



# Requirements

## Element Software

NetApp  
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# Requirements

Before you get started, you should review the prerequisites to deploy NetApp Element software, including networking and port requirements.

- [Networking requirements](#)
- [Switch configuration](#)
- [Network port requirements](#)

## Find more information

- [SolidFire and Element Software Documentation](#)

## Networking

The network setup for a SolidFire system consists of switch and port requirements. The implementation of these depends on your system.

### For more information

- [Switch configuration for clusters running Element software](#)
- [Network port requirements](#)
- [SolidFire and Element Software Documentation](#)
- [NetApp Element Plug-in for vCenter Server](#)

## Switch configuration for clusters running Element software

The NetApp Element software system has certain switch requirements and best practices for optimal storage performance.

Storage nodes require 10 or 25GbE Ethernet switches, depending on specific node hardware, for iSCSI storage services and node intra-cluster services communication. 1GbE switches can be used for these types of traffic:

- Management of the cluster and the nodes
- Intra-cluster management traffic between the nodes
- Traffic between the cluster nodes and the management node virtual machine

**Best Practice:** You should implement the following best practices when configuring Ethernet switches for cluster traffic:

- For non-storage traffic in the cluster, deploy a pair of 1GbE switches to provide high availability and load sharing.
- On the storage network switches, deploy switches in pairs and configure and utilize jumbo frames (an MTU size of 9216 bytes). This ensures a successful installation and eliminates storage network errors due to fragmented packets.

Element deployment requires at least two network segments, one for each of the following types of traffic:

- Management
- Storage/Data

Depending on the NetApp H-Series storage node models and the planned cabling configuration, you can physically separate these networks using separate switches or logically separate them using VLANs. For most deployments, however, you need to logically separate these networks using VLANs.

Storage nodes need to be able to communicate before, during, and after deployment.

If you are implementing separate management networks for storage nodes, ensure that these management networks have network routes between them. These networks must have gateways assigned, and there must be a route between the gateways. Ensure that each new node has a gateway assigned to facilitate communication between nodes and management networks.

NetApp Element requires the following:

- All switch ports connected to NetApp H-Series storage nodes must be configured as spanning tree edge ports.
  - On Cisco switches, depending on the switch model, software version and port type, you can do this with one of the following commands:
    - `spanning-tree port type edge`
    - `spanning-tree port type edge trunk`
    - `spanning-tree portfast`
    - `spanning-tree portfast trunk`
  - On Mellanox switches, you can do this with the `spanning-tree port type edge` command.
- The switches handling storage traffic must support speeds of at least 10GbE per port (up to 25GbE per port is supported).
- The switches handling management traffic must support speeds of at least 1GbE per port.
- You must configure jumbo frames on the switch ports handling storage traffic. Hosts must be able to send 9000 byte packets end-to-end for a successful installation.
- Round-trip network latency between all storage nodes should not exceed 2ms.

Some nodes provide additional out-of-band management capabilities via a dedicated management port. NetApp H300S, H500S, and H700S nodes also allow for IPMI access via Port A. As a best practice, you should ease remote management by configuring out-of-band management for all nodes in your environment.

## For more information

- [NetApp HCI network and switch requirements](#)
- [SolidFire and Element Software Documentation](#)
- [NetApp Element Plug-in for vCenter Server](#)

## Network port requirements

You might need to allow the following TCP and UDP ports through your data center's edge firewall so that you can manage the system remotely and allow clients outside of your data center to connect to resources. Some of these ports might not be required, depending on how you use the system.

All ports are TCP unless stated otherwise, and all TCP ports must support three-way handshake communication between the NetApp Support Server, management node, and nodes running Element software. For example, the host on a management node source communicates with the host on a storage cluster MVIP destination through TCP port 443, and the destination host communicates back to the source host through any port.



Enable ICMP between the management node, nodes running Element software, and cluster MVIP.

