Module 7
NDMP and tape backup

NAS data backup solution

About this module

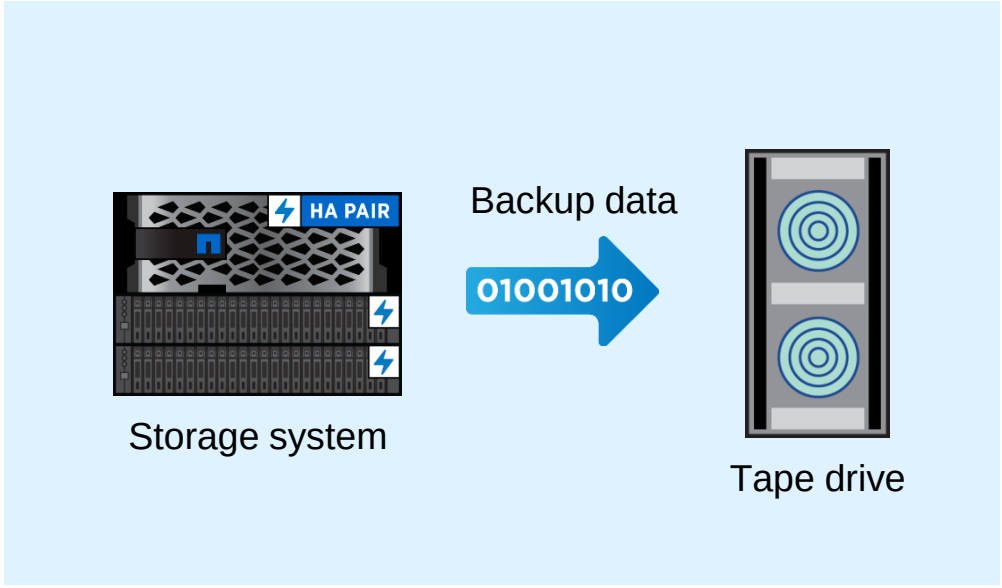
This module focuses on enabling you to do the following:

- Describe how NetApp ONTAP software uses NDMP to back up NAS data to tape storage
- Describe the various NDMP topologies
- Explain the NDMP modes of operation that are available in ONTAP software
- Identify the required NDMP configurations for preparing an ONTAP cluster to communicate with backup management software
- Monitor NDMP-based operations from the ONTAP CLI

Lesson 1
NDMP fundamentals

NDMP overview

- NDMP is an industry-standard open protocol that was invented by NetApp for network-based data backup.
- NDMP provides control over backup operations between storage systems and tape drives.



NDMP terms

Data management application	The data management application enables management and control of backup and restore operations.
Direct access recovery (DAR)	DAR enables quick access to the secondary media during a recovery operation.
Cluster Aware Backup (CAB) extension	The CAB NDMPv4 extension enables NDMP to connect to a node and determine if volumes and tape devices are on the node.
Connection address extension (CAE)	The CAE supports IPv6.
Affinity information	Affinity information is unique location information about volumes and tape devices.

Tape backup of FlexVol volumes

- Enabling NDMP on an ONTAP storage system enables communication with NDMP-enabled backup applications.
- ONTAP software supports two engines for tape backup:
  - Dump
  - SMTape

Tape backup using dump	A method that uses Snapshot copies to back up file system data to tape
Tape backup using SMTape	A method that uses Snapshot copies to back up volumes to tape

