

Windows Server 2016 Storage Spaces Direct

Chelsio Solution Brief

Chelsio offers one of the most comprehensive server adapter solutions that can unleash the full value of Windows Server 2016 Storage Spaces Direct for enterprise and cloud installations.

Storage Spaces Direct Overview

Windows Server 2016 Technical Preview introduces Storage Spaces Direct (S2D), which enables building highly available and scalable storage systems with local storage. This is a significant step forward in Microsoft Windows Server software-defined storage (SDS) as it simplifies the deployment and management of SDS systems and also unlocks use of new classes of disk devices, such as SATA and NVMe disk devices, that were previously not possible with clustered Storage Spaces with shared disks.

There are two targeted deployment scenarios for Windows Server 2016 Technical Preview Storage Spaces Direct. Both cases provide storage for Hyper-V, specifically focusing on Hyper-V IaaS (Infrastructure as a Service) for Service Providers and Enterprises.

- The **disaggregated** deployment scenario has the Hyper-V servers (compute component) in a separate cluster from the Storage Spaces Direct servers (storage component).
- The **hyper-converged** deployment scenario has the Hyper-V (compute) and Storage Spaces Direct (storage) components on the same cluster.

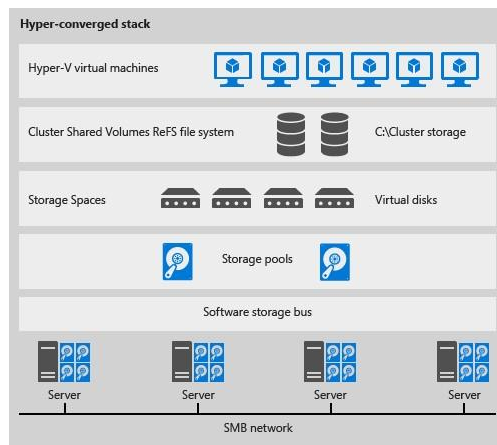


Figure 1 - Hyper-converged Deployment Model

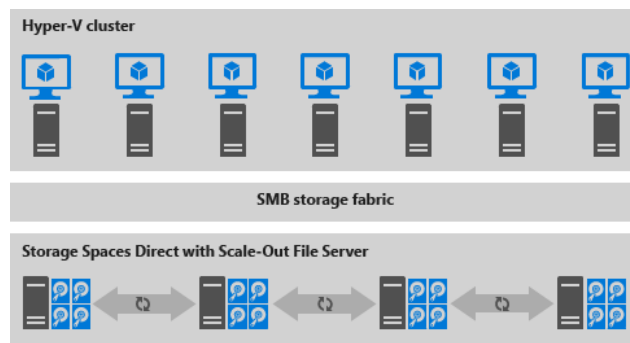


Figure 2 - Disaggregated Deployment Model

Storage Spaces Direct and RDMA Networking

Microsoft addresses the cost and management burdens introduced in complex storage environments with Windows Server 2016 Storage Spaces Direct running over the RDMA (Remote Direct Memory Access)-based SMB Direct protocol. Storage Spaces Direct using SMB Direct delivers near-equivalent performance for business critical applications compared to

traditional SAN solutions. In addition, SMB Direct-enabled S2D can provide dramatic savings to enterprises when compared with SAN solutions. Further, with Windows Server 2016, Microsoft Storage Spaces Direct matches traditional storage offerings feature for feature.

The two RDMA NIC (R-NIC) options supported by S2D, Chelsio iWARP (RDMA/TCP) and RoCE, significantly differ in the requirements imposed on network switches. iWARP R-NICs have equivalent switch configuration requirements compared to L2 NICs, whereas RoCE requires network switches to support Enhanced Traffic Selection (802.1Qaz) and Priority Based Flow Control (802.1p/Q and 802.1Qbb)¹.

Chelsio T5 iWARP for Storage Spaces Direct

Chelsio T5 10/40Gb and upcoming 25/50/100Gb Ethernet iWARP R-NICs fully offload Windows Server 2016 host CPUs, resulting in more efficient virtualized datacenter installs and higher scalability for Storage Spaces Direct. Windows Server 2016 SMB Direct over iWARP RDMA provides higher performance by giving direct access to the data residing on hyper-converged or disaggregated S2D storage, while the CPU reduction enables a larger number of VMs per Hyper-V server, unlocking CapEx and OpEx savings in power dissipation, system configuration and deployment scale throughout the life of the installation. In-box system software support for iWARP RDMA in Windows Server 2016 simplifies storage and Virtual Machines management for enterprise and cloud IT administrators, with no network reconfiguration required.

Chelsio T5 iWARP also enables streamlined, simplified configuration of RDMA high-performance networking for S2D. Unlike the RoCE Ethernet RDMA networking alternative, iWARP does not require a complicated layer-2 configuration for lossless operation, which has been found to be very difficult to deploy, even by experienced IT staff. Also, iWARP operates with standard switches, and does not require the more expensive, DCB capable types. iWARP does not depend on configuring Priority Flow Control consistently throughout the network, which adds many interoperability challenges.

Conclusion

Chelsio 10/25/40/50/100 GbE iWARP R-NICs enable high virtualized application performance by giving direct access to the data residing on hyper-converged or disaggregated Storage Spaces Direct storage, as well as higher scalability for Storage Spaces Direct. Chelsio T5 iWARP also enables much more streamlined, simplified configuration of RDMA high-performance networking for Microsoft Storage Spaces Direct compared to Ethernet RDMA networking alternatives.

Resources

[High Performance Disaster Recovery at 40GbE](#) (White Paper)

[Complete Connectivity Solution for Microsoft Cloud](#) (White Paper)

[Windows 10GbE NVGRE Offload Performance](#) (White Paper)

[Windows SMB 3.0 Performance at 40Gbps](#) (White Paper)

¹ [Hardware options for evaluating Storage Spaces Direct](#)