



# **Manage FC services for SVMs**

ONTAP 9.15.1 REST API reference

NetApp  
September 11, 2024

# Table of Contents

- Manage FC services for SVMs ..... 1
  - Protocols SAN fcp services endpoint overview ..... 1
  - Retrieve FC protocol services ..... 6
  - Create an FC protocol service ..... 22
  - Delete an FC protocol service ..... 37
  - Retrieve an FC protocol service ..... 39
  - Update an FC protocol service ..... 50
  - Retrieve historical performance metrics for the FC protocol service of an SVM ..... 62

# Manage FC services for SVMs

## Protocols SAN fcp services endpoint overview

### Overview

A Fibre Channel Protocol (FC Protocol) service defines the properties of the FC Protocol target for an SVM. There can be at most one FC Protocol service for an SVM. An SVM FC Protocol service must be created before FC Protocol initiators can log in to the SVM.

The FC Protocol service REST API allows you to create, update, delete, and discover FC services for SVMs.

### Performance monitoring

Performance of the SVM can be monitored by the `metric.*` and `statistics.*` properties. These show the performance of the SVM in terms of IOPS, latency, and throughput. The `metric.*` properties denote an average whereas `statistics.*` properties denote a real-time monotonically increasing value aggregated across all nodes.

### Examples

#### Creating an FC Protocol service for an SVM

The simplest way to create an FC Protocol service is to specify only the SVM, either by name or UUID. By default, the new FC Protocol service is enabled.

In this example, the `return_records` query parameter is used to retrieve the new FC Protocol service object in the REST response.

```

# The API:
POST /api/protocols/san/fcp/services

# The call:
curl -X POST 'https://<mgmt-
ip>/api/protocols/san/fcp/services?return_records=true' -H 'Accept:
application/hal+json' -d '{ "svm": { "name": "svm1" } }'

# The response:
{
  "num_records": 1,
  "records": [
    {
      "svm": {
        "uuid": "5c659d90-c01a-11e8-88ed-005056bbb24b",
        "name": "svm1",
        "_links": {
          "self": {
            "href": "/api/svm/svms/5c659d90-c01a-11e8-88ed-005056bbb24b"
          }
        }
      },
      "enabled": true,
      "target": {
        "name": "20:00:00:50:56:bb:b2:4b"
      },
      "_links": {
        "self": {
          "href": "/api/protocols/san/fcp/services/5c659d90-c01a-11e8-88ed-
005056bbb24b"
        }
      }
    }
  ]
}

```

---

### Retrieving FC Protocol services for all SVMs in the cluster

```

# The API:
GET /api/protocols/san/fcp/services

# The call:
curl -X GET 'https://<mgmt-ip>/api/protocols/san/fcp/services' -H 'Accept:

```

```
application/hal+json'
```

```
# The response:
```

```
{  
  "records": [  
    {  
      "svm": {  
        "uuid": "5c659d90-c01a-11e8-88ed-005056bbb24b",  
        "name": "svm1",  
        "_links": {  
          "self": {  
            "href": "/api/svm/svms/5c659d90-c01a-11e8-88ed-005056bbb24b"  
          }  
        }  
      },  
      "_links": {  
        "self": {  
          "href": "/api/protocols/san/fcp/services/5c659d90-c01a-11e8-88ed-005056bbb24b"  
        }  
      }  
    },  
    {  
      "svm": {  
        "uuid": "6011f874-c01a-11e8-88ed-005056bbb24b",  
        "name": "svm2",  
        "_links": {  
          "self": {  
            "href": "/api/svm/svms/6011f874-c01a-11e8-88ed-005056bbb24b"  
          }  
        }  
      },  
      "_links": {  
        "self": {  
          "href": "/api/protocols/san/fcp/services/6011f874-c01a-11e8-88ed-005056bbb24b"  
        }  
      }  
    }  
  ],  
  "num_records": 2,  
  "_links": {  
    "self": {  
      "href": "/api/protocols/san/fcp/services"  
    }  
  }  
}
```

```
}
```

## Retrieving details for a specific FC Protocol service

The FC Protocol service is identified by the UUID of its SVM.

```
# The API:
GET /api/protocols/san/fcp/services/{svm.uuid}

# The call:
curl -X GET 'https://<mgmt-ip>/api/protocols/san/fcp/services/5c659d90-
c01a-11e8-88ed-005056bbb24b' -H 'Accept: application/hal+json'

# The response:
{
  "svm": {
    "uuid": "5c659d90-c01a-11e8-88ed-005056bbb24b",
    "name": "svm1",
    "_links": {
      "self": {
        "href": "/api/svm/svms/5c659d90-c01a-11e8-88ed-005056bbb24b"
      }
    }
  },
  "enabled": true,
  "target": {
    "name": "20:00:00:50:56:bb:b2:4b"
  },
  "_links": {
    "self": {
      "href": "/api/protocols/san/fcp/services/5c659d90-c01a-11e8-88ed-
005056bbb24b"
    }
  }
}
```

## Disabling an FC Protocol service

Disabling an FC Protocol service shuts down all active FC Protocol logins for the SVM and prevents new FC Protocol logins.

The FC Protocol service to update is identified by the UUID of its SVM.

```
# The API:
PATCH /api/protocols/san/fcp/services/{svm.uuid}

# The call:
curl -X PATCH 'https://<mgmt-ip>/api/protocols/san/fcp/services/5c659d90-
c01a-11e8-88ed-005056bbb24b' -H 'Accept: application/hal+json' -d '{
"enabled": "false" }'
```

You can retrieve the FC Protocol service to confirm the change.

In this example, the `fields` query parameter is used to limit the response to the `enabled` property and FC Protocol service identifiers.

```
# The API:
GET /api/protocols/san/fcp/services/{svm.uuid}

# The call:
curl -X GET 'https://<mgmt-ip>/api/protocols/san/fcp/services/5c659d90-
c01a-11e8-88ed-005056bbb24b?fields=enabled' -H 'Accept:
application/hal+json'

# The response:
{
"svm": {
  "uuid": "5c659d90-c01a-11e8-88ed-005056bbb24b",
  "name": "svm1",
  "_links": {
    "self": {
      "href": "/api/svm/svms/5c659d90-c01a-11e8-88ed-005056bbb24b"
    }
  }
},
"enabled": false,
"_links": {
  "self": {
    "href": "/api/protocols/san/fcp/services/5c659d90-c01a-11e8-88ed-
005056bbb24b"
  }
}
}
```

## Deleting an FC Protocol service

The FC Protocol service must be disabled before it can be deleted.

The FC Protocol service to delete is identified by the UUID of its SVM.

```
# The API:
DELETE /api/protocols/san/fcp/services/{svm.uuid}

# The call:
curl -X DELETE 'https://<mgmt-ip>/api/protocols/san/fcp/services/5c659d90-
c01a-11e8-88ed-005056bbb24b' -H 'Accept: application/hal+json'
```

## Retrieve FC protocol services

GET /protocols/san/fcp/services

**Introduced In:** 9.6

Retrieves FC Protocol services.

### Expensive properties

There is an added computational cost to retrieving values for these properties. They are not included by default in GET results and must be explicitly requested using the `fields` query parameter. See [Requesting specific fields](#) to learn more.