The following abbreviations are used in the table:

- MIP: Management IP address, a per-node address
- SIP: Storage IP address, a per-node address
- MVIP: Management virtual IP address
- SVIP: Storage virtual IP address

Source	Destination	Port	Description
iSCSI clients	Storage cluster MVIP	443	(Optional) UI and API access
iSCSI clients	Storage cluster SVIP	3260	Client iSCSI communications
iSCSI clients	Storage node SIP	3260	Client iSCSI communications
Management node	sfsupport.solidfire.com	22	Reverse SSH tunnel for support access
Management node	Storage node MIP	22	SSH access for support
Management node	DNS servers	53 TCP/UDP	DNS lookup
Management node	Storage node MIP	442	UI and API access to storage node and Element software upgrades

Source	Destination	Port	Description
Management node	Storage cluster MVIP	442	UI and API access to storage node and Element software upgrades
Management node	monitoring.solidfire.com	443	Storage cluster reporting to Active IQ
Management node	Storage cluster MVIP	443	UI and API access to storage node and Element software upgrades
Management node	repo.netapp.com	443	Provides access to components necessary to install/update on-premises deployment.
Management node	Storage node BMC/IPMI	623 UDP	RMCP port. This is required to manage IPMI-enabled systems.
Management node	Witness Node	9442	Per-node configuration API service
Management node	vCenter Server	9443	vCenter Plug-in registration. The port can be closed after registration is complete.
SNMP server	Storage cluster MVIP	161 UDP	SNMP polling
SNMP server	Storage node MIP	161 UDP	SNMP polling
Storage node BMC/IPMI	Management node	623 UDP	RMCP port. This is required to manage IPMI-enabled systems.
Storage node MIP	DNS servers	53 TCP/UDP	DNS lookup
Storage node MIP	Management node	80	Element software upgrades
Storage node MIP	S3/Swift endpoint	80	(Optional) HTTP communication to S3/Swift endpoint for backup and recovery
Storage node MIP	NTP server	123 UDP	NTP
Storage node MIP	Management node	162 UDP	(Optional) SNMP traps
Storage node MIP	SNMP server	162 UDP	(Optional) SNMP traps
Storage node MIP	LDAP server	389 TCP/UDP	(Optional) LDAP lookup
Storage node MIP	Management node	443	Element storage firmware upgrades

Source	Destination	Port	Description
Storage node MIP	Remote storage cluster MVIP	443	Remote replication cluster pairing communication
Storage node MIP	Remote storage node MIP	443	Remote replication cluster pairing communication
Storage node MIP	S3/Swift endpoint	443	(Optional) HTTPS communication to S3/Swift endpoint for backup and recovery
Storage node MIP	Management node	514 TCP/UDP 10514 TCP/UDP	Syslog forwarding
Storage node MIP	Syslog server	514 TCP/UDP 10514 TCP/UDP	Syslog forwarding
Storage node MIP	LDAPS server	636 TCP/UDP	LDAPS lookup
Storage node MIP	Remote storage node MIP	2181	Intercluster communication for remote replication
Storage node SIP	Remote storage node SIP	2181	Intercluster communication for remote replication
Storage node SIP	Storage node SIP	3260	Internode iSCSI
Storage node SIP	Remote storage node SIP	4000 through 4020	Remote replication node-to-node data transfer
System administrator PC	Management node	442	HTTPS UI access to management node
System administrator PC	Storage node MIP	442	HTTPS UI and API access to storage node
System administrator PC	Management node	443	HTTPS UI and API access to management node
System administrator PC	Storage cluster MVIP	443	HTTPS UI and API access to storage cluster

Source	Destination	Port	Description
System administrator PC	Storage node baseboard management controller (BMC)/Intelligent Platform Management Interface (IPMI) H410 and H600 series	443	HTTPS UI and API access to node remote control
System administrator PC	Storage node MIP	443	HTTPS storage cluster creation, post-deployment UI access to storage cluster
System administrator PC	Storage node BMC/IPMI H410 and H600 series	623 UDP	Remote Management Control Protocol port. This is required to manage IPMI-enabled systems.
System administrator PC	Witness Node	8080	Witness Node per-node web UI
vCenter Server	Storage cluster MVIP	443	vCenter Plug-in API access
vCenter Server	Remote plug-in	8333	Remote vCenter Plug-in service
vCenter Server	Management node	8443	(Optional) vCenter Plug-in QoSIOC service.
vCenter Server	Storage cluster MVIP	8444	vCenter VASA provider access (VVols only)
vCenter Server	Management node	9443	vCenter Plug-in registration. The port can be closed after registration is complete.

## For more information

- [SolidFire and Element Software Documentation](#)
- [NetApp Element Plug-in for vCenter Server](#)

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