Use cases for choosing a tape backup engine

Use cases for dump

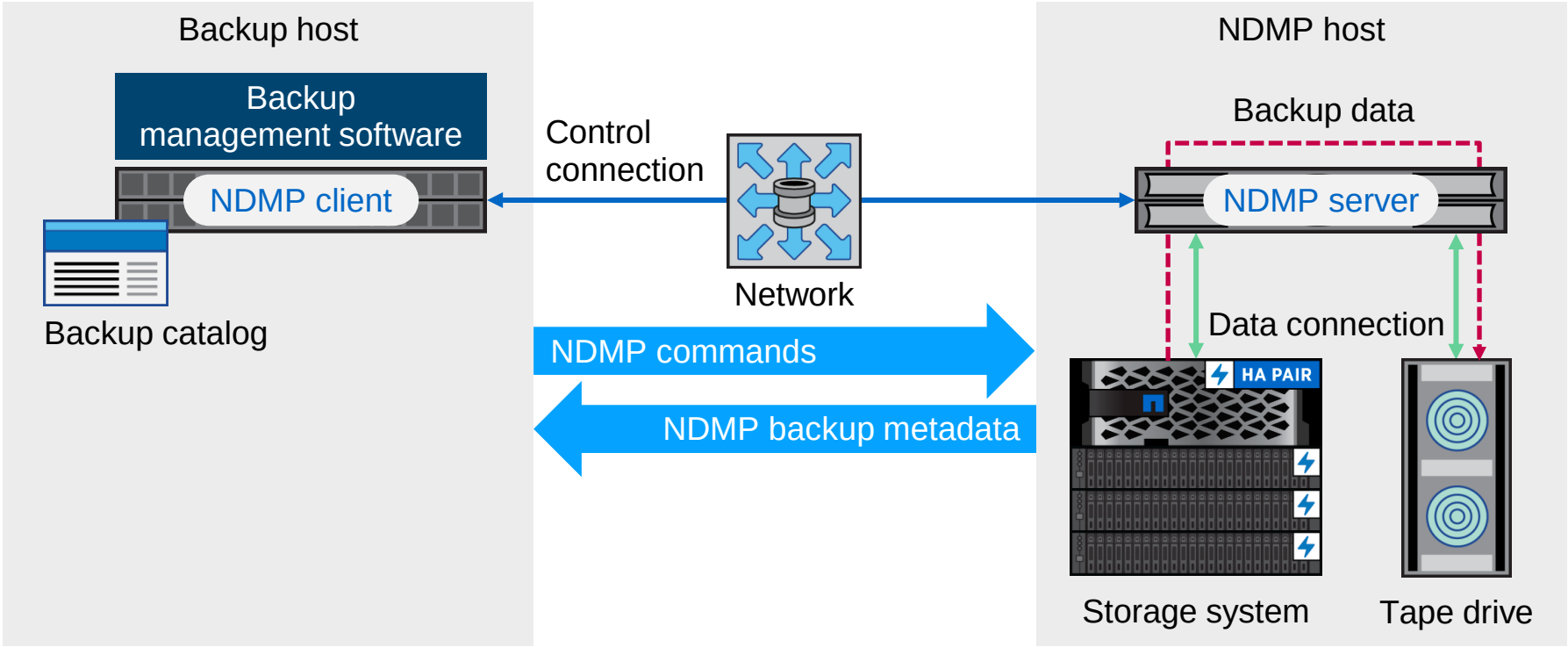
- Direct Access Recovery (DAR) of files and directories
- Back up a subset of subdirectories or files in a specific path
- Exclude specific files and directories during backups
- Preserve backups for long durations

Use cases for SMTape

- Disaster recovery solution
- Preserve deduplication savings and deduplication settings on the backed-up data during a restore operation
- Back up large volumes