- `statistics.*`
- `metric.*`

### Related ONTAP commands

- `vserver fcp show`

### Learn more

- [DOC /protocols/san/fcp/services](#)

### Parameters

Name	Type	In	Required	Description
metric.duration	string	query	False	Filter by metric.duration <ul style="list-style-type: none"><li>• Introduced in: 9.7</li></ul>



Name	Type	In	Required	Description
metric.throughput.total	integer	query	False	Filter by metric.throughput.total  • Introduced in: 9.7
metric.throughput.write	integer	query	False	Filter by metric.throughput.write  • Introduced in: 9.7
metric.throughput.read	integer	query	False	Filter by metric.throughput.read  • Introduced in: 9.7
metric.status	string	query	False	Filter by metric.status  • Introduced in: 9.7
metric.iops.write	integer	query	False	Filter by metric.iops.write  • Introduced in: 9.7
metric.iops.read	integer	query	False	Filter by metric.iops.read  • Introduced in: 9.7
metric.iops.other	integer	query	False	Filter by metric.iops.other  • Introduced in: 9.7

Name	Type	In	Required	Description
metric.iops.total	integer	query	False	Filter by metric.iops.total  • Introduced in: 9.7
metric.timestamp	string	query	False	Filter by metric.timestamp  • Introduced in: 9.7
metric.latency.write	integer	query	False	Filter by metric.latency.write  • Introduced in: 9.7
metric.latency.read	integer	query	False	Filter by metric.latency.read  • Introduced in: 9.7
metric.latency.other	integer	query	False	Filter by metric.latency.other  • Introduced in: 9.7
metric.latency.total	integer	query	False	Filter by metric.latency.total  • Introduced in: 9.7
enabled	boolean	query	False	Filter by enabled
svm.uuid	string	query	False	Filter by svm.uuid
svm.name	string	query	False	Filter by svm.name
statistics.iops_raw.write	integer	query	False	Filter by statistics.iops_raw.write  • Introduced in: 9.7

Name	Type	In	Required	Description
statistics.iops_raw.read	integer	query	False	Filter by statistics.iops_raw.read  • Introduced in: 9.7
statistics.iops_raw.other	integer	query	False	Filter by statistics.iops_raw.other  • Introduced in: 9.7
statistics.iops_raw.total	integer	query	False	Filter by statistics.iops_raw.total  • Introduced in: 9.7
statistics.status	string	query	False	Filter by statistics.status  • Introduced in: 9.7
statistics.throughput_raw.total	integer	query	False	Filter by statistics.throughput_raw.total  • Introduced in: 9.7
statistics.throughput_raw.write	integer	query	False	Filter by statistics.throughput_raw.write  • Introduced in: 9.7
statistics.throughput_raw.read	integer	query	False	Filter by statistics.throughput_raw.read  • Introduced in: 9.7

Name	Type	In	Required	Description
statistics.latency_read.write	integer	query	False	Filter by statistics.latency_read.write  • Introduced in: 9.7
statistics.latency_read.read	integer	query	False	Filter by statistics.latency_read.read  • Introduced in: 9.7
statistics.latency_read.other	integer	query	False	Filter by statistics.latency_read.other  • Introduced in: 9.7
statistics.latency_read.total	integer	query	False	Filter by statistics.latency_read.total  • Introduced in: 9.7
statistics.timestamp	string	query	False	Filter by statistics.timestamp  • Introduced in: 9.7
target.name	string	query	False	Filter by target.name  • maxLength: 128 • minLength: 1
fields	array[string]	query	False	Specify the fields to return.
max_records	integer	query	False	Limit the number of records returned.

Name	Type	In	Required	Description
return_records	boolean	query	False	The default is true for GET calls. When set to false, only the number of records is returned. <ul style="list-style-type: none"> <li>• Default value: 1</li> </ul>
return_timeout	integer	query	False	The number of seconds to allow the call to execute before returning. When iterating over a collection, the default is 15 seconds. ONTAP returns earlier if either max records or the end of the collection is reached. <ul style="list-style-type: none"> <li>• Default value: 1</li> <li>• Max value: 120</li> <li>• Min value: 0</li> </ul>
order_by	array[string]	query	False	Order results by specified fields and optional [asc

## Response

Status: 200, Ok

Name	Type	Description
_links	<a href="#">_links</a>	
num_records	integer	The number of records in the response.
records	array[ <a href="#">fcp_service</a> ]	

## Example response

```
{
  "_links": {
    "next": {
      "href": "/api/resourcelink"
    },
    "self": {
      "href": "/api/resourcelink"
    }
  },
  "num_records": 1,
  "records": [
    {
      "_links": {
        "self": {
          "href": "/api/resourcelink"
        }
      },
      "metric": {
        "_links": {
          "self": {
            "href": "/api/resourcelink"
          }
        }
      },
      "duration": "PT15S",
      "iops": {
        "read": 200,
        "total": 1000,
        "write": 100
      },
      "latency": {
        "read": 200,
        "total": 1000,
        "write": 100
      },
      "status": "ok",
      "throughput": {
        "read": 200,
        "total": 1000,
        "write": 100
      },
      "timestamp": "2017-01-25 06:20:13 -0500"
    },
    "statistics": {
      "iops_raw": {
```

```

    "read": 200,
    "total": 1000,
    "write": 100
  },
  "latency_raw": {
    "read": 200,
    "total": 1000,
    "write": 100
  },
  "status": "ok",
  "throughput_raw": {
    "read": 200,
    "total": 1000,
    "write": 100
  },
  "timestamp": "2017-01-25 06:20:13 -0500"
},
"svm": {
  "_links": {
    "self": {
      "href": "/api/resourcelink"
    }
  },
  "name": "svm1",
  "uuid": "02c9e252-41be-11e9-81d5-00a0986138f7"
},
"target": {
  "name": "20:00:00:50:56:bb:b2:4b"
}
}
]
}

```

## Error

Status: Default, Error

Name	Type	Description
error	<a href="#">returned_error</a>	

## Example error

```
{
  "error": {
    "arguments": [
      {
        "code": "string",
        "message": "string"
      }
    ],
    "code": "4",
    "message": "entry doesn't exist",
    "target": "uuid"
  }
}
```

## Definitions



## See Definitions

href

Name	Type	Description
href	string	

\_links

Name	Type	Description
next	<a href="#">href</a>	
self	<a href="#">href</a>	

\_links

Name	Type	Description
self	<a href="#">href</a>	

iops

The rate of I/O operations observed at the storage object.

Name	Type	Description
other	integer	Performance metric for other I/O operations. Other I/O operations can be metadata operations, such as directory lookups and so on.
read	integer	Performance metric for read I/O operations.
total	integer	Performance metric aggregated over all types of I/O operations.
write	integer	Performance metric for write I/O operations.

latency

The round trip latency in microseconds observed at the storage object.

Name	Type	Description
other	integer	Performance metric for other I/O operations. Other I/O operations can be metadata operations, such as directory lookups and so on.
read	integer	Performance metric for read I/O operations.
total	integer	Performance metric aggregated over all types of I/O operations.
write	integer	Performance metric for write I/O operations.

### throughput

The rate of throughput bytes per second observed at the storage object.

Name	Type	Description
read	integer	Performance metric for read I/O operations.
total	integer	Performance metric aggregated over all types of I/O operations.
write	integer	Performance metric for write I/O operations.

### metric

Performance numbers, such as IOPS latency and throughput, for SVM protocols.

Name	Type	Description
<a href="#">_links</a>	<a href="#">_links</a>	
duration	string	The duration over which this sample is calculated. The time durations are represented in the ISO-8601 standard format. Samples can be calculated over the following durations:
iops	<a href="#">iops</a>	The rate of I/O operations observed at the storage object.

Name	Type	Description
latency	latency	The round trip latency in microseconds observed at the storage object.
status	string	Any errors associated with the sample. For example, if the aggregation of data over multiple nodes fails then any of the partial errors might be returned, "ok" on success, or "error" on any internal uncategorized failure. Whenever a sample collection is missed but done at a later time, it is back filled to the previous 15 second timestamp and tagged with "backfilled_data". "Inconsistent_delta_time" is encountered when the time between two collections is not the same for all nodes. Therefore, the aggregated value might be over or under inflated. "Negative_delta" is returned when an expected monotonically increasing value has decreased in value. "Inconsistent_old_data" is returned when one or more nodes do not have the latest data.
throughput	throughput	The rate of throughput bytes per second observed at the storage object.
timestamp	string	The timestamp of the performance data.

