The needs for modern applications and distributed workloads are causing an explosion in the demands of data transport and storage requirements, bringing about the need for new low-latency/high-bandwidth storage technologies. NVMe/TCP (NVMe over Fabrics/TCP) is a communication protocol that provides high-performance, low-latency access to NVMe flash storage solutions over a network - without the complexity and cost of other NVMe connectivity methodologies that use special switches, adapters, and configuration settings that are more expensive to purchase and operate.

Dell SmartFabric storage Software (SFSS) for NVMe/TCP enables automation of Storage services on a wide range of existing 25GbE / 100GbE IP Fabrics. Additional software-driven automation and life cycle management capabilities can be achieved by using Dell Ethernet Interconnects running SmartFabric OS10, SmartFabric Services, and OpenManage Network Integration (OMNI). These components work together to provide fibre channel-like access control and reliability with automated storage service discovery, endpoint registration, connectivity, and zoning. SFSS orchestrates NVMe/TCP fabric setup, and provides discovery, naming, and zone services to the SAN.

SFSS is a standards-based NVMe/TCP Centralized Discovery Controller (CDC) that provides automated discovery, endpoint management, and zoning services, similar to Fibre Channel. SFSS automates the establishment of IP-based connectivity between NVMe/TCP hosts and NVMe/TCP storage subsystems. SFSS provides the following fabric services:

- **Discovery Service**
  - NVMe/TCP endpoints dynamically discover the SFSS instance
  - SFSS listens and responds to mDNS queries from endpoints in the fabric

- **Endpoint Registration Service**
  - NVMe/TCP endpoints (hosts and subsystems) register their information with SFSS

- **Endpoint Query Service**
  - NVMe/TCP Hosts query SFSS to discover the NVMe/TCP subsystems they can communicate with
  - NVMe/TCP subsystems query SFSS to discover the NVMe/TCP hosts that can connect to them

- **Zone Service**
  - Soft Zoning – SFSS responses only include subsystems zoned for the querying host

- **Asynchronous Notifications**
  - Asynchronous Event Registration – subscribe to state change notifications from endpoints
  - Asynchronous Event Notifications – send notifications to endpoints for state changes
### Dell NVMe IP SAN key features and benefits

<table>
<thead>
<tr>
<th>Dell NVMe IP SAN Features</th>
<th>Customer Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centralized Discovery Controller – SmartFabric Storage Software</td>
<td>Enables a Fibre Channel-like user experience. Customers can control connectivity from a single centralized location instead of having to configure each host manually.</td>
</tr>
<tr>
<td>PowerStore and PowerMax with NVMe/TCP connectivity</td>
<td>To boost your workload performance with faster, more cost-effective networks, the latest PowerStore and PowerMax releases allow hosts to access storage systems across a network fabric using the NVMe/TCP protocol</td>
</tr>
<tr>
<td>Runs over standard IP Ethernet networks</td>
<td>• Take advantage of a ubiquitous transport medium that is widely deployed at scale in demanding environments and lower CAPEX • Keep pace with growing storage traffic by utilizing 25GbE, 100GbE, and 400 GbE connections</td>
</tr>
<tr>
<td>Complete end-to-end solution with full testing and validation</td>
<td>Confidence in deploying cutting-edge NVMe/TCP solutions across Dell servers, storage, and networking that can keep up with capacity and performance needs to help drive revenue growth and unparalleled efficiencies across the infrastructure</td>
</tr>
<tr>
<td>Dell Technologies global support &amp; services</td>
<td>An integrated NVMe/TCP solution that is backed by market-leading global support and services to help minimize connectivity downtime and loss of service</td>
</tr>
</tbody>
</table>

### Technical specifications

- NVM Express Base Specification 2.0b
- NVM Express over Fabrics Revision 1.1a
- NVM Express Technical Proposal 8009 (TP8009) Compliance for mDNS based Discovery
- NVM Express Technical Proposal 8010 (TP8010) Compliance for Registration and Zoning

### Supported Endpoints

**Host:**
- PowerEdge servers running VMware ESXi 7.0U3 or later, or SUSE Linux Enterprise Server 15 SP4: R640, R650, R650XS, R740, R740XD, R750, R840, R940, R940XA, R6115, R6525, R750XS, R7515, R7525 MX740c, MX750c, MX840c
- VxRail solutions running 7.0.400 or later

**Subsystem:**
- PowerStore T/X OS2.1.0 or later
- PowerMax 2500 and 8500

### Supported IP Fabric when using Dell switches

- PowerSwitch S5200, S5448, Z9264, Z9332, Z9432

For 3rd party switches support, please refer to [Interoperability document](#).

For Any 3rd party vendor, please refer to [NVMe/TCP Host/Storage Interoperability](#).
Deployment

SFSS is deployed as a standalone VM (on ESXi or Linux KVM) on an external server platform and comes pre-packaged with all images/packages necessary for a standalone deployment.

