Technical Report

RestfulAPI transition guide to ASA r2

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Abstract

This technical report illustrates the REST API endpoints for ASA r2 configuration. It covers the differences between the ASA r2 system REST API and unified ONTAP REST API which is applicable to the rest of the NetApp ONTAP storage platforms.

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Overview

ASA r2 systems deliver a dedicated hardware and software solution optimized for SAN-only environments on all-flash platforms. Unlike traditional ONTAP-based systems such as AFF, FAS, and earlier ASA platforms, ASA r2 introduces a distinct storage architecture, supports a refined set of SAN protocols, and operates with a specialized ONTAP personality tailored exclusively for block-based workloads.

The ASA r2 REST API is based on the REST API provided with the unified ONTAP personality, with a number of changes adapted to the unique characteristics and capabilities of the ASA r2 personality.

NetApp ASA r2

The NetApp ASA r2 systems are simple, powerful, optimized for block deployments, and offer advanced data management and protection capabilities. With NetApp 100% Data Availability Guarantee and symmetric active-active multipathing, ASA r2 systems enable modernization of SAN infrastructure, streamlined storage administration, and acceleration of mission-critical applications.

The ASA r2 family includes ASA A20, A30, A50, A70, A90, and A1K. These offer a wide range of performance and capacity to meet the diverse customer requirements for their SAN solutions. The ASA r2 systems support IP-based and FC-based SAN protocols, including iSCSI, NVMe/TCP, FC, and NVMe/FC. Table 1 below highlights some of the key technical specifications of the ASA r2 platforms.

Table 1) Key ASA r2 platforms technical specifications.

Specifications	ASA A1K	ASA A90	ASA A70	ASA A50	ASA A30	ASA A20
Form factor	2 x 2U	4U	4U	2U	2U	2U
Max. raw capacity per HA pair	2.67 PB	2.67 PB	2.67 PB	1.8 PB	1.1 PB	734 TB
Max. raw capacity per cluster	16 PB	16 PB	16 PB	11 PB	4.4 PB	2.2 PB
Max. cluster size	12 Nodes	12 Nodes	12 Nodes	12 Nodes	8 Nodes	6 Nodes
PCIe expansion slots per HA pair	18	18	18	8	8	8
Max. Ethernet speed	200 Gbps	200 Gbps	200 Gbps	100 Gbps	100 Gbps	100 Gbps
Max. FC speed	64 Gbps	64 Gbps	64 Gbps	64 Gbps	64 Gbps	64 Gbps
Minimum ONTAP version	9.16.0 GA	9.16.0 GA	9.16.0 GA	9.16.1	9.16.1	9.16.1

Note: Please see NetApp ASA datasheet and NetApp Hardware Universe for detailed technical specifications and the various supported configurations and cluster limits of these new ASA platforms.

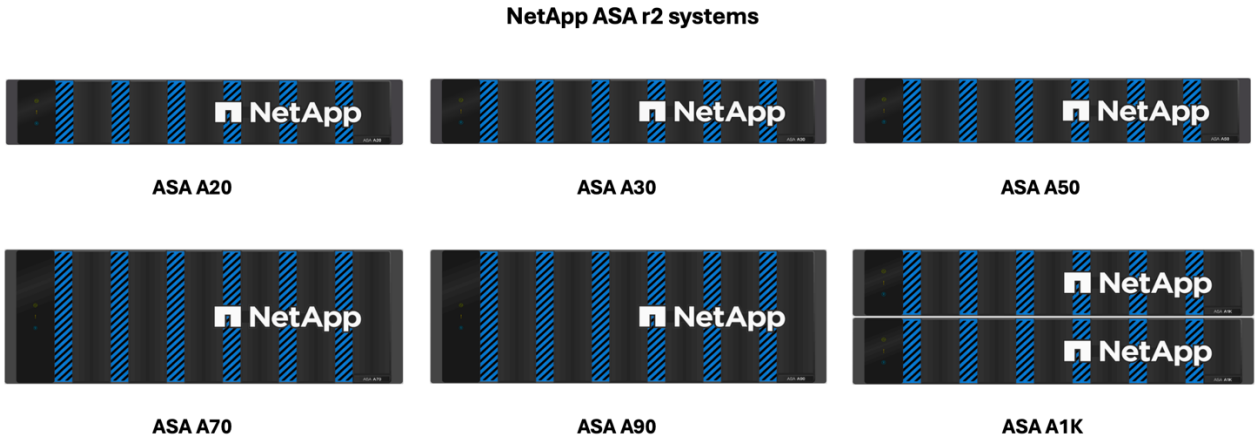
The NetApp new ASA A-series storage systems offer the following important benefits:

- Continuous data availability with dual-controller architecture, symmetric active-active multipathing access to storage, non-disruptive firmware upgrade, and six-nines data availability guarantee.
- Always-on storage efficiency with data compression, deduplication, and compaction to efficiently store your data with 4:1 storage efficiency guarantee.
- Scale-out storage performance with clustering for to up to 6 nodes for ASA A20, up to 8 nodes for ASA A30, and up to 12 nodes for the remaining mid-range and high-end ASA A-Series storage systems.

