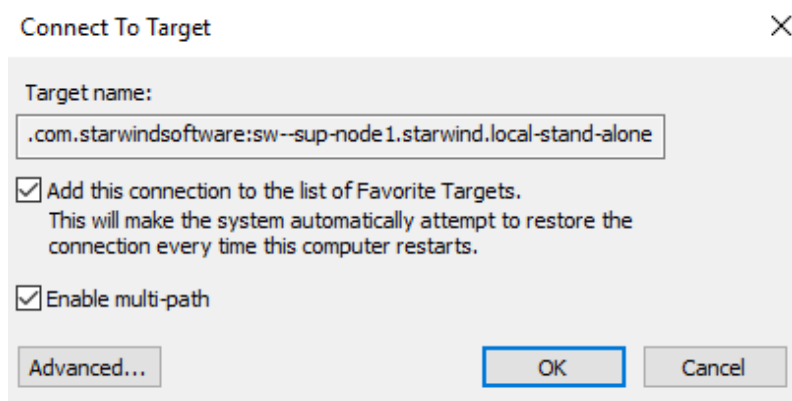
18. Click OK twice to complete the Target Portal discovery.
19. Click on the Targets tab.

NOTE: If the created targets are not listed, check the StarWind Server firewall and the list of networks served by the StarWind Server (go to StarWind Management Console -> Configuration -> Network).

20. Select a target of the stand-alone device located on the local server and click **Connect**.



21. Add the target to the Favorites list and enable multi-path. Click **Advanced**.



22. Select 127.0.0.1 in the Target portal IP and Microsoft iSCSI Initiator as the default initiator.

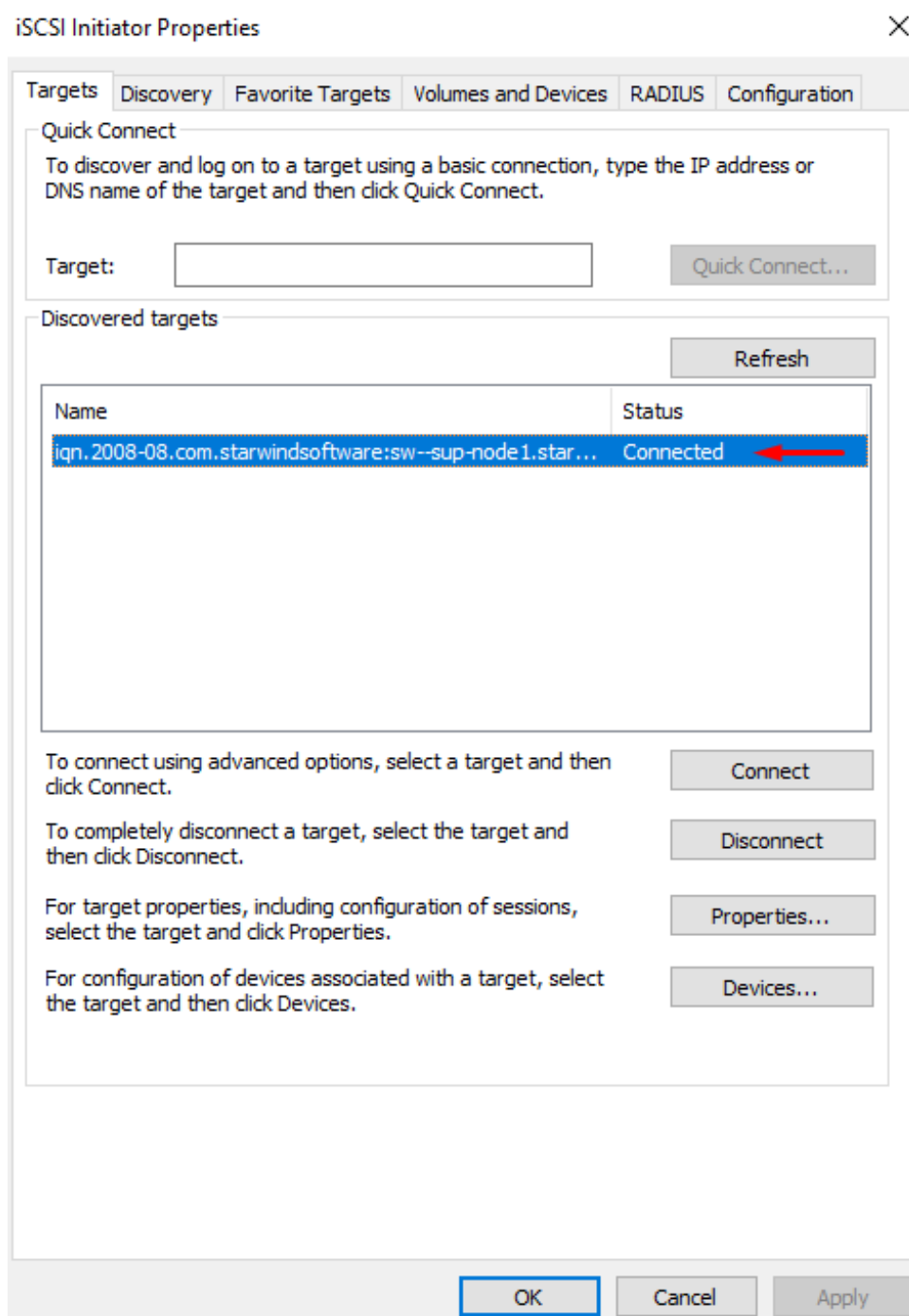
The image shows a screenshot of the 'Advanced Settings' dialog box, specifically the 'IPsec' tab. The dialog has a title bar with a question mark and a close button. It contains several sections:

- Connect using:** A group box containing three dropdown menus:
 - 'Local adapter:' is set to 'Microsoft iSCSI Initiator'.
 - 'Initiator IP:' is set to 'Default'.
 - 'Target portal IP:' is set to '127.0.0.1 / 3260'.
- CRC / Checksum:** Two checkboxes: 'Data digest' and 'Header digest', both are unchecked.
- Enable CHAP log on:** An unchecked checkbox.
- CHAP Log on information:** A section with explanatory text: '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.' Below this text are two input fields:
 - 'Name:' is filled with 'iqn.1991-05.com.microsoft:sw--sup-node1.starwind.local'.
 - 'Target secret:' is an empty field.
- Authentication options:** Three unchecked checkboxes:
 - 'Perform mutual authentication' with subtext: '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'

At the bottom of the dialog are three buttons: 'OK', 'Cancel', and 'Apply'. The 'OK' button is highlighted with a blue border.

Click **OK** and finish the connection.

23. Make sure that your device status is Connected as shown in the picture below:



24. Initialize the disks and create partitions on them using the Disk Management snap-in. The disk devices are required to be visible on both nodes in order to create the cluster.

NOTE: it is recommended to initialize the disks as GPT.

Conclusion

LSFS is a snapshot-based file system that saves only changes made in the environment. Here, we discussed setting up the stand-alone LSFS device using StarWind Virtual SAN for creating a shared storage configuration.

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