Automation: All SFSS configuration, including Storage services and Life cycle management, are accessible through OMNI. CLI, Web UI, and APIs are also available as other options.

- Integration with OpenManage Network (OMNI) for integration with VMware vCenter UI
- Single pane of management for SFSS and SFS with OMNI (coming soon)
- Embedded GUI
- Ansible role and collections
- APIs for integration with external orchestrators

Security for management of user accounts
- RADIUS
- TACACS+

Deployment Topologies

There are three typical deployment topologies for SFSS:

- **Dedicated NVMe IP SAN** - The NVMe IP SAN is a physically separate network dedicated to storage traffic and is separated from the IP LAN traffic that runs workloads and applications.

- **Dedicated Dual NVMe IP SAN** - using air-gapped switches or Leaf-Spine IP Fabrics: Dual resilient NVMe IP SAN networks enable HA for storage traffic and is physically separate from IP LAN traffic that runs workloads and applications.

- **Converged NVMe IP LAN/SAN** - A single IP fabric infrastructure for LAN and SAN traffic enables optimized infrastructure for best performance and Cost trade-off

Licensing

SFSS supports a licensing mechanism to activate SFSS services. Customers have the option to start with a Base 48 port endpoint license and an optional expansion license to support expansion up-to 2048 endpoints.

**Base License Options**

- SFSS Enterprise License (48 endpoints, perpetual)
- SFSS Partner License (10 endpoints, perpetual, no expansions allowed, non-production deployment)

**Expansion License Options**

- SFSS Expansion License (16 endpoints increments, perpetual)
- SFSS Expansion License (48 endpoint increments, perpetual)
## Scale

<table>
<thead>
<tr>
<th>Number</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max number of CDC instances</td>
<td>16</td>
</tr>
<tr>
<td>Max number of endpoints (TCP connections to SFSS) per SFSS App</td>
<td>2048</td>
</tr>
<tr>
<td>Max number of sub systems returned to a host in a getLogPage response</td>
<td>16</td>
</tr>
<tr>
<td>Max number of zone groups</td>
<td>16</td>
</tr>
<tr>
<td>Max number of zones per zone group</td>
<td>26</td>
</tr>
<tr>
<td>Max number of members per zone</td>
<td>80</td>
</tr>
</tbody>
</table>

## Infrastructure for SFSS

<table>
<thead>
<tr>
<th>Resources</th>
<th>Minimum requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESXi Host Configuration</td>
<td>7.0U3 or later</td>
</tr>
<tr>
<td>Linux Host Configuration</td>
<td>Linux with KVM</td>
</tr>
<tr>
<td>OMNI plugin for vCenter</td>
<td>3.0.0</td>
</tr>
<tr>
<td>Hardware Processor</td>
<td>8 vCPUs</td>
</tr>
<tr>
<td>Hardware RAM</td>
<td>16GB</td>
</tr>
<tr>
<td>Network</td>
<td>1x Management Network</td>
</tr>
<tr>
<td></td>
<td>1x Storage Area Network **</td>
</tr>
<tr>
<td>Hard disk</td>
<td>40GB</td>
</tr>
</tbody>
</table>

**can add additional storage networks on demand**

## Ordering Information

### Software

- **Dell SmartFabric Storage Software**
  - Enterprise License, 48 Endpoints (528-CSSK)
  - Partner License (528-CSSL)

- **Dell SmartFabric Storage Software Expansion License**
  - Expansion License 16 Endpoints (528-CTMP)
  - Expansion License, 48 Endpoints (528-CSSM)
IT Lifecycle Services for Networking

**Experts, insights and ease**
Our highly trained experts, with innovative tools and proven processes, help you transform your IT investments into strategic advantages.

**Plan & Design**
Let us analyze your multivendor environment and deliver a comprehensive report and action plan to build upon the existing network and improve performance.

**Deploy & Integrate**
Get new wired or wireless network technology installed and configured with ProDeploy. Reduce costs, save time, and get up and running fast.

**Educate**
Ensure your staff builds the right skills for long-term success. Get certified on Dell Networking technology and learn how to increase performance and optimize infrastructure.

**Manage & Support**
Gain access to technical experts and quickly resolve multivendor networking challenges with ProSupport. Spend less time resolving network issues and more time innovating.

**Optimize**
Maximize performance for dynamic IT environments with Dell Optimize. Benefit from in-depth predictive analysis, remote monitoring and a dedicated systems analyst for your network.

**Retire**
We can help you resell or retire excess hardware while meeting local regulatory guidelines and acting in an environmentally responsible way.

Learn more at [DellTechnologies.com/Services](https://www.delltechnologies.com/services)