- Secure storage access and administration with multi-factor authentication, role-based access control, multi-admin verification to safe-guard sensitive storage operations, secure multi-tenancy to minimize attack surface, and FIPS 140-2 compliant mode for regulatory compliance.
- Simple to deploy, manage, and upgrade the storage system. Easy to provision SAN storage units (LUNs and NVMe namespaces) and add data protection from ONTAP System Manager.

The following figure illustrates the NetApp ASA r2 storage platforms.

Figure 1) NetApp ASA r2 systems.



To get started on using the NetApp ASA r2 storage systems to protect your critical business data, check out the information available on the ASA r2 documentation site.

NetApp ONTAP

NetApp® ONTAP® is an enterprise data-management platform with native capabilities that includes industry leading storage efficiency capabilities and could be clustered up to 12 nodes for SAN using mid-range and high-end platforms. NetApp Snapshot™ technology which is an integral part of ONTAP enables instantaneous backups of critical datasets and cloning of datasets and offers comprehensive disaster recovery capabilities.

NetApp storage systems also offer a hybrid cloud foundation for customers to take advantage of the seamless data mobility enabled by NetApp intelligent data infrastructure which can easily get data from the edge where it is generated to the core where it is utilized and to the cloud to take advantage of the on-demand elastic compute and AI / ML capabilities to gain actionable business insights from your valuable data.

NetApp ONTAP System Manager is a web service included with ONTAP. You can use a web browser to manage ONTAP storage system and storage units (iSCSI LUNs and NVMe namespaces). You can create consistency group for related storage units used by an application and then create Snapshot for the consistency group to back up your application. In ONTAP System Manager, you can view information regarding important alerts and notifications, see capacity utilization and storage efficiency, configure network and host access to the storage system, and perform ONTAP updates.

ASA r2 system differences

ASA r2 systems offer a hardware and software solution for SAN-only environments built on all flash platforms. ASA r2 systems vary from other ONTAP systems (ASA, AFF, and FAS) in the implementation of its storage layer, supported protocols, and ONTAP personality.

The major differences between ASA r2 systems and FAS, AFF, and ASA systems relevant to the ONTAP command line interface (CLI) and REST API are described below.

- Default SVM creation with protocol services: When a cluster is created, a default data SVM, svm1, is created with the SAN protocols enabled. IP data LIFs support iSCSI and NVMe/TCP protocols and use the default-data-blocks service policy by default.
- Automatic volume creation: Instead of user-managed aggregates and volumes, ONTAP manages the common pool of storage with storage availability zone and automatically creates or deletes the associated volume when a storage unit is created or deleted.
- Changes to thin and thick provisioning: Storage units are always thinly provisioned, and they are automatically placed and rebalanced as needed. Thick provisioning is not supported.
- Changes to data compression: Temperature-sensitive storage efficiency is not applicable, and data compression begins without waiting for data to become cold.

Due to the differences, ONTAP CLI, ONTAP System Manager, and ONTAP REST API endpoints have changed accordingly to simplify user experience.

For more information, refer to the following link: https://docs.netapp.com/us-en/asa-r2/learn-more/hardware-comparison.html

ONTAP Automation

There are various options available to automate the deployment and administration of your ONTAP storage systems.

ONTAP REST API

Starting with ONTAP 9.6, ONTAP includes an expansive REST API that provides the foundation for automating the deployment and management of your storage systems. Since its release, the API has evolved significantly and is now the recommended and strategic approach for automating the administration of ONTAP deployments.

Note: You should review the ONTAP Release Notes for additional information including known limitations or issues. Also refer Changes to ONTAP REST API calls for any changes that might impact your automation software.

Note: For ASA r2 REST API implementation, latest ONTAP version 9.16.1P3 is used here.

Access the REST API natively

Users can access the ONTAP REST API directly using any programming language that supports a REST client. Popular language choices include Python, PowerShell, and Java.

Note: The ONTAPI API (Zephyr API or ZAPI) is not available for ASA r2 systems.

Client software toolkits

NetApp provides client toolkits that abstract the ONTAP REST API and make it easier to create automation code. Customers should choose one appropriate for their development language and environment.

Python client library

The Python client library is a package one can use when writing scripts to access the ONTAP REST API. It provides support for several underlying services, including connection management, asynchronous request processing, and exception handling. Leveraging this library enables you to quickly build reliable

and efficient automation solutions for ONTAP. For more information, refer to the Python client library documentation.

PowerShell toolkit

Customers can use the NetApp ONTAP PowerShell Toolkit to automate the administration of an ONTAP cluster from a Windows host. See Learn about the NetApp PowerShell Toolkit for more information

Automation frameworks

Users can also create and deploy automation code using one of several frameworks.