Lesson 2
NDMP topologies

Generic NDMP configuration

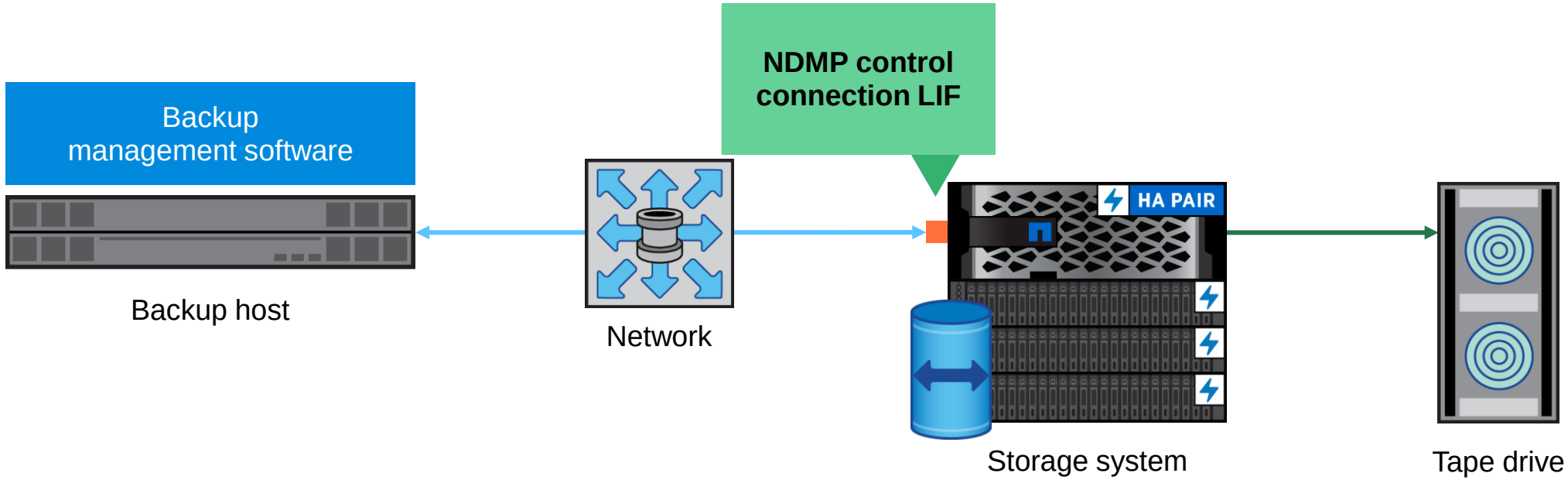


NDMP backup topologies

ONTAP software supports the following NDMP backup topologies:

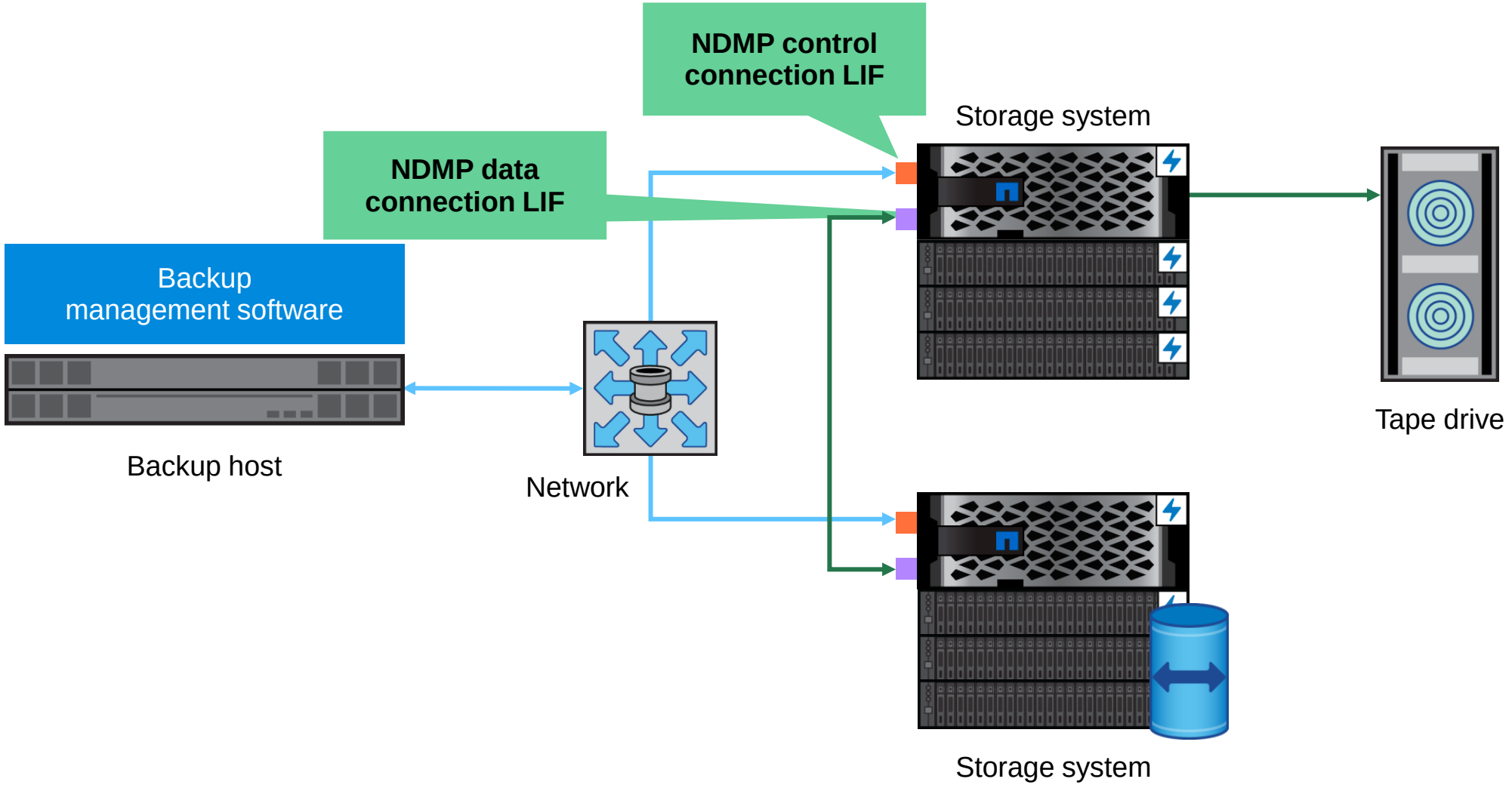
- Storage system to local tape (local or direct configuration)
- Storage system to tape attached to another storage system (three-way configuration)
- Storage system to network-attached tape library
- Storage system to data server to tape (indirect or remote configuration)