#### iops\_raw

The number of I/O operations observed at the storage object. This should be used along with delta time to calculate the rate of I/O operations per unit of time.

Name	Type	Description
other	integer	Performance metric for other I/O operations. Other I/O operations can be metadata operations, such as directory lookups and so on.

Name	Type	Description
read	integer	Performance metric for read I/O operations.
total	integer	Performance metric aggregated over all types of I/O operations.
write	integer	Performance metric for write I/O operations.

#### latency\_raw

The raw latency in microseconds observed at the storage object. This should be divided by the raw IOPS value to calculate the average latency per I/O operation.

Name	Type	Description
other	integer	Performance metric for other I/O operations. Other I/O operations can be metadata operations, such as directory lookups and so on.
read	integer	Performance metric for read I/O operations.
total	integer	Performance metric aggregated over all types of I/O operations.
write	integer	Performance metric for write I/O operations.

#### throughput\_raw

Throughput bytes observed at the storage object. This should be used along with delta time to calculate the rate of throughput bytes per unit of time.

Name	Type	Description
read	integer	Performance metric for read I/O operations.
total	integer	Performance metric aggregated over all types of I/O operations.
write	integer	Performance metric for write I/O operations.

## statistics

These are raw performance numbers, such as IOPS latency and throughput for SVM protocols. These numbers are aggregated across all nodes in the cluster and increase with the uptime of the cluster.

Name	Type	Description
iops_raw	<a href="#">iops_raw</a>	The number of I/O operations observed at the storage object. This should be used along with delta time to calculate the rate of I/O operations per unit of time.
latency_raw	<a href="#">latency_raw</a>	The raw latency in microseconds observed at the storage object. This should be divided by the raw IOPS value to calculate the average latency per I/O operation.
status	string	Any errors associated with the sample. For example, if the aggregation of data over multiple nodes fails then any of the partial errors might be returned, "ok" on success, or "error" on any internal uncategorized failure. Whenever a sample collection is missed but done at a later time, it is back filled to the previous 15 second timestamp and tagged with "backfilled_data". "Inconsistent_delta_time" is encountered when the time between two collections is not the same for all nodes. Therefore, the aggregated value might be over or under inflated. "Negative_delta" is returned when an expected monotonically increasing value has decreased in value. "Inconsistent_old_data" is returned when one or more nodes do not have the latest data.
throughput_raw	<a href="#">throughput_raw</a>	Throughput bytes observed at the storage object. This should be used along with delta time to calculate the rate of throughput bytes per unit of time.

Name	Type	Description
timestamp	string	The timestamp of the performance data.

svm

SVM, applies only to SVM-scoped objects.

Name	Type	Description
<a href="#">_links</a>	<a href="#">_links</a>	
name	string	The name of the SVM. This field cannot be specified in a PATCH method.
uuid	string	The unique identifier of the SVM. This field cannot be specified in a PATCH method.

target

Name	Type	Description
name	string	<p>The target name of the FC Protocol service. This is generated for the SVM during POST.</p> <p>The FC Protocol target name is a world wide node name (WWNN).</p> <p>If required, the target name can be modified using the ONTAP command line.</p> <ul style="list-style-type: none"> <li>• example: 20:00:00:50:56:bb:b2:4b</li> <li>• maxLength: 128</li> <li>• minLength: 1</li> <li>• readOnly: 1</li> <li>• Introduced in: 9.6</li> <li>• x-nullable: true</li> </ul>

fcp\_service

A Fibre Channel (FC) Protocol service defines the properties of the FC Protocol target for an SVM. There can be at most one FC Protocol service for an SVM. An SVM's FC Protocol service must be created before FC Protocol initiators can login to the SVM.

A FC Protocol service is identified by the UUID of its SVM.

Name	Type	Description
<code>_links</code>	<code>_links</code>	
<code>enabled</code>	boolean	The administrative state of the FC Protocol service. The FC Protocol service can be disabled to block all FC Protocol connectivity to the SVM.  This is optional in POST and PATCH. The default setting is <i>true</i> (enabled) in POST.
<code>metric</code>	<code>metric</code>	Performance numbers, such as IOPS latency and throughput, for SVM protocols.
<code>statistics</code>	<code>statistics</code>	These are raw performance numbers, such as IOPS latency and throughput for SVM protocols. These numbers are aggregated across all nodes in the cluster and increase with the uptime of the cluster.
<code>svm</code>	<code>svm</code>	SVM, applies only to SVM-scoped objects.
<code>target</code>	<code>target</code>	

#### error\_arguments

Name	Type	Description
<code>code</code>	string	Argument code
<code>message</code>	string	Message argument

#### returned\_error

Name	Type	Description
<code>arguments</code>	array[ <code>error_arguments</code> ]	Message arguments
<code>code</code>	string	Error code
<code>message</code>	string	Error message

Name	Type	Description
target	string	The target parameter that caused the error.

## Create an FC protocol service

POST `/protocols/san/fcp/services`

**Introduced In:** 9.6

Creates an FC Protocol service.

### Platform Specifics

- **Unified ONTAP:** POST and DELETE must be used to manage the FC Protocol service for access to the FC Protocol.
- **ASA.Next:** POST and DELETE are not supported. The FC Protocol service is automatically created and deleted with the SVM.

### Required properties

- `svm.uuid` or `svm.name` - Existing SVM in which to create the FC Protocol service.

### Related ONTAP commands

- `vserver fcp create`

### Learn more

- [DOC /protocols/san/fcp/services](#)

### Parameters

Name	Type	In	Required	Description
return_records	boolean	query	False	The default is false. If set to true, the records are returned. <ul style="list-style-type: none"> <li>• Default value:</li> </ul>

### Request Body

Name	Type	Description
<code>_links</code>	<a href="#">_links</a>	



Name	Type	Description
enabled	boolean	<p>The administrative state of the FC Protocol service. The FC Protocol service can be disabled to block all FC Protocol connectivity to the SVM.</p> <p>This is optional in POST and PATCH. The default setting is <i>true</i> (enabled) in POST.</p>
metric	metric	Performance numbers, such as IOPS latency and throughput, for SVM protocols.
statistics	statistics	These are raw performance numbers, such as IOPS latency and throughput for SVM protocols. These numbers are aggregated across all nodes in the cluster and increase with the uptime of the cluster.
svm	svm	SVM, applies only to SVM-scoped objects.
target	target	

## Example request

```
{
  "_links": {
    "self": {
      "href": "/api/resourcelink"
    }
  },
  "metric": {
    "_links": {
      "self": {
        "href": "/api/resourcelink"
      }
    },
    "duration": "PT15S",
    "iops": {
      "read": 200,
      "total": 1000,
      "write": 100
    },
    "latency": {
      "read": 200,
      "total": 1000,
      "write": 100
    },
    "status": "ok",
    "throughput": {
      "read": 200,
      "total": 1000,
      "write": 100
    },
    "timestamp": "2017-01-25 06:20:13 -0500"
  },
  "statistics": {
    "iops_raw": {
      "read": 200,
      "total": 1000,
      "write": 100
    },
    "latency_raw": {
      "read": 200,
      "total": 1000,
      "write": 100
    },
    "status": "ok",
    "throughput_raw": {
```

```

    "read": 200,
    "total": 1000,
    "write": 100
  },
  "timestamp": "2017-01-25 06:20:13 -0500"
},
"svm": {
  "_links": {
    "self": {
      "href": "/api/resourcelink"
    }
  },
  "name": "svm1",
  "uuid": "02c9e252-41be-11e9-81d5-00a0986138f7"
},
"target": {
  "name": "20:00:00:50:56:bb:b2:4b"
}
}

```

## Response

Status: 201, Created

Name	Type	Description
_links	<a href="#">_links</a>	
num_records	integer	The number of records in the response.
records	array[ <a href="#">fcp_service</a> ]	