Ansible

Ansible is an open-source software tool that supports provisioning, configuration management, and application deployment. NetApp provides Ansible-certified modules that customers can use to automate the administration of their ONTAP storage systems.

Refer to following links for additional information:

- NetApp Ansible DevOps Solutions
- Getting Started with NetApp and Ansible

REST API support for ASA r2

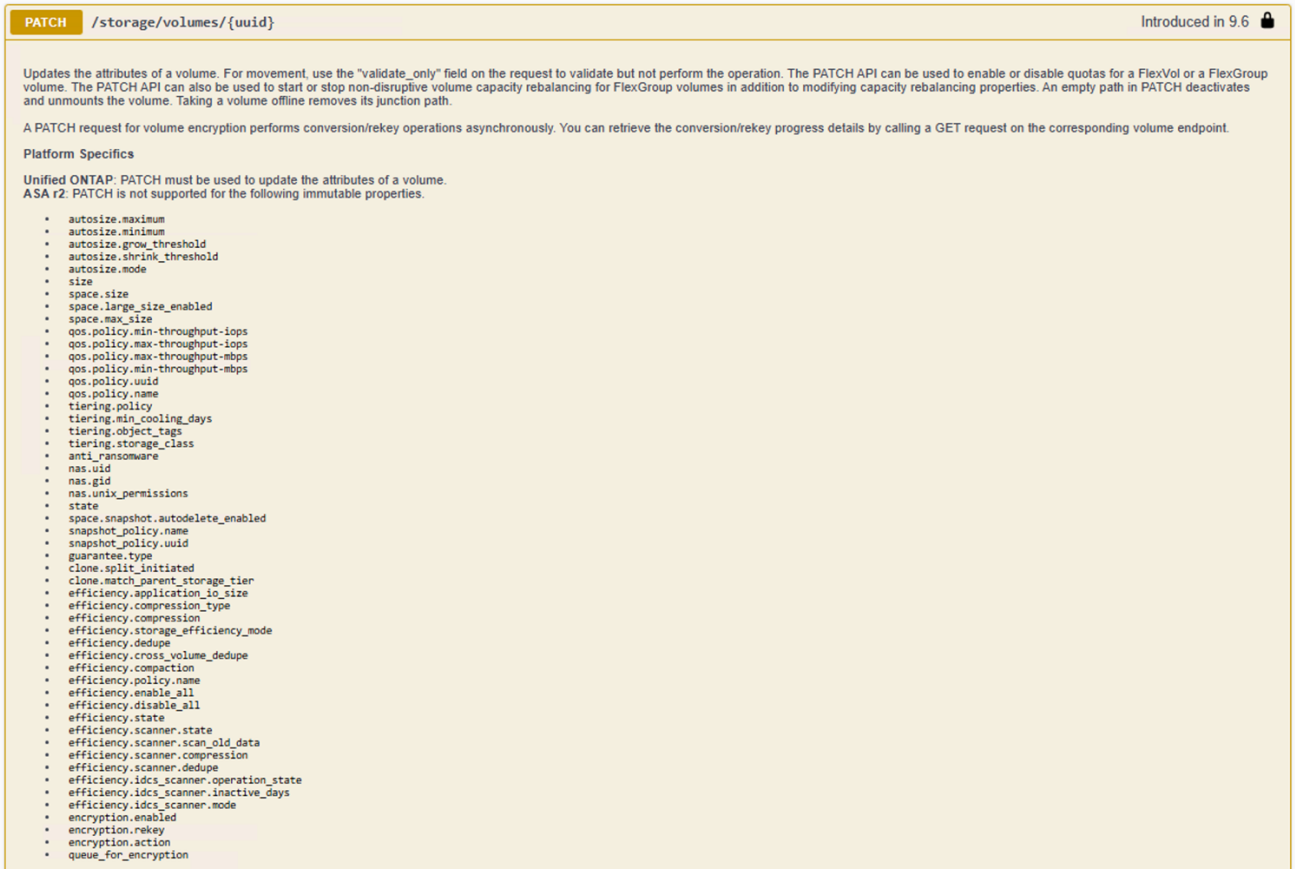
The NetApp ASA r2 REST API is based on the REST API provided with the unified ONTAP personality, with a number of changes adapted to the unique characteristics and capabilities of the ASA r2 personality.

Types of API changes

The REST API for the ASA r2 systems differs in several ways from the unified ONTAP REST API available with FAS, AFF, and ASA platforms. Gaining a clear understanding of the types of changes will help us better utilize the online API reference documentation.