Storage system to local tape (local configuration)

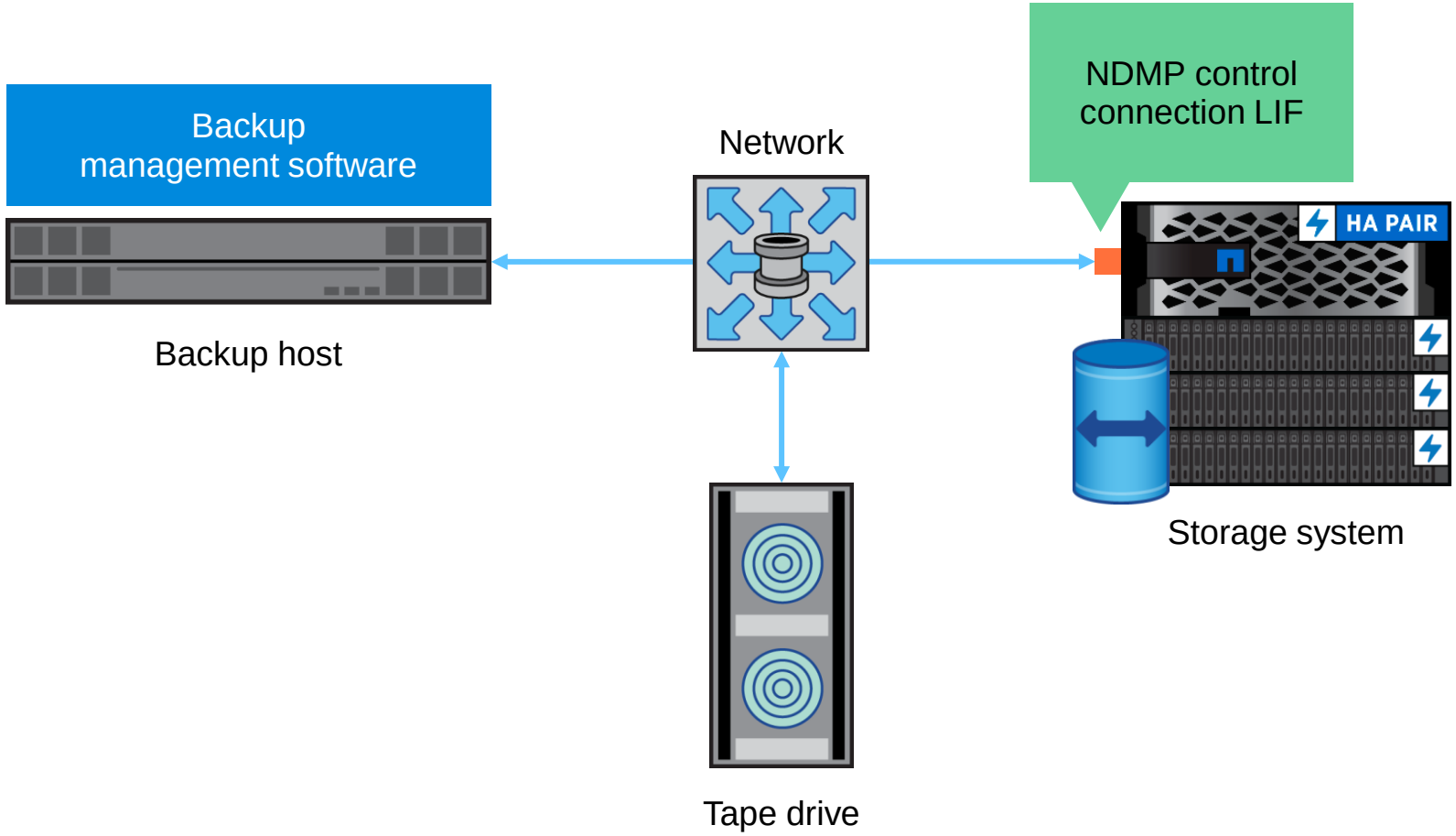


Storage system to tape that is attached to another storage system

Three-way configuration

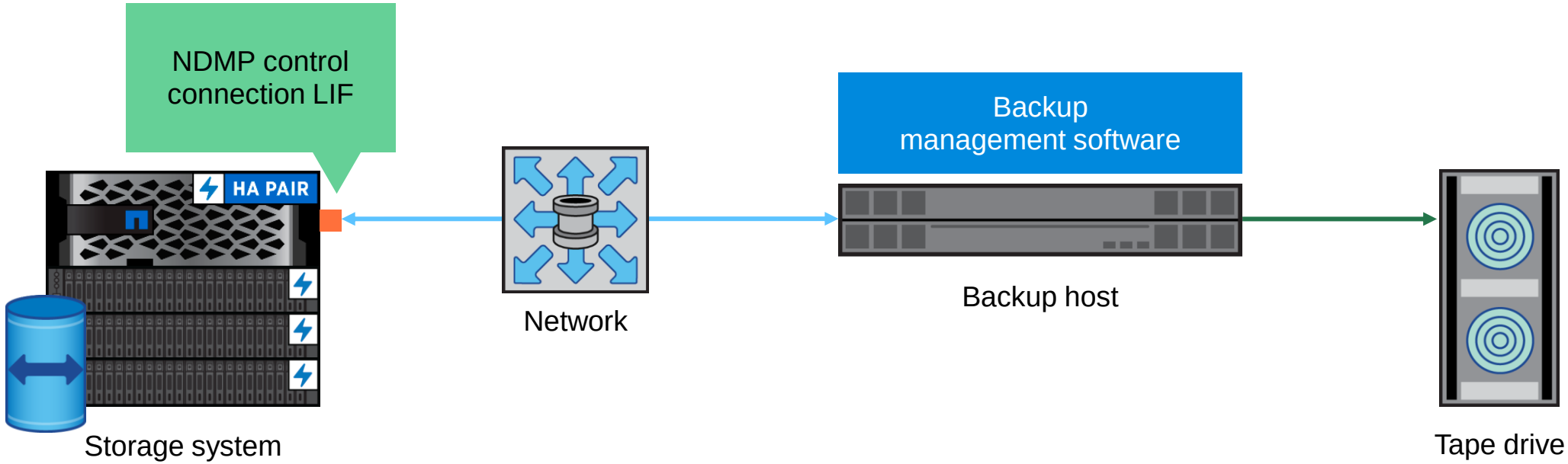


Storage system to network-attached tape library



Storage system to data server to tape

Indirect configuration



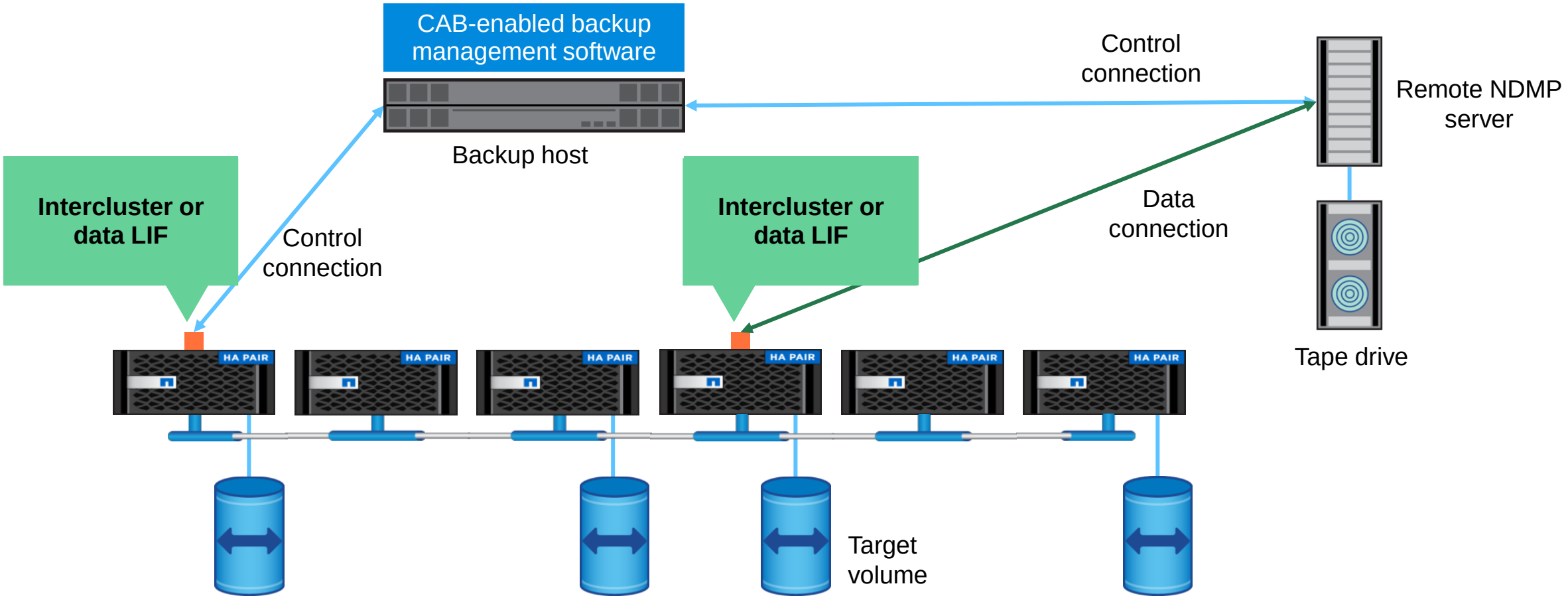
Lesson 3
NDMP management

NDMP modes of operation

ONTAP software has two NDMP modes of operation:

Storage Virtual Machine (SVM)-scoped NDMP mode (Default)	Back up and restore all volumes that are hosted across different nodes in an SVM *(Requires the backup application to supports the CAB extension)*
Node-scoped NDMP mode (deprecated)	Perform backup and restore operations at the node level

SVM-scoped NDMP mode



Availability of volumes and tape devices by LIF type

When the backup application supports CAB

LIF type	Volumes that are available for backup and restore	Types of devices that are available for backup and restore
Node-Management LIF	All volumes that are hosted by a node	Tape devices that are connected to the node that hosts the node-management LIF
Data LIF	All volumes that belong to the SVM that hosts the data LIF	None
Cluster-Management LIF	All volumes in the cluster	All tape devices in the cluster
Intercluster LIF	All volumes in the cluster	All tape devices in the cluster