## Example response

```
{
  "_links": {
    "next": {
      "href": "/api/resourcelink"
    },
    "self": {
      "href": "/api/resourcelink"
    }
  },
  "num_records": 1,
  "records": [
    {
      "_links": {
        "self": {
          "href": "/api/resourcelink"
        }
      },
      "metric": {
        "_links": {
          "self": {
            "href": "/api/resourcelink"
          }
        }
      },
      "duration": "PT15S",
      "iops": {
        "read": 200,
        "total": 1000,
        "write": 100
      },
      "latency": {
        "read": 200,
        "total": 1000,
        "write": 100
      },
      "status": "ok",
      "throughput": {
        "read": 200,
        "total": 1000,
        "write": 100
      },
      "timestamp": "2017-01-25 06:20:13 -0500"
    },
    "statistics": {
      "iops_raw": {
```

```

    "read": 200,
    "total": 1000,
    "write": 100
  },
  "latency_raw": {
    "read": 200,
    "total": 1000,
    "write": 100
  },
  "status": "ok",
  "throughput_raw": {
    "read": 200,
    "total": 1000,
    "write": 100
  },
  "timestamp": "2017-01-25 06:20:13 -0500"
},
"svm": {
  "_links": {
    "self": {
      "href": "/api/resourcelink"
    }
  },
  "name": "svm1",
  "uuid": "02c9e252-41be-11e9-81d5-00a0986138f7"
},
"target": {
  "name": "20:00:00:50:56:bb:b2:4b"
}
}
]
}

```

## Headers

Name	Description	Type
Location	Useful for tracking the resource location	string

## Error

Status: Default

## ONTAP Error Response Codes

Error Code	Description
1115127	The cluster lacks a valid FC Protocol license.
2621462	The supplied SVM does not exist.
2621507	The Fibre Channel Protocol is not allowed for the specified SVM.
2621706	The specified <code>svm.uuid</code> and <code>svm.name</code> do not refer to the same SVM.
2621707	No SVM was specified. Either <code>svm.name</code> or <code>svm.uuid</code> must be supplied.
5374082	The Fibre Channel Protocol service already exists for the SVM.
5374092	The Fibre Channel Protocol is not supported on the cluster hardware configuration; there are no Fibre Channel adapters.
5374893	The SVM is stopped. The SVM must be running to create a Fibre Channel Protocol service.
5376452	Service POST and DELETE are not supported on <code>ASA.next</code> .

Also see the table of common errors in the [Response body](#) overview section of this documentation.

Name	Type	Description
error	<a href="#">returned_error</a>	

### Example error

```
{
  "error": {
    "arguments": [
      {
        "code": "string",
        "message": "string"
      }
    ],
    "code": "4",
    "message": "entry doesn't exist",
    "target": "uuid"
  }
}
```

# Definitions

## See Definitions

href

Name	Type	Description
href	string	

\_links

Name	Type	Description
self	<a href="#">href</a>	

iops

The rate of I/O operations observed at the storage object.

Name	Type	Description
other	integer	Performance metric for other I/O operations. Other I/O operations can be metadata operations, such as directory lookups and so on.
read	integer	Performance metric for read I/O operations.
total	integer	Performance metric aggregated over all types of I/O operations.
write	integer	Performance metric for write I/O operations.

latency

The round trip latency in microseconds observed at the storage object.

Name	Type	Description
other	integer	Performance metric for other I/O operations. Other I/O operations can be metadata operations, such as directory lookups and so on.
read	integer	Performance metric for read I/O operations.



Name	Type	Description
total	integer	Performance metric aggregated over all types of I/O operations.
write	integer	Performance metric for write I/O operations.

### throughput

The rate of throughput bytes per second observed at the storage object.

Name	Type	Description
read	integer	Performance metric for read I/O operations.
total	integer	Performance metric aggregated over all types of I/O operations.
write	integer	Performance metric for write I/O operations.

### metric

Performance numbers, such as IOPS latency and throughput, for SVM protocols.

Name	Type	Description
<a href="#">_links</a>	<a href="#">_links</a>	
duration	string	The duration over which this sample is calculated. The time durations are represented in the ISO-8601 standard format. Samples can be calculated over the following durations:
iops	<a href="#">iops</a>	The rate of I/O operations observed at the storage object.
latency	<a href="#">latency</a>	The round trip latency in microseconds observed at the storage object.

Name	Type	Description
status	string	Any errors associated with the sample. For example, if the aggregation of data over multiple nodes fails then any of the partial errors might be returned, "ok" on success, or "error" on any internal uncategorized failure. Whenever a sample collection is missed but done at a later time, it is back filled to the previous 15 second timestamp and tagged with "backfilled_data". "Inconsistent_delta_time" is encountered when the time between two collections is not the same for all nodes. Therefore, the aggregated value might be over or under inflated. "Negative_delta" is returned when an expected monotonically increasing value has decreased in value. "Inconsistent_old_data" is returned when one or more nodes do not have the latest data.
throughput	<a href="#">throughput</a>	The rate of throughput bytes per second observed at the storage object.
timestamp	string	The timestamp of the performance data.

#### iops\_raw

The number of I/O operations observed at the storage object. This should be used along with delta time to calculate the rate of I/O operations per unit of time.

Name	Type	Description
other	integer	Performance metric for other I/O operations. Other I/O operations can be metadata operations, such as directory lookups and so on.
read	integer	Performance metric for read I/O operations.

Name	Type	Description
total	integer	Performance metric aggregated over all types of I/O operations.
write	integer	Performance metric for write I/O operations.

#### latency\_raw

The raw latency in microseconds observed at the storage object. This should be divided by the raw IOPS value to calculate the average latency per I/O operation.

Name	Type	Description
other	integer	Performance metric for other I/O operations. Other I/O operations can be metadata operations, such as directory lookups and so on.
read	integer	Performance metric for read I/O operations.
total	integer	Performance metric aggregated over all types of I/O operations.
write	integer	Performance metric for write I/O operations.

#### throughput\_raw

Throughput bytes observed at the storage object. This should be used along with delta time to calculate the rate of throughput bytes per unit of time.

Name	Type	Description
read	integer	Performance metric for read I/O operations.
total	integer	Performance metric aggregated over all types of I/O operations.
write	integer	Performance metric for write I/O operations.

#### statistics

These are raw performance numbers, such as IOPS latency and throughput for SVM protocols. These numbers are aggregated across all nodes in the cluster and increase with the uptime of the cluster.

Name	Type	Description
iops_raw	iops_raw	The number of I/O operations observed at the storage object. This should be used along with delta time to calculate the rate of I/O operations per unit of time.
latency_raw	latency_raw	The raw latency in microseconds observed at the storage object. This should be divided by the raw IOPS value to calculate the average latency per I/O operation.
status	string	Any errors associated with the sample. For example, if the aggregation of data over multiple nodes fails then any of the partial errors might be returned, "ok" on success, or "error" on any internal uncategorized failure. Whenever a sample collection is missed but done at a later time, it is back filled to the previous 15 second timestamp and tagged with "backfilled_data". "Inconsistent_delta_time" is encountered when the time between two collections is not the same for all nodes. Therefore, the aggregated value might be over or under inflated. "Negative_delta" is returned when an expected monotonically increasing value has decreased in value. "Inconsistent_old_data" is returned when one or more nodes do not have the latest data.
throughput_raw	throughput_raw	Throughput bytes observed at the storage object. This should be used along with delta time to calculate the rate of throughput bytes per unit of time.
timestamp	string	The timestamp of the performance data.

svm

SVM, applies only to SVM-scoped objects.