1. New ASA r2 endpoints not supported in unified ONTAP: Several endpoints have been added to the ASA r2 REST API which are not available with unified ONTAP. For example, the **storage-units** endpoints provide an aggregated view of the LUNs and NVMe namespaces. There are several endpoints and they're all derived from `/api/storage/storage-units`.
2. Restrictions on the HTTP methods used for some endpoints: Compared to the unified ONTAP REST API, several endpoints available with ASA r2 have restrictions on the supported HTTP methods. For example, POST and DELETE are not allowed when using the endpoint `/api/protocols/nvme/services` with ASA r2 systems.
3. Property changes for an endpoint and HTTP method: Certain ASA r2 system endpoint and method combinations do not support all the defined properties available in the unified ONTAP personality. For example, when using PATCH with the endpoint `/api/storage/volumes/{uuid}`, several properties are not supported with ASA r2, including:
   - `autosize.maximum`
   - `autosize.minimum`
   - `autosize.mode`

Figure 2) Properties not supported with ASA r2 when using PATCH with endpoint /api/storage/volumes/{uuid}.



The above figure (captured from ASA r2 REST API reference documentation) shows list of properties not supported with ASA r2 when using PATCH with endpoint `/api/storage/volumes/{uuid}`.

4. Changes to internal processing: There are various changes to how ASA r2 systems process certain REST API requests. For example, a DELETE request with the endpoint `/api/storage/luns/{uuid}` is processed asynchronously.

Enhanced security with OAuth 2.0

OAuth 2.0 is the industry standard framework for authorization. It's used to restrict and control access to protected resources based on signed access tokens. Customers can configure OAuth 2.0 using System Manager to protect ASA r2 system resources.

How it works with ASA r2:

- The ASA r2 system utilizes OAuth 2.0 to secure access to its REST API, ensuring that only authorized clients can interact with the system.
- Clients need to first obtain an access token from an authorization server.
- The REST client then passes the token to the ASA r2 cluster as a bearer token using the HTTP authorization request header.
- The REST API can then validate the token and grant access to protected resources accordingly.

Refer Authentication and authorization using OAuth 2.0 for more information.

Access the ASA r2 REST API reference documentation

Users can access the REST API reference documentation through the Swagger UI at their ASA r2 systems.

Prerequisites:

- IP address or host name of the ASA r2 system's cluster management LIF.
- User name and password for an account with authority to access the REST API.

Steps:

1. Type the URL in your browser and press Enter:

   https://<ip_address>/docs/api
2. Sign in using your administrator account.

   The ASA r2 API documentation page is displayed with the API calls organized in major resource categories.
3. To see an example of a REST API call that's specifically applicable only to ASA r2 systems, scroll down to the **SAN** category and click **GET `/storage/storage-units`**.

REST API Endpoints for ASA r2

Every REST API call is performed as an HTTP request to the ONTAP system which generates an associated response to the client. This request/response pair is considered an API transaction. Before using the API, users should be familiar with the input variables available to control a request and the contents of the response output.

This section talks about the REST API endpoints for ASA r2 storage systems configuration.

Primary Network setup

The following table illustrates the REST API endpoints for primary networking setup of an ASA r2 system.

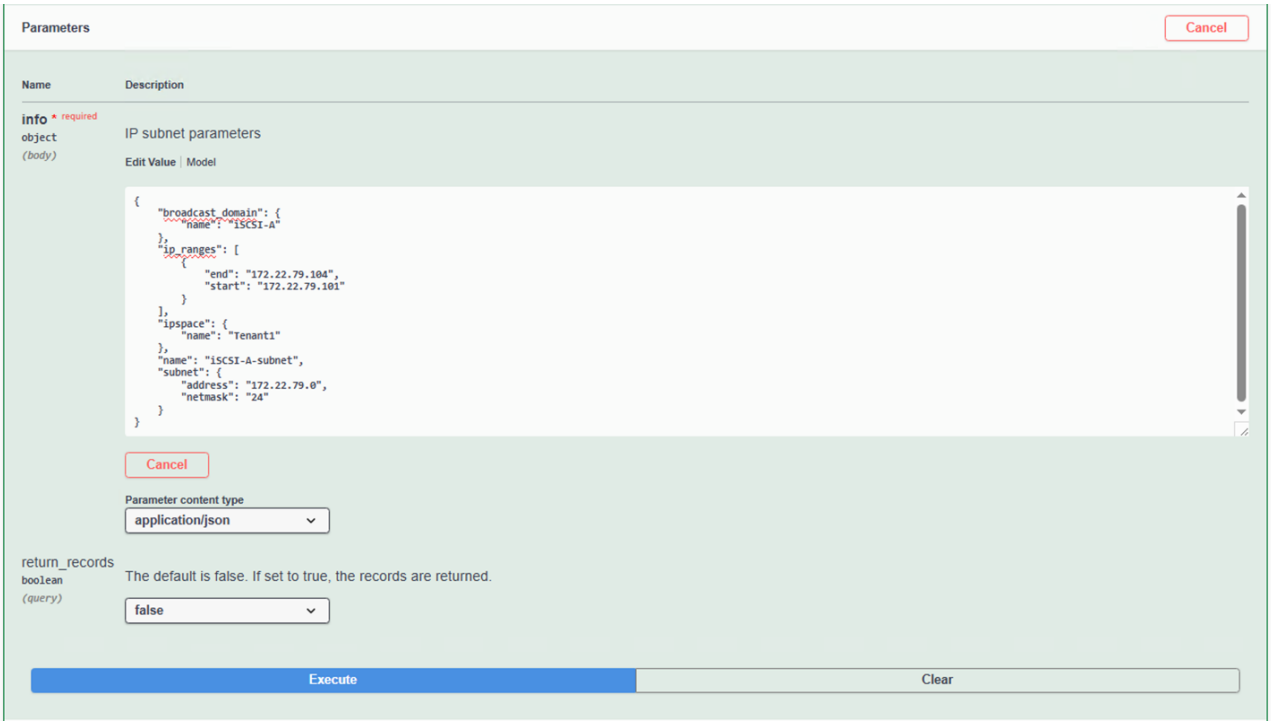
Table 2) REST API endpoints for ASA r2 network setup.