Availability of volumes and tape devices by LIF type

When the backup application does *not* support CAB

LIF type	Volumes that are available for backup and restore	Types of devices that are available for backup and restore
Node-Management LIF	All the volumes on a node	Tape devices that are connected to the node that hosts the node-management LIF
Data LIF	Only the volumes that belong to the SVM on a node that hosts the data LIF	None
Cluster-Management LIF	All the volumes on a node that hosts the cluster-management LIF	None
Intercluster LIF	All the volumes on a node that hosts the intercluster LIF	Tape devices that are connected to the node that hosts the intercluster LIF

SVM-scoped NDMP management

```
cluster1::> vserver add-protocols -vserver svm1 -protocols ndmp
```

Add NDMP to the list of protocols that are enabled to run on the SVM.

```
cluster1::> vserver services ndmp on -vserver svm1
```

Enable the NDMP service for the SVM.

```
cluster1::> vserver services ndmp show
VServer         Enabled   Authentication type
--------------- --------- -------------------
svm1            true      challenge
svm3            false     challenge
```

Verify that NDMP is enabled for the SVM.

SVM-scoped NDMP management commands

Command	Action
`vserver services ndmp on`	Enable NDMP service
`vserver services ndmp off`	Disable NDMP service
`vserver services ndmp show`	Display an NDMP configuration
`vserver services ndmp modify`	Modify an NDMP configuration
`vserver services ndmp version`	Display the default NDMP version
`vserver services ndmp status`	Display all NDMP sessions
`vserver services ndmp probe`	Display detailed information about all NDMP sessions