Name	Type	Description
<a href="#">_links</a>	<a href="#">_links</a>	
name	string	The name of the SVM. This field cannot be specified in a PATCH method.
uuid	string	The unique identifier of the SVM. This field cannot be specified in a PATCH method.

target

Name	Type	Description
name	string	<p>The target name of the FC Protocol service. This is generated for the SVM during POST.</p> <p>The FC Protocol target name is a world wide node name (WWNN).</p> <p>If required, the target name can be modified using the ONTAP command line.</p> <ul style="list-style-type: none"><li>• example: 20:00:00:50:56:bb:b2:4b</li><li>• maxLength: 128</li><li>• minLength: 1</li><li>• readOnly: 1</li><li>• Introduced in: 9.6</li><li>• x-nullable: true</li></ul>

fcp\_service

A Fibre Channel (FC) Protocol service defines the properties of the FC Protocol target for an SVM. There can be at most one FC Protocol service for an SVM. An SVM's FC Protocol service must be created before FC Protocol initiators can login to the SVM.

A FC Protocol service is identified by the UUID of its SVM.

Name	Type	Description
<a href="#">_links</a>	<a href="#">_links</a>	

Name	Type	Description
enabled	boolean	The administrative state of the FC Protocol service. The FC Protocol service can be disabled to block all FC Protocol connectivity to the SVM.  This is optional in POST and PATCH. The default setting is <i>true</i> (enabled) in POST.
metric	<a href="#">metric</a>	Performance numbers, such as IOPS latency and throughput, for SVM protocols.
statistics	<a href="#">statistics</a>	These are raw performance numbers, such as IOPS latency and throughput for SVM protocols. These numbers are aggregated across all nodes in the cluster and increase with the uptime of the cluster.
svm	<a href="#">svm</a>	SVM, applies only to SVM-scoped objects.
target	<a href="#">target</a>	

#### \_links

Name	Type	Description
next	<a href="#">href</a>	
self	<a href="#">href</a>	

#### error\_arguments

Name	Type	Description
code	string	Argument code
message	string	Message argument

#### returned\_error

Name	Type	Description
arguments	array[ <a href="#">error_arguments</a> ]	Message arguments

Name	Type	Description
code	string	Error code
message	string	Error message
target	string	The target parameter that caused the error.

## Delete an FC protocol service

DELETE /protocols/san/fcp/services/{svm.uuid}

**Introduced In:** 9.6

Deletes an FC Protocol service. An FC Protocol service must be disabled before it can be deleted.

### Platform Specifics

- **Unified ONTAP:** POST and DELETE must be used to manage the FC Protocol service for access to the FC Protocol.
- **ASA.Next:** POST and DELETE are not supported. The FC Protocol service is automatically created and deleted with the SVM.

### Related ONTAP commands

- `vserver fcp delete`

### Learn more

- [DOC /protocols/san/fcp/services](#)

### Parameters

Name	Type	In	Required	Description
svm.uuid	string	path	True	The unique identifier of the SVM for which to delete the FC Protocol service.

### Response

Status: 200, Ok

## Error

Status: Default

### ONTAP Error Response Codes

Error Code	Description
2621462	An SVM with the specified UUID does not exist.
5373960	The Fibre Channel Protocol service cannot be removed while it is enabled.
5374083	There is no Fibre Channel Protocol service for the specified SVM.
5376452	Service POST and DELETE are not supported on ASA.next.

Also see the table of common errors in the [Response body](#) overview section of this documentation.

Name	Type	Description
error	<a href="#">returned_error</a>	

### Example error

```
{
  "error": {
    "arguments": [
      {
        "code": "string",
        "message": "string"
      }
    ],
    "code": "4",
    "message": "entry doesn't exist",
    "target": "uuid"
  }
}
```

## Definitions



## See Definitions

error\_arguments

Name	Type	Description
code	string	Argument code
message	string	Message argument

returned\_error

Name	Type	Description
arguments	array[ <a href="#">error_arguments</a> ]	Message arguments
code	string	Error code
message	string	Error message
target	string	The target parameter that caused the error.

## Retrieve an FC protocol service

GET /protocols/san/fcp/services/{svm.uuid}

**Introduced In:** 9.6

Retrieves an FC Protocol service.

### Related ONTAP commands

- `vserver fcp show`

### Learn more

- [DOC /protocols/san/fcp/services](#)

### Parameters

Name	Type	In	Required	Description
svm.uuid	string	path	True	The unique identifier of the SVM for which to retrieve the FC Protocol service.

Name	Type	In	Required	Description
fields	array[string]	query	False	Specify the fields to return.

## Response

Status: 200, Ok

Name	Type	Description
<a href="#">_links</a>	<a href="#">_links</a>	
enabled	boolean	<p>The administrative state of the FC Protocol service. The FC Protocol service can be disabled to block all FC Protocol connectivity to the SVM.</p> <p>This is optional in POST and PATCH. The default setting is <i>true</i> (enabled) in POST.</p>
metric	<a href="#">metric</a>	Performance numbers, such as IOPS latency and throughput, for SVM protocols.
statistics	<a href="#">statistics</a>	These are raw performance numbers, such as IOPS latency and throughput for SVM protocols. These numbers are aggregated across all nodes in the cluster and increase with the uptime of the cluster.
svm	<a href="#">svm</a>	SVM, applies only to SVM-scoped objects.
target	<a href="#">target</a>	

## Example response

```
{
  "_links": {
    "self": {
      "href": "/api/resourcelink"
    }
  },
  "metric": {
    "_links": {
      "self": {
        "href": "/api/resourcelink"
      }
    }
  },
  "duration": "PT15S",
  "iops": {
    "read": 200,
    "total": 1000,
    "write": 100
  },
  "latency": {
    "read": 200,
    "total": 1000,
    "write": 100
  },
  "status": "ok",
  "throughput": {
    "read": 200,
    "total": 1000,
    "write": 100
  },
  "timestamp": "2017-01-25 06:20:13 -0500"
},
"statistics": {
  "iops_raw": {
    "read": 200,
    "total": 1000,
    "write": 100
  },
  "latency_raw": {
    "read": 200,
    "total": 1000,
    "write": 100
  },
  "status": "ok",
  "throughput_raw": {
```

```

    "read": 200,
    "total": 1000,
    "write": 100
  },
  "timestamp": "2017-01-25 06:20:13 -0500"
},
"svm": {
  "_links": {
    "self": {
      "href": "/api/resourcelink"
    }
  },
  "name": "svm1",
  "uuid": "02c9e252-41be-11e9-81d5-00a0986138f7"
},
"target": {
  "name": "20:00:00:50:56:bb:b2:4b"
}
}

```

## Error

Status: Default

### ONTAP Error Response Codes

Error Code	Description
2621462	An SVM with the specified UUID does not exist.
5374083	There is no Fibre Channel Protocol service for the specified SVM.

Also see the table of common errors in the [Response body](#) overview section of this documentation.

Name	Type	Description
error	<a href="#">returned_error</a>	

## Example error

```
{
  "error": {
    "arguments": [
      {
        "code": "string",
        "message": "string"
      }
    ],
    "code": "4",
    "message": "entry doesn't exist",
    "target": "uuid"
  }
}
```

## Definitions

## See Definitions

href

Name	Type	Description
href	string	

\_links

Name	Type	Description
self	<a href="#">href</a>	

iops

The rate of I/O operations observed at the storage object.

Name	Type	Description
other	integer	Performance metric for other I/O operations. Other I/O operations can be metadata operations, such as directory lookups and so on.
read	integer	Performance metric for read I/O operations.
total	integer	Performance metric aggregated over all types of I/O operations.
write	integer	Performance metric for write I/O operations.

latency

The round trip latency in microseconds observed at the storage object.

Name	Type	Description
other	integer	Performance metric for other I/O operations. Other I/O operations can be metadata operations, such as directory lookups and so on.
read	integer	Performance metric for read I/O operations.

Name	Type	Description
total	integer	Performance metric aggregated over all types of I/O operations.
write	integer	Performance metric for write I/O operations.

### throughput

The rate of throughput bytes per second observed at the storage object.

Name	Type	Description
read	integer	Performance metric for read I/O operations.
total	integer	Performance metric aggregated over all types of I/O operations.
write	integer	Performance metric for write I/O operations.