Network objects	API endpoint	Supported HTTP methods	Comparison with unified ONTAP REST API endpoint
IPspaces	/api/network/ipspaces	GET, POST	No change from unified ONTAP REST API
	/api/network/ipspaces/{uuid}	GET, PATCH, DELETE	
Broadcast-domain	/api/network/ethernet/broadcast-domains	GET, POST	
	/api/network/ethernet/broadcast-domains/{uuid}	GET, PATCH, DELETE	
Subnets	/api/network/ip/subnets	GET, POST	
	/api/network/ip/subnets/{uuid}	GET, PATCH, DELETE	
Interface group (ifgrp)/ VLANs	/api/network/ethernet/ports	GET, POST	
	/api/network/ethernet/ports/{uuid}	GET, PATCH, DELETE	

Example:

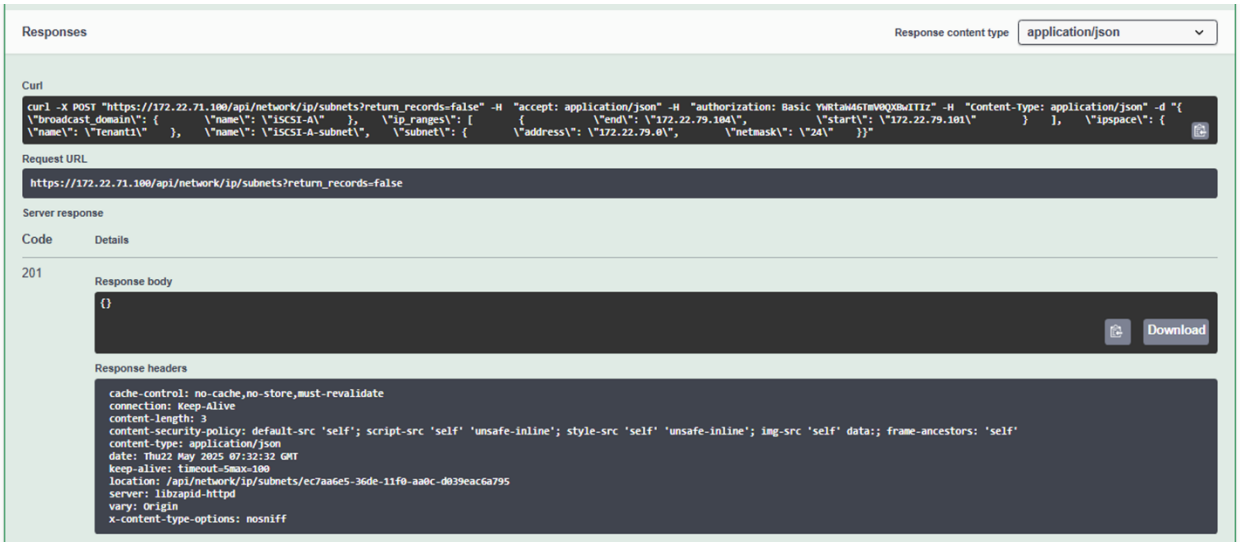
The following figure shows the JSON request (POST) body to create iSCSI-A subnet in Tenant1 IPspace via Swagger UI.

Figure 3) JSON request body for subnet creation (POST method).



The below figure shows the response output once the above POST request is executed. As shown in the figure, status code is 201, that means the subnet is created successfully.

Figure 4) Response output of subnet creation POST request.



Note: Similarly, iSCSI-B subnet was created in the Tenant1 IPspace.

We can also verify from the ONTAP CLI output that the iSCSI-A and iSCSI-B subnets have been created successfully as shown in the following figure.

Figure 5) Verification of subnet creation.

```
fpsa-a50-u0909::> network subnet show -ipspace Tenant1

IPspace: Tenant1
Subnet                       Broadcast                 Avail/
Name      Subnet             Domain    Gateway         Total   Ranges
--------- ------------------ --------- --------------- --------- ---------------
iSCSI-A-subnet 172.22.79.0/24 iSCSI-A -                  4/4    172.22.79.101-172.22.79.104
iSCSI-B-subnet 172.22.80.0/24 iSCSI-B -                  4/4    172.22.80.101-172.22.80.104
2 entries were displayed.
```

SVM setup and related configurations

The following table shows the REST API endpoints for SVM setup and related configurations of an ASA r2 system.