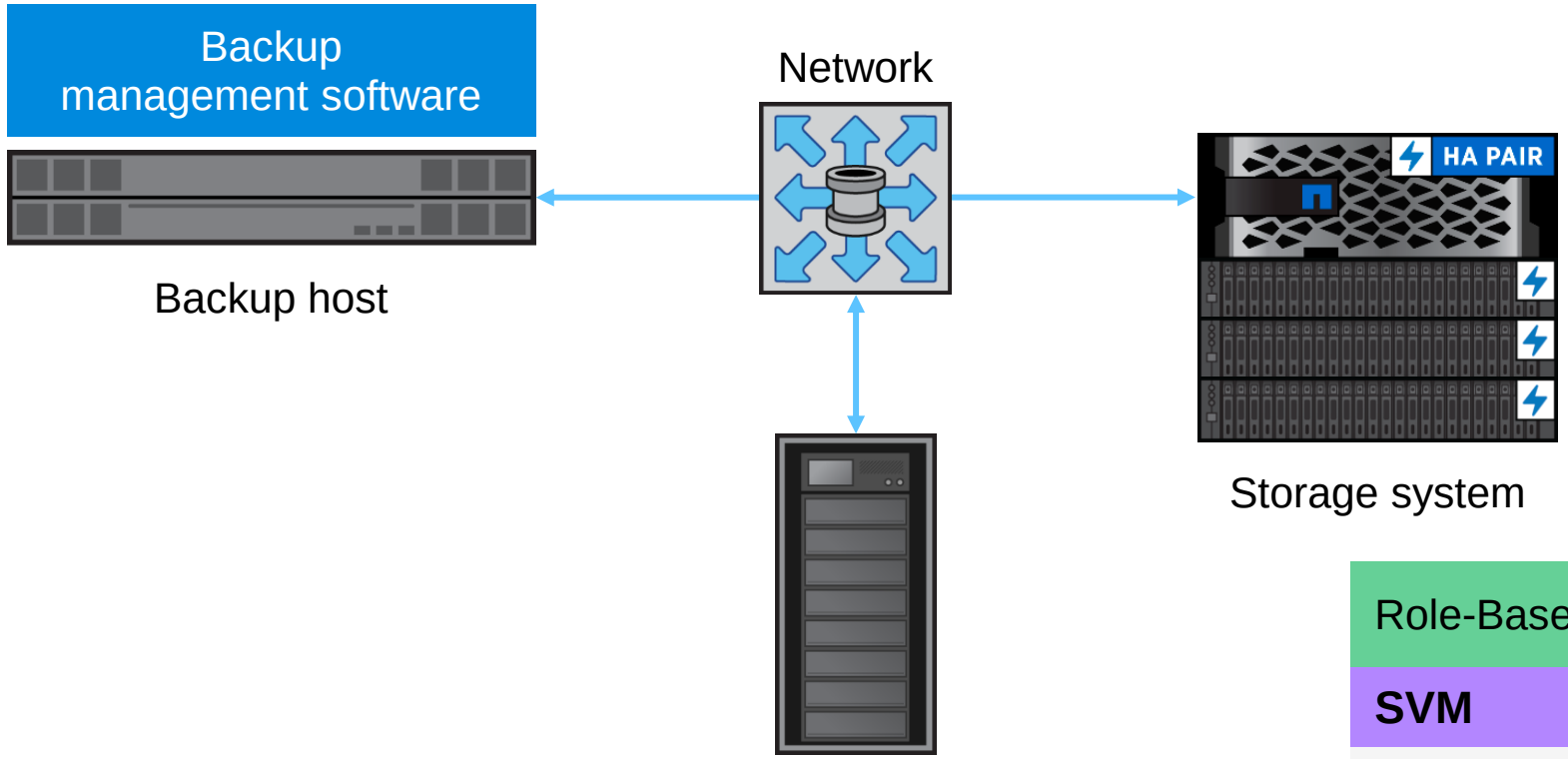
SVM-scoped NDMP management commands

Command	Action
`vserver services ndmp kill`	Terminate a specified NDMP session
`vserver services ndmp kill-all`	Terminate all NDMP sessions
`vserver services ndmp generate-password`	Generate the NDMP password
`vserver services ndmp extensions show (advanced)`	Display the NDMP extension status
`vserver services ndmp extensions modify (advanced)`	Modify (enable or disable) the NDMP extension status
`vserver services ndmp log start (advanced)`	Start logging for the specified NDMP session
`vserver services ndmp log stop (advanced)`	Stop logging for the specified NDMP session

NDMP environment variables

- NDMP environment variables communicate information about a backup operation between a backup application and a storage system.
- Example: If you specify that a backup application should back up `/vserver1/vol1/dir1`, the backup application sets the FILESYSTEM environment variable to `/vserver1/vol1/dir1`.
- Although the backup application automatically sets the environment variables, some variables can be manually set.

User authentication



Role-Based Access Control (RBAC) roles	
SVM	**Cluster**
vsadmin	admin
vsadmin-backup	backup

Action

Try this task

Using cluster1 in your exercise kit, enter two commands:

- `system services ndmp ?`
- `vserver services ndmp ?`

Answer the following questions:

1. How many commands are deprecated in the `system services ndmp` command syntax?
2. How many commands are deprecated in the `vserver services ndmp` command syntax?

Resources

- *ONTAP Data Protection Tape Backup and Recovery Guide*

  https://docs.netapp.com/ontap-9/topic/com.netapp.doc.dot-cm-ptbrg/Data%20protection%20using%20tape%20backup.pdf

- *ONTAP NDMP Configuration Express Guide*

  https://docs.netapp.com/ontap-9/topic/com.netapp.doc.exp-ndmp/NDMP%20express%20configuration.pdf

- *Storage Networking Industry Association (SNIA) resources on NDMP*

  https://www.snia.org/ndmp

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Knowledge check

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Knowledge check

Which version of NDMP does ONTAP software support?

a. 1

b. 2

c. 3

d. 4

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a. 1

b. 2

c. 3

d. 4

Knowledge check

You want to back up and restore all volumes across all nodes in an SVM. The data management application supports the NDMP. Which two actions do you take? (Choose two.)

a. Enable node-scoped NDMP mode.

b. Configure a direct NDMP backup connection to every node in the cluster.

c. Enable SVM-scoped NDMP mode.

d. Ensure that the data management application supports the CAB extension.

Knowledge check

You want to back up and restore all volumes across all nodes in an SVM. The data management application supports the NDMP. Which two actions do you take? (Choose two.)

a. Enable node-scoped NDMP mode.

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c. Enable SVM-scoped NDMP mode.

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