### metric

Performance numbers, such as IOPS latency and throughput, for SVM protocols.

Name	Type	Description
<a href="#">_links</a>	<a href="#">_links</a>	
duration	string	The duration over which this sample is calculated. The time durations are represented in the ISO-8601 standard format. Samples can be calculated over the following durations:
iops	<a href="#">iops</a>	The rate of I/O operations observed at the storage object.
latency	<a href="#">latency</a>	The round trip latency in microseconds observed at the storage object.

Name	Type	Description
status	string	Any errors associated with the sample. For example, if the aggregation of data over multiple nodes fails then any of the partial errors might be returned, "ok" on success, or "error" on any internal uncategorized failure. Whenever a sample collection is missed but done at a later time, it is back filled to the previous 15 second timestamp and tagged with "backfilled_data". "Inconsistent_delta_time" is encountered when the time between two collections is not the same for all nodes. Therefore, the aggregated value might be over or under inflated. "Negative_delta" is returned when an expected monotonically increasing value has decreased in value. "Inconsistent_old_data" is returned when one or more nodes do not have the latest data.
throughput	<a href="#">throughput</a>	The rate of throughput bytes per second observed at the storage object.
timestamp	string	The timestamp of the performance data.

#### iops\_raw

The number of I/O operations observed at the storage object. This should be used along with delta time to calculate the rate of I/O operations per unit of time.

Name	Type	Description
other	integer	Performance metric for other I/O operations. Other I/O operations can be metadata operations, such as directory lookups and so on.
read	integer	Performance metric for read I/O operations.



Name	Type	Description
total	integer	Performance metric aggregated over all types of I/O operations.
write	integer	Performance metric for write I/O operations.

#### latency\_raw

The raw latency in microseconds observed at the storage object. This should be divided by the raw IOPS value to calculate the average latency per I/O operation.

Name	Type	Description
other	integer	Performance metric for other I/O operations. Other I/O operations can be metadata operations, such as directory lookups and so on.
read	integer	Performance metric for read I/O operations.
total	integer	Performance metric aggregated over all types of I/O operations.
write	integer	Performance metric for write I/O operations.

#### throughput\_raw

Throughput bytes observed at the storage object. This should be used along with delta time to calculate the rate of throughput bytes per unit of time.

Name	Type	Description
read	integer	Performance metric for read I/O operations.
total	integer	Performance metric aggregated over all types of I/O operations.
write	integer	Performance metric for write I/O operations.

#### statistics

These are raw performance numbers, such as IOPS latency and throughput for SVM protocols. These numbers are aggregated across all nodes in the cluster and increase with the uptime of the cluster.

Name	Type	Description
iops_raw	<a href="#">iops_raw</a>	The number of I/O operations observed at the storage object. This should be used along with delta time to calculate the rate of I/O operations per unit of time.
latency_raw	<a href="#">latency_raw</a>	The raw latency in microseconds observed at the storage object. This should be divided by the raw IOPS value to calculate the average latency per I/O operation.
status	string	Any errors associated with the sample. For example, if the aggregation of data over multiple nodes fails then any of the partial errors might be returned, "ok" on success, or "error" on any internal uncategorized failure. Whenever a sample collection is missed but done at a later time, it is back filled to the previous 15 second timestamp and tagged with "backfilled_data". "Inconsistent_delta_time" is encountered when the time between two collections is not the same for all nodes. Therefore, the aggregated value might be over or under inflated. "Negative_delta" is returned when an expected monotonically increasing value has decreased in value. "Inconsistent_old_data" is returned when one or more nodes do not have the latest data.
throughput_raw	<a href="#">throughput_raw</a>	Throughput bytes observed at the storage object. This should be used along with delta time to calculate the rate of throughput bytes per unit of time.
timestamp	string	The timestamp of the performance data.

svm

SVM, applies only to SVM-scoped objects.

Name	Type	Description
<a href="#">_links</a>	<a href="#">_links</a>	
name	string	The name of the SVM. This field cannot be specified in a PATCH method.
uuid	string	The unique identifier of the SVM. This field cannot be specified in a PATCH method.

target

Name	Type	Description
name	string	<p>The target name of the FC Protocol service. This is generated for the SVM during POST.</p> <p>The FC Protocol target name is a world wide node name (WWNN).</p> <p>If required, the target name can be modified using the ONTAP command line.</p> <ul style="list-style-type: none"><li>• example: 20:00:00:50:56:bb:b2:4b</li><li>• maxLength: 128</li><li>• minLength: 1</li><li>• readOnly: 1</li><li>• Introduced in: 9.6</li><li>• x-nullable: true</li></ul>

error\_arguments

Name	Type	Description
code	string	Argument code
message	string	Message argument

returned\_error

Name	Type	Description
arguments	array[ <a href="#">error_arguments</a> ]	Message arguments
code	string	Error code
message	string	Error message
target	string	The target parameter that caused the error.

## Update an FC protocol service

PATCH /protocols/san/fcp/services/{svm.uuid}

**Introduced In:** 9.6

Updates an FC Protocol service.

### Related ONTAP commands

- `vserver fcp modify`
- `vserver fcp start`
- `vserver fcp stop`

### Learn more

- [DOC /protocols/san/fcp/services](#)

### Parameters

Name	Type	In	Required	Description
svm.uuid	string	path	True	The unique identifier of the SVM whose FC Protocol service is to be updated.

### Request Body

Name	Type	Description
<a href="#">_links</a>	<a href="#">_links</a>	

Name	Type	Description
enabled	boolean	<p>The administrative state of the FC Protocol service. The FC Protocol service can be disabled to block all FC Protocol connectivity to the SVM.</p> <p>This is optional in POST and PATCH. The default setting is <i>true</i> (enabled) in POST.</p>
metric	metric	Performance numbers, such as IOPS latency and throughput, for SVM protocols.
statistics	statistics	These are raw performance numbers, such as IOPS latency and throughput for SVM protocols. These numbers are aggregated across all nodes in the cluster and increase with the uptime of the cluster.
svm	svm	SVM, applies only to SVM-scoped objects.
target	target	

## Example request

```
{
  "_links": {
    "self": {
      "href": "/api/resourcelink"
    }
  },
  "metric": {
    "_links": {
      "self": {
        "href": "/api/resourcelink"
      }
    }
  },
  "duration": "PT15S",
  "iops": {
    "read": 200,
    "total": 1000,
    "write": 100
  },
  "latency": {
    "read": 200,
    "total": 1000,
    "write": 100
  },
  "status": "ok",
  "throughput": {
    "read": 200,
    "total": 1000,
    "write": 100
  },
  "timestamp": "2017-01-25 06:20:13 -0500"
},
"statistics": {
  "iops_raw": {
    "read": 200,
    "total": 1000,
    "write": 100
  },
  "latency_raw": {
    "read": 200,
    "total": 1000,
    "write": 100
  },
  "status": "ok",
  "throughput_raw": {
```

```

    "read": 200,
    "total": 1000,
    "write": 100
  },
  "timestamp": "2017-01-25 06:20:13 -0500"
},
"svm": {
  "_links": {
    "self": {
      "href": "/api/resourcelink"
    }
  },
  "name": "svm1",
  "uuid": "02c9e252-41be-11e9-81d5-00a0986138f7"
},
"target": {
  "name": "20:00:00:50:56:bb:b2:4b"
}
}

```

## Response

Status: 200, Ok

## Error

Status: Default

### ONTAP Error Response Codes

Error Code	Description
2621462	An SVM with the specified UUID does not exist.
5374083	There is no Fibre Channel Protocol service for the specified SVM.

Also see the table of common errors in the [Response body](#) overview section of this documentation.