Note: For ASA r2 storage systems, operations and configurations have been simplified and optimized for SAN. The cluster initialization process creates a default storage virtual machine *svm1* (with SAN protocols enabled) and users can start to create LUNs/namespaces without needing to configure other objects such as aggregates and volumes after the cluster is initialized. Please refer to ASA r2 documentation for additional details.

Table 3) REST API endpoints for ASA r2 SVM setup and related configurations.

SVM objects	API endpoint	Supported HTTP methods	Important information associated with configuration	Comparison with unified ONTAP REST API endpoint
SVM (vserver)	/api/svm/svms	GET, POST	• On ASA r2 platforms, *fcp*, *iscsi*, and *nvme* services are enabled and allowed by default, and are not necessary in the POST request.	No change
	/api/svm/svms/{uuid}	GET, PATCH, DELETE		
Service policy for LIFs	/api/network/ip/service-policies	GET, POST	• To create service policy for iSCSI only LIFs, add services – *data_core* and *data_iscsi* to the custom service policy parameters in POST request. • To create service policy for NVMe/TCP only LIFs, add services – *data_core* and *data_nvme_tcp* to the custom service policy parameters in POST request.	No change
	/api/network/ip/service-policies/{uuid}	GET, PATCH, DELETE		
IP Interfaces (LIFs)	/api/network/ip/interfaces	GET, POST	• For ASA r2, in POST request service_policy *"default-data-blocks"* is set as default if scope is "svm". • To enable automatic iSCSI LIF failover, iSCSI only LIFs should be created. For this, use the custom service policy (with services: *data_core* and *data_iscsi*) and set the failover attribute to	No change
	/api/network/ip/interfaces/{uuid}	GET, PATCH, DELETE		

			“sfo_partners_only” in POST request. • To create NVMe/TCP only LIF, use the custom service policy (with services: *data_core* and *data_nvme_tcp*). Note that NVMe/TCP LIFs do not support LIF failover.	
FC Interfaces (LIFs)	/api/network/fc/interfaces	GET, POST	• Valid values for data_protocol attribute: *“fcp”* and *“fc_nvme”*.	No change
	/api/network/fc/interfaces/{uuid}	GET, PATCH, DELETE		
Storage units – LUNs (iSCSI and FC)	/api/storage/luns	GET, POST	• With POST request, the *“name”* attribute value must start with an alphabetic character (a to z or A to Z) or an underscore (_). The name must be 203 characters or less in length.	No change
	/api/storage/luns/{uuid}	GET, PATCH, DELETE		
Storage units – namespaces (FC-NVMe and NVMe/TCP)	/api/storage/namespaces	GET, POST	• If not specified in POST, the following default property values are assigned: - `auto_delete`: false - `space.block_size`: 4096 (512 when ‘os_type’ is *vmware*)	No change
	/api/storage/namespaces/{uuid}	GET, PATCH, DELETE		
Retrieve storage units (LUNs and namespaces)	/api/storage/storage-units	GET	• There is an added computational cost to retrieving values for some properties. They are not included by default in GET results and must be explicitly requested using the fields query parameter.	These API endpoints are specific to ASA r2 platforms. [Added in ONTAP 9.16]
	/api/storage/storage-units/{uuid}	GET	• Retrieves a storage unit’s properties.	
Clone of an existing storage unit (LUNs and namespaces)	/api/storage/storage-units	POST	• With this API endpoint, a storage unit can only be directly created as a clone of an existing storage unit. To create a new storage unit that is not a clone of another, use `/api/storage/luns` or `/api/storage/namespaces` as explained previously.	These API endpoints are specific to ASA r2 platforms. [Added in ONTAP 9.16]

Modify an existing storage unit (LUNs and namespaces)	/api/storage/storage-units/{uuid}	PATCH	• Storage unit modification supports the following: - `restore_to` - Restores the storage unit to a prior snapshot. These properties are specified in the query. - `clone.split_initiated` - Initiates a clone split operation.	These API endpoints are specific to ASA r2 platforms. [Added in ONTAP 9.16]
Host initiators for SCSI hosts (iSCSI and FC)	/api/protocols/san/igroups	GET, POST	• In POST, the property "`initiators.name`" can be used to create the initiator group and populate it with initiators in a single request. • With ASA r2, `'lun_maps'` property of the LUN POST endpoint (`/api/storage/luns`) can be used to create the igroup and map it to the LUN being created. • If not specified in POST, the following default property values are assigned: - `protocol`: mixed	No change
	/api/protocols/san/igroups/{uuid}	GET, PATCH, DELETE		
Host initiators for NVMe hosts (FC-NVMe and NVMe/TCP)	/api/protocols/nvme/subsystems	GET, POST	• With POST request execution, the configuration is equivalent to NVMe subsystem creation and adding host(s) to the subsystem. • With ASA r2, `'subsystem_map'` property of the namespace POST endpoint (`/api/storage/namespaces`) can be used to create the subsystem and map it to the namespace being created. • Related ONTAP commands- - `vserver nvme subsystem create` - `vserver nvme subsystem host add` - `vserver nvme subsystem show` - `vserver nvme subsystem host show`	No change
	/api/protocols/nvme/subsystems/{uuid}	GET, PATCH, DELETE		
	/api/protocols/nvme/subsystems/{subsystem.uuid}/hosts	GET, POST		
	/api/protocols/nvme/subsystems/{subsystem.uuid}/hosts/{nqn}	GET, DELETE		

Map storage units (LUNs) to the hosts – iSCSI and FC	/api/protocols/san/lun-maps	GET, POST	• If not specified in POST, the following default property values are assigned: - `logical_unit_number`: If no value is provided, ONTAP assigns the lowest available value.	No change
	/api/protocols/san/lun-maps/{lun.uuid}/{igroup.uuid}	GET, DELETE		
Map storage units (namespaces) to the hosts – FC-NVMe and NVMe/TCP	/api/protocols/nvme/subsystem-maps	GET, POST	• With POST request execution, NVMe subsystem map is created. • Related ONTAP commands- - `vserver nvme subsystem map add` - `vserver nvme subsystem map show`	No change
	/api/protocols/nvme/subsystem-maps/{subsystem.uuid}/{namespace.uuid}	GET, DELETE		
Retrieve the collection of storage unit snapshots	/api/storage/storage-units/{storage_unit.uuid}/snapshots	GET	• There is an added computational cost to retrieving the amount of reclaimable space for snapshots, as the calculation is done on demand based on the list of snapshots provided. - `reclaimable_space` - `delta`	This API endpoint is specific to ASA r2 platforms. [Added in ONTAP 9.16]
Create a storage unit snapshot	/api/storage/storage-units/{storage_unit.uuid}/snapshots	POST	• Required properties: - `name`: Name of the snapshot to be created	This API endpoint is specific to ASA r2 systems. [Added in ONTAP 9.16]
Retrieve details of a specific storage unit snapshot	/api/storage/storage-units/{storage_unit.uuid}/snapshots/{uuid}	GET	• Required parameters: - `storage_unit.uuid`: Storage Unit UUID - `uuid`: Snapshot UUID	This API endpoint is specific to ASA r2 platforms. [Added in ONTAP 9.16]
Update a storage unit snapshot	/api/storage/storage-units/{storage_unit.uuid}/snapshots/{uuid}	PATCH	• Required parameters: - `storage_unit.uuid`: Storage Unit UUID - `uuid`: Snapshot UUID • Provide modification values under the `info` specification field.	This API endpoint is specific to ASA r2 systems. [Added in ONTAP 9.16]

Delete a storage unit snapshot	/api/storage/storage-units/{storage_unit.uuid}/snapshots/{uuid}	DELETE	• Required parameters: - `storage_unit.uuid`: Storage Unit UUID - `uuid`: Snapshot UUID	This API endpoint is specific to ASA r2 systems. [Added in ONTAP 9.16]

Example:

The following figure shows the creation of a storage unit (iSCSI LUN), adding host initiator, and subsequent storage unit mapping to the host via ONTAP REST API. In this case, the REST API implementation is done by issuing curl command with the parameters as shown in the below diagram.

The response output is displayed in a JSON format.

Figure 6) Storage unit (iSCSI LUN) creation and mapping to the host via REST API (using curl command).

```
[root@ansible-ctrlvm ~]# curl -X POST
"https://172.22.71.100/api/storage/luns?return_timeout=0&return_records=false
" -H  "accept: application/json" -H  "authorization: Basic
YWRtaW46TmV0QXBwITIz" -H  "Content-Type: application/json" -d '{ "name":
"Tenant1_SU1", "svm": { "name": "Tenant1-SVM" }, "os_type": "windows",
"space": { "size": 107374182400 }, "lun_maps": [ { "igroup": { "initiators":
[ { "name": "iqn.1991-05.com.microsoft:win2022vm-01" } ], "name": "Tenant1-
igroup1", "os_type": "windows", "protocol": "iscsi" } } ] }' -k
{
  "job": {
    "uuid": "cd270428-451a-11f0-aa0c-d039eac6a795",
    "_links": {
      "self": {
        "href": "/api/cluster/jobs/cd270428-451a-11f0-aa0c-d039eac6a795"
      }
    }
  }
}
```

In the above figure, the response output provides job uuid. Users can verify the status of the job by executing the GET request on the API endpoint `/api/cluster/jobs/{uuid}` and specifying the same job uuid value in the field. The below figure shows the implementation of the same. This verifies the job has succeeded and storage unit has been created and mapped to the host.

Figure 7) Verification of job success by executing GET request with job uuid parameter.