Name	Type	Description
error	<a href="#">returned_error</a>	

## Example error

```
{
  "error": {
    "arguments": [
      {
        "code": "string",
        "message": "string"
      }
    ],
    "code": "4",
    "message": "entry doesn't exist",
    "target": "uuid"
  }
}
```

## Definitions



## See Definitions

href

Name	Type	Description
href	string	

\_links

Name	Type	Description
self	<a href="#">href</a>	

iops

The rate of I/O operations observed at the storage object.

Name	Type	Description
other	integer	Performance metric for other I/O operations. Other I/O operations can be metadata operations, such as directory lookups and so on.
read	integer	Performance metric for read I/O operations.
total	integer	Performance metric aggregated over all types of I/O operations.
write	integer	Performance metric for write I/O operations.

latency

The round trip latency in microseconds observed at the storage object.

Name	Type	Description
other	integer	Performance metric for other I/O operations. Other I/O operations can be metadata operations, such as directory lookups and so on.
read	integer	Performance metric for read I/O operations.

Name	Type	Description
total	integer	Performance metric aggregated over all types of I/O operations.
write	integer	Performance metric for write I/O operations.

### throughput

The rate of throughput bytes per second observed at the storage object.

Name	Type	Description
read	integer	Performance metric for read I/O operations.
total	integer	Performance metric aggregated over all types of I/O operations.
write	integer	Performance metric for write I/O operations.

### metric

Performance numbers, such as IOPS latency and throughput, for SVM protocols.

Name	Type	Description
_links	<a href="#">_links</a>	
duration	string	The duration over which this sample is calculated. The time durations are represented in the ISO-8601 standard format. Samples can be calculated over the following durations:
iops	<a href="#">iops</a>	The rate of I/O operations observed at the storage object.
latency	<a href="#">latency</a>	The round trip latency in microseconds observed at the storage object.

Name	Type	Description
status	string	Any errors associated with the sample. For example, if the aggregation of data over multiple nodes fails then any of the partial errors might be returned, "ok" on success, or "error" on any internal uncategorized failure. Whenever a sample collection is missed but done at a later time, it is back filled to the previous 15 second timestamp and tagged with "backfilled_data". "Inconsistent_delta_time" is encountered when the time between two collections is not the same for all nodes. Therefore, the aggregated value might be over or under inflated. "Negative_delta" is returned when an expected monotonically increasing value has decreased in value. "Inconsistent_old_data" is returned when one or more nodes do not have the latest data.
throughput	<a href="#">throughput</a>	The rate of throughput bytes per second observed at the storage object.
timestamp	string	The timestamp of the performance data.

#### iops\_raw

The number of I/O operations observed at the storage object. This should be used along with delta time to calculate the rate of I/O operations per unit of time.

Name	Type	Description
other	integer	Performance metric for other I/O operations. Other I/O operations can be metadata operations, such as directory lookups and so on.
read	integer	Performance metric for read I/O operations.

Name	Type	Description
total	integer	Performance metric aggregated over all types of I/O operations.
write	integer	Performance metric for write I/O operations.

#### latency\_raw

The raw latency in microseconds observed at the storage object. This should be divided by the raw IOPS value to calculate the average latency per I/O operation.

Name	Type	Description
other	integer	Performance metric for other I/O operations. Other I/O operations can be metadata operations, such as directory lookups and so on.
read	integer	Performance metric for read I/O operations.
total	integer	Performance metric aggregated over all types of I/O operations.
write	integer	Performance metric for write I/O operations.

#### throughput\_raw

Throughput bytes observed at the storage object. This should be used along with delta time to calculate the rate of throughput bytes per unit of time.

Name	Type	Description
read	integer	Performance metric for read I/O operations.
total	integer	Performance metric aggregated over all types of I/O operations.
write	integer	Performance metric for write I/O operations.

#### statistics

These are raw performance numbers, such as IOPS latency and throughput for SVM protocols. These numbers are aggregated across all nodes in the cluster and increase with the uptime of the cluster.

Name	Type	Description
iops_raw	iops_raw	The number of I/O operations observed at the storage object. This should be used along with delta time to calculate the rate of I/O operations per unit of time.
latency_raw	latency_raw	The raw latency in microseconds observed at the storage object. This should be divided by the raw IOPS value to calculate the average latency per I/O operation.
status	string	<p>Any errors associated with the sample. For example, if the aggregation of data over multiple nodes fails then any of the partial errors might be returned, "ok" on success, or "error" on any internal uncategorized failure. Whenever a sample collection is missed but done at a later time, it is back filled to the previous 15 second timestamp and tagged with "backfilled_data".</p> <p>"Inconsistent_delta_time" is encountered when the time between two collections is not the same for all nodes. Therefore, the aggregated value might be over or under inflated.</p> <p>"Negative_delta" is returned when an expected monotonically increasing value has decreased in value. "Inconsistent_old_data" is returned when one or more nodes do not have the latest data.</p>
throughput_raw	throughput_raw	Throughput bytes observed at the storage object. This should be used along with delta time to calculate the rate of throughput bytes per unit of time.
timestamp	string	The timestamp of the performance data.

svm

SVM, applies only to SVM-scoped objects.

Name	Type	Description
<a href="#">_links</a>	<a href="#">_links</a>	
name	string	The name of the SVM. This field cannot be specified in a PATCH method.
uuid	string	The unique identifier of the SVM. This field cannot be specified in a PATCH method.

target

Name	Type	Description
name	string	<p>The target name of the FC Protocol service. This is generated for the SVM during POST.</p> <p>The FC Protocol target name is a world wide node name (WWNN).</p> <p>If required, the target name can be modified using the ONTAP command line.</p> <ul style="list-style-type: none"><li>• example: 20:00:00:50:56:bb:b2:4b</li><li>• maxLength: 128</li><li>• minLength: 1</li><li>• readOnly: 1</li><li>• Introduced in: 9.6</li><li>• x-nullable: true</li></ul>

fcp\_service

A Fibre Channel (FC) Protocol service defines the properties of the FC Protocol target for an SVM. There can be at most one FC Protocol service for an SVM. An SVM's FC Protocol service must be created before FC Protocol initiators can login to the SVM.

A FC Protocol service is identified by the UUID of its SVM.

Name	Type	Description
<a href="#">_links</a>	<a href="#">_links</a>	

Name	Type	Description
enabled	boolean	The administrative state of the FC Protocol service. The FC Protocol service can be disabled to block all FC Protocol connectivity to the SVM.  This is optional in POST and PATCH. The default setting is <i>true</i> (enabled) in POST.
metric	<a href="#">metric</a>	Performance numbers, such as IOPS latency and throughput, for SVM protocols.
statistics	<a href="#">statistics</a>	These are raw performance numbers, such as IOPS latency and throughput for SVM protocols. These numbers are aggregated across all nodes in the cluster and increase with the uptime of the cluster.
svm	<a href="#">svm</a>	SVM, applies only to SVM-scoped objects.
target	<a href="#">target</a>	

#### error\_arguments

Name	Type	Description
code	string	Argument code
message	string	Message argument

#### returned\_error

Name	Type	Description
arguments	array[ <a href="#">error_arguments</a> ]	Message arguments
code	string	Error code
message	string	Error message
target	string	The target parameter that caused the error.

# Retrieve historical performance metrics for the FC protocol service of an SVM

GET /protocols/san/fcp/services/{svm.uuid}/metrics

Introduced In: 9.7

Retrieves historical performance metrics for the FC Protocol service of an SVM.

## Parameters

Name	Type	In	Required	Description
throughput.total	integer	query	False	Filter by throughput.total
throughput.write	integer	query	False	Filter by throughput.write
throughput.read	integer	query	False	Filter by throughput.read
duration	string	query	False	Filter by duration
latency.write	integer	query	False	Filter by latency.write
latency.read	integer	query	False	Filter by latency.read
latency.other	integer	query	False	Filter by latency.other
latency.total	integer	query	False	Filter by latency.total
iops.write	integer	query	False	Filter by iops.write
iops.read	integer	query	False	Filter by iops.read
iops.other	integer	query	False	Filter by iops.other
iops.total	integer	query	False	Filter by iops.total
timestamp	string	query	False	Filter by timestamp
status	string	query	False	Filter by status



Name	Type	In	Required	Description
svm.uuid	string	path	True	The unique identifier of the SVM.
interval	string	query	False	<p>The time range for the data. Examples can be 1h, 1d, 1m, 1w, 1y. The period for each time range is as follows:</p> <ul style="list-style-type: none"> <li>• 1h: Metrics over the most recent hour sampled over 15 seconds.</li> <li>• 1d: Metrics over the most recent day sampled over 5 minutes.</li> <li>• 1w: Metrics over the most recent week sampled over 30 minutes.</li> <li>• 1m: Metrics over the most recent month sampled over 2 hours.</li> <li>• 1y: Metrics over the most recent year sampled over a day.</li> <li>• Default value: 1</li> <li>• enum: ["1h", "1d", "1w", "1m", "1y"]</li> </ul>

Name	Type	In	Required	Description
return_timeout	integer	query	False	The number of seconds to allow the call to execute before returning. When iterating over a collection, the default is 15 seconds. ONTAP returns earlier if either max records or the end of the collection is reached. <ul style="list-style-type: none"> <li>• Default value: 1</li> <li>• Max value: 120</li> <li>• Min value: 0</li> </ul>
fields	array[string]	query	False	Specify the fields to return.
max_records	integer	query	False	Limit the number of records returned.
order_by	array[string]	query	False	Order results by specified fields and optional [asc
desc] direction. Default direction is 'asc' for ascending.	return_records	boolean	query	False

## Response

Status: 200, Ok

Name	Type	Description
_links	<a href="#">_links</a>	
num_records	integer	Number of records
records	array[ <a href="#">records</a> ]	

## Example response

```
{
  "_links": {
    "next": {
      "href": "/api/resourcelink"
    },
    "self": {
      "href": "/api/resourcelink"
    }
  },
  "num_records": 1,
  "records": [
    {
      "_links": {
        "self": {
          "href": "/api/resourcelink"
        }
      },
      "duration": "PT15S",
      "iops": {
        "read": 200,
        "total": 1000,
        "write": 100
      },
      "latency": {
        "read": 200,
        "total": 1000,
        "write": 100
      },
      "status": "ok",
      "svm": {
        "uuid": "02c9e252-41be-11e9-81d5-00a0986138f7"
      },
      "throughput": {
        "read": 200,
        "total": 1000,
        "write": 100
      },
      "timestamp": "2017-01-25 06:20:13 -0500"
    }
  ]
}
```

## Error

Status: Default

### ONTAP Error Response Codes

Error Code	Description
8585947	No metrics are available for the requested object.
8586225	An unexpected error occurred retrieving metrics for the requested object.

Also see the table of common errors in the [Response body](#) overview section of this documentation.

Name	Type	Description
error	<a href="#">returned_error</a>	

### Example error

```
{
  "error": {
    "arguments": [
      {
        "code": "string",
        "message": "string"
      }
    ],
    "code": "4",
    "message": "entry doesn't exist",
    "target": "uuid"
  }
}
```

## Definitions

## See Definitions

href

Name	Type	Description
href	string	

\_links

Name	Type	Description
next	<a href="#">href</a>	
self	<a href="#">href</a>	

\_links

Name	Type	Description
self	<a href="#">href</a>	

iops

The rate of I/O operations observed at the storage object.

Name	Type	Description
other	integer	Performance metric for other I/O operations. Other I/O operations can be metadata operations, such as directory lookups and so on.
read	integer	Performance metric for read I/O operations.
total	integer	Performance metric aggregated over all types of I/O operations.
write	integer	Performance metric for write I/O operations.

latency

The round trip latency in microseconds observed at the storage object.

Name	Type	Description
other	integer	Performance metric for other I/O operations. Other I/O operations can be metadata operations, such as directory lookups and so on.
read	integer	Performance metric for read I/O operations.
total	integer	Performance metric aggregated over all types of I/O operations.
write	integer	Performance metric for write I/O operations.

#### svm

Name	Type	Description
uuid	string	The unique identifier of the SVM.

#### throughput

The rate of throughput bytes per second observed at the storage object.

Name	Type	Description
read	integer	Performance metric for read I/O operations.
total	integer	Performance metric aggregated over all types of I/O operations.
write	integer	Performance metric for write I/O operations.

#### records

Performance numbers, such as IOPS latency and throughput, for SVM protocols.

Name	Type	Description
<a href="#">_links</a>	<a href="#">_links</a>	

Name	Type	Description
duration	string	The duration over which this sample is calculated. The time durations are represented in the ISO-8601 standard format. Samples can be calculated over the following durations:
iops	iops	The rate of I/O operations observed at the storage object.
latency	latency	The round trip latency in microseconds observed at the storage object.
status	string	Any errors associated with the sample. For example, if the aggregation of data over multiple nodes fails then any of the partial errors might be returned, "ok" on success, or "error" on any internal uncategorized failure. Whenever a sample collection is missed but done at a later time, it is back filled to the previous 15 second timestamp and tagged with "backfilled_data". "Inconsistent_delta_time" is encountered when the time between two collections is not the same for all nodes. Therefore, the aggregated value might be over or under inflated. "Negative_delta" is returned when an expected monotonically increasing value has decreased in value. "Inconsistent_old_data" is returned when one or more nodes do not have the latest data.
svm	svm	
throughput	throughput	The rate of throughput bytes per second observed at the storage object.
timestamp	string	The timestamp of the performance data.

error\_arguments

Name	Type	Description
code	string	Argument code
message	string	Message argument

returned\_error

Name	Type	Description
arguments	array[ <a href="#">error_arguments</a> ]	Message arguments
code	string	Error code
message	string	Error message
target	string	The target parameter that caused the error.



## Copyright information

Copyright © 2024 NetApp, Inc. All Rights Reserved. Printed in the U.S. No part of this document covered by copyright may be reproduced in any form or by any means—graphic, electronic, or mechanical, including photocopying, recording, taping, or storage in an electronic retrieval system—without prior written permission of the copyright owner.

Software derived from copyrighted NetApp material is subject to the following license and disclaimer:

THIS SOFTWARE IS PROVIDED BY NETAPP “AS IS” AND WITHOUT ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WHICH ARE HEREBY DISCLAIMED. IN NO EVENT SHALL NETAPP BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

NetApp reserves the right to change any products described herein at any time, and without notice. NetApp assumes no responsibility or liability arising from the use of products described herein, except as expressly agreed to in writing by NetApp. The use or purchase of this product does not convey a license under any patent rights, trademark rights, or any other intellectual property rights of NetApp.

The product described in this manual may be protected by one or more U.S. patents, foreign patents, or pending applications.

LIMITED RIGHTS LEGEND: Use, duplication, or disclosure by the government is subject to restrictions as set forth in subparagraph (b)(3) of the Rights in Technical Data -Noncommercial Items at DFARS 252.227-7013 (FEB 2014) and FAR 52.227-19 (DEC 2007).

Data contained herein pertains to a commercial product and/or commercial service (as defined in FAR 2.101) and is proprietary to NetApp, Inc. All NetApp technical data and computer software provided under this Agreement is commercial in nature and developed solely at private expense. The U.S. Government has a non-exclusive, non-transferrable, nonsublicensable, worldwide, limited irrevocable license to use the Data only in connection with and in support of the U.S. Government contract under which the Data was delivered. Except as provided herein, the Data may not be used, disclosed, reproduced, modified, performed, or displayed without the prior written approval of NetApp, Inc. United States Government license rights for the Department of Defense are limited to those rights identified in DFARS clause 252.227-7015(b) (FEB 2014).

## Trademark information

NETAPP, the NETAPP logo, and the marks listed at <http://www.netapp.com/TM> are trademarks of NetApp, Inc. Other company and product names may be trademarks of their respective owners.