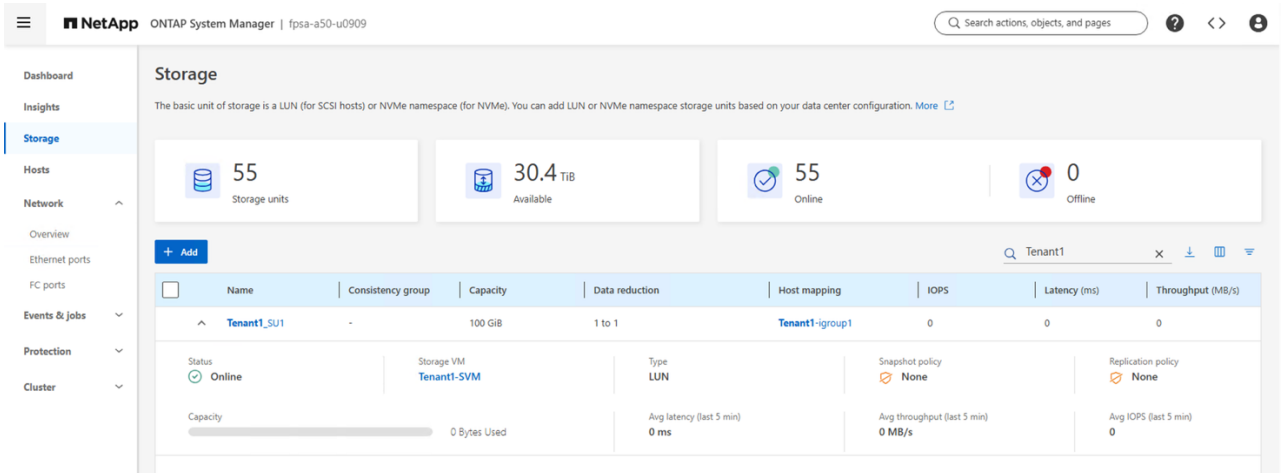
```
[root@ansible-ctrlvm ~]# curl --request GET
"https://172.22.71.100/api/cluster/jobs/cd270428-451a-11f0-aa0c-d039eac6a795"
--user admin:NetApp\!23 -k
{
  "uuid": "cd270428-451a-11f0-aa0c-d039eac6a795",
  "description": "POST /api/storage/luns/cd26f8da-451a-11f0-aa0c-
d039eac6a795",
  "state": "success",
  "message": "success",
  "code": 0,
```



```
  "start_time": "2025-06-09T06:16:26-04:00",
  "end_time": "2025-06-09T06:16:34-04:00",
  "svm": {
    "name": "Tenant1-SVM",
    "uuid": "3505047c-3c59-11f0-aa0c-d039eac6a795",
    "_links": {
      "self": {
        "href": "/api/svm/svms/3505047c-3c59-11f0-aa0c-d039eac6a795"
      }
    }
  },
  "_links": {
    "self": {
      "href": "/api/cluster/jobs/cd270428-451a-11f0-aa0c-d039eac6a795"
    }
  }
}
```


Let's verify the storage unit creation and it's subsequent mapping to the host initiator. The following figure captures the System Manager view and we can see the storage unit *Tenant1_SU1* has been created and it is mapped to the *Tenant1-igroup*.

Figure 8) Verification of storage unit (iSCSI LUN) creation and subsequent mapping to the host.



Conclusion

This technical report serves as the baseline for the customers who would like to implement the ASA r2 configuration using ONTAP REST API. The document clearly mentions the ASA r2 REST API endpoints which are different from unified ONTAP REST API. Few examples of REST API implementation have also been illustrated in the document so that users can easily replicate the same in their environment with some parameter changes to suit their requirements.

Where to find additional information

To learn more about the information that is described in this document, review the following documents and/or websites:

- NetApp ASA r2 documentation: https://docs.netapp.com/us-en/asa-r2/index.html
- NetApp product documentation: https://www.netapp.com/support-and-training/documentation/
- NetApp ASA datasheet: https://www.netapp.com/media/85736-ds-4254-asa.pdf
- ONTAP automation docs: https://docs.netapp.com/us-en/ontap-automation/index.html
- ONTAP REST API Implementation details: https://docs.netapp.com/us-en/ontap-automation/rest/operational_characteristics.html
- ONTAPI to ONTAP REST API mapping: https://docs.netapp.com/us-en/ontap-restmap/
- NetApp hardware universe: https://hwu.netapp.com
- NetApp interoperability matrix tool: http://support.netapp.com/matrix

Version history

As an option, use the NetApp Table style to create a Version History table. Do not add a table number or caption.

Version	Date	Document version history
Version 1.0	June 2025	Initial release.

Refer to the Interoperability Matrix Tool (IMT) on the NetApp Support site to validate that the exact product and feature versions described in this document are supported for your specific environment. The NetApp IMT defines the product components and versions that can be used to construct configurations that are supported by NetApp. Specific results depend on each customer's installation in accordance with published specifications.

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